

# **Financial Literacy and Retirement Planning – A Capital Market Based View**

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**Ich danke**

meinen **Großeltern, Eltern** und **Brüdern** für ihre Unterstützung in schwierigen  
Zeiten,

meinen **Freunden** für die guten Zeiten und

meiner **Kerstin**, dass sie mich bei beidem begleitet.

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## Zusammenfassung

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### **Financial Literacy and Retirement Planning – A Capital Market Based View**

von Eduard Gaar

Die vorliegende Dissertation untersucht den Zusammenhang zwischen der Altersvorsorge individueller Privatpersonen und dem Kapitalmarkt in Deutschland und Europa. Im Fokus steht dabei die finanzielle Bildung von Privatpersonen, die nötig ist, um adäquat vorzusorgen, die Befähigung sich dieses Wissen anzueignen und die Fähigkeit des Kapitalmarkts, die Basis für eine kapitalmarktbasiertere Altersvorsorge zu sein.

Die ersten Kapitel bieten Literaturüberblicke zum Thema Finanzwissen und Finanzbildung, welche außerdem die Basis für die weiteren Arbeiten darstellen. Diese zeigen bereits ein mittelmäßiges bis schlechtes Kompetenzniveau der Finanzbildung in Deutschland und damit schlechte Voraussetzungen, um angemessen, also vermögenssteigernd und rentensichernd, für die Altersvorsorge vorzusorgen.

Basierend auf dieser Erkenntnis werden Studierende mit Bezug zu den Wirtschaftswissenschaften in Russland und Deutschland in einer Umfrage zu grundlegendem Finanzmarktwissen befragt. Es wird unterstellt, dass die Studierenden durch ihre fachliche Nähe eine überdurchschnittliche Finanzbildung haben und damit als Multiplikatoren fungieren könnten. Es wurde zwar ein besseres Finanzwissen im Vergleich zur Allgemeinheit nachgewiesen, jedoch haben auch die Studierenden Probleme, alle Fragen richtig zu beantworten. Folglich sind Studierende nur bedingt in der Lage, als Multiplikatoren für Finanzwissen zu fungieren, wobei sich die Frage stellt, ob dieses Ergebnis zufällig aufgetreten ist oder eine systematische Verzerrung vorliegt. Literaturüberblicke zum home und self-serving bias zeigen, dass diese oft und weit verbreitet sowohl auf dem Kapitalmarkt als auch unter professionellen Anlegern vorkommen. Eine weitere Umfrage unter Studierenden in Russland und Deutschland zeigt, dass auch sie dem home bias unterliegen, während eine Gruppe von internationalen Studierenden keinen home bias zeigt. Dies lässt vermuten, dass internationale Erfahrung den home bias zu reduzieren scheint.

Neben der Befähigung von Privatpersonen zu einer adäquaten Altersvorsorge stellt sich auch die Frage, ob der Kapitalmarkt in Deutschland eine gute Grundlage für eine Altersvorsorge bilden kann.

Die Notierungszahlen im Regulierten Markt sind seit Jahren rückläufig, wobei dieser Rückgang nicht durch Insolvenzen, sondern hauptsächlich durch Fusionen und Rückzüge vom Kapitalmarkt zu erklären ist. Um diesen Vorgang aufzuhalten und umzukehren, bedarf es junger Unternehmen, die den Schritt an die Börse wagen. Ein Beispiel dafür, wie junge Unternehmen an die Börse gelockt werden können, liefert das Einstiegssegment NewConnect in Warschau. Sie verzeichnet seit mehreren Jahren starke Zuwächse und kann somit ein Beispiel für die deutsche Scale sein.

Abschließend richtet sich der Blick auf den gesamten europäischen Markt. Die abschließende Untersuchung fokussiert sich auf europäische börsennotierte Unternehmen und den Zusammenhang zwischen der Aktienkursperformance und dem systematischen Risiko, in Abhängigkeit des Immobilienbesitzes der Unternehmen. Es zeigt sich, dass Unternehmen Investitionen in Immobilien in unsicheren Zeiten vermeiden, obwohl Immobilien das systematische Risiko senken. Gleichzeitig erhöht der Immobilienbesitz die Performance in sicheren Zeiten, während in unsicheren Zeiten der Immobilienbesitz zu einer schlechteren Aktienkursperformance führt.

Die kumulative Dissertation besteht aus neun eigenständigen Aufsätzen, wobei vier bereits veröffentlicht bzw. zur Veröffentlichung angenommen sind, zwei Kapitel bei einem wissenschaftlichen Journal unter Begutachtung sind und drei weitere als Arbeitsdokumente in dieser Dissertation vorzufinden sind.

## Abstract

This dissertation examines the relationship between the old-age provision of individual private persons and the capital market in Germany and Europe. The focus is on the knowledge needed to provide adequately for old age, the ability to acquire this knowledge and the ability of the capital market to be the basis for capital market-based old age provision.

The first two chapters present literature reviews on the topic of financial knowledge and financial education. These form the basis for the further work and already at the beginning show a rather mediocre to poor level of financial education in Germany and thus a lack of ability to prepare adequately for old age. Based on this, a survey is conducted among students who are connected to economics in Russia and Germany. It is assumed that such students should have an above-average financial education due to their subject proximity and this could act as multipliers. Although we can prove that they have a better knowledge of finance than the general public, we also find that only few students are able to answer all questions correctly. Overall, students are only partially able to act as multipliers for financial knowledge. Since even students of economics have problems with financial questions, the question of systematic biases arises. Literature reviews on home and self-serving bias show that they are frequent and widespread both in the capital market and among professional investors. Another survey of students in Russia and Germany shows that they are also subject to home bias, while a group of international students does not show any sign of a home bias. Therefore, international experience seems to reduce home bias.

In addition to the empowerment of private individuals, the question also arises as to whether the capital market in Germany is suitable to be the basis for old-age provision. The German stock market segment Regulierter Markt has been declining for years, however, this decline cannot be explained by insolvencies, but mainly by mergers and withdrawals from the capital market. An example of how young companies can be attracted to the stock market is provided by the NewConnect in Warsaw, which has had strong growth over several years and could be a model for the German entry market Scale. Finally, the focus is extended to the entire European market. The final analysis focuses on European listed companies and the relationship between stock performance and systematic risk with the real estate owned by the company. It shows that companies avoid investing in real estate in uncertain times despite that real estate reduces systematic risk. At the same time, property ownership increases performance in safe times, while in uncertain times property ownership leads to poorer share price performance.

The cumulative dissertation consists of nine stand-alone papers, of which four have been published, two are under review and the remaining three are in the status of a working paper.

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# List of Abbreviations

|        |   |
|--------|---|
| AG     | <i>Aktiengesellschaft</i>                               |
| AIM    | <i>Alternative Investment Market</i>                    |
| ALP    | <i>American Life Panel</i>                              |
| AMEX   | <i>American Stock Exchange</i>                          |
| AMP    | <i>Alternative Mortgage Products</i>                    |
| ARM    | <i>Adjustable Rate Mortgage</i>                         |
| ATS    | <i>Alternative Trading Systems</i>                      |
| BHARs  | <i>Buy-and-Hold-Abnormal&gt;Returns</i>                 |
| BRICS  | <i>Brasilien, Russland, Indien, China und Südafrika</i> |
| CAPM   | <i>Capital Asset Pricing Model</i>                      |
| CAR    | <i>Cumulative Abnormal Return</i>                       |
| CEO    | <i>Chief Executive Officer</i>                          |
| CFO    | <i>Chief Financial Officer</i>                          |
| CGER   | <i>Competence of the German sub-sample</i>              |
| CNBC   | <i>Consumer News and Business Channel</i>               |
| CPI    | <i>Consumer Price Index</i>                             |
| CRE    | <i>Corporate real estate</i>                            |
| CREM   | <i>Corporate real estate management</i>                 |
| CRER   | <i>Corporate real estate ownership ratio</i>            |
| CRU    | <i>Competence of the Russian sub-sample</i>             |
| DAX    | <i>Deutscher Aktienindex</i>                            |
| DE     | <i>Departing Entrant, Deutschland</i>                   |
| DIW    | <i>Deutsches Institut für Wirtschaftsforschung</i>      |
| DS     | <i>Departing Survivor</i>                               |
| EBIT   | <i>Earnings before Interest and Taxes</i>               |
| EBSCO  | <i>Elton B. Stephens Company</i>                        |
| EHB    | <i>Economic home bias</i>                               |
| et al. | <i>et alia - and others</i>                             |
| EUR    | <i>Euro</i>   |
| FDIC   | <i>Federal Deposit Insurance Corporation</i>            |
| FK     | <i>Finanzkompetenz</i>                                  |
| FTSE   | <i>Financial Times Stock Exchange</i>                   |
| GDP    | <i>Gross Domestic Product</i>                           |
| GER    | <i>Germany</i>  |
| GST    | <i>Goods and Services Tax</i>                           |
| HBM    | <i>Home bias magnification</i>                          |
| HML    | <i>High-Minus-Low</i>                                   |
| HRS    | <i>Health and Retirement Study</i>                      |
| I      | <i>Inflation</i>  |
| i.a.   | <i>inter alia - among others</i>                        |
| i.e.   | <i>id est - that is to say</i>                          |
| IAS    | <i>International Accounting Standards</i>               |
| ICAPM  | <i>International Capital Asset Pricing Model</i>        |
| INFE   | <i>International Network on Financial Education</i>     |

|        |  |
|--------|--|
| IPOs   | <i>Initial Public Offerings</i>  |
| IR     | <i>Initial Return</i>  |
| ISIN   | <i>International Securities Identification Number</i>  |
| LE     | <i>Lasting Entrant</i>   |
| LS     | <i>Lasting Survivor</i>  |
| LSE    | <i>London Stock Exchange</i>   |
| M&A    | <i>Mergers and Acquisitions</i>  |
| MAB    | <i>Alternative Equity Market</i>   |
| n.a.   | <i>not applicable</i>  |
| NFCS   | <i>National Financial Capability Study</i>   |
| NLSY   | <i>National Longitudinal Survey of Youth</i>   |
| NYSE   | <i>New York Stock Exchange</i>   |
| OECD   | <i>Organisation for Economic Co-operation and Development</i>                                      |
| PACFL  | <i>The President's Advisory Council on Financial Literacy</i>                                      |
| PL     | <i>Poland</i>  |
| PLN    | <i>Polnischer Zloty</i>  |
| PPP    | <i>Purchasing power parity</i>   |
| q.v.   | <i>quod vidē - which see</i>   |
| Q1     | <i>Question 1</i>  |
| R&D    | <i>Research and Development</i>  |
| RD     | <i>Risikodiversifikation</i>   |
| RTSI   | <i>Russian Trading System Index</i>  |
| RU     | <i>Russia</i>  |
| SGA    | <i>Sales, General and Administrative</i>   |
| SMB    | <i>Small-Minus-Big</i>   |
| SWIG80 | <i>Spółek Warszawski Indeks Gieldowy - Warschauer Börsenindex für die 80 kleinsten Unternehmen</i> |
| U.S.   | <i>United States</i>   |
| UK     | <i>United Kingdom</i>  |
| UNECON | <i>Saint Petersburg State University of Economics</i>  |
| USA    | <i>United States of America</i>  |
| USM    | <i>Unlisted Securities Market</i>  |
| VHB    | <i>Verbands der Hochschullehrer für Betriebswirtschaft e.V.</i>                                    |
| WIG20  | <i>Warszawski Indeks Gieldowy - Warschauer Börsenindex</i>   |
| WKN    | <i>Wertpapierkennnummer</i>  |
| WSE    | <i>Warsaw Stock Exchange</i>   |
| Z      | <i>Zinseszins</i>  |
| $\rho$ | <i>Average Correlation Between Markets</i>   |

# Chapter 1

## **Synopsis**

Diese Arbeit basiert auf der Beobachtung, dass eine Reihe von Faktoren seit Jahren die gesetzlichen Rentensysteme westlicher Nationen auf den Prüfstand stellen und belasten. Diese Faktoren sind bekannt und umfassen eine Reihe von Entwicklungen, die speziell die Umlageverfahren betreffen. Dazu zählen, unter anderem, (i) der demografische Wandel, (ii) steigende Lebenserwartungen bei sinkenden Geburtenraten der letzten Jahrzehnte, (iii) ungeplante wiedervereinigungsbedingte Belastungen, (iv) eine höhere Sockelarbeitslosigkeit im Vergleich zur Nachkriegszeit und (v) zu optimistisch unterstellte Wirtschaftswachstumsraten (Bräuninger & Wilke, 2014). All diese Faktoren erhöhen das Altersarmutsrisiko unter breiten Schichten der Bevölkerung (UNDESA, 2015), indem sie dafür sorgen, dass die reale erwartete Rendite der gesetzlichen Rentenversicherung, ausgedrückt durch den realen internen Zinsfuß, durch Änderungen in der Rentenberechnungsformel und verschlechterter Eingabewerte sukzessive weiter sinkt. In Deutschland wird, laut Berechnungen auf Originalfallbeispielen der Mathematiker Siepe und Fischer, vermutet, dass die Rendite der gesetzlichen Rentenversicherung für die Jahrgänge 1942 bis 1954 bei 3% bis 4,2% liegt und zukünftige Generationen durch den Renteneintritt der Babyboomer lediglich eine Rendite zwischen 1,8% und 2,1% zu erwarten haben (Romanski, 2021)<sup>1</sup>. Mögliche Maßnahmen, den Entwicklungen zu begegnen, sind die Erhöhung des Renteneintrittsalters, der Erwerbsquoten und der Beitragssätze zur Rentenversicherung, eine Absenkung des gesetzlichen Rentenniveaus oder eine stärkere individuelle Vorsorge (Morgenstern, 2014). Letztere setzt allerdings ein bereits vorhandenes Grundwissen bezüglich Rentenvorsorge und Kapitalanlagen und -möglichkeiten voraus. Gleichzeitig ist ein signifikanter Abwärtstrend der Realzinssätze in führenden Wirtschaftsnationen zu beobachten (Del Negro et al., 2019). Die seit Jahren niedrigen Zinssätze, die deutsche Sparer mit einer Vorliebe für Sparbücher und Tagesgeldkonten besonders stark treffen, führen inflationsbereinigt zu einem sinkenden Vermögen und einem gestiegenen Druck auf die private Altersvorsorge (Bankenverband, 2011). Auch wenn Deutschland 2014 noch auf dem 7. Platz des „Retirement Index“ steht und dadurch bei der finanziellen Absicherung durchaus akzeptable Ergebnisse vorweist (Romanski, 2014), ist 2021 vom „Gesetz der sinkenden Rentenrendite“ für die Jahrgänge ab 1990 die Rede (Romanski, 2021).

Der kürzlich von den Bundestagsabgeordneten Johannes Vogel und Christian Dürr gemachte Vorschlag des Umbaus der Rentenversicherung hin zu einer Teilkapitaldeckung versucht das beschriebene Problem grundsätzlicher anzugehen (Morgenstern, 2021). Anstatt das alte System nachzujustieren, ohne die oben erwähnten Probleme (demografischer Wandel, höhere Sockelarbeitslosigkeit usw.) langfristig zu lösen, schlagen sie, basierend auf einer Studie von Werding und Läßle (2021), einen Systemwechsel vor. Dieser Systemwechsel sieht eine Abkehr vom Umlageverfahren vor und beruft sich an mehreren Stellen auf das schwedische Modell, insbesondere bei der Kapitaldeckung zukünftiger Rentenansprüche. Dabei stehen den Schweden mehrere Optionen bei der Anlage der Beiträge zur Verfügung inkl. einer Default-Option, die gewählt wird, wenn man sich nicht entscheidet. Je nach Option, in die inves-

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<sup>1</sup> Zu ähnlichen Ergebnissen kommt das Deutsche Institut für Wirtschaftsforschung (DIW) in einer Studie im Auftrag der Hans-Böckler-Stiftung im November 2020 (Buslei et al., 2020)

tiert wird, schwanken die Rentenrenditen zwischen 5% und 9,5% und liegen somit selbst im schlechtesten Fall höher als die Berechnungen von Siepe und Fischer oder die der Studie der Hans-Böckler-Stiftung.

Sollte ein Systemwechsel stattfinden, stehen die Privatpersonen erneut vor dem Problem, zwischen Optionen wählen zu müssen, die zumindest ein geringes Verständnis von Kapitalmarktgegriffen und -zusammenhängen voraussetzen. Dieses Verständnis darf, wie wir später sehen werden, angezweifelt werden. In Schweden fließen 40% des Anlagevolumens in die Default-Option. Dies zeigt einerseits die Wichtigkeit der Default-Option und wirft andererseits die Frage nach der Entscheidungsfindung auf. Entweder haben sich die Privatpersonen bewusst für die Default-Option entschieden oder keine Entscheidung treffen wollen bzw. können. Madrian und Shea (2001) weisen darauf hin, dass zumindest in den USA Privatpersonen bei der Altersvorsorge über 401(k)<sup>2</sup> tendenziell dazu neigen, die Default-Options zu übernehmen. Sowohl die Sparrate als auch die Fondszusammenstellung wird in der Mehrzahl der Fälle nicht verändert und zeigt somit die Wichtigkeit der gewählten Vorauswahl. Als Begründung wird einerseits Trägheit und andererseits die Wahrnehmung der Default-Options als Empfehlung diskutiert. Dies wäre insofern nicht überraschend, da die Komplexität der Vorsorgeentscheidungen durch Trends im institutionellen Umfeld in den letzten Jahren stark gestiegen ist. Auf der Angebotsseite hat die Vielfalt privater Anlageoptionen und Produkte auch technologieinduziert stetig zugenommen, was den individuellen Entscheidungsprozess zur langfristigen Privatvorsorge verkompliziert (Błach, 2011). Zusätzlich sind Frequenz und Masse der auf die individuellen Privatpersonen jederzeit und allorts einwirkenden Informationen um ein Vielfaches gestiegen und die Informationsqualität ist schwieriger zu bewerten (Obermiller & Spangenberg, 2013). Die erforderliche finanzielle Bildung, um sich auf der Angebotsseite zu Recht zu finden, ist dementsprechend groß und gleichzeitig maßgebend für die erfolgreiche Altersvorsorge. Je nach Definition ist die Finanzbildung, neben der allgemeinen beruflichen Bildung, Teil des Humankapitals. Während die allgemeine berufliche Bildung das zukünftige Arbeitseinkommen einer Person stark beeinflusst und als Barwert der zukünftigen Einzahlungen aus der Arbeitstätigkeit gut abgeschätzt werden kann, hat es wenig Einfluss auf die Investitionsentscheidungen von Personen und somit die Finanzbildung. Während die allgemeine berufliche Bildung in Schulen, an Ausbildungsstätten und Universitäten vermittelt wird, wird der Umgang mit Geld und damit die Finanzbildung entweder nur indirekt in benachbarten Domänen, wie den Wirtschaftswissenschaften, erwähnt oder lediglich im Rahmen eines generellen Überblicks angeschnitten (Klapper, Lusardi & van Oudheusden, 2015). Bei einer ganzheitlichen Betrachtung der Altersvorsorge einer individuellen Privatperson sollten gleichzeitig aber möglichst alle zur Verfügung stehenden Assets, unabhängig der Verteilung des Kapitals auf diese, einbezogen werden (Chen et al., 2006).

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<sup>2</sup> 401(k) bezeichnet ein vom Arbeitgeber mitfinanziertes Modell der privaten Altersvorsorge in den USA, das seinen Namen durch den Abschnitt 401(k) im Internal Revenue Code des amerikanischen Steuergesetzes hat.

Diese Arbeit stellt ganz speziell die Verbindung zwischen der finanziellen Bildung, der Altersplanung und den Kapitalmärkten her. Sie erhebt allerdings nicht den Anspruch, alle Facetten einer Altersvorsorge abdecken zu wollen, da eine Altersplanung, die über Begriffe über und Investitionen in den Kapitalmarkt hinausgeht, weiterer Analysen bedarf. Für eine ganzheitliche Betrachtung aller Facetten zählt an erster Stelle das bereits erwähnte Humankapital, das sich über die Jahre verändert hat und für die meisten Privatpersonen der wichtigste Faktor ist, wenn es um die Altersvorsorge geht (Milevsky, 2010). Dazu zählen weiterhin verschiedene Versicherungen wie eine private Haftpflicht, eine Berufsunfähigkeits- oder Rentenversicherung, nur um einige hier zu nennen. Diese sorgen zwar in den meisten Fällen nicht für eine Vermehrung des angesparten Kapitals, sichern dieses aber gegen unvorhergesehene Situationen ab und verhindern so zumindest eine Verringerung. Neben dem Kapitalaufbau oder der Geldvermehrung darf auch die andere Seite, der Kapitalabbau oder die Geldverringerung, nicht vergessen werden. In Deutschland sind rund 6 Millionen Menschen laut dem SchuldnerAtlas Deutschland (2020) überschuldet. Dazu gehören knapp 10% der unter 30-jährigen. Das ist ein Punkt, der in den meisten Studien nicht berücksichtigt wird und Potential für weitere Untersuchungen bietet. Eine weitere Einschränkung in den folgenden Analysen betrifft die Anlageklasse. Mit dem Kapitalmarkt ist in dieser Arbeit der Aktienmarkt gemeint. Weitere Anlageklassen wie zum Beispiel Anleihen oder Immobilien werden nur angeschnitten (siehe Kapitel 11 für Immobilien aus Unternehmenssicht), wobei gerade Immobilien für die private Altersvorsorge für die meisten Personen eine besondere Rolle spielen und oft die höchste einzelne Investition darstellen. Nach der Phase der Kapitalvermehrung kommt im Rentenalter eine Phase des Kapitalabbaus. Auch das ist ein Aspekt, der in der Literatur selten Erwähnung findet, aber maßgeblich dafür verantwortlich ist, dass das angesparte Kapital für einen bestimmten Lebensstandard über die komplette Planungszeit reicht.

Die Dissertation besteht aus 9 inhaltlichen Kapiteln, die identisch zu 9 wissenschaftlichen Aufsätzen sind. Diese wurden teilweise bereits veröffentlicht oder für die Veröffentlichung akzeptiert (Kapitel 2, 4, 5 und 9), befinden sich unter Begutachtung bei einem wissenschaftlichen Journal (Kapitel 7 und 10) oder werden für eine (Wieder-) Einreichung vorbereitet (Kapitel 3, 6 und 8). Siehe auch Tabelle 1-1 für eine Übersicht der Kapitel und des Veröffentlichungsstatus. Die vorliegende Arbeit kann in zwei Hauptbereiche eingeteilt werden: Der erste Teil, Kapitel 2 bis einschließlich 7, hat den Fokus auf die finanzielle Bildung und die systematischen Verzerrungen, denen Menschen unterliegen, gerichtet. Diese Kapitel untersuchen die Befähigung von Privatpersonen, sich auf Kapitalmärkten zurecht zu finden, die tatsächlich getätigten Investitionen der Privatpersonen und die Auswirkungen, die diese Investitionen haben. Der zweite Teil der Arbeit konzentriert sich auf die Kapitalmärkte. Hier wird die Entwicklung des deutschen Kapitalmarkts untersucht und analysiert, inwiefern es überhaupt möglich und sinnvoll ist, in deutsche Aktien zu investieren. Weiterhin wird analysiert, ob junge und aufstrebende Börsen eine Option bei der Lösung des immer kleiner werdenden Aktienmarkts sind und wie Immobilien aus Unternehmenssicht eine Sicherheit in unsicheren Zeiten darstellen.

Tabelle 1-2 gibt einen Überblick über den Aufbau der Arbeit und die jeweiligen Kapitel und deren Fokus.

Tabelle 1-1: Übersicht des aktuellen Status der Kapitel

| Kapitel/ Titel  | Status  |
|---|---|
| <b>Teil I</b>   |   |
| 2.) Finanzkompetenz von Privathaushalten – Ein Überblick zum aktuellen Stand der Forschung  | Gaar, E., Kronin, S. und Schiereck, D. (2020), „Finanzkompetenz von Privathaushalten – Ein Literaturüberblick zum aktuellen Stand der Forschung“, <i>Österreichisches BankArchiv</i> , Vol. 11., pp. 778-799. <a href="https://doi.org/10.47782/oeba202011077801">https://doi.org/10.47782/oeba202011077801</a> |
| 3.) Financial literacy in a transnational context: a literature review  | Working Paper   |
| 4.) Multipliers of Financial Literacy in Germany and Russia?  | Dembinskaite, V., Gaar, E., Nikitina, T. und Schiereck, D. (2000), <i>Journal of Accounting &amp; Finance</i> (2158-3625), 20 (8), pp. 148-175. <a href="https://doi.org/10.33423/jaf.v20i8.3961">https://doi.org/10.33423/jaf.v20i8.3961</a>   |
| 5.) The home bias and the local bias: A survey  | Gaar, E., Scherer, D. & Schiereck, D. The home bias and the local bias: A survey. <i>Manag Rev Q</i> (2020). <a href="https://doi.org/10.1007/s11301-020-00203-8">https://doi.org/10.1007/s11301-020-00203-8</a>  |
| 6.) Competence and return expectations: Home bias with international investors  | Working Paper   |
| 7.) The self-serving bias: a survey   | Under Review at Journal of Banking Law and Banking  |
| <b>Teil II</b>  |   |
| 8.) Notierungsdynamik an deutschen Wertpapierbörsen: Eine Analyse der historischen Entwicklung ab 1950  | Working Paper   |
| 9.) Zum Erfolg von Europas erfolgreichstem Börseneinstiegssegment – Einsichten zu New Connect   | Gaar, E., Roß, D. und Schiereck, D. (2020), „Zum Erfolg von Europas erfolgreichstem Börseneinstiegssegment – Einsichten zu New Connect“, <i>Österreichisches BankArchiv</i> , Vol. 2., pp. 97-106. <a href="https://doi.org/10.47782/oeba202002009701">https://doi.org/10.47782/oeba202002009701</a>            |
| 10.) Corporate real estate ownership and its contribution to firm performance under business uncertainty: Empirical evidence from European non-property companies | Under Review at Review of Managerial Science  |

In der vorliegenden Arbeit sollen die folgenden zwei Hypothesen beantwortet werden<sup>3</sup>:

*H.1.: Hat eine durchschnittliche Privatperson das Wissen und die Fähigkeiten, sinnvolle Investitionsentscheidungen auf dem Kapitalmarkt zu treffen?*

*H.2.: Hat der deutsche und europäische Kapitalmarkt das Potential, die Basis für eine kapitalmarktorientierte Altersvorsorge zu sein?*

<sup>3</sup> Siehe auch Tabelle 1-2 für eine Zuordnung der Kapitel zu den Hypothesen.

Jedes Kapitel wurde mit dem Ziel erstellt, in einem wissenschaftlichen Journal eingereicht und publiziert zu werden, wodurch sich die Eigenständigkeit eines jeden Abschnitts ergibt.

Tabelle 1-2: Übersicht des Aufbaus und Inhalts der Dissertation und der Zuordnung zu den Hypothesen

| Teil I  |  |           | Teil II |   |           |
|---------|--|-----------|---------|---|-----------|
| Kapitel | Inhalt/ Fokus  | Hypothese | Kapitel | Inhalt/ Fokus   | Hypothese |
| 2.)     | Literaturüberblick zur Finanzkompetenz von Privathaushalten            | H.1.      | 8.)     | Entwicklung der Notierungszahlen am Regulierten Markt               | H.2.      |
| 3.)     | Literaturüberblick zur Finanzbildung im internationalen Kontext        | H.1.      | 9.)     | IPO-Performance an der NewConnect in Warschau                       | H.2.      |
| 4.)     | Umfrage zur Finanzbildung unter Studierenden in internationalem Umfeld | H.1.      | 10.)    | Auswirkungen von Immobilieneigentum auf Nicht-Immobilienunternehmen | H.2.      |
| 5.)     | Literaturüberblick zum Home Bias                                       | H.1.      |         |   |           |
| 6.)     | Umfrage zum Home Bias unter Studierenden in internationalem Umfeld     | H.1.      |         |   |           |
| 7.)     | Literaturüberblick zum Self-serving Bias                               | H.1.      |         |   |           |

Kapitel 2, „Finanzkompetenz von Privathaushalten – Ein Überblick zum aktuellen Stand der Forschung“ gibt einen ersten Überblick zu dem Thema Finanzbildung. Der Fokus liegt dabei auf westlichen Nationen und auf den letzten 10 Jahren. Der Literaturüberblick hat einen breiten Fokus und das Ziel, die Ergebnisse von 51 aktuellen empirischen Studien auszuwerten. Dabei wird versucht, zu einem aktuelleren Bild über den Stand der Forschung zur Finanzkompetenz in Privathaushalten zu kommen und die Frage zu beantworten, wie und ob Privathaushalte die Befähigung besitzen, komplexe Finanzentscheidungen zu verstehen und bewältigen zu können und eigenständig finanziell vorzusorgen. Die Analyse geschieht unter verschiedenen Perspektiven. Es werden länderübergreifende, länderspezifische und performancebasierte Studien ausgewertet und auf ihren Inhalt überprüft. Daraus ergeben sich Determinanten, die studienübergreifend Einfluss auf die Finanzbildung haben. Dazu zählen die geographische Herkunft der Studienteilnehmer, das Geschlecht, das Alter, der Bildungsstand, das Einkommen oder Vermögen und die Selbsteinschätzung. Das sich ergebende Bild ist im Hinblick auf adäquate Altersvorsorge bedenklich. Nur eine Minderheit der Finanzentscheider ist mit grundlegenden finanziellen Konzepten vertraut. Dabei gibt es regional große Unterschiede in den Niveaus. Weiterhin sind private Haushalte mit hoher Finanzkompetenz in der Lage, effizient zu wirtschaften, während die Haushalte mit weniger Finanzkompetenz Gefahr laufen, sich zu verschulden. Sie sind somit nur beschränkt fähig, selbstständig vorzusorgen. Zurückzuführen ist das auf die mangelnde Fähigkeit, die eigene Situation angemessen einzuschätzen, benötigte Informationen einzuholen und Finanzierungsfehler zu vermeiden. Dies wirkt sich auch auf Investmententscheidungen aus. Der Kapitalmarkt wird seltener gemieden, und Wertpapiere werden bei höherer Diversifikation angelegt. Insgesamt können dadurch Kapitalerträge zur Altersvorsorge generiert werden, die in der aktuellen Niedrigzinspolitik ausschlaggebend sein können. Um auf

die Leitfrage einzugehen: Im Durchschnitt scheint es, dass Privatpersonen nicht über die nötige Finanzkompetenz verfügen, um selbstständig und langfristig ausreichend vorzusorgen.

Kapitel 3, „Financial literacy in a transnational context: a literature review“, stellt ebenfalls eine Literaturübersicht dar und versucht den in Kapitel 2 gewählten Fokus durch das Hinzuziehen weiterer Länder sowie die numerische Erweiterung der Literatur systematisch zu vergrößern und gleichzeitig genauer zu fassen. So werden die Einflüsse auf die Finanzbildung einerseits unterteilt in altersabhängige Gruppen (Schüler, Erwachsene und ältere Menschen) und andererseits in tatsächlich gemessene bzw. relative selbst wahrgenommene Finanzkompetenz. Dabei werden die Einflüsse nicht nur separat identifiziert, sondern auch in einer wechselseitigen Beziehung dargestellt. Neben den unveränderbaren Einflüssen, wie Alter, Geschlecht oder Kultur, gibt es eine Reihe von Einflüssen, die zu einer Verbesserung der Kompetenz führen. Dazu zählen unter anderem bessere Formate für die finanzielle Bildung und eine bessere Informationspolitik von Banken. Es zeigt sich auch hier, dass die tatsächliche Finanzkompetenz auf allen wirtschaftlichen Ebenen sehr niedrig ist, aber durch entsprechende Bildung verbessert werden kann.

Kapitel 4, „Multipliers of Financial Literacy in Germany and Russia?“, greift die Erkenntnis der niedrigen Finanzkompetenz auf und versucht einerseits die Frage zu beantworten, ob das niedrige Niveau auch für Studierende der Wirtschaftswissenschaften gilt, und andererseits, ob Studierende die Befähigung besitzen, Finanzwissen in der breiten Bevölkerung zu verbreiten. Dafür wird Finanzwissen mit Hilfe von international anerkannten und damit vergleichbaren Fragen in Deutschland und Russland getestet. Die Fragen sind hierbei in mathematische, grundlegende und fortgeschrittene Finanzfragen aufgeteilt. In einem zweiten Schritt wird der Einfluss einer Reihe demographischer Eigenschaften und des Finanzwissens der Studierenden auf die Neigung, an die Zukunft zu denken und somit vorzusorgen, getestet. Die Ergebnisse deuten auf ein gutes mathematisches und generelles Wissen der befragten Studierenden hin, zeigen aber auch, dass nur wenige alle anspruchsvollen Fragen richtig beantworten. Bei den weiteren Auswertungen zeigt sich, dass mathematische Fragen öfter von Frauen richtig beantwortet werden, diese aber bei Finanzfragen schlechter abschneiden. Eine Schlussfolgerung daraus ist, dass ein gutes mathematisches Wissen nicht zwangsläufig zu gutem finanziellem Wissen führt und weitere Bildung an dieser Stelle nötig ist.

Nachdem Kapitel 2 bis 4 das Finanzwissen untersucht haben, wenden sich die nächsten Kapitel der Frage zu, ob Menschen auch unabhängig ihres Wissens adäquat im Sinne der Standardportfoliotheorie am Aktienmarkt investieren. Kapitel 5, „The home bias and the local bias: A survey“, behandelt dabei die allgemeine Präferenz von Menschen, in ihnen bekannte und heimische Aktientitel zu investieren. Es zeigt sich, dass der home bias übergreifend in allen Bevölkerungsschichten, Ländern und Bildungsschichten auftritt und eine systematische Abweichung vom idealen Aktienportfolio<sup>4</sup> bedeutet. Der Lite-

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<sup>4</sup> Zum Beispiel im Sinne des ICAPM.

raturüberblick unterteilt die Gründe für den home bias in institutionelle, informationsbasierte und investorenspezifische Gründe und stellt in einem weiteren Schritt die Auswirkungen des home bias dar. Gerade die investorenspezifischen Gründe haben in den letzten Jahren stark an Bedeutung gewonnen, da in einer stärker globalisierten Welt institutionelle und informationsbasierte Gründe abnehmen. Unter anderem haben sich ein allgemeiner Optimismus und ein starker Glaube an inländische/lokale Vermögenswerte, die Abneigung von Unsicherheit (Ambiguitätsaversion), wahrgenommene Kompetenz und die Erfahrung der Investoren als konstant erwiesen und deuten darauf hin, dass der home bias wohl auch in Zukunft nicht komplett verschwinden wird.

Nachdem Kapitel 5 einen aktuellen Einblick in die home bias Forschung gegeben hat, behandelt Kapitel 6, „Competence and return expectations: Home bias with international investors“, den home bias unter Studierenden und mögliche Ursachen für das Auftreten. Es wird das Wissen der Studierenden mit Bezug zu den Wirtschaftswissenschaften in Russland und Deutschland mit Hilfe eines Fragebogens analysiert. Diese analysierte Gruppe an Studierenden hat ein generelles Interesse an und erwartungsgemäß ein besseres Verständnis von ökonomischen Fragestellungen und besitzt darüber hinaus internationale Erfahrungen. Ziel des Kapitels ist es, erstens den home bias auch unter Studierenden aufzuzeigen, zweitens die wahrgenommene Kompetenz als einen möglichen Grund für den home bias auszumachen und drittens zu zeigen, dass internationale Erfahrungen zu einer Reduktion des home bias führen können. Das erlangte Ergebnis ist nicht eindeutig: Die russischen und deutschen Studierenden zeigen einen home bias und bestätigen daher weitgehend die aufgestellten Hypothesen, während die internationalen Austauschstudierenden keinen signifikanten home bias aufweisen. Eine wahrgenommene Kompetenz kann in einigen Fällen für einheimische Titel beobachtet und somit als mögliche Ursache für den home bias identifiziert werden.

Kapitel 7, „The self-serving bias: a survey“, wendet sich danach einer weiteren Tendenz von individuellen Privatinvestoren zu und beschreibt eine systematische Verzerrung, die in der wirtschaftswissenschaftlichen Literatur als self-serving bias bekannt ist. Diese Heuristik beschreibt den Effekt, dass eigene Fähigkeiten als die Ursache für den eigenen Erfolg und äußere Faktoren als Grund für Misserfolg angesehen werden. Die Analyse der Literatur zeigt, dass persönliche Fähigkeiten und Eigenschaften, Intelligenz, Geschicklichkeit oder Anstrengungen als interne Faktoren oder Ursachen für einen positiven Ausgang gesehen werden. Der Zufall, das Wetter, äußere wirtschaftliche Ereignisse und das Agieren Anderer werden allgemein als externe Faktoren oder Ursachen für ein Scheitern bezeichnet. Die Akzeptanz eines eigenen Fehlers geschieht dann, wenn der Fehler leicht zu beheben ist und keine schwerwiegenden Folgen hatte oder das eigene Verhalten ohne viel Aufwand geändert werden kann. Der self-serving bias tritt dabei gehäuft im oberen Management und unter Führungskräften auf. Ein weiterer, oft untersuchter, Bereich sind Finanzmärkte und die Grundlagen des self-serving bias für den overconfidence effect.

Wie bereits eingangs erwähnt, konzentrieren sich die Kapitel 2 bis 7 auf den Menschen, sein Finanzwissen, die systematischen Verzerrungen beim Investieren und die Auswirkungen auf den Aktienmarkt beim Investieren. Der zweite Teil der Dissertation untersucht die Befähigung des Aktienmarkts, die

Basis für eine vermögenssteigernde und absichernde Altersvorsorge zu sein. Dazu rückt zuerst der deutsche Regulierte Markt in den Fokus. Kapitel 8, „Notierungsdynamik an deutschen Wertpapierbörsen: Eine Analyse der historischen Entwicklung ab 1950“, untersucht dafür die historische Performance und Notierungsdauer deutscher Unternehmen am höchsten deutschen Wertpapiersegment, dem Regulierten Markt. Es zeigt sich, dass die schon lange anhaltende negative Notierungsdynamik in Deutschland sowohl ein historisches Phänomen als auch eine sich zuletzt verstärkende negative Entwicklung ist. Insbesondere mit Beginn der 2000er Jahre steigt die Anzahl an Notierungseinstellungen stark an, ganz überwiegend getrieben durch Akquisitionen. Über den gesamten Zeitraum verliert der deutsche Kapitalmarkt netto pro Jahr 2,41 Notierungen. Für alle Arten an Notierungseinstellungen können klare Anzeichen in der Entwicklung der Unternehmenskennzahlen identifiziert werden. Insbesondere die Umsatz- und Eigenkapitalrentabilität weisen bei Unternehmen, die die Börse verlassen, durchgehend negative Werte auf. Aber auch die Entwicklung des absoluten Umsatzes, der Earnings before Interest and Taxes (EBIT) und des Jahresüberschusses/-fehlbetrags weisen zum Teil negative Anzeichen auf.

Kapitel 8 hat im ersten Kapitel des zweiten Teils der Dissertation sinkende Notierungszahlen für den deutschen Wertpapiermarkt gezeigt. In einem weiteren Schritt behandelt Kapitel 9, „Zum Erfolg von Europas ‚erfolgreichstem‘ Börseneinstiegssegment: Einsichten zu New Connect“, die New Connect an der Börse Warschau. Dieses Einstiegssegment sticht in den letzten Jahren und speziell nach der Finanzkrise durch dreistellige Notierungszahlen heraus und wirft daher die Frage nach der Qualität dieses Erfolgs auf. Zwischen 2008 und 2017 fanden an der New Connect durchschnittlich 55 Börsengänge (Initial Public Offerings, IPOs) pro Jahr statt. Dies waren im Schnitt mehr als auf dem Vorreitermarkt, dem Alternative Investment Market (AIM) der London Stock Exchange (LSE), und führte dazu, dass die New Connect Ende 2018, gemessen an der Gesamtzahl der gelisteten Unternehmen, hinter dem AIM in London auf dem zweiten Platz unter den börsenregulierten Märkten in Europa stand. Um die Befähigung der Börse zur Entwicklung junger Unternehmen beurteilen zu können, bedarf es Analysen im Bereich der Performancemessung und der Notierungsdynamik. Die Notierungsdynamik zeigt nach einem Skandal 2013 einen negativen Trend und lässt sich auf regulatorische Änderungen zurückführen. Bei der Analyse der kurzfristigen und langfristigen Performance konnte ein statistisch signifikantes Underpricing und eine langfristig positive Performance bestätigt werden. Zusammenfassend zeigt die Analyse der Delisting-Gründe, dass die Hauptaufgabe, nämlich die Förderung von Wachstumsunternehmen, gut gelingt. Das Aufsteigen der jungen Unternehmen in den Hauptmarkt ist bis 2018 konstant hoch geblieben und sorgt somit für eine Unterstützung der Warschauer Börse.

Kapitel 10, „Corporate real estate ownership and its contribution to firm performance under business uncertainty: Empirical evidence from European non-property companies“, beleuchtet den Aktienmarkt aus Sicht der Unternehmen und fokussiert sich dabei auf die Auswirkungen von Immobilienbesitz. Der unternehmensspezifische Besitz von Immobilien ist in dynamischen Zeiten ein Problem, da ein Verkauf nur über Rabatte möglich ist. Unternehmen antizipieren das und vermeiden oder verschieben in unsicheren Zeiten Investitionen in bestimmte Immobilienwerte oder schreiben diese wegen Überführung in

eine neue Nutzung ab. Dies zeigt sich in einem negativen Einfluss von Immobilienbesitz auf die Aktienkursperformance in unsicheren Zeiten, während in sicheren Zeiten Immobilienbesitz einen positiven Einfluss auf die Performance hat. Unabhängig der Situation in der sich ein Unternehmen befindet, führt eine hohe Immobilienquote aber immer zu einem geringeren systematischen Risiko und scheint damit einen diversifizierenden Effekt zu haben.

## Chapter 2

# **Finanzkompetenz von Privathaushalten – Ein Überblick zum aktuellen Stand der Forschung**

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## Chapter 3

### **Financial literacy in a transnational context: a literature review**

This chapter was under review in the “Journal of Behavioral and Experimental Finance” and has now a working paper status.

# Financial literacy in a transnational context: a literature review

Eduard Gaar<sup>35</sup>, Dirk Schiereck<sup>36</sup>, Yanni Zhang<sup>37</sup>

## Abstract

Sound economic decisions require a sufficient level of financial literacy. A higher degree of financial literacy contributes to better financial decision making and rational financial behaviors, so that people can realize superior solutions for retirement savings, changes in diversification beliefs, disentanglement of genuine from fraudulent information etc. Recent studies examine mainly two aspects related to financial literacy – influencing factors for the development of a person’s financial literacy and impacts from financial literacy. To investigate the development and current state of research on financial literacy, this study conducts a systematic literature review which includes 59 papers from highly recommended journals. Financial literacy is discussed in different transnational contexts. Finally, these pillars are aggregated into a causality model that can serve as a starting point for future research activities.

**Keywords:** Financial literacy, Financial education, Survey

**JEL Classification:** A20, G53; I22, J32

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### 3.1. Introduction

Lusardi (2015, p. 639) writes, “Financial literacy is an important element of economic and financial stability, both for the individual and the economy”. Berry et al. (2018, p. 1) define financial literacy “as one’s ability to understand financial concepts, plan one’s finances, and understand financial services and products”. Many economic decisions require basic knowledge of financial concepts, such as interest rates, inflation and numeracy. However, many people lack this basic financial literacy (Grohmann et al., 2015). Individuals with low financial literacy are associated with low levels of participation in the kinds of planning and savings decisions that are needed to build a sound financial future (Anderson et al., 2015). Agarwalla et al. (2015, p. 3) note, “In an environment where the range and the complexity of financial products continue to increase, it is imperative that individuals develop nuanced understanding of the world of finance to be able to make choices that are most appropriate to their financial goals and needs”. As Hsu (2016, p. 5) describes, “Public and scholarly interest in financial literacy and informed financial decision making is increasing in part because of the poor financial outcomes that are associated with low levels of financial literacy: problems with debt and lack of retirement planning, among others”. In order to improve households’ financial decisions, governments and donors often support policies to improve financial literacy (Berry et al., 2018). Hsiao and Tsai (2018, p. 34) point out that, “As noted by the Organization for Economic Cooperation and Development, as a result of the increasing complexity of financial products, the financial literacy of a society has become increasingly important”. Financial literacy is a skill that is important to living and thriving in the modern economy (Lusardi, 2015). Further, Lusardi (2015, p. 635) notes, “Financial services and products have become more complex and more widely accessible due to globalization and digital technologies. Individuals today must take on greater responsibility for their financial decisions, such as investing in additional education, saving for a child’s education, or planning for retirement”. The lack of financial literacy and the misperception of crucial economic factors has an impact on the ability of individuals to fulfill long-term goals such as daily money management, home purchase, tertiary education, pension financing, optimal investment choices and wealth accumulation (Ergün, 2018; Fort et al., 2016). Kadoya et al. (2018, p. 4) point out that “In recent decades, although financial markets have become more accessible and offer different sophisticated financial products that people can use to maximize their benefits in old age, the complexity of the financial products and riskiness of the markets can have disastrous consequences for people’s financial conditions”.

The existing low level of financial literacy among young people has, in the longterm, negative economic effects in terms of wealth accumulation, retirement and debt contracting (Campenhout, 2015). The demographic changes are putting especially western nations with a statutory pension system to the test. Rising life expectancies and falling birth rates in the last decades increase the risk of poverty in old age. At the same time, a significant downward trend in real interest rates can be observed in leading economic nations. These developments are forcing individuals to take the responsibility for old-age

provision to a large extent on his or her own. At the same time, trends in the institutional environment have greatly increased the complexity of pension decisions. On the supply side, also due to technology, the variety of private investment options and products has steadily developed, which makes it more difficult to select the most appropriate financial products without professional financial advice. In addition, the frequency and mass of information affecting financial decision-makers at any time and in any place is increasing. This makes it more difficult to assess the quality of the information. In sum, as financial decisions become more complex, individuals face new challenges making the right choice, not only in statutory systems.

Further, according to Allgood and Walstad (2016, p. 675), “Adults must manage household budgets subject to income constraints, buy goods and services, monitor financial accounts, handle credit cards, save and invest for a future event such as a child’s college education or retirement, purchase insurance to reduce risk, pay taxes, and seek sound financial advice”. Financial literacy can explain a significant proportion of wealth inequality (Ergün, 2018). Life for those with low financial literacy is more difficult (French & McKillop, 2016). As Boisclair et al. (2017, p. 292) note, “Enhanced financial literacy among lower-earning individuals may subsequently improve their general financial situation and retirement and, hence, benefit them more as they move to higher earning categories”. Financially illiterate people are more likely to experience asset loss and outlive their savings after retirement (Xue, 2018). Improving financial and health literacy is an important step in reducing economic vulnerability in older age (Bavafa et al., 2019).

It is no wonder that financial literacy research grows considerably. In particular, the influencing factors and the impact from financial literacy move into the focus of researchers. These two main research fields are the subject of conceptual and empirical studies in various journals, highlighting the growing interest in this topic. The findings concern a variety of topics, such as demographic characteristics, exogenous factors, endogenous factors, financial products and financial behaviors. Despite the booming research activities, neither a holistic picture nor an overview of the current state of research exists.

To the best of our knowledge, no systematic literature review presents a detailed and comprehensive picture of financial literacy from various perspectives. Therefore, this article aims to fill this research gap. The analyzed literature consists of 59 articles published in peer-reviewed journals, which provide an extensive overview of the theoretical and empirical findings on financial literacy. The aim is to identify key scientific contributions or questions, to offer meta-analysis and to develop a statistical procedure for synthesizing findings in order to obtain an overall reliability. Our contributions are fourfold. First, this review contributes to the research on financial literacy by gathering research efforts and by explaining the scholarly interest in financial literacy over the last five years. Second, the current state of research is identified and structured. In addition, the causal associations with financial literacy in a transnational context are presented. The influencing factors for individuals’ financial literacy, along with the impact from financial literacy, are highlighted. Third, the paper considers actual financial literacy by clustering

and discussing existing findings according to different ages and the perceived financial literacy. Finally, the research streams are integrated into a model that illustrates existing interrelationships. Consequently, existing research gaps are identified and some ways for future research and inspirations for practitioners are presented.

The paper is structured as follows. The next section explains the methodology that is applied in the literature research and examines the characteristics of the found papers. Section 3.3 describes the definition of financial literacy. Section 3.4 presents the assessment of financial literacy before the subsequent section provides an overview of actual financial literacy in three types of target groups and the perceived financial literacy. In this section, the research streams are also integrated into one model. This causality model could contribute to future research. A discussion of implications and limitations concludes the paper.

### 3.2. Methodology

#### 3.2.1. Literature selection

In conducting the systematic literature review, we follow the guidelines suggested by Tranfield et al. (2003). First, the topic and corresponding keywords are defined. By using just one searching keyword “financial literacy”, plenty of articles in Google Scholar and EBSCO appeared. Due to the number of articles and because of the focus on latest research we limit the time frame to 2015 till 2020. Second, two scientific databases (Google Scholar and EBSCO) are searched for the keyword. The findings are screened for their topic fit and with the inclusion criteria defined in Table 3-1.

Table 3-1: Criteria for inclusion

| Characteristics    | Inclusion criteria   | Specification         |
|--------------------|--|-----------------------|
| Publication medium | Scientific, peer-reviewed journals that meet the defined quality threshold | Published full papers |
| Publication Date   | 2015-2020  |                       |
| Language           | English  |                       |
| Content            | Financial literacy   |                       |

The database search results in 253 articles that match the defined search terms in the title, abstract or keyword. After removing the articles which are not written in English the remaining articles were checked for their publication media, as not all database searches could filter the publication type. Since this review focuses on original contributions, the search is limited to scientific journals with peer-review processes. In addition, the vast majority of publications in financial literacy research are journal articles. To control the quality of the articles, the Academic Journal Guide 2015 of the Chartered Association of Business Schools and the VHB-JOURQUAL 3 (2015) of the German Academic Association for Business Research are applied. Only papers that conform one of the following ranking criteria are included in the literature review:

- A ranking of  $\geq 2$  in the Academic Journal Guide (2015)
- A ranking of  $\geq C$  in the VHB-JOURQUAL 3 (2015)

179 papers are excluded on the principle of the ranking criteria. In the next step, the papers' abstracts and contents are read to examine the criterion of topic fit. The vast majority fit with the topic very well, only 6 did not meet the criterion. These excluded articles focus for example too much on Financial Adviser Anxiety (Gerrans & Hershey, 2017) instead of financial literacy. After this exclusion 60 hits result. Two of them are duplicates, which results in 59 papers in the end. Table 3-2 illustrates the selection process. For all further analyses the papers are screened again for their topic fit. So for example, not all papers contain an assessment method, thus only 51 paper are analyzed in chapter 3.4 (Financial literacy assessment).

Table 3-2: Selection process

| Results of search   | Number of articles |
|---|--------------------|
| Google Scholar  | 150                |
| EBSCO   | 103                |
| <b>Total</b>  | <b>253</b>         |
| Reasons for exclusion   |                    |
| Not written in English  | 8                  |
| Books, conference papers, and journals that do not meet the quality threshold | 179                |
| No relation to financial literacy   | 6                  |
| Duplicates  | 2                  |
| <b>Excluded articles</b>  | <b>194</b>         |
| <b>Total articles included in the literature review</b>                       | <b>59</b>          |

In a next step, the study characteristics and results, such as the researched countries, the measures of financial literacy, the influencing factors of a person's financial literacy, the relationship between financial literacy and financial products, are collected. Afterwards, all relevant articles are submitted to a content analysis.

### 3.2.2. Article characteristics

To review the latest research on financial literacy only articles published between 2015 and 2020 are included. As Figure 3-1 shows 20 articles (34%) are published in 2015, and only 7 (12%) in 2018. No article is published in 2020 so far. The 59 articles in the review are from 44 different journals. The journals with the most publications on financial literacy are Journal of Consumer Affairs (8 articles), Journal of Pension Economics & Finance (4 articles), Journal of Banking and Finance (3 articles), International Journal of Consumer Studies (3 articles), European Journal of Finance (3 articles), which together published one-third of all examined articles. Figure 3-2 shows that three-quarters of all articles are published in good journals with the ratings 3 and 4, and eight articles are published in excellent journals with the ratings 4\* and A+.

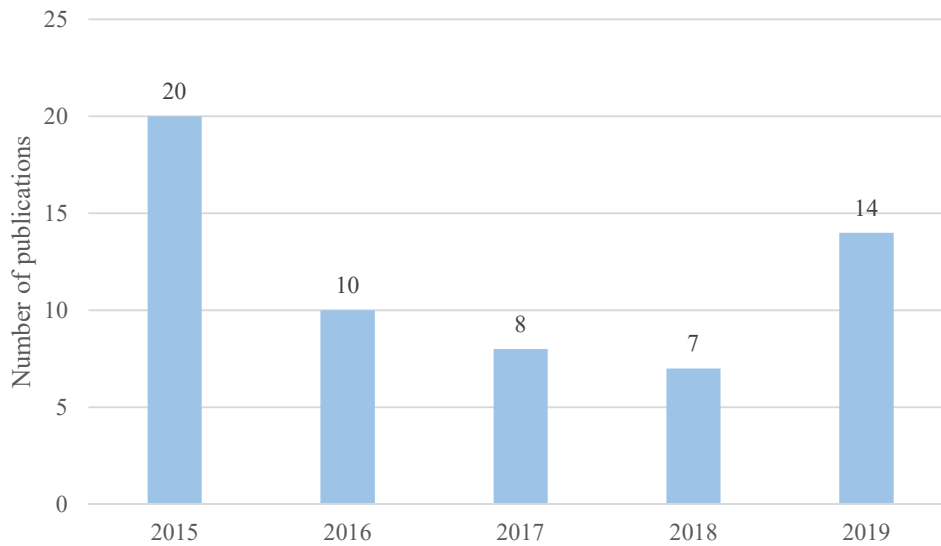


Figure 3-1: Publication year of the considered articles

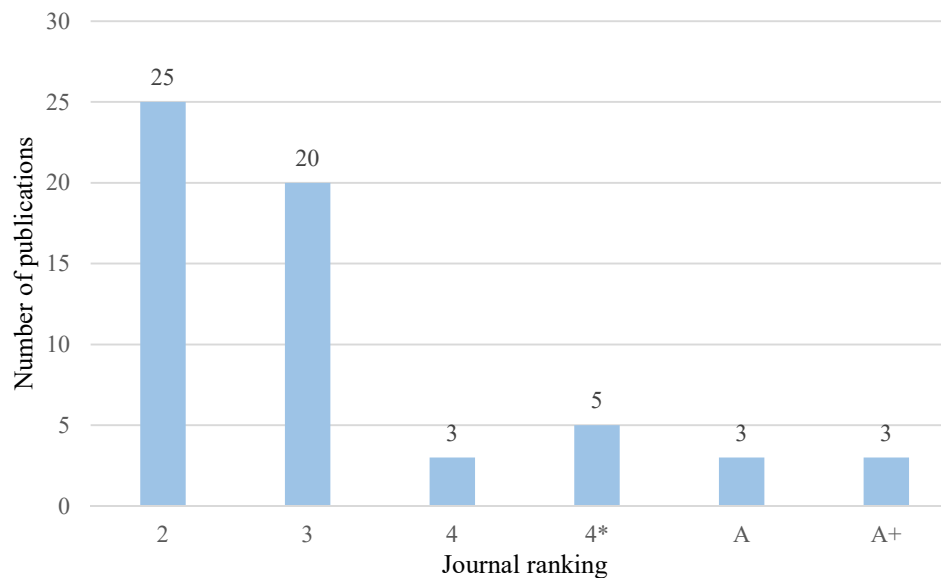
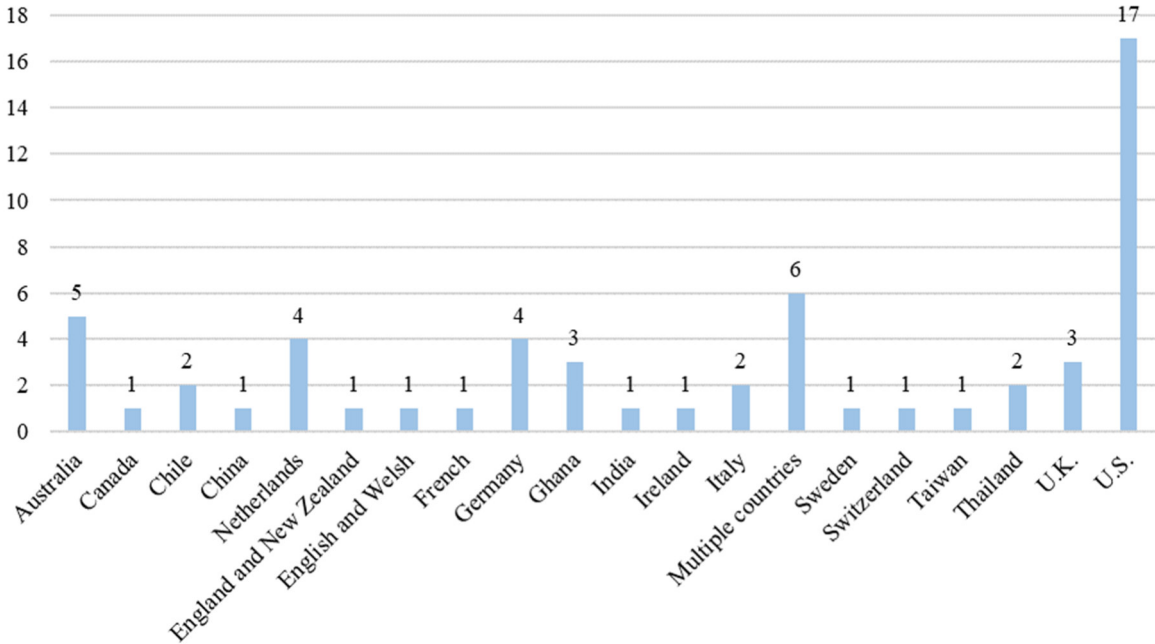


Figure 3-2: Number of journals per journal-ranking

The 59 papers focus on two aspects: the influencing factors on financial literacy and the impact from financial literacy. The influencing factors for financial literacy include demographic characteristics, exogenous factors, endogenous factors and the redefinition of financial literacy. Financial literacy could also affect investments in financial products, a person’s financial behavior and some other aspects. Table 3-3 shows the detailed classification of the research field. “Financial education” (12 articles) is the most popular research field for financial literacy. 6 articles assess the impact from financial literacy on savings for retirement. The demographic character “age” is discussed in five articles, which describes the relationship between financial literacy and increasing age. Besides, the factors gender, portfolio diversification, debt behavior and willingness to accept financial advice are researched three times respectively.

The articles related to financial literacy originate from various research fields, which demonstrates the topic's relevance for a number of disciplines and reflects the variety of themes in this research area.

Most studies take a quantitative approach (55 studies, 93%). They use data to accurately control for important demographic characteristics such as gender, race and education that may influence or impact several factors of financial literacy. Although all quantitative studies measure an individual's financial literacy, they use different judging criteria, so that the generated financial literacy score could suit better the analyzed topics at hand. Only few quantitative studies also take a qualitative approach (3 studies, 5%) in face-to-face interviews. Another four papers (7%) are conceptual or theoretical and do not in-



clude empirical data analysis, which are the papers written by Campenhout (2015), Alsemgeest (2015), Clarke (2015) and Santos (2017).

Figure 3-3: Research countries

Table 3-3: Research field

| Research field                                   | Specification                  | Total     | %            |
|--|--------------------------------|-----------|--------------|
| <b>Influencing factors of financial literacy</b> |                                |           |              |
| <b>Demographic characteristics</b>               |                                | <b>12</b> | <b>20.3%</b> |
|  | Multiple factors               | 1         |              |
|  | Age                            | 5         |              |
|  | Gender                         | 3         |              |
|  | Region                         | 1         |              |
|  | Employment                     | 1         |              |
|  | Culture                        | 1         |              |
| <b>Exogenous factors</b>                         |                                | <b>16</b> | <b>27.1%</b> |
|  | Neighbor                       | 1         |              |
|  | Responsibility Between Couples | 1         |              |
|  | Financial education            | 12        |              |

|  |  |           |              |
|--|--|-----------|--------------|
|  | Bank information policies              | 1         |              |
|  | Presentation format                    | 1         |              |
| <b>Endogenous factors</b>              |  | <b>3</b>  | <b>5.1%</b>  |
|  | Self-perceptions, Self-efficacy        | 2         |              |
|  | Using the internet for searching       | 1         |              |
| <b>Redefinition financial literacy</b> |  | <b>1</b>  | <b>1.7%</b>  |
| <b>Impact from financial literacy</b>  |  |           |              |
| <b>Financial products</b>              |  | <b>15</b> | <b>25.4%</b> |
|  | Retirement plan                        | 6         |              |
|  | Derivatives products                   | 1         |              |
|  | Portfolio diversification              | 3         |              |
|  | Mortgage products                      | 2         |              |
|  | Debt                                   | 3         |              |
| <b>Financial behaviors</b>             |  | <b>8</b>  | <b>13.6%</b> |
|  | Multiple behaviors                     | 2         |              |
|  | Credit counseling                      | 1         |              |
|  | Willingness to accept financial advice | 3         |              |
|  | Investment-related judgments           | 1         |              |
|  | Fraud detection                        | 1         |              |
| <b>Others</b>                          |  | <b>4</b>  | <b>6.8%</b>  |
|  | Financial inclusion                    | 1         |              |
|  | Anxiety about life in old age          | 1         |              |
|  | Firm growth                            | 1         |              |
|  | Energy efficiency                      | 1         |              |
| <b>Total</b>                           |  | <b>59</b> | <b>100%</b>  |

With regard to geographical regions, the topic seems to be of great interest in the United States, with 17 studies originating from this region. Six papers investigated at least two countries. Five papers analyzed Australia, four papers Germany, and three papers the Netherlands, Ghana and U.K. respectively.

### 3.3. Defining financial literacy

The existing definitions of actual financial literacy generally “imply the ability of individuals to obtain, understand and evaluate information required to make decisions to secure their financial future as best as possible” (Agarwalla et al., 2015, p. 5). As Foster et al. (2015, p. 532) describe, “In the academic literature, the term ‘financial literacy’ has referred to, among other things, the knowledge of financial products, the knowledge of financial concepts, and having the mathematical or numeracy skills necessary for effective financial decision making”. The most widely adopted definition of financial literacy focuses on knowledge of basic financial concepts and familiarity with the economic environment. As Haliassos et al. (2020, p. 960) describe, “Such knowledge is most often proxied by answers to the ‘Big Three’ questions of financial literacy, capturing knowledge of interest compounding, the difference between real and nominal interest rates, and risk diversification”. Apart from basic financial literacy, advanced financial literacy is also summarized by Hsu (2016, p. 2) as “including more effective wealth management, better management of credit and debt, retirement planning, increased saving, and higher stock market participation”.

Financial literacy represents more than an individual's actual financial knowledge. "Mistaken beliefs about financial literacy are as important as actual financial literacy itself" (Anderson et al., 2015, p. 23). The perceived financial literacy is also of great significance for the development of political systems aimed at improving financial results (Farrell et al., 2016). As Allgood and Walstad (2016, p. 676) advise, "An alternative way to assess financial literacy is to use some type of subjective measure such as a self-assessment of financial literacy or knowledge". Lusardi et al. (2015) define perceived self-efficacy as the belief in one's own ability to perform successfully in a particular situation. An individual also needs a sense of self-assuredness, or 'self-belief', in their own capabilities (Farrell et al., 2016). The measurement of the subjective evaluation focuses on what people think they know about personal finance based on self-assessments of their financial literacy (Allgood & Walstad, 2016).

### **3.4. Financial literacy assessment**

Financial literacy does not have a single definition; therefore, the assessment of financial literacy is a major challenge for conducting research on this topic (Allgood & Walstad, 2016). Actual financial literacy and perceived financial literacy are two types of the assessment. The actual assessment is primarily based on knowledge and components of the conceptual definitions of financial literacy. In contrast, self-assessment methods measure perceived knowledge or confidence in knowledge, i.e. how much do you think you know (French & McKillop, 2016).

Since all papers discuss causal relations between the influencing factors or the impact and financial literacy, the measurement of financial literacy is quite essential. Although financial literacy research is growing, no standard assessment exists. Every study uses different questions to measure an individual's financial literacy. Although all papers focus on the theme of financial literacy, the four conceptual papers just express opinions without assessing financial literacy. Besides, the papers written by Gerrans and Heaney (2019), Xiao et al. (2015), Skimmyhorn (2016) and Kalwij et al. (2019) also do not provide an assessment method of financial literacy. In other words, they do not present a questionnaire for financial literacy nor describe an assessment method. After sorting out, only 51 articles are left for the following analysis. Table 3-4 shows all the keywords for the assessment according to these 51 articles.

Although there is no common assessment of financial literacy, most papers use the "Big Three" (Hastings et al., 2013) questions. As Artavanis et al. (2019, p. 5) advise, "we assess students' financial literacy from three questions that test basic knowledge in the areas of interest compounding, inflation and diversification. This set of questions, also known as the 'Big Three', is extensively used in the literature, and enables comparisons with findings of previous studies". Bavafa et al. (2019, p. 883) describe, "The most discussed questions are the 'Big Three', which were discussed in Lusardi et al. (2010) and developed earlier by Annamaria Lusardi and Olivia S. Mitchell. These questions elicit knowledge about interest rates, inflation, and risk diversification of stocks versus mutual funds". According to Grohmann et al. (2015, p. 2), "Many economic decisions require basic knowledge of financial concepts, such as interest rates and inflation. However, many people lack this type of knowledge. The degree of

this deficiency has been systematically researched using tests, which collect 'financial literacy' scores". As Table 3-4 shows, 42 papers (82%) adopt an interest rate question, 35 studies (69%) a risk diversification question and 32 (63%) a question regarding inflation.

Table 3-4: Questions for the assessment of financial literacy

| Topics of questions for the assessment of financial literacy                              | Number of articles |
|---|--------------------|
| Interest rates  | 42                 |
| Risk diversification  | 35                 |
| Inflation   | 32                 |
| Return volatility   | 19                 |
| Numeracy/math ability   | 18                 |
| Investments   | 17                 |
| Perceived literacy  | 16                 |
| Relationship between bond prices and interest rates                                       | 14                 |
| Information about market trends   | 14                 |
| Credit and debt   | 14                 |
| Returns assets  | 11                 |
| Mortgage  | 8                  |
| Cash management and savings   | 7                  |
| Time value of money   | 7                  |
| Mutual funds  | 6                  |
| Bond  | 4                  |
| Insurance   | 4                  |
| Taxation  | 4                  |
| Budgeting skills  | 2                  |
| Exchange rate   | 2                  |
| Money illusion  | 2                  |
| Name foreign banks  | 2                  |
| Amortization  | 1                  |
| Balanced funds  | 1                  |
| Cash versus payment in installments   | 1                  |
| Consumer Price Index (CPI)  | 1                  |
| Cost of car financing and household goods financing                                       | 1                  |
| Household goods financing   | 1                  |
| Financial assistance  | 1                  |
| Housing prices  | 1                  |
| Knowledge of unemployment   | 1                  |
| Liquidity   | 1                  |
| Running versus one-off costs  | 1                  |
| The current rate of Goods and Services Tax (GST)  | 1                  |
| Understanding of a bank statement   | 1                  |
| Understanding of possibility of housing market losses                                     | 1                  |
| Federal Deposit Insurance Corporation (FDIC)  | 1                  |
| Prepare monthly company financial statement   | 1                  |
| Review monthly financial statements   | 1                  |
| Perform financial analysis on monthly financial statements                                | 1                  |
| Understand of the company's gross profit ratio and its contribution to the overall profit | 1                  |

Apart from basic financial literacy, advanced financial literacy is also measured by most of the papers. As Deuflhard et al. (2019, p. 135) mention, “The latter index aims to measure understanding of more advanced financial concepts and the relevant questions refer to differences between stocks and bonds, stock market functioning, the benefits of portfolio diversification, and the association between bond prices and interest rates”. 19 papers (37%) ask a question about return volatility. Typical questions are: “Which of the following assets exhibits the highest return volatility?” (Banner & Neubert, 2016, p. 134) or “Normally, which asset described below displays the highest fluctuations over time?” (Engels et al, 2020, p. 35).

Financial literacy clearly involves a certain level of numeracy (18 papers, 35%). According to Gaudecker (2015, p. 497), “The financial numeracy index measures whether individuals possess the necessary skills to perform simple numerical computations in financial matters, which is important for informed financial decision making”. French and McKillop (2016) use four numerical questions, which deal with simple interest, percentage, division and compound interest over two years. As Gamble et al. (2015, p. 2605) describe, “Two questions require calculating amounts from percentages, and three questions require simple subtraction or division of dollar amounts. One question involves comparing the interest rate earned to the rate of inflation during the same period to determine which direction purchasing power changes. The most challenging two numeracy questions concern the growth of invested money over time”.

Tests on perceived literacy (16 papers, 31%) try to find out if there is a consistent perception of one’s actual financial literacy. As Allgood and Walstad (2016, p. 678) describe, “Survey respondents were asked to self-assess their overall financial knowledge based on a seven-point scale with a rating of one being very low and a rating of seven being very high. This subjective item provides insights into how respondents perceive their level of financial literacy without having to answer test questions”. Relationship between bond prices and interest rates (14 papers, 27%) with the question “If the interest rates rise, what should happen to bond prices?” (Warmath & Zimmerman, 2019, p. 1612) and the question for information about market trends “What is the main task of the stock market?” (Banner & Neubert, 2016, p. 134) are asked 14 times, respectively. The question about returns of assets is asked eleven times. The typical question is “Considering a long time period (for example 10 or 20 years), which asset normally gives the highest return? [Saving account; Bonds; Stocks]” (Engels et al., 2020, p. 35). Investments (17 papers, 33%) are also regarded as an important judging criterion for financial literacy. The questions about investments are very broad, which include saving present resources for future consumption through the use of saving accounts and investing through stocks, bonds, or mutual funds. As Farrell et al. (2016, p. 86) note, “investments in shares and property, mortgages, savings and insurance – are indicative of an individual having greater capacity to manage their finances and to plan for the future”. Krische (2019, p. 1635) writes, “relative to noninvestors, for two types of investment experience: (i) any stock or mutual fund investment and (ii) any direct stock or mutual fund investment reported history (i.e. nonretirement)”. The online survey conducted by Ergün (2018, p. 4) consists of 20 multiple-choice

basic questions for the measurement of financial literacy, such as “‘saving effect on purchasing power’, ‘effect of inflation on saving’, ‘effect of interest on future value of saving and investing’, ‘investment risk’ or ‘meaning of credit rating’”. For the survey of financial literacy, Ćumurović and Hyll (2019, p. 463) applied the questions about “the stock market (its main function), balanced funds (features/operating principle), and bond prices (features)”.

In order to identify more specific issues, more concrete questions for investment, credit and debt (14 papers), mortgage (eight papers), cash management and savings (seven papers), mutual funds (six papers), bond (four papers), insurance (four papers) and balanced funds (one paper) are discussed. French and McKillop (2016, p. 12) use the question about debt in their article, “Cheryl owes £1,000 on her bank overdraft and the interest rate she is charged is 15% per year. If she didn’t pay anything off, how much money would she owe on her overdraft after one year?”. Anderson et al. (2015, p. 40) ask the responders, “A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less. True or false?”. Gathergood and Weber (2017a) test whether individuals can identify the amortization profile of a mortgage using four questions. Hsiao and Tsai (2017, p. 55) ask such questions for cash management and savings: “When gas and electricity prices both rise, our living costs are reduced and our purchasing power is elevated. Agree or disagree? When the inflation rate is extremely high, fewer items can be purchased with NT\$1,000. Agree or disagree?”. As Krišche (2019, p. 1663) describes, “Do you think that the following statement is true or false? A stock mutual fund combines the money of many investors to buy a variety of stocks”. Finke et al. (2017) discuss age and the decline in financial literacy and focus on insurance knowledge because rates of insurance ownership are higher among older cohorts.

Apart from questions of basic financial literacy, these articles do not apply unified question sets for the assessment of advanced financial literacy. The reason is that the setting of the questions should follow the researched theme, target groups and target ages. As Allgood and Walstad (2016, p. 676) note, “In fact, in the list of studies just cited the number of test questions used for assessing financial literacy varies from as few as three to as many as 70. The test content within a measure often covers a wide range even when there are as few as three questions (e.g. interest compounding, risk diversification, and inflation effects)”.

## **3.5. Areas of research**

### **3.5.1. Overview of research streams**

In the course of the analysis, three age-related research streams emerge. The influencing factors of financial literacy vary according to different ages of the respondents. Besides, the degree of financial literacy also changes merely by age. Xiao et al. (2015) point out, that young adults aged 18–24 have the lowest scores on objective and subjective financial literacy. Finke et al. (2017) find a consistent linear decline in financial literacy score after age 60. Hsu (2016, p. 19) notes that, “Men’s financial sophistication follows a flat or upside-down U-shape, whereas women’s scores are upward sloping with respect to their husband’s age”. According to Migliavacca (2020), age does not influence the degree of financial literacy, but interestingly enough the presence of children does.

For this review, three research streams consisting of 54 articles are illustrated in Table 3-5. All of the 54 articles estimate the associated factors of financial literacy by using regression analysis. The articles written by Alsemgeest (2015), Campenhout (2015), Clarke (2015) and Santos (2017) are conceptual articles and do not use regression techniques to analyze the influencing factors and impacts. Warmath and Zimmerman (2019) just redefine financial literacy and do not a regression analysis either. So, in the end there are 54 articles out of 59 left.

Table 3-6 shows the research streams with the number of articles per stream and year. The yearly number of articles changes over time. In 2015, there are eighteen articles published. Between 2016 and 2018, the numbers drop before they start to increase again with thirteen articles that examine influencing factors of financial literacy published in 2019. As illustrated in Table 3-6, most of the articles focus on adults above the age of 18, including the elderly people. Eleven articles study financial literacy during schooldays and only five articles discuss special influencing factors and financial behaviors that only happen in old age.

Table 3-5: Research streams over time

| Researchstream | Influencing factors originating from schoolday  | Influencing factors originating from adults   | Influencing factors originating from elderly people |
|----------------|---|---|---|
| 2015           | Agnew and Harrison (2015);<br>Driva et al. (2015); Grohmann et al. (2015); Lusardi (2015) | Adomako et al. (2016); Agarwala et al. (2015); Anderson et al. (2015); Disney et al. Weber (2015); Farrell et al. (2016); Foster et al. (2015); Gaudecker (2015); Lusardi and Michaud (2015); Stolper (2018); Xiao et al. (2015); | Gamble et al. (2015); Hsu (2016);                   |
| 2016           | Gerrans and Heaney (2019)   | Allgood and Walstad (2016); Bannier and Neubert (2016); Clark et al. (2017); Farias (2019); Fort et al. (2016); French and McKillop (2016);   |   |
| 2017           | Berry et al. (2018); Ergün (2018)   | Brent and Ward (2018); Gathergood and Weber (2017a); Gathergood and Weber (2017b); Grohmann (2017); Hsiao and Tsai (2017); Kramer (2016); Skimmvhorn (2016);  | Finke et al. (2017);                                |
| 2018           | Brown et al. (2018)   | Bianchi (2018); Grohmann et al. (2018); Hastings and Mitchell (2018); Kadoya et al. (2018); Ward and Lynch Jr. (2018);  | Xue et al. (2018)                                   |
| 2019           | Artavanis et al. (2019); Kalwij et al. (2019)   | Cornil et al. (2019); Cucinelli et al. (2019); Čumurović and Hyll (2019); Deuffhard et al. (2019); Engels et al. (2020); Haliassos et al. (2020); Koomson et al. (2020); Kricshe (2019); Song (2019);                             | Bavafa et al. (2019)                                |
| Total          | 10  | 39<br>Migliavacca (2020)  | 5   |

Table 3-6: Research streams with number of articles

| Researchstream | Students  | Adults    | Elderly people |
|----------------|-----------|-----------|----------------|
| 2015           | 4         | 11        | 2              |
| 2016           | 1         | 8         |                |
| 2017           | 2         | 5         | 1              |
| 2018           | 1         | 5         | 1              |
| 2019           | 2         | 10        | 1              |
| <b>Total</b>   | <b>10</b> | <b>39</b> | <b>5</b>       |

### 3.5.2. Influencing factors and impacts on students

The ten articles included in this chapter analyze students during the school day. Two articles (Berry et al., 2018; Kalwij et al., 2019) investigate primary-school students. Three articles (Brown et al., 2018; Driva et al., 2015; Lusardi, 2015) present surveys of high-school students. The respondents of four articles (Agnew & Harrison, 2015; Artavanis et al., 2019; Gerrans & Heaney, 2019; Ergün, 2018) are from universities. One article (Grohmann et al., 2015) researches adults above 18 but focuses on the influences from both family and school in adolescence. Table 3-7 shows the associations with actual financial literacy that are identified in empirical studies. Most of the factors could positively affect financial literacy. One factor (being male) gives different results using regression analysis. While most of the articles state being male as a positive factor for actual financial literacy, Driva et al. (2015) hold a different opinion.

Most articles agree that financial education could increase an individual's financial literacy. As Gerrans and Heaney (2019, p. 177) note, "Financial education features prominently among the policy options available to improve personal financial decision-making". Gerrans and Heaney (2019) report further increases in objective financial literacy who enrolled in the unit 'Managing Your Personal Finances'. The study by Ergün (2018) shows that students who take financial courses in the past are more knowledgeable on personal finance. Lusardi (2015, p. 652) confirms that "when students were mandated to take a financial education course, they performed much better than students in states with no personal finance mandates". It is a common belief that men have better financial abilities than women. Agnew and Harrison (2015) and Gerrans and Heaney (2019) find that males outperform females on financial literacy quizzes. The results by Ergün (2018) indicate that male students are more knowledgeable on personal finance. Although three articles show a positive association between financial literacy and being male, Driva et al. (2015, p. 2) state that the correlation is related to the factor gender stereotypes. According to the results, the existence of a gender gap in financial literacy among teenagers is related to stereotypical beliefs. "The more strongly teenagers agree with such stereotypes, the wider the gender gap".

Further, the analysis from three articles shows that business major students are more knowledgeable on personal finance. According to Gerrans and Heaney (2019), for the advanced financial literacy ques-

tions, commerce students clearly outperform, followed by engineering, mathematics and computing science students. Grohmann et al. (2015) find that parental financial socialization has a positive influence on financial literacy, having the strongest impact among the five childhood factors (parental education, financial socialization by parents, economics at school, educational quality and financial socialization through experience with money and work).

Table 3-7: Influencing factors of financial literacy among students

| Associations                          | Factors influencing financial literacy | Number of Sources | Sources  |
|---------------------------------------|--|-------------------|--|
| Positive                              | Financial education                    | 4                 | Ergün (2018); Gerrans and Heaney (2019); Lusardi (2015); Kalwij et. al (2019); |
|                                       | Being men                              | 3                 | Agnew and Harrison (2015); Ergün (2018); Gerrans and Heaney (2019)             |
|                                       | Business major                         | 3                 | Agnew and Harrison (2015); Ergün (2018); Gerrans and Heaney (2019)             |
|                                       | Parental financial socialization       | 3                 | Brown et al. (2018); Gerrans and Heaney (2019); Grohmann et al. (2015);        |
|                                       | Wealth                                 | 2                 | Gerrans and Heaney (2019); Lusardi (2015)                                      |
|                                       | School education                       | 2                 | Ergün (2018); Grohmann et al. (2015)   |
|                                       | Income                                 | 2                 | Gerrans and Heaney (2019); Grohmann et al. (2015)                              |
|                                       | Age (before 21)                        | 2                 | Agnew and Harrison (2015); Gerrans and Heaney (2019)                           |
|                                       | Parental income                        | 1                 | Ergün (2018)   |
|                                       | A student's socioeconomic status       | 1                 | Lusardi (2015)   |
|                                       | Numeracy in primary school             | 1                 | Grohmann et al. (2015)   |
|                                       | Honors students                        | 1                 | Artavanis et al. (2019)  |
|                                       | Culture                                | 1                 | Brown et al. (2018)  |
| Students who followed friends' advice | 1                                      | Ergün (2018)      |  |
| Negative                              | Working experience in childhood        | 1                 | Grohmann et al. (2015)   |
|                                       | Money in adolescence                   | 1                 | Grohmann et al. (2015)   |
|                                       | Students living with parents           | 1                 | Ergün (2018)   |
| Neutral                               | Living in a rich country               | 1                 | Lusardi (2015)   |
|                                       | Being men                              | 1                 | Driva et al. (2015)  |
| Others                                | Gender stereotypes                     | 1                 | Driva et al. (2015)  |

Gerrans and Heaney (2019) conclude that those exposed to socialization sources (e.g. prior studies and discussions at home) have higher financial literacy scores. Brown et al. (2018, p. 68) capture parental financial socialization by constructing a measure related to observable actions of parents in fostering financial independence of their children such as “whether a student has a bank account or received the

first pocket money earlier” and find a positive association. Several articles state, that especially socio-demographic factors such as wealth, school education, income, age and parental income have positive associations with financial literacy. By contrast, Lusardi (2015) points out, that the socio-demographic factor living in a rich country does not appear to have a strong impact on the financial literacy scores of 15-year-olds. Students with good performance (better numeracy in primary school and honors students) also have better financial literacy. Further, Lusardi (2015, p. 649) states that “there is a very strong link between financial literacy and socioeconomic status; in all countries, the students who come from a higher socioeconomic status do better in financial literacy”. Brown et al. (2018, p. 62) focus on the association between culture and financial literacy and conclude, “the cultural divide in financial literacy is related to systematic differences in financial socialization across the language groups”. The study by Ergün (2018) indicates that students who mostly followed their mothers’ and fathers’ advice on financial matters are less knowledgeable than those who mostly followed their friends’ advice.

The articles related to students show three factors that have a negative effect on financial literacy. Grohmann et al. (2015, p. 23) find that “financial socialization through experience with work and money in adolescence has an unexpected negative effect on financial literacy in adulthood”. Ergün (2018, p. 11) concludes that “the students who live with their parents were more likely to be less knowledgeable about personal finance than students who live in a rental home”.

Table 3-8: Impacts from financial literacy among students

| <b>Impact</b> | <b>Impacts from financial literacy</b>                     | <b>Number of Sources</b> | <b>Sources</b>                       |
|---------------|--|--------------------------|--------------------------------------|
| Positive      | Precautionary savings                                      | 2                        | Kalwij et. al (2019); Lusardi (2015) |
|               | Financial decision making                                  | 1                        | Grohmann et al. (2015)               |
|               | Investments  | 1                        | Lusardi (2015)                       |
|               | Expected starting salaries                                 | 1                        | Artavanis et al. (2019)              |
|               | More likely to see the future benefits of higher education | 1                        | Agnew & Harrison (2015)              |
|               | Payment Estimation (student loans)                         | 1                        | Artavanis et al. (2019)              |
| Negative      | Willingness to enroll in financial education               | 1                        | Gerrans and Heaney (2019)            |

Table 3-8 presents the impacts from financial literacy during school days. Better financial literacy often leads to better saving and investment decisions of individuals (Lusardi, 2015). Kalwij et. al (2019) estimate the short-term effects of a 45-minute financial education program on financial literacy and find the improvement in actual financial literacy raises the savings behavior of children. Studies show that students with a deficit in financial literacy are more likely to significantly underestimate future loan payments (Artavanis et al., 2019), systematically expect lower starting salaries (Artavanis et al., 2019) and are less likely to see the future benefits of higher education (Agnew & Harrison, 2015). Gerrans and Heaney (2019, p. 192) describe participants of an undergraduate personal financial education as “Those enrolling had lower knowledge scores, do not display positive behaviors as often, are less aware of

financial products, exhibit poorer financial behaviors and report significantly lower satisfaction with managing their personal finances”.

### **3.5.3. Influencing factors and impacts on adults**

Thirty-nine articles analyze the group of adults. This makes adults the most popular target group for financial literacy studies. Adults are defined as all respondents with an age above 18. Thus, the influencing factors for actual financial literacy and the impacts from actual financial literacy appear to be particularly numerous as shown in Table 3-9 and Table 3-10.

Most socio-demographic factors play an important role in raising the actual financial literacy. There are nine articles that prove a positive association between income and financial literacy. Eight articles show that financial literacy is increasing in school education. Five articles state a positive association between financial literacy and wealth. Four articles confirm the positive association of being male and increasing age. Cucinelli et al. (2019, p. 1911) confirm “the findings of previous research where males, the married, individuals with a higher family income, with higher education and higher parents’ education show greater financial literacy”. Bianchi (2018, p. 839) finds that “Financial Literacy is positively correlated with Education, Income, and Wealth.”. Cucinelli et al. (2019, p. 1906) underline “a positive association between the level of financial literacy and the wealth of people in a geographical area”. As Gathergood and Weber (2017a, p. 5) note, “households holding ‘Alternative Mortgage Products’ are typically more likely to be educated, have higher average incomes and higher average wealth”. Agarwalla et al. (2015) find that women do worse in financial literacy in urban India, a pattern that is consistently spread over other countries as well. Anderson et al. (2015) show that financial literacy is increasing in age, education and income. According to Hastings and Mitchell (2018), those who answer each financial literacy question correctly are more likely to have higher monthly income, more education, and savings.

Two articles analyze the connection between financial education and financial literacy. Lusardi et al. (2015) find that online educational programs that engage the user emotionally or physically and involve vicarious experience (such as watching a video) are most effective at increasing financial literacy. As Song (2019, p. 916) notes, “financial education enables households to partially correct their misunderstanding of compound interest”. Financial socialization has a positive association with financial literacy in two articles. Haliassos et al. (2020) estimate medium- and long-run effects of peoples’ exposure to financially literate neighbors on their financial behavior and contribute to the evidence of a causal impact from exposure and of a social multiplier of financial knowledge. Cucinelli et al. (2019) suggest that people can also improve their financial knowledge through informal mechanisms rather than only through financial education and advice - for example, the socialization among family members, or in the workplace, or during leisure activities that may allow people to maintain relationships with others and acquire their skills. Boisclair et al. (2017) show that individuals who are not working (students, homemakers, and the unemployed) are consistently found to display low levels of financial literacy

internationally. The results from Ćumurović and Hyll (2019) provide support for a positive effect of financial literacy on the probability of being self-employed. Migliavacca (2020) shows the positive and significant impact from a degree in economics or finance and the respondents' willingness to learn. This together with the number of children has a positive influence on financial literacy. Ćumurović and Hyll (2019) show further a significant negative relation between growing up without parents or with one parent only and financial literacy. Gathergood and Weber (2017b) find that financial literacy among renters with a mortgage is substantially worse than among homeowners.

Table 3-9: Influencing factors of financial literacy among adults

| Associations   | Factors influencing financial literacy | Number of Sources       | Sources  |
|----------------|--|-------------------------|--|
| Positive       | Income                                 | 9                       | Agarwalla et al. (2015); Anderson et al. (2015); Bianchi (2018); Cucinelli et al. (2019); Clark et al. (2017); Gathergood and Weber (2017a); Grohmann (2017); Hastings and Mitchell (2018); Migliavacca (2020) |
|                | School education                       | 8                       | Agarwalla et al. (2015); Anderson et al. (2015); Boisclair et al. (2017); Bianchi (2018); Cucinelli et al. (2019); Gathergood and Weber (2017a); Grohmann (2017); Hastings and Mitchell (2018)                 |
|                | Wealth                                 | 5                       | Bianchi (2018); Cucinelli et al. (2019); Gathergood and Weber (2017a); Grohmann (2017); Hastings and Mitchell (2018)   |
|                | Being men                              | 4                       | Agarwalla et al. (2015); Bianchi (2018); Boisclair et al. (2017); Cucinelli et al. (2019)  |
|                | Age above 18                           | 4                       | Anderson et al. (2015); Boisclair et al. (2017); Hastings and Mitchell (2018); Xiao et al. (2015)  |
|                | Financial education                    | 2                       | Lusardi et al. (2015); Song (2019)   |
|                | Financial socialization                | 2                       | Cucinelli et al. (2019); Haliassos et al. (2020);  |
|                | Employed                               | 1                       | Boisclair et al. (2017)  |
|                | Self-employment                        | 1                       | Ćumurović & Hyll (2019)  |
|                | A degree in economics or finance       | 1                       | Migliavacca (2020)   |
|                | Number of children                     | 1                       | Migliavacca (2020)   |
|                | Married                                | 1                       | Cucinelli et al. (2019)  |
|                | Growing up with parents                | 1                       | Ćumurović & Hyll (2019)  |
|                | Homeownership                          | 1                       | Gathergood and Weber (2017b)   |
|                | Familiarity with new technologies      | 1                       | Deuflhard et al. (2019)  |
|                | Willingness to learn                   | 1                       | Migliavacca (2020)   |
|                | Financial responsibility               | 1                       | Ward and Lynch Jr. (2018)  |
|                | Independent financial advisers         | 1                       | Migliavacca (2020)   |
|                | Bank information policies              | 1                       | Fort et al. (2016)   |
|                | Labor market condition                 | 1                       | Cucinelli et al. (2019)  |
| Social capital | 1                                      | Cucinelli et al. (2019) |  |

|          |                                      |   |   |
|----------|--------------------------------------|---|---|
| Negative | Married                              | 1 | Bianchi (2018)                            |
|          | Impatient                            | 1 | Bianchi (2018)                            |
|          | Poverty rate                         | 1 | Cucinelli et al. (2019)                   |
| Neutral  | Individual received financial advice | 2 | Deuflhard et al. (2019); Gaudecker (2015) |
|          | Married                              | 1 | Migliavacca (2020)                        |
|          | Risk and ambiguity                   | 1 | Bianchi (2018)                            |
|          | Age                                  | 1 | Migliavacca (2020)                        |

In addition to socio-demographic factors, there are also some individual psychological and external environmental factors that could positively affect financial literacy. Ward and Lynch Jr. (2018) find that, as long-term relationships of couples lengthen, high levels of financial responsibility associate with increases in financial literacy, whereas low levels of financial responsibility are not. The results by Migliavacca (2020, p. 1) indicate that “financial advisors have a significant educational role; in particular, the presence of independent financial advisors tends to increase the ‘advanced’ financial literacy of their clients”. Fort et al. (2016, p. 773) find that “bank information policies are effective in improving financial literacy and influencing financial decisions for a small fraction of individuals in the population and mostly so for the 60+ and low educated”. Cucinelli et al. (2019) perform a multilevel regression model and find that variables such as human capital and labor market conditions show a significant relationship with financial literacy at the individual level. Deuflhard et al. (2019) suggest that a sizable part of the effect of advanced financial literacy on the ‘Adjustable Rate Mortgage’ derives from familiarity with new technologies and the willingness and ability to use self-managed online banking.

There are three negative factors influencing financial literacy. Bianchi (2018) reports the correlation between financial literacy and a set of demographic factors and finds that marriage and impatience is negatively correlated with financial literacy. Cucinelli et al. (2019, p. 1876) find that “poverty rate measured at the regional level show a significant relationship with financial literacy at the individual level”.

Some factors have no significant relationship with financial literacy. Deuflhard et al. (2019) add a dummy denoting whether the individual received financial advice. This dummy turns out insignificant and leaves the results unchanged. Gaudecker (2015, p. 498) points out that, “There is no significant difference from those who rely on their network of family and friends”. Bianchi (2018) considers preferences over risk and ambiguity and observes no significant relationship with financial literacy. The results of the baseline model by Migliavacca (2020, p. 9) confirm that, “Neither the age, nor the marital status appear to influence the degree of financial literacy, but interestingly enough the presence of children does, increasing by around 3% the probability of ending up in the highest quartile of the financial literacy scores distribution”.

Financial literacy also has a significant effect on individual’s financial behaviors and financial decisions. Table 3-10 shows the positive, negative and neutral impacts from actual financial literacy by

reviewing 39 articles about adults. There are five articles that discuss the association between precautionary savings and financial literacy and state that the inadequacy in many countries is common. Among them, there are four positive associations and one neutral association. According to Boisclair et al. (2017, p. 277), “Retirement planning is strongly associated with financial literacy; those who responded correctly to all three financial literacy questions are 10 percentage points more likely to have retirement savings”. Clark et al. (2017) show that higher levels of financial literacy have a beneficial impact on retirement saving patterns. Hastings and Mitchell (2018, p. 13) point out that, “Financial literacy is positive associated with more retirement saving, but it is less closely associated with sensitivity to framing of investment information”. Song (2019, p. 916) finds that “explaining the concept of compound interest to subjects increased pension contributions by roughly 40%”. Hastings and Mitchell (2018) investigate the effects of exposure to knowledgeable initial neighbors and find a positive effect of access to financially literate neighbors on saving for retirement through private accounts. However, Fort et al. (2016) do not find evidence that households with higher financial literacy associate with a stronger attitude to plan for retirement or have a higher saving rate.

Table 3-10: Actual financial literacy with its impacts on adults

| <b>Impact</b> | <b>Impacts from financial literacy</b>                              | <b>Number of Sources</b> | <b>Sources</b>   |
|---------------|---|--------------------------|--|
| Positive      | Precautionary savings   | 5                        | Boisclair et al. (2017); Clark et al. (2017); Haliassos et al. (2020); Hastings and Mitchell (2018); Song (2019) |
|               | Probability of holding stocks                                       | 4                        | Bianchi (2018); Fort et al. (2016); Grohmann et al. (2015); Haliassos et al. (2020)                              |
|               | Financial behavior  | 3                        | Agarwalla et al. (2015); Allgood and Walstad (2016); Grohmann (2017)   |
|               | Portfolio returns   | 3                        | Bianchi (2018); Clark et al. (2017); Gaudecker (2015)  |
|               | Household financial assets  | 3                        | Allgood and Walstad (2016); Fort et al. (2016); Kadoya et al. (2018)   |
|               | Number of different holding financial products                      | 1                        | Bianchi (2018)   |
|               | Savings account returns   | 1                        | Deuffhard et al. (2019)  |
|               | Hold riskier positions  | 1                        | Bianchi (2018)   |
|               | More likely to own as assets other than a savings account           | 1                        | Grohmann (2017)  |
|               | More likely to own a fixed deposit                                  | 1                        | Grohmann (2017)  |
|               | Willingness to accept financial advice (except for debt counseling) | 1                        | Allgood and Walstad (2016)   |
|               | Understanding reporting incentives                                  | 1                        | Krische (2019)   |
|               | Derivatives market participation                                    | 1                        | Hsiao and Tsai (2017)  |
|               | Financial inclusion   | 1                        | Grohmann et al. (2018)   |
|               | Fraud detection   | 1                        | Engels et al. (2020)   |
|               | Willingness to pay for energy efficiency                            | 1                        | Brent and Ward (2018)  |
|               | The longer one is in a relationship (for the household CFO)         | 1                        | Ward and Lynch Jr. (2018)  |
|               | Assets reduce anxiety about life in old age                         | 1                        | Kadoya et al. (2018)   |
|               | Insurance (life, health, auto)                                      | 1                        | Allgood and Walstad (2016)   |

|          |   |   |  |
|----------|---|---|--|
| Negative | Use debt counseling   | 2 | Allgood and Walstad (2016); Disney et al. (2015)           |
|          | Holding alternative mortgage products                               | 2 | Gathergood and Weber (2017a); Gathergood and Weber (2017b) |
|          | Willingness to accept financial advice                              | 1 | Stolper (2018)   |
|          | Adverse debt behaviors  | 1 | Gathergood and Weber (2017b)                               |
|          | Portfolio Inertia   | 1 | Bianchi (2018)   |
|          | Return loss resulting from underdiversification (after-fee returns) | 1 | Gaudecker (2015)   |
|          | Holding adjustable rate mortgage                                    | 1 | Gathergood and Weber (2017a)                               |
|          | Joint-Family  | 1 | Agarwalla et al. (2015)                                    |
|          | Social security reduce anxiety about life in old age                | 1 | Kadoya et al. (2018)                                       |
|          | Minority  | 1 | Boisclair et al. (2017)                                    |
|          | Life insurance  | 1 | Grohmann (2017)  |
| Neutral  | Willingness to accept financial advice                              | 1 | Kramer (2016)  |
|          | Framing of investment information                                   | 1 | Hastings and Mitchell (2018)                               |
|          | Precautionary savings   | 1 | Fort et al. (2016)   |
|          | Actual/perceived knowledge of personal loans' total costs           | 1 | Farías (2019)  |
|          | Purchase recency  | 1 | Farías (2019)  |
|          | Adverse debt behaviors and household net worth                      | 1 | French and McKillop (2016)                                 |
|          | Loan  | 1 | Allgood and Walstad (2016)                                 |

The positive association between the probability of holding stocks and financial literacy is mentioned four times. Bianchi (2018) shows that financial literacy correlates with stock market participation and holdings of financial products. The reported results by Fort et al. (2016, p. 763) suggest that “financial literacy leads to an increase in stock market participation and to a more diversified portfolio”. Haliassos et al. (2020) find the positive effect of access to financially literate neighbors on participation in stockholdings. The results from Grohmann et al. (2015, p. 20) indicate that “a one-point increase in the financial literacy score is associated with 2 percentage points increase in the probability of owning stocks”. Three articles show the positive association between financial behavior and financial literacy. Agarwalla et al. (2015, p. 15) conclude that “the correlation between financial knowledge and financial behavior was positive and highly significant”. Allgood and Walstad (2016, p. 675) analyze five financial products (credit cards, investments, loans, insurance, and financial advice) to investigate the association with financial literacy and find that “both actual and perceived financial literacy appear to influence financial behaviors and that perceived financial literacy may be as important as actual financial literacy”. Grohmann (2017) studies the financial behavior and financial literacy in emerging Asia and finds that the relationship between financial literacy and better financial behavior is statistically significant and economically meaningful.

Portfolio returns are also positively correlated to financial literacy. According to Bianchi (2018, p. 831), “More literate households are more likely to buy assets that provide higher returns than the assets that they sell”. Clark et al. (2017) research whether financial literacy is related to investment returns and

found that more financially literate employees are better investors. The results from Gaudecker (2015, p. 505) show that “the largest losses resulting from underdiversification incur by those who neither turn to external help with their investments nor have good skills in basic financial-numerical operations and concepts”. Actual financial literacy could help to accumulate financial assets. A financial asset is a liquid asset that gets its value from a contractual right or ownership claim, such as cash, stocks, bonds, mutual funds, and bank. According to Bianchi (2018, p. 689), “Adults with high perceived and actual financial literacy are 21 percentage points more likely to have financial investments in stocks, bonds, mutual funds, or other securities than those adults with low perceived and actual financial literacy, indicating that they are more capable of building wealth through investing”. Fort et al. (2016) find that one standard deviation increase in financial literacy determines an increase in household financial assets by 35% (on average 8,000 euros). Kadoya et al. (2018, p. 15) provide evidence that “financially literate people are more capable of accumulating assets through which they reduce old age anxiety”.

More literate households hold more different financial products and get more saving account returns. Bianchi (2018) observes a positive relationship between financial literacy and financial products (e.g. individual stocks, bonds, mutual funds) held by households. Deuflhard et al. (2019, p. 132) find that “financial literacy has a significant relationship with households’ individual returns on saving accounts: a one-standard deviation higher advanced financial literacy is associated with an approximately 29 basis points higher interest rate, which represents an increase of 12% compared to the median interest rate of 2.5%”. According to Grohmann (2017, p. 26), “financially literate individuals are more likely to own assets other than a savings account and are more likely to own a fixed deposit account”.

Allgood and Walstad (2016, p. 691) point out that, “Adults with high perceived and actual financial literacy compared with adults with low perceived and actual financial literacy are significantly more likely to seek financial advice about savings and investments, mortgages or loans, or tax planning”. However, debt counseling is an exception. According to Allgood and Walstad (2016, p. 692), “Adults who are more financially literate are better able to manage their personal finances and thus would be less likely to seek or use debt counseling”. Disney et al. (2015, p. 485) also prove a negative association between debt counseling and actual financial literacy, “for a given debt problem, financial literacy decreased the likelihood of an individual seeking help and assistance from a credit counselor by approximately 60%”.

Krische (2019, p. 1656) provides evidence that “participants’ financial literacy moderates the influence of disclosure format and reporting incentives on the risk assessments of participants who are proxying for investors based on their education”. Hsiao and Tsai (2017, p. 7) reveal “significant and increasing relationships between financial literacy and derivatives market participation” and provide “support for the argument that complex derivatives products impose high entry barriers on individuals, with such individuals requiring relatively high financial literacy levels to overcome these barriers and participate in the derivatives markets”. Grohmann et al. (2018) show that a higher degree of financial literacy has a clear beneficial effect on financial inclusion (measured as access to and use of financial services).

Engels et al. (2020) find that more financially knowledgeable individuals have a higher propensity to detect fraud. Brent and Ward (2018, p. 1) investigate the correlation between financial literacy and willingness to pay for energy efficiency and find that “A one standard deviation increase in our metric of financial literacy increases the willingness to pay for reduced operating costs by 9%”. According to Ward and Lynch Jr. (2018), at the beginning of relationships, partners who adopt the role of household CFO have no greater financial literacy than those who do not. “However, the longer couples have been together, the more CFOs come to dominate non-CFOs in financial literacy” (Ward & Lynch Jr., 2018, p. 1031). Kadoya et al. (2018, p. 2) provide evidence that “assets significantly reduce anxiety about life in old age only for people who are more financially literate.”. Allgood and Walstad (2016, p. 690) present a relatively small correlation between financial literacy and insurance, “Adults with high perceived and high actual financial literacy are 4 percentage points more likely to have health insurance, life insurance, or auto insurance compared to adults with low perceived and actual financial literacy”.

Except using debt counseling, there are also some other negative impacts from financial literacy. Gathergood and Weber (2017a, p. 24) show a negative correlation between financial literacy and holding Alternative Mortgage Products (AMP), “a one-point increase in financial literacy lowers the likelihood of an individual holding an AMP by 53%”. According to Gathergood and Weber (2017b, p. 1), “Young homeowners with poorer financial literacy take on larger mortgage debts and are more likely to use alternative mortgage products”. Stolper (2018, p. 26) prove that “standardized financial advice is not able to break up the negative impact from financial sophistication on the implementation of financial advice”. Bianchi (2018) points out that, households with lower financial literacy display greater portfolio inertia. According to Gathergood and Weber (2017a, p. 1), “Financially literate individuals are also more likely to choose an Adjustable Rate Mortgage (ARM), suggesting they avoid paying the term premium of a fixed rate mortgage”. Agarwalla et al. (2015, p. 12) find that, “Living in a joint family negatively impacted the level of financial knowledge with the odds ratios declining to about one-third in both the comparisons”. Further Kadoya et al. (2018, p. 2) show “For less financially literate people, social security plays an important role in reducing anxiety about life in old age”. Boisclair et al. (2017, p. 286) conclude that, “self-declared ‘visible minority status’ seems to be strongly correlated with lower financial literacy. Respondents who identify themselves as belonging to a visible minority fare much worse, on average, than those who do not”. Grohmann (2017) states that financially literate individuals are less likely to own a life insurance, which gives low returns notoriously.

Other articles also investigate the impacts from actual financial literacy but find no correlation. Kramer (2016) reports that people with higher perceived financial literacy are less likely to seek financial advice, but there is no relation between objective measures of literacy and advice seeking. Fariás (2019) shows that financial literacy has no main effect on actual and perceived knowledge of personal loans' total costs and the effect of purchase recency on perceived knowledge of personal loans' total costs is not moderated by financial literacy. According to French and McKillop (2016, p. 1), money management skills promote awareness of financial situations, by encouraging households to manage bills more

effectively and by improving budgeting skills. They conclude that “money management skills are important determinants of consumer debt behaviour and household net worth but that numeracy has almost no role to play”.

In some cases, the impacts from actual financial literacy are based more on the respective conditions than on actual financial literacy. Allgood and Walstad (2016, p. 695) prove that “It is this combination of actual financial knowledge and perceived financial knowledge that may have the greatest influence on the financial behaviors generally recommended by financial experts for improving financial well-being”. They investigate five financial products, namely credit cards, investments, loans, insurance, and financial advice. “Actual literacy has a positive, statistically significant relationship with each behavior when perceived financial literacy is low. However, when perceived financial literacy is high, actual literacy is statistically unrelated to shopping for either type of loan” (Allgood & Walstad, 2016, p. 690).

#### **3.5.4. Influencing factors and impacts on elderly people**

Elderly people are the third target group for surveys of individual’s actual financial literacy. They take increasing responsibility for managing retirement portfolios. Not only financial decisions but also financial behaviors of the elderly differ from students and adults. Five reviewed articles investigate the elderly. The mostly discussed influencing factors are positively associated with actual financial literacy for the elderly, as shown in Table 3-11.

Xue et al. (2018, p. 887) investigate 3,484 elderly Australians aged 55 or above and found that “younger, married males with higher income and greater net wealth are more likely to be financially literate. Better financial literacy also associates with good health, higher educational attainment, better occupation and outright home ownership”, which is also proved for adults and students. Gamble et al. (2015, p. 485) confirm the findings in the existing literature that “levels of financial literacy are strongly linked to prior financial education”. Bavafa et al. (2019, p. 877) evaluate the impact from online search activities on the levels of financial and health literacy and find that using the internet for such information increases literacy significantly: doing so frequently (versus not at all) increases financial literacy by 16%”. By measuring the cognitive ability (fluid and crystallized intelligence), Finke et al. (2017) find that, the decline of cognitive ability in old age contributes to falling financial literacy scores. Hsu (2016, p. 8) points out that, “As the time to widowhood shortens, women are more likely to follow the stock market more closely. This is consistent with women learning more about finance as they approach widowhood”.

There is one negative factor that influences individual’s financial literacy. According to Finke et al. (2017), Hsu (2016) and Xue et al. (2018), actual financial literacy declines with increasing age among the elderly. They find a consistent linear decline in financial literacy score after the age of 60. According to Finke et al. (2017, p. 213), “A nearly identical rate of decline among men, stockowners, older, and

college educated respondents indicates that cohort effects are not driving the results. Confidence in financial decision-making abilities does not decline with age”. Hsu (2016) estimates the age profile and finds that men’s financial sophistication follows a flat or upside-down U-shape, while financial literacy declines after age 60. However, women’s financial literacy is upward sloping with respect to their husband’s age.

Table 3-11: Influencing factors with actual financial literacy for the elderly

| <b>Associations</b> | <b>Factors influencing financial literacy</b> | <b>Number of Sources</b> | <b>Sources</b>                                     |
|---------------------|---|--------------------------|--|
| Positive            | School education                              | 1                        | Xue et al. (2018)                                  |
|                     | Income  | 1                        | Xue et al. (2018)                                  |
|                     | Wealth  | 1                        | Xue et al. (2018)                                  |
|                     | Married                                       | 1                        | Xue et al. (2018)                                  |
|                     | Being men                                     | 1                        | Xue et al. (2018)                                  |
|                     | Occupation                                    | 1                        | Xue et al. (2018)                                  |
|                     | White   | 1                        | Xue et al. (2018)                                  |
|                     | Health  | 1                        | Xue et al. (2018)                                  |
|                     | Self-assessed health                          | 1                        | Xue et al. (2018)                                  |
|                     | Financial education                           | 1                        | Gamble et al. (2015)                               |
|                     | Familiarity with new technologies             | 1                        | Bavafa et al. (2019)                               |
|                     | Cognition                                     | 1                        | Finke et al. (2017)                                |
|                     | Homeownership                                 | 1                        | Xue et al. (2018)                                  |
|                     | Approach widowhood (being female)             | 1                        | Hsu (2016)   |
| Negative            | Age after 60                                  | 3                        | Finke et al. (2017); Hsu (2016); Xue et al. (2018) |

Table 3-12 shows the impacts from actual financial literacy. Gamble et al. (2015, p. 485) prove the negative association between credit counseling and financial literacy. According to them, credit counseling is a substitute for poor financial literacy, “for a given debt problem, financial literacy decreased the likelihood of an individual seeking help and assistance from a credit counselor by approximately 60%”. French and McKillop (2016, p. 2) demonstrate the neutral association between adverse debt behaviors and financial literacy. They state that “money management and not financial literacy ameliorates a range of adverse debt behaviours”.

Table 3-12: Actual financial literacy with its impacts on elderly

| <b>Impact</b> | <b>Impacts from financial literacy</b> | <b>Number of Sources</b> | <b>Sources</b>             |
|---------------|--|--------------------------|----------------------------|
| Negative      | Credit counseling                      | 1                        | Gamble et al. (2015)       |
| Neutral       | Adverse debt behaviors                 | 1                        | French and McKillop (2016) |

### 3.5.5. Perceived financial literacy - Influencing factors and impacts

While most of the 59 articles in this review examine actual financial literacy, some of the articles also investigate perceived financial literacy. The measures of perceived financial literacy are usually calculated using a Likert scale. The questions look most of the time like “I am good at dealing with day-to-day financial matters, such as checking accounts, credit cards, mortgages, installment payments, and budgeting,” and “I understand the stock market reasonably well” (Hsu, 2016, p. 7).

Table 3-13 shows four positive influencing factors for perceived financial literacy. Gerrans and Heaney (2019) and Lusardi et al. (2015) suggest that financial educational programs such as watching a video or completing a financial education unit are key for improving confidence in financial knowledge. Finke et al. (2017) and Xiao et al. (2015) show that confidence in financial literacy does not decline with age. Hsu (2016, p. 7) concludes that, “reductions in the time to widowhood are associated with increases in self-rated stock market knowledge and self-rated financial skills”. Anderson et al. (2015, p. 14) prove that, “entrepreneurs are optimistic and overconfident across a wide variety of domains”.

As shown in Table 3-14, perceived financial literacy also has a substantial impact on financial decision making and financial behaviors. Most of the impacts are positive associated with perceived financial literacy. Allgood and Walstad (2016, p. 689) prove that “the change in perceived financial literacy is significant and important in affecting investment behaviors no matter what the level of actual financial literacy” is. According to Krische (2019, p. 1662), “Investors are more likely to have higher self-assessed financial abilities and have higher financial literacy scores”. Farrell et al. (2016, p. 95) show that “women who have higher levels of financial self-efficacy are more likely to have an investment, mortgage or savings account, while being less likely to have a credit card or loan”. Bannier and Neubert (2016, p. 130) prove that “sophisticated investments are significantly related to perceived financial literacy with an even stronger association for women than for men”. Anderson et al. (2015) conclude that financial literacy, precautionary savings and retirement planning are positively correlated. This correlation is mostly driven by perceived, not actual literacy. They also show that perceptions drive decision-making among low-literacy respondents and are associated with mistaken beliefs about financial products and financial decision making. According to Allgood and Walstad (2016), adults with a high perceived financial literacy are except for debt counselling more likely to strive for financial advice regarding savings and investments, mortgages, loans and tax planning.

Table 3-13: Factors influencing perceived financial literacy

| Associations | Factors influencing financial literacy | Number of Sources | Sources  |
|--------------|--|-------------------|--|
| Positive     | Financial education                    | 2                 | Gerrans and Heaney (2019); Lusardi et al. (2015) |
|              | Age                                    | 2                 | Finke et al. (2017); Xiao et al. (2015)          |
|              | Approach widowhood                     | 1                 | Hsu (2016)                                       |
|              | Entrepreneurs                          | 1                 | Anderson et al. (2015)                           |

Although higher perceived financial literacy has a positive effect on many financial behaviors, it has a negative effect on the willingness to accept financial advice (Anderson et al., 2015). Kramer (2016, p. 198) finds that “people with higher confidence in their own financial literacy are less likely to seek financial advice, but no relation between objective measures of literacy and advice seeking”. Allgood and Walstad (2016, p. 690) prove that, “when perceived financial literacy is high, actual literacy is statistically unrelated to shopping for either type of loan”.

Some articles also show neutral associations. Finke et al. (2017, p. 227) say that “it is not so much the imbalance between confidence and knowledge that is causing poor financial decisions, but the low financial literacy itself”. Bannier and Neubert (2016, p. 130) state that “standard investments are strongly associated with both actual and perceived financial literacy for men, but only with actual literacy for women”.

Table 3-14: Perceived financial literacy with its impacts

| Impact   | Impacts from financial literacy               | Number of Sources | Sources  |
|----------|---|-------------------|--|
| Positive | Standard investments (being men)              | 3                 | Allgood and Walstad (2016); Bannier and Neubert (2016); Krische (2019) |
|          | Standard investments (being female)           | 3                 | Allgood and Walstad (2016); Farrell et al. (2016); Krische (2019)      |
|          | Sophisticated investments                     | 1                 | Bannier and Neubert (2016)   |
|          | Having a mortgage                             | 1                 | Farrell et al. (2016)  |
|          | Precautionary savings and retirement planning | 1                 | Anderson et al. (2015)   |
|          | Mistaken beliefs about financial products     | 1                 | Anderson et al. (2015)   |
|          | Hold savings products (being female)          | 1                 | Farrell et al. (2016)  |
|          | Willingness to accept financial advice        | 1                 | Allgood and Walstad (2016)   |
|          | Financial decision making                     | 1                 | Anderson et al. (2015)   |
| Negative | Willingness to accept financial advice        | 2                 | Anderson et al. (2015); Kramer (2016)                                  |
|          | Loans or credit cards                         | 2                 | Allgood and Walstad (2016); Farrell et al. (2016)                      |
| Neutral  | Financial decision making                     | 1                 | Finke et al. (2017)  |
|          | Standard investment (being female)            | 1                 | Bannier and Neubert (2016)   |

**3.5.6. The overall view**

The three research groups for actual financial literacy and perceived financial literacy can be summarized in a comprehensive view. The most important influencing factors and impacts mentioned in the articles are incorporated into the model presented in Figure 3-4. The positive relationships are displayed as continuous lines with an arrow, while dashed lines with an arrow represent negative associations. The grey dashed lines without arrows represent the neutral associations. The only dotted line with an arrow

represents the relationship between “agree with stereotypes” and actual financial literacy. These stereotypes mean the beliefs that, teenagers of both genders believe that boys have higher interest and ability regarding financial matters. Driva et al. (2015, p. 2) prove that, “The more strongly teenagers agree with such stereotypes, the wider the gender gap in financial literacy”, which could not be simply classified in a positive or negative association in the figure and is therefore shown as the category “others”.

Most of the influencing factors are socio-demographic factors, such as parental and school education, socialization, being male, wealth, culture, financially literate employees, business major, occupation, income, assets, married, good health, homeownership and age before 60. They increase the individual’s actual financial literacy. Individuals’ actual financial literacy could also benefit from external environment, such as advice from friends or neighbors, improved bank information policies, online information and financial education and better presentation format for financial education. Actual financial literacy is also associated with financial responsibility. The longer couples are in a relationship, the better financially responsible individuals become regarding actual financial literacy. Individuals with working experience before the age of 18 or minorities, appear to have lower actual financial literacy. Students or adults who live with their parents know less about personal finance. Homeowners compared to renters have a generally high financial literacy. As the age of older people increases, cognitive abilities on financial literacy gradually decline. However, women are more likely to learn more about finances as they approach widowhood. Age also positively affects perceived financial literacy. Financial education can not only improve individual’s actual financial literacy, but also the perceived financial literacy.

Better financial literacy has a positive impact on financial decision making and financial behaviors. As shown in Figure 3-4, an individual with a high level of actual financial literacy has a number of benefits. So for example he or she is more likely to make better financial decisions, sees the future benefits of higher education and is more likely to participate in the stock market and the derivatives market. Further, the individual holds a better diversified investment portfolio, with a better performance and riskier positions, contributes more for pensions, detects easier fraud information and owns more assets. A higher degree of actual financial literacy also has a clear beneficial effect on financial inclusion and on the access to a finance-firm growth relationship. In addition, an individual with a higher degree of actual financial literacy is less likely to hold Alternative Mortgage Products, owns a life insurance, underestimates future student loan payments, enrolls in financial education, uses debt counseling and has lower losses resulting from underdiversification. Actual financial literacy has no impact on consumer debt behavior and household net worth. Perceived financial literacy positively affects retirement savings, investments and credit card use behavior.

However, other articles also prove that, perceived financial literacy has no influence on financial decision making and investments. Women who have higher levels of financial self-efficacy are less likely to have a loan or mortgage. Some articles show a complicated relationship between financial behaviors and perceived financial literacy. While Kramer (2016) states that, individuals with a high perceived literacy are less likely to seek financial advice, Allgood and Walstad (2016) contradict that

statement and show the contrary. Respective financial behaviors are affected not only by financial literacy, but by other financial behaviors as well. According to Krische (2019, p. 1634), “First, investment experience strengthens the influence of financial accounting disclosures on participants’ investment-related judgments. Second, financial literacy further strengthens the influence of financial accounting disclosures on investors’ judgments”. Individuals who turn to external help with their investments have lower losses resulting from underdiversification. Besides, local house price dynamics affect the holding of Alternative Mortgage Products and Adjustable Rate Mortgage positively. Further patience does not affect the holding of an Adjustable Rate Mortgage.

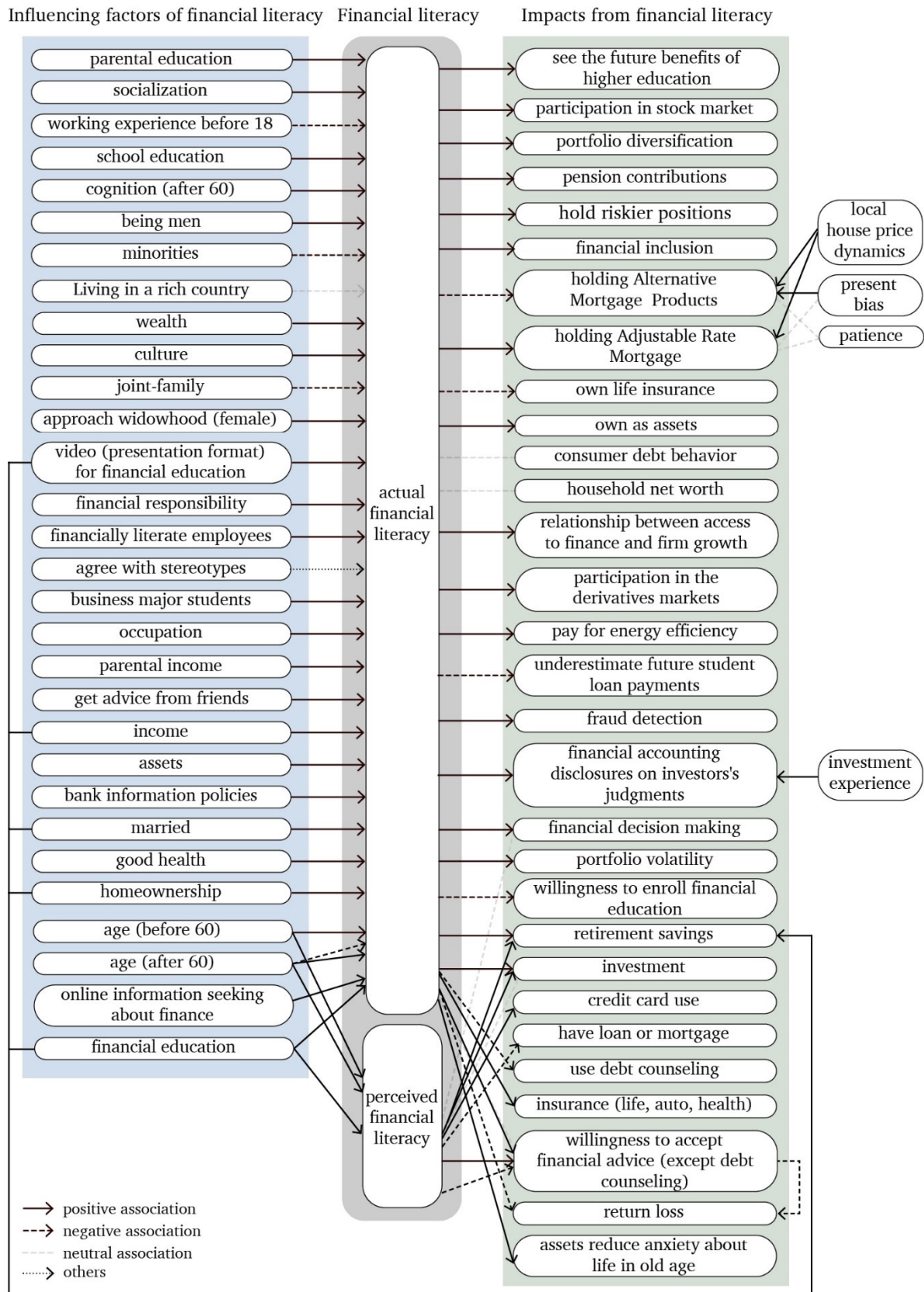


Figure 3-4: The overall view of financial literacy

### 3.6. Conclusion

Financial literacy is a field that has been researched a lot. Although the number of publications on this topic has been declining in recent years, financial literacy is still of crucial importance for individuals, countries, and researchers. In the past five years, studies have explored the influencing factors and impacts related to financial literacy by investigating different age groups. This paper highlights the impacts from financial literacy on financial decisions and behaviors. Not only the actual financial literacy, but also the perceived financial literacy is studied. Still, only individual aspects are investigated; as such, no overall view has illustrated the associations of the aforementioned factors and impacts from financial literacy.

The lack of financial literacy and the misperception of crucial economic factors have an impact on the ability of individuals to fulfill long-term goals such as a better money management, home purchase, tertiary education, pension financing, optimal investment choices and wealth accumulation (Ergün, 2018; Fort et al., 2016). However, large proportions of populations at all levels of economic and financial developments demonstrate only low basic financial literacy. To avoid unnecessary debts and poor pension provision it is extremely important to improve individual's actual financial literacy. Apart from some socio-demographic factors such as gender, age and culture, which cannot be changed for an individual, lots of external influencing factors also play a significant role on improving financial literacy.

Through improved external influencing factors such as better presentation formats for financial education and better bank information policies, individual's financial knowledge increases. In recent years, many countries have paid much attention to financial education. Although most studies prove that education could effectively improve financial literacy, Berry et al. (2018) show that financial education only has positive impacts on self-reported savings at school, but does not lead to statistically significant increases in aggregate savings nor in examined factors such as attitudes, preferences, or knowledge. It seems like, there is still much room for improvements in education among different countries. Financial education should pay more attention to an adequate content, the presentation format, the gender effect and the individual's cognitive ability. Individuals who seek financial advice can improve their financial decisions. This financial advice could come from friends, parents, neighbors and consultants. As a result, people from a higher socioeconomic status do better in financial literacy. On average, private individuals do not have the necessary financial competence to make an adequate long-term provision.

Furthermore, the methods used to assess financial literacy often result in low competence levels, whereby they only measure financial fundamentals. This puts the results of countries and individuals with a high competence into perspective. The current situation illustrates an increasing need for action for the affected people. The responsibility in old-age provision leaves people with a low financial literacy unprepared. Without intervention, the shift from public to private pension provision will drive and reinforce social inequalities. There is an urgent need for research into which interventions will be effective in the long term. The necessary reform of financial education as well as causes for higher skills

deficits among women and low-income households are of high relevance. These are avenues to future research. As financial education and parental education can greatly improve financial literacy, future studies could investigate how to maximize the contribution of parents and schools in financial literacy programs. Since all of the articles focus on financial behaviors in a static context, the financial behaviors in a dynamic context over the life cycle could be a fascinating area for future work. Further, due to the adverse effect of financial sophistication that people with a great confidence in their financial literacy don't accept financial advice, future research could investigate what makes people follow financial advice in general.

## Chapter 4

# **Multipliers of Financial Literacy in Germany and Russia?**

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# Multipliers of Financial Literacy in Germany and Russia?

Viktoriiia Dembinskaite<sup>38</sup>, Eduard Gaar<sup>39</sup>, Tatjana Nikitina<sup>40</sup>, Dirk Schiereck<sup>41</sup>

## Abstract

In Germany and Russia, the majority of the population shows significant deficits in financial literacy. To overcome this situation both countries need people who are able to share and teach their knowledge. Economic students could be such multipliers. Therefore, it is important to understand the qualification of these students as ambassadors of financial literacy.

We examine the financial competence of German and Russian economic students. Based on a survey with international-comparable questions we find that most students perform indeed better than the international average. But only few students are able to answer all questions correctly with gender and age specific divergences. Women perform better at numeracy but worse at financial questions and younger students perform worse than older. Finally, we show that students with better understanding and education in finance are more likely to assign a probability to future crisis and that Russian students are more pessimistic than German students.

**Keywords:** Financial Literacy; Financial Competence; Economic Students; Retirement Planning; Crisis Expectation

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## 4.1. Introduction

Many studies provide evidence that a large proportion of the population knows little about finance and that many individuals are unfamiliar with basic economic concepts, such as risk diversification in stock investing, inflation, and interest compounding (OECD, 2006, 2008). This lack of knowledge is one reason why individuals avoid dealing with topics like personal retirement saving or equity investing. Emerging a retirement saving system from a more or less complete government provision to more private individual investing enforces on individuals the responsibility to save, invest and consume reasonable over a lifetime cycle (Lusardi & Mitchell, 2011b) and depends on individuals possessing the skills needed to manage their financial responsibilities well. Research from Lusardi and Mitchell (2017) and van Rooij et al. (2011a) into retirement savings behaviour shows that financial skills, retirement planning and retirement income are strongly related and that retirement planning is a strong predictor of wealth. Higher levels of financial knowledge are associated with increased stock market participation (Yoong, 2011; van Rooij et al., 2011b), higher private retirement savings (Bucher-Koenen, 2009), greater portfolio diversification (Guiso & Jappelli, 2008) and increased wealth holdings (Lusardi & Mitchell, 2007a; van Rooij et al., 2012; Behrman et al., 2012). Further, Gerardi et al. (2010) show that mortgage delinquency rates are higher among borrowers with poor numerical ability (using the same measure of numeracy we use here) and Banks and Oldfield (2007) link poor numeracy with low savings.

Based on the relationship between financial literacy and retirement savings it is hardly surprising that there is overall a low level of financial knowledge in countries like Germany and Russia. Bucher-Koenen and Lusardi (2011) document this low level of financial literacy in Germany, and there is an ongoing debate how to overcome this undesired state of knowledge. Given the large number of less informed, often older people politicians are looking for multipliers who share their superior knowledge and teach financial literacy. Students of economics could be such multipliers. Consequently, we analyse whether a university education in economics leads to superior investment knowledge to enable people for an effective retirement planning. To address this question, we conduct a comparable survey (Lusardi & Mitchell, 2017; Gerardi et al., 2010) for assessing numeracy, basic and sophisticated financial literacy at top universities in Germany and Russia respectively. This survey design facilitates to compare our results directly with outcomes from earlier studies in other countries. The findings show a good general financial knowledge but still difficulties when it comes to more sophisticated questions and answering all questions correctly.

In search for a simple proxy to forecast who might be especially qualified to communicate financial topics we analyse the link between mathematical and financial knowledge. The known good mathematical education of Russian students indicates good numeracy results. Our findings confirm these math skills but do not show a link to financial knowledge. Actually, a country comparison shows worse results for Russian economic students than for general populations.

The rest of the study is organized as follows. In section 4.2 we introduce the theoretical framework for financial literacy and present patterns often analysed in the context of financial literacy. Section 4.3 provides information on data and methodology, before section 4.4 shows the results. Section 4.5 summarizes the findings and concludes.

## **4.2. Theoretical Framework for Financial Literacy**

Financial planning of household finances is an important type of non-market production that requires its own form of human capital, especially financial literacy. Like human capital, financial literacy accumulation is purposive based on its costs and benefits. Public and scholarly interest in financial literacy and informed financial decision-making is increasing in part because of the poor financial outcomes that are associated with low levels of financial literacy: problems with debt (Lusardi & Tufano, 2009) and lack of retirement planning (Lusardi & Mitchell, 2007c, 2017), among others. Especially the connection between financial literacy and retirement planning is of particular importance. Even after accounting for a large set of economic characteristics and circumstances the results that those who are more financially literate are more likely to plan for retirement are striking consistent throughout international studies (Lusardi & Mitchell, 2011b). Given that there is no evidence that people invest much in financial knowledge, partially because of a lack of adult education programs in several countries, a few papers have begun to examine the decision to acquire financial literacy and to study the links between financial knowledge, saving and investment behaviour, especially incentives to invest (Delavande et al., 2008; Jappelli & Padula, 2013; Hsu, 2016; Lusardi et al., 2013).

The notion that financial knowledge is a form of human capital was introduced in Delavande et al. (2008), which related the production of human capital to portfolio choice. Usually studies analysing financial literacy harness a two period approach of saving and portfolio allocation across different assets and allow the acquisition of human capital in form of financial knowledge. The results suggest that individuals acquire knowledge mostly when it becomes relevant (Hsu, 2016), that wealth and financial literacy are strongly correlated (Banks & Oldfield, 2007; van Rooij et al., 2007) and that in countries with generous social security benefits the incentives to save and accumulate wealth and to invest in financial literacy are smaller (Jappelli & Padula, 2013).

Several studies show that these patterns are consistent through different countries or stages of economic development and that financial illiteracy is widespread even when financial markets are well developed as in the U.S., Germany, the Netherlands, Sweden, Italy, Japan, and New Zealand (Lusardi & Mitchell, 2011b). However, there are differences across countries. For example, where people score high on math and science tests, they also tend to score high on questions measuring numeracy (e.g. the Programme for International Student Assessment; (OECD, 2005)). Furthermore, people are more knowledgeable about inflation if their country has experienced it recently. For example, Italians are more likely to answer the question on inflation correctly. Conversely, in a country like Japan that expe-

rienced deflation, fewer people answer the inflation question correctly. If a country like Sweden experienced a pension privatization in recent times the people are more aware of risk diversification. Whereas, Russians and people born in East Germany know less about it (Lusardi & Mitchell, 2011b).

More studies concerned with geographic and population related differences within countries show large racial and ethnic differences in the U.S. For example, Whites and Asians are consistently more likely to be financially knowledgeable compared to African Americans and Hispanics (Lusardi & Mitchell, 2007a, 2007b, 2011b). In Italy the Northern and Central regions score higher than the Southern regions, though not all of the Northern regions show high levels of financial knowledge (Fornero & Monticone, 2011). In Russia and Romania people living in urban areas tend to be more financially literate than people living in rural areas (Klapper et al., 2013; Beckmann, 2013). And in the Netherlands other religious beliefs seem to have an influence on financial knowledge meaning that another than the main religion (including Muslims and other smaller religious groups) are less financial literate (Lusardi & Mitchell, 2011b). At the same time, studies find that U.S. citizens tend to display low levels of financial literacy (Bernheim, 1996; Hilgert et al., 2003; Lusardi & Tufano, 2009). Financial illiteracy and financial mistakes are particularly widespread among older Americans (Lusardi & Mitchell, 2011b; Agarwal et al., 2009). Recent government policies, including the establishment of the Consumer Financial Protection Bureau, aim to increase financial literacy among the public (Hsu, 2016).

When reviewing the available literature certain factors are particularly consistent over countries. For this reason, we deal specifically with them in the following.

### ***Gender***

One striking feature of the empirical data on financial literacy is the large and persistent gender difference. Not only are older men generally more financially literate than older women, but similar patterns also show up among younger respondents as well (Lusardi et al., 2010; Lusardi & Mitchell, 2017; Lusardi & Tufano, 2009, 2015). Moreover, these gaps persist across both the basic and the more sophisticated literacy questions (Lusardi et al., 2010; Hung et al., 2009). One twist on the differences by sex, however, is that while women are less likely to answer financial literacy questions correctly than men, they are also far more likely to say they “do not know” as an answer to a question, a result that is strikingly consistent across countries. This awareness of their own lack of knowledge may make women ideal targets for financial education programs. Lusardi and Mitchell (2008) show for example that only 61.9% of all women answer the interest rate question correct, whereas 70.6% answer the inflation and only 47.6% of all woman are able to answer the risk diversification question correctly. With the exceptions of Russia and East Germany where women and men are equally illiterate (Lusardi & Mitchell, 2011b) these sex differences in financial literacy are so persistent and widespread across surveys and countries, several researchers seek to explain them. Hsu (2016) proposes that some sex differences may be rational, with specialization of labour within the household leading married women to build up financial knowledge only late in life (close to widowhood). Chen and Volpe (2002) and Mandell (2008)

show further that even women in high school and college are usually less financial literate and confirm the observations that single woman in charge of their own finances have lower finance knowledge. Fonseca et al. (2012) suggest that women may acquire financial literacy differently from men, while Bucher-Koenen et al. (2017) point to a potentially important role of self-confidence that differs by sex. Brown and Graf (2013) also show that sex differences are not due to different interests in finance and financial matters between women and men. To shed more light on women's financial literacy, Mahdavi and Horton (2014) examined alumnae from a highly selective U.S. women's liberal arts college. Even in this talented and well-educated group, women's financial literacy was found to be very low. In other words, even very well educated women are not particularly financially literate, which could confirm Fonseca et al. (2012) that women may acquire financial literacy differently from men. Nevertheless, this debate is far from closed, and additional research will be required to better understand these observed differences.

### *Age*

A study by Agarwal et al. (2009) which focused on financial mistakes shows that these are most predominant among the young and old subsample, groups which usually display the lowest financial knowledge. Age patterns are notable, in that financial knowledge follows an inverted U-shaped pattern, being lowest for the young and the older groups, but peaks in the middle of the life cycle. Lusardi and Mitchell (2011a) show for US-Americans over 50 years a very low performance on basic financial literacy questions with 75% correct answers for the numeracy, 56% correct on the inflation and only 52% correct answers for the risk diversification question which are used to test gender differences and is also used in our survey. At the same time Lusardi and Mitchell (2017) show in another study how very young respondents score worse than middle age people, 60% correct versus 69% for older respondents on the risk diversification question. This is a finding which is robust across countries (Lusardi & Mitchell, 2014). Additionally, it is of interest that older people give themselves very high scores regarding their own financial literacy, despite scoring poorly on the basic financial literacy questions (Lusardi & Mitchell, 2011a; Lusardi & Tufano, 2015) and not just in the United States, but other countries as well (Lusardi & Mitchell, 2011c). Similarly, Finke et al. (2017) develop a multidimensional measure of financial literacy for the old and confirm that, though actual financial literacy falls with age, people's confidence in their own financial decision-making abilities actually increases with age. The mismatch between actual and perceived knowledge might explain why financial scams are often perpetrated against the elderly (Deevy et al., 2012).

### *Education*

In all countries, higher educational attainment is strongly correlated with financial knowledge, but even at the highest level of schooling, financial literacy tends to be low (Lusardi & Mitchell, 2008). Moreover, education is not a good proxy for financial literacy. That is, when education and financial literacy are included in multivariate regression models, both tend to be statistically significant, indicating that financial literacy has an effect above and beyond education. Financial literacy is also higher

among those who are working, and in some countries among the self-employed, compared to those who do not work. This difference may in part result from financial education programs offered in the workplace (as in the United States); it could also be the effect of learning from colleagues or skills acquired on the job (Lusardi & Mitchell, 2011a). Furthermore, they show how the percentage of correct answers for the compound interest (inflation, risk diversification) question rises with better education up to 81.2% (85.1%, 70.2%) correct answers for a level of education corresponding to “College and More”. Christiansen et al. (2008) use a large register-based panel data set containing detailed information on Danish investors’ education attainment, and financial and socioeconomic variables. The authors show that stock-holding increases if individuals have completed an economics education program and if an economist becomes part of the household. To sort out the double causality between portfolio choice and the decision to become an economist, Christiansen et al. (2008) use better access to education due to the establishment of a new university, as an instrument for economics

There are substantial differences in financial knowledge by education: specifically, those without a college education are much less likely to be literate about basic financial literacy concepts, as reported in several U.S. surveys and across countries (Lusardi & Mitchell, 2007a, 2011c). Moreover, numeracy is especially poor for those with low educational attainment (Christelis et al., 2010; Lusardi, 2012). How to interpret the finding of a positive link between education and financial literacy has been subject to some debate in the economics literature. One possibility is that the positive correlation might be driven by cognitive ability (McArdle et al., 2009), implying that one must control on measures of ability when seeking to parse out the separate impact of financial literacy. Lusardi, Mitchell, and Curto (2010) did find a positive correlation between financial literacy and cognitive ability among young NLSY respondents, but they also showed that cognitive factors did not fully account for the variance in financial literacy. That means that substantial heterogeneity in financial literacy remains even after controlling on cognitive factor.

### ***Understanding***

Not only are there patterns in measured financial literacy, but we also can compare what people actually know with their self-assessed understanding of finance. So for example that women tend to indicate a higher self-rated understanding when approaching widowhood (Hsu, 2016). Across countries younger people know very little and acknowledge it. By contrast, older people consistently rate themselves as very well-informed although they are actually less literate than average. There are also important international differences in self-reports: in the U.S. a majority of respondents give themselves high scores, whereas in Japan people rate themselves quite low (Lusardi & Mitchell, 2011b).

### ***Other patterns***

There are numerous other empirical regularities in the financial literacy literature that are, again, persistent across countries. Financial savvy varies by income and employment type, with lower-paid individuals doing less well and employees and the self-employed doing better than the unemployed (Lusardi & Tufano, 2015; Lusardi & Mitchell, 2011c). These findings hold across age groups and many

different financial literacy measures (Lusardi & Mitchell, 2017). The literature also points to differences in financial literacy by family background. For instance, Lusardi, Mitchell, and Curto (2010) link financial literacy of 23 - 28-year old NLSY respondents to characteristics of the households in which they grow up controlling for a set of demographic and economic characteristics. Respondents' financial literacy is also significantly positively correlated with parental education (in particular, that of their mothers), and whether their parents hold stocks or retirement accounts when the respondents are teenagers. Mahdavi and Horton (2014) report a connection between financial literacy and parental background; in this case, fathers' education is positively associated with their female children's financial literacy. In other words, financial literacy may well get its start in the family, perhaps when children observe their parents saving and investing habits, or more directly by receiving financial education from parents (Chiteji & Stafford, 1999; Li, 2014; Shim et al., 2009). Other studies note a nationality gap in financial literacy, with foreign citizens reporting lower financial literacy than the native born (Brown & Graf, 2013). Or differences in financial literacy according to religion (Alessie et al., 2011) and political opinions (Arrondel et al., 2013).

To summarize, while financial illiteracy is widespread, it is also concentrated among specific population subgroups and demographic and self-assessed characteristics in most countries studied to date.

### **4.3. Data and Survey Design**

#### **4.3.1. Survey Design**

We interview 63 students of an economics master course in Germany at the Technical University of Darmstadt and a mix of 59 students of an economics bachelors' and masters' degree course in St. Petersburg in Russia at the UNECON. Our survey aims to determine the link between an education at university level with demographic and self-assessed characteristics, numeracy and financial skills, the tendency to think about the future and the differences between Russia and Germany.

First the demographic and self-assessed part contains questions about the gender and age of the students. The next part asked about the self-assessment of the students regarding their previous education in finance on a four step scale from "Hardly at all" to "A lot" and their understanding in the finance field on a scale from 1 (very low) to 7 (very high).

The numeracy and financial skill questions are divided in three parts: a numeracy test, a basic and a sophisticated financial literacy test. The numeracy test contains five questions about simple mathematical tasks regarding multiplying, dividing, percentages and fractions. The basic literacy part contains five questions as well and asks for knowledge about numeracy, compound interest, inflation, time value of money and money illusion. The eight sophisticated literacy questions are on the function of stock markets, the knowledge of mutual funds, the relation between interest rates and bond prices, the safety of company stocks and mutual funds, about risky assets, about long period returns, about volatility and about risk diversification.

The last two questions are concerned with the tendency to predict the future. We ask how likely the respondents estimate another crisis in 5 and in 25 years.

### 4.3.2. Data

In total 122 students answer the survey. Divided per country the sample consists of 65 German and 59 Russian respondents with at least a partly background in economics. The sex is unequally distributed between the subsamples.

Table 4-1: Survey sample demographic and self-assessment characteristics

| Survey respondent population |         |        |       |  |         |        |       |
|------------------------------|---------|--------|-------|--|---------|--------|-------|
|                              | Germany | Russia | Total |  | Germany | Russia | Total |
| <i>Gender</i>                |         |        |       | <i>Understanding of finance?</i>                 |         |        |       |
| Female                       | 15      | 31     | 46    | 1 (very low)                                     | 0       | 2      | 2     |
| Male                         | 47      | 28     | 75    | 2  | 7       | 2      | 9     |
| Prefer not to answer         | 1       | 0      | 1     | 3  | 14      | 4      | 18    |
|                              |         |        |       | 4  | 21      | 12     | 33    |
|                              |         |        |       | 5  | 17      | 16     | 33    |
| <i>Age</i>                   |         |        |       | 6  | 5       | 9      | 14    |
| 17                           | 0       | 2      | 2     | 7 (very high)                                    | 0       | 10     | 10    |
| 18                           | 0       | 8      | 8     |  |         |        |       |
| 19                           | 0       | 8      | 8     |  |         |        |       |
| 20                           | 0       | 10     | 10    | <i>Education devoted to financial education?</i> |         |        |       |
| 21                           | 1       | 7      | 8     | A lot  | 8       | 16     | 24    |
| 22                           | 15      | 5      | 20    | Some   | 38      | 29     | 67    |
| 23                           | 14      | 13     | 27    | A little   | 18      | 10     | 28    |
| 24                           | 15      | 3      | 18    | Hardly at all                                    | 0       | 4      | 4     |
| 25                           | 11      | 0      | 11    |  |         |        |       |
| 26                           | 4       | 1      | 5     |  |         |        |       |
| 27                           | 1       | 1      | 2     |  |         |        |       |
| 28                           | 1       | 0      | 1     |  |         |        |       |
| 30                           | 0       | 1      | 1     |  |         |        |       |
| 32                           | 1       | 0      | 1     |  |         |        |       |

Table shows responses to survey questions. Missing statements are listed in the table.

Whereas Russians are mostly female the German group consists mainly of male students. Because we ask students the distribution of age is quite young with the oldest student from Germany with 32 years and the youngest student from the Russian subsample with 17 years. Regarding the self-assessed understanding of finance, the Russian group seems to rate itself better than the Germans whereas the German group avoids extreme statements like a very low and very high understanding. For the education devoted to finance the picture is similar. Although the Russian group is smaller the amount of students stating that they receive “A lot” of finance education is higher compared to the German group. Table 4-1 shows summarized both samples.

## 4.4. Results

As a first step we analyse the three sets of questions, numeracy, basic and sophisticated financial literacy, separately. The numeracy questions are designed to test mathematical skills like division, multiplication, percentages and fractions. Nearly 95% of the students answer each of the five questions correctly and over 90% answer all five questions correctly. The mean is 4.9 correct questions for the German and Russian subsample respectively. The question with the most incorrect answers is Q5 which asks how many people out of 1000 will get a disease if the chance of getting one is 1 in 10. Q5 reframes Q2 which asks for a 10 percent probability of getting a disease. Taking into account that Q2 has the second most incorrect answers it seems that percentages are most difficult to answer whereby the differences to the other questions are in general small. Table 4-2 reports the results for every question, for all five question together and for each question split up per gender, age, understanding of finance and education devoted to finance. The questions were generally answered correctly with a rate of 100% with a few exceptions.

Table 4-2: Numeracy Questions

| a.) Percent correct by numeracy question                   |           |           |           |           |           |          |         |
|--|-----------|-----------|-----------|-----------|-----------|----------|---------|
|  | Q1 (%)    | Q2 (%)    | Q3 (%)    | Q4 (%)    | Q5 (%)    |          |         |
|  | DE/RU     | DE/RU     | DE/RU     | DE/RU     | DE/RU     |          |         |
| Correct  | 96.9/98.3 | 96.9/98.3 | 96.9/100  | 98.5/98.3 | 96.9/94.9 |          |         |
| b.) Summary of correct responses to all numeracy questions |           |           |           |           |           |          |         |
|  | Five (%)  | Four (%)  | Three (%) | Two (%)   | One (%)   | None (%) | Mean    |
|  | DE/RU     | DE/RU     | DE/RU     | DE/RU     | DE/RU     | DE/RU    | DE/RU   |
| Correct  | 93.8/91.5 | 3.1/6.8   | 1.5/1.7   | 0/0       | 0/0       | 1.5/0    | 4.9/4.9 |

Table shows correct responses by demographic characteristics and in aggregate form. The numeracy questions were designed to test concepts of fractions, percentages, division, multiplication and simple probability.

Following Lusardi and Mitchell (2017) and van Rooij et al. (2011b) the financial literacy questions are summarized in two parts. The first five questions test basic concepts of numeracy, compound interest, inflation, time value of money and money illusion. The second part consists of eight questions and aims to measure more sophisticated concepts like volatility, differences between bonds and stocks, long period returns and risk diversification, which, among other things, are relevant for retirement planning.

The results for the basic literacy questions are worse compared to the numeracy part. Q1, which asks about interest rates, is the only question answered more than 90% correct from both subsamples. The biggest discrepancy between the groups shows question Q2 about compound interest. On the other side Q4 about the time value of money seems to cause the most difficulties for both groups of students. More than one quarter of the Russian group gets it wrong. This result is in line with Bateman et al. (2012) who ask the same questions in an Australian survey and got the worst results for the time value of money question as well.

Table 4-2: Numeracy Questions (Continued)

| c.) Percent correct by numeracy question and demographics |          |           |          |          |           |
|---|----------|-----------|----------|----------|-----------|
|   | Q1 (%)   | Q2 (%)    | Q3 (%)   | Q4 (%)   | Q5 (%)    |
|   | DE/RU    | DE/RU     | DE/RU    | DE/RU    | DE/RU     |
| <i>Gender</i>   |          |           |          |          |           |
| Female  | 100/100  | 100/96.8  | 100/100  | 100/100  | 100/93.5  |
| Male  | 100/96.4 | 97.9/100  | 97.9/100 | 100/96.4 | 97.9/96.4 |
| Prefer not to answer                                      | 0/-      | 100/-     | 100/-    | 100/-    | 100/-     |
| <i>Age</i>  |          |           |          |          |           |
| 17  | -/100    | -/100     | -/100    | -/100    | -/100     |
| 18  | -/100    | -/100     | -/100    | -/100    | -/100     |
| 19  | -/90.9   | -/100     | -/100    | -/100    | -/100     |
| 20  | -/100    | -/100     | -/100    | -/100    | -/90.0    |
| 21  | 100/100  | 100/100   | 100/100  | 100/100  | 100/85.7  |
| 22  | 100/80.0 | 100/80.0  | 100/100  | 100/80.0 | 100/100   |
| 23  | 92.9/100 | 92.9/100  | 100/100  | 100/100  | 92.9/92.3 |
| 24  | 100/100  | 100/100   | 100/100  | 100/100  | 100/100   |
| 25  | 100/-    | 100/-     | 100/-    | 100/-    | 100/-     |
| 26  | 100/100  | 100/100   | 100/100  | 100/100  | 100/100   |
| 27  | 100/100  | 100/100   | 100/100  | 100/100  | 100/100   |
| 28  | 100/-    | 100/-     | 100/-    | 100/-    | 100/-     |
| 30  | -/100    | -/100     | -/100    | -/100    | -/100     |
| 32  | 100/-    | 100/-     | 0/-      | 100/-    | 100/-     |
| <i>Understanding of finance?</i>                          |          |           |          |          |           |
| 1 (very low)  | -/100    | -/100     | -/100    | -/100    | -/100     |
| 2   | 100/100  | 100/100   | 100/100  | 100/100  | 100/100   |
| 3   | 100/75.0 | 100/100   | 100/100  | 100/75.0 | 100/75.0  |
| 4   | 100/100  | 100/100   | 100/100  | 100/100  | 100/100   |
| 5   | 100/100  | 100/100   | 100/100  | 100/100  | 100/90.0  |
| 6   | 80/100   | 80/100    | 80/100   | 100/100  | 80/100    |
| 7 (very high)   | -/100    | -/90.0    | -/100    | -/100    | -/100     |
| <i>Education devoted to financial education?</i>          |          |           |          |          |           |
| A lot   | 100/93.8 | 100/100   | 87.5/100 | 100/93.8 | 100/100   |
| Some  | 97.4/100 | 97.4/96.6 | 100/100  | 100/100  | 97.4/93.1 |
| A little  | 100/100  | 100/100   | 100/100  | 100/100  | 100/90.0  |
| Hardly at all   | -/100    | -/100     | -/100    | -/100    | -/100     |

Table shows correct responses by demographic characteristics and in aggregate form. The numeracy questions were designed to test concepts of fractions, percentages, division, multiplication and simple probability.

From the German subsample 72.3% answer all five questions, with a mean of 4.6, correct whereas only 27.1% of the Russians, with a mean of 3.8 correct answers, get all questions right. Table 4-3 shows the correct answers per question and the share of students who answered all five questions correct. However, Table 4-3c breaks down responses by demographic characteristics. Female students answer the questions about numeracy and money illusion better than male students whereas males answer questions about compound interest, inflation and time value of money better than females. Comparing the results with other studies female respondents with an economics education answer better. For example,

Lusardi and Mitchell (2008) show that woman in general answer the interest rate and inflation question 61.9% and 70.6% correctly whereas our results indicate 100% and 93.3% correct answers for the German subsample. The Russian subsample confirms it partly with 96.8% and 67.7% correct answers. Considering students who indicate a high understanding of finance usually the German group answers better than the Russian. The general pattern shown by Lusardi and Mitchell (2017) that very young people answer worse than middle age respondents is also seen in Table 4-3 with only correct answers from the age of 26 on. Regarding the education, respondents who indicate “A little” score better than students with “A lot” of education in finance. Comparing to other studies (Lusardi & Mitchell, 2011a) students with an economic background perform still better than general populations for the compound interest and inflation question.

Table 4-4 presents answers to the sophisticated financial literacy questions and shows some difficulties for the concepts of the relation between interest rates and bond prices, for knowledge of mutual funds and long period returns of different assets. All this questions are answered largely incorrect. That means that even students with an economics background don't know how bond prices behave depending on interest rates and whether stocks give a higher return than bonds or saving accounts. Similar patterns show Lusardi and Mitchell (2008) who state that even at the highest level of schooling financial literacy tends to be low. 18.5% of the German group and 1.7% of the Russian students answer all possible eight questions correct. A gender comparison shows that men are in 5 out of 8 cases better than women and older students usually better than younger. The effect that women perform worse than men is in line with Lusardi and Mitchell (2011b), Chen and Volpe (2002) and Mandell (2008) who state that women in high school and college show worse results than men. But compared to woman in a general population they still perform better with 60% correct answers for example for the risk diversification question than 47.6% correct in general (Lusardi & Mitchell, 2008). The results vary in general more over gender, age, understanding and education and are worse compared to the basic literacy questions.

Table 4-3: Basic Financial Literacy Questions

| a.) Percent correct by basic financial literacy question                   |                             |   |                              |   |                                   |                   |               |
|--|-----------------------------|---|------------------------------|---|-----------------------------------|-------------------|---------------|
|  | Q1 (%)<br>DE/RU             | Q2 (%)<br>DE/RU                         | Q3 (%)<br>DE/RU              | Q4 (%)<br>DE/RU                           | Q5 (%)<br>DE/RU                   |                   |               |
| Correct  | 98.5/90.0                   | 92.3/58.3                               | 95.4/76.7                    | 86.2/61.7                                 | 84.6/85.0                         |                   |               |
| b.) Summary of correct responses to all basic financial literacy questions |                             |   |                              |   |                                   |                   |               |
|  | Five (%)<br>DE/RU           | Four (%)<br>DE/RU                       | Three (%)<br>DE/RU           | Two (%)<br>DE/RU                          | One (%)<br>DE/RU                  | None (%)<br>DE/RU | Mean<br>DE/RU |
| Correct  | 72.3/27.1                   | 20.0/37.3                               | 4.6/25.4                     | 0/8.5                                     | 1.5/0                             | 1.5/1.7           | 4.6/3.8       |
| c.) Percent correct by basic financial literacy question and demographics  |                             |   |                              |   |                                   |                   |               |
|  | Numeracy<br>Q1 (%)<br>DE/RU | Compound<br>interest<br>Q2 (%)<br>DE/RU | Inflation<br>Q3 (%)<br>DE/RU | Time value of<br>money<br>Q4 (%)<br>DE/RU | Money illusion<br>Q5 (%)<br>DE/RU |                   |               |
| <i>Gender</i>  |                             |   |                              |   |                                   |                   |               |
| Female   | 100/96.8                    | 93.3/58.1                               | 93.3/67.7                    | 80.0/58.1                                 | 93.3/90.3                         |                   |               |
| Male   | 100/85.7                    | 93.6/60.7                               | 97.9/89.3                    | 91.5/67.9                                 | 85.1/82.1                         |                   |               |
| Prefer not to answer   | 100/-                       | 100/-                                   | 100/-                        | 0/-                                       | 0/-                               |                   |               |
| <i>Age</i>   |                             |   |                              |   |                                   |                   |               |
| 17   | -/100                       | -/0                                     | -/0                          | -/100                                     | -/100                             |                   |               |
| 18   | -/87.5                      | -/50.0                                  | -/62.5                       | -/25.0                                    | -/87.5                            |                   |               |
| 19   | -/100                       | -/75.0                                  | -/100                        | -/37.5                                    | -/75.0                            |                   |               |
| 20   | -/90.0                      | -/70.0                                  | -/70.0                       | -/70.0                                    | -/80.0                            |                   |               |
| 21   | 100/71.4                    | 100/71.4                                | 100/100                      | 100/42.9                                  | 0/85.7                            |                   |               |
| 22   | 100/100                     | 93.3/40.0                               | 100/100                      | 93.3/80.0                                 | 86.7/100                          |                   |               |
| 23   | 100/100                     | 100/46.2                                | 100/76.9                     | 85.7/84.6                                 | 92.9/92.3                         |                   |               |
| 24   | 100/66.7                    | 93.3/66.7                               | 100/33.3                     | 86.7/100                                  | 80/66.7                           |                   |               |
| 25   | 100/-                       | 90.9/-                                  | 90.9/-                       | 81.8/-                                    | 81.8/-                            |                   |               |
| 26   | 100/100                     | 100/100                                 | 100/100                      | 100/100                                   | 100/100                           |                   |               |
| 27   | 100/100                     | 100/100                                 | 100/100                      | 0/100                                     | 100/100                           |                   |               |
| 28   | 100/-                       | 100/-                                   | 100/-                        | 100/-                                     | 100/-                             |                   |               |
| 30   | -/100                       | -/100                                   | -/100                        | -/0                                       | -/100                             |                   |               |
| 32   | 100/-                       | 0/-                                     | 0/-                          | 100/-                                     | 100/-                             |                   |               |
| <i>Understanding of finance?</i>   |                             |   |                              |   |                                   |                   |               |
| 1 (very low)   | -/0                         | -/50.0                                  | -/0                          | -/50.0                                    | -/50.0                            |                   |               |
| 2  | 100/100                     | 85.7/0                                  | 85.7/50.0                    | 71.4/50.0                                 | 85.7/100                          |                   |               |
| 3  | 100/75.0                    | 100/50.0                                | 100/100                      | 92.9/50.0                                 | 78.6/100                          |                   |               |
| 4  | 100/100                     | 90.5/75.0                               | 100/66.7                     | 85.7/75.0                                 | 85.7/83.3                         |                   |               |
| 5  | 100/95.0                    | 100/55.0                                | 100/75.0                     | 94.1/60.0                                 | 94.1/75.0                         |                   |               |
| 6  | 100/100                     | 80.0/66.7                               | 80.0/88.9                    | 80.0/66.7                                 | 80/100                            |                   |               |
| 7 (very high)  | -/90.0                      | -/60.0                                  | -/100                        | -/60.0                                    | -/100                             |                   |               |
| <i>Education devoted to financial education?</i>                           |                             |   |                              |   |                                   |                   |               |
| A lot  | 100/87.5                    | 87.5/75.0                               | 87.5/75.0                    | 87.5/87.5                                 | 75/93.8                           |                   |               |
| Some   | 100/96.6                    | 92.1/48.3                               | 97.4/82.8                    | 89.5/58.6                                 | 86.8/86.2                         |                   |               |
| A little   | 100/90.0                    | 100/70.0                                | 100/80.0                     | 83.3/40.0                                 | 88.9/80.0                         |                   |               |
| Hardly at all  | -/75.0                      | -/50.0                                  | -/50.0                       | -/50.0                                    | -/75.0                            |                   |               |

Table shows correct responses by demographic characteristics and in aggregate form.

Table 4-4: Sophisticated Financial Literacy Questions

| a.) Percent correct by sophisticated financial literacy question                   |   |  |  |  |                                    |   |                               |  |                   |               |
|--|---|--|--|--|------------------------------------|---|-------------------------------|--|-------------------|---------------|
|  | Q1 (%)<br>DE/RU                                   | Q2 (%)<br>DE/RU                                    | Q3 (%)<br>DE/RU  | Q4 (%)<br>DE/RU  | Q5 (%)<br>DE/RU                    | Q6 (%)<br>DE/RU                           | Q7 (%)<br>DE/RU               | Q8 (%)<br>DE/RU                              |                   |               |
| Correct  | 95.4/86.7   | 60.0/46.7  | 55.4/31.7  | 76.9/53.3  | 75.4/66.7                          | 67.7/38.3                                 | 78.5/71.7                     | 95.4/80.0                                    |                   |               |
| b.) Summary of correct responses to all sophisticated financial literacy questions |   |  |  |  |                                    |   |                               |  |                   |               |
|  | Eight (%)<br>DE/RU                                | Seven (%)<br>DE/RU                                 | Six (%)<br>DE/RU   | Five (%)<br>DE/RU  | Four (%)<br>DE/RU                  | Three (%)<br>DE/RU                        | Two (%)<br>DE/RU              | One (%)<br>DE/RU                             | None (%)<br>DE/RU | Mean<br>DE/RU |
| Correct  | 18.5/1.7  | 35.4/18.6  | 24.6/15.3  | 6.2/30.5   | 1.5/13.6                           | 4.6/8.5                                   | 4.6/5.1                       | 1.5/5.1                                      | 3.1/1.7           | 6.0/4.8       |
| c.) Percent correct by sophisticated financial literacy question and demographics  |   |  |  |  |                                    |   |                               |  |                   |               |
|  | Function of<br>Stock<br>Market<br>Q1 (%)<br>DE/RU | Knowledge<br>of Mutual<br>Funds<br>Q2 (%)<br>DE/RU | Relation<br>between<br>Interest<br>Rates and<br>Bond Prices<br>Q3 (%)<br>DE/RU | Safer:<br>Company<br>stock or<br>Mutual<br>Fund<br>Q4 (%)<br>DE/RU | Risky<br>Assets<br>Q5 (%)<br>DE/RU | Long period<br>Returns<br>Q6 (%)<br>DE/RU | Volatility<br>Q7 (%)<br>DE/RU | Risk Diver-<br>sification<br>Q8 (%)<br>DE/RU |                   |               |
| <i>Gender</i>  |   |  |  |  |                                    |   |                               |  |                   |               |
| Female   | 86.7/83.9   | 33.3/35.5  | 60.0/35.5  | 60.0/61.3  | 73.3/74.2                          | 53.3/38.7                                 | 53.3/71.0                     | 93.3/80.6                                    |                   |               |
| Male   | 100/92.9  | 70.2/60.7  | 53.2/28.6  | 83/46.4  | 78.7/60.7                          | 72.3/39.3                                 | 87.2/75.0                     | 97.9/82.1                                    |                   |               |
| Prefer not to<br>answer  | 100/-   | 100/-  | 100/-  | 100/-  | 0/-                                | 100/-                                     | 100/-                         | 100/-  |                   |               |
| <i>Age</i>   |   |  |  |  |                                    |   |                               |  |                   |               |
| 17   | -/50.0  | -/0  | -/50.0   | -/0  | -/0                                | -/50.0                                    | -/0                           | -/50.0                                       |                   |               |
| 18   | -/62.5  | -/25.0   | -/0  | -/37.5   | -/62.5                             | -/25.0                                    | -/62.5                        | -/50.0                                       |                   |               |
| 19   | -/87.5  | -/37.5   | -/25.0   | -/37.5   | -/62.5                             | -/62.5                                    | -/50.0                        | -/62.5                                       |                   |               |
| 20   | -/90.0  | -/40.0   | -/40.0   | -/40.0   | -/60.0                             | -/50.0                                    | -/60.0                        | -/70.0                                       |                   |               |
| 21   | 100/85.7  | 100/57.1   | 0/14.3   | 100/85.7   | 100/57.1                           | 100/28.6                                  | 100/57.1                      | 100/100                                      |                   |               |
| 22   | 100/100   | 60.0/60.0  | 60.0/40.0  | 86.7/40.0  | 80.0/60.0                          | 80.0/40.0                                 | 80.0/100                      | 93.3/100                                     |                   |               |
| 23   | 100/100   | 78.6/61.5  | 64.3/53.8  | 78.6/69.2  | 78.6/84.6                          | 78.6/30.8                                 | 92.9/100                      | 100/100                                      |                   |               |
| 24   | 93.3/100  | 46.7/33.3  | 53.3/33.3  | 73.3/66.7  | 80.0/100                           | 60.0/33.3                                 | 60.0/100                      | 100/100                                      |                   |               |
| 25   | 90.9/-  | 63.6/-   | 63.6/-   | 72.7/-   | 72.7/-                             | 81.8/-                                    | 90.9/-                        | 90.9/-                                       |                   |               |
| 26   | 100/100   | 50.0/100   | 50.0/100   | 75.0/100   | 50.0/100                           | 0/0                                       | 75.0/100                      | 100/100                                      |                   |               |
| 27   | 100/100   | 100/100  | 0/0  | 0/100  | 100/100                            | 0/0                                       | 100/100                       | 100/100                                      |                   |               |
| 28   | 100/-   | 100/-  | 0/-  | 100/-  | 100/-                              | 100/-                                     | 100/-                         | 100/-  |                   |               |
| 30   | -/100   | -/100  | -/0  | -/100  | -/100                              | -/100                                     | -/100                         | -/100  |                   |               |
| 32   | 100/-   | 0/-  | 0/-  | 100/-  | 0/-                                | 0/-                                       | 0/-                           | 100/-  |                   |               |
| <i>Understanding of finance?</i>   |   |  |  |  |                                    |   |                               |  |                   |               |
| 1 (very low)   | -/50.0  | -/0  | -/0  | -/50.0   | -/50.0                             | -/0                                       | -/100                         | -/50.0                                       |                   |               |
| 2  | 71.4/50.0   | 28.6/50.0  | 42.9/50.0  | 42.9/0   | 14.3/50.0                          | 28.6/0                                    | 42.9/50.0                     | 71.4/50.0                                    |                   |               |
| 3  | 100/100   | 64.3/50.0  | 50.0/25.0  | 71.4/75.0  | 78.6/75.0                          | 57.1/75.0                                 | 71.4/25.5                     | 100/75.0                                     |                   |               |
| 4  | 100/91.7  | 76.2/33.3  | 71.4/16.7  | 76.2/50.0  | 81.0/58.3                          | 71.4/16.7                                 | 95.2/75.0                     | 100/83.3                                     |                   |               |
| 5  | 100/80.0  | 47.1/45.0  | 47.1/25.0  | 94.1/45.0  | 100/60.0                           | 88.2/35.0                                 | 82.4/85.0                     | 100/75.0                                     |                   |               |
| 6  | 100/100   | 80.0/55.6  | 60.0/55.6  | 100/66.7   | 60.0/88.9                          | 80.0/55.6                                 | 80.0/66.7                     | 100/100                                      |                   |               |
| 7 (very high)  | -/100   | -/70.0   | -/50.0   | -/70.0   | -/80.0                             | -/60.0                                    | -/70.0                        | -/90.0                                       |                   |               |
| <i>Education devoted to financial education?</i>                                   |   |  |  |  |                                    |   |                               |  |                   |               |
| A lot  | 100/100   | 62.5/68.8  | 62.5/31.3  | 87.5/68.8  | 75.0/75.0                          | 75.0/43.8                                 | 87.5/81.3                     | 100/100                                      |                   |               |
| Some   | 97.4/89.7   | 65.8/48.3  | 63.2/34.5  | 81.6/55.2  | 89.5/69.0                          | 76.3/34.5                                 | 84.2/72.4                     | 97.4/82.8                                    |                   |               |
| A little   | 94.4/80.0   | 50.0/30.0  | 38.9/20.0  | 66.7/40.0  | 50.0/70.0                          | 50.0/50.0                                 | 66.7/70.0                     | 94.4/60.0                                    |                   |               |
| Hardly at all  | -/50.0  | -/0  | -/50.0   | -/25.0   | -/25.0                             | -/25.0                                    | -/50.0                        | -/50.0                                       |                   |               |

Table shows correct responses by demographic characteristics and in aggregate form.

Comparing these results to international studies with the same questions in

Table 4-5 TU Darmstadt students perform better in four basic financial literacy questions and in two out of four comparable sophisticated financial literacy questions.

Table 4-5: International Comparison of Financial Literacy Responses

|                          | Basic financial literacy |                        |               |                         |                    | Sophisticated financial literacy |                         |                |                      |
|--------------------------|--------------------------|------------------------|---------------|-------------------------|--------------------|----------------------------------|-------------------------|----------------|----------------------|
|                          | Nu-meracy (%)            | Com-pound interest (%) | Inflation (%) | Time value of money (%) | Money illusion (%) | Risky as-sets (%)                | Long period returns (%) | Volatility (%) | Diversifica-tion (%) |
| Australia <sup>a</sup>   | 88.4                     | 71.8                   | 78.4          | 54.9                    | 86.7               | 64.1                             | 54.9                    | 76.7           | 73.3                 |
| US-ALP <sup>b</sup>      | 91.8                     | 69.0                   | 87.1          | 73.8                    | 78.4               | 80.2                             | 62.3                    | 88.3           | 74.9                 |
| US-NFCS <sup>c</sup>     | 64.9                     | n.a.                   | 64.3          | n.a.                    | n.a.               | n.a                              | n.a                     | n.a            | n.a                  |
| New Zealand <sup>d</sup> | 86.0                     | n.a.                   | 81.0          | n.a.                    | n.a.               | n.a                              | n.a                     | n.a            | n.a                  |
| Germany <sup>e</sup>     | 82.4                     | n.a.                   | 78.4          | n.a.                    | n.a.               | n.a                              | n.a                     | n.a            | n.a                  |
| Netherlands <sup>f</sup> | 84.8                     | n.a.                   | 76.9          | n.a.                    | n.a.               | n.a                              | n.a                     | n.a            | n.a                  |
| UNECON<br>St. Petersburg | 90.0                     | 58.3                   | 76.7          | 61.7                    | 85.0               | 66.7                             | 38.3                    | 71.7           | 80.0                 |
| TU Darmstadt             | <b>98.5</b>              | <b>92.3</b>            | <b>95.4</b>   | <b>86.2</b>             | 84.6               | 75.4                             | <b>67.7</b>             | 78.5           | <b>95.4</b>          |

Table shows correctly answered respondent in percentages of survey. n.a. = not applicable. In bold font are the values that are higher than the international comparison. The table is taken from Bateman et al. (2012) and adjusted with given results. <sup>a)</sup> CenSoc-UNSW survey of 1199 superannuation account holders, May 2010; <sup>b)</sup> American Life Panel (ALP) (Lusardi & Mitchell, 2017); <sup>c)</sup> National Financial Capability Study (NFCS) (Lusardi, 2011b); <sup>d)</sup> ANZ-New Zealand Retirement Commission Financial Knowledge Survey (Retirement Commission, 2009); <sup>e)</sup> SAVE 2009 survey (Bucher-Koenen & Lusardi, 2011); <sup>f)</sup> Dutch Central Bank Household Survey (Alessie et al., 2011).

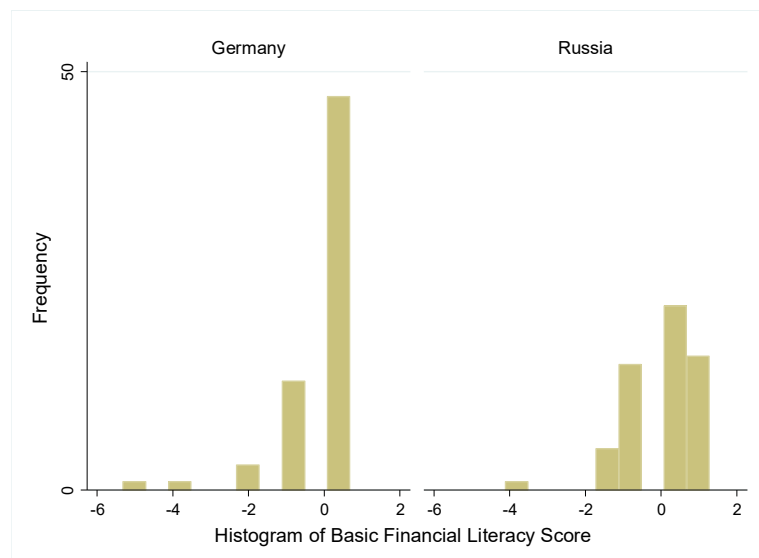
Comparing the Russian and German group of students directly in Table 4-6 the results show that the German group performs in most comparison better even though not all results are significant. One pattern that emerges is that the Russian group seems to be overall better at the numeracy questions even though not significant whereas the basic and sophisticated financial literacy questions show significant better results for the German group. The only significant result indicating better Russian students is for students with a high self-assessed understanding of finance for numeracy questions.

Table 4-6: Difference Between the German and Russian Subsample over Demographic and Self-Assessment Characteristics

|  | T-Test    |                          |                                  |
|--|-----------|--------------------------|----------------------------------|
|  | Numeracy  | Basic Financial Literacy | Sophisticated Financial Literacy |
| <i>Gender</i>                                    |           |                          |                                  |
| Female   | 1.2399    | 2.8311***                | 0.4892                           |
| Male   | 0.5033    | 4.1842***                | 4.1503***                        |
| Prefer not to answer                             | -         | -                        | -                                |
| <i>Understanding of finance?</i>                 |           |                          |                                  |
| 1 (very low)                                     | -         | -                        | -                                |
| 2  | -         | 1.1578                   | 0.2006                           |
| 3  | 3.1909*** | 3.5821***                | 0.9774                           |
| 4  | -         | 2.1878**                 | 4.6482***                        |
| 5  | 1.3367    | 4.8413***                | 4.0124***                        |
| 6  | -2,9692** | -0.0393                  | 0.7564                           |
| 7 (very high)                                    | -         | -                        | -                                |
| <i>Education devoted to financial education?</i> |           |                          |                                  |
| A lot  | 0         | 0.6325                   | 1.2778                           |
| Some   | 0.2934    | 4.3029***                | 4.3053***                        |
| A little   | 1.3628    | 3.6259***                | 1.0872                           |
| Hardly at all                                    | -         | -                        | -                                |
| <i>Overall</i>                                   | -0.3706   | 4.4634***                | 3.5632***                        |

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively. The columns report T-statistics for the test of equality of relative correct answers for the numeracy (basic, sophisticated) questions between the German and Russian subsample.

#### 4.4.1. Index Construction



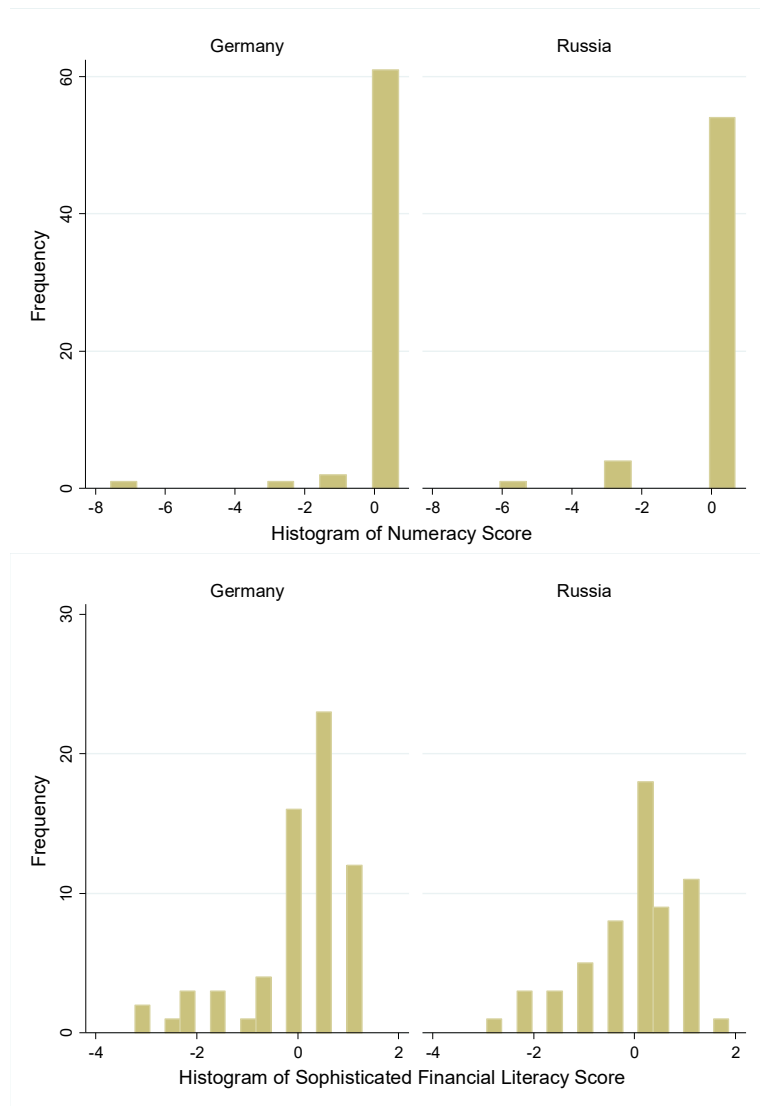


Figure 4-1: Histograms of Numeracy, Basic and Sophisticated Financial Literacy

In contrast to Gerardi et al. (2010) who include only numeracy and basic financial literacy questions and Lusardi and Mitchell (2017) and van Rooij et al. (2011a) who only ask for basic and financial literacy questions this study includes all three. Banks (2010) states that numeracy questions are closer linked with cognition, whereas basic literacy questions refer to common economic decisions (inflation and time value of money) and sophisticated literacy questions relate to more financial specialised knowledge (Bateman et al., 2012). We include all three categories and investigate any significant differences between these skillsets at different demographic and self-assessed characteristics.

In order to compare the different skillsets and to analyse the connections to the demographic and self-assessed characteristics we follow the approach of Bateman et al. (2012) and create a score for every respondent and every set of questions. This score results by counting the correct answers per group of questions and standardising them using the sample means and standard deviations to make three indices per respondent.

Figure 4-1 shows the histograms of the numeracy, basic and sophisticated financial literacy score for the German and Russian subsample. The distributions are negatively skewed and present a slightly more balanced distribution for the sophisticated literacy score.

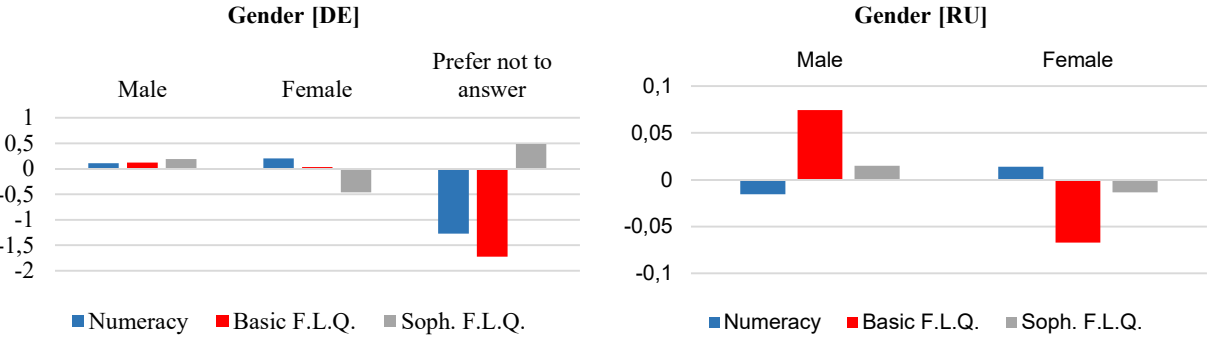
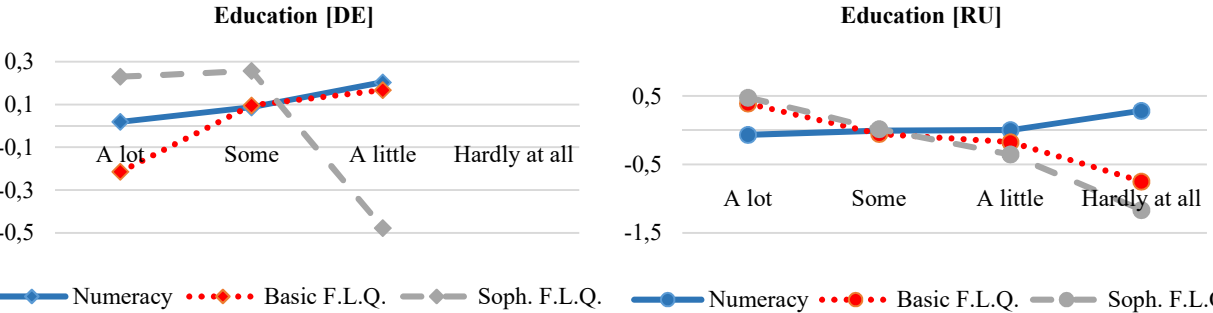
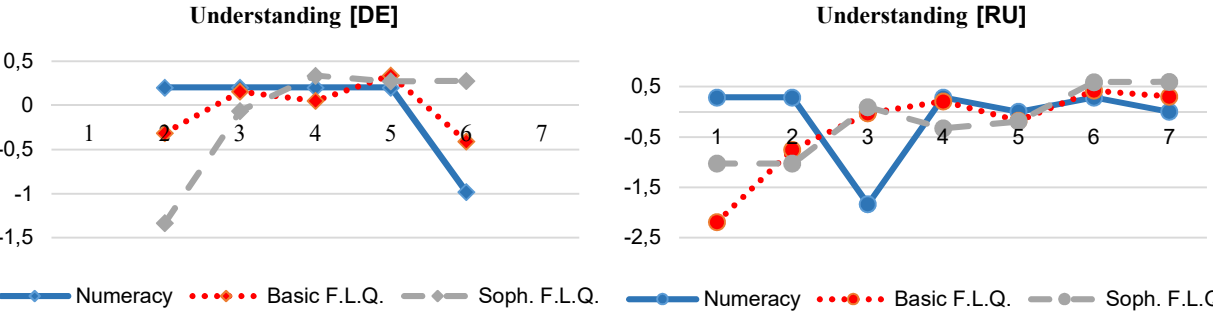
#### **4.4.2. Financial Competence and General Demographics**

Figure 4-2 shows five sets of graphs covering demographics, education, self-assessed financial competence and share market expectations. On the left is the German subsample, on the right the Russian. The y-axis shows the average of the numeracy, basic and financial literacy index scores and the horizontal axis the specification of the respective variable. Where there is no natural order for the x-axis variable, we display bars, where the blue bar is average numeracy, the red bar is average basic literacy and the grey bar is average sophisticated literacy. For variables that have an order, we show lines, where the solid blue line displays numeracy scores, the dotted red line the basic financial literacy score and the dashed grey line sophisticated financial literacy scores.

For each graph, we test the influence of the demographic and self-assessed characteristic on each score and report the results in Table 4-7. In a first step, we test the restriction that in a regression of the numeracy index score (and basic and sophisticated financial literacy score) on a constant and indicator variable, the coefficients on the indicators are jointly zero. These three standard F-tests indicate significant change in average numeracy or literacy score as the horizontal axis category varies. The second step is a Wald test for equality (at each horizontal axis category) of the coefficients of the three regressions for overall differences between the three indices.

An important feature of the relationship between financial competence and gender is the difference between the sophisticated literacy score and the other two measures. For males the sophisticated literacy score is always positive and for women always negative independent from the numeracy and basic literacy scores. That means that male respondents score better in sophisticated literacy questions, on average, than female respondents. Further numeracy and basic literacy varies significantly per age for the German group whereas the sophisticated financial literacy scores rise significantly with age for the Russian group. The following figures show the scores per level of understanding and education. The understanding is inverted u-shaped and significant for all scores for the German group. That means that respondents with a high self-assessed understanding of finance score worse than respondent with an average understanding. The scores vary for the Russian group and are significant for all index scores. Again, the respondents with the highest scores do not indicate that they also have the best understanding exhibiting the overconfidence in self-assessment which is regularly seen in survey responses (see, e.g. Agnew & Szykman, 2005). (In our survey the self-assessment question comes before the financial literacy questions, so the responses should not be affected by respondents' feelings about how well or badly they answer.) The picture for the education of the German group is similar. Respondents who say that they have "A lot" education in the field of finance score worse than respondent who indicate "Some" education. The Russian group shows the best literacy scores for the students with the most education

whereas students with nearly no education in finance score better in the numeracy part. The four graphs in the last row refer to financial competence scores with responses to two survey questions relating to expectations for another financial crisis. This follows the analysis of Bateman et al. (2012) and evaluates in the next section these graphs and explore the relationship between respondent characteristics and expectations using first a standard logit and second an ordered logit model.



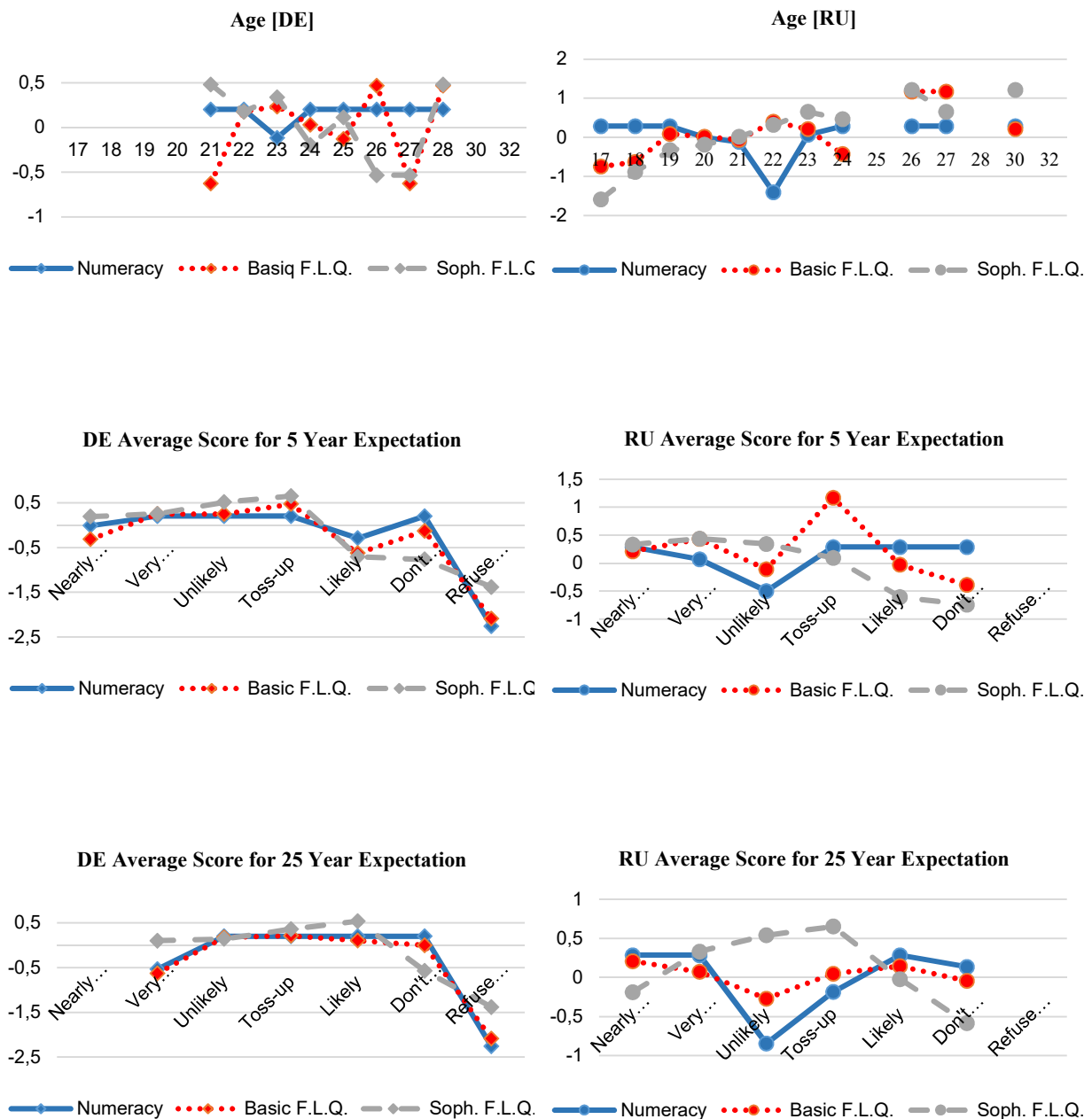


Figure 4-2: Average Financial Competence Score by Demographic and Self-Assessed Characteristics

#### 4.4.3. Competence and Crisis Expectations

The global financial crisis of 2007–2009 created many problems for stock holders and thus for many retirement savers, especially for those who were shortly before retirement. At the time of the survey, 13 years after the crisis and after an almost continuous growth for many investors it seemed like another crisis is just a matter of time. This raises the question of how the crisis influences the attitudes and behaviour of future investors. Because of that the last two questions of our survey address respondents' views, on the likelihood of another large stock market crash. We use these answers to evaluate the role of demographics, self-assessed characteristics and financial literacy in expectations formation. Further

we are interested in the association of those variables to optimistic or pessimistic views of future markets. We assess expectations about future shocks with two questions. They describe a sharp fall in share prices and then ask how likely it is that share prices will suffer another similar sized loss in the next 5 and 25 years. The answers fall into seven categories, with each category attributing increasing probability to another sharp stock market decline within the next years, and then separate categories for “Don’t know” and “Refuse to answer”. The respondents could assign probabilities ranging from “Nearly impossible - less than a one in a hundred chance” to “Likely - a greater than one in two chance”.

The last graphs in Figure 4-2 show for the German group that low financial competence is associated with two extreme responses to these questions: extreme optimism and uncertainty (“Don’t know”). Respondents with poor basic financial literacy are especially likely to fall into these categories, but poor numeracy is also associated with choosing “Don’t know” (uncertainty). For all three scores, we see a significant influence on share market optimism and equality between all three scores (Table 4-7).

The link between poor financial literacy and optimism matches research into retirement preparation and pension expectations in the Netherlands. Alessie et al. (2011) observe that Dutch respondents with lower financial literacy have difficulty forming realistic expectations of retirement replacement rates and are uncertain of at what age to retire. The Russian students don’t show that clear pattern. Instead, students with a poor numeracy score choose often “Unlikely” whereas a poor sophisticated index score is again associated with the two extreme responses.

Table 4-7: Variation Within and Between Financial Competence Indices

|  | F-Test            |                                      |  | Wald Test               |
|--|-------------------|--------------------------------------|--|-------------------------|
|  | Numeracy<br>DE/RU | Basic Financial<br>Literacy<br>DE/RU | Sophisticated Finan-<br>cial Literacy<br>DE/RU | Joint Equality<br>DE/RU |
| Gender                                       | 5.85***/0.01      | 2.81*/0.29                           | 3.07*/0.01                                     | 26.77***/0.33           |
| Age  | 2.15**/1.23       | 1.22/0.88                            | 0.98/2.98***                                   | 38.65**/58.16***        |
| Understanding of<br>finance?                 | 113.59***/3.08**  | 9.56***/2.79**                       | 7.9***/2.43**                                  | 683.03***/51.60***      |
| Education devoted to<br>financial education? | 0.61/0.13         | 0.66/1.72                            | 4.33**/3.91**                                  | 15.5**/14.67            |
| Share market crash<br>(5 years)              | 4.04***/1.39      | 3.56***/1.37                         | 5.02***/3.87***                                | 59.5***/33.61***        |
| Share market crash<br>(25 years)             | 5.42***/2.07*     | 3.71***/0.22                         | 4.09***/2.94**                                 | 51.2***/35.26***        |

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively. First three columns report F-statistics for the test of the restriction that in a regression of the numeracy (basic, sophisticated) index the coefficients on the indicators are jointly zero for the German and Russian subsample respectively. Final column reports Chi2 statistics for the test that the constants and coefficients of the three regressions, at each horizontal axis category, are equal for the German and Russian subsample respectively.

To further investigate the connections between competence and expectations, we model respondents’ subjective evaluations of the likelihood of another severe stock market decline within the next years in a standard logit model and test whether respondents with special characteristics are more likely to make

a statement about the future. In a second step we deploy an ordered logit model to test whether respondents with special characteristics are more optimistic or pessimistic about the future. We include age, gender, education devoted to finance, self-assessed understanding of finance, numeracy and the two financial literacy scores, as possible indicator variables.

Table 4-8 shows the results for the 5 year expectations of the German group. For reasons of space we show at this point only the results for the German group and only for the five year expectations. The other tables for the Russian group show similar results and are in the appendix. The table reports absolute probabilities for the standard logit (column “I”) and ordered logit (column “II”) estimation of respondents’ expectations, where the reference category is “Don’t know/refuse to answer”. We put the two categories together because there were too few answers to model “Refuse to answer” separately. For example, the probability for making any statement about the future is 71.4 % when you’re female and 80% when male. While no clear pattern can be identified for age and no direct comparison is possible due to the different distribution there is a pattern for the variables understanding of finance and education devoted for finance. Both variables show increasing probabilities for an increasing level of understanding and education indicating that students who are more in contact with finance are more likely to assign a probability to future crisis expectations. The same goes for the index scores even though the interpretation is a little bit different. For the index scores the tables show not absolute probabilities but an increase of probabilities when the index scores increases for one unit. That means that a student who increases his basic financial literacy score by one unit is 8.9% more likely to make a statement about the next five years. Students with higher sophisticated financial literacy are even 15.9% more likely to attribute a specific probability to another crash rather than expressing ignorance or uncertainty by choosing “Don’t know”. This result is in line with Arrondel (2018) who shows a positive correlation between financial literacy and the propensity to formulate a specific financial plan for a French sample.

The column “II” shows the results for an ordered logit model and thus the absolute probabilities for choosing one of the six answers for the demographic characteristics and an increase in probability for the index scores. An overall comparison between the German and Russian group indicates that Russians are more pessimistic. Overall the main category with highest probability is “Unlikely” whereas Germans mainly choose “Very unlikely”. In Germany are males more pessimistic whereas in Russia females are mainly pessimistic. Regarding the understanding of finance and education it seems that students with a high level of understanding and education are more pessimistic. As the index scores increase it becomes more likely that one chooses a pessimistic option with the most improvement for the category “Unlikely”. The results for the 25 years are similar except that they are more pessimistic for both groups up to the point that no one from the German students who evaluated the future says that it’s “Nearly impossible” that there will be no crisis in the next 25 years. Overall, better financial competence, a better understanding of finance and more education in finance reduce uncertainty in favour of risk quantification. This result is in line with previous studies like Epstein (1999) and Halevy (2007) who show that uncertainty averse people are “not probabilistically sophisticated”.

Table 4-8: Logit and Ordered Logit Regression of Financial Literacy on Stock Market Expectations for the next 5 Years for the German Subsample

|  | I           |                                    | II                   |               |           |           |          |
|--|-------------|------------------------------------|----------------------|---------------|-----------|-----------|----------|
|  | Probability | Don't know/<br>Refuse to<br>answer | Nearly<br>impossible | Very unlikely | Unlikely  | Toss-up   | Likely   |
| <i>Gender</i>  |             |                                    |                      |               |           |           |          |
| Female   | 71.4%***    | 28.7%***                           | 13.8%***             | 31.7%***      | 19.2%**   | 3.4%      | 3.3%     |
| Male   | 80.0%***    | 18.6%***                           | 11.0%***             | 32.5%***      | 26.8%***  | 5.5%*     | 5.6%*    |
| Prefer not to<br>answer  | -           | 42.4%                              | 15.1%***             | 26.5%         | 12.2%     | 1.9%      | 1.8%     |
| <i>Age</i>   |             |                                    |                      |               |           |           |          |
| 17   | -           | -                                  | -                    | -             | -         | -         | -        |
| 18   | -           | -                                  | -                    | -             | -         | -         | -        |
| 19   | -           | -                                  | -                    | -             | -         | -         | -        |
| 20   | -           | -                                  | -                    | -             | -         | -         | -        |
| 21   | -           | 4.6%                               | 3.6%                 | 20.6%         | 42.5%***  | 15.5%     | 13.2%    |
| 22   | 85.7%***    | 12.3%**                            | 8.3%**               | 33.3%***      | 33.9%***  | 7.3%      | 5.0%     |
| 23   | 84.6%***    | 29.4%***                           | 14.1%***             | 34.1%***      | 17.8%***  | 2.7%      | 1.7%     |
| 24   | 71.4%***    | 25.0%**                            | 13.2%**              | 35.4%***      | 20.9%**   | 3.4%      | 2.2%     |
| 25   | 81.8%***    | 13.3%*                             | 8.8%**               | 34.0%***      | 32.5%***  | 6.7%      | 4.6%     |
| 26   | 50.0%***    | 28.2%                              | 13.9%**              | 34.5%***      | 18.7%     | 2.9%      | 1.8%     |
| 27   | -           | 99.95***                           | 2.01e-5%             | 1.83e-5%      | 4.37e-6%  | 5.31e-7%  | 3.21e-7% |
| 28   | -           | 20.3%                              | 11.7%                | 36.0%***      | 24.9%     | 4.3%      | 2.8%     |
| 30   | -           | -                                  | -                    | -             | -         | -         | -        |
| 32   | -           | 1.76e-13%                          | 1.5e-13%             | 1.14e-12%     | 7.54e-12% | 1.49e-11% | 100%***  |
| <i>Understanding of finance?</i>   |             |                                    |                      |               |           |           |          |
| 1 (very low)   | -           | 99.99%***                          | 1.04e-4%             | 8.81e-5%      | 2.22e-5%  | 2.91e-6%  | 2.43e-6% |
| 2  | 50.0%**     | 49.1%**                            | 15.6%***             | 23.8%**       | 9.1%      | 1.3%      | 1.1%     |
| 3  | 64.3%***    | 28.9%***                           | 14.6%***             | 32.9%***      | 18.0%**   | 3.0%      | 2.7%     |
| 4  | 85.0%***    | 15.4%**                            | 10.2%**              | 33.5%***      | 29.1%***  | 6.1%      | 5.7%     |
| 5  | 88.2%***    | 17.3%**                            | 11.1%**              | 34.1%***      | 27.1%***  | 5.4%      | 5.0%     |
| 6  | -           | 5.8%                               | 4.6%                 | 22.3%         | 38.9%***  | 13.2%     | 15.3%    |
| 7 (very high)  | -           | -                                  | -                    | -             | -         | -         | -        |
| <i>Education devoted to financial education?</i>   |             |                                    |                      |               |           |           |          |
| A lot  | -           | 12.9%*                             | 9.2%*                | 32.0%***      | 31.1%***  | 7.4%      | 7.5%     |
| Some   | 83.3%***    | 16.3%***                           | 10.8%***             | 33.6%***      | 27.5%***  | 5.9%*     | 5.8%*    |
| A little   | 58.8%***    | 37.5%***                           | 16.0%***             | 29.2%***      | 13.2%**   | 2.2%      | 2.0%     |
| Hardly at all  | -           | -                                  | -                    | -             | -         | -         | -        |
| <i>Average change of probability in percent points for an one unit increase in the score</i> |             |                                    |                      |               |           |           |          |
| Numeracy   | +7.2%       | -6.9%                              | -2.0%                | -1.1%         | +5.5%     | +1.7%     | +1.9%    |
| Basic literacy   | +8.9%**     | -9.0%**                            | -2.7%                | -0.3%         | +7.2%**   | +2.2%     | +2.5%    |
| Sophisticated<br>literacy  | +15.9%***   | -14.1%***                          | -4.3%**              | -0.8%         | +11.4%*** | +3.6%     | +4.2%    |

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively. Column I reports probabilities of a logit regression whereas Column II shows ordered logit regressions. Demographic and self-assessment characteristics show an absolute probability value and the index scores an increase of probability when the index score increases in one unit.

## 4.5. Conclusion

Our study documents how a formal education in economics affects financial knowledge and how mathematical knowledge is able to forecast financial literacy. The results are derived from a survey asking 122 students from Germany and Russia an internationally established set of questions about numeracy, basic financial literacy, sophisticated financial literacy and future crisis expectations. The German group shows superior results in four out of five comparable basic financial literacy questions and in two out of four comparable sophisticated financial literacy questions. Overall, economic students perform better than average individuals but even with that background are only few able to answer all eight sophisticated literacy questions correct (Germany: 18.4%; Russia: 1.7%) which is in line with Lusardi and Mitchell (2008) who show that the level of knowledge is even among well educated people quite low. At the same time, we show that good mathematical skills not necessarily indicate superior financial knowledge. The Russian group shows overall better numeracy results but significant worse financial literacy responses compared to the German group.

Female students perform better on the numeracy part. Regarding the financial literacy questions we confirm former studies from Lusardi and Mitchell (2008), Chen and Volpe (2002), Mandell (2008), and Hung et al. (2009) that women are less financially literate than men. Lusardi and Mitchell (2011b) show differences in self-assessed characteristics like understanding or education of finance between countries. We also find these differences in our dataset between Russians and Germans.

If financial literacy is key to a private and responsible retirement planning and considering that our results indicate that even individuals with an economic background have problems answering all questions correctly it is not surprising that the need of improving financial knowledge is gaining momentum. The success of a partly shifting from a far reaching public to a more private retirement planning depends highly on the skills people have or acquire through time going further than a university education in economics.

## Appendix

Table 4-9: Logit and Ordered Logit Regression of Financial Literacy on Stock Market Expectations for the next 25 Years for the German Subsample

|  | I           | II                              |                      |                  |          |          |           |
|--|-------------|---------------------------------|----------------------|------------------|----------|----------|-----------|
|  | Probability | Don't know/<br>Refuse to answer | Nearly<br>impossible | Very<br>unlikely | Unlikely | Toss-up  | Likely    |
| <i>Gender</i>  |             |                                 |                      |                  |          |          |           |
| Female   | 71.4%***    | 34.2%***                        | -                    | 7.5%**           | 23.8%*** | 24.0%*** | 10.5%**   |
| Male   | 73.3%***    | 23.2%***                        | -                    | 6.1%**           | 23.1%*** | 30.8%*** | 16.8%***  |
| Prefer not to answer   | -           | 46.0%                           | -                    | 7.9%**           | 21.8%**  | 17.6%    | 6.7%      |
| <i>Age</i>   |             |                                 |                      |                  |          |          |           |
| 17   | -           | -                               | -                    | -                | -        | -        | -         |
| 18   | -           | -                               | -                    | -                | -        | -        | -         |
| 19   | -           | -                               | -                    | -                | -        | -        | -         |
| 20   | -           | -                               | -                    | -                | -        | -        | -         |
| 21   | -           | 9.5%                            | -                    | 3.3%             | 18.4%    | 37.6%*** | 31.2%     |
| 22   | 78.6%***    | 12.3%**                         | -                    | 4.0%*            | 21.3%*** | 37.0%*** | 25.4%**   |
| 23   | 76.9%***    | 27.2%***                        | -                    | 7.0%**           | 27.4%*** | 27.1%*** | 11.3%*    |
| 24   | 71.4%***    | 27.2%***                        | -                    | 7.0%**           | 27.4%*** | 27.1%*** | 11.3%*    |
| 25   | 72.7%***    | 31.0%***                        | -                    | 7.5%**           | 27.4%*** | 24.5%*** | 9.6%*     |
| 26   | 50.0%**     | 36.5%                           | -                    | 8.0%*            | 26.7%*** | 21.1%    | 7.7%      |
| 27   | -           | 100%***                         | -                    | 1.54e-5%         | 2.64e-5% | 1.01e-5% | 2.6e-6%   |
| 28   | -           | 9.5%                            | -                    | 3.3%***          | 18.4%    | 37.6%*** | 31.2%     |
| 30   | -           | -                               | -                    | -                | -        | -        | -         |
| 32   | -           | 45.9%                           | -                    | 8.3%**           | 24.3%**  | 16.2%    | 5.3%      |
| <i>Understanding of finance?</i>   |             |                                 |                      |                  |          |          |           |
| 1 (very low)   | -           | 100.0%                          | -                    | 1.34e-5%         | 2.16e-5% | 8.84e-6% | 2.54e-6%  |
| 2  | -           | -                               | -                    | -                | -        | -        | -         |
| 3  | 33.3%*      | 64.0%                           | -                    | 7.4%             | 16.5%    | 9.1%     | 3.0%      |
| 4  | 64.3%***    | 22.8%                           | -                    | 6.6%             | 25.3%    | 29.7%    | 15.7%     |
| 5  | 85.0%***    | 18.7%                           | -                    | 5.8%             | 24.0%    | 32.4%    | 19.2%     |
| 6  | 76.5%***    | 25.5%                           | -                    | 7.0%             | 25.8%    | 27.9%    | 13.8%     |
| 7 (very high)  | -           | 26.5%                           | -                    | 7.2%             | 25.9%    | 27.3%    | 13.2%     |
| <i>Education devoted to financial education?</i>   |             |                                 |                      |                  |          |          |           |
| A lot  | -           | 17.3%*                          | -                    | 5.4%*            | 23.4%*** | 32.9%*** | 21.1%**   |
| Some   | 77.8%***    | 22.4%***                        | -                    | 6.4%**           | 25.3%*** | 29.7%*** | 16.2%***  |
| A little   | 52.9%***    | 41.0%***                        | -                    | 8.4%**           | 24.6%*** | 18.6%*** | 7.4%*     |
| Hardly at all  | -           | -                               | -                    | -                | -        | -        | -         |
| <i>Average change of probability in percent points for an one unit increase in the score</i> |             |                                 |                      |                  |          |          |           |
| Numeracy   | +7.2%       | -13.0%                          | -                    | -1.9%            | -1.9%    | +8.1%    | +8.6%     |
| Basic literacy   | +7.8%       | -8.5%*                          | -                    | -1.1%            | -1.0%    | +5.1%*   | +5.6%     |
| Sophisticated literacy   | +17.4%***   | -16.6%***                       | -                    | -2.4%*           | -3.4%    | +9.8%*** | +12.6%*** |

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\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively. Column I reports probabilities of a logit regression whereas Column II shows ordered logit regressions. Demographic and self-assessment characteristics show an absolute probability value and the index scores an increase of probability when the index score increases in one unit.

Table 4-10: Logit and Ordered Logit Regression of Financial Literacy on Stock Market Expectations for the next 5 Years for the Russian Subsample

|  | I           |                                    | II                   |               |           |          |          |
|--|-------------|------------------------------------|----------------------|---------------|-----------|----------|----------|
|  | Probability | Don't know/<br>Refuse to<br>answer | Nearly<br>impossible | Very unlikely | Unlikely  | Toss-up  | Likely   |
| <i>Gender</i>  |             |                                    |                      |               |           |          |          |
| Female   | 74.2%***    | 22.9%***                           | 11.0%***             | 22.2%***      | 33.9%***  | 1.9%     | 8.0%**   |
| Male   | 71.4%***    | 31.4%***                           | 12.8%***             | 22.2%***      | 26.9%***  | 1.4%     | 5.3%*    |
| Prefer not to<br>answer  | -           | -                                  | -                    | -             | -         | -        | -        |
| <i>Age</i>   |             |                                    |                      |               |           |          |          |
| 17   | -           | 99.9%***                           | 1.49e-5%             | 1.04e-5%      | 5.15e-6%  | 1.66e-7% | 4.57e-7% |
| 18   | 75.0%***    | 15.8%*                             | 10.7%*               | 23.7%***      | 40.1%***  | 2.4%     | 7.3%     |
| 19   | 37.5%**     | 58.2%***                           | 14.6%**              | 15.4%**       | 10.4%     | 0.4%     | 1.0%     |
| 20   | 90.0%***    | 19.9%**                            | 12.4%**              | 24.8%***      | 35.3%***  | 1.9%     | 5.6%     |
| 21   | 57.1%***    | 26.1%*                             | 14.3%**              | 25.0%***      | 29.2%**   | 1.4%     | 4.0%     |
| 22   | 80.0%***    | 23.9%                              | 13.8%**              | 25.1%***      | 31.1%**   | 1.5%     | 4.5%     |
| 23   | 92.3%***    | 14.1%**                            | 9.9%**               | 22.9%***      | 42.2%***  | 2.7%     | 8.2%     |
| 24   | 66.7%**     | 27.8%                              | 14.7%**              | 24.9%***      | 27.7%     | 1.3%     | 3.7%     |
| 25   | -           | -                                  | -                    | -             | -         | -        | -        |
| 26   | -           | 23.7%                              | 13.7%                | 25.1%***      | 31.4%     | 1.5%     | 4.5%     |
| 27   | -           | 9.95e-12%                          | 9.17e-12%            | 3.43e-11%     | 4.41e-10% | 1.8e-10% | 100%***  |
| 28   | -           | -                                  | -                    | -             | -         | -        | -        |
| 30   | -           | 41.9%                              | 16.2%***             | 21.4%*        | 17.8%     | 0.7%     | 2.0%     |
| 32   | -           | -                                  | -                    | -             | -         | -        | -        |
| <i>Understanding of finance?</i>   |             |                                    |                      |               |           |          |          |
| 1 (very low)   | -           | 99.9%                              | 1.54e-5%             | 1.17e-5%      | 6.48e-6%  | 2.25e-7% | 8.02e-7% |
| 2  | 50.0%       | 34.5%                              | 14.2%                | 22.1%         | 23.8%     | 1.1%     | 4.2%     |
| 3  | -           | 17.8%                              | 10.3%                | 21.9%         | 37.9%     | 2.4%     | 9.7%     |
| 4  | 75.0%***    | 16.5%                              | 9.8%                 | 21.4%         | 39.2%     | 2.6%     | 10.5%    |
| 5  | 65.0%***    | 26.8%                              | 12.9%                | 23.0%         | 29.7%     | 1.5%     | 5.9%     |
| 6  | 77.8%***    | 30.4%                              | 13.6%                | 22.8%         | 26.8%     | 1.3%     | 5.0%     |
| 7 (very high)  | 90.0***     | 25.0%                              | 12.5%                | 23.0%         | 31.2%     | 1.7%     | 6.5%     |
| <i>Education devoted to financial education?</i>   |             |                                    |                      |               |           |          |          |
| A lot  | 81.3%***    | 29.2%***                           | 13.1%                | 23.1%***      | 27.8%***  | 1.4%     | 5.3%     |
| Some   | 72.4%***    | 21.8%***                           | 11.4%                | 23.0%***      | 34.2%***  | 1.9%     | 7.7%*    |
| A little   | 80.0%***    | 18.9%**                            | 10.4%                | 22.4%***      | 36.9%***  | 2.2%     | 9.1%     |
| Hardly at all  | 25.0        | 74.4%***                           | 9.4%                 | 9.2%          | 5.9%      | 0.2%     | 0.8%     |
| <i>Average change of probability in percent points for an one unit increase in the score</i> |             |                                    |                      |               |           |          |          |
| Numeracy   | -           | 6.9%                               | 1.3%                 | -0.2%         | -5.5%     | -0.5%    | -2.1%    |
| Basic literacy   | +9.7%*      | -4.8%                              | -1.0%                | +0.1%         | +3.9%     | +0.4%    | +1.5%    |
| Sophisticated<br>literacy  | +17.4%***   | -11.0%**                           | -2.0%*               | +0.4%         | +8.4%**   | +0.8%    | +3.5%    |

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively. Column I reports probabilities of a logit regression whereas Column II shows ordered logit regressions. Demographic and self-assessment characteristics show an absolute probability value and the index scores an increase of probability when the index score increases in one unit

Table 4-11: Logit and Ordered Logit Regression of Financial Literacy on Stock Market Expectations for the next 25 Years for the Russian Subsample

|  | I           |                                    | II                   |               |          |          |          |
|--|-------------|------------------------------------|----------------------|---------------|----------|----------|----------|
|  | Probability | Don't know/<br>Refuse to<br>answer | Nearly<br>impossible | Very unlikely | Unlikely | Toss-up  | Likely   |
| <i>Gender</i>  |             |                                    |                      |               |          |          |          |
| Female   | 74.2%***    | 26.4%***                           | 3.1%                 | 11.7%***      | 17.7%*** | 11.0%**  | 30.0%*** |
| Male   | 60.7%***    | 38.7%***                           | 3.8%                 | 12.8%***      | 16.4%*** | 8.8%**   | 19.6%*** |
| Prefer not to<br>answer  | -           | -                                  | -                    | -             | -        | -        | -        |
| <i>Age</i>   |             |                                    |                      |               |          |          |          |
| 17   | -           | 100%                               | 1.74e-6%             | 3.74e-6%      | 2.60e-6% | 8.47e-7% | 1.09e-6% |
| 18   | 75.0%***    | 29.9%                              | 4.1%                 | 14.4%         | 20.3%    | 10.8%    | 20.4%    |
| 19   | 37.5%**     | 56.2%                              | 4.6%                 | 13.1%         | 13.0%    | 5.3%     | 7.8%     |
| 20   | 80.0%***    | 19.8%                              | 3.2%                 | 12.2%         | 20.8%    | 13.3%    | 30.7%    |
| 21   | 42.9%**     | 44.7%                              | 4.7%                 | 14.6%         | 16.6%    | 7.4%     | 11.9%    |
| 22   | 60.0%***    | 45.8%                              | 4.7%                 | 14.5%         | 16.3%    | 7.2%     | 11.4%    |
| 23   | 92.3%***    | 15.2%                              | 2.6%                 | 10.5%         | 19.8%    | 14.1%    | 37.8%    |
| 24   | 66.7%**     | 30.8%                              | 4.2%                 | 14.5%         | 20.2%    | 10.6%    | 19.7%    |
| 25   | -           | -                                  | -                    | -             | -        | -        | -        |
| 26   | -           | 6.33e-7%                           | 1.33e-7%             | 6.30e-7%      | 1.87e-6% | 2.53e-6% | 100%     |
| 27   | -           | 6.33e-7%                           | 1.33e-7%             | 6.30e-7%      | 1.87e-6% | 2.53e-6% | 100%     |
| 28   | -           | -                                  | -                    | -             | -        | -        | -        |
| 30   | -           | 38.0%                              | 4.6%                 | 14.9%         | 18.5%    | 8.9%     | 15.1%    |
| 32   | -           | -                                  | -                    | -             | -        | -        | -        |
| <i>Understanding of finance?</i>   |             |                                    |                      |               |          |          |          |
| 1 (very low)   | -           | 100%                               | 7.71e-6%             | 1.73e-5%      | 1.28e-5% | 4.77e-6% | 7.20e-6% |
| 2  | 50.0%       | 27.5%                              | 3.5%                 | 12.3%         | 18.0%    | 11.2%    | 27.5%    |
| 3  | -           | 30.6%                              | 3.7%                 | 12.7%         | 17.8%    | 10.6%    | 24.7%    |
| 4  | 66.7%***    | 26.6%                              | 3.4%                 | 12.1%         | 18.0%    | 11.4%    | 28.5%    |
| 5  | 60.0%***    | 32.3%                              | 3.8%                 | 12.8%         | 17.6%    | 10.3%    | 23.3%    |
| 6  | 66.7%***    | 41.5%                              | 4.1%                 | 13.1%         | 15.9%    | 8.4%     | 16.9%    |
| 7 (very high)  | 90.0***     | 18.0%                              | 2.6%                 | 10.0%         | 17.2%    | 12.6%    | 39.6%    |
| <i>Education devoted to financial education?</i>   |             |                                    |                      |               |          |          |          |
| A lot  | 62.5%***    | 38.5%***                           | 3.9%                 | 12.8%***      | 16.7%*** | 9.1%**   | 19.1%**  |
| Some   | 75.9%***    | 24.6%***                           | 3.1%                 | 11.3%***      | 18.1%*** | 11.8%    | 31.1%*** |
| A little   | 70.0%***    | 27.7%**                            | 3.4%                 | 11.9%***      | 18.1%*** | 11.2%**  | 27.8%**  |
| Hardly at all  | 25.0%       | 74.3%***                           | 3.0%                 | 7.8%          | 7.2%     | 3.0%     | 4.9%     |
| <i>Average change of probability in percent points for an one unit increase in the score</i> |             |                                    |                      |               |          |          |          |
| Numeracy   | -5.5%       | +0.5%                              | +0.0%                | +0.0%         | -0.0%    | -0.0%    | -0.4%    |
| Basic literacy   | 1.3%        | -2.2%                              | -0.1%                | -0.2%         | +0.2%    | +0.4%    | +1.9%    |
| Sophisticated<br>literacy  | +17%***     | -11.9%**                           | -0.5%                | -0.9%         | +1.2%    | +2.0%*   | +10.2%** |

\*, \*\*, and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively. Column I reports probabilities of a logit regression whereas Column II shows ordered logit regressions. Demographic and self-assessment characteristics show an absolute probability value and the index scores an increase of probability when the index score increases in one unit.

## Chapter 5

### **The home bias and the local bias: A survey**

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# The home bias and the local bias: a survey

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## Abstract

The home bias like the disposition effect is a well-researched economic phenomenon in investor behaviour which has been examined in finance journal articles for decades. While there is little doubt about the existence of the bias, its magnitude varies across countries and investor groups. The home bias has to be regarded as a multifactorial phenomenon, a combination of numerous causes which all synergistically contribute. In contrast to other biases the home bias can at least partially be explained by reasons beyond irrational investor behaviour. While institutional restrictions play a minor role, informational asymmetries and superior information of domestic investors are important factors. Thus, the performance of investments may well benefit from a home bias, and the bias then no longer would be a puzzle but rather rational behaviour as a lower diversification level may lead to higher returns. The contemporary understanding of the home bias gains in relevance as the ongoing political debate in Germany has to clarify an institutional framework for long-run retirement savings plans of private households based on equity investments.

**Keywords:** Home Bias, Local Bias, Domestic Bias, Behavioural Bias, Market Imperfections

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## 5.1. Introduction

In a frictionless perfect global capital market, investors should invest the risky part of their savings completely in the market portfolio to optimize their risk-return patterns and to comply with classical approaches as the CAPM (Sharpe, 1964). However, empirical research provides evidence for decades that in real markets investors deviate from this portfolio structure which is optimal in perfect markets. The home bias belongs to the puzzles in economics, proven empirically, that do not fit into (neoclassical) theory (Obstfeld & Rogoff, 2000). Following the home bias and the intra-national local bias investors are inclined to invest disproportionately into local and domestic assets, not following portfolio diversification strategies.

Based on capital market models, the home bias has been elaborated (Black, 1974; Michaelides, 2003; Stulz, 1981a, 1981b), and empirical research on the bias started with French and Poterba (1991) studying U.S., UK and Japan. Cooper and Kaplanis (1994) and Fidora et al. (2007) among others confirmed the patterns of the home bias for these three countries. Additional evidence for Germany, France, Italy and Sweden documents the global reach of the phenomenon (Anderson et al., 2011; Chan et al., 2005; Lau et al., 2010; Mishra, 2015; Lippi, 2016). The local bias as the intra-national equivalent has been detected for intra-U.S. investments (Hong et al., 2005; Huberman, 2001), Finish investors (Grinblatt & Keloharju, 2001), Japanese investors (Kang & Stulz, 1997) and German individual investors (Baltzer et al., 2013). The overwhelming majority of research examines home and local bias dealing with direct equity investments and indirect equity mutual fund investments, but the home bias also can be determined for bonds (Ferreira & Miguel, 2011; Solnik & Zuo, 2016), real estate (Eichholtz et al., 2001; Imazeki & Gallimore, 2009) venture capital investments (Cumming & Dai, 2010) and bank loans (Presbitero et al., 2014).

Home and local bias are prevalent and existing for both individual household investors and sophisticated, professional investors like mutual fund managers (Shapira & Venezia, 2001) or occupational pension fund managers (Lippi, 2016). However, individuals tend to exhibit a higher degree of the bias (Ivkovic & Weisbenner, 2005; Lütje & Menkhoff, 2007). Most empirical research tried to detect reasons why investors show a home and local bias. It can be discussed if institutional reasons urge investors to show a home bias. Taxes, transaction costs and barriers to international investments may contribute (Black, 1974; Michaelides, 2003), though institutional reasons are often challenged in literature (Coën, 2001; Glassman & Riddick, 2001). Informational asymmetries between investors presumably cause home bias. These informational reasons can be seen in a universal setting as general information asymmetries (Coval & Moskowitz, 1999, 2001; Dziuda & Mondria, 2012; Shukla & van Inwegen, 1995) or as informational advantages resulting from different accounting standards between countries (Ahearne et al., 2004; Bradshaw et al., 2004; Eichler, 2012). Familiarity also may induce informational advantages, thus a home and local bias (Bodnaruk, 2009; Massa & Simonov, 2006).

A third, quite popular category in studies are behavioural reasons and home bias then should be related to emotional biases of investments and asset allocation. A general optimism and a strong belief in domestic/local assets (Li, 2004; Solnik & Zuo, 2016; Strong & Xu, 2003) are part of these explanations as well as ambiguity aversion (Dimmock et al., 2016), perceived competence (Abreu et al., 2011; Kilka & Weber, 2000) and experience of investors (Graham et al., 2009; Lütje & Menkhoff, 2007). Financial literacy and advice seeking of investors (Calcagno & Monticone, 2015; Kramer, 2016; Mietzner & Molterer, 2018) can be assumed being related to home and local bias. ‘Pure familiarity’, a notion coined by Massa and Simonov (2006), and also studied for the local bias by Grinblatt and Keloharju (2001), plays a role as well. Patriotism (Morse & Shive, 2011) and loyalty (Cohen, 2009) are similar behavioural traits. Hedging motives constitute the last part of behavioural reasons. By exhibiting a home bias, investors may be capable of hedging against uncertainty (generally examined by Choi et al. (2017)) which often takes the form of inflation risk, exchange rate risk and consequential deviations from purchasing power parity (Fidora et al., 2007; Harms et al., 2015). The importance and practical relevance of hedging motives is put into question (Cooper & Kaplanis, 1994; Glassman & Riddick, 2001; Uppal, 1993).

There are many reviews about home bias (Lewis, 1999; Wolf, 2000; Coeurdacier & Rey, 2013; Ardalan, 2019). The reviews of Lewis (1999) and Wolf (2000) are dated back two decades and often examined home bias in consumption as well. Meanwhile the number of exchange listed companies dropped significantly in all major stock markets leaving investors with a smaller number of assets to diversify. The sources to collect information about stocks for investments increased with the number of internet users facilitating the basis for knowledge about foreign assets. And in recent years, the necessity to privately save and invest for retirement purposes became more and more obvious to private households in countries like Germany with a long history of predominant savings only based on bank accounts and life insurances. These changes in the overall institutional environment lead us to derive two research questions for the following literature survey:

1. *Is there still convincing evidence for a home bias and a local bias in developed stock markets?*
2. *If there still is a bias, does this bias result in inferior risk-return structures of private portfolios?*

In the case, that both questions have to be answered positively then financial advisors in banks but also the new robo advisors should address this issue to support investors in overcoming the otherwise biased investment behaviour. Compared to the more recent reviews by Coeurdacier and Rey (2013) and Ardalan (2019) the contribution to research of this review can be defined from two sides. First, the studies and papers incorporated in this review differ significantly from the two mentioned and a large part has not been included in the previous reviews. This is partly due to the method of literature selection and partly based on the fact that mainly studies explicitly elaborating home bias are included in this review. Second, the approach of this review is more comprehensive and grasps the broad picture of home bias, especially referring to Ardalan (2019). Whereas Ardalan (2019) exclusively reviews the

reasons of home bias encyclopaedically, this paper reviews various measurements, the reasons and implications of home bias. On top of that, the study differentiates between home bias and local bias and simultaneously integrates both.

The paper is structured as follows. First, in section 5.2 the methodical approach will be explained and how relevant literature has been found and evaluated. Section 5.3 deals with the precise definition of home and local bias. Section 5.4 gives empirical evidence on both the existence and the degree of the home bias for numerous countries addressing the first research question. Section 5.5 constitutes the main body of the review and works out reasons for and consequences of the home and local bias, divided into institutional, informational and behavioural reasons and thereby addressing the second research question. In addition, the implications of home and local bias, especially on portfolio performance, are presented in section 5.6. Section 5.7 summarizes the findings and provides avenues for future research.

## **5.2. Literature selection**

The search request started with the identification of the relevant keywords. Although the basic puzzle is called home bias equity puzzle, it is expected that merely the notion home bias is being used in most of the relevant research articles. Besides, there may be several synonyms like local bias or domestic bias. These similar terms are also used for search requests. In a second step, the search is divided into advanced (title, abstract) search and simple full-text-search.

In this review, concerning the considered media type the focal point will be on highly recommended journals in order to concentrate on the most qualified results for the two research questions.<sup>45</sup> Besides the standard library catalogue, Google Scholar is used as source. The decision falls on Google Scholar as it offers a high number of sources and the goal of the review is to capture all studies on home bias. The results in this review would not change significantly using another bibliometric database. The titles of all identified articles are scanned. However, the findings obtained by the advanced search are subject to a more thorough analysis. Nearly all of these are significant to the researched topic and are included in this review. The number of results in Google Scholar reinforces that the home bias is a broadly discussed topic in finance; just the advanced search findings and not all of the full-text findings with Google Scholar are scanned for relevance.

Apart from actively conducting search requests, the references and citations in the articles found by using the two methods are analysed. Relevant papers are drawn from the references and included in the review. This process may be repeated several times. Note, that the quality of every identified paper is evaluated. If the paper, respectively the correspondent journal, has a poor ranking, it will not be included in this review. This cross-reference method is one of the most promising ones in order to find further

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<sup>45</sup> The online journal databases of all 'A+'- and 'A'-rated journals of the VHB-ranking ('Banking & Finance'; 'General Business Management') are searched.

articles related to the topic. Table 5-3 in the appendix gives an overview about the results of the home bias search per journal and database.

Following the advice of Fisch and Block (2018) that the screening criteria can have crucial implications for the results, this review solely concentrates on articles published in high quality journals. All types of grey literature like working papers and discussion papers are not incorporated. The evaluation and the selection process is conducted as a combination of objective and subjective methods. The VHB-ranking for a subjective evaluation whereas the impact factors constitute the objective method. The VHB-Ranking is made by skilled and experienced university professors who give their opinion about the quality of journals (The ranking goes from A+ for a worldwide leading journal over A, B and C to D). Even though this seems to be and even is a subjective<sup>46</sup> judgement and ranking, the VHB-ranking is one of the most qualified rankings one can obtain for evaluating the scientific quality of journals. First, all journals are included which are found in the VHB-ranking and not ranked below B-level. Within this range, higher-ranked journals are preferred over lower-ranked. Second, two different impact factors are used to evaluate the significance of journals. Only if the journal is ranked in the upper half of both considered impact factor surveys, the correspondent article may be included in this review. All other journals and related papers are excluded and neither used, nor cited. The first impact factors is based on the database IDEAS (IDEAS, 2019). The impact factor survey "<https://ideas.repec.org/top/top.journals.simple.html>" is obtained on the internet. In this survey 2,244 journals (without working papers) are ranked. There are two journals not ranked in the VHB-ranking and not being within the upper half of the IDEAS impact factor survey: 'Jahrbuch für Wirtschaftsgeschichte' and 'International Journal of Financial Research'. These two journals are therefore excluded from this review.<sup>47</sup> All other considered journals are within rank 707 or above. The second impact factor is developed by 'Scimago'. There are two considered survey categories of the Scimago ranking. In the category 'Economics, Econometrics and Finance' 1,035 journals are ranked (Scimago, 2019). The only journal that is ranked below the upper half of the rated journals is the 'Review of Derivatives Research'. Since this journal is 'A'-ranked in the prioritized VHB-ranking, it is nevertheless used in this review.

On the whole, applying the evaluation methods, there are two journals not listed: 'International Research Journal of Finance and Economics' and 'Journal of Psychology and Financial Markets'. Thus, the 'International Research Journal of Finance and Economics' is excluded from this review. The 'Journal of Psychology and Financial Markets' is not included in any rating because it no longer exists under this name. The current name (from 2003 on) of the journal is 'Journal of Behavioural Finance' (Taylor & Francis Online, 2019). This journal is 'B'-rated in the VHB-ranking and ranked 320 in the 1,035 journals in the Scimago impact factor survey 'Economics, Econometrics and Finance'. Therefore, the journal is part of this literature review.

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<sup>46</sup> Subjective is used in the meaning of not measurable. For a rating of a specific individual, this is the case. Since the ratings of all the individuals are calculated together, the VHB-ranking also has some objective traits.

<sup>47</sup> These two journals are not included in any of the Scimago impact factor surveys.

### **5.3. Defining home and local bias**

In general, the home bias describes an investment behaviour in portfolio management where investors tend to overweight their home country's market and thus investing disproportionately more in assets of their home country compared to its share in the overall market portfolio. In principle, the notion domestic bias is being used with the same meaning.

In contrast, the local bias is more of an intra-national phenomenon. It is always related to distance within a certain country. Investors are inclined to invest a disproportionate high percentage in assets of firms located close to them, independent from country borders. This also results in a lack of diversification. It is also called 'home bias at home'.

Since the effects and causes of home/domestic bias and local bias are quite similar and both even considered in several papers, the literature on local bias' effects is fully included in this review. Baltzer, Stolper, and Walter (2013) examine the bridge between local bias and home bias. Studying the data of stockholdings from Germany and its neighbour countries they find that the local bias is not limited to national borders, it is cross-border-related. If the investment proximity is close enough, the inclination to local stocks exceeds borders. Therefore, it is possible to perceive foreign countries as local if they are 'close enough'.

There are some other inclinations towards the domestic market respectively biases in general that are closely related to home and local bias. These are foreign bias observed by Chan, Covrig, and Ng (2005), foreign industry bias (Schumacher, 2018), home-institution bias (McQueen & Stenkrona, 2012), listing home bias (Sarkissian & Schill, 2003), flight home effect (Giannetti & Laeven, 2012), consumption home bias (Obstfeld & Rogoff, 2000) and the academic home bias (Karolyi, 2016).

### **5.4. Empirical evidence and measures for home and local bias**

There is much evidence of the existence of home bias and local bias. The degree of home bias can be measured by various approaches for numerous countries. There is an observable variation in the extent of home bias in the course of time. Besides, induced by some factors the degree varies as well.

#### **5.4.1. Empirical evidence and measures on the existence of home bias and local bias**

Evidence on the existence of the home bias can be observed in most countries worldwide. French and Poterba (1991), Cooper and Kaplanis (1994), Tesar and Werner (1995) report evidence for OECD countries and Stockman and Dellas (1989) and Dziuda and Mondria (2012) for additional countries. Oehler et al. (2008) confirm a significant home bias of German mutual fund investors and even a European home bias. German mutual funds not only hold a more-than-optimal share of German assets but also hold higher-than-optimal weights of other European countries' assets compared to the world market portfolio. Lütje and Menkhoff (2007) also prove the existence of the home bias specifically for German

investors, Dahlquist (2001) for investments in Sweden. Lippi (2016) confirms home bias for Italian professional occupational pension fund managers investing in government securities, corporate bonds and equities.

Relating to different asset types, the existence of a home bias has been underlined for equities (Bradshaw, Bushee, & Miller, 2004; Diyarbakirlioglu, 2011; Tesar & Werner, 1995), bonds (Fidora, Fratzscher, & Thimann, 2007; Solnik & Zuo, 2016; Tse, 1999; Ferreira & Miguel, 2011; Tesar & Werner, 1995), real estate (Imazeki & Gallimore, 2009; Eichholtz, Koedijk, & Schweitzer, 2001) and mutual funds (Coval & Moskowitz, 1999; Giannetti & Laeven, 2016; Lütje & Menkhoff, 2007; Oehler et al., 2008).

There is also much evidence of the existence of the intra-national local bias. Coval and Moskowitz (1999, 2001) document a local bias for mutual funds. Amongst others, Ivkovic and Weisbenner (2005), Seasholes and Zhu (2010), Huberman (2001) as well as Hong, Kubik, and Stein (2005) confirm the existence of a local bias of individual U.S. investors. Grinblatt and Keloharju (2001) prove a significant local bias of Finish investors, Kang and Stulz (1997) for Japanese. For German individual investors, Baltzer et al. (2013) also document a local bias. Parwada (2008) examines the location and portfolio choice of investment start-ups. The degree of start-ups' local bias is three times higher than the local bias extent reported by Coval and Moskowitz (2001). Pool et al. (2012) show that mutual fund managers in the U.S. overweight their home states where they come from. The degree of local bias is hardly measurable and measurements are even worse to compare to each other because local (or regional) is not a clearly defined area, in particular compared to home bias for which the borders (of a country) are clearly determined.<sup>48</sup> Additionally, it is hard to determine a comparing, well-diversified portfolio which is crucial to measuring the degree of the bias.

In contrary, the home bias can be measured much better. In their basic work on the home bias, French and Poterba (1991) show the degree of home bias for three countries based on data from the end of 1989. U.S. investors invest 93.8% domestically, Japanese 98.11% and UK investors just 82% of their equity portfolios. The lower level of British domestic investments was due to "Prime Minister Thatcher's relaxation of capital control" (French & Poterba, 1991, p. 223). These figures underline that there is a home bias, but the figures do not take into account the optimal weight of every country in a well-diversified portfolio. Also with data from the end of the 1980s, Cooper and Kaplanis (1994, p. 46) support the results of French and Poterba (1991) but calculate a better comparable measure of the home bias by calculating the "domestic equities relative to the proportion of domestic equities in the world market portfolio": US 98%, UK 78.5%, Japan 86.7%, Germany 75.4%, France 64.4% and Sweden even 100%. Still, the home bias remains significant and strong.

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<sup>48</sup> For example, Coval and Moskowitz (2001) define a 100-km-radius as local.

Nowadays<sup>49</sup>, home bias is measured with numerous approaches (some just slightly different to others). Table 5-1 gives an overview about the results of home bias measurements of selected countries which are explained briefly in the following section. One way to measure it, is to set the share of domestic assets in relation to the ‘optimal’ CAPM share of domestic assets. The difference of weights of domestic assets (in the actual and ‘optimal’ portfolio) is then considered as a measure of home bias. The CAPM home bias is defined according to Morse and Shive (2011, p. 418):

$$CAPM \text{ Home Bias } \% = \text{domestic holdings } \% - \frac{\text{home capitalization}}{\text{world capitalization}}$$

Hau and Rey (2008, p. 335) “estimate total investment in the domestic market by domestic agents, ... then simply divide it by total domestic market capitalization”. The data is not normalized by the relation of the domestic capitalization to the world capitalization. Fidora et al. (2007) give comprehensive data on the degree of home bias which in contrast to Hau and Rey (2008) is related to the share of the world capitalization based on the formula:

$$\text{Home Bias of Country } i = 1 - \frac{w_i}{w_i^*}$$

Fidora et al. (2007, p. 635) define  $w_i$  as the “share of international assets in the country’s portfolio” and  $w_i^*$  as the “market weight of the rest of the world seen from the viewpoint of a given country  $i$ ”. Mature economies (e.g. the U.S., the UK, Germany, Japan etc.) exhibit, on average, a home bias of 67.6%. Emerging economies (e.g. in Asia and Latin America) show a significant higher degree of around 95%.

Chan et al. (2005) apply a resembling measure, but express the home bias as a natural logarithm. Lau, Ng, and Zhang (2010) calculate their home bias measure exactly the same way as Chan et al. (2005). Since the measurement of Lau et al. (2010) is based on data over a longer period of time (from 1998 to 2007), they obtain slightly different results. Anderson, Fedenia, Hirschey, and Skiba (2011) approach the calculation similar to the general definition of Chan et al. (2005), but distinct in two important aspects: First, Anderson et al. (2011) perform a subtraction and second they do not express the results logarithmically. Both factors cause the very different and not comparable measures of Chan et al. (2005) and Anderson et al. (2011). Mondria and Wu (2010) use the same definition of home bias as Ahearne, Grier, and Warnock (2004). Mondria and Wu (2010) define home bias as ‘one minus the ratio share of “foreign equities in country  $i$ ’s portfolio” and “the share of foreign equities in the world portfolio” from perspective of country  $i$ ’. Going more into detail regarding the measurement approaches, there are different ways on how to build up the optimal weight of a country of a portfolio. Mishra (2015) shows different approaches and measures of home bias based on different optimal portfolios. A comprehensive measure of both home bias and foreign bias can be found in Cooper, Sercu, and Vanpée (2018) who integrate home and foreign bias in one model and then measure so-called pure home bias

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<sup>49</sup> Relating to papers starting from 2004.

relative to the model. Pure home bias is just the part of home bias which cannot be explained by foreign bias and distance effects. Thus, it is not a measure of home bias as considered by the large part of authors (and in this review) and the results are therefore not included in the comparison of home bias measurements in this review. However, the model is very compelling and seems a promising approach different to the large part of existing studies. Cooper et al. (2018) find that pure home bias can just be observed in emerging markets. For developed countries foreign bias can explain the large part of total home bias variation, i.e. “the home country is very much like a foreign country with zero distance. Investors do not appear to exhibit a pure fear of foreign investment separate from their general dislike of distance” (Cooper et al., 2018).

As summarized in Table 5-1, the measures are quite different. All papers confirm the existence of home bias for all countries although no consistent and standardized measure is applied. That is why the results sometimes show inverse directions. For example, Chan et al. (2005) measure a larger home bias of the UK compared to the U.S., whereas the findings of Fidora et al. (2007) show the contrary, even when neglecting the logarithmic presentation and even though the data is about a similar period of time. The consistency and accuracy of data and measurements is only guaranteed within one specific study and within one specific method of measurement. There are some papers stating that mismeasurement of the home bias leads to its existence. For example, Lewis (1999) states that the used mathematical models may be the only reason that there is a home bias. But, since all of the presented studies provide evidence for the existence with different models, the effect of mismeasurement when dealing with the pure existence seems to be marginal.

Table 5-1: Different measurements of home bias for selected countries<sup>48</sup>

|              | French and Poterba (1991) | Cooper and Kaplanis (1994) | Chan et al. (2005) | Lau et al. (2010) | Own calculation 1 | Own calculation 2 | Fidora et al. (2007) | Hau and Rey (2008) | Anderson et al. (2011) | Mondria and Wu (2010) | Mishra (2015) |
|--------------|---------------------------|----------------------------|--------------------|-------------------|-------------------|-------------------|----------------------|--------------------|------------------------|-----------------------|---------------|
| year of data | 1989                      | 1987                       | 1999 - 2000        | 1998-2007         | 1999-2000         | 1999-2000         | 2001-2003            | 2001-2002          | 2006                   | 1988-2004             | 2011          |
| U.S.         | 93.8                      | 98.0                       | 0.61               | 0.695             | 0.730             | 0.388             | 75.1                 | 92.1               | 42.21                  | 0.820                 | 0.6118        |
| UK           | 82.00                     | 78.5                       | 1.67               | 1.714             | 0.380             | 0.349             | 67.1                 | 65.4               | 20.75                  | 0.730                 | 0.5629        |
| Japan        | 98.11                     | 86.7                       | 1.86               | 2.363             | 0.682             | 0.605             | 89.3                 | -                  | 14.83                  | 0.910                 | 0.7916        |
| Germany      | -                         | 75.4                       | 2.12               | 2.171             | 0.307             | 0.295             | 61.6                 | 55.4               | 16.40                  | 0.700                 | 0.4609        |
| France       | -                         | 64.4                       | 2.55               | 2.651             | 0.533             | 0.510             | 72.4                 | 55.4               | 32.42                  | 0.820                 | 0.6345        |
| Italy        | -                         | 91.0                       | 2.77               | 3.028             | 0.339             | 0.332             | 57.3                 | 55.4               | 16.63                  | 0.830                 | 0.3902        |
| Sweden       | -                         | 100.0                      | 3.81               | 3.927             | 0.472             | 0.457             | -                    | -                  | 41.43                  | 0.770                 | 0.5035        |

<sup>50</sup> The ‘own calculations’ are based on the data of Chan et al. (2005). ‘Own calculation 1’ is calculated according to Fidora et al. (2007). ‘Own calculation 2’ is the domestic capital market weight subtracted from the share of domestic investments. For Mishra (2015), the measures with the international capital asset pricing model (ICAPM, weekly) are included in the table.

#### **5.4.2. Empirical measuring the varying degree of home bias and local bias**

The degree of home bias varies by two points of view, a general decline in home bias in the course of time and relating to particular factors which impact the extent of home bias. Since most of the available data is provided to U.S. investors (Karolyi, 2016), the degree of home bias for U.S. investors is best analysed in empirical research (Eichler, 2012). For local bias, there is no disposable data.

Since the percentage of foreign ownership at the Japanese stock market from the 1970s to the 1990s has increased, it can be considered as an indication of a general decline of home bias on course of time (Kang & Stulz, 1997). Explicitly measured decline by Levy and Levy (2014) shows a decrease of U.S. home bias from 1988 until the 2000s. This finding is confirmed by Ahearne et al. (2004). After the early 2000s, home bias first slightly increased but has fallen again until 2012 and remains on a significant level around 40%. Support of the decline of home bias for other countries comes from Fidora et al. (2007). Both equity and bond home bias in mature markets have decreased during 1997 to 2003. Unfortunately, more recent data on the degree of home bias for other countries than the U.S. could not be found in any considered paper.

The home bias also varies due to particular factors/variables. The economic respectively financial development of a country is one factor, however most studies show that there is no statistically significant correlation and impact. Bae et al. (2008) exclude economic development of a country as a driving force for the equity home bias. Also, Dahlquist et al. (2003) challenge the influence and importance of the financial development on the equity home bias, as differences in financial development will be reflected in stock prices. Chan et al. (2005) support these findings and do not find a significant impact of economic development. They detect that merely the stock market development and familiarity have a statistically significant influence on the extent of home bias. Imazeki and Gallimore (2009) use the same approach as Chan et al. (2005) but examine real estate mutual funds and report similar results. The only significant factor which influences the degree of home bias in real estate is a combination of two variables: real estate market capitalization size and real estate market transparency. According to Imazeki and Gallimore (2009) general economic development also seems to not be important when studying real estate home bias. However, there is evidence for an influence of the variable ‘economic development’ with respect to home bias in bonds (Ferreira & Miguel, 2011).

In accordance with Pool et al. (2012) resource-constraints of managers influence the degree of home bias. Managers with more limited resources exhibit more home bias. Investors with a small amount of invested money are more inclined to exhibit home bias (Karlsson & Nordén, 2007). The effect of the size can be also transferred to the countries’ size, i.e. the size has a positive impact on home bias as in a big country an investor has more opportunities to diversify his portfolio and is not depend on diversifying internationally (Mishra, 2015).

Anderson et al. (2011) examine the influence of culture on home bias and show that high values of the variables long-term orientation and masculinity lead to a relative decrease in the level of home bias,

whereas uncertainty avoidance as a cultural characteristic increases home bias. The influence of gender is also proven by Karlsson and Nordén (2007) who show that overconfident investors (mostly men) are more probable to show home bias. Lütje and Menkhoff (2007) also underline the influence of overconfidence on home bias<sup>51</sup>. The impact of cultural variables on investment decisions is confirmed by Beugelsdijk and Frijns (2010), though only for foreign bias.

Employees in the public sector (having a high job security) acting as investors and investors with a low education/sophistication are more inclined of being home-biased (Karlsson & Nordén, 2007). According to Mondria and Wu (2010) home bias decreases with financial openness but remains in the long run due to interaction between “portfolio and information choices” (Mondria & Wu, 2010). Banks just like institutional ‘investors’ also exhibit an information-based home bias when they give loans to enterprises (Presbitero, Udell & Zazzaro, 2014). Banks even exhibit home bias when allocating their own bank assets and do not diversify internationally with the help of international subsidiaries (García-Herrero & Vázquez, 2013).

Shapira and Venezia (2001) examine differences in (behavioural) patterns of institutional and individual investors and show that professional investors have a better diversified portfolio (less home bias) than individual investors. Sometimes the individual investors influence the institutional one. That means that the institutional investor is the one who actually invests but has to consider the ‘wishes’ of the individuals, e.g. considering mutual fund investing (Oehler et al., 2008). Lütje and Menkhoff (2007) for home bias and Ivkovic and Weisbenner (2005) for local bias provide similar evidence in favour of a higher bias of individual investors.

## **5.5. Reasons and causes of home bias and local bias**

The reasons for a home bias and local bias may be divided according to French and Poterba (1991) into two types: institutional and individual investor-related reasons. Nowadays, since research has advanced, it seems appropriate to add one further reason, i.e. information. Information-based explanations constitute a big part of recent research and the large part of recently published articles. Nearly all of the literature discussed in this section refers to home and local bias for volatile assets which are equities/stocks and mutual funds investing in stocks.

### **5.5.1. Institutional reasons**

In their early work French and Poterba (1991) mention institutional aspects such as capital flow restrictions, taxes and transaction costs as reasons for home bias. However, they do not find significant evidence for these reasons and conclude that institutional reasons may account for a certain degree of the home bias, but are unable to explain the large extent. In recent research the relevance of such institutional reasons is declining or the reasons are even rejected. Institutional reasons consist of reasons

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<sup>51</sup> The findings of Lütje and Menkhoff (2007) are just valid for equity managers and not for bond managers.

which the actual investor cannot influence and which are set up by policy makers or are based on general economic principles. Institutional reasons cannot explain any local bias. The identified reasons just relate to international home bias.

#### **5.5.1.1. Transaction barriers and taxes**

Transaction barriers are explicit barriers to an investment abroad and can be induced by different causes: taxes on foreign investments or not further specified transaction costs (e.g. cost for opening an investment account abroad). In the early 1970s, Black (1974) develops a model with a capital market equilibrium combined with explicit barriers (taxes) to foreign investment. In his model, a home bias occurs with these taxes on foreign investments. However, the results are not validated empirically. Stulz (1981b) constructs a similar model by introducing barriers to international investment. Compared to Black (1974) the model has slight differences in the assumptions, especially in the calculation of the costs respectively taxes. Though, he finds similar results that holding foreign assets is costly to domestic investors, therefore hold less by domestic investors. Stulz (1981b) also gives no empirical support to his hypotheses and to the predictions he derived from his model. But, even in a model without barriers to international investments, investors hold a higher share of domestic assets than expected by standard portfolio theory (Stulz, 1981a). The result can be considered as a first step of doubting explicit barriers to investment as an explanation for home bias.

In order to assume transaction costs as a reason, risk aversion levels have to be set to unreasonable extents that cannot be shown in data (Cooper & Kaplanis, 1994). Tesar and Werner (1995) explain that the turnover rates for foreign stocks are higher than for domestic stocks. Given that fact, transaction barriers and costs cannot be considered as a plausible explanation. Also, French and Poterba (1991) support the hypothesis that taxes are possibly not the reason for home bias. In a more recent reconsideration of Tesar and Werner (1995), Warnock (2002) approves the basic finding: transaction costs are not able to explain home bias.

Model-based, Michaelides (2003) shows that small additional costs to foreign investments can generate a home bias. These costs may result from fees to international investment or costs of opening a foreign account. Michaelides also suggests information asymmetry as a reason. Very high taxes and cross border taxation may lead to home bias (Mishra & Ratti, 2013). However, such high tax rates do not seem to be existent in today's economy. An appropriate treatment by countries' policy makers with double taxation is important.

As there has been more deregulation and liberalization of capital markets and capital flows over the last decades, home bias should have been decreased significantly which is not the case. Recent studies challenge explicit barriers as an important reason. Ahearne et al. (2004) test the impact of direct and explicit barriers on international investment. They find that even though these barriers are statistically significant they are not economically meaningful. Dahlquist et al. (2003), Coën (2001), Glassman and Riddick (2001) and Baltzer et al. (2013) challenge the explanations of home bias induced by explicit

barriers as well. None of the studies directly rejects any influence of transaction costs on home bias at all, it is rather that transaction costs and taxes as the single reason are unable to fully explain home bias. There is support of the fact that direct costs on foreign investments exist and contribute to a certain, however undefined, degree of home bias. This seems plausible since there are still some kind of cross-border transaction costs in most countries.

#### **5.5.1.2. Correlation between markets**

Costs for foreign investments have decreased enormously in the last decades (Levy & Levy, 2014). The existence of costs on foreign investments is confirmed, but these costs do not serve as an explanation of home bias. Due to the decrease in general foreign investment costs the home bias should have been decreased as well. Correlation of markets leads to extra costs for investors. Since correlation of markets has increased significantly, the sum of the costs remains stable and thus home bias as well (Levy & Levy, 2014). The induced additional cost is proportional to the so-called ‘home bias magnification’ (HBM) factor that can be calculated with the following formula, “where  $\rho$  is the average correlation between markets” (Levy & Levy, 2014):

$$HBM = \frac{\rho}{1 - \rho}$$

The HBM explains the finding that there is no economic benefit from investing abroad in highly correlated markets. In summary, high correlation equals low diversification gains. Based on a model, Michaelides (2003) also supports the idea that a positive and strong correlation between domestic and foreign market leads to a significant home bias.

#### **5.5.1.3. Internal governance of firms**

Internal governance of firms is seen as an institutional reason for home bias because the investors are not able to change any of these facts. According to Dahlquist et al. (2003), across 51 countries 32% of shares are not traded at all which means that these shares are not available for public investors. They are with controlling shareholders (e.g. a family or similar). In the U.S., the percentage of controlling shareholders is lower. Consequently, investors cannot hold the world market portfolio (which assumes that all stocks are traded) even if they would like to, regardless of and independent on any other reasons for home bias. Home bias is significantly smaller for the U.S. and other countries taking into account the fraction of controlling shareholders. Mishra (2015) measures ‘institutional quality’ which highly influences corporate governance as well. He finds a correlation to home bias and claims that good corporate governance is appreciated and therefore leads to lower home bias.

Poor governance of firms can also be shown in another aspect, meaning high managerial control and a high level of insider control. If a firm is poorly governed, foreigners are inclined to hold fewer equities of such firms, thus investing more in their domestic market, exhibiting home bias (Leuz et al., 2009). In poorly governed firms, expropriation and governance problems are more likely. These results can help

to explain home bias. Investors are ‘forced’ to invest disproportionately in their domestic country (exhibit home bias), because the world market portfolio is not available to them for investment.

### **5.5.2. Informational reasons**

French and Poterba (1991) already mention informational aspects as one possible reason for the shown investor-specific behaviour: “They [investors] may impute extra ‘risk’ to foreign investments because they know less about foreign markets, institutions, and firms” (French & Poterba, 1991, p. 223). Different information results in different expected risk-return patterns, hence inducing home bias if the perceived information advantage is towards domestic assets.

#### **5.5.2.1. General informational asymmetries**

Information asymmetries are a reason for both intra-national local bias and international home bias. Shukla and van Inwegen (1995) provide the first study on informational advantages as a reason for home bias and show that domestic investors (U.S. investors) have an information advantage compared to foreign investors (UK investors). The prevalent asymmetry in information induces a home bias of the UK investors, because they underweight the foreign U.S. market. The behaviour of underrating the U.S. market seems rational due to the poor performance of foreign UK investors which discourages them from investing abroad. Both Zhou (1998) and Michaelides (2003) in a model and Coval and Moskowitz (1999) confirm the existence of informational asymmetries as an explanation of home bias for investors whereas Presbitero et al. (2014) for banks giving loans.

When dealing with informational asymmetries and home bias, the question arises why informational advantages in a world with a high level of information transmission (especially by the Internet) still exist. van Nieuwerburgh and Veldkamp (2009, 2010) show that the advantages are based on fundamental and natural human behaviour: Information is rated differently depending on the exclusiveness. Exclusive information is worth more. These findings of investors’ behaviour can explain both local and home bias, national borders are not taken into account. So, when taking information-based explanations of home bias it is not just about the existing advantage, it is also about the learning process of obtaining information. This result is closely related to Choi, Fedenia, Skiba, and Sokolyk (2017) who conclude that the higher the learning capacity of an investor, the more concentrated the portfolio is. Since home bias is a type of portfolio concentration, this finding means that an investor is inclined to learn more and more about the assets he already knows in order to obtain specific information. The higher the learning capacity the better the behaviour works out.

The model by Dziuda and Mondria (2012) supports the information-based explanation of home bias. But in their model, they attribute the informational advantage to the clients of professional investors (managers). The managers’ reply leads to a reinforcement cycle. Thus, they prove information to be the reason for home bias, however challenge the source of the information asymmetry and advantage as determined in Coval and Moskowitz (2001). These differences can be due to studying intra-national

investment and local bias (Coval and Moskowitz, 2001), whereas Dziuda and Mondria (2012) exemplify international portfolio choice and home bias. The results of a survey (run in 2003) about German fund managers analysed by Lütje and Menkhoff (2007) are rather in accordance with Coval and Moskowitz (2001) that the existence of home bias is unrelated to clients' preferences. The fund managers themselves perceive a local information advantage, expect higher returns of domestic investments and therefore their investments are home-biased. This perceived information advantage does not exactly hold to be true. Lütje and Menkhoff (2007) conclude that pure informational explanations of home bias should be challenged.

Hong et al. (2005), in contrast to Coval and Moskowitz (1999, 2001) who study how investors gather information, examine how investors share information. Investments in one city correlate, i.a. by word-of-mouth information transmission between investors. The finding constitutes a reinforcement process of any local bias or home bias, because one investor who is slightly biased transmits this bias to other local investors. It comes to a positive feedback amongst investors located nearby. Hence, information asymmetries play an important role in explaining home bias (Hong et al., 2005). Also, Hau (2001) identifies information asymmetries to be inducing home bias. The discovered information asymmetries are caused by linguistic and cultural differences between traders. A pure geographic bias which is just based on distance and not informational aspects can neither be confirmed nor fully discarded.

The above-explained standard local information approaches claim that there is only local/intra-country information and better knowledge. Albuquerque et al. (2009) introduce 'global private information' because local information alone cannot explain different performances of investments with informational advantages.

Local bias is closely related to distance effects meaning geographic proximity. If an investor is located more proximate to a potential investment opportunity, she has often access to more and better information, the accessibility of information is better and less costly. Three firm characteristics (based on U.S. data) lead to an informational advantage and thus to local bias: a small firm size, a high leverage and a low international output tradability (Coval & Moskowitz, 1999). If all of these three characteristics are given, there is the biggest informational advantage for local investors. The result can be easily explained, because it is precisely for such characterized firms that local information can be obtained most easily and informational advantages have the biggest impact on performance (e.g. the firm is not known as widespread, therefore the information about the firm is not either). As well, geographic proximity leads to informational advantages for local investors. Local investors have lower costs to monitor the local firm and the local stock or have special access to specific, investment-relevant information (Coval & Moskowitz, 2001).

Baik et al. (2010) and Gaspar and Massa (2007) also support the information advantage theory of local investments. Ivkovic and Weisbenner (2005) and Ivkovic et al. (2008) go the argumentation the other way around and conclude from a better performance of a biased/concentrated portfolio as local

information advantage. They find that investing locally in combination with a concentration on a very few stocks, the best results would be yielded. Besides, by mimicking the behaviour of the local investors, outside investors are able to increase returns (Ivkovic & Weisbenner, 2005).

Information advantages also cause the local bias for investment decisions of start-ups (Parwada, 2008). The founders are able to maintain their local and familiar network of the former employment and use the local information. This leads to a local bias in equities three times higher than the local bias of mutual funds, reported by Coval and Moskowitz (2001). Even investment banks exhibit local bias due to informational advantages when placing municipal bonds especially by local investment banks (Butler, 2008).

The reason ‘informational advantage’ for local bias is detected for both investor types but unfortunately the evidence is limited to U.S. investors investing in the U.S. Only Bae et al. (2008), on the basis of analysts’ data worldwide, observe an information advantage for local investors respectively analysts over foreigners.

Some studies challenge the information-based explanations of local and home bias. Even though Seasholes and Zhu (2010) state that there is a local bias in the U.S., they do not observe informational advantage of local investors over foreign investors. The same conclusions are made by Pool et al. (2012). Both findings are based on the comparison between the performance of biased and not-biased portfolios. It may be the case that the possibly existing surplus of information of a domestic or local investor has a poor quality, hence not results in higher returns. Glassman and Riddick (2001) subsume information asymmetries to differential perceived riskiness of foreign assets and claim that perceived riskiness adjustments cannot explain home bias solely. Though, all these studies questioning information-based reasons follow rather implicit approaches, i.e. concluding from performance results on possible reasons.

#### **5.5.2.2. Accounting and reporting standards as informational asymmetries**

Accounting and reporting standards are a reason mentioned frequently in research about home bias. It is reasonable to assume that the adoption of accounting standards is related to information asymmetries. As Bradshaw et al. (2004, p.836) say “informational issues that affect home bias are multilevel and at least partially due to reporting decisions”.

Examining investment decisions of institutional U.S. investors in non-U.S. firms<sup>52</sup>, Bradshaw et al. (2004) document that if a non-U.S. firm has a high level of adoption of U.S. accounting standards, U.S. investors invest more in such a firm. Thus, there is a higher degree of diversification, hence less investment in the domestic market (home bias). The adoption of U.S. accounting standards contributes to a reduction of information processing costs for potential investors. Besides, investors feel familiar and comfortable with the well-known standards. U.S. investors are home-biased towards accounting standards that they know (Bradshaw et al., 2004). With a different approach, Ahearne et al. (2004) confirm

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<sup>52</sup> Canadian firms are not part of the Non-U.S. sample.

that information costs and asymmetry are highly related to accounting standards. Firms are able to reduce information costs for potential investors by listing their equities publicly in foreign indexes and thus have to comply with the regulatory issues. For example, just 18% of German firms are listed in the U.S., while 81% of Dutch firms. That is one potential reason why U.S. investors underweight German companies and assets much more in their portfolio compared to Dutch. If all firms were listed in the U.S., a large extent of home bias should be eliminated. Though, not all of it as public listing and adopting certain accounting standards are only two aspects contributing to home bias, i.e. not being able to entirely explain the extent (Ahearne et al., 2004). Mishra (2015) supports the finding that foreign listing has a negative impact on home bias. Aggarwal et al. (2005) report that U.S. mutual fund investors have certain preferences (factors) related to accounting issues when investing in 30 emerging markets. Country-specific factors consist of accounting standards, shareholder rights and legal framework. The issuance of American Depository Receipts, accounting transparency and the voluntary adoption of accounting standards belong to firm-specific factors. All of the mentioned factors have to be at least partially fulfilled, otherwise home bias occurs for U.S. investors.

There might be different results for other countries since U.S. accounting standards belong for decades to the highest quality standards set (Bradshaw et al., 2004). In other countries with less-qualified standards (e.g. Germany or France), investors may be less biased towards their domestic standards. However, it is expected that accounting standards also play a role for those countries when explaining home bias, though having less importance. Covrig et al. (2007) provide evidence on accounting standards as a reason for home bias in an international setting. Using International Accounting Standards (IAS), firms are able to attract more foreign investors, because IAS contribute to better and more useful information for those foreign investors. Therefore, the degree of home bias for foreign investors declines. For firms operating in a poor information environment with low visibility the impact is even higher. The number of foreign investors increases (controlled for other variables) from 2% to 2.9% when adopting IAS compared to local accounting standards.

A higher level of corporate disclosure (resulting in more information for potential investors) is able to reduce home bias (Eichler, 2012). Two prerequisites make the corporate disclosure efficient to reduce home bias. On the one hand, security laws have to make the statements credible and reliable by punishing false information. On the other hand, the disclosure statements have to be understandable for the investors, i.e. the investor can interpret them easily without much incurred additional 'cost' for understanding. In contrast to the above-mentioned studies, which discussed the regulatory requirements for accounting standards (Eichler calls this corporate disclosure *de jure*, from law), Eichler (2012) shows that only the formal regulatory requirements have no impact on home bias. For the investors, it is always of importance how they are applied (the corporate disclosure *de facto*), which means how a specific firm conducts their accountings and disclosure. But the actual *de facto* corporate disclosure is normally highly dependent on the *de jure* regulatory requirements for accounting. Slightly different assumptions when calculating the results and impacts may lead to such different results.

### **5.5.2.3. Information-based familiarity and information asymmetry**

An investor who is familiar with a firm may have informational advantages about the company, so familiarity is in some cases highly related to information asymmetries. This so-called information-based familiarity should not be confused with behavioural familiarity (Massa & Simonov, 2006). Investors are inclined to invest in assets which they are familiar with. Massa and Simonov (2006) see familiarity to stocks in the meaning of geographically and professionally close and information-driven. Bodnaruk (2009) supports the existence of familiarity in combination with information asymmetry as a reason for local bias. In a setting of moving, the evolution of familiarity can be observed. Former ties to firms get loose and new ties and familiar relations are build up close to the new residence (Bodnaruk, 2009).

The evidence found on information-based familiarity is limited to local bias and both studies are relying on the same data, i.e. Swedish data and investors. Thus, the explanatory power of these specific findings is narrowed. However, without distinguishing information-based familiarity and general information asymmetry but rather considering information-based familiarity as a normal informational reason, the evidence on information-based explanations for home and local bias is still overwhelming.

### **5.5.3. Behavioural and individual investor-specific reasons**

Behavioural and individual reasons are caused by human's nature. Behavioural reasons are directly related to investors' beliefs, perceptions and personality and are normally uncorrelated with market's development. The introduced behavioural reasons are optimism, ambiguity aversion/competence/experience/financial literacy, pure familiarity/patriotism/loyalty and hedging against uncertainty. These reasons for home and local bias constitute, combined with the informational reasons, the major part of explanations.

#### **5.5.3.1. Optimism and beliefs towards domestic assets**

Investors are, in general, more optimistic about the domestic market and systematically assume higher expected returns. This perception results in biased portfolio choices, thus providing an explanation for home and local bias. First, two types of optimism, absolute optimism and relative optimism, have to be distinguished. According to Strong and Xu (2003, p. 308), absolute optimism "occurs when investors are more optimistic about their home market than they are about foreign" whereas "relative optimism towards domestic equities occurs when investors are more optimistic about their home market than are investors from other countries". Both types of optimism contribute to the explanation of home bias.

French and Poterba (1991) already suggest that investors systematically are more optimistic about the domestic market. Shiller et al. (1996) study the expectations, representing the degree of optimism, from Japanese and U.S. investors based on empirical data and surveys. The answers in the survey correlate, but there is a vast difference in the actual numbers. The investors always exhibit a higher relative

optimism for their domestic market which helps explaining home bias. Shiller et al. (1996) are aware of possible information asymmetries, but assume that both investors have nearly equivalent information.

In a model with a standard Bayesian approach, higher expectations of investors for the domestic market are confirmed (Pástor, 2000). Prior beliefs are incorporated in the model. Therefore, it is possible to be free from the two disputing approaches: relying fully on standard asset pricing models or not believing these models at all (just relying on data). Concluding from the model, home bias can be justified for U.S. investors when the prior beliefs are stable in reality. Though, Pástor (2000) gives no empirical evidence of his conclusion. Li (2004) puts empirical evidence on the model of Pástor (2000) setting the parameters of prior beliefs consistent with existing literature. In this framework, when computed with actual G7 data, Li (2004) supports the hypothesis of Pástor (2000). Investors consider foreign investments much riskier, resulting in a higher expectation and a higher optimism for the domestic market.

Based on a survey of fund managers, there is further and more comprehensive evidence on differences in optimism as an explanation for home bias. The fund managers surveyed exhibit a higher relative optimism towards the domestic markets (Strong & Xu, 2003). The evidence on absolute optimism is not directly supporting home bias. Only for European and Japanese fund managers, an absolute optimism can be found, hence explaining home bias. However, according to Strong and Xu (2003), the absolute optimism findings are subject to the studied time period. In summary, fund managers have “a bias towards domestic equities and a relative bias against foreign equities” (Strong & Xu, 2003, p. 312). The result that relative optimism has a positive relation to home bias in portfolio holdings of equity and bonds is confirmed by Solnik and Zuo (2016). They are the first to give evidence on a broader time span which is independent of market phases (bull, bear, market crash).

For specifically German equity fund managers, a relative return optimism for domestic securities leading to home bias towards German investments can be found (Lütje & Menkhoff, 2007). Lai and Teo (2008) discover that local analysts of eight Asian emerging countries are more optimistic about the domestic market than recommendations from foreign analysts. If potential investors base their investment decision upon the recommendations of local analysts, this finding can explain home bias.

As a result, there is much evidence of relative optimism for numerous investors' countries. However, the studies on absolute optimism are limited. Relative optimism should be considered as an important explanation contributing to home bias. Prior beliefs contribute to a certain degree to the existence of home bias. In general, home bias in equities and bonds is driven by behavioural and informational factors whereas home bias in bonds is also influenced by institutional factors (e.g. capital control, investor protection, legal framework). Though, there may be some limitations to the evidence that should not be neglected. Strong and Xu (2003) question what came first and what results: relative optimism or home bias. At least mutual dependencies can be confirmed. But, behavioural reasons, even for sophisticated

fund managers, cannot be rejected. Informational reasons together with behavioural causes can exist simultaneously and both contribute to home bias (Lütje & Menkhoff, 2007).

### **5.5.3.2. Ambiguity aversion, competence, experience and financial literacy of investors**

In decisions under uncertainty individuals' preferences are numerous. Ambiguity and aversion to ambiguity of individual investors are one inclination of investors' behaviours. Some behaviours cannot be explained by ambiguity aversion, but rather based on competence and experience of investors. Besides, financial literacy and the extent of advices seeking is another behavioural approach.

Ambiguity aversion is a behavioural characteristic of human beings and was tested and confirmed in an experiment by Ellsberg (1961). In an ambiguous investment setting no return distributions are known at all. These findings are "in trouble with the Savage axioms" (Ellsberg, 1961, p. 651). Relating to portfolio choices of investors, ambiguity aversion can be part of an explanation for home bias. In a recent study, Dimmock, Kouwenberg, Mitchell, and Peijnenburg (2016) examine how ambiguity aversion refrains investors from investing abroad. Ambiguity aversion is negatively correlated to foreign stock ownership. This means that ambiguity-averse household investors hold less foreign equities in their portfolio than an average investor. Since the majority of people is ambiguity-averse, there is a certain degree of home bias. Guidolin and Liu (2016) provide supporting evidence in line with the results by Dimmock et al. (2016) based on a model with incorporated prior beliefs of an U.S. investor in the domestic CAPM. In contrast to Pástor (2000), they do not rely on the standard Bayesian approach. Within this model, ambiguity aversion of an investor leads to strong and significant home bias in both bull and bear periods. It is independent from the extent of risk aversion and from the degree of prior beliefs respectively trust about the efficiency of the domestic CAPM. Guidolin and Liu (2016) validate the model based on empirical data. According to Giannetti and Laeven (2012, 2016) ambiguity aversion is reinforced in times of crisis. Giannetti and Laeven (2016) are the only assuming that amongst other reasons ambiguity aversion intensifies local bias (and not home bias) of investors in times of crisis.

Beyond the probability-based (ambiguity) explanation, Heath and Tversky (1991) examine the rather just psychological aspects of the preference for competence-based decisions. The preference of investors, that they establish, is called 'competence hypothesis'<sup>53</sup>. This theory is highly applicable to investors' portfolio choice and home bias. The event of being competent and skilful in this setting is like betting on - in this sense meaning investing in - domestic assets. First, it is, in fact, the case that investors perceive themselves as more competent about assessing domestic assets and overestimate their own judgements. Second, when investing in domestic assets it is generally assumed that the investor has to be more competent. The investor would have the ability to gather information and would have easier access to knowledge about the investment opportunity.

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<sup>53</sup> Competence hypothesis is based on three pillars: First there is a preference for betting on the known compared to the unknown. Second, a preference to bet on future rather than on past events. Third, a preference for skill-based betting compared to pure chance (Heath & Tversky, 1991).

Kilka and Weber (2000) examine the perceived competence of investors and the implications on the expected returns in an upswing market and conclude that competence-based asymmetric judgements and expected returns of domestic stocks compared to foreign stocks contribute to the existence of home bias. Individuals feel more competent about assessing domestic stocks and perceive them more valuable to making investments.

The feeling of competence is closely related to experience. Making and gathering experience can lead to a higher perceived competence of investors. Abreu, Mendes and Santos (2011) show that investors want to acquire experience by investing in domestic securities and consider their first step to investing abroad thoroughly. Investors who invest domestically more often tend to decide on investments abroad earlier, because, based on the domestic experience, they feel more competent about investments in general, including foreign investments. Married, female and older investors wait longer until their first investment abroad; wealthier investors and better educated investors start earlier. According to Graham, Harvey and Huang (2009) especially male investors, investors with a larger portfolio and with more/better education feel more competent. These investors with a higher perceived competence exhibit less home bias.

Overall, it can be concluded that a learning process is an important feature of foreign investment. This learning process has, in general, similarities to the learning process examined by van Nieuwerburgh and Veldkamp (2009), though the two findings have to be distinguished. For both studies learning is important for portfolio choice. However, van Nieuwerburgh and Veldkamp (2009) study learning and information which always results in an information advantage. Abreu et al. (2011) use a more general setting about learning and competence perception, no matter whether there are any competence-based informational advantages which may induce a better performance. This difference demonstrates the importance of why we distinguish between behavioural respectively personal reasons and information-based reasons for home bias.

Some other studies merely examine the experience of investors. Measuring experience by the age variable (high age is equivalent to a high experience level) the degree of home bias decreases with the age of the investor (Lehmann-Hasemeyer & Neumayer, 2019). This result is contrary to Lütje and Menkhoff (2007) who consider the age as a determinant of risk aversion and thus conclude that home bias increases with advancing age. They do not relate age to experience. But, Lütje and Menkhoff (2007) also report that investors with less experience exhibit more home bias. Both Karlsson and Nordén (2007) for home bias and Pool et al. (2012) for local bias document that less experience has a positive impact on the bias. The opposition in the findings about age and home bias cannot be resolved. Presumably, the impact of age on home bias is dependent on the fact whether risk aversion or experience is stronger at influencing home bias.

Closely related to experience and competence is financial literacy which is examined in many studies and might be related to home bias. Financial literacy especially determines the degree of advice seeking

of investors. Investing abroad without consulting advisors is generally considered risky. Calcagno and Monticone (2015) point out that financial literate people consult advisors with a higher probability. This means that advisors do not resolve the problem of low financial literate investors who rely on their own competence. Kramer (2016) differentiates between perceived and objective literacy. Investors who are confident about their literacy ‘are less likely to seek financial advice’, however referring to objective measure no relation can be found. The advice from banks to (in particular illiterate) investors seems not to be the best for fulfilling the individual investors’ goals (Mietzner & Molterer, 2018). This statement is mainly due to high commission and bank fees.

Consequently, on the one hand being financial illiterate and lacking of advice may lead to poor diversification, i.e. under-diversification of the portfolio. Home bias is such type of poor diversification. On the other hand, the received advice may not always be beneficial for preventing biased investment decisions. However, these are just assumptions not empirically fully proven yet. Therefore, financial literacy and resulting advice seeking and their potential influence on home and local bias should be studied in future research. In a single study, von Gaudecker (2015) proves that both financial literate households and those who seek advice show a lower degree of under-diversification and thus their investment outcomes are better. This study can be the starting point for future research by relating under-diversification more detailed to home bias as a specific type of poor diversification.

All in all, there is much evidence that competence and experience do have an impact on home bias. It seems reasonable to argue that investors feel more competent about domestic assets and therefore are home-biased. The influence of experience is obvious and confirmed as well: Less experience leads to a higher degree of home bias. The influence of age is ambiguous, making no conclusion possible. There are no findings about competence and local bias, it may be supposed that the results are also valid for local bias. Lack of experience has a positive influence on local bias. Concerning financial literacy and advice seeking, there is no direct evidence on home and local bias, however a relation can be assumed.

### **5.5.3.3. Pure familiarity, patriotism and loyalty**

Both familiarity, patriotism and loyalty are closely related to each other since they all perceive the bond/solidarity of investors with their country. As Grinblatt and Keloharju (2001) claim, familiarity and patriotism are similar and hard to distinguish. Familiarity can be driven by information advantages and vice versa. Though, familiarity is often examined on its own without any relation to information, labelled ‘pure familiarity’ or behavioural familiarity (Massa & Simonov, 2006). Behavioural familiarity of investors can contribute to home and local bias as well, since investors are more familiar with domestic/local assets. The characteristic of pure familiarity is that investors show no performance improvement when investing based on pure familiarity. Better performance would only occur if investors acted according to information advantages and information-based familiarity. Though, different to many studies, in this review not all of the analyses, that state a not-better performance of biased portfolios, are considered to be in favour of the familiarity explanation for home and local bias but have to provide

explicit evidence that pure familiarity plays a significant role to explain the bias. Tse (1999) for the bond market supports the pure familiarity hypothesis. McQueen and Stenkrona (2012) consider familiarity as the reason for the so-called home-institution bias, another phenomenon closely related to original home bias. The home-institution bias is the highest for provincial and unsophisticated investors, especially with low education, low income and low trading frequency.

For local bias of Finish investors, Grinblatt and Keloharju (2001) identify pure familiarity as a reason. First, investors prefer to invest in firms which are located nearby. Second, investors select firms with the annual reports in their native language. Third, they invest more money to firms whose CEO has a cultural background the investor is familiar with. The effects are less prevalent for well-versed and sophisticated investors. However, it remains unclear if these results can be transferred to higher capitalized markets like the UK or the U.S. Also, Pool et al. (2012) reject the information-based explanation of local bias and identify pure familiarity as a reason for local bias, even among professional investors in the U.S.. These findings are consistent with Huberman (2001) who documents familiarity as an explanation for investment decisions of individual investors. He defines pure familiarity as “a general sense of comfort with the known” (Huberman, 2001, p. 678). According to Giannetti and Laeven (2016), who study local bias, familiarity aspects are probably even higher in an international setting, like home bias. Bhattacharya and Groznic (2008), Loughran and Schultz (2005) and Morse and Shive (2011) also report familiarity as a reason for home and local bias.

In contrast to general pure familiarity, which is rather referring to the individual, patriotism and loyalty are often attributed to a larger and specific group of people. Morse and Shive (2011) examine the influence of patriotism on portfolio choices and home bias. From a survey of 53 countries they find that patriotism and home bias are positively related. In a more patriotic country, an average portfolio consists of more domestic equities compared to a less patriotic. The results are valid and robust for other home bias reasons. Within a country, the level of home bias is also lower for regions with a lower level of patriotism. Cohen (2009) shows that investment decisions in an intra-national setting are driven by loyalty which is similar to patriotism. If the finding of Cohen (2009) can be transferred to international investment decisions and home bias, remains unclear.

#### **5.5.3.4. Uncertainty and hedging against uncertainty**

Human beings try to avoid uncertainty or at least want to reduce the impact of uncertainty. In a financial setting, an instrument of trying to control uncertainty is called hedging. In principle, hedging can be regarded as a reason which is based amongst others on the individuals' risk aversion. The circumstances and the framework why investors hedge (real exchange rate volatility and inflation risk) are given in economy and therefore hedging could also be considered as an institutional reason. But, since the focus is on the individual herself, hedging is here subsumed to behavioural aspects.

Choi et al. (2017) show that the extent of home bias and uncertainty in general have a positive correlation. Lehmann-Hasemeyer and Neumayer (2019) confirm the correlation. Uncertainty avoidance

can be combined with information-based explanations. In uncertain and turbulent times (measured by market volatility) the informational advantage of local and domestic investments is worth more, because it can be harder to gather valid information during crisis. Consequently, investors are more biased towards domestic and local assets in times of high market volatility, retracting to the familiar and to the local investments is a plausible explanation (Giannetti & Laeven, 2016). Overall, uncertainty is always existing, though at varying degrees. Investors try to hedge against uncertainty, i.e. hedging against real exchange rate volatility, deviations from purchasing power parity (PPP), inflation risk and general market volatility. Exhibiting home bias is one solution to hedge.

The real exchange rate is subject to fluctuations and therefore represents uncertainty. That is why investors want to hedge against the variation in the real exchange rate. Since within a common currency area there is no need for exchange rate hedging, local bias cannot be influenced by hedging real exchange rate volatility. In a two-country equilibrium model, distribution costs lead to international price differences and real exchange rate fluctuations. Investors try to hedge against real exchange rate risk by exhibiting home bias (Harms, Hoffmann & Ortseifer, 2015). Michaelides (2003) also shows that the exchange rate volatility has a positive impact on home bias. Challenging these findings, hedging motives may be rejected for explaining home bias when saying that “hedging against price uncertainty is neither necessary nor sufficient for home asset preference” (Eldor et al., 1988, p. 165). However, all of these three studies are model-based and not entirely underlined by empirical evidence.

Fidora et al. (2007) give empirical evidence and acts in favour of Harms et al. (2015) confirming the hedging motive against real exchange rate volatility. Changes in the real exchange rate do have a positive relation to home bias. The impact is higher for home bias in bonds because bond returns are a priori less volatile than returns on equity, thus the volatility of the real exchange rate can influence stronger. Fidora et al. (2007) show that if the real exchange rate volatility is set to zero, home bias in bonds can be reduced by 60 percentage points whereas equity home bias decreases only by about 20 percentage points.

Real exchange rate hedging is related to hedging PPP deviations and inflation risks. With incorporating both inflation risk and deviations from PPP in their model, Adler and Dumas (1983) find that people in different countries hold divergent portfolios. The difference should be able to hedge the inflation risk. The model of Stulz (1981b) also acts in favour of these explanations that investors desire a hedge against PPP deviations and inflation risk. However, Cooper and Kaplanis (1994) challenge the main result of the model of Adler and Dumas (1983). They test the model with empirical data from eight developed markets (i.a. the UK, the U.S., Germany, Japan). Hedging just would be a possible reason if there is a negative correlation between equity returns and domestic inflation and if investors have a very low level of risk aversion which is typically not assumed in real economy (Cooper & Kaplanis, 1994). Hedging (of inflation risk) can just be attributed as a reason for home bias if risk aversions are set at a very low level in various models (e.g. model of Adler and Dumas (1983) and Stulz (1981a, 1981b)). In contrast to these theoretical considerations and with conventionally assumed levels of risk aversion,

Uppal (1993) even shows that investors should prefer foreign investments in such a setting. Also, Mishra (2015) finds no significant correlation between inflation and home bias. Glassman and Riddick (2001) claim that, with a slightly different approach and a relaxation of the PPP assumption, some of the home bias by Cooper and Kaplanis (1994) can be explained.

Additionally, some other hedging motives are considered to explain the home bias. Stockman and Dellas (1989) show model-based that hedging against price uncertainty of nontraded goods induces home bias. Tesar and Werner (1995) show for five OECD countries that holding a disproportionate number of domestic assets can serve as a hedge against shocks to domestic income which have to happen frequent and at a strong extent. The possibility of hedging human capital risks is also incorporated into some models and examined empirically (Baxter et al., 1998; Coën, 2001). The large part of studies finds a positive correlation between returns on domestic assets and human capital.<sup>54</sup> Therefore, using human capital as a hedge is not reasonable as both variables show a positive and no reciprocal correlation.

Overall, the evidence on hedging motives is discussed controversially in the literature. Some studies are supporting different hedging motives as an explanation for home bias, others cast doubt on the impact of hedging. The evidence that hedging real exchange rate risk is part of an explanation of home bias seems strongest. Since most of the literature about hedging is older than 20 years, examining hedging motives should be subject for further analyses nowadays, especially with respect to newly perceived uncertainties induced by the coronavirus pandemic.

## **5.6. Implications of home and local bias**

Since home bias and local bias do not follow standard portfolio selection theory and CAPM, they have economic implications. Apart from implications at the microeconomic level (differences in performance and returns of individual investors' portfolios), there is also an impact on a macroeconomic level.

### **5.6.1. The performance of biased portfolios**

The most-often analysed implications of home bias focus on investment performance. Numerous studies examine explicitly the relation between home bias respectively local bias and the performance of such portfolios. While there is also research that focus on the relationship of concentration of portfolios and performance, it has to be clarified that home-biased portfolios are concentrated towards domestic stocks. That is why both research types give a hint about the performance of home- and local-biased portfolios. There is evidence of both better and worse performance of biased and concentrated portfolios compared to well-diversified investment structures. Especially if information-related causes drive the portfolio bias, a superior performance can be observed.

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<sup>54</sup> Only Bottazzi et al. (1996) find a negative correlation between human capital and domestic securities.

Shukla and van Inwegen (1995) report that domestic mutual fund investors (from the U.S.) perform better than foreign investors (from the UK) and are able to generate higher returns. For the German market, Hau (2001) confirms that home German traders perform better than foreigners due to the linguistics barrier (non-German speaking countries). For high frequency trading and whether the investor is located close to the stocks' firms headquarter the performance is even better (Hau, 2001). In the Indonesian market, Dvorak (2005) suggests that local investors from Indonesia with an informational advantage generate superior returns to foreign investors in the short- and medium-term. Performance is best when combining local individuals' informational advantage with the expertise and experience of global brokerages. Especially in the short run and for not internationally listed stocks, domestic investors outperform foreign investors due to informational advantages regarding the Finnish market (Kalev et al., 2008). Massa and Simonov (2006) approve higher returns when holding home-biased portfolios.

For real estate investments as well, Eichholtz et al. (2001) report a better performance when investing in real estate companies domestically. In markets with given information asymmetries, portfolio concentration can have positive results on the performance (Choi et al., 2017; Ivkovic et al., 2008), as information asymmetries lead to superior knowledge about investment opportunities. Based on a model with delegated asset management Dziuda & Mondria (2012) show that fund managers who specialize in the domestic market generate higher returns. Thus, at least to some extent home bias seems to be a rational behaviour to exploit superior knowledge.

Conclusions on performance can also be drawn for local bias by comparing the performance of intra-national investors with each other. Coval and Moskowitz (2001) elaborate a better performance and higher returns for local-biased mutual funds in the U.S. market compared to more diversified funds (2.67% higher returns per year, with 100 km as local). Ivkovic and Weisbenner (2005) confirm the superior performance of local-biased individual investors. On average local investments earn annually 3.2% higher returns compared to non-local investments. Thus, both institutional/professional investors (fund managers) and individual investors (households) are able to exploit local information for performance improvement (Coval & Moskowitz, 2001; Ivkovic & Weisbenner, 2005).

Baik et al. (2010) also report higher returns of local-biased investments. Performance could be pushed even higher if local focus were combined with diversification in this certain local area (Bodnaruk, 2009). This result is in conflict with Ivkovic et al. (2008) who suppose that it yields highest returns if investors invest locally and, on top, concentrate the local investment on very few stocks. The puzzle can be resolved by claiming that Bodnaruk (2009) assumes a general information advantage of local stocks whereas Ivkovic et al. (2008) suppose that investors should specify on the few local assets about which the superiority of information is highest. The performance is also better for local-biased venture capital investments (Cumming & Dai, 2010). During uncertain times and a high market volatility, exhibiting local and home bias seems to result in a better performance compared to a higher diversification (Giannetti & Laeven, 2016). These findings suggest that exhibiting home and local bias is not necessarily an irrational behaviour as the returns of biased and concentrated portfolios are often higher.

If biased portfolios do not perform better (or even worse) than more diversified portfolios, local bias and home bias should be considered as critical behavioural patterns. Pool et al. (2012) claim that the preference for home-state investments of professional investors in the U.S. does not bring higher returns, especially compared to local investments, even though local (geographically) investments perform better. Loyalty-based home bias in portfolio choice of retirement plans of individual U.S. investors makes up about 20% loss in retirement income (Cohen, 2009). For local bias, Seasholes and Zhu (2010) document that biased ‘holding portfolios’ of individual investors do not obtain excess returns. When considering the transaction-based local-biased portfolios the purchase of stocks even underperforms the sale. Huberman (2001) also approves the fact that local bias is not a smart behaviour due to the lack of return improvements.

Relating to the performance of home-biased portfolios, Grinblatt (2000) examines investments in Finland, distinguishes sophisticated investors from unsophisticated investors and shows that foreign investors perform better than any domestic investors. Morse and Shive (2011) support the worse performance theory. Bailey et al. (2007, p. 1) also observe a better “information-processing ability” of foreigners compared to locals resulting in a better performance of foreigners. The economic home bias (EHB) by Levy (2017) shows explicitly the economic loss induced by home bias and is dependent on the correlations of the different markets. If markets are highly correlated, the EHB seems to become insignificant. When neutralizing the means and variances in their calculations, the EHB is significant for the U.S. and France, concluding that the home bias remains a puzzle, because there are no benefits from biased portfolios, rather return losses (Levy, 2017).

Overall, the results on performance implications are analogue to the number of findings on the particular reasons. The major part of studied reasons is about information asymmetries. It seems that the reasons that are assumed for local and home bias play a crucial role when determining whether the considered biased portfolio performs better or worse than a well-diversified portfolio. This contributes to the assumptions that it has to be a high-level informational advantage which make investors bias their portfolio in order to exploit the superior knowledge and to obtain higher returns. If home and local bias are driven by informational advantages the results challenge the idea of efficient capital markets and induce implications on the macroeconomic level.

### **5.6.2. Further implications at the macroeconomic level**

Implications at portfolio and individual level are resulting in performance divergences. But there are also implications of home and local bias at the macroeconomic level, hence concerning the entire economy. Home bias seems to have direct implications on the cost of capital in the considered country, because home bias leads to an inappropriate risk-sharing (Lau et al., 2010). The degree of home bias and the cost of capital have a positive correlation. Besides, in a country with home bias, the trade balance

is more sensitive to economic shocks<sup>55</sup>. Put differently, if investors exhibit little diversification (low risk sharing), new shocks will have a higher impact on the trade balance (Fratzscher & Straub, 2013). For Germany, Jacobs and Weber (2012) observe that the local bias also impacts at firm level. The main finding is that stocks of firms located in a holiday region<sup>56</sup> are traded less on the particular holiday. Normally, locally biased investors would trade the stock but, on a holiday, these local investors show inattention and negligence to the stock market and therefore trade less. The reduction in trading at aggregated stock level is significant and observable and confirms strong local bias (Jacobs & Weber, 2012). Differences in information release are rejected as an explanation.

An influence of home or local bias on the cost of capital, trade balance sensitivity and stock turnover rates can be assumed. However, as the findings are limited to just a few studies, the macroeconomic implications of home and local bias should be subject to future research.

## 5.7. Conclusion

This review summarizes the state of the literature on home and local bias. There is much empirical evidence on the existence of home bias and local bias. Investors do not diversify according to standard CAPM. This behaviour is observed for many countries, various asset types and both individual and professional investors. However, the degree varies across time and country. The degree has been decreasing, mainly due to relaxing capital controls and by eliminating explicit barriers (transaction costs) to foreign investments. Though, since there is no unified approach of how to measure the extent of home bias, the results vary notably, especially across countries. No final conclusion on the relation between country and extent can be made.

A large part of the existing literature studies the reasons for home and local bias. Home and local bias are generally considered simultaneously, because the reasons do not differentiate that much. Unfortunately, research on home and in particular local bias is heavily concentrated on U.S. data.

The reasons can be divided into three main categories: institutional reasons, information-based reasons and behavioural/individual reasons. All three categories offer their parts to explain the extent of the bias. This is probably due to various cross-dependencies in economy and also amongst the identified reasons for the bias. In order to understand whether home and local bias are smart rational or critical behaviours, the performance implications are reviewed. There is much evidence of a better performance of biased portfolios, in particular for those (articles) which also show informational advantages as a

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<sup>55</sup> News shocks can be seen amongst others as an "increase in domestic equity prices relative to the rest of the world" (Fratzscher & Straub, 2013, p. 1211).

<sup>56</sup> Germany is divided in 16 states. Some holidays are only holidays in some states and in others not. A holiday region is a region in which a holiday is official whereas in a non-holiday-region a holiday cannot be applied (Jacobs & Weber, 2012).

reason. However, some research also reports that foreigners perform better while not referring to information asymmetries. Overall, this mixed evidence does not allow to derive recommendations for financial advisors to actively push clients to more internationally diversified portfolios.

The review gives some avenues to future research. Table 5-2 shows an overview and summarizes them. First, home bias seems to be declining over time, but the decrease has not been researched intensively. The variation in the degree during a course of time and in various countries is still not explained convincingly and should be examined in time series studies. Additionally, there is still no standardized and integrated method of measuring the bias. On top of that, the empirical research should be more thoroughly elaborated for countries beyond the U.S. For example, could future studies select certain measurements of home bias and elaborate the development over time, comparing them with the U.S. results. Second, it should be studied whether ambiguity aversion causes or has implications on local bias, as well the relationship between ambiguity aversion of institutional investors and home bias/ local bias might be examined. Third, as some authors indicate that financially literate investors show a better diversification in their portfolios. Thus, financial literacy (in combination to the probability of advice seeking) is presumably influencing home and local bias as well. As far we are informed, there are no studies examining this relationship which seems a promising avenue for explaining part of home bias. Fourth, French (2008) points out the influence of the digitalization and technology advance on trading costs and shows that an overall decrease can be observed. Therefore, even though a decrease of home bias can be assumed over time, the influence of recent technology advancement, as for example algorithmic trading or robo advisors, on asset allocation should be studied more thoroughly. Fifth, since the evidence in this area is very limited, the implications of home bias and local bias have to be subject to further research, in particular using new and broader data. The findings presented in this study are not based on substantial numerous evidence but rather on singular studies.

Apart from the limitations regarding home bias' implications, one further limitation of the review is incorporating all relevant studies. As indicated with the full-text search of Google Scholar there are numerous results when searching for home and local bias. It is impossible to achieve a fully comprehensive review of all studies dealing with home bias since the field is very broad. Some studies which even not explicitly elaborate home bias may be suited for explaining at least a part of home bias. However, it should always be taken into account that the differentiation between correlations and causalities in the considered studies is crucial. The absolute difference in cited studies compared to the literature reviews of both Coeurdacier and Rey (2013) and Ardalan (2019) strengthens the limitation. Apart from the described limitations of the method of literature search, it has to be mentioned again that all types of grey literature are not included in this review. Despite the benefits of this procedure that thereby just peer-reviewed articles are included, the exclusion of grey literature also constitutes a limitation of this review and could change the structure of this review considerably (Fisch & Block, 2018).

Table 5-2: Identifying research directions in home bias research

| <b>Category</b>                 | <b>Gap/issue</b>  | <b>Research direction</b>   |
|---------------------------------|---|---|
| Home bias in the course of time | The potential decrease of home bias has not been studied intensively for various countries.   | Develop a time series study examining home bias in various countries.   |
| Measurement of home bias        | No standardized measurement of home bias.   | Develop an integrated and standardized measurement of home bias and apply it to various countries.  |
| Home bias of various countries  | Existing studies focus only on the US.  | Analyzing reasons for home bias country-specifically.   |
| Reasons for Home bias           | The relation between home bias and ambiguity aversion (as well as financial literacy) is just brought up but not subject to elaborate research. | Study these two reasons more detailed in order to find a potential causal relationship between ambiguity aversion (and financial literacy) and home bias. |
| Factors influencing home bias   | There are no studies elaborating the impact of recent developments in technology and digitalization on home bias.                               | Study the relationship between digitalization and trading costs and consequently, a potential decrease of home bias.                                      |
| Implications of home bias       | The implications of home bias are not very thoroughly studied and evidence is limited.  | Use new and broad data for different countries to examine (yet unresearched) implications of home bias  |
| Literature selection            | Research is mainly based on peer-reviewed articles.   | Grey literature should be scanned if results are substantial or provide future research avenues.  |

# Appendix

Table 5-3: Findings in the journal databases and other sources with different search requests, number of

| Journal  | advanced    |              |                 | full-text<br>"Home Bias" / Home Bias | Date of search |
|--|-------------|--------------|-----------------|--------------------------------------|----------------|
|  | "Home Bias" | "Local Bias" | "Domestic Bias" |                                      |                |
| The Journal of Finance                         | 2           | 1            | 1               | 468 / 70                             | 6th May 2019   |
| Journal of Financial Economics                 | 11          | 3            | 0               | 366 / 58                             | 6th May 2019   |
| The Review of Financial Studies                | 3           | 0            | 0               | 306 / 17                             | 6th May 2019   |
| Journal of Financial and Quantitative Analysis | 2           | 0            | 0               | 124 / 87                             | 6th May 2019   |
| Review of Finance                              | 3           | 2            | 0               | 139 / 63                             | 6th May 2019   |
| Journal of Banking & Finance                   | 22          | 3            | 0               | 595 / 114                            | 6th May 2019   |
| Journal of Economic Dynamics & Control         | 7           | 0            | 0               | 151 / 67                             | 6th May 2019   |
| Journal of Financial Intermediation            | 0           | 0            | 0               | 62 / 4                               | 7th May 2019   |
| Journal of Money, Credit and Banking           | 3           | 0            | 0               | 152 / 37                             | 7th May 2019   |
| Review of Derivatives Research                 | -           | -            | -               | 1                                    | 7th May 2019   |

| Source   | advanced    |              |                 | full-text<br>"Home Bias" / Home Bias | Date of search |
|--|-------------|--------------|-----------------|--------------------------------------|----------------|
|  | "Home Bias" | "Local Bias" | "Domestic Bias" |                                      |                |
| Library catalogue of Technical University of Darmstadt | 26          | 1            | 0               | 77                                   | 6th June 2019  |
| Google Scholar   | 980         | 190          | 28              | 25.600 / 3.940.000                   | 6th June 2019  |

## Chapter 6

# **Competence and return expectations: Home bias with international investors**

This chapter has a working paper status.

# Competence and return expectations: Home bias with international investors

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## Abstract

The share of foreign stocks in institutional and private portfolios is smaller than one could theoretically expect regarding the missing boundaries for international investments. This effect is called “home bias” and describes a strong tendency towards domestic stocks. Cross-country studies reveal that investors feel more competent regarding domestic stocks. This asymmetric assessment of competence is connected with an asymmetric assessment of probability judgments about return expectations. To test this asymmetric assessment and to analyse the underlying effects that might cause distortions in investors’ expectations, we conducted a cross country study in Germany and Russia comparing three groups of students’ judgments about an identical set of German, Polish and Russian stocks.

Results show that the Russian and German test groups feel more competent about domestic stocks while the international group is indifferent. Subjective probability distributions of stock returns are significantly less dispersed and at least partly more optimistic for stocks associated with high competence levels than for stocks with low competence levels.

**Keywords:** Home Bias, Local Bias, Domestic Bias, Behavioural Bias, Market Imperfections

**JEL Classification:** D82, D84, G11, G15

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## 6.1. Introduction

Since Behavioural Finance research has identified several valid heuristics irrational investor behaviour can be explained by (Barberis & Thaler, 2003; Costa, Carvalho & Moreira, 2018; Ritter, 2003; Shleifer, 2000; Zahera & Bansal, 2018) research has been interested for possible reasons and to which extent different heuristics appear (Coval & Shumway, 2005; Fromlet, 2001; Shefrin, 2002). Especially regarding the topic of diversification actual equity portfolio holdings reveal a strong bias towards domestic stocks despite the advantages of international portfolio diversification (de Santis & Gerard, 1997; Eldor, Pines & Schwartz, 1988; Goetzmann & Kumar, 2008) and even a bias towards geographically close investments regarding portfolios of domestic stocks (Coval & Moskowitz, 1999). In a frictionless perfect global capital market, investors should invest the risky part of their savings completely in the market portfolio to optimize their risk-return patterns and to comply with classical approaches as the CAPM (Sharpe, 1964). However, empirical research provides evidence for decades that in real markets investors deviate from this portfolio structure which is optimal in perfect markets (French & Poterba, 1991; Cooper & Kaplanis, 1994; Chan et al., 2005). The home bias belongs to the puzzles in economics, proven empirically, that do not fit into (neoclassical) theory (Obstfeld & Rogoff, 2000). Following the home bias and the intra-national local bias investors are inclined to invest disproportionately into local and domestic assets, not following portfolio diversification strategies. Although no consistent or standardized measure is applied and thus the degree of the effect varies through country and measurement all papers confirm the existence of home bias for all countries.

Next to particular factors, like e.g. the education of investors, which impact the extent of home bias (McQueen & Stenkrona, 2012; Karlsson & Nordén, 2007) the degree declines in the course of time (Levy & Levy, 2014; Fidora et al., 2007). These variations make the current study interesting. For one thing, we analyse economic students who generally show an interest in economic interrelations and have a good education and secondly, the survey takes place in Germany and Russia in 2017 and not in the U.S.A. A group of people and two countries which are gravely underrepresented in literature (Karolyi, 2016). The first studies dealing with diversification are 50 years old. Grubel (1968) shows in a mean-variance approach the welfare gains from international portfolio diversification theoretically and empirically. Moreover, Levy and Sarnat (1970) show that the proportion of foreign assets held by domestic investors is too small if you follow the predictions of standard portfolio theory. This observation has been called “home bias”. Further articles in this area came from Solnik (1974) who shows that substantial advantages in risk reduction can be easily obtained in foreign and domestic stocks through portfolio diversification and Grauer and Hakansson (1987) who find that especially for highly risk-averse strategies an active diversification among major asset classes were substantial and brought even a higher return in some cases. Regarding home bias research in an international setting, French and Poterba (1991) note that U.S. investors hold 93.8% of their equity portfolio in domestic stocks, Japanese investors 98.1% and U.K. investors 82%. Similar results find Tesar and Werner (1992) in their work. They show that foreign portfolio investments range from 33.3% of GDP in the UK to less than ten percent

in Canada and the United States despite the significant gains foreign securities offers. Cooper and Kaplanis (1994) analyse in their article inflation as a possible reason for a home bias and show at the beginning a ratio of market capitalizations of eight major economies to the world market portfolio and proportion of portfolios held in domestic stocks. For instance, the US economy accounts for 36.4% of the world market portfolio whereas U.S. citizens hold 98% of their portfolios in domestic equities. A similar picture applies to Germany. Germanys economy accounts for 3.5% of the world portfolio whereas 75.4% of all equities are held in domestic equities. The list for similar scientific work goes on.

Since the academic world knows about the home bias, the search for possible reasons delivers divers reasons for the emergence. According to Stulz (1995) and Lewis (1999) are monetary investment barriers, regulatory investment barriers, political risk, deviation from purchasing power parity, and asymmetric information possible explanations. Further, various approaches try to rationalize the bias claiming that domestic equities provide a better hedge for risks that are specific to the home country. Especially hedges against domestic inflation are discussed within this context. The before mentioned Cooper and Kaplanis (1994) test if the home bias could be an explanation for investors hedging the inflation risk and the costs for international investments and show that unless investors have a very low level of risk aversion the home bias cannot be explained by these two. Van Nieuwerburgh and Veldkamp (2009) and their model with endogenous information choice reveal that home bias can occur due to an initial small information advantage in home equities, which is enhanced for investors with a limited information process capacity. Ahearne, Grier and Warnock (2004) analyse information asymmetries as a reason for home bias in the context of different and partly poor quality or credibility of financial information in different countries and show that a second listing in the U.S. increases the countries share in U.S. investors' portfolios. Although in principle all of these effects may induce a home bias, the barriers to international investments have fallen dramatically and empirical evidence shows that institutional factors have proved to be unable to explain the lack of international diversification in total (Sercu & Vanpée, 2007). Regarding the presented possible reasons for a home bias the question arises how do investors act who don't live in the respective country of origin. If most investors invest in domestic shares, are investors abroad still investing in stocks from the respective country of origin or do they diversify more?

Our study contributes to two angles of home bias research contrasting local investors and investors with international experience: the examination of different degrees of exposure to availability heuristics, on the one hand, and the vulnerability to overconfidence, on the other hand.

Thus, methodologically, we follow the work of Sigl-Grüb and Schiereck (2009) and conduct a cross country study in Germany and Russia comparing participants' judgments about an identical set of nine stocks from three branches (mining, consumer goods and banks) and three different nations (Germany, Russia, Poland). We chose Russia as comparison because of its interesting capital market characteristics. For one thing is Russia a BRICS group member and at the edge to an industry nation and has compared to Germany a small capital market. That could be a reason for investors to look out for more international

investments. At the same time, it is reasonable to assume that because of a smaller market most Russians are more illiterate regarding capital markets. This financial illiteracy could hinder international diversification. Poland is because of the geography and common history with Russia and Germany the natural choice as the third country. We surveyed 89 students, 44 German students in a German corporate finance course, 14 Russian students in a Russian finance course and 31 international students in a Russian foreign finance class. We expected to find competence effects like those described by Sigl-Grüb and Schiereck (2009). A further research objective consists in investigating if and in how far the results cited above also hold for investors with experience abroad. The results of our study are mixed. The German and Russian group confirm our expectations regarding the home bias whereas they did not support all set hypothesis. At the same time the international group does not show the same pattern so that it seems that people with experience abroad do not fall for the home bias.

The rest of the paper is organized as follows. In chapter 6.2 we provide detailed information about the design of our analysis. Chapter 6.3 presents the derived hypothesis whereas chapter 6.4 presents the analysed data. Chapter 6.5 discusses the findings and finally, chapter 6.6 concludes and analyzes the implications of the results.

## **6.2. Theoretical Background**

In general, the home bias describes an investment behaviour in portfolio management where investors tend to overweight their home country's market and thus investing disproportionately more in assets of their home country compared to its share in the overall market portfolio. This effect is prevalent and existing for both individual household investors and sophisticated, professional investors like mutual fund managers (Shapira & Venezia, 2001). However, individuals tend to exhibit a higher degree of the bias (Ivkovic & Weisbenner, 2005; Lütje & Menkhoff, 2007).

Most empirical research tried to detect reasons why investors show a home bias. The results may be divided into three types: institutional, individual investor-related and information-based reasons. It can be discussed if institutional reasons urge investors to show a home bias. Taxes, transaction costs and barriers to international investments may contribute (Black, 1974; Michaelides, 2003), though institutional reasons are often challenged in literature (Coën, 2001; Glassman & Riddick, 2001). Informational asymmetries between investors presumably cause home bias. These informational reasons can be seen in a universal setting as general information asymmetries (Coval & Moskowitz, 1999, 2001; Dziuda & Mondria, 2012; Shukla & van Inwegen, 1995) or as informational advantages resulting from different accounting standards between countries (Ahearne et al., 2004; Bradshaw et al., 2004; Eichler, 2012). Familiarity also may induce informational advantages, thus a home and local bias (Bodnaruk, 2009; Massa & Simonov, 2006).

A third, quite popular category in studies are behavioural reasons. A general optimism and a strong belief in domestic/local assets (Li, 2004; Solnik & Zuo, 2016; Strong & Xu, 2003) are part of these

explanations as well as ambiguity aversion (Dimmock et al., 2016), perceived competence (Abreu et al., 2011; Kilka & Weber, 2000) and experience of investors (Graham et al., 2009; Lütje & Menkhoff, 2007). ‘Pure familiarity’, a notion coined by Massa and Simonov (2006), and also studied for the local bias by Grinblatt and Keloharju (2001), plays a role as well. Patriotism (Morse & Shive, 2011) and loyalty (Cohen, 2009) are similar behavioural traits. Hedging motives constitute the last part of behavioural reasons. By exhibiting a home bias, investors may be capable of hedging against uncertainty (generally examined by Choi et al. (2017)) which often takes the form of inflation risk, exchange rate risk and consequential deviations from purchasing power parity (Fidora et al., 2007; Harms et al., 2015). The importance and practical relevance of hedging motives is put into question (Cooper & Kaplanis, 1994; Glassman & Riddick, 2001; Uppal, 1993).

One popular behavioural reason for home bias is the perceived competence of investors about domestic stocks. Heath and Tversky (1991) examine psychological aspects in their competence hypothesis about the preference for competence-based decisions. This theory is highly applicable to investors’ portfolio choice and home bias. The event of being competent and skilful in this setting is like betting on – or investing in - domestic assets. First, it is, in fact, the case that investors perceive themselves as more competent about assessing domestic assets and overestimate their own judgements. Second, when investing in domestic assets it is generally assumed that the investor has to be more competent. The investor would have the ability to gather information and would have easier access to knowledge about the investment opportunity. Kilka and Weber (2000) examine the perceived competence of investors and the implications on the expected returns in an upswing market and conclude that competence-based asymmetric judgements and expected returns of domestic stocks compared to foreign stocks contribute to the existence of home bias. Individuals feel more competent about assessing domestic stocks and perceive them more valuable to making investments. The feeling of competence is closely related to experience. Making and gathering experience can lead to a higher perceived competence of investors. Abreu et al. (2011) show that investors want to acquire experience by investing in domestic securities and consider their first step to investing abroad thoroughly. Investors who invest domestically more often tend to decide on investments abroad earlier, because, based on the domestic experience, they feel more competent about investments in general, including foreign investments. Married, female and older investors wait longer until their first investment abroad; wealthier investors and better educated investors start earlier. According to Graham et al. (2009) especially male investors, investors with a larger portfolio and with more/better education feel more competent. These investors with a higher perceived competence exhibit less home bias. Overall, a learning process is an important feature of foreign investment. This learning process has similarities to the learning process examined by van Nieuwerburgh and Veldkamp (2009), though the two findings have to be distinguished. For both studies learning is important for portfolio choice. However, van Nieuwerburgh and Veldkamp (2009) study learning and information which always results in an information advantage. Abreu et al. (2011) use a more general setting about learning and competence perception, no matter whether there are any competence-based

informational advantages which may induce a better performance. Some other studies merely examine the experience of investors. Measuring experience by the age variable (high age is equivalent to a high experience level) the degree of home bias decreases with the age of the investor (Lehmann-Hasemeyer & Neumayer, 2019). This result is contrary to Lütje and Menkhoff (2007) who consider the age as a determinant of risk aversion and thus conclude that home bias increases with advancing age. They do not relate age to experience. But, Lütje and Menkhoff (2007) also report that investors with less experience exhibit more home bias. Both Karlsson and Nordén (2007) for home bias and Pool et al. (2012) for local bias document that less experience has a positive impact on the bias. Most likely, the impact of age on home bias is dependent on whether risk aversion or experience is stronger at influencing home bias.

Optimism is often thought as an implication of perceived competence and is another behavioural reason for a home bias. Investors systematically assume higher expected returns which results in biased portfolio choices. According to the literature, there are two types optimism, absolute and relative optimism. Strong and Xu (2003) define absolute optimism as the optimism about their home market compared to a foreign market whereas relative optimism refers to different investors and occurs when investors are more optimistic about their home market than are investors from other countries. Both types of optimism contribute to the explanation of home bias. Early studies regarding optimism as an explanation are from French and Poterba (1991) and Shiller et al. (1996). In their basic work on the home bias, French and Poterba (1991) suggest that investors systematically are more optimistic about the domestic market. And show the degree of home bias for three countries based on data from the end of 1989. U.S. investors invest 93.8% domestically, Japanese 98.11% and UK investors just 82% of their equity portfolios. The lower level of British domestic investments was due to “Prime Minister Thatcher’s relaxation of capital control”. Shiller et al. (1996) study the expectations, representing the degree of optimism, from Japanese and U.S. investors based on empirical data and surveys. Even though the answers in the survey correlate, there is a vast difference in the actual numbers. The investors always exhibit a higher relative optimism for their domestic market which helps explaining home bias.

Based on a survey of fund managers, Strong and Xu (2003) find further and more comprehensive evidence on differences in optimism as an explanation for home bias. Fund managers show a higher relative optimism towards domestic markets whereas the evidence on absolute optimism is not directly supporting home bias. Just European and Japanese fund managers, exhibit an absolute optimism, hence explaining home bias. At the same time Strong and Xu (2003) narrow down their results about absolute optimism to the studied time period and sum it up as fund managers who have a bias towards domestic equities and a relative bias against foreign equities. Though, there may be some limitations to the evidence that should not be neglected. Strong and Xu (2003) also question what came first and what results: relative optimism or home bias. At least mutual dependencies can be confirmed. But, behavioural reasons, even for sophisticated fund managers, cannot be rejected. Solnik and Zuo (2016) show that relative optimism has a positive relation to home bias in portfolio holdings of equity and bonds. They are the

first to give evidence on a broader time span which is independent of market phases (bull, bear, market crash). For specifically German equity fund managers, Lütje and Menkhoff (2007) confirm a relative return optimism for domestic securities leading to home bias towards German investments. Lai and Teo (2008) discover that local analysts of eight Asian emerging countries are more optimistic about the domestic market than recommendations from foreign analysts. If potential investors base their investment decision upon the recommendations of local analysts, this finding can explain home bias.

All in all, there is much evidence that optimism, competence and experience do have an impact on home bias. It seems reasonable to argue that investors feel more optimistic and competent about domestic assets and therefore are home-biased. While there is much evidence of relative optimism for numerous investors' countries, the studies on absolute optimism are limited. The influence of experience is obvious and confirmed as well: Less experience leads to a higher degree of home bias. The influence of age is ambiguous, making no conclusion possible.

### **6.3. Hypotheses**

According to the considerations above, a home bias could be explained by expectations of domestic investors being more precise and more optimistic for domestic than for foreign stocks.

Before we come to this aspect we first discuss the underlying problem that might cause asymmetries in expected risks and returns. It is often claimed that investors feel more competent in estimating the future returns of domestic stocks compared to returns of foreign equities. This feeling of higher competence for domestic stocks might reduce the perceived degree of uncertainty associated with an investment decision in these securities and therefore may also influence investors' preferences for the selected stock markets and the selected portfolio choice. Investors in their respective country consider themselves on average more competent judging a domestic market than foreign markets. Investors abroad show higher competence values for foreign stocks compared with investors at home. With respect to the effect of perceived competence on investors' preferences we come to hypothesis 1.

#### ***Hypothesis 1: Competency and preference for domestic markets***

*Investors in their respective country consider themselves on average more competent judging a domestic market than foreign markets. Investors abroad show higher competence values for foreign stocks compared with investors at home.*

Without referring to the reasons for the supposedly different competence variations the next step will be the central question of this study, the alleged connection between competence and expected return. In line with Kilka and Weber (2000) and other mentioned studies in this paper we expect that perceived high competence comes with a less dispersed probability distribution regarding future performance. In the context of the home bias the hypothesis 2 is:

#### ***Hypothesis 2: Competence and expected return distribution***

*The investors' perceived probability distributions are on average less dispersed for domestic stocks than for foreign stocks which are linked to lower competence. For investors abroad we expect a less dispersed distribution for foreign stocks.*

Ex ante there is no theoretical reason why perceived competence influences the average probability distributions except the often observed domestic optimism. Thus we analyze in hypothesis 3 the relation between competence and expected mean return in order to find evidence for such an effect.

### ***Hypothesis 3: Competence and expected mean return***

*The perceived competence value is independent from the subjective probability distribution of the respective stock returns.*

If hypothesis 3 is true, stocks, which investors feel more competent with, are not more optimistic valued than stocks with a low perceived competence. For testing the hypotheses is the following data used.

## **6.4. Data**

The methodology is based on Kilka and Weber (2000). We analyze risk and return expectations of German, Russian and a mix of international participants about stocks from three branches: consumer goods, banks and mining. In September and October 2017, German, Russian and international business students were interviewed at the Technical University of Darmstadt and the State University of Economics of St. Petersburg. Each group of students were presented with a six-page questionnaire in English. Each participant had to estimate the performance of three German, Russian and Polish securities for a period of three months (as at 25 January 2018 for the German group and as at 20 December 2017 for the international and Russian group). The selection of these three stock markets took place under the point of view that next to the domestic market a common foreign reference market was needed which at least is known in general for Germans and Russians. Poland is here because of historical reasons and the geographical proximity the natural choice. Regarding critics that expectations retrieved from surveys are inferior to expectations data derived from market prices it must be said that the necessary data for an explanation of the home bias diffuses in different rates across subpopulations. Moreover, the importance of different groups varies across different markets whereas market data always just shows an average of the whole market.

In order to ensure the comparability of the shares to be assessed from the countries under consideration, initially sectors were selected for which there are nationally important share prices in Russia as well as in Germany and Poland. The next step was to identify important companies in three sectors in the respective countries, from the banking sector [PKO Bank Polski (Poland - PL), Bank Saint Petersburg (Russia - RU), Commerzbank (Germany - GER)], the consumer goods industry [Eurocash (Poland), JSFC Sistema (Russia), Beiersdorf (Germany)] and mining companies [JSW (Poland), Alrosa

(Russia), Aurubis (Germany)]. All shares are listed in the highest market segment of the respective home exchange.

In a first block, all participants have to rate their personal competence in assessing the price development on a scale of 0 (no competence) to 6 (very competent) for each of the nine shares. In order to obtain an unambiguous ranking even in cases in which these competency specifications had identical values, the participants had to rank the shares according to their competence assessment, whereby the share with the highest perceived competence was ranked first and the lowest rank was 9. Next, participants are asked to provide probability estimates regarding stock value changes within the next three months following the first questions for each of the nine shares (in the corresponding local currency, i.e. Russian equities in Ruble, German shares in Euro and Polish shares in Zloty). In order to additionally control the assessments for survey methodology, two different survey forms were used. Thus, for each share, the subjective probability distribution of the stock value change was determined according to the approach of Yates, McDaniel and Brown (1991), Muradoğlu and Önkal (1994) and Önkal and Muradoğlu (1995). Participants initially had to indicate their probability estimates that the change in stock value would fall within one of six predefined intervals (The stock price will decrease by more than 10%, ...decrease by 10% to 5%, ...decrease by 5% to 0%, ...increase by 0 % to 5%, increase by 5% to 10%, ...increase by more than 10%). Additionally, participants were reminded that the total of all probability judgements was 100%.

In addition, the participants had to quote the expected share prices directly in the respective local currency. Specifically, we asked for the 0.5 quantile (For which value is it equally likely that the stock price will be above or below?), for the 0.1 quantile (Which value do you expect the stock price with high probability (90%) not to fall short off?) and for the 0.9 quantile (Which value do you expect the stock price with high probability (90%) not to exceed?). The stock prices of the respective day the survey was taken were given as reference values. In order to accommodate different expectations of dividend payments, participants also had to indicate which dividend payments were included in their price expectations.

Thus, the complete record of a participant  $s$  with respect to the share  $i$  comprises the following values: the competence assessment  $C_{s,i}$  with the rank  $R_{s,i}$ , the probabilities of the share price changes  $p_{s,i}^1, \dots, p_{s,i}^6$  and the price quantiles  $X_{s,i}^{0.1}, X_{s,i}^{0.5}, X_{s,i}^{0.9}$  as well as the dividend payments  $Div_{s,i}$ . The Russian group consists of 14 participants, the international group of 31 and the German group of 44 participants. Thus there are 126 stock price estimates from the Russian group, 279 from the international and 396 from the German group. Incomplete stock price estimates or estimates that do not meet the order relation "0.1 quantile < 0.5 quantile < 0.9 quantile" have been removed from the data set for evaluation. Next to questions regarding their competence we are interested in demographic characteristics and their experience in stock investing. So at the end of the survey the respondents had to provide some personal information about gender, graduation, nationality, stock ownership and their portfolio in foreign stocks. Table 6-1

provides an overview about the survey population. The Russian group is mainly female whereas the group from the Technical University of Darmstadt consists mainly of male students. Except for the international course most of the students are graduates and never invested in stocks. Even it is not clear how much of their portfolio consists of foreign stocks most of the students who invest also invest abroad.

Table 6-1: Descriptive statistics about the respondent for every group

| Survey respondent population |        |               |         |       |                         |        |               |         |       |
|------------------------------|--------|---------------|---------|-------|-------------------------|--------|---------------|---------|-------|
|                              | Russia | International | Germany | Total |                         | Russia | International | Germany | Total |
| <i>Gender</i>                |        |               |         |       | <i>Stock ownership?</i> |        |               |         |       |
| Female                       | 10     | 13            | 7       | 30    | Yes                     | 1      | 6             | 11      | 18    |
| Male                         | 4      | 18            | 36      | 58    | No                      | 13     | 25            | 33      | 71    |
| No answer                    | 0      | 0             | 1       | 1     |                         |        |               |         |       |
| <i>Graduation</i>            |        |               |         |       | <i>Foreign stocks?</i>  |        |               |         |       |
|                              |        |               |         |       | Yes                     | 0      | 6             | 10      | 16    |
| Graduate                     | 12     | 9             | 37      | 58    | No                      | 14     | 25            | 33      | 72    |
| Under-graduate               | 2      | 20            | 5       | 27    |                         |        |               |         |       |
| No answer                    | 0      | 2             | 2       | 4     |                         |        |               |         |       |
| <i>Nationality</i>           |        |               |         |       |                         |        |               |         |       |
| German                       | 0      | 13            | 38      | 51    |                         |        |               |         |       |
| Russian                      | 14     | 0             | 1       | 15    |                         |        |               |         |       |
| Others                       | 0      | 18            | 5       | 23    |                         |        |               |         |       |

## 6.5. Results

In line with the research approach outlined above, the analysis focuses on reviewing the three hypotheses presented in chapter 3 using individual stock survey data.

### 6.5.1. Competence for domestic stocks

The first step is to analyse questionnaire data on the perceived competence, which on average makes investors feel more competent in predicting domestic equities than foreign ones. Table 6-2 summarizes the mean values of the specified competence assessments for German, international and Russian investors.

The values for 2 a) show that the Russian sub-sample estimates its competence for Russian shares (CRU, RU) significantly higher than for German (CRU, GER) and Polish (CRU, PL) shares (CRU, RU = 3.45, CRU, GER = 2.00, CRU, PL = 1.36,  $p < 0.01$ ). Accordingly, the German subsample is more competent in assessing German equities over Russian and Polish shares (CGER, GER = 2.45, CGER, RU = 1.01, CGER, PL = 0.94,  $p < 0.01$ ). Whereas the international group sees its competences for German shares significantly higher than for Russian and Polish shares ( $p < 0.01$ ) it does not estimate its competences

significantly different between Russian and Polish stocks. These results should be considered a strong support for hypothesis 1. On average, private investors assess themselves as significantly more competent with regard to their respective domestic shares.

Table 6-2: Competence for domestic and foreign stocks

|            | Russian Group              |                |                               | International Group        |                |                               | German Group               |                |                               |
|------------|----------------------------|----------------|-------------------------------|----------------------------|----------------|-------------------------------|----------------------------|----------------|-------------------------------|
| a)         | Rus.<br>stocks             | Pol.<br>stocks | Ger.<br>stocks                | Rus.<br>stocks             | Pol.<br>stocks | Ger.<br>stocks                | Rus.<br>stocks             | Pol.<br>stocks | Ger.<br>stocks                |
| Competence | 3.45                       | 1.36           | 2.00                          | 1.93                       | 1.58           | 2.46                          | 1.01                       | 0.94           | 2.45                          |
| Rank       | 4.22                       | 5.15           | 3.85                          | 4.77                       | 5.16           | 3.55                          | 6.03                       | 5.54           | 2.66                          |
| b)         | Rank 1-3                   | Rank 4-6       | Rank 7-9                      | Rank 1-3                   | Rank 4-6       | Rank 7-9                      | Rank 1-3                   | Rank 4-6       | Rank 7-9                      |
| Competence | 3.54                       | 2.15           | 1.00                          | 3.10                       | 1.72           | 1.35                          | 2.64                       | 0.80           | 0.66                          |
| c)         | Highest<br>rank            |                | Lowest<br>Rank                | Highest<br>rank            |                | Lowest<br>Rank                | Highest<br>rank            |                | Lowest<br>Rank                |
| Competence | 4.43                       |                | 0.33                          | 3.67                       |                | 1.13                          | 3.30                       |                | 0.56                          |
| d)         | Top rank<br>Rus.<br>stocks |                | Lowest<br>rank Rus.<br>stocks | Top rank<br>Rus.<br>stocks |                | Lowest<br>rank Rus.<br>stocks | Top rank<br>Rus.<br>stocks |                | Lowest<br>rank Rus.<br>stocks |
| Competence | 4.36                       |                | 2.50                          | 2.37                       |                | 1.50                          | 1.43                       |                | 0.86                          |
| e)         | Top rank<br>Ger.<br>stocks |                | Lowest<br>rank Ger.<br>stocks | Top rank<br>Ger.<br>stocks |                | Lowest<br>rank Ger.<br>stocks | Top rank<br>Ger.<br>stocks |                | Lowest<br>rank Ger.<br>stocks |
| Competence | 2.71                       |                | 1.71                          | 3.40                       |                | 1.80                          | 3.28                       |                | 1.44                          |
| f)         | Top rank<br>Pol.<br>stocks |                | Lowest<br>rank Pol.<br>stocks | Top rank<br>Pol.<br>stocks |                | Lowest<br>rank Pol.<br>stocks | Top rank<br>Pol.<br>stocks |                | Lowest<br>rank Pol.<br>stocks |
| Competence | 2.08                       |                | 1.46                          | 2.00                       |                | 1.37                          | 1.25                       |                | 0.85                          |

In addition to the comparison of German, Russian and Polish shares, it is also possible to examine other share portions from the range estimates made by the participants. Table 6-2 also summarizes the analyzes for these competency assessments. 2 b) shows the values for the subset of high ranking stocks that means the amount of all competency assessments for individual stocks ranked 1, 2, or 3 (upper third of the respective ranks) and those on middle (4-6) and low (7-9) rank. 2 c) only considers the values for shares with the highest (lowest) rank that means the amount of all competency assessments for individual stocks ranked 1st (9). The data highlights the drop in competency judgments from the first three to the remaining six stocks. This relationship is also very clear in Figure 6-1.

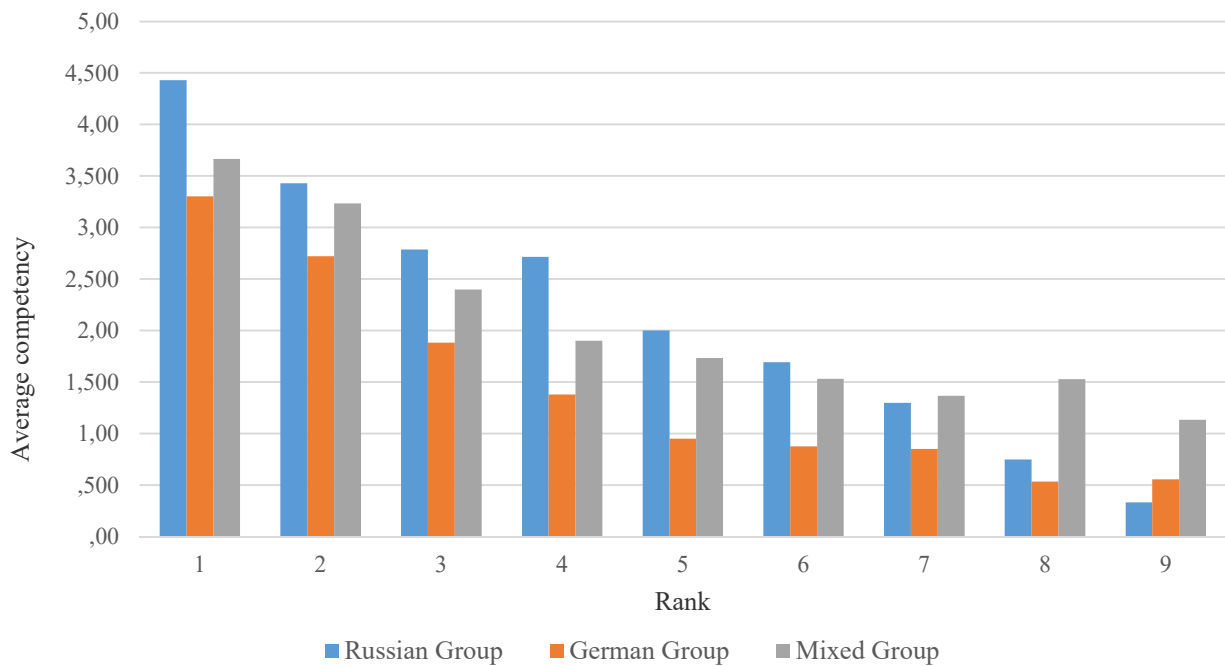


Figure 6-1: Ranks and respective average competency

From a combination of the country and rank-based subsets, 2 d) compares the computational estimates for the subset of the highest and lowest ranking Russian stocks. 2 e) compares the corresponding subsets for German shares and 2 f) for Polish shares. 2 d), 2 e) and 2 f) allow analyzes within the subset of shares from one country. The results already indicate that the shares with the highest competency scores are usually domestic equities. This statement is highlighted by Figure 6-2.

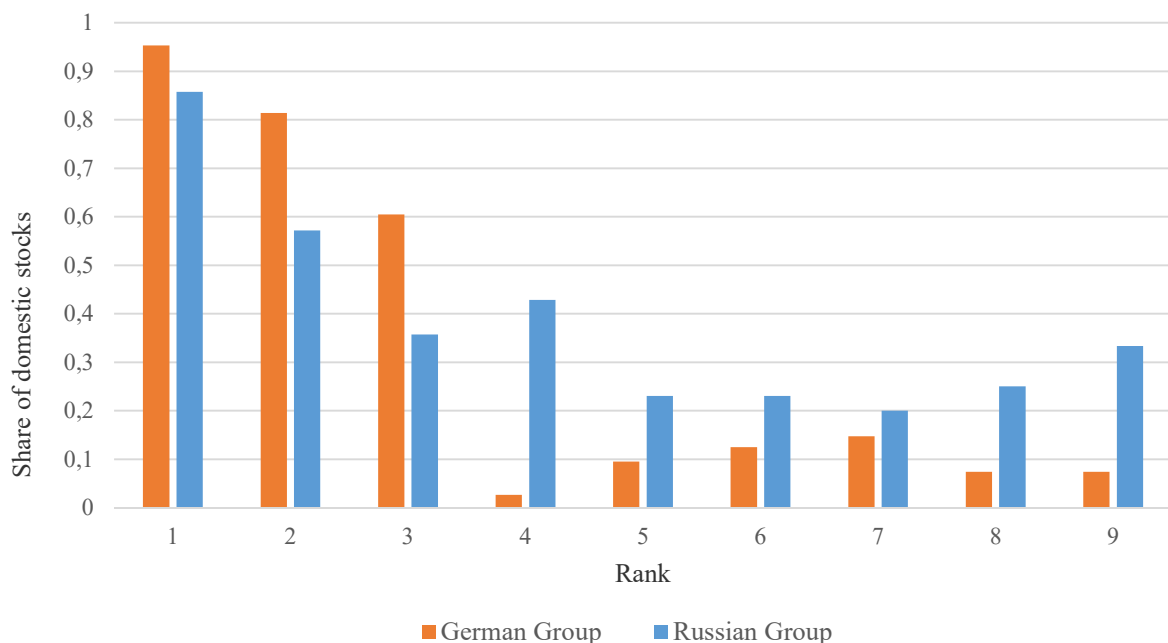


Figure 6-2: Ranks and share of domestic stock

For shares with a high rank (1-3), the share of domestic values ranges from 86% for rank 1 till 36% for rank 3 for the Russian group and from 95% for rank 1 till 60% for rank 3 for the German group. Thus, for a controlled sample of individual equity securities, this study also confirms the expected higher

private sector equity appreciation for domestic equities. This result is not particularly surprising at first, but in the next stage it raises the question of the effects of this superior skill ranking on expectation values of the return distribution within the sample.

### 6.5.2. Optimism for domestic markets

In order to capture the subjective probability distributions of stock returns, it is necessary to have appropriate measures for the diversification. Instead of fitting the very different raw data  $(p_{s,i}^1, \dots, p_{s,i}^6)$  into a specially parameterized distribution that is not known and probably not the same for all estimates, three simple measures are used for the dispersion derived directly from the survey data. To compare these measures, it should be noted that two types of data are used, which allow to compare and control the results of different survey methods. Data type I is based on the direct determination of the subjective probabilities, data type II on the inquiry of prices. Data type I is used for the first and second dimension, data type II for the third.

First, the standard deviation of the probabilities  $p_{s,i} = p_{s,i}^1, \dots, p_{s,i}^6$  assigned to the intervals  $I^1, \dots, I^6$  for each participant  $s$  and each share  $i$  is calculated using the formula

$$\text{Std(prob)}_{s,i} = \sqrt{\sum_{j=1}^9 (p_{s,i}^j - \bar{p}_{s,i})^2 \cdot 1/6} \quad \text{with } \bar{p}_{s,i} = 1/6 .$$

In case the probabilities are not adding up to 100% we normalized the judgments by dividing each number by the sum of  $p_{s,i}^1, \dots, p_{s,i}^6$ . This measure expresses the difference between a participant's probability information and a uniform (flat) probability distribution. Second, from the probabilities  $p_{s,i} = p_{s,i}^1, \dots, p_{s,i}^6$  and assuming a uniform probability distribution within each interval so that each interval  $I_j$  can be characterized by its center  $\hat{r}^j$  we calculate the standard deviation of the returns using the following formula

$$\text{Std(return)}_{s,i} = \sqrt{\sum_{j=1}^6 (\hat{r}^j - \bar{r}_{s,i})^2 \cdot p_{s,i}^j} \quad \text{with } \bar{r}_{s,i} = \sum_{j=1}^9 (\hat{r}^j \cdot p_{s,i}^j) \quad ^{60}.$$

Std(return) has a different meaning than Std(prob). Std(prob) represents the concentration of a probability distribution measured by its deviation from a flat distribution, whereas Std(return) expresses the deviation from the mean. For normally distributed variables, a larger value for Std(prob) is a lower value for Std(return). However, this relation does not have to apply to other distributions. Third, the standard deviation of returns is derived from the price estimates  $X_{s,i}^{0.1}, X_{s,i}^{0.5}, X_{s,i}^{0.9}$ . In order to be able to calculate

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<sup>60</sup> For simplification we assigned the numbers (-12.5%, -7.5%, -2.5%, 2.5%, 7.5% and 12.5%) which correspond with the average return in the intervals to the ranges  $r_1, \dots, r_6$ . The values -12.5% and 12.5% for the end intervals are more an arbitrary and technical assumptions which seem uncritical because we are not interested in the absolute values but in the relation to other judgments. See Kilka and Weber (2000) for a similar use.

with returns we divided  $X_{s,i}^{0.1}$ ,  $X_{s,i}^{0.5}$ ,  $X_{s,i}^{0.9}$  by the price of the respective share  $i$  from the respective beginning of the study which was given to the participants. Since no assumption is made about a particular form of distribution for all subjective probability distributions, the simple three-point approximation of Keefe and Bodily (1983) is used, which can be shown to fit well to a large number of relevant probability distributions:

$$\text{Std}(\text{point}) = \left[ \left( 0.3 \cdot \left( X_{s,i}^{0.1} / X_{0,i} \right)^2 + 0.4 \cdot \left( X_{s,i}^{0.5} / X_{0,i} \right)^2 + 0.3 \cdot \left( X_{s,i}^{0.9} / X_{0,i} \right)^2 \right) - (\text{Mean})^2 \right]^{0.5} \text{ with}$$

$$\text{Mean} = 0.3 \cdot \left( X_{s,i}^{0.1} / X_{0,i} \right) + 0.4 \cdot \left( X_{s,i}^{0.5} / X_{0,i} \right) + 0.3 \cdot \left( X_{s,i}^{0.9} / X_{0,i} \right) \quad 61$$

Table 6-3 presents the medians of the standard deviations for different subsamples of the stocks considered here. When interpreting the following data, it should be noted that a less wide probability distribution implies higher Std(prob), lower Std(return), and lower Std(point) values. Accordingly, almost all results indicate a higher spread for lower-skill stocks. In the case of the German group, the estimates show a significantly higher dispersion of stocks with a low rank for all three measures. This effect is maintained when comparing the highest ranking stocks to the lowest ranked stocks.

Table 6-3: Results for subsamples of hypothesis 2

|             | Russian Group |             |             | International Group |             |             | German Group |             |             |
|-------------|---------------|-------------|-------------|---------------------|-------------|-------------|--------------|-------------|-------------|
| a)          | Rank 1-3      | Rank 4-6    | Rank 7-9    | Rank 1-3            | Rank 4-6    | Rank 7-9    | Rank 1-3     | Rank 4-6    | Rank 7-9    |
| Std(prob)   | 0.19          | 0.15        | 0.15        | 0.17                | 0.16        | 0.16        | 0.14         | 0.13        | 0.12        |
|             | (1-3)-(4-6)   | (4-6)-(7-9) | (1-3)-(7-9) | (1-3)-(4-6)         | (4-6)-(7-9) | (1-3)-(7-9) | (1-3)-(4-6)  | (4-6)-(7-9) | (1-3)-(7-9) |
| p-value     | n.s.          | n.s.        | n.s.        | n.s.                | n.s.        | n.s.        | p<0.05       | n.s.        | p<0.10      |
| Std(return) | 5.45          | 5.02        | 6.29        | 5.12                | 5.59        | 5.11        | 5.45         | 5.59        | 5.85        |
|             | (1-3)-(4-6)   | (4-6)-(7-9) | (1-3)-(7-9) | (1-3)-(4-6)         | (4-6)-(7-9) | (1-3)-(7-9) | (1-3)-(4-6)  | (4-6)-(7-9) | (1-3)-(7-9) |
| p-value     | n.s.          | n.s.        | n.s.        | n.s.                | n.s.        | n.s.        | p<0.05       | n.s.        | n.s.        |
| Std(point)  | 3.25          | 6.16        | 17.27       | 11.36               | 8.77        | 6.42        | 13.46        | 10.84       | 14.54       |
|             | (1-3)-(4-6)   | (4-6)-(7-9) | (1-3)-(7-9) | (1-3)-(4-6)         | (4-6)-(7-9) | (1-3)-(7-9) | (1-3)-(4-6)  | (4-6)-(7-9) | (1-3)-(7-9) |
| p-value     | n.s.          | n.s.        | n.s.        | n.s.                | n.s.        | n.s.        | p<0.05       | n.s.        | n.s.        |
| b)          | Top rank      |             | Lowest rank | Top rank            |             | Lowest rank | Top rank     |             | Lowest rank |
| Std(prob)   | 0.20          |             | 0.07        | 0.17                |             | 0.16        | 0.14         |             | 0.12        |
| p-value     | p<0.10        |             |             | p<0.10              |             |             | n.s.         |             |             |
| Std(return) | 5.12          |             | 7.65        | 4.85                |             | 4.84        | 5.54         |             | 6.00        |
| p-value     | p<0.05        |             |             | p<0.05              |             |             | n.s.         |             |             |
| Std(point)  | 3.25          |             | 33.97       | 12.49               |             | 9.88        | 21.07        |             | 12.70       |
| p-value     | p<0.01        |             |             | n.s.                |             |             | n.s.         |             |             |

n.s. = not significant

<sup>61</sup> Keefe and Bodily (1983) test by numerical comparisons how well different three-point approximations approximate the mean and standard deviation of various differently shaped probability distributions which are likely occurring in practice. We use the "Extended Swanson-Megill" approximation which shows in average the best results for the point estimates given. For more details see Keefe and Bodily (1983).

The assessments of the Russian group points generally in the same direction, although Std(prob) and Std(return) show only insignificant differences. The international group shows also only insignificant differences even the absolute values are mixed and without a tendency to one direction or another. All the results in Table 6-3 confirm in tendency hypothesis 2.

Table 6-4: Results for subsamples of hypothesis 2

|                | Russian Group |             |             | International Group |             |             | German Group |             |             |
|----------------|---------------|-------------|-------------|---------------------|-------------|-------------|--------------|-------------|-------------|
| c)             | Rus. stocks   | Pol. stocks | Ger. stocks | Rus. stocks         | Pol. stocks | Ger. stocks | Rus. stocks  | Pol. stocks | Ger. stocks |
| Std(prob)      | 0.20          | 0.16        | 0.17        | 0.15                | 0.15        | 0.17        | 0.13         | 0.13        | 0.14        |
|                | Rus – Pol     | Pol – Ger   | Rus – Ger   | Rus – Pol           | Pol – Ger   | Rus – Ger   | Rus – Pol    | Pol – Ger   | Rus – Ger   |
| p-value        | p<0.05        | n.s.        | n.s.        | n.s.                | n.s.        | p<0.10      | n.s.         | p<0.05      | p<0.05      |
| Std(return)    | 5.45          | 5.39        | 4.36        | 5.59                | 5.79        | 5.20        | 5.70         | 5.59        | 5.42        |
|                | Rus – Pol     | Pol – Ger   | Rus – Ger   | Rus – Pol           | Pol – Ger   | Rus – Ger   | Rus – Pol    | Pol – Ger   | Rus – Ger   |
| p-value        | n.s.          | n.s.        | n.s.        | n.s.                | n.s.        | n.s.        | n.s.         | p<0.10      | n.s.        |
| Std(point)     | 6.45          | 5.51        | 4.63        | 9.25                | 8.52        | 9.76        | 14.54        | 10.75       | 12.43       |
|                | Rus – Pol     | Pol – Ger   | Rus – Ger   | Rus – Pol           | Pol – Ger   | Rus – Ger   | Rus – Pol    | Pol – Ger   | Rus – Ger   |
| p-value        | p<0.10        | n.s.        | n.s.        | n.s.                | n.s.        | n.s.        | p<0.05       | p<0.10      | n.s.        |
| d) Rus. stocks | Top rank      |             | Lowest rank | Top rank            |             | Lowest rank | Top rank     |             | Lowest rank |
| Std(prob)      | 0.20          |             | 0.15        | 0.15                |             | 0.14        | 0.13         |             | 0.13        |
| p-value        | n.s.          |             |             | n.s.                |             |             | n.s.         |             |             |
| Std(return)    | 5.45          |             | 5.89        | 5.35                |             | 5.68        | 5.56         |             | 5.65        |
| p-value        | n.s.          |             |             | n.s.                |             |             | n.s.         |             |             |
| Std(point)     | 3.25          |             | 9.28        | 8.77                |             | 10.33       | 11.03        |             | 15.16       |
| p-value        | n.s.          |             |             | n.s.                |             |             | n.s.         |             |             |

n.s. = not significant

Since the subset of high-ranked stocks largely coincides with the subset of domestic equities, the pattern of comparison of domestic and foreign equities is similar to that seen in Table 6-3. The German group shows a significantly higher Std(prob) of domestic stocks. Similar effects can also be observed for the Russian group and the respective domestic equities although less significant compared to the German group. However, the international group shows mainly mixed results without any significances or a tendency.

In order to check whether the results are really influenced by the perceived competence, the amount of Russian shares with the highest rank of each participant is additionally compared with those of the lowest rank (Table 6-4). In Table 6-5 the same analysis is done with a Polish and German subsample.

Table 6-5: Results for subsamples of hypothesis 2

|                | Russian Group |             | International Group |             | German Group |             |
|----------------|---------------|-------------|---------------------|-------------|--------------|-------------|
| e) Pol. stocks | Top rank      | Lowest rank | Top rank            | Lowest rank | Top rank     | Lowest rank |
| Std(prob)      | 0.15          |             | 0.17                | 0.15        | 0.13         |             |
| p-value        | n.s.          | 0.15        | n.s.                |             | n.s.         | 0.13        |
| Std(return)    | 5.61          |             | 5.12                | 5.68        | 5.48         |             |
| p-value        | n.s.          | 5.67        | n.s.                |             | n.s.         | 5.36        |
| Std(point)     | 7.23          |             | 10.72               | 7.71        | 15.56        |             |
| p-value        | n.s.          | 9.15        | n.s.                |             | p<0.05       | 8.95        |
| f) Ger. stocks | Top rank      | Lowest rank | Top rank            | Lowest rank | Top rank     | Lowest rank |
| Std(prob)      | 0.17          |             | 0.17                | 0.17        | 0.14         |             |
| p-value        | n.s.          | 0.24        | n.s.                |             | n.s.         | 0.14        |
| Std(return)    | 5.12          |             | 4.85                | 4.72        | 5.54         |             |
| p-value        | n.s.          | 3.87        | n.s.                |             | n.s.         | 5.10        |
| Std(point)     | 2.94          |             | 12.49               | 9.15        | 21.07        |             |
| p-value        | n.s.          | 6.63        | n.s.                |             | p<0.01       | 10.63       |

n.s. = not significant

When comparing the test groups with identical stock-exchange subsamples, it can be seen that for measures based on a direct probability valuation  $p_{s,i} = p_{s,i}^1, \dots, p_{s,i}^6$ , the Russian estimates for Russian stocks are generally significantly less dispersed than German estimates for Russian stocks. The inverse relationship applies to German shares whereas the group with the international students does not show any significant differences between the countries. Even the comparison of the highest and lowest rank shows almost similar absolute values. Overall, the results support hypothesis 2. The subjective probability distributions for equities associated with high competence appear to be less broad on average than for stocks with lower perceived competence.

### 6.5.3. Perceived competence, optimism and return expectations

In order to check systematic differences in expected values of probability distributions, two measures are used for the expected returns. Again, the measurements are based on two different types of data. For the first measure, the data type I is used, for the second data type II. First, we calculate with  $p_{s,i} = p_{s,i}^1, \dots, p_{s,i}^6$  and

$$\text{Mean}(\text{retun})_{s,i} = \sum_{j=1}^6 (\bar{r}^j \cdot p_{s,i}^j) + \text{Div}_{s,i} / X_{0,i}$$

the expected return, assuming a uniform distribution within each interval,  $\text{Div}_{s,i}$  represents the individually expected price decline within the forecast period due to a dividend payment. The second measure  $\text{Mean}(\text{point})$  is determined for each participant  $s$  and each share  $i$  out of  $X_{s,i}^{0.1}$ ,  $X_{s,i}^{0.5}$ ,  $X_{s,i}^{0.9}$  by using

Keefer and Bodily (1983) three-point approximation. In order to be able to work with returns, they are divided again by  $X_{0,i}$ :

$$\text{Mean(point)} = 0.3 \cdot X_{s,i}^{0.1}/X_{0,i} + 0.4 \cdot X_{s,i}^{0.5}/X_{0,i} + 0.3 \cdot X_{s,i}^{0.9}/X_{0,i} + \text{Div}_{s,i}/X_{0,i} - 1$$

Table 6-6: Results hypothesis 3

|             | Russian Group |             |             | International Group |             |             | German Group |             |             |
|-------------|---------------|-------------|-------------|---------------------|-------------|-------------|--------------|-------------|-------------|
| a)          | Rus. stocks   | Pol. stocks | Ger. stocks | Rus. stocks         | Pol. stocks | Ger. stocks | Rus. stocks  | Pol. stocks | Ger. stocks |
| Mean return | 1.16          | 0.56        | 1.59        | 3.23                | 3.78        | 4.08        | 2.00         | 1.38        | 1.85        |
|             | Rus – Pol     | Pol – Ger   | Rus – Ger   | Rus – Pol           | Pol – Ger   | Rus – Ger   | Rus – Pol    | Pol – Ger   | Rus – Ger   |
| p-value     | n.s.          | n.s.        | n.s.        | n.s.                | n.s.        | n.s.        | n.s.         | n.s.        | n.s.        |
| Mean point  | 4.17          | 1.90        | 4.89        | 0.91                | 2.52        | 3.17        | 3.38         | 4.79        | 3.11        |
|             | Rus – Pol     | Pol – Ger   | Rus – Ger   | Rus – Pol           | Pol – Ger   | Rus – Ger   | Rus – Pol    | Pol – Ger   | Rus – Ger   |
| p-value     | p<0.10        | n.s.        | n.s.        | n.s.                | n.s.        | n.s.        | n.s.         | p<0.05      | n.s.        |
| b)          | Top rank      |             | Lowest rank | Top rank            |             | Lowest rank | Top rank     |             | Lowest rank |
|             | Rus. Stocks   |             | Rus. stocks | Rus. stocks         |             | Rus. stocks | Rus. Stocks  |             | Rus. Stocks |
| Mean return | 1.88          |             | 1.07        | 2.37                |             | 6.51        | 1.37         |             | 3.41        |
| p-value     | n.s.          |             | n.s.        | n.s.                |             |             | n.s.         |             |             |
| Mean point  | -0.90         |             | 8.49        | 0.25                |             | -0.15       | -0.81        |             | 5.36        |
| p-value     | n.s.          |             | n.s.        | n.s.                |             |             | n.s.         |             |             |
| c)          | Top rank      |             | Lowest rank | Top rank            |             | Lowest rank | Top rank     |             | Lowest rank |
|             | Ger. Stocks   |             | Ger. stocks | Ger. Stocks         |             | Ger. stocks | Ger. stocks  |             | Ger. stocks |
| Mean return | 2.58          |             | 2.85        | 4.30                |             | 2.12        | 3.19         |             | 0.80        |
| p-value     | n.s.          |             | n.s.        | n.s.                |             |             | n.s.         |             |             |
| Mean point  | -0.10         |             | 19.88       | 3.53                |             | 2.74        | 7.49         |             | -3.32       |
| p-value     | n.s.          |             | n.s.        | n.s.                |             |             | p<0.01       |             |             |
| d)          | Top rank      |             | Lowest rank | Top rank            |             | Lowest rank | Top rank     |             | Lowest rank |
|             | Pol. stocks   |             | Pol. stocks | Pol. stocks         |             | Pol. Stocks | Pol. stocks  |             | Pol. stocks |
| Mean return | 0.39          |             | 1.03        | 1.79                |             | 4.59        | 1.56         |             | 0.73        |
| p-value     | n.s.          |             | n.s.        | n.s.                |             |             | p<0.10       |             |             |
| Mean point  | 0.27          |             | 4.29        | 3.13                |             | 0.29        | 5.82         |             | 5.03        |
| p-value     | n.s.          |             | n.s.        | n.s.                |             |             | n.s.         |             |             |

n.s. = not significant

Table 6-6 shows the corresponding means of the return expectations for national stock subsamples. In line to hypothesis 3, the data reveals no systematic differences in the expected return values. The Russian test group does not show a significantly more optimistic assessment for Russian stocks than for values from Germany. Just the mean(point) difference between Russian and Polish equities has a significant p-value of 0.10. The same applies for the German group. The mean(return) is not significant and without a tendency towards German shares whereas the mean(point) is the lowest and at least significant compared with Polish stocks. The results for the international group are not significant but are pointing for the mean(return) and mean(point) in the same direction, towards higher values for German

shares. This result is completely different from all the above-mentioned papers, which basically suggest more optimistic forecasts for the price performance of domestic stocks. Further we looked at the top and lowest rank for each country and detected at least higher mean returns for domestic stocks for the Russian and German group even if they are not significant.

In addition to the findings with regard to the home bias, the results from Table 6-3 to Table 6-6 also document a fundamental problem for the query of expected stock price changes. In the standard models of capital market theory for the expectation of investors, it is true that expectation distortions can be implemented in principle. However, different expectation values depending on the design of the survey of these expectations are hidden on a regular basis. Thus, no theoretical prediction can be made as to which of the query methods, price- or return-oriented, correctly reflects the actual expectations of investors. With this in mind further insights into a valid query of expected returns appear desirable.

The information on dispersion and expected value of future returns from different survey methods are unproblematic for the statements on the home bias insofar as they run in the same direction for the Russian and German group. Only the significance of the statements reaches varying levels. More difficult will be the comparison with actual realized prices, which will be done in the following section.

**6.5.4. Realized price development**

The differences in the assessments between the German, Russian and international test groups could also be explained by superior information (van Nieuwerburgh & Veldkamp, 2009) or simply by the fact that a group is indeed more competent in its judgments and the results shown express only these competence divergences. Such a statement seems unproblematic with regard to the expected values of the returns achieved.

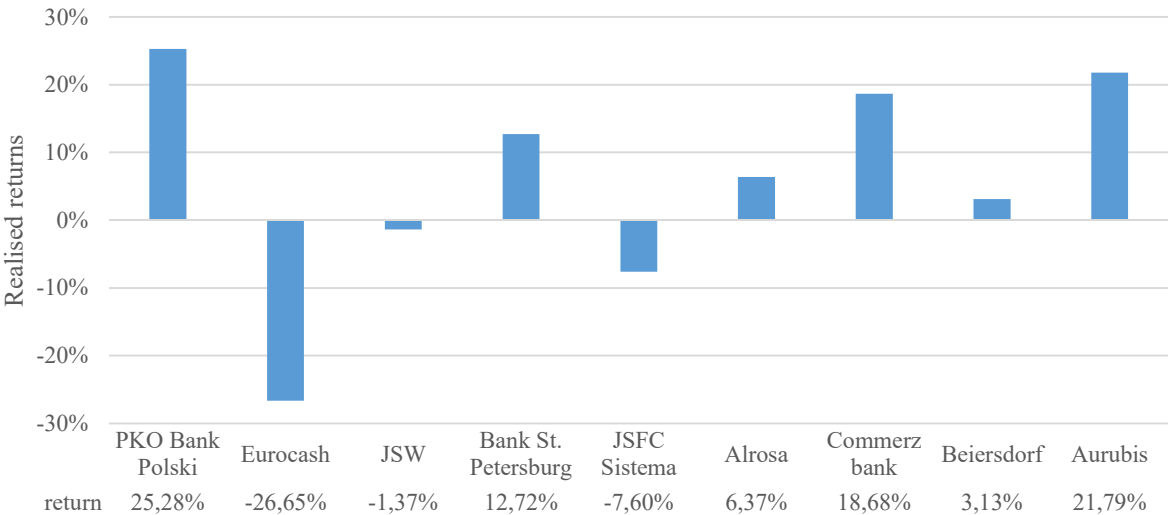


Figure 6-3: Real performance of stocks for the Russian and international group  
Timeframe: 20.09.2017 – 20.12.2017

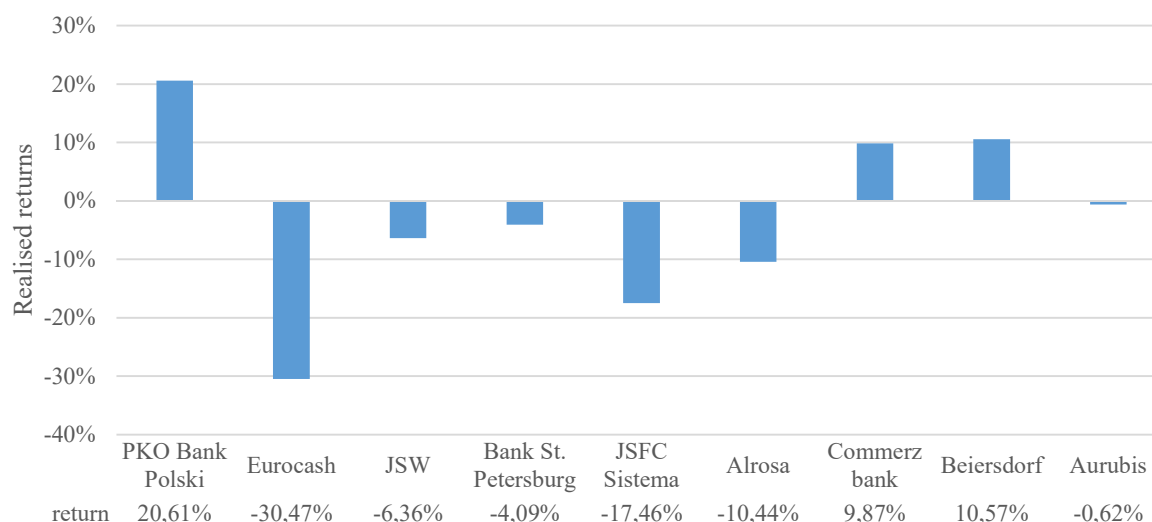


Figure 6-4: Real performance of the stocks for the German group  
 Timeframe: 25.10.2017 – 25.01.2018

As Figure 6-3 for the Russian and international group and Figure 6-4 for the German group show there was no consistent direction of return for all stocks in a country during the survey period, although there was a fairly clearly trend. German shares performed the best overall, followed by Russian and Polish stocks. The German respondents, on average, have expected a better performance of the Polish shares than the German shares, whereas the Russians and the international group have made a more optimistic estimate for German shares. In this respect, the average expectation of the Russian and international participants was better. However, an analysis of all expected price changes shows that there are no significant differences in the forecasting quality of the two subgroups.

A comparison of expected and actual dispersion values, which would certainly be desirable against the background of the strongly diverging statements of the three subgroups, was not carried out here. The strongly divergent dispersion variables for the different survey modes on the one hand and the point that the question of the intra-periodic variations of returns until the end of the survey period was not explicitly addressed in the survey do not allow such an analysis in our opinion. In general, it should also be noted that verification by historical data offers low validity for only one considered period. For more general results are a larger number of time periods required, which are hardly realizable in the context of surveys. But in view of the astonishingly different results observed for the main hypotheses analyzed here, a reexamination of the results in another survey seems appropriate.

## 6.6. Conclusion and outlook

The results of this study provide new empirical evidence that private investors on average feel more competent in assessing domestic equities than foreign ones. High scores for subjectively perceived competence have a major impact on expected stock returns, which are expressed by corresponding subjective

probability distributions. In particular, this analysis supports the hypothesis that, on average, the subjective probability distributions are broader for stocks with perceived lower proficiency than for stocks where high competence is found. The investigation is in general in line with the findings of Kilka and Weber (2000). In contrast to Kilka and Weber (2000), however, it was not generally possible to confirm the statement that stocks with a high level of competence are generally considered to be more optimistic. For the German test group, the results tend to point in the opposite direction.

The other question we tried to answer is if investors with experience abroad are facing the same bias. Regarding all results, we have to reject this statement. For instance, the competence level for foreign shares is higher when you have experience abroad than for investors without foreign experience. At the same time are the probability distributions less dispersed which is a sign for a higher competence and domestic stocks. A similar picture shows the mean return. In summary, even when some results are not significant at least the tendency's show a clear pattern. Investors with experience abroad do not fall for the home bias.

Further aspects not discussed in this analysis are to be noted. First, if differences in expected return distributions are based on a judgment bias, this is obviously primarily a valuation problem for individual stocks, but not for an entire national stock market. Second, of course, there are other explanations that help to explain the lack of international diversification. For example, there are convincing empirical indications that short-term oriented foreign investors have disadvantages in trading large German default values from abroad. For example shows Hau (1999) that foreign traders make significantly less profit than German traders than they operate on the German stock market. All of these shares are tradable via the Xetra computer trading system of Deutsche Börse AG. In an analysis of transactions made through Xetra, Hau (2001) states further that traders operating from a non-German-speaking city abroad can record statistically and economically significantly lower short-term trading gains. And third, the data suggesting a home bias relate only to the Russian and German test group. The values for the international participants are mixed and in most cases without a tendency or significance. So that we cannot say that the home bias exists for participants with international experience. If the experience abroad or other characteristics of the participants are in charge for the missing home bias is a question we cannot answer completely at this point. Therefore, further research efforts in all directions are indispensable to explain home bias.

## Appendix

### Stock Price Changes of Russian, Polish, and German Stocks

In this questionnaire we would like to ask you to judge future stock price changes of Russian, Polish, and German stocks from three different industries and to judge your competence concerning each stock price judgement. Please answer the following questions completely! There are no correct or wrong answers but only your perception we are interested in. The questions always refer to the per share stock price in the respective *local currency*: German stocks in European Euro (EUR), Polish stocks in Polish Zloty, and Russian stocks in Russian Ruble. Russian stocks are traded on Moscow Stock Exchange, Polish stocks are traded on Warsaw Stock Exchange, and German stocks on Frankfurt Stock Exchange.

- Imagine you should estimate today the stock price of the following stocks and stock indices on December 20, 2017. How *competent* do you feel in estimating the price of each stock? Please mark on a scale from 0 (= not competent at all) to 6 (= very competent):

|                              |                      | <b>Competence</b>         |
|------------------------------|----------------------|---------------------------|
| <i>PKO Bank Polski</i>       | (PL, Bank)           | 0---1---2---3---4---5---6 |
| <i>Bank Saint Petersburg</i> | (RU, Bank)           | 0---1---2---3---4---5---6 |
| <i>Commerzbank</i>           | (DE, Bank)           | 0---1---2---3---4---5---6 |
| <i>Eurocash</i>              | (PL, Consumer goods) | 0---1---2---3---4---5---6 |
| <i>JSFC Sistema</i>          | (RU, Consumer goods) | 0---1---2---3---4---5---6 |
| <i>Beiersdorf</i>            | (DE, Consumer goods) | 0---1---2---3---4---5---6 |
| <i>JSW</i>                   | (PL, Mining)         | 0---1---2---3---4---5---6 |
| <i>Alrosa</i>                | (RU, Mining)         | 0---1---2---3---4---5---6 |
| <i>Aurubis</i>               | (DE, Mining)         | 0---1---2---3---4---5---6 |
| Polish stock market WIG20    |                      | 0---1---2---3---4---5---6 |
| Russian stock market RTSI    |                      | 0---1---2---3---4---5---6 |
| German stock market DAX      |                      | 0---1---2---3---4---5---6 |

- Please *rank* the nine stocks from A to I according to your competence judgement indicated above. Rank A should be assigned to the stock with the highest judgement competence, rank I to the stock with the lowest judged competence. In case of identical competence judgements please decide which stock you would rather assign to the better rank.

Rank A: \_\_\_\_\_ Rank B: \_\_\_\_\_ Rank C: \_\_\_\_\_  
 Rank D: \_\_\_\_\_ Rank E: \_\_\_\_\_ Rank F: \_\_\_\_\_  
 Rank G: \_\_\_\_\_ Rank H: \_\_\_\_\_ Rank I: \_\_\_\_\_

- How would you judge the *probabilities* (in percent) that the stock price change by 12/20/2017 (relative to the current stock price given on the supplementary sheet) will be within the specified ranges? Please keep in mind that the total of judged probabilities for each stock should be equal to 100%.

By 12/20/2017, the stock price will...

| <b>Stock</b>        | <i>decrease by</i><br>more than 10% | <i>decrease by</i><br>10% to 5% | <i>decrease by</i><br>5% to 0% | <i>increase by</i><br>0% to 5% | <i>increase by</i><br>5% to 10% | <i>increase by</i><br>more than 10% | <b>Total</b> |
|---------------------|-------------------------------------|---------------------------------|--------------------------------|--------------------------------|---------------------------------|-------------------------------------|--------------|
| <i>PKO</i>          | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>Bank Polski</i>  |                                     |                                 |                                |                                |                                 |                                     |              |
| <i>Bank Saint</i>   | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>Petersburg</i>   |                                     |                                 |                                |                                |                                 |                                     |              |
| <i>Commerzbank</i>  | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>Eurocash</i>     | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>JSFC Sistema</i> | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>Beiersdorf</i>   | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>JSW</i>          | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>Alrosa</i>       | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |
| <i>Aurubis</i>      | __                                  | __                              | __                             | __                             | __                              | __                                  | =100%        |

- Now we would like to ask you to assess future stock prices in local currency!

|  |  |  |
|--|--|--|
| What is your <i>forecast</i> for the stock price on 12/20/2017 i.e. for which value is it equally likely that the stock price will be above _____ respectively below this value? | Which value do you expect the stock price on 12/20/2017 with high probability (90%) not to <i>fall short</i> of? | Which value do you expect the stock price on 12/20/2017 with high probability (90%) not to <i>exceed</i> ? |
|--|--|--|

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|                              |             |             |             |
|------------------------------|-------------|-------------|-------------|
| <i>PKO</i>                   | _____   PLN | _____   PLN | _____   PLN |
| <i>Bank Polski</i>           |             |             |             |
| <i>Bank Saint Petersburg</i> | _____   RUB | _____   RUB | _____   RUB |
| <i>Commerzbank</i>           | _____   EUR | _____   EUR | _____   EUR |
| <i>Eurocash</i>              | _____   PLN | _____   PLN | _____   PLN |
| <i>JSFC Sistema</i>          | _____   RUB | _____   RUB | _____   RUB |
| <i>Beiersdorf</i>            | _____   EUR | _____   EUR | _____   EUR |
| <i>JSW</i>                   | _____   PLN | _____   PLN | _____   PLN |
| <i>Alrosa</i>                | _____   RUB | _____   RUB | _____   RUB |
| <i>Aurubis</i>               | _____   EUR | _____   EUR | _____   EUR |

- If dividend payments occur during the considered time period, the stock price will usually decrease after the dividend due date. To evaluate your forecasts correctly: Do your answers explicitly include a stock price decrease due to expected dividend payments by 12/20/2017?

|                              |        |                           |
|------------------------------|--------|---------------------------|
| <i>PKO Bank Polski</i>       | No [ ] | Yes, to the amount of [ ] |
| <i>Bank Saint Petersburg</i> | No [ ] | Yes, to the amount of [ ] |
| <i>Commerzbank</i>           | No [ ] | Yes, to the amount of [ ] |
| <i>Eurocash</i>              | No [ ] | Yes, to the amount of [ ] |
| <i>JSFC Sistema</i>          | No [ ] | Yes, to the amount of [ ] |
| <i>Beiersdorf</i>            | No [ ] | Yes, to the amount of [ ] |
| <i>JSW</i>                   | No [ ] | Yes, to the amount of [ ] |
| <i>Alrosa</i>                | No [ ] | Yes, to the amount of [ ] |
| <i>Aurubis</i>               | No [ ] | Yes, to the amount of [ ] |

- How do you judge the *probabilities* (in percent) that the index level change by 12/20/2017 (relative to the current index level given on the supplementary sheet) will be within the specified ranges? Please keep in mind that the total of judged probabilities for each index should be equal to 100%.

By 12/20/2017, the index level will...

| <b>Stock</b> | <i>decrease by</i><br>more than 10% | <i>decrease by</i><br>10% to 5% | <i>decrease by</i><br>5% to 0% | <i>increase by</i><br>0% to 5% | <i>increase by</i><br>5% to 10% | <i>increase by</i><br>more than 10% | <b>Total</b> |
|--------------|-------------------------------------|---------------------------------|--------------------------------|--------------------------------|---------------------------------|-------------------------------------|--------------|
| <i>WIG20</i> | ___                                 | ___                             | ___                            | ___                            | ___                             | ___                                 | =100%        |
| <i>RTSI</i>  | ___                                 | ___                             | ___                            | ___                            | ___                             | ___                                 | =100%        |
| <i>DAX</i>   | ___                                 | ___                             | ___                            | ___                            | ___                             | ___                                 | =100%        |

- Now we would like to ask you to assess future index levels?

| What is your <i>forecast</i> for the index level on 12/20/2017 i.e. for which value is it equally likely that the index will be above<br>respectively below this value? | Which value do you expect the index level on 12/20/2017 with high probability (90%) not to <i>fall short</i> of? | Which value do you expect the index level on 12/20/2017 with high probability (90%) level not to <i>exceed</i> ? |
|---|--|--|
| <i>WIG20</i>  | ___  | ___  |
| <i>RTSI</i>   | ___  | ___  |
| <i>DAX</i>  | ___  | ___  |

Finally, some questions concerning your personal experience with stocks:

- Your gender: Female [ ] Male [ ]
- Are you a graduate or undergraduate student? Graduate [ ] Undergraduate [ ]
- Your major: \_\_\_\_\_
- Your nationality: Russian [ ] German [ ] Others [ ]
- Have you owned stocks or shares of equity funds at any time during the last two years? Yes [ ] No [ ]
- If you owned stocks or shares of equity funds, has your portfolio contained foreign stocks or shares of equity funds investing in foreign stocks? Yes [ ] No [ ]

If you are interested in stocks, for *how long* have you already been following stock prices?

Chapter 7  
**The self-serving bias: a survey**

This chapter is under review at Journal of Banking Law and Banking

# The self-serving bias: a survey

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## Abstract

The self-serving bias is primarily defined as the attribution of favorable outcomes to internal factors, such as skill or intelligence, whereas unfavorable outcomes are attributed to external factors, such as the environment or the economy. This phenomenon has been researched in a multitude of settings and environments. The focus of this literature review is on the self-serving bias in an economic setting. As such the review reveals significant evidence for a self-serving bias in corporate narratives, especially in letters to shareholders. The reaction of the market to these self-serving attributions is not uniform and appears to be dependent on the specific circumstances. Scientific research also reveals significant evidence for a self-serving bias in managers. This bias combined with overconfidence can lead to a heightened acquisition activity, which likely results in worse future firm performance. Biased managers issue more forecasts than unbiased ones and the forecasts are less accurate. The self-serving bias also influences investors and traders. Biased financial market participants show worse results than unbiased ones. Furthermore, the bias appears to influence momentum. To conclude, the review reveals significant evidence for a widespread emergence of a self-serving bias in an economic context. As the bias can significantly influence the actions of economic market participants, knowledge of this phenomenon is essential to prevent suboptimal decisions.

**Keywords:** self-serving bias, self-attribution bias, self-serving attribution bias, self-serving attribution, overconfidence

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## 7.1. Introduction

The tendency to credit the own abilities or internal factors excessively for personal success but putting blame on others or external factors for personal failure is a concept in social psychology, the so called self-serving bias (Bradley, 1978; Campbell & Sedikides, 1999; Miller & Ross, 1975).

For example, abilities, personal traits, intelligence, skill or efforts are referred to as internal factors or causes, whereas luck, weather, economy and actions or inactions of others are generally referred to as external factors or causes. It is human trait, that factors for wanted outcomes are perceived to be more under one's control or foreseeable. In contrast factors for an unwanted outcome are perceived as outside of personal control or unforeseeable. This appears sensible, otherwise if individuals could have controlled or foreseen an unwanted result they would have done something to avoid it (Shepperd et al., 2008).

The foundation for the self-serving bias was laid by Heider (1958)<sup>65</sup> in his work regarding the psychology of interpersonal relations. In his 'Naive analysis of action' model Heider (1958) remarks, that reasons for events are often chosen because they "fit the wishes of the person" but "the datum has to be plausibly derived from the reason". Thus he concludes, that assuming the attributed reasons to an event seem plausible, individuals try to explain their behavior in terms that make them feel positively about themselves and show them in good light.

The self-serving bias can be detected in a large variety of settings and is pervasive in the general population. Over the years of research, a multitude of situations have been examined regarding the existence of a self-serving bias. In interpersonal relations for example, a self-serving bias can be seen in the perception of responsibility for the breakup of ex-couples (Gray & Silver, 1990). Shtudiner et al. (2017) also find a bias in the responsibility attribution for socio-economic failures in the political context. Responsibility for or avoidance of accidents is another situation in which self-serving biases are likely to emerge (Stewart, 2005). Furthermore self-serving bias is also present in sport competitions and players (Lau & Russell, 1980; Roesch & Amirkhan, 1997; Vanyperen, 1992).

A self-serving bias can emerge in a multitude of situations and can significantly influence the perception and comprehension of individuals. Therefore, it is not surprising, that the emergence of a self-serving bias in economic settings is extensively researched following its first appearance in social psychology.

As there is no dedicated review of the self-serving bias in an economic background available<sup>66</sup>, the focus of this review is on creating an overview over scientific literature that researches the self-serving

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<sup>65</sup> "The psychology of interpersonal relations" by Heider is a book, due to the importance of his work for the self-serving bias research, it is included nevertheless.

<sup>66</sup> Merkl-Davies and Brennan (2007) give a short overview over literature regarding self-serving attributions in letters to shareholders as part of their research into impression management in corporate narratives.

bias in an economic setting. To present a general overview into the current status of economic research, the focus lies on topics that are significantly examined. As such the goal is, to summarize and connect the main studies regarding a self-serving bias in the economic setting and highlight the results as well as discrepancies. This is especially important as the self-serving bias can have a significant impact on the behavior of individuals and can lead to suboptimal decisions in an economic and investment context. As such it is important to understand where this bias emerges and the consequences that arise due to it. This review helps to understand the bias in an economic context and highlights the environments in which the self-serving bias is especially pervasive.

The review is structured as follows. At first the methodical approach to research and the evaluation of the literature is described. Then ways to measure a self-serving bias are explained, followed by the psychological framework the bias is based on. The next chapters review the scientific research regarding the bias in corporate communications, chief executive officers (CEOs) and management as well as in a financial market environment. At last the results are discussed and further research possibilities highlighted.

## **7.2. Methodical Approach**

To receive valid and robust results in this literature review, the methodical approach of how the scientific literature is searched, is crucial. The scientific literature is examined for key phrases and connected literature. To ensure the validity and robustness of the search results, the literature is evaluated as well.

At first, key phrases have to be identified that can be used in the search, as the bias can have different nomenclatures or synonyms. Just the search for “self-serving bias” is likely not to reveal a complete picture of literature regarding the bias. A first general search reveals that the bias is indeed not uniformly designated in the literature. As such, three key phrases have been identified that can be used in the search and cover the widest possible spectrum of designations. The three key phrases used in the literature search are: self-serving bias, self-serving attribution, self-attribution bias.

The phrase “self-serving attribution” is used, as it allows to capture early literature regarding the phenomenon, in which the word bias is not used. Besides, it allows to capture designations such as “self-serving attribution bias”. The third phrase is used, as in some economic areas the bias is designated as such and the relevant literature could otherwise not be captured in the search. To reduce the noise ratio in the results, only the specific phrases are searched for in the literature. Furthermore, to include the plural of the key phrases two separate searches for each key phrase are conducted once in singular and once in plural.

This review focuses only on established journals as new scientific research is likely published in these and the work is peer-reviewed in contrast to working papers or discussion papers, which ensures qualified results.

In a first step, the base for this literature review is built by searching the databases of specific journals. The journals are selected based on the VHB-ranking. As the self-serving bias spans multiple categories of economic research as well as psychology, VHB-ranking categories are selected that most likely include research regarding the bias. Accordingly, the following categories have been used for the search: Allgemeine Betriebswirtschaftslehre, Bankbetriebslehre/Finanzierung, Rechnungswesen, Organisation/Personalwesen, Entrepreneurship.

The databases of all A+ and A ranked journals of the selected categories have been searched. Access to the databases is obtained via the Technical University of Darmstadt. Some search engines automatically aggregate the results of singular and plural phrases in one search, due to the fact, that for the plural versions only letters are added to the end of the words. To produce uniform search results, the findings for singular and plural searches are compared and aggregated for all databases.

Table 7-1 shows the results of the database searches aggregated into A+ and A ratings. For the results separated by journal see the appendix. All findings obtained by the database searches have been completely examined for a connection with a self-serving bias and if they add value to this review.

Table 7-1: VHB-Ranking category search overview

| Categorie (Ranking) [Journal count]          | Key phrases         |                            |                         |
|--|---------------------|----------------------------|-------------------------|
|  | "self-serving bias" | "self-serving attribution" | "self-attribution bias" |
| Allgemeine Betriebswirtschaftslehre (A+) [8] | 66                  | 36                         | 8                       |
| Allgemeine Betriebswirtschaftslehre (A) [9]  | 74                  | 40                         | 4                       |
| Bankbetriebslehre/Finanzierung (A+) [3]      | 6                   | 7                          | 35                      |
| Bankbetriebslehre/Finanzierung (A) [7]       | 4                   | 4                          | 27                      |
| Rechnungswesen (A+) [3]                      | 12                  | 7                          | 2                       |
| Rechnungswesen (A) [6]                       | 19                  | 13                         | 4                       |
| Organisation/Personalwesen (A+) [1]          | 12                  | 5                          | 0                       |
| Organisation/Personalwesen (A) [11]          | 160                 | 39                         | 7                       |
| Entrepreneurship (A) [4]                     | 19                  | 9                          | 2                       |

In the second step, the library catalogue of the Technical Universität of Darmstadt as well as Google Scholar are used to search for the key phrases. All searches have been conducted in May 2020. The results are shown in Table 7-2. All title and abstract searches have been reviewed whereas the full text searches have only been skimmed through.

The third step is the review of citations used in the papers found in the previous two steps, as well as the review of references to these papers. This step ensures that relevant research into the self-serving bias which has not been found to this point is most likely discovered.

Table 7-2: Library catalogue and Google Scholar search results

| Source  | Key phrases                  |   |                                  |
|---|------------------------------|---|----------------------------------|
|   | "self-serving bias / biases" | "self-serving attribution / attributions" | "self-attribution bias / biases" |
| Library catalogue of Technical University of Darmstadt (title and abstract) | 364/102                      | 22/60                                     | 78/0                             |
| Library catalogue of Technical University of Darmstadt (full text)          | 2774/968                     | 220/506                                   | 340/16                           |
| Google Scholar (title)  | 277/118                      | 48/67                                     | 45/2                             |
| Google Scholar (full text)  | 18200/11400                  | 1920/3540                                 | 2700/213                         |

In order to ensure the validity and robustness of the literature used in this review, the evaluation and the selection process is crucial. There are two distinctive methods used in this review, the VHB-ranking and impact factors. The VHB-Ranking is chosen as it is based on the opinion of over 1,100 university professors and professionals in the field of economic research (Verband der Hochschullehrer für Betriebswirtschaft e.V., 2019). These individuals give their opinion about the quality of the journals and consequently a ranking is built. Even though the base, the VHB-Ranking is built on, is subjective in nature, it is one of the best suited means to evaluate an economic journal. Correspondingly it is used as the primary method of evaluation in this review. As described, the databases of the journals ranked A+ and A in the selected economic categories of the VHB-Ranking are searched. As such the quality of the corresponding search results is ensured. For search results identified with the help of the library catalogue or Google Scholar the VHB-Ranking is used as well. If the journal, the paper is published in, is ranked between A+ and B it can be used for this review. If it is ranked C or D it will not be included. An identical process is used for literature found with the help of citations or references. As not all economic journals are included in the VHB-Ranking and psychological journals are used as well, a second way of evaluating the journals is needed. Hence, impact factors are used.

As there are multiple different impact factors available, generally two are used to determine the quality of the journal in this review. The first ranking database used is IDEAS, which is especially dedicated to economic literature, with a scope of 2,848 journals (IDEAS, 2020). The literature is not separated into specific areas as only economic literature is ranked. The second database used is Scimago (Scimago Lab, 2020). This ranking database is not focused on a specific research field. The journals are nevertheless clustered into subject area and category. The third database used is InCites<sup>67</sup>, this database is also not focused on a specific research field, but the journals are again clustered into categories (Clarivate, 2020). For economic journals IDEAS and Scimago are used for the evaluation. Papers of economic journals are used in this review, if they are ranked in the upper half of the IDEAS ranking as

<sup>67</sup> Access is provided by the Technical University of Darmstadt.

well as in the upper half of the Scimago ranking for the specific category. If they are below the median in either one of the two rankings they are not included.

For other, especially psychological journals, the databases of Scimago and InCites are used. To be included in this review the journal must be in the upper half of the specific category in both databases as well. If the journal is not included in both relevant databases, the content will not be used. If a journal ranking is only available in one of the two relevant databases a tightened evaluation rule is used. The journal needs to be in the upper third of the ranking database to be included. If sources deviate from the presented methodical approach, they will be specifically highlighted.

### **7.3. Measuring a self-serving bias**

Measuring or even determining the existence of a self-serving bias is no trivial task. As bias already connotes this phenomenon is something subjective, there is no unit of measurement readily available to express the existence. Every person might express the bias in slightly different ways which can even depend on the specific situation. As such the results of scientific studies are always subject to interpretation. Over the years of research into self-serving bias there have been multiple methods used to make the bias tangible for scientific evaluation. One of the first and to this date heavily used methods to investigate the existence of a self-serving bias are social experiments or experiments in general (q.v. Chen et al., 2016; Miller & Ross, 1975; Rotter, 1966; Streufert & Streufert, 1969). In these experiments, participants have to complete tasks which are aligned in a way to make the bias measurable. Most of the time these participants are students but can also be from the field the bias should be examined in. For example, the participants complete a task and receive feedback for their performance. The performance feedback is often manipulated and randomly assigned (q.v. Dobbins & Russell, 1986; Libby & Rennekamp, 2012). As such it is possible to investigate the attributions made by the participants detached from the real performance, which enables the investigation of self-serving attributions.

Another experimental design is, in the first step, to research field specific general internal and external events. In the second step these events are connotated with positive and negative performance or outcomes. The participants of the experiment are then asked to put themselves into the role of a person in this specific field and commentate the performance. As such it is possible to differentiate if the attributions that are made, are indeed self-serving or a reflection of rational behavior (q.v. Chen et al., 2016; Gooding & Kinicki, 1995).

The use of a fictional firm or similar is additional design. The participants are again asked to commentate and explain the performance. A slight variation is the evaluation of fictional performance attributions from an outside, for example investor perspective, in order to examine the reaction of the environment to show a self-serving bias.

The precise design of these experiments can vary and is dependent from the specific topic that is researched. Nevertheless, the goal of all these experiments is to make self-serving bias or the influence

on the outside measurable. This is possible as influence factors can be specifically controlled, and the setting manipulated in an experimental environment. Hence, if attributions are made these are indeed self-serving or can be highlighted by a comparison with a baseline. As experiments do not necessarily reflect reality, this can be a shortfall, as patterns observed in an experiment may not be transferable or exaggerated due to the experiment's composition.

Surveys are also used to capture self-serving bias. The questions are designed in such a way as to highlight self-serving tendencies for example in managers (Qin et al., 2019). In their work Peterson and Villanova (1988) make suggestions how questions, with the goal to capture attributions, can be designed. Based on such work, the questions are adapted to the specific area of research. The answers are analyzed and evaluated regarding the existence or emergence of a self-serving bias. As the surveys usually aim to capture the bias in real settings, transferability of the results is likely. Problems can arise if the participants do not answer the questions truthfully or according to their normal behavior and if the questions are not adequately designed.

A theoretical model aims to capture the self-serving bias with the help of hypothesis and derived mathematical formulas. Furthermore, it can connect the bias with possible consequences and outside reactions. With the help of a model it is possible to highlight complex connections and interactions of the bias (q.v. Daniel et al., 1998; Gervais & Odean, 2001). But as the name already implies, the model is of a theoretical nature and as such a transferability and applicability to reality still needs to be established.

If the influencing factors cannot be directly measured it is possible to use constructed proxies which stand for the original factor. Such a measure, in this review, is for example overconfidence. As it is in most cases not possible to directly measure overconfidence of a person, proxies such as the presentation of an individual in the media are used. As these proxies are not able to replace a direct measure in its precision, a combination of multiple proxies for one measure is usually used (Adebambo & Yan, 2018; Chen et al., 2015).

If personal accounts of individuals are available, in the field that self-serving bias is researched in, content analysis can be used. Examples are interviews, public comments, or personal accounts in corporate communications, such as letters to shareholders (q.v. Aerts, 1994; Salancik & Meindl, 1984). Content analysis can be separated into two steps, first the identification of attributions and second the coding of the attributions. In the first step, all attributions made in the communications are identified. As attributions in communications can have multiple forms and shapes, some are clearly visible, and others are imbedded into lengthy discussions. Phrases, like because of, hence, resulting in, or led to, can help in extracting attributional statements.

With the help of these results it is possible to analyze a self-serving bias directly from real communications. As such a connection with reality is given. A possible problem is that different coders can interpret attributions differently, thus the usage of a coding guideline and coding by multiple coders is

advantageous. To complement the measurement of a self-serving bias, data analysis is used to measure for example firm or stock performance, trade size and frequency, or reference values.

Multiple of the presented methods can be combined as well. The combination of a survey with data analysis can for example enable the analysis of factors otherwise not measurable (Uchida, 2006). Content analysis can be combined as well with data analysis, if matching data is available (Czaja & Röder, 2020). A data analysis with the usage of proxies can be used to investigate whether the data is consistent with a theoretical model (q.v. Cooper et al., 2004; Kaustia & Knüpfer, 2012). If enough of these real-world data analyses show a consistency with a theoretical model, it is likely that the model is indeed reflecting the real situation. As such the combination of methods can be used to enhance the research value.

Depending on the specific field that is researched, different methods are used. For the research of self-serving bias in corporate communications mostly content analysis is used, as personal accounts are readily available. For the investigation of the influence of self-serving bias on management actions basically all methods are used. The research of self-serving bias in negotiations is mostly experimental, whereas for the influence of self-serving bias on financial protagonists mostly models and proxies are used.

As this review of measurement methods shows, there are multiple methods available. Which is best suited depends on the field and the environment a self-serving bias is researched in.

#### **7.4. Self-serving bias in psychology and definitions**

The term self-serving bias is shaped by the work of Miller and Ross (1975). They research the extend, in which individuals engage in self-serving attributions. They split the bias into two parts, the self enhancement part which attributes success internally and the self-protection part which externally attributes failure. Miller and Ross (1975) find consistent evidence for the self-enhancement part of the self-serving bias but minimal evidence for the self-protection part. They conclude that the self-serving bias hypothesis is “too intuitively appealing to be summarily abandoned” (Miller & Ross, 1975, p. 224).

Since then, the self-serving bias has been constantly explored and scrutinized in psychological science (Arkin et al., 1980; Campbell & Sedikides, 1999; Duval & Silvia, 2002; Lammers & Burgmer, 2019; Zuckerman, 1979). In contrast to the results of Miller and Ross (1975) multiple researchers have demonstrated and verified the self-enhancing as well as the self-protection part of the bias (Arkin et al., 1978; Campbell & Sedikides, 1999; Mezulis et al., 2004; Zuckerman, 1979) over the following years. Still, the topic of self-protection experiences more scrutiny in psychological research. It appears that the conditions for attributing failure externally and not internally are not as extensive as attributing success

internally (Duval & Silvia, 2002). According to Duval and Silvia (2002) uncontrolled moderators<sup>68</sup> appear to be the reason for this phenomenon. In their introduced model for example, they propose that if “highly self-focused people feel that failure can be rapidly remedied, they will attribute failure to self; when the likelihood of improvement seems low, however, failure will be attributed externally” (Duval & Silvia, 2002, p. 58). Nevertheless, the general existence of the self-serving bias in the form of ascribing negative personal outcomes to external circumstances and positive outcomes to internal factors is accepted in psychological science (Campbell & Sedikides, 1999; Krusemark et al., 2008; Powell, 2011).

As Individuals strategically employ the self-serving bias to enhance or defend positive self-views (Krusemark et al., 2008), many researchers have claimed, that this bias plays an important role for individuals adaptive functioning and mental health (Heine et al., 1999; Mezulis et al., 2004; Taylor & Brown, 1988). The bias occurs in a multiplicity of events and environments. Hence the question arises, why there is a self-serving bias, why do people tend to attribute success internally and failure externally? Possible explanations for this bias have been discussed since the beginning of research on this topic. Two major causal explanations have been proposed and debated in research. On one hand the motivational theory and on the other the information processing theory.

In the motivational theory, self-confidence and self-esteem motivate successful action. People maintain excessive self-assessments to improve and protect their self-esteem (Greenwald, 1980). Abilities are not willfully overestimated but genuinely misperceived (Powell et al., 2006). The motivational theory’s focus lies on two main motives: self-enhancement and self-presentation (Shepperd et al., 2008).

The information processing theory has been primarily introduced by Miller and Ross (1975). If asked, most people would argue, that they make their attributions based on an objective evaluation of evidence (Shepperd et al., 2008). But individuals often do not look at all evidence, rather stop at the first satisfying logical explanation (Shepperd et al., 2008; Simon, 1956). This process of examining the evidence can produce an illusion of objectivity (Kunda, 1990; Shepperd et al., 2008). People pay special attention or are very easily receptive to information about their own efforts, qualities, or abilities but less sensitive to external information, objective data, efforts, and characteristics of others. As people want to achieve goals, they align their plans and actions to succeed. Not giving enough weight to external cues, people tend to overestimate their own relative efforts, qualities or abilities (Powell et al., 2006).

At the beginning the two theories were discussed against each other and viewed mutually exclusive (Bradley, 1978; Miller & Ross, 1975), later research indicates that no theory is universal, but both can be used to explain certain portions of the self-serving bias and are working together, situation dependent, to create this bias (Campbell & Sedikides, 1999; Riess et al., 1981; Shepperd et al., 2008). The motivational theory only explains that individuals are only able to believe something about themselves so far as they can find evidence to support the belief (Kunda, 1990). Therefore individuals will only attribute desirable outcomes internally and undesirable outcomes externally, as long as they can find evidence

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<sup>68</sup> Factors that influence the manifestation of the self-serving bias.

supporting these claims (Powell et al., 2006). People want to portray a positive image of themselves, so they are unlikely to create a self-serving bias for themselves (Shepperd et al., 2008). On the other hand, information processing theories can be influenced by motivational aspects (Shepperd et al., 2008). It is for example likely, that individuals are motivated to expect positive outcomes more than negative ones or to have a positive self-schema (Shepperd et al., 2008). Thus, both theoretical approaches can support each other and help to better understand why people engage in a self-serving bias.

As different magnitudes of self-serving bias have been found in research over the years, the question arises what influences the emergence of a self-serving bias. Over the years a multitude of factors influencing the appearance of the bias have been researched, the so-called moderators. The found moderators are diverse, for example focus of control of a person, the self-esteem, mental illnesses, age or the importance of a task the self-serving bias is measured in (Campbell & Sedikides, 1999; Mezulis et al., 2004).

Another important moderator are cultural differences. In their review Mezulis et al. (2004) find a significant difference in the magnitude of self-serving bias between Western and Asian cultures. Western cultures show a larger self-serving bias than Asian cultures. But the culture groups are not homogeneous, as such the United States for example shows a larger self-serving bias than western European cultures. Asian cultures display these differences as well. Data from Japan and pacific islands indicates a probable absence of a self-serving bias in these cultures. In comparison India shows a moderate self-serving bias (Mezulis et al., 2004). Heine et al. (1999) and Crittenden and Bae (1994) suggest, that the difference or absence of a self-serving bias in Asian cultures is because the usual self-serving patterns of attribution are not self-serving in these cultures. For example, sharing responsibility for success and assuming responsibility for failure may be a better way to maintain self-esteem (Mezulis et al., 2004). Crittenden and Bae (1994) confirm, that individuals that engage in the aforementioned ways are not seen as less competent in fact they are seen more positively. Mezulis et al. (2004) hypothesis that Asian cultures may as well engage in positive illusions, just not in the same way as Western individuals do.

Self-serving bias derived from psychological science, as presented, is described as the internal attribution of favorable outcomes and the external attribution of unfavorable outcomes. Nevertheless, there are multiple designations for this exact phenomenon, especially in the economic literature as well as differing underlying definitions with the same name.

Self-serving attribution bias is a name variation which describes the bias as defined above, highlighting the connection with attributions. In early research, the term self-serving attributions is heavily used, without the term bias (q.v. Streufert & Streufert, 1969). To use a consistent nomenclature, the term self-serving bias will be used in this work to describe this psychological phenomenon, as it is the most commonly used term (Lammers & Burgmer, 2019).

The self-serving bias in judgements about fairness is a subset and based on a slightly different definition but can also be found in psychological and economical research literature. According to Babcock

and Loewenstein (1997) this bias is a tendency to conflate what is fair with what benefits oneself. Individuals “tend to arrive at judgements of what is fair or right that are biased in the direction of their own self-interests” (Babcock & Loewenstein, 1997, p. 111). Due to this self-serving bias, individuals make systematic errors when making judgements about fairness, for example when individuals sincerely think, that what is beneficial to themselves is also fair to all parties concerned (Newey, 2016). Newey (2016) identifies psychological findings that are relevant to this bias in judgments about fairness. The bias happens subconsciously, and individuals see what they consider a fair act to be impartially justified, even if their endorsement of those acts is self-serving. Is the case or situation simple, the bias in judgment about fairness is usually not present and the individuals tend to reach a consensus about fairness in these situations. Is the situation or case on the other hand more complex, the bias becomes more apparent. Newey (2016) gives the following situation as an example: A person is told to divide a sum of money fairly between themselves and another person. Without more context, the situation is simple and a bias in fairness is unlikely to happen. Does the person now receive more information or context, for example that the other person is rich or in much greater need due to being reckless, the judgement about fairness becomes more complex (Newey, 2016).

A third subset of the term self-serving bias, albeit found sparsely and primarily in economic literature, is closely related to the bias in judgements about fairness (Blaufus et al., 2015; Cappelen et al., 2013; Passarelli & Tabellini, 2017). This bias describes the unconscious adjustment of one owns moral judgement in self-serving ways. Blaufus et al. (2015) use this bias to explain tax evasion. In their research they find the connection, that subjects with an easy opportunity to evade taxes, see this behavior as less unethical, than those that cannot easily evade taxes. Their moral evaluation of tax evasion is prone to a self-serving bias and thus moral appeals by police makers on reducing tax evasion might not be effective.

A fourth subset that sometimes emerges in scientific literature is the self-serving bias connected with a superior than average effect. According to this bias, individuals perceive themselves more capable than they really are and feel that they are better than average (Campbell, 1986; Larwood & Whittaker, 1977). Svenson (1981) for example finds, that nearly all drivers rate themselves as better than average, even after self-inflicted accidents.

Nevertheless, as most research uses the definition that success is attributed internally and failure externally, this is the definition for self-serving bias this work is focused on and as such research into the other definitions is not included in this review.

## **7.5. Self-serving bias in management and CEO narratives**

One of the main economic settings in which the self-serving bias is researched, are communications of managers and CEOs to shareholders, for example in annual reports, president letters or forecasts. The corresponding scientific studies will be reviewed in the following chapters.

### **7.5.1. Self-serving attributions in corporate narratives**

One of the first studies, regarding an attribution of positive results to internal factors and negative results to external factors, in corporate narratives is by Bettman and Weitz (1983). They analyze letters to shareholders, in annual reports of 181 firms located in the United States, regarding their attributions. The authors use data of the years 1972 and 1974. The year 1972 was more favorable than the year 1974, for the firms reviewed in their paper. As such, the results of the firms are on average noticeably worse in 1974 than in 1972. Overall Bettman and Weitz (1983) find an attribution of positive outcomes to internal factors and negative outcomes to external factors in corporations, which is similar to the one in individuals. They propose, that during a bad year there is less incentive for management to engage in self-serving attributions as the shareholders are primarily interested in performance and are aware of the general worse economic situation, thus expect more unfavorable results than in a good year. Whereas in the year 1972 only weak self-serving attributions emerge, the effect is significant for the year 1974. The proportion of positive outcomes attributed internally does not differ between the two examined years, whereas the proportional attribution of negative outcomes to external factors is significantly higher in the year 1974. Thus, the effect appears to be stronger in times when an unfavorable outcome occurs. Their study results do not match their hypothesis, that in an unfavorable year the need for self-serving attributions is less and hence their magnitude is smaller.

Published in the same year as Bettman and Weitz (1983), Staw et al. (1983) search for evidence in letters to shareholders for self-serving attributions as well. Their results regarding the existence of self-serving attributions are similar to the ones of Bettman and Weitz (1983). They find evidence for the attribution of positive events to internal causes and negative events to external factors. As such there is evidence for the enhancement part as well as the protection part of the bias. The authors further discover that the greatest determinant in their research, which influences the existence of attributions, is the development of the stock price of the firm. If the stock price rises, there are more self-enhancing attributions, whereas when the stock price falls the number of self-protecting attributions rises. Furthermore, self-enhancing attributions are connected with insider selling rather than purchasing of stock, which leads to the conclusion that self-enhancement is rather a form of impression management, than a true form of optimism. As the self-serving attributions are still detectable in high, as well as low performing firms and inside single industries, the authors conclude, that they are likely biases and not occurrences due to different environments.

Salancik and Meindl (1984) examine annual stock reports of firms over a period of 18 years, regarding the attribution of negative and positive outcomes. They find in their data, that firms are three times more likely to attribute favorable outcomes to internal events and three times more likely to attribute unfavorable outcomes to external factors as well. The authors further distinguish between firms that are unstable, lacking control over their outcomes and stable firms. They conclude that in contrast to stable firms, unstable firms prefer to attribute positive as well as negative outcomes to internal factors. Their

reasoning is, that blaming external events would imply that managers are lacking control. The authors do not directly discuss self-serving attributions or a self-serving bias. The results nevertheless show, that management is biased in their attribution of favorable and unfavorable outcomes depending on the stability of the firm. Salancik and Meindl (1984) connect their findings with a bias in self-presentation. Their argumentation has similarities with the self-presentation part of the motivational theory to explain the self-serving bias (Shepperd et al., 2008). Further their definition of attributions is analogous to that of a self-serving bias. Their research is thus relevant for this review.

Clapham and Schwenk (1991) analyze letters to shareholders of firms situated in the United States as well, but in a regulated environment (utility companies). Similar to the other studies, the management or CEOs take credit for positive outcomes and blame environmental factors for negative outcomes. Furthermore their data shows no significant difference for protective attributions in unstable vs stable firms, contrary to Salancik and Meindl (1984).

Aerts (1994) investigates annual reports of 50 Belgian companies. His results reveal self-serving attributions in the annual reports, which are consistent with a bias in corporate reasoning patterns<sup>69</sup>. The emergence is especially high for positive internal attributions. Negative external attributions are only slightly emergent. In addition to a bias in attribution, the author also examines an accounting bias. He defines an accounting bias as the usage of accounting specific, very technical terms to describe a situation, the contrast to clear formulations. In his research, this accounting bias emerges when unfavorable outcomes are attributed either internally or externally, especially in stable firms. Aerts (1994) hypothesizes that this bias could influence the described low emergences of negative external attributions and complement the protective part of the self-serving bias.

Building on the research described above, Aerts (2001) finds that the magnitude of attributions remains fairly stable over his research period of 8 years. Especially positive attributions remain on a high level, not influenced by overall changes in performance levels. Aerts (2001) further argues, that the consistency in attributions speak against a purely rational, calculative view of attributions. Aerts (2005) shows, that listed companies use more self-serving attributions than unlisted companies. The author explains this with the heightened public scrutiny that listed companies experience.

Clatworthy and Jones (2003) show the existence of self-serving attributions in annual reports, but this time in companies listed in the United Kingdom and Kimbrough and Wang (2014) show a similar phenomenon in quarterly earning press releases, again for companies in the United States. Cho et al. (2010) examine environmental disclosures of firms situated in the United States. They find that firms tend to report positive factors and attribute good environmental performance to internal efforts as well.

Another study that examines the self-serving bias in annual reports is by Keusch et al. (2012). In contrast to other studies, they explicitly research the influence of an economic crisis situation on the

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<sup>69</sup> The author does not use the term self-serving bias, instead hedonic or egocentric bias. The underlying definitions for these biases are identical and similar psychological research sources are cited.

bias. The authors compare the letters to shareholders of highly capitalized European companies<sup>70</sup> between the year 2006 and 2008. The year 2006 depicts a non-crisis year, whereas 2008 depicts a crisis year. Their results show that during a crisis, the overall magnitude of self-serving attributions is higher. However, the number of general positive statements remains the same during crisis and non-crisis years. As the amount of positive news appears to be independent from the actual performance, this is highly likely a result of a self-serving bias (Keusch et al., 2012). Accordingly, the percentage of self-enhancing attributions in crisis years is higher than in non-crisis years. Thus management is claiming more credit for favorable outcomes in a crisis than in a non-crisis year. Keusch et al. (2012) results further highlight, that negative outcomes are attributed similarly to internal and external factors in a non-crisis year, whereas in a crisis year the attribution to external factors is significantly higher. Consequently, managers use more self-protecting attributions during a crisis situation to dissociate themselves from unfavorable outcomes. Thus the authors conclude, that management is more likely to engage in self-serving behavior during a crisis than during a non-crisis year. Keusch et al. (2012) further conclude, that good firm performance leads to the discussion of internal actions while poor performance leads firms to stress adverse external factors, which is evidence for a self-serving bias.

The study of Bettman and Weitz (1983) was replicated by Tsang (2002), but in the context of companies listed in Singapore. The find analogous self-serving attributions in their study to Bettman and Weitz (1983). Contrary to Bettman and Weitz (1983) the authors find significant attribution patterns in both a good and a bad year.

Hooghiemstra (2008) researches whether managers in firms situated in the United States or in Japan are more likely to engage in self-serving attributions, explaining company results. The author analyzes 50 American and 50 Japanese firms regarding their explanations for favorable and unfavorable outcomes in their letters to shareholders as part of the annual reports. For each firm, the author selects an annual report from a good and a bad year, in the timespan from 1994 to 2000. To categorize if a year was good or bad, Hooghiemstra (2008) uses information on net sales margin and return on assets for each company. If the change from the previous year was positive, the year is categorized as good otherwise as bad. His results show that the overall attribution in letters to shareholders is significantly more positive than negative in US firms, thus highlighting their success. Attributions in Japanese firms are in contrary more even, with only slightly more positive attributions than negative ones. In both countries the positive attributional statements diminish significantly between a good and a bad year. In a good year companies in both countries focus on positive performances. In bad years however, the amount of attributions made to negative events is significantly higher in Japanese than in American firms. Companies in both countries show self-serving attributions to favorable and unfavorable outcomes. The amount of self-enhanc-

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<sup>70</sup> The authors used Standard & Poor's Euro 350 index to select the companies. If a merger had happened between 2006 and 2008, the letter to shareholders was written by the supervisory board or not in plain text form, the company was excluded from the sample.

ing attributions is comparable between firms in both countries, albeit slightly bigger for American companies. In contrast Japanese firms show a higher tendency for self-protection attributions than American firms.

These results are inconsistent with the presented findings of cultural influence on the self-serving bias. Hooghiemstra (2008) argues, that most of the studies showing a difference between the magnitude of self-serving biases in Japanese and American cultures are experimental, thus they might not paint a realistic picture. Furthermore, the author argues, that research has found evidence that Japanese people do use self-enhancing attributions in anonymous settings (q.v. Takata, 2003). Additionally, the competitive pressure international Japanese firms operate in may have a stronger effect on attributions than culture (Hooghiemstra, 2008). Lehmborg and Tangpong (2020) research letters to shareholders as well in Japanese and American firms. Contrary to Hooghiemstra (2008) and matching with psychological research, the authors find that American firms use more self-protective attributions than Japanese firms.

### **7.5.2. Incremental information explanation for attributions**

Another school of thought in economic literature, that tries to explain management attributions to performance results, is the incremental information theory (Merkl-Davies & Brennan, 2007).

The incremental information explanation theory is primarily compared to the impression management theory which includes concealment as well as attribution (Merkl-Davies & Brennan, 2007). In this review only the attribution part is of interest, because if attributions are factual and primarily a strategy to disclose additional explanations in order to level information asymmetries it would weaken the emergence of a self-serving bias (Baginski et al., 2004). Baginski et al. (2000, p. 374) argue, that attribution of negative results to external factors “might be a credible expression that a manager engaged in internal actions to improve earnings conditional on an expected state of nature, but that an unexpected state of nature occurred”. Furthermore, they argue that biased reporting would lead to damaged relations with financial analysts and thus greater capital costs and lower share prices. Accordingly, more frequent external attributions to unfavorable outcomes do not necessarily imply a bias in attributions.

Baginski et al. (2000) conclude in their study, that since attributions are associated with price effects, it is doubtful that attributional behavior in corporate communications is significantly biased. The bias appears to be not large enough to reduce the usefulness of the communications.

In comparison to the other studies presented regarding attributions Baginski et al. (2000) and Baginski et al. (2004) do not examine self-serving attributions. The authors only classify the attributions in internal or external without connecting them to favorable or unfavorable outcomes (Merkl-Davies & Brennan, 2007). In their work Merkl-Davies and Brennan (2007) compare the scientific literature regarding impression management and incremental information. For the attribution part of the comparison Merkl-Davies and Brennan (2007, p. 156) conclude, that evidence seems to suggest that “performance

attributions constitute self-serving bias (i.e. impression management) rather than managerial performance explanations aimed at providing investors with incremental information”.

### **7.5.3. Existence of a self-serving bias in corporate narratives**

As the presented research shows, there is no doubt that self-serving attributions are present in corporate communications, especially in annual reports which make up most of the researched communication channels. Furthermore there are strong indications that these attributions are emerging to a significant part because of a self-serving bias (Aerts, 1994, 2005; Bettman & Weitz, 1983; Keusch et al., 2012; Merkl-Davies & Brennan, 2007; Staw et al., 1983). The studies show that especially self-enhancing attributions remain at a high stable level over the time and are not subject to major fluctuations. The overall magnitude of the self-serving bias increases during crisis years (Bettman & Weitz, 1983; Keusch et al., 2012).

Salancik and Meindl (1984) conclude that unstable firms engage in less self-serving attributions to generate an illusion of control whereas Clapham and Schwenk (1991) and Keusch et al. (2012) find no evidence for this observation. Hooghiemstra's (2008) results also show that psychological moderators may not always be transferable, as they show a significant self-serving bias in the letters to shareholders of Japanese firms. Lehmborg and Tangpong's (2020) results in contrast are more in line with psychological research regarding the magnitude of a self-serving bias in the different cultures. Further cultural differences are indicated by Tsang (2002). As such no uniform conclusion can be drawn regarding cultural differences of the self-serving bias in corporate communications with the currently available research.

### **7.5.4. Theories explaining a self-serving bias in corporate narratives**

In contrast to the existence of a self-serving bias, explanatory approaches for the reasons why this phenomenon emerges, are significantly differing from each other in economic research. This discussion is similar to the discussion in social psychology about the different explanation theories.

Bettman and Weitz (1983) discuss the underlying reason behind the attribution process and conclude, that neither the motivational nor the information processing theory can explain the results of their research on their own. They argue that if the information processing theory is decisive for the existence of a self-serving bias, attributions for negative outcomes will be more to external causes in a bad year than in a good year. They reason that in a bad year there are more plausible causes for external attribution and thus the role of external causes would be judged as greater. If the motivational theory would explain the self-serving bias on the other hand, the need for protective attributions would be less in a bad than in a good year if the outcomes are unfavorable. Corresponding with this argumentation, attributions for favorable outcomes should be more to internal causes in a good year than in a bad year. Their results match these argumentations only for the unfavorable outcome part. Thus “attributions to causes of unfavorable performance appear to be informationally based. On the other hand, the pattern of attributions

to the causes of favorable outcomes appears to support a motivational explanation” (Bettman & Weitz, 1983, p. 180).

The argumentation of Keusch et al. (2012) is similar, as their results show that the amount of positive attributional statements does not change between crisis and non-crisis years, this is indicative for impression management and thus the motivational theory. The results further match the information processing argumentation of Bettman & Weitz (1983) for unfavorable outcomes. But Keusch et al. (2012) also note, that if management has to report an increase in unfavorable outcomes the need for self-protective behavior is possibly rising, which would support the motivational theory. Keusch et al. (2012, p. 644) conclude that their study “provides more support for the prevalence of impression management as opposed to cognitive bias”.

Staw et al. (1983) advocate for impression management (self-presentation) as an explanation for the self-serving bias in corporate communications. Their research results show that the overall performance of a firm has no significant influence on the existence of self-serving attributions. Thus, the authors conclude that egocentric mechanisms (self-enhancement) are not as well suited to explain their findings, as these mechanisms imply a direct effect off corporate performance on the attribution emergence. Clapham and Schwenk (1991) explain their results with the information processing theory. The bias may result from cognitive driven mechanisms as how positive and negative outcomes are recalled. They argue against the impression management hypothesis as their data shows that self-protecting attributions do not have a positive effect on stakeholders and future earnings.

In their replication study of Bettman and Weitz (1983) in an Singaporean context, Tsang (2002) find significant evidence for an information processing explanation for the self-serving bias. In contrast to Bettman and Weitz (1983) who find differing evidence explaining self-enhancing and self-protecting attributions, Tsang's (2002) results favor the information processing explanation in both cases. They explain this difference to Bettman and Weitz (1983) with the different cultures the research has taken place in and the resulting cognitive differences in management, as East Asian cultures show a greater sensitivity to situational influences than Western cultures (Choi et al., 1999; Tsang, 2002).

Aerts (2005) further discusses which theory is best suited to explain the self-serving bias in a corporate communication context. They argue that the differences could be due to the fact, that the bias has been researched decoupled from the content of the attributions. “Attributional statements provide both the content of valued company characteristics and the appropriate cues for interpreting them” (Aerts, 2005, p. 515). Both aspects need to be included to understand how attributions function in the context of impression management. The authors conclude that a motivational explanation is supported by their research. First, they argue that the need for external self-presentation better explains why social factors, such as accountability and publicness, are influencing attributional tendencies. Secondly, they argue that

an incline in self-serving attributions during an overall economic decline is counterintuitive to an information processing model. The authors conclude that the motivational theory is a better explanation for the self-serving bias in corporate communications than the information processing theory.

As the presented information shows, there is no unanimous opinion in economic research which theory is the correct one to explain the emergence of the self-serving bias. If a parallel to socio psychological research is drawn, which has shown similar discussions between the two main theories, it is likely that both theories need to be considered, to be able to explain the self-serving bias. Depending on the situation and the setting each theory can be better suited and both can complement each other. Even the culture the experiment has taken place in can influence the underlying explanation.

#### **7.5.5. Market reactions to self-serving bias in corporate narratives**

In their study of self-serving attributions in annual reports, Staw et al. (1983) find a connection between self-enhancing attributions and stock market reactions. The more self-enhancing attributions are present, the more positive is the change in subsequent stock prices. This observation is similar for good and bad performing companies. The effect of self-protecting, defensive attributions is reversed. The more self-protecting attributions are made the greater is the decline in a company's stock price.

Schwenk (1990) uses two experiments to examine the effects of self-serving attributions on confidence in management connected with money allocations. One experiment uses students which assume a management role, with the task to allocate monetary resources to an autonomous operating division of the fictional company. The students receive financial information of the division for the past three years. Additionally, they receive statements regarding the financial results of the current year in which earnings have substantially increased. One part of the students receives a simple description of the financial results and the actions undertaken. The other part receives statements which contain self-serving attributions by the division's management regarding the performance. Students which receive the self-serving statement allocate significantly less money to the division than students which receive the simple description. The second experiment is constructed similarly, with the difference that for one part of the students the current performance of the division is good and for the other part the performance of the division is bad. Each group is again split, with one half receiving objective statements regarding the performance and the other half statements including self-serving attributions of the division management. The results show that in both cases the students allocate less resources to the management which uses self-serving attributions. Furthermore, the percentage of students that perceive the management as competent and that agree with the statement that the management actions will improve future performance, is significantly less for the part that received statements containing self-serving attributions. Thus Schwenk (1990, p. 345) argues that self-serving attributions "reduce recipients financial commitments and confidence in management".

Clapham and Schwenk (1991) research self-serving attribution patterns in the annual reports of utility companies in the United States, a highly regulated industry. Their results show a negative relationship between self-protective attributions and subsequent stock prices. Contrary to Staw et al. (1983), Clapham and Schwenk (1991) find also a negative relation between self-enhancing attributions and future stock price. Thus, the authors argue that at least in regulated industries managers that are less subjective to a self-serving bias are more effective at securing investments. They further propose that less biased attribution may produce better decision making, as the management may be able to learn more from past experiences and better evaluate the environmental conditions the firm is exposed to. As such future results of companies that show less self-serving bias, are likely better than the results of companies with a more biased management (Clapham & Schwenk, 1991).

Lee et al. (2004) analyze annual reports and compare them with stock prices of the corresponding firms. They find that corporations that made more external and uncontrollable attributions for unfavorable outcomes have lower future stock prices than firms that ascribed unfavorable outcomes to internal and controllable factors. They argue that shareholders expect firms to be in control, whereas external attributions for negative outcomes suggest otherwise, which leads to a worse impression of the corporation. This argumentation is similar to the one of Salancik and Meindl (1984) who suggest that unstable firms use less self-protective attributions, to show that they are in control of the situation. Contrary to the negative influence of self-protective attributions, Lee et al. (2004) find no impact of self-enhancing attributions on the stock price of firms.

Barton and Mercer (2005) research the response of analysts to self-serving attributions in statements. For the experiment, the authors recruit financial analysts which receive financial statements about a fictional company. The attributions made in the statements are either plausible, implausible or a control group without attributions to the performance. The results show that managers' self-protective attributions influence the analysts forecast. If the analysts perceive the attribution to external factors as plausible, they provide higher earnings forecasts than without an attribution. If the attribution is perceived as implausible on the other hand, the issued earning forecast is more pessimistic than without an attribution. Furthermore, the authors conclude that protective attributions have also an influence on the management reputation, which affects the company's costs of capital. Plausible self-protective attributions have no effect on the reputation, while implausible attributions have a negative effect on the reputation.

A study that investigates the reactions of investors to self-serving attributions in quarterly earnings press releases has been carried out by Kimbrough and Wang (2014). The authors find that self-enhancing attributions are connected with higher stock market prices, when more of the firm's industry peers show poor performance. The response to self-protective attributions is reversed, when more of the firm's industry peers also show poor performance, the negative stock market response is less severe (Kimbrough & Wang, 2014).

Chen et al. (2016) use again an experimental fictional setting to investigate the influence of self-serving attributions on investor earnings estimates. The students are this time recruited from a university located in Hong Kong. They receive background and financial information, as well as management statements of the fictional firm. Chen et al. (2016) indicate, that if the management statements contain unfavorable news and the news are attributed externally, the earnings estimates are lower than if the news were attributed internally. In contrary if positive management news is attributed internally or externally does not influence the earnings estimates. The authors show as well, that if attributions made by the management are perceived as controllable the earnings estimates are significantly higher than if they are perceived as uncontrollable. Chen et al. (2016) hypothesize that the difference between internal and external attributions to negative news might be because investors perceive that management is more in control when internal attributions are made. As such the authors conclude that external attribution to negative news might be counter-productive for the management.

Lehmberg and Tangpong (2020) perform an analysis of letters to shareholders contained in annual reports of American and Japanese firms. Their results show that in both countries self-protective attributions are negatively related to infirm performance improvements, but not significantly related to performance measures which compare to other firms. Internal attributions to unfavorable outcomes are on the other hand not related to performance decreases or improvements. Self-enhancing attributions are related to inner firm performance improvements as well as compared to other companies.

The market reactions and performance estimates by analysts and investors to self-serving bias appear to be heavily setting dependent. Self-enhancing attributions have a positive effect on the market and firm performance in Staw et al. (1983) and Lehmberg and Tangpong (2020) as well as Kimbrough and Wang (2014) when comparable firms show worse results. Lee et al. (2004) and Chen et al. (2016) find on the other hand no influence on the stock price or earnings estimates. Negative influences are shown in Barton and Mercer (2005) when the attributions are deemed as implausible. Schwenk (1990) and Clapham and Schwenk (1991) find a general negative influence of self-enhancing attributions. As such the environmental conditions, the self-enhancing attributions are made in, appear to have a strong influence on the reactions. If the attributions are deemed as implausible and much information about the general situation of the firm is available, for example in heavily regulated industries, the effect is negative. On the other hand, if no contradictory information is readily available, the attributions appear to have no or even a positive effect on the market or investor response. The picture for self-protective attributions is more uniform. Most studies find a primarily negative effect of self-protective attributions on the market price or earnings forecasts (Clapham & Schwenk, 1991; Lee et al., 2004; Schwenk, 1990; Staw et al., 1983). The perceived plausibility (Barton & Mercer, 2005) and the relative market conditions (Kimbrough & Wang, 2014) seem to influence the effect as well. The primary explanation for the negative market or analyst reactions is that due to the external attributions of unfavorable outcomes, the management is perceived to be in less control of the situation. Furthermore Ridge and Ingram (2017) research modesty in the top management. They propose that deviating from the normally expected use

of self-serving attributions can be perceived as modesty. The authors further link modesty in managers with positive investor reactions and firm performance. As such, depending on the situation, self-serving attributions in corporate communications can be counterproductive, as the market and investors appear to recognize them in most cases and react accordingly.

## **7.6. Influence of self-serving bias on managers**

As examined, there is significant evidence that managers engage in a self-serving bias in corporate communications. Derived from this result the question arises, if the bias influences other management actions as well.

### **7.6.1. General influence of self-serving bias on managers**

Gooding and Kinicki (1995) find, in their general review of managerial interpretations of event causes, that managers are generally attributing positive events to internal and negative events to external causes. Gooding and Kinicki (1995, p. 15) note, that it “appears that top-level managers exhibit the same attributional biases as other individuals and those biases influence their perceptions of event causes across a wide range of organizational and environmental events”. The results of Wagner III and Goodings (1997) experiment are similar to Gooding and Kinicki (1995). They find strong evidence for a self-serving bias in management, as positive performance of the own company is attributed to organizational strengths or other internal factors, whereas poor performance is attributed to external factors for example environmental threats. In their research Wagner III and Gooding (1997) also find actor-observer attributional<sup>71</sup> patterns in managers, where good performance of other companies is attributed to external factors and poor performance to internal ones. Levy (1993) shows in an experiment, that self-serving bias is likely to emerge in self-appraisals regarding a managerial selection test as well. The extend of self-attributions is dependent on the self-esteem and focus of control of the participants. As such not only the attribution of performance feedback, but also the self-evaluation appears to be self-servingly biased.

In Lee and Robinson's (2000) study, recruited managers role play and explain a fictional negative event to their superior and an subordinate. Their results show that the managers made more internal than external attributions for the unfavorable outcome. The internal attributions were specifically to factors that are in their control, such as effort or behavior and not to factors such as ability or character. The authors argue that within realistic organizational relationships the managers might have multiple motivations. On the one hand they are motivated to deflect blame and enhance self-esteem, on the other hand

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<sup>71</sup> Actor-observer attributions are a reversal of self-serving attributions due to the viewpoint change from actor to observer. Whereas the actor attributes causes to its own performance, the observer attributes the causes to the actors performance, i.e. someone else's performance. The normal self-serving pattern reverses and good performance is attributed to external factors to the actor by the observer and poor performance to internal ones (Wagner III & Gooding, 1997).

they are motivated to appear in control. The manager's internal attributions are overwhelmingly controllable. If uncontrollable attributions are made, they are external and not internal. The authors argue, that this supports the motivation to appear in control, as uncontrollable internal attributions would not have the same connotation and effect. Lee and Robinson (2000) further argue that managers might change motivation based on private or public attributions. Furthermore, their negative event, which is a salary freeze due to poor commercial performance, entails a high level of uncertainty. This might trigger the motivation to appear in control to a greater degree than self-enhancements. On the other hand if a competitor is ranked higher in the industry, the need to enhance the self-esteem might be bigger (Lee & Robinson, 2000). Lee and Tiedens (2001) examine the effect of social status on the self-serving bias in three experimental settings with managers and undergraduates. They conclude that "self-serving biases are especially disserving when made by organizational members who occupy high-status roles" (Lee & Tiedens, 2001, p. 277). The authors further propose that the relationship, the attributions are made in, is likely to have an influence on the alignment. If it is a close relationship or the relationship is expected to last, self-serving attributions are likely to be less, as interpersonal motivations prevail over self-esteem motivations. In contrary if the relationship is distant or only expected to be short lived, self-esteem motivations are likely to prevail.

Lange et al. (2015) examine the factors influencing the identification of a CEO with its firm. They find evidence that a self-serving bias, especially a self-enhancing attribution, increases the identification of a CEO with its firm. They argue that CEOs will overattribute positive outcomes and press to themselves, which increases the tendency of the CEO to perceive connections between the company and oneself. On the other hand, negative outcomes are attributed externally, where no connection between oneself and the company is perceived.

Elfenbein et al. (2017) and Elfenbein and Knott (2015) show that self-serving bias, as part of biases that generate asymmetric updating, can influence the exit delay in equity stakes shown by managers and entrepreneurs. The influence of self-serving bias is not examined exclusively, rather only in a bundle with other biases that can generate asymmetric updating. The authors argue that self-serving bias can influence the decision updating accuracy, as new information's are processed biasedly. Hence managers place more weight on positive signals than on negative signals when investigating future profitability, which likely leads to prolonged exit delays.

Haleblian and Rajagopalan (2006) propose a model of CEO dismissal dependent on the board influence. One of their factors influencing the CEO dismissal are self-serving attributions connected with the boards influence. According to the self-serving bias, if firm performance is low, unfavorable performance is more likely attributed to external factors than to internal factors by the CEO, even if this is inaccurate. Hence a performance decline does not threaten the self-concept of the CEO. Haleblian and Rajagopalan (2006) apply this concept on the board. If it is CEO-dominated, the board is likely engaging in self-serving attributions about the firm's performance and those managing it. Hence the authors pro-

pose that it is rather unlikely that CEOs are dismissed as unfavorable performance is attributed externally when the board is CEO-dominated. On the other hand, if the board is outsider-dominated, they propose that a reversed effect could emerge. Unfavorable performance is attributed to the CEO even if external factors are the real cause. In such a setting the likelihood of CEO dismissal is elevated. However in both cases if the retention of the CEO is inappropriate or the dismissal is inappropriate, the boards decisions are likely influencing the subsequent firm performance negatively (Haleblian & Rajagopalan, 2006).

The reviewed studies show that self-serving bias is similarly spread in managers as in the general population. Furthermore studies show that the specific setting and the status of the manager, using self-serving attributions, can have a significant influence on how attributions are perceived by the recipients (Lee & Robinson, 2000; Lee & Tiedens, 2001). To be able to selectively differentiate in which settings the self-serving bias is advantageous or disadvantageous for managers, further research is needed especially under real world settings.

### **7.6.2. Influence of self-serving bias on leader-subordinate relations**

Dobbins and Russell (1986) investigate the influence of the self-serving bias in the attribution of group performance in a leader-subordinate setting. They use a simulated manufacturing task with randomly assigned roles to investigate the influence of the bias. The authors find that if the performance is low, leaders attribute the poor performance to factors internal to subordinates and subordinates attribute the poor performance to factors internal to leaders. Additionally, the results show that leaders see supervisory actions such as training and punishment as more appropriate than subordinates. Contrary to poor performance, there is no difference in attribution for good performance measurable in Dobbins and Russell's (1986) results. The authors explain this result with a multiple sufficient causal schema in subordinates and leaders. Both groups believe that high group performance can only be achieved if leaders and subordinates adequately perform their task, whereas poor performance can be produced by inadequate performance of either group. Martinko and Gardner (1987) note as well, in their review of leader-subordinate relations, that subordinates display attribution patterns that are consistent with a self-serving bias. In contrast leaders are more likely to attribute poor subordinate performance to internal factors, but attribute good performance less to internal factors of the subordinates than the subordinates themselves. This is, depending on the involvement of the leader, evidence for an actor-observer attribution pattern or self-serving attributions by the leader (Martinko et al., 2007). Consequently, the emergence of inaccurate attributions due to a self-serving bias may negatively influence the leader-subordinate relationship.

Qin et al. (2019, p. 1) note “extant research has uniformly demonstrated that leader humility is beneficial for subordinates, teams, and even organizations”. In contrast to this statement the authors propose that the profitability of leader humility is dependent of the degree of self-serving bias shown in subordinates. Qin et al. (2019) argue that in case of subordinates which engage in high levels of self-serving

bias, the reason for leadership humbleness is misinterpreted. As such subordinates with a high self-serving bias think that “leaders treat them humbly because they are unique and deserve such treatment” (Qin et al., 2019, p. 2). This can lead to higher levels of psychological entitlements in subordinates. Qin et al. (2019) use a field study and an experiment to investigate their hypothesis. They conclude that leader humility leads indeed to higher psychological entitlements in subordinates if their level of self-serving attributions is high, which increases workplace deviance. In contrast if the level of self-serving attributions is low in subordinates, leader humility leads to more leader-member exchange and less workplace deviance.

In their research regarding performance evaluation of leaders, Goerke et al. (2004) find that leaders reference external factors when they think about how past performance could have been improved, whereas if they think how future performance could be improved, they reference in internal factors. This pattern is only observable for weak performance. Goerke et al. (2004) conclude that this phenomenon is most likely due to self-serving bias in leaders. If leaders would acknowledge internal possibilities to enhance past performance, their self-esteem should be threatened. As such their thoughts focus on what employees could have done to improve their performance, which are external factors to them. Improvement of future performance on the other hand does not threaten manager’s self-esteem. In contrast, internal attributions to future performance improvements can enhance the self-esteem, as leaders feel that they are the ones that make improvements in the future possible. Goerke et al. (2004) et al further comment that if leaders deny responsibility for poor performance in the past, as shown in their results, this might lead to inappropriate guidance behavior towards subordinates.

The results of the reviewed studies highlight that self-serving bias is likely to emerge in a leader subordinate relationship, but the induced effects are primarily negative. As such self-serving attributions by managers can result in unmotivated or unsatisfied workers, which show less effort. But on the other hand leader humbleness can also be misinterpreted by workers that engage themselves heavily in self-serving bias (Qin et al., 2019).

### **7.6.3. Overconfidence in managers caused by self-serving bias**

Multiple studies argue that self-serving attributions can influence the level of overconfidence managers show (Hilary & Hsu, 2011; Kim, 2013; Libby & Rennekamp, 2012; Malmendier & Tate, 2005, 2008). Malmendier and Tate (2005) build on the information processing theory as well as on the better than average definition and argue that because individuals expect success, they attribute favorable outcomes internally and unfavorable outcomes externally, which lets managers to tend to overestimate their skills and think their acumen is better than that of their peers. Malmendier and Tate (2008, p. 22) define overconfidence as the “overestimation of outcomes related to own abilities”. Hilary and Hsu (2011) as well as Libby and Rennekamp (2012) split overconfidence into two parts, static and dynamic overconfidence. Static overconfidence is a stable personal trait (Libby & Rennekamp, 2012). Dynamic overconfidence on the other hand is triggered by self-serving attributions. As favorable outcomes are attributed

to internal characteristics and unfavorable outcomes to external factor, the beliefs about own skills are adjusted upwards. Dynamic overconfidence increases following past success but is not or only slightly reduced following failure (Libby & Rennekamp, 2012). Managers who have been successful in the past, accordingly attribute to much of their success to superior skill and too little to lucky coincidences (Hilary & Hsu, 2011).

#### **7.6.4. Influence of self-serving bias connected with overconfidence**

Malmendier and Tate (2005) investigate the influence of management overconfidence on corporate investment. They argue that overconfident managers “overestimate the returns to their investment projects and view external funds as unduly costly” (Malmendier & Tate, 2005, p. 2661). As such they tend to overinvest if an abundance of internal funds is available but reduce investment when external financing is required. The authors do investigate the influence of overconfidence on management investments and not specifically of self-serving attributions. However, they define the key aspects of overconfidence for their results as “overestimation of skill and self-attribution by the CEO” (Malmendier & Tate, 2005, p. 2671). Confirming their proposed hypothesis, the authors find a strong positive relation between the sensitivity of investment to cash flow and managerial overconfidence, with an even stronger influence for firms that are equity dependent.

Koo and Yang (2018) investigate the influence of self-serving bias on corporate investment as well, this time in Korean firms. They find that overconfidence in managers makes investment-cash flow sensitivity stickier. Using prior favorable outcomes as an indicator for self-serving bias, Koo and Yang (2018) find that self-serving bias in overconfident managers makes the investment-cash flow sensitivity even stickier. The authors conclude that managerial overconfidence and self-serving bias are likely to increase aggressive investment commitments, which matches with the results of Malmendier and Tate (2005).

Overconfidence partly influenced by the self-serving bias in managers is again examined by Gervais et al. (2011). They find that “the manager’s overconfidence implicitly commits him to follow an optimal risky investment policy with a flatter compensation schedule” (Gervais et al., 2011, p. 1761) and that his overconfidence “commits him to exert effort to gather information that improves the success rate and value of the firm’s investment policy” (Gervais et al., 2011, p. 1761). As such overconfidence in managers can be advantageous for the firm, himself or both as well (Gervais et al., 2011).

Kim (2013) also find in their analysis of CEO interviews on CNBC<sup>72</sup> that overconfidence influenced by the self-serving bias in CEOs leads to a greater likelihood of CEO dismissal. Galasso and Simcoe (2011) adopt the theory that overconfidence is influenced by self-serving attributions as well. They research the influence of overconfidence in CEOs on the innovation in firms. They find in their examination, of publicly traded firms in the United States, a significant positive relation between citation-

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<sup>72</sup> CNBC is a business news television channel which covers U.S. and international financial markets.

weighted patent count and overconfident CEOs. This relation is especially emergent in competitive industries. As such it is more likely that overconfident CEOs “initiate a significant change in their firm’s innovation strategy” (Galasso & Simcoe, 2011, p. 1484).

Adam et al. (2015) research the influence of overconfidence and self-serving bias on managerial risk management. Their hypothesis follows the described connection between overconfidence and self-serving attribution, this time in the context of hedging. The authors propose that managers are overconfident in their ability to predict future market movements and believe they have a relative information advantage which results in excessive use of derivatives positions. Adam et al. (2015) examine a dataset of corporate derivatives positions and find a positive relation between an increase in speculations and past speculation gains. Contrary speculative losses in the past do not decrease the amount of following speculation. The authors conclude that their results support the hypothesis that past speculative gains increase overconfidence through self-serving attributions, which again increases derivative speculations. As such their results provide evidence that corporate risk management practices are likely affected by managerial biases as well.

#### **7.6.5. Influence of self-serving bias on management forecasts**

Hilary and Hsu (2011) research if accurate forecasts in the past lead managers to become overconfident and if this overconfidence influences the accuracy of following forecasts and managerial credibility. They follow the presented hypothesis that overconfidence is being increased by self-serving attributions following success. They further hypothesize that increased “overconfidence in one’s personal abilities results in suboptimal behavior, whereby managers place too great a weight on their own private information and too little on public signals” (Hilary & Hsu, 2011, p. 303). Subsequent forecasts are thus more likely to deviate from optimal unbiased predictions. The authors use quarterly predictions of managers between the years 1994 and 2007 to examine their hypothesis. Their results show that managers that have issued a series of accurate predictions are subsequently issuing significantly less accurate forecasts, which supports the dynamic overconfidence hypothesis, triggered by a self-serving bias. Hilary and Hsu (2011) results also show that overconfident managers are likely overemphasizing their private information as their forecasts are varying significantly from the consensus forecast. Additionally, dynamically overconfident managers issue forecasts with more precise information. Furthermore analysts and investors appear to recognize that forecasts issued by managers, that had successful predictions in the past, are likely less accurate and ascribe them less value (Hilary & Hsu, 2011).

Libby and Rennekamp (2012) research the influence of overconfidence combined with a self-serving bias on management forecast as well. In contrast to Hilary and Hsu (2011) they research if overconfidence plays a role in the decision of a manager to issue a forecast. To examine this question, they use an experimental test in which participants are asked trivia questions with one of two levels of difficulty. They are later asked to evaluate their results and if they expect to improve their performance in the second round. The results of Libby and Rennekamp (2012) show that successful outcomes in the first

round increase self-serving attributions, which result in greater overconfidence and subsequently more confidence about improving in the future. As such the overconfident participants are more likely to commit to an improvement in the second round of the experiment. As managers tend to issue forecasts when they expect improved performance, Libby and Rennekamp (2012) connect this commitment to improvement with the higher probability of a forecast issuance. As such the authors conclude that self-serving bias as well as static overconfidence are increasing the willingness of managers to issue forecasts<sup>73</sup>.

Hribar and Yang (2016) also investigate the influence of overconfidence on management forecast issuance. They use option-exercise behavior and press characterizations of CEOs to evaluate the managerial overconfidence. In contrast to Libby and Rennekamp (2012) the authors do not differentiate between overconfidence as a stable individual trait and dynamic overconfidence due to a self-serving bias. Nevertheless they build their research on the results and conclusions of Libby and Rennekamp (2012). Hribar and Yang's (2016) results show as well, that overconfidence triggers stronger optimism about future performance and as such leads overconfident managers to issue voluntary forecasts. Furthermore, overconfident CEOs are more likely to miss their own predicted results and they issue more precise forecasts, which matches with the results of Hilary and Hsu (2011).

Chen et al. (2015) research the influence of overconfidence in managers on the responsiveness to corrective feedback, in the context of forecasts. In contrary to Hilary and Hsu (2011) and Libby and Rennekamp (2012) they hypothesize a different connection between self-serving attributions and overconfidence. They assume that overconfidence triggers more self-serving attributions and not that self-serving attributions lead to dynamic overconfidence. They theorize that overconfidence will significantly increase the ego involvement of a CEO or manager, which increases the perceived importance of a task. This leads to a higher emergence of self-serving attributions. Chen et al. (2015) second assumption is, that when managers face evidence that their forecast were wrong dissonance arises. The authors argue that “blaming an incorrect prediction on unforeseeable external factors, is a successful way to reduce dissonance” (Chen et al., 2015, p. 1518). As such the self-serving bias should be stronger in overconfident managers (Chen et al., 2015). They further argue that self-serving bias especially the attribution of failures to external, unforeseeable events inhibits forecast accuracy improvements. Examining their results Chen et al. (2015) find, that overconfident CEOs are indeed more resistant to feedback. The authors further evaluate the influence of ambiguity of the received feedback on the forecast accuracy improvements. They find that ambiguity influences the magnitude of the self-serving bias. Forecast accuracy improvements were less when the ambiguity of the received corrective feedback was high, which matches their proposed theory.

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<sup>73</sup> Libby and Rennekamp (2012) also use a survey of financial managers, which confirms their experimental findings in a real-world setting. However they issued an expression of concern as the underlying survey data could not be verified (Libby & Rennekamp, 2015). Additionally the authors replicate their survey with an independent group of financial executives, which again confirms their experimental findings (Libby & Rennekamp, 2016)). As this replication is not published in a peer-reviewed journal it is not included in this review.

The results of the presented studies clearly indicate a relation between self-serving bias, overconfidence and a rise in the level of issued management forecasts as well as a decline in the level accuracy. Previous accurate forecasts appear to influence the level of issued forecasts independently from the actual reasons that made the forecasts accurate.

#### **7.6.6. Influence of self-serving bias on mergers and acquisitions**

Another topic in which the influence of self-serving attributions has been researched is mergers and acquisitions (M&A).

Vaara (2002) research the language used in narratives regarding success and failure of post-merger-integrations in Finnish-Swedish mergers. Although not researching a self-serving bias directly, they find evidence that managers use attributions to reframe success and failure. Managers “frequently emphasized their own responsibility in success accounts and the role of others in failure” (Vaara, 2002, p. 238). They show as well a tendency in managers to attribute failure in post-merger integrations to cultural differences. Vaara et al. (2014) examine the use of attributions for explanations of M&A performance in Finnish firms. They specially research, if positive performance is attributed internally and negative performance to cultural differences, thus taking into account the results from Vaara (2002). Vaara et al. (2014) find that managers are likely to blame cultural differences for failure. Their results further show that this tendency magnifies with prior experience in M&A. Hence it appears, that managers learn to attribute unfavorable performance in M&A to cultural differences with their rising experience and become increasingly skilled in it. In contrary their results show a positive curvilinear relationship between attribution of managers actions and M&A performance. Managers attribute especially very positive and very poor performance to their actions. The authors argue that the attribution of positive performance to management actions is likely creating overconfidence which could lead to overly risky deals. Vaara et al. (2014) propose that the internal attribution of extremely poor performance is likely due to the need to project a sense of control to themselves and to others. Correspondingly the authors conclude that self-serving attributions need a nuanced understanding and are setting dependent.

Malmendier and Tate (2008) investigate the influence of overconfidence in CEOs on their acquisitions and the reaction of the market. In their research they use a sample of U.S. firms. They connect overconfidence with self-serving attributions as they propose that the overestimation of one’s own skills due to self-serving attributions leads to overconfidence. Malmendier and Tate (2008) use press coverage and private investment decisions to measure overconfidence in the CEOs. Their results show that overconfident CEOs are more likely to make acquisitions especially if it is possible to finance the acquisition internally and the merger is diversifying. As the market reaction to acquisitions of overconfident CEOs is especially negative, the authors conclude that overconfident CEOs “destroy value for their shareholders through acquisitions” (Malmendier & Tate, 2008, p. 42). Furthermore, incentive contracts are unlikely to mitigate CEO overconfidence as these CEOs believe they are maximizing the value. However the results also show, that financial constraints do have an influence on the acquisitions of overconfident

managers and as such might be an adequate tool to counter CEO overconfidence (Malmendier & Tate, 2008).

A further study that researches the influence of overconfidence triggered by a self-serving bias on M&As is from Billett and Qian (2008). In their research the authors concentrate on public acquisitions of firms based in the United States. They hypothesize that when a CEO starts doing acquisitions, he is not overconfident. However successful acquisitions will lead to overconfidence as ex-post success is mistakenly credited to the CEOs own abilities, due to self-serving bias. This overconfidence in turn will lead to more acquisitions. They further agree that due to overconfidence, the CEO will likely view the value of a deal as too optimistic and exceed the true value. Hence the CEO will overpay which will destroy value for the acquiring firm. Billett and Qian (2008) find in their research that high-order<sup>74</sup> deals of frequent acquirers show a more negative announcement effect than deals of normal acquirers. Additionally, previous success leads to an increase in acquisitions even if it is value destructive. The results also show that CEOs purchase more stock preceding high-order deals than first deals, which confirms the higher confidence of the CEOs due to self-serving attributions (Billett & Qian, 2008). The market appears to anticipate future acquisitions based on the CEOs history as well and “impounds such anticipation into stock prices” (Billett & Qian, 2008, p. 1037). As such the authors conclude, that the self-serving bias has a strong influence on the decision of the CEO if an acquisition should be made.

Doukas and Petmezas (2007) investigate a similar influence of overconfidence and self-serving bias on acquisitions as Billett and Qian (2008). In contrast, their study is based on private acquisitions of companies based in the United Kingdom. They argue as well, that due to initial successful acquisitions, managers become overconfident as they tend to excessively credit their own abilities. This overconfidence leads to an increase in acquisitions. Doukas and Petmezas (2007) find that overconfident bidders create positive announcement returns but the returns are significantly lower than in single bidders. The authors also find poor long-term performance in frequent acquirers. As well as that overconfident managers, who use excessive acquisitions, fail to generate greater shareholder value than rational managers, as high order acquisitions have as significantly lower wealth effect than lower order acquisitions. This lower return in high-order acquisitions suggests that successful first deals promote overconfidence in managers, which in turn is motivated by self-serving attributions. The authors explain the lower performance of multiple acquirers with the problematic integration of multiple acquisitions in a short time frame, as synergy effects cannot be realized. Furthermore, the market appears to anticipate the disruptive effect of mergers and adapts the firm value accordingly. Additionally, overconfident managers appear to be too optimistic about future prospects of mergers and thus overpay.

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<sup>74</sup> Billett and Qian (2008) define high-order deals as those deals, that are in the acquisitions order of a CEO higher than two. The deals following the first two deals would be high-order deals.

In his analysis of CEO interviews on CNBC, Kim (2013) finds only a negative relation between stock market response and acquisition announcements in extremely overconfident CEOs. As such investors appear to welcome acquisition announcements in moderate overconfident CEOs. He explains this finding with the prediction of Campbell et al. (2011) that overconfidence, in this case due to self-serving bias is preferable in CEOs as they are more willing to take the necessary risks than rational CEOs. Kim (2013) also shows that overconfident CEOs prefer to finance acquisitions internally which corresponds with the findings of Malmendier and Tate (2008).

As the review of studies regarding the influence of self-serving bias in M&As shows, dynamic overconfidence, triggered by self-serving attributions, highly likely increases the amount of acquisitions. The market response to acquisition announcements by overconfident CEOs are not uniform in the presented studies Malmendier and Tate (2008) and Billett and Qian (2008) find negative responses whereas Kim (2013) finds only negative responses for highly overconfident CEOs and Doukas and Petmezas (2007) find slightly positive responses. Furthermore Malmendier and Tate (2008), Billett and Qian (2008) as well as Doukas and Petmezas (2007) find that frequent acquisitions of overconfident CEOs can have a negative effect on future firm performance.

## **7.7. Self-serving bias in a financial market setting**

The following chapter reviews the literature connecting investors, traders and financial market participants in general with the self-serving bias.

### **7.7.1. Theoretical models connecting investors and traders with overconfidence engendered by a self-serving bias**

The influence of self-serving bias on investors and their trading activity is again connected with overconfidence. Daniel et al. (1998) propose a theoretical model, in which they connect overconfidence and self-serving bias with investment actions. They argue that overconfidence is more pronounced for diffuse tasks, where feedback is delayed and noisy. As such forecasting long term cash flows should relate to overconfidence. Daniel et al. (1998, p. 1844) assume that “investors view themselves as more able to value securities than they actually are, so that they underestimate their forecast error variance”. Consequently, investors overestimate their own abilities and skills. As overconfidence appears to grow with experience, the authors argue that when public information agrees with the investor’s own information, the confidence of the investor grows due to self-serving attributions. If public information disagrees with his private information the confidence on the other hand does not fall commensurately, as due to self-serving attributions external factors are blamed. In the model of Daniel et al. (1998) self-serving bias is thus the reason for confidence changes in investors. Following this reasoning the authors define an overconfident investor as one “who overestimates the precision of his private information signal, but not of information signals publicly received by all” (Daniel et al., 1998, p. 1841). Daniel et

al. (1998) show in their theoretical model that the inclusion of a self-serving bias adds short-term momentum<sup>75</sup> and short-term earnings drift<sup>76</sup>. Furthermore, the correlation between future returns and long term past stock market and accounting performance can be negative, as well as positive, with a self-serving bias included into the model.

Gervais and Odean (2001) look as well into overconfidence in investors and traders but concentrate specifically on the connection between overconfidence and self-serving bias in traders. They assume in their model that a trader initially does not know his abilities. As his career progresses, the trader assesses his abilities from success and failure. Due to self-serving attributions made, the trader overestimates the degree to which he is responsible for success and vice versa for failure. As he takes too much credit for his success, he becomes overconfident. The authors thus expect that the level of overconfidence increases in the trader's early stage of his career. They further argue that the longer his career lasts the more feedback he receives due to success and failure. As feedback in financial markets is often ambiguous and disconnected from a decision's overconfidence, his success rate is likely to reflect his true abilities to a higher degree in later stages than in the early stages of his career. Hence with experience the overconfidence will diminish depending on the level of self-serving bias shown by the trader. Gervais and Odean's (2001) model further predicts that overconfident traders will trade a higher volume which is correlated with lower profits.

### **7.7.2. Empirical and further evidence for a self-serving bias connected with overconfidence in a financial market setting**

In the following part studies that further research the connection between self-serving bias, overconfidence and financial markets will be reviewed, as the models of Daniel et al. (1998) and Gervais and Odean (2001) are solely theoretical.

#### **7.7.2.1. Self-serving bias and overconfidence in investors**

Barber and Odean (2002) analyze a multitude of investors that switched from phone based to online based trading. Prior to the change the investors outperformed the market by more than two percent, whereas after the change to online trading the investors underperform by more than three percent. The authors explain their finding with several behavioral biases. Due to the strong prior performance to going online, investors become overconfident as they take too much credit for success due to a self-serving bias. The overconfidence then leads the investors to change from phone based to online based trading and when online, an illusion of control and illusion of knowledge further increase the overconfidence. The overconfidence leads to more trading which in turn leads to subpar performance (Barber & Odean, 2002).

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<sup>75</sup> Short-term momentum is the "positive short-term autocorrelation of stock returns, for individual stocks and the market as a whole" (Daniel et al., 1998, p. 1839).

<sup>76</sup> Drift is the abnormal average return performance of stocks following the arrival of public news (Daniel et al., 1998).

Chuang and Lee (2006) use a sample of firms listed on the New York Stock Exchange (NYSE) and former American Stock Exchange (AMEX) in the timespan from 1963 to 2001, to investigate overconfidence in investors. They find that investors trade more actively following successful forecasts of future stock returns than following unsuccessful forecasts. Chuang and Lee (2006) thus conclude that their findings empirically support the presence of investors self-serving bias, in the fact that they become overconfident. As investors become overconfident, they trade more actively following market gains due to correct forecasts of future stock returns.

Specifically the emergence of self-serving bias in investors is analyzed by Hoffmann and Post (2014). They use Dutch survey data and brokerage records to empirically test the existence of the bias among individual investors, which leads to overconfidence. Their results show “that the higher previous period’s returns are, the more investors agree with a statement claiming that their recent performance accurately reflects their investment skills. Moreover, while individual returns relate to such agreement, market returns do not have an impact on investors’ agreement with this statement” (Hoffmann & Post, 2014, p. 27). Hence the authors conclude, that they have found empirical evidence for the presence of self-serving bias in individual investors which confirm the hypotheses made in the models of Daniel et al. (1998) and Gervais and Odean (2001). Building on their results they advise, that overcoming self-serving bias is important as the bias may prevent individual investors to learn from their mistakes.

Kaustia and Knüpfer (2012) investigate how peer performance affects stock market entry in Finnish investors. They find that the entry likelihood into the market does not decrease, if returns fall below zero, which is consistent with the motion that people do not talk about decisions that have produced inferior outcomes. Kaustia and Knüpfer (2012) conclude that due to a self-serving bias people recall and interpret factors that lead to success or failure differently. As such investors are more likely to discuss their profitable investments but not their unprofitable. And other investors fail to adjust for this bias and thus overestimate the value of active investment strategies.

The characteristics of Japanese online investors is analyzed by Uchida (2006). In contrast to Barber and Odean (2002) he does not find a connection between investors that are more satisfied with their past performance and online trading. As such he concludes that his evidence does not support a self-serving bias in Japanese online traders. Uchida's (2006) results are consistent with the influence of different cultural settings on the self-serving bias as well as the proposed momentum differences due to cultures in Daniel et al. (1998).

#### **7.7.2.2. Self-serving bias and overconfidence in traders**

Chang et al. (2016) find in their study that U.S. stock traders learn substantially less when the results are negative than when they are positive. The authors attribute this to a self-serving bias, “when the results are congruent with the idea that the purchase decision was a good one, individuals update their beliefs, while dissonant information is disregarded or downgraded in importance” (Chang et al., 2016, p. 294).

Ben-David et al. (2018) further examine the proposals of Daniel et al. (1998) and Gervais and Odean (2001) regarding overconfidence and self-serving bias in the context of retail traders in a Forex market. They find that traders respond to past gains and losses in an asymmetric fashion. Gains in the past week are connected with higher risk taking and higher perceived skill as average trade size and number increases. Losses have no such effect and the effect is also not reversed. Furthermore, traders react significantly even for small gains whereas there is no reaction for small losses. The results are consistent with a self-serving bias as “traders behave as though they perceive any gain as a positive outcome, indicating their skill. Conversely, they attribute small losses to bad luck” (Ben-David et al., 2018, p. 2012).

The influence of self-serving bias, connected with overconfidence, in nonprofessional traders is investigated by Czaja and Röder (2020) with the help of data from an European social trading platform. They find that the better the past performance of a trader, the more self-references are in the trader’s public comments. As such they conclude that self-serving bias is an issue among nonprofessional traders. The results show that self-enhancement bias leads to future underperformance whereas self-protection bias has no negative effect. Czaja and Röder (2020) conclude that this is consistent with the model of Gervais and Odean (2001) as negative performance does not lead to overconfidence. They find as well that self-enhancement bias leads to higher trading frequencies, volume and turnover, as well as less diversification. Furthermore, they find that portfolios of traders prone to self-enhancing bias receive significantly more investment flow, which leads to the conclusion that overconfidence is interpreted as a positive sign by investors. However as overconfident traders are likely to show underperformance, investing in these portfolios can be disadvantageous.

### **7.7.2.3. Further studies researching overconfidence and self-serving bias**

Hilary and Menzly (2006, p. 489) find in their study that “analysts who have predicted earnings more accurately than the median analyst in the previous four quarters tend to be simultaneously less accurate and further from the consensus forecast in their subsequent earnings prediction”. They conclude that their findings are consistent with self-serving bias leading analysts to become overconfident in their ability to forecast future earnings. Their results implicate that a similar phenomenon to the one described in the models of Daniel et al. (1998) and Gervais and Odean (2001) exists in analysts too.

Earnings announcements and the markets reactions, especially the post-earnings announcement drift, is studied by Liang (2003). The author concludes that his result support the model of Daniel et al. (1998) in that post earnings-announcement drifts can be partially attributed to overconfidence in private information, due to imperfect information processing behavior by investors.

A lead-lag relationship of market returns and turnover is found by Statman et al. (2006) in their empirical study. As such trading volume is dependent on past returns over several months. Statman et al. (2006, p. 1558) interpret aspects of this finding “as confirmation of the overconfidence hypothesis

that motivated the study, although precise distinctions between overconfidence trading and the disposition effect<sup>77</sup> are somewhat subjective”.

Adebambo and Yan (2018) investigate how investor overconfidence influences firm valuation and corporate decision. They build on the models of Daniel et al. (1998) and Gervais and Odean (2001) but do not specifically investigate the influence of self-serving bias. They find that stocks with more overconfident investors are relatively overvalued and exhibit significantly lower returns in subsequent periods. Furthermore, they find that firms with more overconfident investors issue more equity and invest more.

Anderson (2013) suggests that trading and under-diversification are related in that individuals who are overconfident in their abilities will choose to concentrate their investment into stocks they believe will outperform the market. Their results show that individuals with highly concentrated stocks also trade more than others. However, they do not perform more successfully when they trade, which would be a rational reason to concentrate their investment. As such the authors conclude that their behavior is likely influenced by a self-serving bias.

The connection between overconfidence and delegated portfolio management<sup>78</sup>, in a theoretical model, is investigated by Palomino and Sadrieh (2011). They base their model on the notion that overconfidence is generated by a self-serving bias. According to their model, overconfident agents trade less than rational agents when both acquire information of the same precision. However, Palomino and Sadrieh (2011) also propose, that overconfident agents are offered compensation contracts with larger incentives. Hence, when overconfidence increases, the precision of the information acquired by the agents also increases. As such overconfident trader’s trade larger quantities and take more risks than rational agents. Furthermore, they argue that compensation increases with overconfidence. As overconfidence increases with success due to self-serving bias, positive past performance is likely to increase management fees. On the other hand, poor past performance is not likely to decrease management fees.

Puetz and Ruenzi (2011) investigate the influence of overconfidence on the trading behavior of U.S. mutual fund managers. They find that manager that performed well in the past and those that performed poorly have higher subsequent turnover ratios. As such the performance to turnover ratio curve is U-shaped. Market segment performance does not influence turnover ratio, but individual portfolio performance does. The results are similar for single managers and management teams. As Puetz and Ruenzi

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<sup>77</sup> Disposition effect is the phenomenon that investors tend to sell shares that show good performance and hold shares that show bad performance. This can lead to the effect that good performing stock is sold too early and bad performing stock is sold too late (see Shefrin and Statman (1985)).

<sup>78</sup> Palomino and Sadrieh (2011) define delegated portfolio management as the delegation of investment decisions to portfolio managers by financial institutions, connected with contracts that aim to align the interests of the managers with those of the institutions.

(2011) find, that increased turnover hurts performance, they conclude that their findings are likely due to overconfidence in connection with self-serving bias and not rational learning<sup>79</sup>.

#### **7.7.2.4. Self-serving bias and momentum**

Jaggia and Thosar (2004) research the medium-term aftermarket in high tech U.S. initial public offerings (IPOs) in the late 1990s. They focus on the research if anomalies are consistent with behavioral finance models such as the one from Daniel et al. (1998). As the technology sector went thru a bubble-like pattern in the 1990s, the authors argue that if biases exist, they should be more pronounced during this timeframe. They follow the argumentation of Daniel et al. (1998) that if public signals appear to confirm an initial private assessment, self-serving bias leads to more confidence in private signals. This drives the price higher and further away from a rational level which is called short-term positive momentum. As time progresses, more public information becomes available and the price is gradually reduced to a rational level. Their data shows a similar pattern of short-term positive momentum and gradual reversal in post IPO returns. As such Jaggia and Thosar (2004) conclude that their data confirms the pattern described in Daniel et al. (1998) theoretical model. They further note that the overconfidence model by Daniel et al. (1998) is fitting to their data but they do not wish to convey the impression that the model is the only possible explanation for the phenomenon of short-term momentum.

Cooper et al. (2004) research short-term momentum and long-term reversal effects of stocks listed on the NYSE and AMEX in the timespan from 1926 to 1995. Their data shows that six-month momentum portfolios are only profitable following periods of positive market development. The momentum profits increase as the lagged market return increases. In the long term the momentum profits are reversed. Cooper et al. (2004) conclude that this is consistent evidence for the model of Daniel et al. (1998). Past success leads to overconfidence due to self-serving attributions, which positively effects momentum.

Cremers and Pareek (2015) analyze the influence of short-term trading on momentum and reversals. They find that momentum returns are generally much stronger for stocks primarily held by short-term investors. Momentum is especially strong when the investors recently had superior past performance. As such the authors conclude that their empirical findings are consistent with the model of Daniel et al. (1998).

Adebambo and Yan (2016) examine momentum and overconfidence as well, but this time in the trading patterns of U.S. mutual fund managers. They find that “stocks held by more overconfident managers experience greater momentum profits and stronger return reversals than stocks held by less overconfident managers” (Adebambo & Yan, 2016, p. 609). As the difference in momentum profits is not

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<sup>79</sup> Choi and Lou (2010) find similar results as Puetz and Ruenzi (2011) especially investigating self-serving bias. As there is no peer-reviewed version of their study, their results are not included in this review.

compensation for risk nor attributable to stock characteristics, they conclude that their results are consistent with the proposition that overconfidence with biased self-serving attribution intensifies momentum.

In their study Daniel et al. (1998) note that the general evidence of momentum is strong in the United States and in European countries whereas there is only weak evidence for momentum in Japan. This corresponds with the general cultural differences in self-serving bias. The authors thus note that in cultures where self-enhancing bias is less evident, momentum should be as well. Chui et al. (2010) empirically examine how cultural differences affect momentum. They find that cultural differences have a significant effect on stock return patterns. In individualistic cultures the magnitude of momentum profits is higher, as well as trading volume and volatility, than in less individualistic cultures such as Japan. Chui et al. (2010) conclude that in less individualistic cultures investors put less weight on their own information and more on the consensus of their peers. As such they are in agreement with the notion of Daniel et al. (1998) that momentum is more distinctive in cultures where self-serving bias is more pronounced. The study of Dou et al. (2016) shows similar results. They find in their examination of data from 41 countries over a period of thirteen years, that the level of individualism in a country or culture is positively associated with momentum profits, whereas the level of uncertainty avoidance is negatively associated. As such the authors conclude that cultural differences are essential to include into research among international investors.

Hillert et al. (2014) examine the influence of the media on momentum. They use national and local U.S. newspaper articles between 1989 and 2010. They find that stocks of firms particularly covered in the articles show a stronger momentum than similar stocks that are not covered. The size of this effect depends on the article tone and is stronger for stocks with high uncertainty and in states with high investor individualism. Hillert et al. (2014) conclude that their findings match the model of Daniel et al. (1998). The media coverage, which often presents vague ambiguous information, catches the attention of investors. First private signal in the model from Daniel et al. (1998) could also be intangible or vague information from public sources. Hence the authors argue, that “in the context of the model, articles in newspapers measured during the momentum formation period might be best thought of as the first signal that acts as a confirmation device when later public, tangible, informative signals arrive” (Daniel et al., 1998, p. 3473). Their results also coincide with the findings of Chui et al. (2010).

### **7.7.3. Research contradicting the connection between overconfidence and self-serving bias in a financial market setting**

A study from Chan et al. (2004) doubts the model of Daniel et al. (1998). They connect the model of Daniel et al. (1998) with a representativeness bias. In their study they find results that are inconsistent with a representativeness bias and as such would also be inconsistent with the model of Daniel et al. (1998). Daniel (2004) however argues, that their general connection between representativeness bias and the model is wrong and in fact the model is consistent with their results (q.v. Daniel, 2004).

Allen and Evans (2005) use data from an experimental market to investigate overconfidence in traders. The participants in this market are from the United States. They find evidence that general overconfidence carries over into financial decision making but find no compelling evidence that self-serving bias affects overconfidence, at least in their setting.

Dorn and Sengmueller (2009) find no significant evidence for a self-serving bias in German brokerage records and a complementary survey. They propose that heightened trading activity is due to an enjoyment of investing and gambling in their participants. As such entertainment driven investors trade even if the return is negative.

Deaves et al. (2010) research overconfidence in German market forecasters. They find no evidence that success has greater influence than failure. While forecasters on average remain overconfident, they are not learning to become more overconfident. The authors thus conclude that their findings are inconsistent with self-serving bias leading to overconfidence. They further conclude that experience in financial markets leads to overconfidence which emerges due to reduced knowledge rather than increased certainty due to self-serving attributions. Dorn and Huberman (2005) find no evidence, in a German market setting, that more overconfident investors, due to self-serving attributions, take more risks and have a less diversified portfolio.

#### **7.7.4. Comparison of the reviewed literature regarding a self-serving bias in a financial market setting**

There are multiple studies that find empirical results similar to the ones predicted by the models of Daniel et al. (1998) and Gervais and Odean (2001) as well as more direct evidence for a self-serving bias in investors (Hoffmann & Post, 2014) and traders (Czaja & Röder, 2020). Thus, it is very likely that self-serving bias does indeed influence the behavior of several financial market participants such as investors, traders and analysts. Furthermore, self-serving bias appears to influence the momentum effect as well. A cultural influence can be seen in investors as well as in the momentum effect. Surprising are the results of Deaves et al. (2010), Dorn and Huberman (2005) and Dorn and Sengmueller (2009) which do not find evidence for a self-serving bias. All three studies have in common, that they are based on German financial market participants, as such a cultural or national influence appears to be likely. In contrast, Hoffmann and Post (2014) find evidence for a self-serving bias based on Dutch investor data. As both cultures are very similar, the hypothesis of German culture as a moderator is questionable. Hence more research in this specific field is needed, to be able to propose a sound explanation for these results.

## **7.8. Conclusion**

The self-serving bias is a widespread phenomenon in humankind. First proposed and researched in social psychology, this bias is discovered and researched in more and more disciplines. Economic science is one area in which the self-serving bias is researched extensively and a multitude of references

for its existence and different forms of expression have been found. Furthermore, as several name variations can be used for the self-serving bias in an attributional context, especially in economic research, this fact needs to be considered as well for research in this field. Following these observations, the nomenclature used in social psychology appears to be more uniform and consistent.

The review results reveal significant evidence for a self-serving bias in corporate narratives especially in letters to shareholders. The answer to the question, if culture has a similar influence on the bias in corporate communications as in psychology, is not clear. To be able to form a conclusion more research is needed. A possible moderator are the recipients of these corporate communications. If the recipients are international and as such also from individualistic cultures, the self-serving bias might emerge even in otherwise collectivistic individuals. The market reaction to a self-serving bias in corporate communications appears to be dependent on the setting and on the extent that self-serving attributions are used. If the attributions are perceived as plausible, positive reactions can be observed. Otherwise self-serving bias can be counterproductive as the bias is recognized by the market and investors.

The literature review also reveals that a self-serving bias can be found in the actions and in the behavior of managers and CEOs. Good firm performance is attributed to the own actions, but poor performance is attributed to external factors. Research also proposes a connection between self-serving bias and overconfidence in managers. Positive results which are attributed internally due to the self-serving bias enhance the overconfidence, while unfavorable results do not diminish the overconfidence in a similar fashion, as the reason for the results is attributed to external factors. Following this theory, an increase in aggressive investment commitments (Koo & Yang, 2018; Malmendier & Tate, 2005) and an excessive use of derivatives positions (Adam et al., 2015) has been found due to self-serving bias connected with overconfidence.

Furthermore, there are multiple studies that find strong evidence for a connection between self-serving bias together with overconfidence and the heightened issuance of more management forecasts as well as more M&As. The market reaction to acquisition announcements by overconfident managers is not uniform in the studies researching this topic. To be able to form an unambiguous conclusion, more research into the factors influencing the market reaction is needed. The results for the influence of multiple acquisitions on future firm performance are however uniform. Frequent acquisitions due to overconfident managers are likely resulting in poor future performance, as the integrational process can be disruptive and synergy effects not fully used.

The emergence and the influence of a self-serving bias in a financial market setting has been researched as well, but only in connection with overconfidence. The results highlight, that the self-serving bias, connected with overconfidence, does most likely influence the behavior of financial market participants such as investors, traders and analysts. Differing results are primarily shown for a German market setting (Deaves et al., 2010; Dorn & Huberman, 2005; Dorn & Sengmueller, 2009). Culture as a moderator is unlikely, hence further research is needed to explain this phenomenon. The results are

furthermore consistent with the proposal of Daniel et al. (1998) that self-serving bias influences momentum. As the bias is inherently difficult to measure in this setting, most studies use proxies for overconfidence and self-serving bias. As such they are only able to confirm or deny a consistence of their results with the models and not the emergence of a self-serving bias in itself. To further strengthen the evidence for a self-serving bias, more studies that are able to measure the bias more directly would be advantageous.

One limitation of this review is that in cases where overconfidence is connected with a self-serving bias, it is difficult to find direct measures to detect the bias. Furthermore, static overconfidence and the self-serving bias cannot always be separated exactly. Thus, both factors are sometimes researched as one, and the connection with a self-serving bias is established via a theoretical model (q.v. Adebambo & Yan, 2018; Puetz & Ruenzi, 2011). Furthermore, the self-serving bias is often not unambiguous.

Another limitation is that the Google Scholar, library catalogue and especially the references search revealed further extensive research into the self-serving bias in an economic setting which is not published in peer-reviewed journals and is according to the chosen methodical approach not included in this review. As such the possibility exists, that informative research into the self-serving bias is not included. On the other hand, the chosen methodical approach ensures the quality of the presented research. Furthermore, only topics are covered in this review, that show a significant amount of research into the self-serving bias. Hence it is likely, that further topics exist, albeit with limited research extend, that examine the bias within an economic setting.

Furthermore, variations of the self-serving bias like the bias in judgement about fairness are not covered. Related research topics that emerged during the literature review but are not covered as well, are a group-serving bias (q.v. Lam et al., 2004), other-serving bias (q.v. Palmeira et al., 2015) and the actor-observer bias.

As the two main theories to explain the self-serving bias are only discussed in the research into corporate communications, this topic could be further researched for example in a financial context as well. The review also reveals that most studies have been conducted with participants or data from the United States. Some studies used Japanese data and participants. As such a comparison between both cultures is possible in corporate narratives, a financial market setting and in negotiations. Some studies take place in a Western European setting, but the influence of the culture on the self-serving bias is not directly investigated, even though psychological research reveals a difference to American culture. In general, the influence of cultures between the two extremes still needs to be researched for the economic settings. A multitude of moderators for the self-serving bias have been revealed in psychological research. Besides culture the influence of these moderators is not extensively researched in economics. Age for example influences the self-serving bias to a significant degree. The emergence of a bias is lowest in young adults but rises again with increasing age. As such research into the influence of age,

especially connected with experience, on the bias, could lead to interesting results for example in investors or managers. Further research can be done in the review of self-serving bias variations not covered in this work as well.

# Appendix

Table 7-3: Journals and search results

| Journal   | Key phrases         |                            |                         |
|---|---------------------|----------------------------|-------------------------|
|   | "self-serving bias" | "self-serving attribution" | "self-attribution bias" |
| <b>Allgemeine Betriebswirtschaftslehre (A+)</b> |                     |                            |                         |
| Science   | 1                   | 0                          | 0                       |
| American Economic Review                        | 0                   | 0                          | 0                       |
| Econometrica                                    | 2                   | 0                          | 0                       |
| Academy of Management Journal                   | 15                  | 13                         | 0                       |
| Journal of Political Economy                    | 4                   | 0                          | 1                       |
| Administrative Science Quarterly                | 3                   | 5                          | 0                       |
| Academy of Management Review                    | 29                  | 13                         | 0                       |
| Management Science                              | 12                  | 5                          | 7                       |
| <b>Allgemeine Betriebswirtschaftslehre (A)</b>  |                     |                            |                         |
| Strategic Management Journal                    | 16                  | 12                         | 3                       |
| The RAND Journal of Economics                   | 2                   | 0                          | 0                       |
| Journal of Industrial Economics                 | 0                   | 0                          | 0                       |
| Experimental Economics                          | 15                  | 0                          | 0                       |
| Academy of Management Annals                    | 3                   | 0                          | 0                       |
| Journal of Management                           | 26                  | 17                         | 1                       |
| Journal of Management Studies                   | 8                   | 8                          | 0                       |
| Journal of Economics & Management Strategy      | 1                   | 1                          | 0                       |
| Organization Studies                            | 3                   | 2                          | 0                       |
| <b>Bankbetriebslehre/Finanzierung (A+)</b>      |                     |                            |                         |
| The Journal of Finance                          | 2                   | 2                          | 10                      |
| Journal of Financial Economics                  | 1                   | 2                          | 9                       |
| The Review of Financial Studies                 | 3                   | 3                          | 16                      |
| <b>Bankbetriebslehre/Finanzierung (A)</b>       |                     |                            |                         |
| Journal of Financial and Quantitative Analysis  | 0                   | 0                          | 0                       |
| Review of Finance                               | 3                   | 2                          | 7                       |
| Journal of Banking & Finance                    | 0                   | 2                          | 17                      |
| Journal of Economic Dynamics & Control          | 1                   | 0                          | 0                       |
| Journal of Financial Intermediation             | 0                   | 0                          | 3                       |
| Journal of Money, Credit and Banking            | 0                   | 0                          | 0                       |
| Review of Derivatives Research                  | 0                   | 0                          | 0                       |

Table 7-4: Journals and search results (continued)

| Journal  | Key phrases         |                            |                         |
|--|---------------------|----------------------------|-------------------------|
|  | "self-serving bias" | "self-serving attribution" | "self-attribution bias" |
| <b>Rechnungswesen (A+)</b>                           |                     |                            |                         |
| Accounting Review                                    | 11                  | 3                          | 1                       |
| Journal of Accounting and Economics                  | 0                   | 2                          | 1                       |
| Journal of Accounting Research                       | 1                   | 2                          | 0                       |
| <b>Rechnungswesen (A)</b>                            |                     |                            |                         |
| Accounting, Organizations and Society                | 8                   | 7                          | 0                       |
| Contemporary Accounting Research                     | 6                   | 3                          | 2                       |
| Journal of Financial and Quantitative Analysis       | 0                   | 0                          | 0                       |
| Review of Accounting Studies                         | 1                   | 1                          | 1                       |
| Management Accounting Research                       | 3                   | 0                          | 0                       |
| European Accounting Review                           | 1                   | 2                          | 1                       |
| <b>Organisation/Personalwesen (A+)</b>               |                     |                            |                         |
| Organization Science                                 | 12                  | 5                          | 0                       |
| <b>Organisation/Personalwesen (A)</b>                |                     |                            |                         |
| Journal of Applied Psychology                        | 5                   | 1                          | 0                       |
| Journal of International Business Studies            | 5                   | 1                          | 1                       |
| Organizational Behavior and Human Decision Processes | 30                  | 12                         | 1                       |
| Journal of Public Administration Research and Theory | 6                   | 1                          | 0                       |
| Journal of Labor Economics                           | 1                   | 0                          | 0                       |
| Organizational Research Methods                      | 2                   | 2                          | 0                       |
| Journal of Economic Behavior and Organization        | 36                  | 4                          | 4                       |
| The Journal of Strategic Information Systems         | 0                   | 0                          | 0                       |
| Personnel Psychology                                 | 12                  | 4                          | 0                       |
| Journal of Organizational Behavior                   | 29                  | 7                          | 0                       |
| Leadership Quarterly                                 | 34                  | 7                          | 1                       |
| <b>Entrepreneurship (A)</b>                          |                     |                            |                         |
| Research Policy                                      | 3                   | 1                          | 0                       |
| Journal of Business Venturing                        | 5                   | 3                          | 1                       |
| Entrepreneurship: Theory and Practice                | 7                   | 2                          | 1                       |
| Strategic Entrepreneurship Journal                   | 4                   | 3                          | 0                       |

## Chapter 8

# **Notierungsdynamik an deutschen Wertpapierbörsen: Eine Analyse der historischen Entwicklung ab 1950**

Dieses Kapitel war unter Begutachtung in "Perspektiven der Wirtschaftspolitik" und hat nun den Status eines Arbeitspapiers.

# Notierungsdynamik an deutschen Wertpapierbörsen: Eine Analyse der historischen Entwicklung ab 1950

Eduard Gaar<sup>80</sup>, Benedikt Isert<sup>81</sup>, Dirk Schiereck<sup>82</sup>

## Abstract

Die Zahl der börsennotierten Unternehmen nimmt in Deutschland seit 1950 ab, wobei aber das Ausmaß bislang kaum quantifiziert wurde. Die Börse ist aber auf hohe Notierungszahlen angewiesen, um für Emittenten und Anleger attraktiv zu sein und ihrer Aufgabe einer effizienten Kapitalallokation in der deutschen Volkswirtschaft gerecht zu werden. Dafür fehlt aber gegenwärtig sogar eine umfassende Bestandsaufnahme der deutschen Börsennotierungsdynamik. Die vollzogene Bestandsaufnahme zeigt, dass der Kurszettel in 68 Jahren um 39% geschrumpft ist, also um durchschnittlich 2,4 Notierungen pro Jahr. Die Aktienkursperformance der meisten Unternehmen liefert seit langem schwache Ergebnisse, besonders auch die Börsenneulinge im Jahr ihrer Notierungsaufnahme. Anleger sind deshalb gut beraten, auf eine naive Diversifikation bei der Anlage in deutschen Aktien zu verzichten und stattdessen marktgewichtet Anlageprodukte zu wählen. Bei einer Fortsetzung der hier nachvollzogenen Entwicklung könnte die Börse ihre Funktion als effektiver und effizienter Intermediär der Eigenkapitalversorgung der deutschen Volkswirtschaft dauerhaft einbüßen.

**Keywords:** Notierungsdynamik, Deutsche Börse, Aktienkursperformance, Anzeichen für Notierungseinstellungen

**JEL Classification:** G11, N24, O16

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## 8.1. Die Bedeutung der Börsen

Die Bedeutung des Finanzsystems als Ganzes und speziell für das Wachstum einer Volkswirtschaft ist seit langem Thema vieler Debatten. Frühe Arbeiten konzentrieren sich hauptsächlich auf Banken und da einerseits auf ihre Wichtigkeit in der Finanzierung von Projekten und somit in der Förderung von Innovationen (Hicks, 1969; Schumpeter, 1912) und andererseits auf die Überbewertung (Lucas, 1988) von Banken und, dass diese nur eine passive Rolle (Robinson, 1952) für das wirtschaftliche Wachstum spielen. Jüngere Studien in diesem Bereich verschieben den Fokus auf Aktienmärkte. Erste empirische Studien zeigen, dass liquide Aktienmärkte Widerstände gegenüber langfristigen Projekten senken, da Investoren bei Bedarf die Möglichkeit haben vor Ablauf des Projekts auszusteigen (Levine, 1991; Ben-civenga et al., 1995). Demzufolge erleichtert eine bessere Liquidität Investitionen in langfristige Projekte, mit höheren Gewinnen, die wirtschaftliches Wachstum erzeugen. Weiterhin ermöglichen international besser integrierte Aktienmärkte eine bessere Risikoverteilung von Portfolios, die somit die Möglichkeit haben riskantere Projekte zu fördern (Deveraux & Smith, 1994; Obstfeld, 1994). Andere Studien untersuchen Banksysteme und Aktienmärkte parallel und stellen einerseits fest, dass die angebotenen Dienste unterschiedlich und komplementär sind und andererseits, dass die Liquidität von Aktienmärkten neben dem wirtschaftlichen Wachstum auch die Vermögensbildung und die Produktivitätssteigerungen fördert (Levine & Zervos, 1998; Deidda & Fattouh, 2008). Eine der Funktionen, die Börsen dabei übernehmen, ist die Umverteilung von Ressourcen von weniger effizienten Unternehmen hin zu effizienteren (Merton & Bodie, 1995). Demzufolge zeigen Greenwood und Smith (1997) und Levine (1997), dass effiziente Märkte die Umverteilung der Ressourcen besser organisieren und somit Sparquoten, Investitionsentscheidungen und technologische Innovationen beeinflussen.

Zur Bewertung nationaler Finanzsysteme werden dabei oftmals 2 Kennzahlen herangezogen. Einmal das Verhältnis der Börsenkapitalisierung aller in einem Land notierten Gesellschaften zum Bruttoinlandsprodukt (Wurgler, 2000). Diese Kennzahl fällt für den Finanzplatz Deutschland im Vergleich zu anderen europäischen Ländern, wie z. B. Großbritannien, vergleichsweise niedrig aus, und zwar nicht nur als Momentaufnahme, sondern über einen langen Zeitraum hinweg. Und als zweites die absolute Anzahl an Notierungen über mehrere Jahre hinweg. Auch hier zeigt sich, dass Deutschland im Zeitraum 1996 bis 2012 (Doidge et al., 2017) bzw. 1948 bis 2011 (Gaar & Schiereck, 2013) mehr Notierungseinstellungen als -aufnahmen hat. Während solche Kennzahlen als Indikation eines möglichen Problems im deutschen Finanzsystem hilfreich sein können, bedarf die tiefergehende Analyse allerdings eines höheren Detaillierungsgrades. Doidge et al. (2017) argumentieren, dass das bloße Schrumpfen einer Börse noch nicht als negatives Zeichen interpretiert werden, sondern auch auf eine positive Entwicklung der Wirtschaft hindeuten kann. Ohne auf die Gründe für eine Notierungseinstellung einzugehen, ist dementsprechend keine verlässliche Aussage möglich. Schließlich wäre das Schrumpfen des Wertpapiermarkts aufgrund einer Insolvenz anders einzuschätzen als aufgrund eines freiwilligen Rückzugs. Dafür wird die Notierungsdynamik, die Notierungsaufnahmen bzw. -einstellungen im Zeitverlauf, be-

trachtet. Zingales (1995) sieht insbesondere in der Entscheidung zur Notierungsaufnahme einen wesentlichen Einfluss auf die wirtschaftliche Entwicklung der betroffenen Unternehmen und über alle Unternehmen eines Landes dadurch auch auf die gesamte Volkswirtschaft (Beck, Levine & Loayza, 2000; King & Levine, 1993).

Da die Anzahl der Börsengänge als Spiegelbild der wirtschaftlichen Entwicklung interpretiert werden kann, stellt sich auch die Frage nach dem aktuellen Stand der deutschen Wertpapiermärkte. Die bislang vorliegende Evidenz von Ising, Schiereck und Stöber (2009) und Gaar und Schiereck (2013) endet im Jahr 2003 bzw. 2011 und deutet auf einen negativen Trend hin. Ob diese Entwicklung weiterhin anhält oder sich sogar verstärkt und was die möglichen Gründe sind, ist Schwerpunkt dieses Aufsatzes. Dementsprechend folgt die Analyse folgendem Fokus. In einem ersten Schritt wird untersucht, wie sich die Notierungsdynamik am deutschen Kapitalmarkt seit der Gründung der Bundesrepublik Deutschland entwickelt hat. Durch die Ausweitung des Betrachtungszeitraums auf insgesamt 68 Jahre (1950 bis 2018) können hier auch die möglichen langfristigen Auswirkungen der globalen Finanzkrise von 2008 auf den deutschen Aktienmarkt abgebildet werden. Erkenntnisse früherer Studien (Gaar & Schiereck, 2013; Martinez & Serve, 2017) deuten an dieser Stelle auf einen negativen Notierungstrend hin. In einem zweiten Schritt wird die Performance der gebildeten Untergruppen und abhängig von der Notierungsaufnahme betrachtet. Diese Analyse liefert erste Hinweise auf mögliche Gründe für die zunehmende Dynamik am deutschen Aktienmarkt und ob ein Zusammenhang zwischen der Höhe der Aktienrenditen und der Notierungsdauer und dem Grund einer Notierungseinstellung besteht. Da ohne eine genauere Einordnung der Gründe für eine Einstellung keine Aussage über mögliche negative Auswirkungen für die wirtschaftliche Entwicklung möglich ist, stehen in einem weiteren Schritt die Gründe für die Abkehr von der Börsennotierung im Fokus. Dabei wird auch untersucht, ob verschiedene Unternehmenskennzahlen zur Prognose der Notierungseinstellung geeignet sind. Daraus leiten sich wiederum Implikationen ab, wenn deutlich wird, ob tatsächlich insbesondere unprofitable Unternehmen ihre Notierung einstellen. Alle 3 Analysen werden um eine Branchenanalyse erweitert um zu klären, ob die komplette deutsche Wirtschaft demselben Einfluss unterliegt und um etwaige Trends aufzuzeigen.

Die Ergebnisse unserer Auswertungen zeigen, dass es sich bei der negativen Notierungsdynamik in Deutschland sowohl um ein historisches Phänomen als auch um eine zuletzt sich verstärkende negative Entwicklung handelt. Die durchschnittliche Notierungsdauer sinkt. Insbesondere mit Beginn der 2000er Jahre steigt die Anzahl an Notierungseinstellungen stark an, ganz überwiegend getrieben durch Akquisitionen. Über den gesamten Zeitraum verliert der deutsche Kapitalmarkt netto pro Jahr 2,41 Notierungen.

Für alle Arten an Notierungseinstellungen können klare Anzeichen in der Entwicklung der Unternehmenskennzahlen identifiziert werden. Insbesondere die Umsatz- und Eigenkapitalrentabilität weisen bei Unternehmen, die die Börse verlassen, durchgehend negative Werte auf. Aber auch die Entwicklung des absoluten Umsatzes, des EBIT und des Jahresüberschusses/-fehlbetrags weisen zum Teil negative Anzeichen auf.

## 8.2. Aktuelle Entwicklungen in Deutschland und internationale Einordnung

Das deutsche Finanzsystem und damit auch die Wertpapierbörsen haben in den vergangenen Jahren einen starken Wandel erlebt. Dies äußert sich durch das Wachstum der Kapitalmärkte im Allgemeinen und der Märkte für Risikokapital im Speziellen. So lässt sich ein anhaltender Trend zur Verbriefung bzw. Desintermediation erkennen (Kaserer, Fey & Kuhn 2011). Die ursprüngliche stark auf Fremdkapitalgeber, meist in Form von Banken, konzentrierte Unternehmensfinanzierung hat sich über die Jahre verlagert, und die Nachfrage nach Eigenkapitalinstrumenten ist stark gestiegen. Abbildung 8-1 illustriert diese Entwicklung zwischen den Jahren 1995 und 2010.

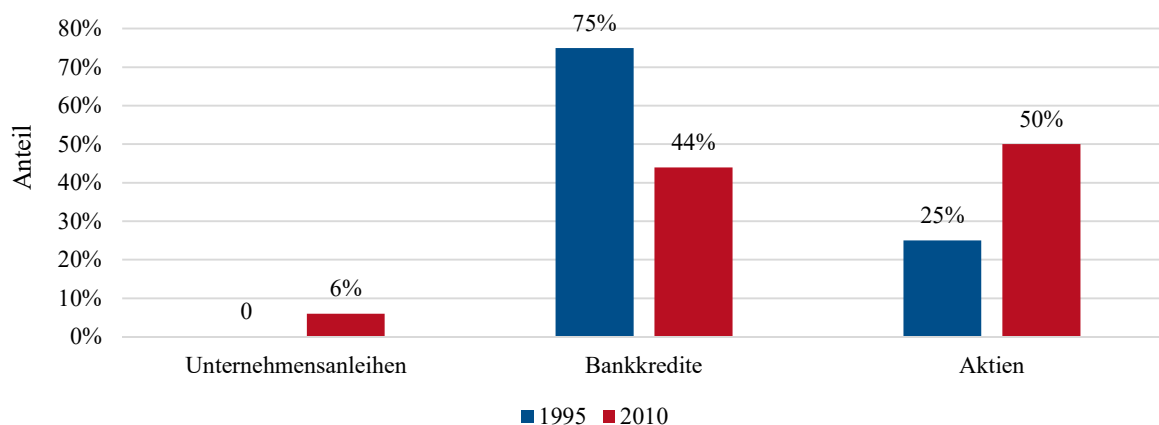


Abbildung 8-1: Quellen der Unternehmensfinanzierung (nach Kaserer, Fey und Kuhn 2011)

Dadurch ist das Verhältnis der gesamten Börsenkapitalisierung zum Bruttoinlandsprodukt – einer häufig herangezogenen Kennzahl zur Bewertung nationaler Finanzsysteme (Ising, Schiereck & Stöber 2009) – insgesamt deutlich gestiegen. Abbildung 8-2 unterstreicht diesen langfristigen Anstieg der Kennzahl zwischen 1980 und 2017 und verdeutlicht ebenso die besonders positive Entwicklung in den 1990er-Jahren sowie den Einbruch der Börsen im Jahr 2008. Insgesamt wird allerdings auch deutlich, dass der Trend zu steigenden Ausprägungen dieser Kennzahl nicht national begrenzt verlief und die Kennzahl in Deutschland sehr viel schwächer zugenommen hat als in den USA. Auch gegenüber anderen europäischen Kapitalmärkten wie denen in Polen und Großbritannien fällt die deutsche Notierungsdynamik ab. So spielt der britische Aktienmarkt im Gegensatz zu den meisten in Kontinentaleuropa traditionell eine zentralere Rolle in der Unternehmensfinanzierung, -überwachung und bei der Übertragung der Unternehmenskontrolle (Rajan & Zingales 1995).

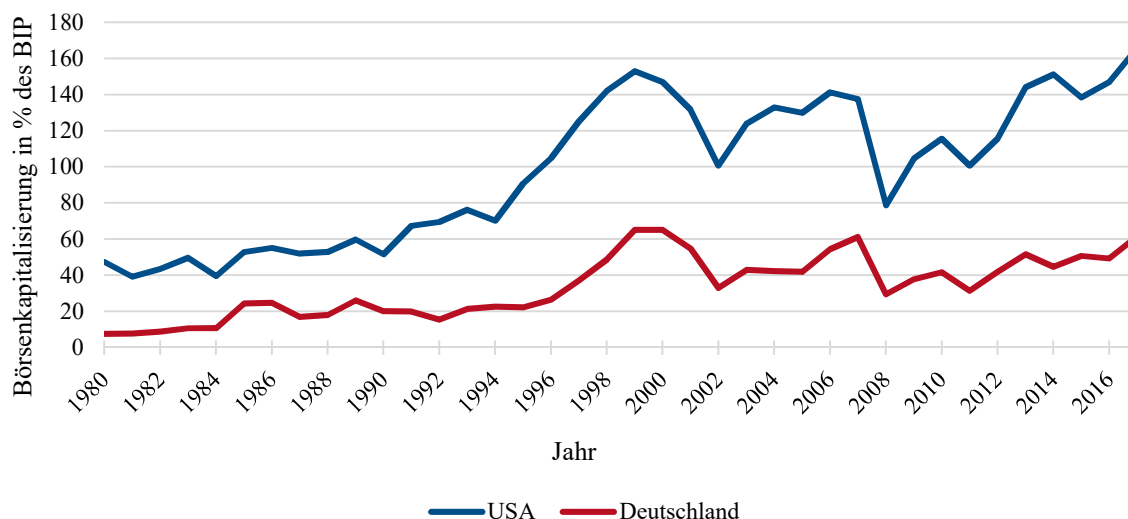


Abbildung 8-2: Börsenkapitalisierung im Ländervergleich nach (World Bank 2019)

In den USA erfolgen über 90% des Beschäftigungswachstums eines Unternehmens nach einem durchgeführten Börsengang (Force, 2011). Steigende Notierungszahlen besitzen also auch eine gesamtwirtschaftliche Relevanz. Abbildung 8-3 zeigt die Anzahl der Börsengänge (Initial Public Offerings, IPOs) in den USA. Wie die Analysen später zeigen werden, wurden dort wesentlich mehr IPOs als in Deutschland in demselben Zeitraum durchgeführt. Im Jahr 1996 wurde dort die maximale Anzahl von 677 Notierungsaufnahmen erreicht (Ritter, 2018). Seither schrumpft auch in den USA die Zahl der Börsennotierungen.

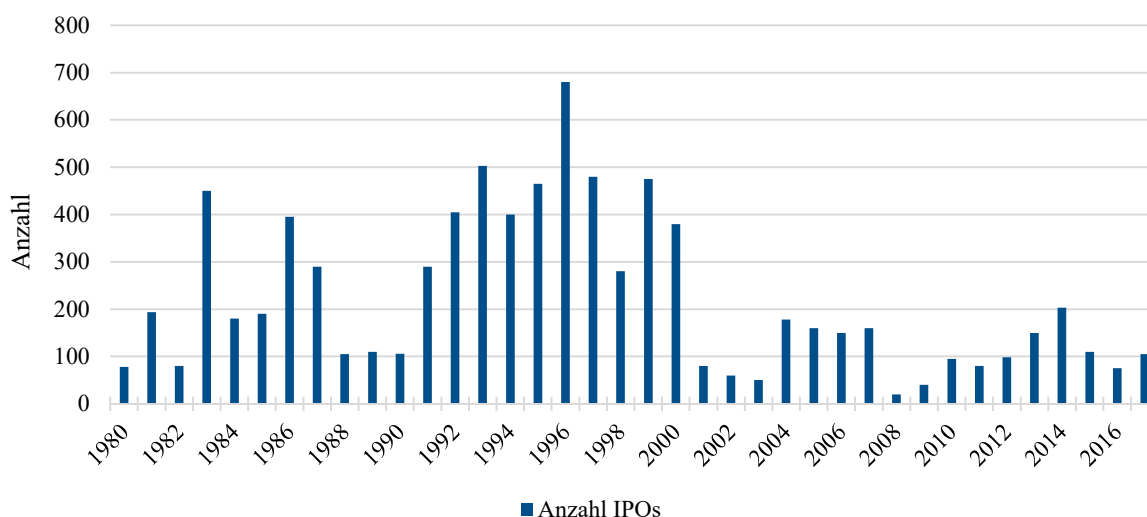


Abbildung 8-3: IPO-Entwicklung in den USA (nach Ritter 2018)

Ising, Schiereck und Stöber (2009) präsentieren die erste umfassende Evidenz für die Notierungsdynamik am deutschen Aktienmarkt und die damit einhergehende Performance börslich gehandelter deutscher Unternehmen. Hierbei wurde eine Betrachtung des Amtlichen Handels zwischen den Jahren 1948 und 2003 vorgenommen. Diese Analyse wurde durch Gaar und Schiereck (2013) bis zum Jahr 2011

fortgeführt. Zusätzlich wurden dort in Deutschland notierte Auslandsaktien in die Auswertungen mit einbezogen.

Zwischen den Jahren 1950 und 2011 haben in Deutschland 432 Unternehmen eine Notierung im Amtlichen Handel oder im Regulierten Markt aufgenommen. Insgesamt waren im genannten Zeitraum zumindest zeitweise 849 deutsche Unternehmen an einer deutschen Wertpapierbörse notiert. Da 565 Unternehmen ihre Börsennotierung eingestellt haben, verringerte sich die Anzahl der Börsennotierungen im Durchschnitt um 2,1 Unternehmen pro Jahr im Zeitraum bis 2011. Dies bestätigt einen negativen Trend an allen führenden westlichen Aktienbörsen, den auch Doidge, Karolyi und Stulz (2017) dokumentieren. Der Gesamtrückgang beläuft sich bei Gaar und Schiereck (2013) in Deutschland auf 31,9%. Für ihren gesamten Datensatz ergibt sich eine durchschnittliche Notierungsdauer von 30,5 Jahren. Insgesamt fällt eine deutlich höhere Notierungsdauer für Unternehmen auf, die schon vor dem Jahr 1950 eine Notierung im Amtlichen Handel aufweisen. Die durchschnittliche Notierungsdauer der DAX 30-Unternehmen liegt bei 44,9 Jahren und damit 14,4 Jahre höher als der Durchschnitt aller Unternehmen (Gaar & Schiereck, 2013).

Die Wahrscheinlichkeit für eine Notierungseinstellung stieg in den letzten Jahrzehnten deutlich an. Als Gründe für eine Notierungseinstellung wurden ein Kauf, eine Fusion, ein Going Private oder eine Insolvenz erfasst. Mit 53,6% der Fälle dominiert der Börsenrückzug wegen eines Kaufs. Besonders in den letzten Jahren der Betrachtung pendelt sich die Anzahl an Notierungseinstellungen auf einem hohen Niveau ein, während nur noch wenige Unternehmen eine Börsennotierung im Regulierten Markt aufnehmen (Gaar & Schiereck, 2013).

Die gleichgewichtete annualisierte Aktienkursperformance zeigt gegenüber der marktgewichteten Performance des DAX schwache Renditewerte. Die Unternehmen, die seit 1950 an deutschen Wertpapierbörsen durchgehend notiert waren, erreichten im Durchschnitt von 1974 bis 2011 nur eine jährliche Rendite von 2,6%. Noch schwächer fällt das Ergebnis für diejenigen aus, die nach 1950 hinzukamen und 2011 immer noch notiert waren. Hier wurde nur eine durchschnittliche negative jährliche Rendite von -5,7% erreicht. In beiden Gruppen zeigt sich eine Korrelation von Eigentümerstruktur und Performance, allerdings mit variierenden Vorzeichen. Für die erste Gruppe wirkt sich ein Mehrheitsaktionär, der über 50% der Anteile hält, negativ aus, für die zweite positiv (Gaar & Schiereck, 2013).

### **8.3. Datensatz**

Die Grundlage für die folgenden empirischen Untersuchungen bildet eine selbsterstellte Datenbank auf Basis von 902 deutschen Unternehmen. Diese Unternehmen sind dem Hoppenstedt Aktienführer und der Bisnode Datenbank entnommen und haben gemeinsam, dass sie im Zeitraum vom 01.01.1950 bis zum 01.11.2007 dauerhaft oder vorübergehend an einer deutschen Börse notiert waren. Hierbei wird nur der Amtliche Handel betrachtet, da dieser das Börsensegment mit den höchsten Anforderungen dar-

stellt. Am 01.11.2007 erfolgte der Zusammenschluss des Amtlichen und Geregelten Markts zum Regu-  
lierten Markt. Die bisherige Unterteilung der organisierten Zulassungssegmente wurde aufgehoben, und  
die Zulassungsvoraussetzungen sowie Folgepflichten des Amtlichen Markts gingen auf den Regulierten  
Markt über (Deutsche Börse, 2019). Somit steht ab diesem Zeitpunkt das Börsensegment mit den für  
Emittenten höchsten Zulassungsvoraussetzungen im Fokus der Untersuchungen, und es werden alle Un-  
ternehmen im Datensatz berücksichtigt, die zwischen dem 01.11.2007 und 01.01.2018 eine Notierung  
im Regulierten Markt aufweisen. Die Unterscheidung in Prime und General Standard findet keine Be-  
rücksichtigung. Der Datensatz zu jedem Unternehmen umfasst Kurs- und Stammdaten, die den Online-  
Datenbanken der Internetpräsenzen Ariva.de, finanzen.net, wallstreet-online.de, dgap.de und börse.de  
entnommen wurden.

Für die Kursdaten wurde der Aktienkurs an der entsprechenden Hauptbörse als Referenz herangezo-  
gen. Für die Frankfurter Wertpapierbörse liegen die entsprechenden Daten ab dem Jahr 1960 und für  
alle anderen deutschen Börsen ab dem Jahr 1974 vor. Die Kursreihe eines Unternehmens beginnt mit  
dem IPO und endet mit dem Schlusskurs im Dezember 2017, also mit dem Ende des Betrachtungszeit-  
raums, oder mit dem Datum der Fusion, der Akquisition des Unternehmens, dem Beginn des Konkurs-  
verfahrens oder der Notierungseinstellung als Folge eines Going Private bzw. Squeeze-Out. In solch  
einem Fall wird nicht zwischen den Formen des aktienrechtlichen und übernahmerechtlichen Squeeze-  
Out unterschieden. Aufgrund starker zeitlicher Variationen bei Transaktionskosten und Steuern wird die  
berechnete Performance der Unternehmen nur als Bruttorendite ermittelt.

Die Stammdaten umfassen Basisinformationen zu den Unternehmen wie die Zeitdauer der Börsen-  
notierung, die Wertpapierkennnummer (WKN) oder die International Securities Identification Number  
(ISIN) und die Eigentümerstruktur. Die Eigentümerstruktur wird als abhängig bezeichnet, falls ein Ein-  
zelaktionär über 50% der Unternehmensanteile hält. In allen anderen Fällen liegt eine unabhängige Ei-  
gentümerstruktur vor. Darüber hinaus wurde die Marktkapitalisierung durch die zugrundeliegenden  
Werte der Aktienanzahl, -kurse und des Streubesitzes berechnet.

Tabelle 8-1: Subsample-Klassifizierung

|   |                         | <b>Erstnotierung vor dem 01.01.1950</b>    |   |
|---|-------------------------|--|---|
|   |                         | <b>Ja → Survivor</b>                       | <b>Nein → Entrant</b>                     |
| <b>Notierung<br/>bis<br/>01.01.2018</b> | <b>Ja → Lasting</b>     | Lasting Survivor (LS)<br>58 Unternehmen    | Lasting Entrant (LE) 195<br>Unternehmen   |
|   | <b>Nein → Departing</b> | Departing Survivor (DS)<br>359 Unternehmen | Departing Entrant (DE)<br>290 Unternehmen |

Um eine Vergleichbarkeit mit früheren Studien zu gewährleisten, wird der Datensatz in Anlehnung  
an Ising, Schiereck und Stöber (2009) in 4 Subsamples unterteilt, die Lasting Survivors (LS), Departing

Survivors (DS), Lasting Entrants (LE) und Departing Entrants (DE). Der erste Teil der Bezeichnung gibt Aufschluss darüber, ob das betreffende Unternehmen zum 01.01.2018 noch im Regulierten Markt notiert ist. Der zweite Teil der Bezeichnung bezieht sich auf den Zeitpunkt der Erstnotierung. Hierbei wird unterschieden, ob ein Unternehmen eine Notierungsaufnahme vor oder nach dem 01.01.1950 durchgeführt hat. Folglich wird ein Unternehmen, das schon vor dem Jahr 1950 notiert war und bis zum Jahr 2018 notiert blieb, den Lastings Survivors zugeordnet. Diese Kriterien erfüllen insgesamt 58 Unternehmen und unter anderem z. B. die Siemens AG. Die Gruppe der Departing Entrants hingegen umfasst 289 Unternehmen, die erst nach dem 01.01.1950 einen Börsengang durchgeführt und die Notierung vor dem Jahr 2018 wiederingestellt haben. Hierzu zählt z. B. die Sky Deutschland AG. Tabelle 8-1 illustriert die Subsample-Klassifizierung und zeigt weiterhin, dass die Gruppe der Lasting Entrants 177 und die Departing Survivors 359 Unternehmen enthält.

Im Datensatz aller 902 Unternehmen sind 22 Prozent in der Konsumbranche tätig. Dicht gefolgt von Banken und Versicherungen, die mit 21 Prozent vertreten sind. Die wenigsten Unternehmen sind hierbei aus den Bereichen Stahl und Bau mit Anteilen von 3 und 6 Prozent. Die folgende Abbildung 8-4 zeigt die Unternehmen des gesamten Datensatzes aufgeteilt nach den Branchen Bau, Stahl, Elektro, Chemie und Pharma, Banken und Versicherungen, Versorger, Fahrzeug und Maschinenbau, Konsum und Sonstige.

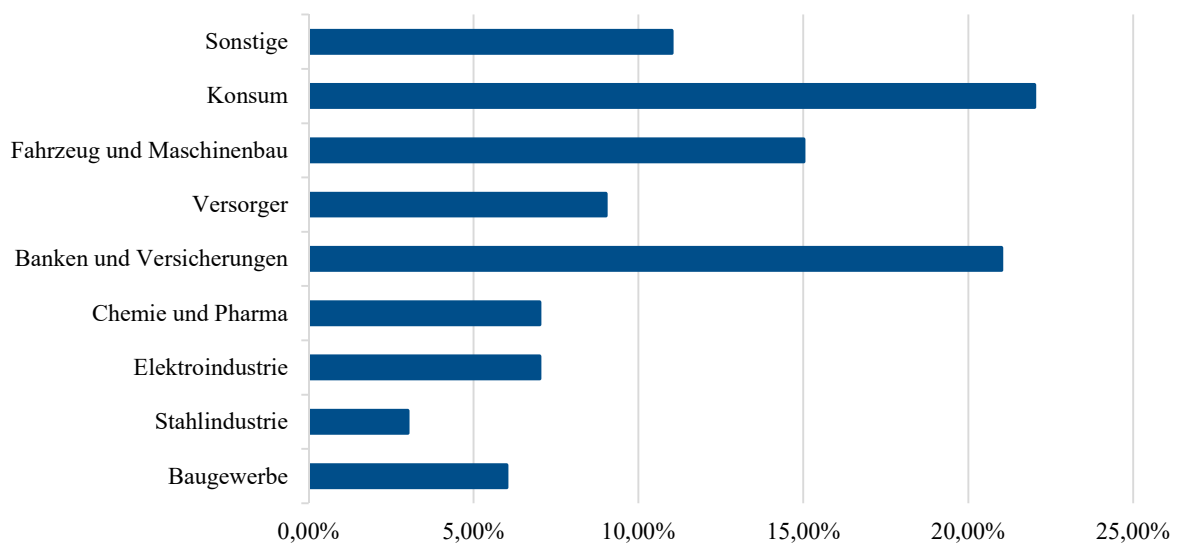


Abbildung 8-4: Branchen im gesamten Datensatz

Zur Untersuchung der Notierungseinstellungen erfolgt eine Aufteilung entsprechend der oben genannten Gründe in 4 Subsamples. Jedem Sample werden bei ausreichender Datenverfügbarkeit mindestens 25 Unternehmen zugewiesen. Entscheidend hierbei ist, dass die Unternehmen nach Aktualität der Notierungseinstellung sortiert werden. Aufgrund einer unzureichenden Datenverfügbarkeit über die weit in der Vergangenheit liegenden Fusionen werden lediglich die übrigen 3 Subsamples (Kauf, Going Private, Konkurs), sowie die DAX 30-Unternehmen als Vergleichsgruppe detailliert untersucht. Dazu

werden Unternehmenskennzahlen wie Eigenkapitalquote, Eigenkapitalrentabilität, Umsatz, Umsatzrentabilität, EBIT und Jahresüberschuss/-fehbetrag betrachtet. Diese Kennzahlen geben sowohl Aufschluss über die Rentabilität, finanzielle Stabilität als auch über die wirtschaftliche Entwicklung der Unternehmen. Voraussetzung für eine Berücksichtigung in der Analyse ist, dass die Werte für mindestens 5 Jahre vor der jeweiligen Notierungseinstellung verfügbar sind. Unternehmen, für die weniger Informationen vorlagen, werden aufgrund von mangelnder Vergleichbarkeit nicht berücksichtigt.

## 8.4. Ergebnisse

### 8.4.1. Notierungsdynamik an deutschen Börsen

Im Betrachtungszeitraum von 1950 bis Anfang 2018 waren insgesamt 902 deutsche Unternehmen zumindest temporär im Amtlichen Handel oder im Regulierten Markt einer deutschen Wertpapierbörse notiert. Zu Beginn des Jahres 1950 lag die Zahl bei 417 notierten Unternehmen und zum Ende des Betrachtungszeitraums zum 01.01.2018, noch bei 253 Unternehmen. Dabei haben in den 68 Jahren 485 Unternehmen eine Notierung aufgenommen und 649 ihre Notierung aus verschiedenen Gründen eingestellt. Folglich ergibt sich eine durchschnittliche Verringerung an Börsennotierungen von 2,41 Unternehmen pro Jahr bzw. eine alle 5 Monate. Dies entspricht einer Verkleinerung des Kurszettels um bemerkenswerte 39% in 68 Betrachtungsjahren.

Da Ising, Schiereck und Stöber (2009) und Gaar und Schiereck (2013) durchschnittliche Rückgänge an Notierungen von 1,4 Unternehmen pro Jahr und 17,9% über den kompletten Untersuchungszeitraum bzw. 2,1 und 31,9% ermitteln, wird die zunehmende negative Dynamik in den Notierungszahlen deutlich. Im Zeitraum zwischen 2012 und 2018 kommt es jährlich im Schnitt zu mehr als 10 Notierungseinstellungen bei gleichzeitig geringer Anzahl an Neunotierungen.

Die Anzahl an Notierungen schwankt zwischen dem Maximalwert von 488 im Jahr 1958 und dem Minimalwert von 253 notierten Unternehmen zu Beginn des Jahres 2018. Langfristig ist eine deutlich negative Entwicklung erkennbar. Abbildung 8-5 zeigt die Anzahl der Börsennotierungen am Anfang des jeweiligen Jahres und unterstreicht den negativen Trend über eine approximierte lineare Trendlinie.

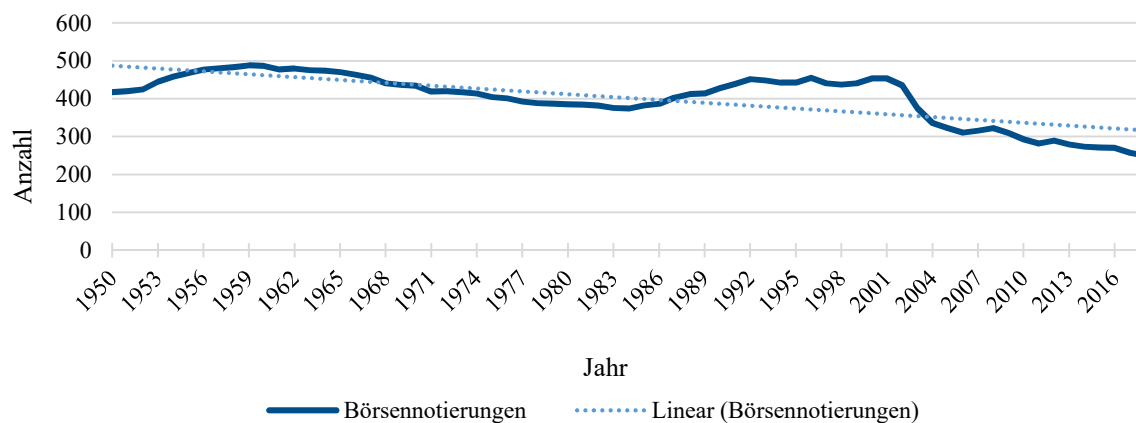


Abbildung 8-5: Anzahl Notierungen von 1950 bis 2018

Die Anzahl der jährlichen Börsengänge schwankt im Untersuchungszeitraum zwischen 0 und 30 im Jahr 1999. Mit diesem Wert schließt ein in den 1990er Jahren erkennbarer Trend steigender Anzahlen an Notierungsaufnahmen ab. Mit Blick auf die Notierungseinstellungen finden sich die Maximalwerte von 61 im Jahr 2002 und von 39 im Folgejahr 2003. Mehr als ein Viertel (27,4%) aller Notierungseinstellungen fand zwischen 2000 und 2005 statt. Abbildung 8-6 fasst diese Ergebnisse zusammen und illustriert speziell die Bedeutung der 2000er Jahre sowie das konstant hohe Niveau an Notierungseinstellungen ab 2010. Zusätzlich zeigt die Abbildung für jedes Jahr des Betrachtungszeitraums die Zu- und Abgänge sowie die gleitenden Durchschnitte in 5-Jahres-Intervallen. Hierdurch werden die langfristigen Trends bei den Zu- und Abgängen noch deutlicher.

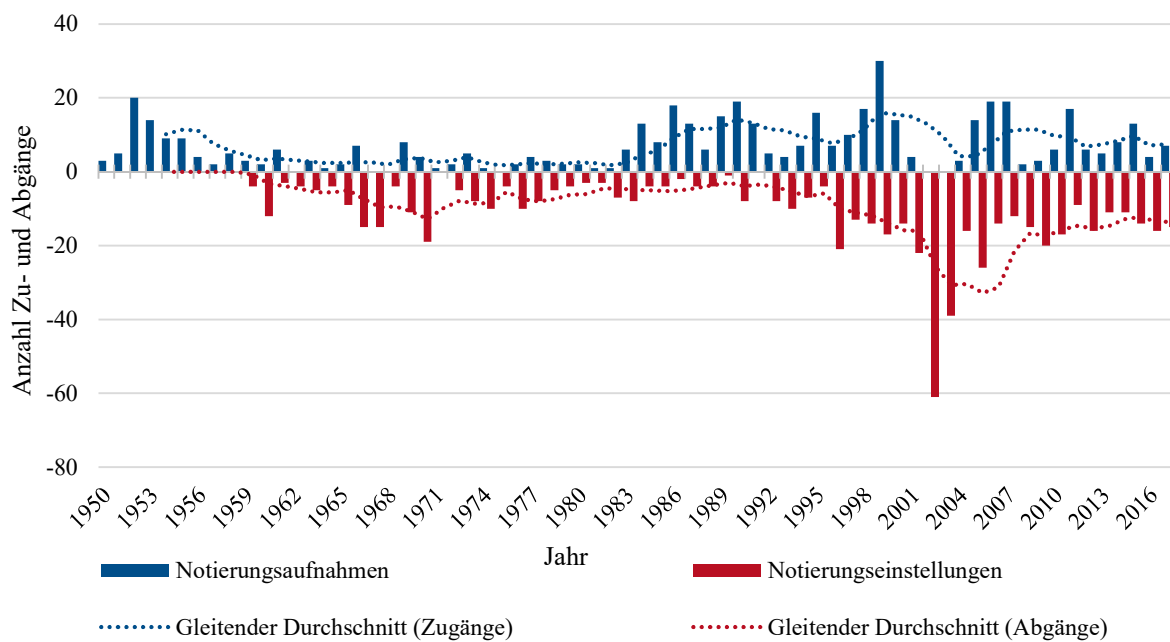


Abbildung 8-6: Notierungsaufnahmen und -einstellungen von 1950 bis 2018

Auffallend ist, dass in den Jahren 2002 und 2003 kein Unternehmen eine Notierung am Regulierten Markt aufgenommen hat. Gleichzeitig hat sich eine Tendenz zu freiwilligen Börsenrückzügen entwickelt, darunter die Dresdner Bank oder die T-Mobile AG. „Die wachsende Bedeutung dieser Vorgänge spiegelt sich in der Anzahl und Größe der Transaktionen wider“ (Kemper, 2007). Etwa 10% der noch 2001 an der Börse gelisteten Unternehmen haben ihre Notierung in den Folgejahren aufgegeben.

Die Auswertung der Notierungsdynamik in den einzelnen Subsamples führt definitionsgemäß zu großen Unterschieden zwischen den einzelnen Gruppen. In dem Subsample der LS mit 58 Unternehmen (entspricht 6,43% des gesamten Datensatzes) ergibt sich folglich eine Notierungsdauer über den Gesamtbetrachtungszeitraum von 68 Jahren. Für die Gruppe der DS mit 359 Unternehmen (39,80%) berechnet sich eine durchschnittliche Notierungsdauer von 40,23 Jahren bei einer Standardabweichung von 17,1 Jahren. Für beide Gruppen wird aus Gründen der Vergleichbarkeit als einheitlicher Startzeitpunkt der 31.12.1949 gesetzt. Im Subsample der DE befinden sich 290 Unternehmen (32,15%). Die durchschnittliche Notierungsdauer liegt hier bei 18,87 Jahren bei einer Standardabweichung von 14,34

Jahren. Bei den LE mit 195 Unternehmen (21,62%) beträgt die Notierungsdauer im Durchschnitt bei 18,69 Jahren mit einer Standardabweichung von 15,83 Jahren.

Die insgesamt lange Notierungsdauer im Amtlichen Handel bzw. Regulierten Markt wird im folgenden Schritt nochmals getrennt für die eingangs eingeführten Branchen untersucht. Hierbei erreichen Banken und Versicherungen die längste Notierungsdauer mit durchschnittlich 37,74 Jahren bei einer Standardabweichung von 22,4 Jahren. Darauf folgen die Versorger mit einer Notierungsdauer von 35,54 Jahren. Hier berechnet sich die Standardabweichung zu 20,75 Jahren. In 6 von insgesamt 9 Branchen liegt die Notierungsdauer über 30 Jahren und verdeutlicht nochmals die hohe Kontinuität und Konstanz im Amtlichen Handel bzw. Regulierten Markt. Lediglich die Elektrobranche erreicht eine durchschnittliche Notierungsdauer von unter 20 Jahren. Dies ist allerdings erwartungsgemäß, da das enorme Wachstum dieser Branche sowie die steigende Anzahl an Börsennotierungen erst in jüngster Vergangenheit eingesetzt haben. Die folgende Abbildung zeigt die Notierungsdauern innerhalb der einzelnen Branchen in grafischer Darstellung.

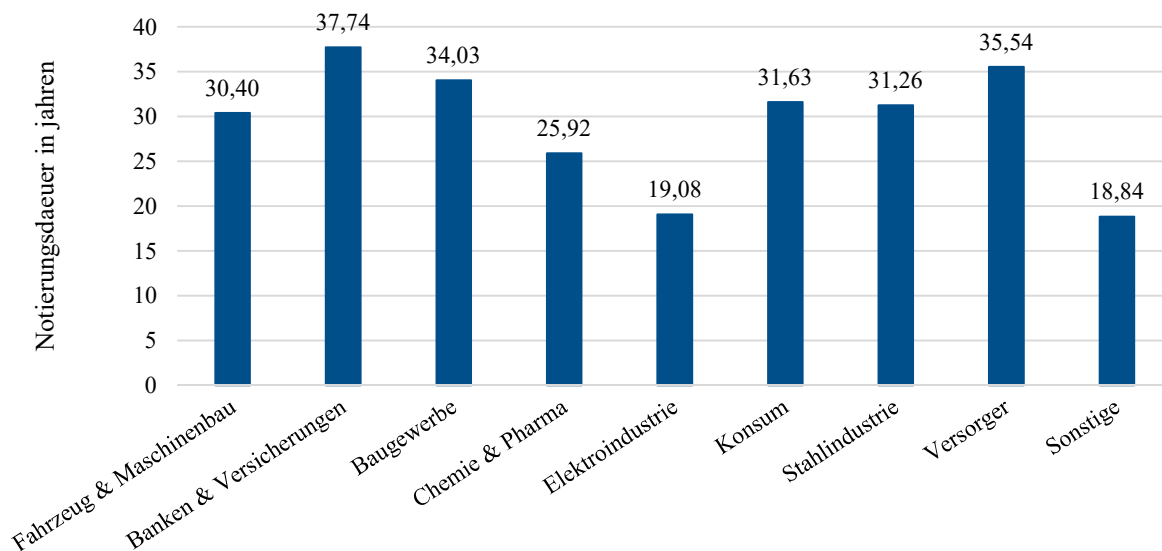


Abbildung 8-7: Notierungsdauer innerhalb der einzelnen Branchen

Bei der Auswertung der Überlebensdauer über verschiedene Zeitperioden wird erneut eine zunehmende Dynamik am deutschen Aktienmarkt erkennbar. Die einjährige Notierungseinstellungsrates und die zehnjährige Notierungseinstellungsrates zeigen beide über die Untersuchungsperiode hinweg eine insgesamt stark steigende Tendenz. In der kurzfristigen Periode von einem Jahr schwankt die Rate bis 2001 zwischen null und fast 5%. Im Jahr 2002 liegt die Rate für eine Notierungseinstellung im Folgejahr sogar bei 14%. Konsistent dazu finden in diesem Jahr – wie bereits oben erläutert – die meisten Notierungseinstellungen statt. In den Folgejahren kommt es wiederum zu starken Schwankungen. Über den gesamten Betrachtungszeitraum liegt die durchschnittliche Rate für eine Notierungseinstellung eines Unternehmens im Folgejahr bei 2,55%. Abbildung 8-8 fasst diese Ergebnisse grafisch zusammen.

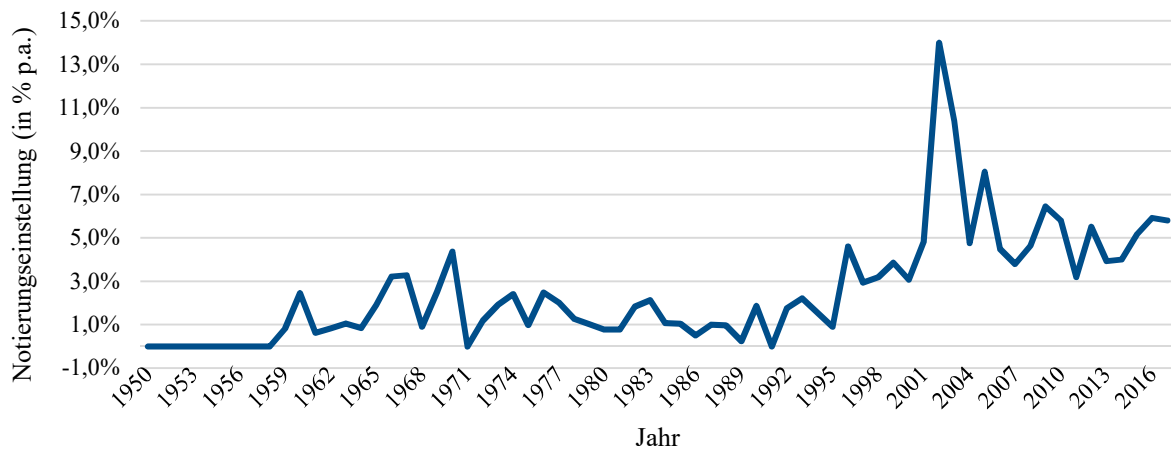


Abbildung 8-8: Einjährige Notierungseinstellungsrate von 1950 bis 2017

Bei Betrachtung der langfristigen Notierungseinstellungsraten zwischen 1950 und 2008 kommt es zu wesentlich größeren Ausschlägen. Hierbei variiert die Rate im Zeitraum zwischen 1950 und 1986 zwischen 0,96% und ca. 20%. Zwischen den Jahren 1991 und 2008 berechnen sich Werte zwischen 24% und 54%. Der größte Anstieg liegt zwischen den Jahren 1991 und 1996. Der Maximalwert wird im Jahr 1998 erreicht, wie Abbildung 8-9 illustriert.

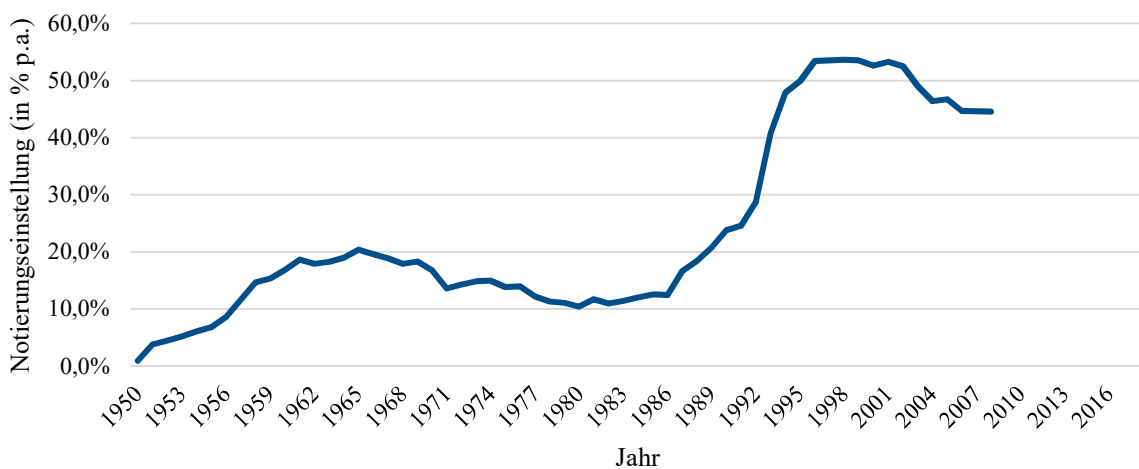


Abbildung 8-9: Zehnjährige Notierungseinstellungsrate von 1950 bis 2008

Durch den Anstieg der Notierungseinstellungsraten wird deutlich, dass nicht nur die Zahl der notierten Gesellschaften, sondern auch die Notierungsdauer an den deutschen Börsen langfristig abnimmt.

## 8.4.2. Performance und Notierungsdauer

Für einen aussagekräftigen Performanceüberblick werden geometrische Durchschnittsrenditen wie folgt berechnet.

$$TR_{i,1974-2018} = \left( \frac{Kurs_{i,12/2017}}{Kurs_{i,01/1974}} \right)^{\frac{1}{44}} - 1$$

### Performance der Subsamples

Das Subsample der LS umfasst 58 Unternehmen von 1974 bis Ende 2017, den Zeitraum, für den vollständige Aktienkursdaten vorliegen. In einem ersten Schritt erfolgt die Betrachtung der jährlichen Renditen. Für jedes Unternehmen existieren 44 Jahresrenditen, also für das Subsample 2552 auswertbare Jahresrenditen. Der Mittelwert der jährlichen Durchschnittsrenditen liegt im Betrachtungszeitraum bei 4,29% mit einer Standardabweichung von 5,77%. Die Renditeverteilung weist eine negative Schiefe von -0,34 auf. Es liegt somit eine linksschiefe Verteilung vor, und der Median (5,34%) ist größer als der Mittelwert. Die größten durchschnittlichen Jahresrenditen weisen die Hochtief AG mit 16,6% und die BMW AG mit 15,01% aus. Im Gegensatz dazu ist die durchschnittliche jährliche Performance der Ru-beroid AG mit -10,05% am schwächsten. Insgesamt weisen 13 Unternehmen (22,4%) aller LS über den Betrachtungszeitraum eine negative Durchschnittsrendite auf.

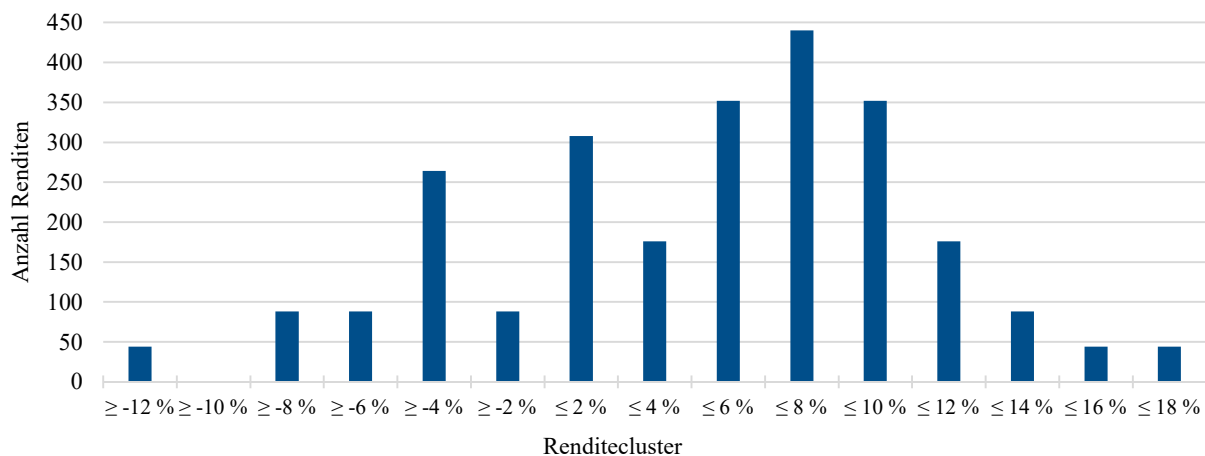


Abbildung 8-10: Renditeverteilung der LS von 1974 bis 2017

Die durchschnittliche Rendite des gesamten Datensatzes beträgt -0,51% bei einer Standardabweichung von 16,05%. Die LS gehören dabei bezüglich ihrer Aktienrenditen im Schnitt zu den solidesten und stabilsten deutschen Unternehmen. Ihre Ergebnisse werden in Abbildung 8-10 grafisch dargestellt mit aggregierter Verteilung der durchschnittlichen jährlichen Renditen in 2-Prozent-Intervallen. Dabei beschreibt die Beschriftung „≥ -2%“ das Intervall [-2,0). Gleichmaßen beschreibt die Beschriftung „≤ 10%“ das Intervall (8,10].

Die Gruppe der LE beinhaltet 195 Unternehmen und erreicht eine durchschnittliche jährliche Rendite von 3,55%. (Standardabweichung 23,22%). Hiervon weisen 75 Unternehmen oder 38,46% des Subsamples eine negative durchschnittliche Rendite auf. Die DE erreichen insgesamt eine durchschnittliche jährliche Performance von -5,81% (Standardabweichung 26,22%) mit sogar 131 von 290 Unternehmen mit negativer Rendite (45,17%). Im Subsample der DS mit 359 Unternehmen berechnet sich die durchschnittliche jährliche Performance zu 1,88% (Standardabweichung 4,79%). Die schwache durchschnittliche Rendite des gesamten Datensatzes beruht erwartungsgemäß im Wesentlichen auf den großen Gruppen der DE und DS, die ihre Notierungen inzwischen eingestellt haben. Die Daten weisen aber auch auf die Risiken naiver Diversifikation hin, denn die durchschnittliche gleichgewichtete Rendite liegt deutlich unter der von wertgewichteten Performanceindices.

Für eine weitere Steigerung der Aussagekraft werden die Branchen getrennt untersucht. Hierbei erreichen Versorgungsunternehmen sowie Unternehmen aus der Chemie und Pharmaindustrie die höchsten Renditen mit jeweils über 4 Prozent. Dicht dahinter liegt die Stahlbranche mit durchschnittlich 3,67 Prozent. Mit einem leichten jährlichen Zuwachs von 0,77 Prozent folgen Banken und Versicherungen. Die weiteren Branchen weisen alle eine durchschnittliche negative Rendite auf.

Zur Einordnung und zur Bewertung der Zahlen wird die Performance der DAX 30-Unternehmen als Vergleich herangezogen. Hier wird eine durchschnittliche jährliche Rendite von 9,23 Prozent erreicht. Die Standardabweichung liegt bei 15,12 Prozent und somit in einem vergleichbaren Bereich wie für alle Unternehmen des Datensatzes. Die folgende Abbildung stellt die Performance der einzelnen Branchen gegenüber. Alles in allem zeigen die deutschen Unternehmen eine schwache Performance. Lediglich kleine Gruppen stechen mit einer stark positiven Rendite heraus.

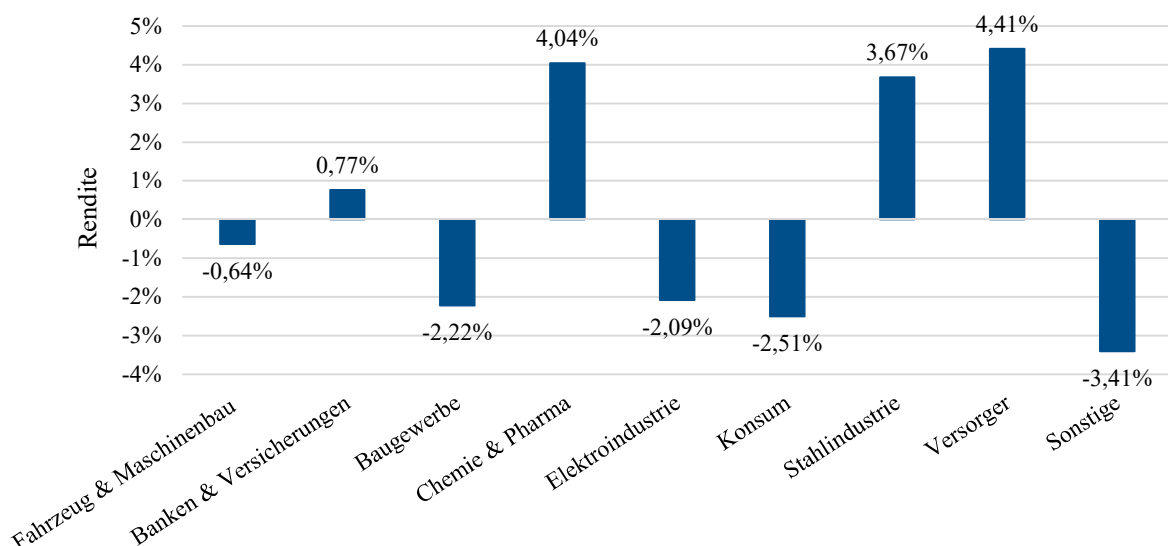


Abbildung 8-11: Aktienkursperformance der einzelnen Branchen

## Aktienkursperformance in Abhängigkeit des Notierungszeitpunkts

Für einen besseren Überblick über die Entwicklung der Performance wird in einem nächsten Schritt die durchschnittliche jährliche Performance in Abhängigkeit des Jahres einer Notierungsaufnahme berechnet. Für diese Untersuchung steht der Zeitraum von 1948 bis 2016 zur Verfügung, da Notierungsaufnahmen aus dem Jahr 2017 noch keine Notierungsdauer von einem Jahr aufweisen. Die Auswertung zeigt, dass insgesamt die Anzahl der negativen durchschnittlichen jährlichen Renditen immer größer wird. Im Zeitraum von 1948 bis 1978 liegt lediglich in 3 Fällen eine negative Rendite vor. Das bedeutet, dass in den übrigen 29 Jahren dieses Zeitabschnitts eine Notierungsaufnahme eine positive durchschnittliche jährliche Rendite erwirtschaftet hat.

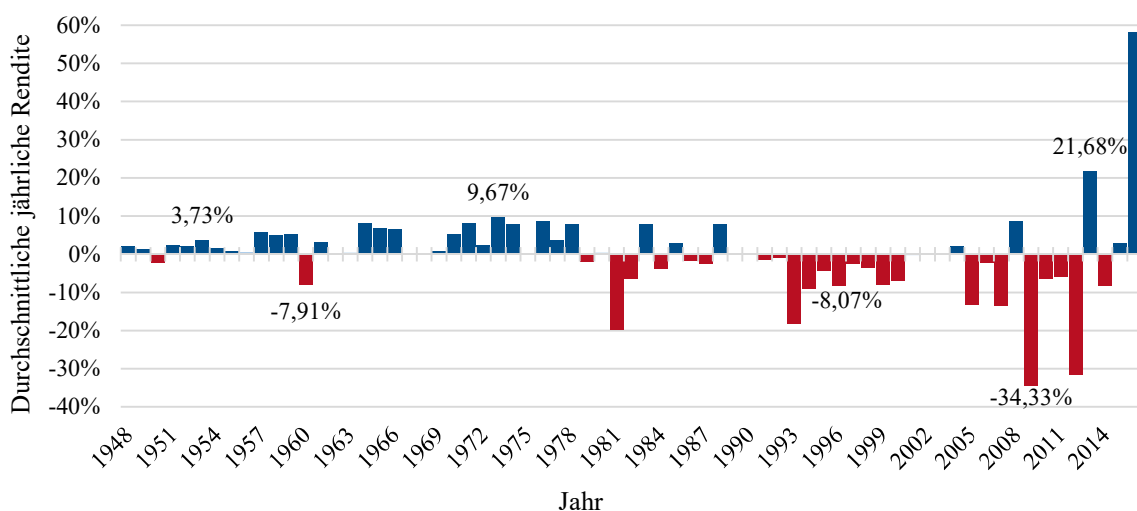


Abbildung 8-12: Durchschnittliche jährliche Rendite für Notierungsaufnahmen von 1948 bis 2016

Im Gegensatz dazu haben Unternehmen, die in den letzten 10 Jahren des Betrachtungszeitraums ihre Notierung aufgenommen haben, in 6 Jahren durchschnittlich eine stark negative Rendite erreicht, und ab dem Jahr 1990 wurde lediglich in 5 Jahren eine positive Rendite erzielt. Diese kritische Performance ist in den letzten Jahren stark gewachsen. Zum Beispiel haben Unternehmen, die ihre Notierung im Jahr 2009 aufgenommen haben, im Durchschnitt eine jährliche Rendite von -34,33% erreicht, wie Abbildung 8-12 dokumentiert.

Gaar und Schiereck (2013) berichten eine Abhängigkeit der Performance von der Eigentümerstruktur. Deshalb wird auch hier nun die Eigentümerstruktur, approximiert durch die Daten zu Beginn des Jahres 2018, im Kontext der Performance betrachtet. Die Existenz eines Großaktionärs kann für die Performance einerseits sehr förderlich sein, da durch einen großen einzelnen Aktionär eine bessere Überwachung möglich ist, andererseits besteht die Gefahr bei großen Aktionären, dass diese ihre eigenen Interessen über die der Firma oder anderer Aktionäre stellen. Für die LS ergeben sich 38 abhängige

Unternehmen mit einem Großaktionär, der mehr als 50% der Anteile hält. Der Mittelwert der geometrischen Durchschnittsrenditen liegt für diese Unternehmen bei 2,84%. Für die bezüglich der Eigentümerstruktur unabhängigen Unternehmen ergibt sich ein Mittelwert von 7,02%.

Fasst man die Gruppen der LS und LE zusammen, erreicht der Mittelwert für die unabhängigen Unternehmen eine jährliche Rendite von 4,7% (Standardabweichung 25,7%) und für die abhängigen Unternehmen 2,5% (Standardabweichung 8,8%). Unabhängige Unternehmen ohne Mehrheitsaktionär waren also renditestärker. Diese Erkenntnis widerspricht den Ergebnissen von Gaar und Schiereck (2013) und Seifert et al. (2005), die eine stärkere Rendite bei Unternehmen mit einem Mehrheitsaktionär feststellten. Diese Schlussfolgerung gilt allerdings nur für Unternehmen, die bis einschließlich 01.01.2018 an einer deutschen Börse notiert waren und unter der Annahme, dass die Eigentümerstruktur zum Ende der Betrachtungsperiode repräsentativ für die Gesamtlaufzeit ist.

In einem nächsten Schritt wird wiederum für die Gruppe der LS die Beziehung zwischen Aktienrenditen und Marktkapitalisierung untersucht. Als Vergleichsindex wird der DAX 30 herangezogen. Für den Zeitraum von 1974 bis 2017 liegt hier eine jährliche Durchschnittsperformance von 8,2% vor. 15 Unternehmen des Subsamples LS weisen größere Renditen auf. Die mittlere Marktkapitalisierung dieser Gruppe liegt bei ca. 18 Milliarden Euro und die mittlere Rendite bei 10,86%. Für die übrigen 43 Unternehmen, die eine schwächere Performance als der Vergleichsindex aufweisen, berechnet sich eine mittlere Marktkapitalisierung von etwa 1,5 Milliarden Euro und eine Durchschnittsrendite von 1,99%. Größere LS wiesen also im Schnitt eine höhere Performance aus.

### 8.4.3. Notierungseinstellungen

Im letzten Untersuchungsschritt wird nun der Frage nachgegangen, ob es im Vorfeld der Notierungseinstellungen bereits auffällige Kennzahlenentwicklungen gegeben hat. Zunächst fällt bei der Zusammensetzung der Gruppe ausgeschiedener Unternehmen die recht kleine Zahl (18%) an Konkursen auf, die auch erst nach einer durchschnittlichen Notierungsdauer von 29,92 Jahren auftreten.

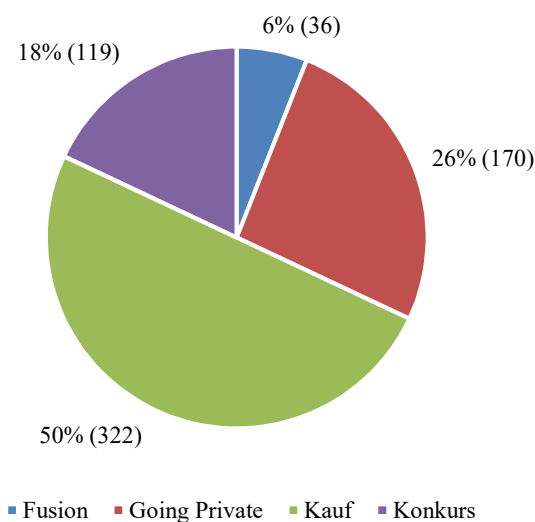


Abbildung 8-13: Gründe für eine Notierungseinstellung und Anteil am Gesamtdatensatz

Im Umkehrschluss bedeutet dies, dass bei mehr als 80% aller Notierungseinstellungen das dann ehemals gelistete Unternehmen weiterlebt. Der Hauptgrund für die Notierungseinstellung ist in jedem zweiten Fall (50%) eine Kauftransaktion. Die vorhergehende durchschnittliche Notierungsdauer beträgt hier im Schnitt 31,93 Jahre. Eine von 4 Notierungseinstellungen (26%) erfolgt als Going Private im Schnitt nach einer Notierungsdauer von 31,10 Jahren. Mit 6% kommen Fusionen als Grund für Notierungseinstellungen nur sehr selten vor. Abbildung 8-13 zeigt die Anteile in einem Kuchendiagramm.

Um eine bessere Aussage treffen zu können, ob der Rückgang an Börsennotierungen aufgrund einer negativen wirtschaftlichen Entwicklung der Unternehmen geschah, zeigt Abbildung 8-14 die Gründe für eine Einstellung im Zeitraum von 1950 bis 2017, wobei es vor 1959 keine Notierungseinstellungen gab und dieser Zeitraum somit nicht in der Abbildung enthalten ist. Es zeigt sich in den 58 Jahren ab 1959, dass die Anzahl der „Going Privates“ durchgehend volatil ist und ein Maximum von 10 Einstellungen im Jahr 1966 hat.

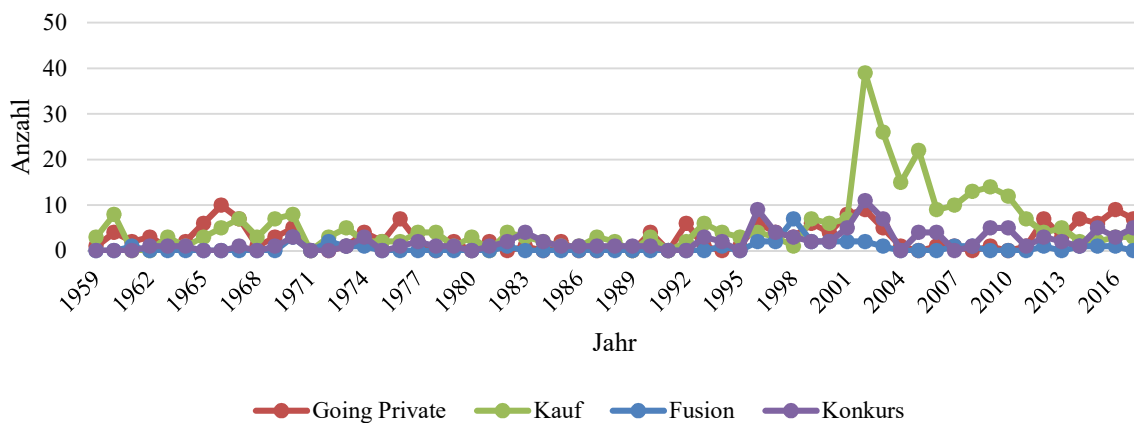


Abbildung 8-14: Gründe für eine Notierungseinstellung im Zeitraum 1959 bis 2017

Die meisten Unternehmen sind durch einen Kauf vom Aktienmarkt verschwunden. Die maximale Anzahl an gekauften Unternehmen in Höhe von 39 ist im Jahr 2002 und somit auf die Dotcomblase zurückzuführen. Für einen besseren Überblick finden sich im Anhang Abbildungen für jeden Einstellungsgrund einzeln. Der seltenste Grund für eine Einstellung ist eine Fusion mit einem Maximum von 7 Fusionen im Jahr 1998, während die meisten börsennotierten Unternehmen im Jahr 2002 aufgrund eines Konkurses ihre Notierung einstellen mussten. Es zeigt sich, dass die Dotcomblase in den Jahren 2002 und 2003 zu dem größten Rückgang an Börsennotierungen führte, während die Finanzkrise in den Jahren 2007 und 2008 insgesamt keinen großen Einfluss hatte. Bei einem Blick auf die Gründe für eine Notierungseinstellung aufgeteilt nach Branchen, wird das sehr heterogene Bild deutlich. Während Banken und Versicherungen stark von Käufen und Fusionen geprägt sind, spielen Notierungseinstellungen in der Metallindustrie keine große Rolle. Die Branche mit den zweitmeisten Notierungseinstellungen ist die Konsumgüterbranche, die gleichzeitig die meisten insolventen Unternehmen und zweitmeisten aufgekauften Unternehmen hat. Abbildung 8-15 zeigt die weiteren Branchen und die jeweiligen Gründe für eine Notierungseinstellung.

Die durchschnittliche Notierungsdauer von allen 649 Notierungseinstellungen liegt bei 30,99 Jahren. Abbildung 8-16 fasst die Gründe für Notierungseinstellungen und die durchschnittliche Notierungsdauer vor einer solchen Transaktion zusammen. Dabei wird offensichtlich, dass es kaum Variationen in der (sehr langen) durchschnittlichen Notierungsdauer gibt, wenn nach den 4 Notierungsgründen differenziert wird.

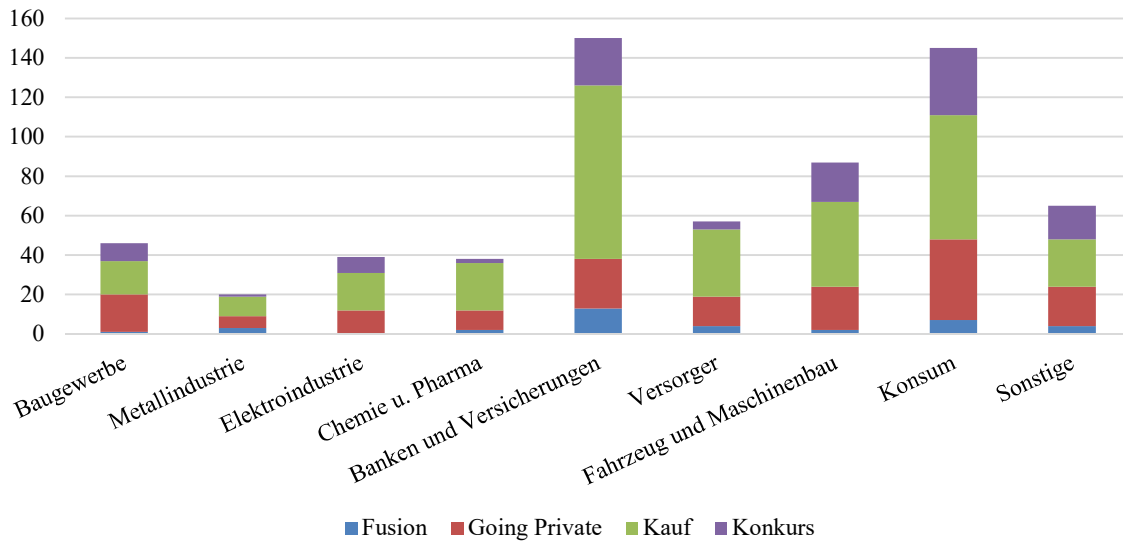


Abbildung 8-15: Gründe für eine Notierungseinstellung nach Branche

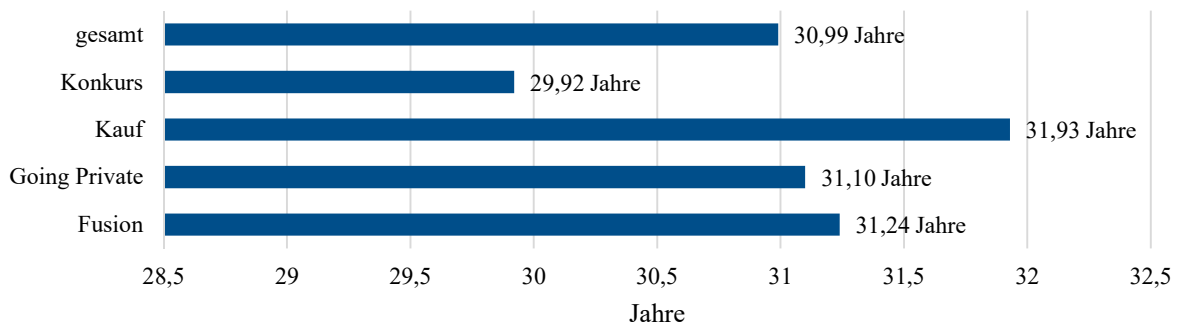


Abbildung 8-16: Durchschnittliche Notierungsdauer vor einer Notierungseinstellung

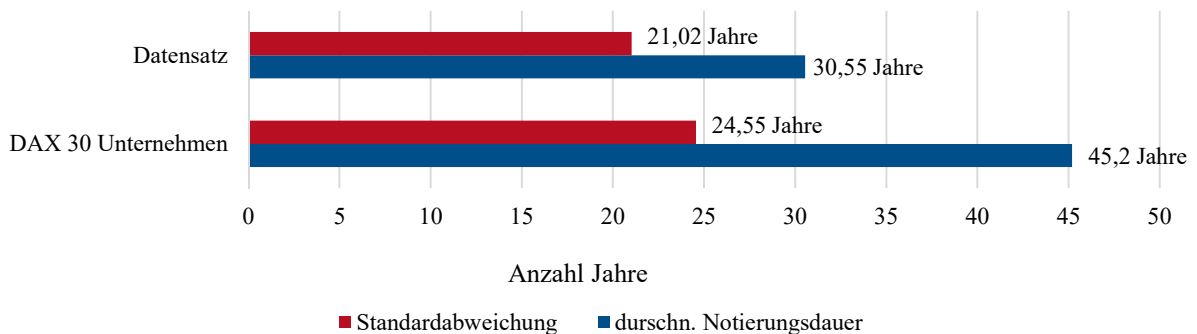


Abbildung 8-17: Notierungsdauer der DAX 30-Unternehmen

Die trotz der zunehmenden Notierungsdynamik lange Notierungsdauer im Amtlichen Handel bzw. Regulierten Markt wird von den DAX 30-Unternehmen noch deutlich übertroffen. Hier ergibt sich eine durchschnittliche Notierungsdauer von 45,2 Jahren, wie Abbildung 8-17 zeigt.

### Aktienkursperformance in Abhängigkeit der Notierungseinstellung

Im Betrachtungszeitraum von 1950 bis 2018 haben insgesamt 649 deutsche Unternehmen ihre Aktiennotierung an einer deutschen Wertpapierbörse aufgegeben. Die durchschnittliche jährliche Performance dieser Unternehmen liegt bei -1,95% und fällt somit um 1,44 Prozentpunkte schwächer aus als die durchschnittliche Performance des Gesamt Datensatzes. Innerhalb der 4 nach Einstellungsgründen abgegrenzten Subsamples ergeben sich zum Teil große Unterschiede. Für die 119 Unternehmen, die Konkurs anmelden mussten, berechnet sich eine Rendite von -21,59% (Standardabweichung 28,94%). Dies ist erwartungsgemäß die schlechteste Performance aller betrachteten Unternehmen. Im Falle eines freiwilligen Börsenrückzugs (Going Private), das von 170 Unternehmen durchgeführt wurde, liegt die durchschnittliche jährliche Rendite bei -0,10% (Standardabweichung 10,6%). Die Rendite der übernommenen Unternehmen weist die höchste Performance aus mit 4,31% (Standardabweichung 11,5%). Zur Einordnung dieser Rendite gilt es allerdings zu beachten, dass zum einen hier eine gezahlte Übernahmeprämie eingeschlossen ist, die typischerweise einen signifikant zweistelligen Aufschlag auf den letzten zuvor festgestellten Kurs ausmacht. Zum anderen liegt die jährliche Rendite dennoch bei gerade einmal der Hälfte der DAX-Rendite. Im Subsample der Fusionen entspricht die durchschnittliche jährliche Rendite 3,88% (Standardabweichung 9,02%). Abbildung 8-18 verdeutlicht diese Ergebnisse. Als Vergleichsgruppe werden erneut die DAX 30-Unternehmen herangezogen.

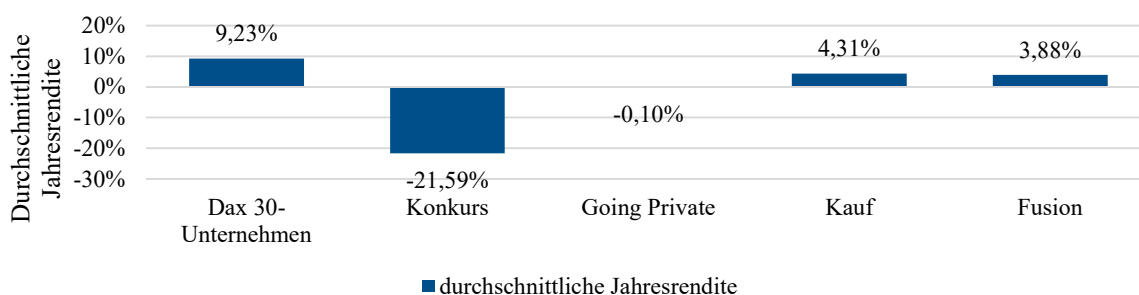


Abbildung 8-18: Jahresrenditen vor Notierungseinstellungen

Angesichts der sehr heterogenen Gründe für den Rückzug von der Börse sind keine einheitlichen Performancekennzahlen im Vorfeld der Notierungseinstellung zu erwarten, sondern viel mehr eine klare Differenzierung zwischen Notierungseinstellung in Not bzw. als Akt des freiwilligen Rückzugs. Für entsprechende Auswertungen bei den Konkursen, Going Privates und Akquisitionen wurden jeweils die letzten 7 Jahre der Börsennotierung analysiert (aufgrund der geringen Fallzahl werden Fusionen nicht weiter betrachtet). Zur Einordnung der Kennzahlen werden jeweils die Werte für die DAX 30-Unternehmen im Zeitraum zwischen 2011 und 2017 mit berichtet.

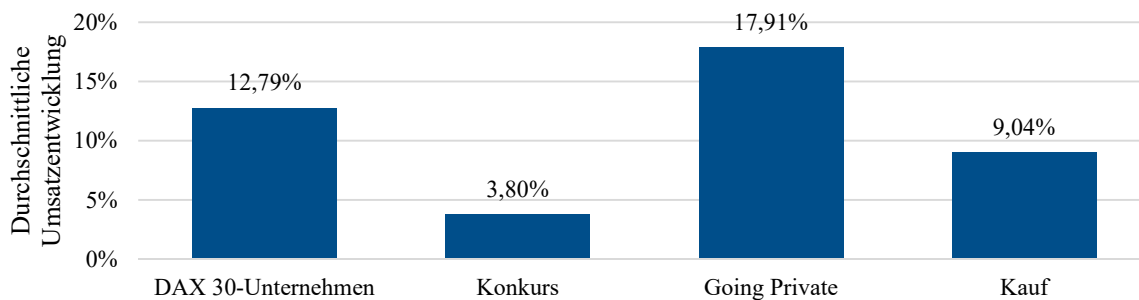


Abbildung 8-19: Umsatzentwicklung vor Notierungseinstellungen

Bei allen Subsamples sind die Umsatzzahlen über die letzten 7 Jahre der Notierung gewachsen, allerdings höchst unterschiedlich. Während bei den freiwilligen Notierungseinstellungen ein durchschnittlicher Umsatzanstieg von 17,91% erreicht wird, sind es im Subsample der Konkurse gerade 3,80% und bei den aufgekauften Unternehmen 9,04%. Abbildung 8-19 fasst die Ergebnisse zusammen. Dieses Grundmuster mit Kennzahlenausprägungen, bei denen das Subsample der Konkurse besonders schlechte und das der Going Privates besonders gute Werte ausweist, zeigt sich unabhängig von der konkret betrachteten Kennzahl, wie bspw. Abbildung 8-20 für die EBIT-Entwicklung und Abbildung 8-21 für den Jahresüberschuss illustriert.

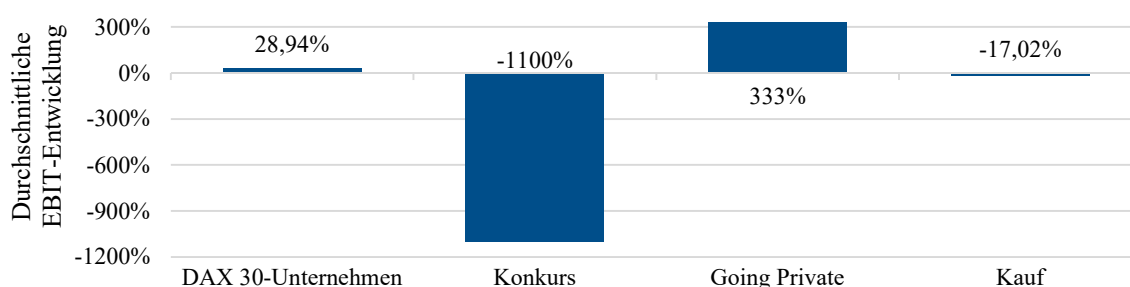


Abbildung 8-20: EBIT-Entwicklung vor Notierungseinstellungen

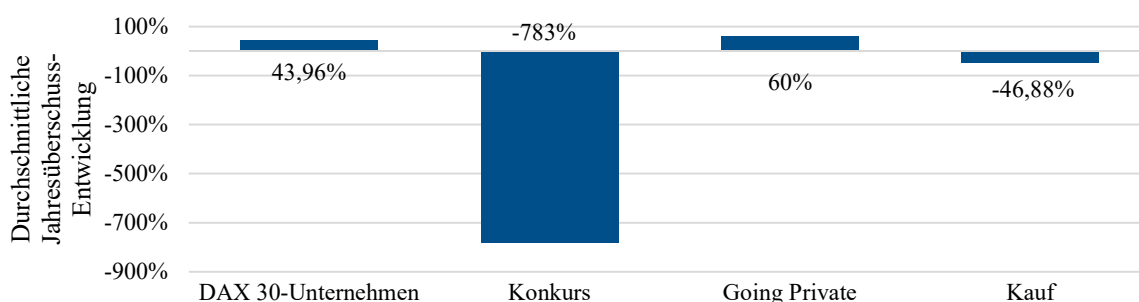


Abbildung 8-21: Jahresüberschuss/-fehlbetrag-Entwicklung vor Notierungseinstellungen

Bemerkenswert ist bei den Kennzahlenentwicklungen die zunächst besonders positiv erscheinenden Werte der Going Privates, die durchschnittlich höhere Kenngrößen ausweisen als die DAX 30-Unter-

nehmen. Dieser Eindruck relativiert sich allerdings, wenn die durchschnittliche Entwicklung der Umsatz- und Eigenkapitalrentabilität in den Jahren vor einer Notierungseinstellung betrachtet wird. Während die Werte für einen Konkurs am schlechtesten abschneiden, fallen die Zahlen für einen freiwilligen Rückzug zwar unter den Notierungseinstellungen am besten aus, aber die DAX 30-Konzerne sind sehr viel profitabler, wie Abbildung 8-22 und Abbildung 8-23 unterstreichen.

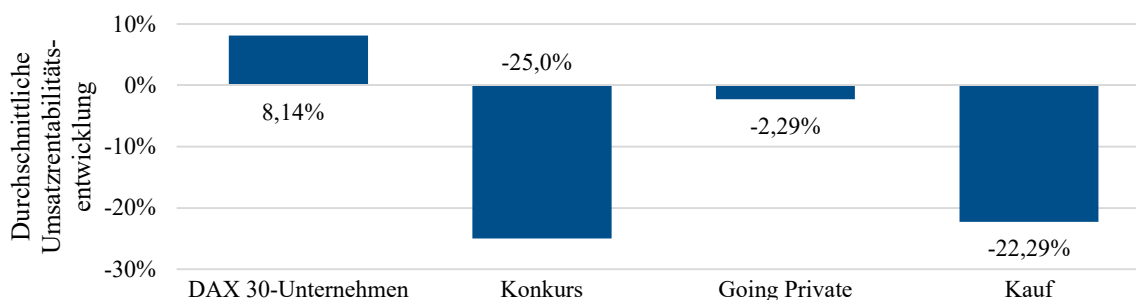


Abbildung 8-22: Umsatzrentabilitäts-Entwicklung vor Notierungseinstellungen

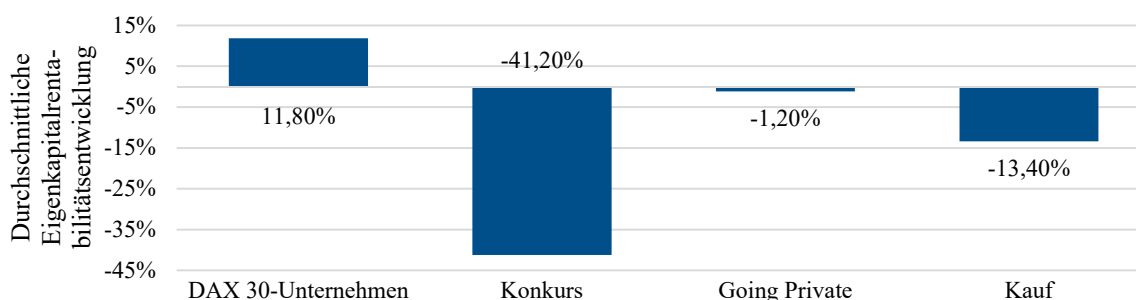


Abbildung 8-23: Eigenkapitalrentabilitäts-Entwicklung vor Notierungseinstellungen

## 8.5. Zusammenfassung und Fazit

Die hier zusammengetragenen Analysen unterstreichen den seit Anfang der 2000er Jahre zunehmend negativen Trend an deutschen Börsen. Es ergeben sich im Durchschnitt 2,41 Nettoabgänge pro Jahr, mit der schlechtesten Entwicklung in der Zeit von 2000 bis 2006, als 19,71 Nettoabgänge pro Jahr zu verzeichnen waren. Konsistent dazu ist die Rate für die Aufrechterhaltung einer Börsennotierung sowohl in der ein- als auch in der zehnjährigen Prognose signifikant niedriger als in der Vergangenheit. Ähnliche Ergebnisse zeigen sich auf dem US-amerikanischen Markt. Im Zeitraum zwischen 1963 und 1996 lassen sich bezüglich der einjährigen Notierungseinstellungsrate vergleichbare Ergebnisse finden. Die zehnjährige Notierungseinstellungsrate liegt allerdings nur zwischen 30 und 40% (Baker & Kennedy 2002). Die negative Notierungsdynamik des deutschen Aktienmarkts lässt jedoch noch keine Schlüsse auf eine negative wirtschaftliche Entwicklung zu. Dafür bedarf es eines tiefergehenden Blickes auf die Gründe für eine Notierungseinstellung. Da zeigt sich, dass die meisten Einstellungen nicht aufgrund einer Insolvenz, sondern in 50% der Fälle aufgrund einer Kauftransaktion stattfanden und das ein Going Private in 26% der Fälle für einen Abgang verantwortlich ist. Lediglich in ca. 18% der Abgänge liegt

ein Konkurs vor, während 6% durch Fusionen von der Börse abgehen. Auch eine Analyse der Gründe, über verschiedene Branchen hinweg, zeigt, dass Kauftransaktionen der häufigste Grund in jeder Branche für eine Einstellung sind, und dass die Finanzkrise lediglich einen Einfluss auf die Kauftransaktionen hatte. Dieser Einfluss fällt aber im Vergleich zu der Dotcom-Blase gering aus, sodass zusammenfassend davon ausgegangen werden kann, dass die Finanzkrise keinen großen Einfluss hatte. Diese Entwicklungen sind, wie in den Abbildungen im Anhang zu sehen, über die Zeit stärker geworden, wobei die Kauftransaktionen insgesamt die höchsten Zuwächse haben und gerade während der Dotcom- und Finanzkrise die höchsten Ausschläge hatten. Die Tatsache, dass in über 80% der Fälle die Unternehmen aufgrund einer Kauftransaktion, einer Fusion oder eines freiwilligen Delistings und nicht aufgrund einer Insolvenz verschwanden, lässt eine negative Aussage über die wirtschaftliche Entwicklung nicht zu. Vielmehr scheinen entweder die Vorteile einer Notierung zu sinken oder die Nachteile zu steigen. Doidge et al. (2017), die ein ähnliches Phänomen für die USA untersuchen, zeigen, dass es vor allem aufgrund von sinkenden Vorteilen geschieht, sodass sich hauptsächlich große Unternehmen, aufgrund ihrer Effizienzvorteile, eine Notierung leisten können. Die genauen Gründe, wieso jedes einzelne Unternehmen freiwillig die Börse verlassen hat, sind sehr unterschiedlich und im Nachhinein nicht in Gänze zu recherchieren. Ein Blick auf die verschiedenen Finanzkennzahlen lässt aber eine Tendenz erkennen. Während die durchschnittliche Umsatz-, EBIT- und Jahresüberschussentwicklung stark positiv ist, ist die durchschnittliche Jahresrendite, die Umsatz- und Eigenkapitalrentabilität leicht negativ. Das bedeutet, dass die Unternehmen im Durchschnitt zwar stark wachsen, aber nach Abzug der Kosten keinen positiven Gewinn ausweisen können. Das diese Unternehmen dann durch einen freiwilligen Rückzug versuchen Kosten zu sparen, ist nicht überraschend und bestätigt die Ergebnisse von Doidge et al. (2017). Weitere Hinweise liefert die Gruppe der DAX-Unternehmen. Einmal zeigen diese Unternehmen durchgehend positive Kennzahlen und zweitens haben sie die durchschnittlich längste Lebensdauer aller untersuchten Gruppen. Es scheint, als ob die DAX-Unternehmen, durch ihre Größe und die damit einhergehenden Effizienzvorteile, sich weiterhin eine Notierung leisten können. Aus diesen Ergebnissen folgt, dass eine Konsolidierung des Aktienmarkts ein natürlicher Prozess ist, während sich gleichzeitig erahnen lässt, dass es andere Formen der Finanzierung geben könnte, die für kleinere Unternehmen ein besseres Kosten-Nutzen-Verhältnis haben.

Die im nationalen Vergleich lange Notierungsdauer deutscher Unternehmen geht langsam zurück, und es stellt sich eine stark wachsende negative Dynamik ein. Entsprechende Evidenz hierfür wird im Vergleich zwischen den hier dokumentierten Ergebnissen mit den Befunden von Gaar und Schiereck (2013) deutlich. Die durchschnittliche Notierungsdauer des gesamten Datensatzes liegt bei 30,56 Jahren und ist somit nur 0,06 Jahre höher als in der Studie von 2013. Trotz der Erweiterung des Betrachtungszeitraums um fast 10% konnte insgesamt nur eine Verlängerung der Notierungsdauer von 0,5% festgestellt werden. Dies liegt v. a. an den Subsamples der DE und DS. Diese Gruppen machen 72,15% des gesamten Datensatzes aus. In beiden Fällen liegt eine stark unterproportionale bzw. negative Entwicklung vor.

Zusammenfassend ergibt sich folgendes Bild. Nicht nur die Anzahl der Unternehmen, sondern auch die durchschnittliche Notierungsdauer ist deutlich gesunken. Auffällig ist, dass dafür selten eine Insolvenz, sondern meist eine Kauftransaktion oder ein freiwilliger Rückzug der Grund ist. In den USA wird als Begründung für die vielen Börsenrückzüge oftmals der Sarbanes-Oxley Act im Jahr 2002 angeführt (Hostak, Lys, Yang & Carr, 2013; Martinez & Serve, 2017). Dieser führt zu höheren Compliance-Kosten für börsennotierte Unternehmen. Berninger, Klug und Schiereck (2018) berichten ähnliche Ergebnisse für 13 europäische Kapitalmärkte. Sie weisen unter anderem auch darauf hin, dass hohe Corporate Governance-Anforderungen und damit verbundene Zusatzkosten, speziell für kleine Unternehmen, in einem signifikanten Zusammenhang mit der Zunahme von Börsenrückzügen stehen.

Nichtsdestotrotz erfüllen Börsen Aufgaben, die komplementär sind zu anderen Formen der Finanzierung über z.B. Banken oder Private Equity, die somit für kleinere Unternehmen nicht mehr nutzbar sind. Vor diesem Hintergrund wird verständlich, warum die Notierungsdynamik auch im Koalitionsvertrag von 2013 in Deutschland festgehalten wurde. „Um Börsengänge für junge, innovative und wachstumsstarke Unternehmen wieder zu beleben, werden wir die Einführung eines neuen Börsensegments „Markt 2.0“ prüfen“ (CDU, CSU & SPD, 2013). Diese Ausrichtung wird nochmals in einem Maßnahmenpaket des Bundesministeriums für Wirtschaft und Energie im Jahr 2014 betont. Kurze Zeit später führte die Deutsche Börse AG auch das Börseneinstiegssegment „Scale“ ein, das sich an kleine und mittlere Unternehmen richtet und somit auf die Wachstumsfinanzierung fokussiert (Mohr, 2016). Auch international wird die Notwendigkeit eines stärkeren Wachstums bei der Zahl der Börsengänge erkannt (Doidge, Karolyi & Stulz, 2017; Kahle & Stulz, 2017). In diesem Zusammenhang kündigte Jean-Claude Juncker, der Präsident der Europäischen Kommission, im Jahr 2014 bei der Bestätigung seiner Ernennung an, den Kapitalmarktzugang über eine europäische Kapitalmarktunion zu erleichtern (Bundesministerium der Finanzen, 2015). Den politischen Ankündigungen sind bislang allerdings keine Taten gefolgt, die den Trend fallender Notierungszahlen gestoppt oder sogar gedreht hätten.

# Anhang

## Going Private

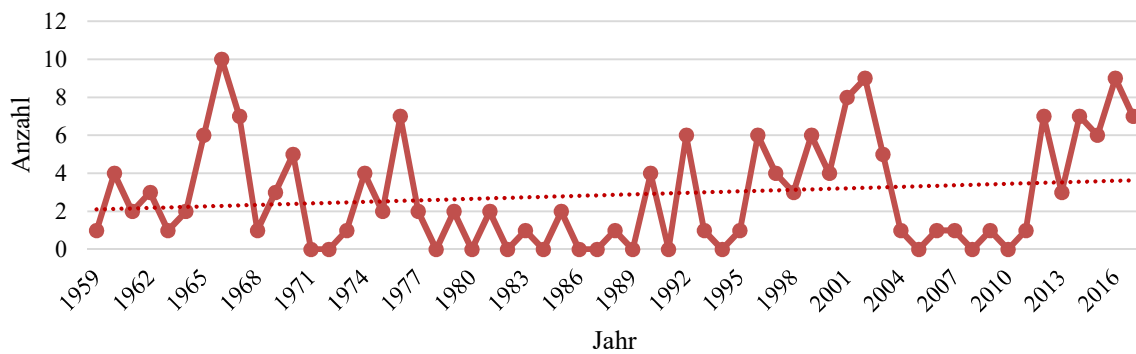


Abbildung 8-24: Going Private als Grund für eine Notierungseinstellung über den Zeitraum 1959 bis 2017

## Kauf

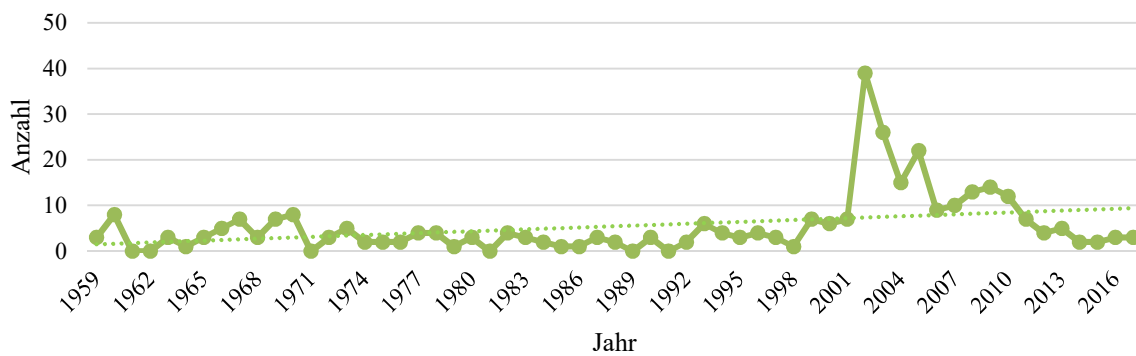


Abbildung 8-25: Kauftransaktionen als Grund für eine Notierungseinstellung über den Zeitraum 1959 bis 2017

## Fusion

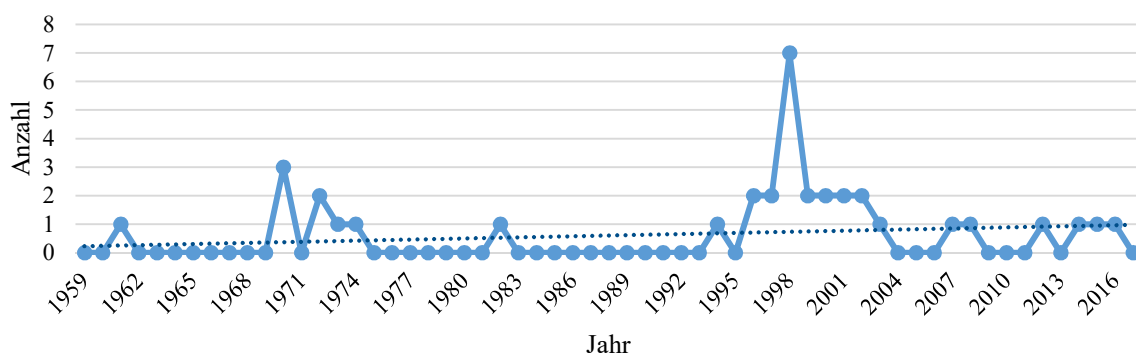


Abbildung 8-26: Fusionen als Grund für eine Notierungseinstellung über den Zeitraum 1959 bis 2017

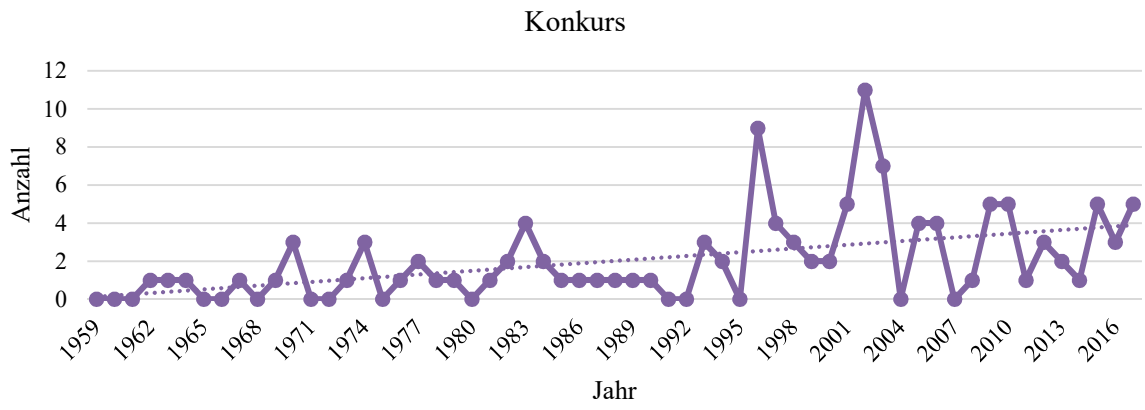


Abbildung 8-27: Konkurse als Grund für eine Notierungseinstellung über den Zeitraum 1959 bis 2017

## Chapter 9

# **Zum Erfolg von Europas ‚erfolgreichstem‘ Börseneinstiegssegment: Einsichten zu New Connect**

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## Chapter 10

# **Corporate real estate ownership and its contribution to firm performance under business uncertainty: Empirical evidence from European non-property companies**

# Corporate real estate ownership and its contribution to firm performance under business uncertainty: Empirical evidence from European non-property companies

Julian Seger<sup>89</sup>, Eduard Gaar<sup>90</sup>, Benjamin Wagner<sup>91</sup>, Andreas Pfnür<sup>92</sup>

## Abstract

Structural and dynamic changes, intensified by the current pandemic situation, confront companies with high levels of uncertainty. This becomes a challenge especially when decisions have to be made about ownership of corporate real estate. This article examines how uncertainty affects the holding of specific property and whether corporate real estate ownership has a positive or negative impact on firm performance under consideration of business uncertainty. Two studies have been conducted. In the first study, multivariate cross-sectional regression analysis is used to test the link between specificity and corporate real estate (CRE) ownership under business uncertainty. For the second study, the sample was expanded to all companies listed in Europe to investigate the influence of the corporate real estate ownership on firm performance under uncertainty. The empirical results show a positive link between specificity and CRE ownership. Additionally, companies seem to adjust their investment behaviour in specific properties under uncertainty by avoiding or postponing investments or even writing-off specific real estate assets due to their transfer to a new use. Furthermore, the results show that the excess returns decrease in the medium term as CRE ownership under uncertainty increases. Our findings also indicate that regardless of the uncertainty situation, CRE ownership reduces the systematic risk. Thus, ownership seems to have a diversifying effect. This paper expands the scientific discourse by explicitly linking real estate specificity with the choice between ownership, leasing or rental solutions and firm performance.

**Keywords:** Corporate real estate ownership, corporate real estate management, European real estate ownership, business uncertainty, corporate real estate and financing

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## 10.1. Introduction and research questions

Corporates are increasingly facing structural and dynamic changes in their business environment (Buliga et al., 2016; Mühlroth & Grottke, 2018). These dynamics are further intensified by the current COVID pandemic situation, which firmly confronts companies with a higher uncertainty (Sharma et al., 2020). As a reaction to growing business uncertainty, in all industries strategic responses from companies are required, especially the adaptation of capabilities and resources to dynamic capabilities and resources (Teece et al., 2016; Randhawa et al., 2020). Successful management of the current changes and uncertainties requires a special focus on resources critical to success and difficult to adjust.

This directs the attention to corporate real estate (CRE) as an immobile company resource, which comprises approximately 5–15% of total company costs (Pfnür, 2011). As a result, real estate is both crucial for the overall success of the company and a comparatively expensive resource in terms of adaptation due to the high proportion of tied-up capital (Louko, 2004; Liow & Nappi-Choulet, 2008; Rochdi, 2015). In addition, as an immobile resource, it can be an obstacle to the strategic flexibility of companies. In addition, real estate as a physical environment is crucial for the work carried out therein. If work and working methods change, then this results in high pressure on CRE portfolios to align to new user demands. Pfnür (2019) shows that due to new work on account of the structural change, German corporates expect to align approximately 50% of their portfolios to new user demands in the next 10 years. This increases the need to evaluate CRE portfolios and their provision against the background of growing business uncertainty, which can be seen as one central challenge alongside megatrends in the real estate industry (Pfnür & Wagner, 2020).

In Europe, approximately 60% of CRE portfolios are owned. This is a particularly high share compared to US and Asian companies with only 30% and 20%, respectively. If the high proportion of tied up real estate assets is used inefficiently, then negative effects on the firm success are the consequence (Tuzel, 2010). Accordingly, it should be scrutinised to what extent a high share of ownership conflicts with rising uncertainty. Recent studies have shown that especially uncertainties originating from the market of the core business influence the ownership strategy and its contribution to firm success. The argument most frequently given in this context is that the ownership decision is long-term and difficult to revise (Tuzel, 2010; Ambrose et al., 2017). Accordingly, the investment decision should be well-considered, especially under uncertainty. The difficulty in revising ownership directs attention to the characteristics of the real estate resource. Owned CRE are company-specific and highly linked to the current use. A change of use is usually costly and resale is only possible with discounts (Gier, 2006; Hartmann et al., 2007; Pfnür & Weiland, 2010). The share of specific properties in CRE portfolios is roughly estimated at about one-third (Roulac, 2003), which only gives an idea of the risk under rising business uncertainty.

In its overarching research question, this article aims to investigate the influence of ownership on firm performance under business uncertainty. However, the role of uncertainty cannot be considered in

isolation from the specificity of a real estate. Therefore, an upstream analysis aims to create a deep understanding about the extent to which specificity affect the ownership strategy of non-property companies, taking into account business uncertainty. In order to achieve these objectives, the paper addresses the following two research questions:

1. *What role does the specificity of CRE play in the real estate ownership strategy under business uncertainty?*
2. *Does the pricing and risk of corporate real estate ownership on the capital market differ between uncertainty situations?*

To answer these research questions, two studies have been conducted. The first study addresses research question 1. The results provide insight into the extent to which CRE ownership is affected by specificity and business uncertainty. The findings then serve as a theoretical basis for the second study, which answers research question 2 and investigates the influence of CRE ownerships on firm performance and risk under different uncertainty situations. The methodological approach and the results of the two studies are presented separately. Subsequently, the results are discussed in their overall context in order to derive both scientific findings and implications for business practice.

## **10.2. Literature review and research model**

In order to present the current state of research, we draw on the literature strands of general management theories and prepare the corporate real estate literature in the context of real estate ownership and its impact on firm performance and risk-incorporating factors relevant to this context. Based on this, we developed a research model to investigate the relationship between real estate ownership and firm performance under the consideration of business uncertainty. While the general relation between CRE ownership and firm performance is already the subject of numerous research approaches (e.g. Deng & Gyourko, 1999; Brounen & Eichholtz, 2005; Tuzel, 2010; Rochdi, 2015; Seger et al., 2020), there is a lack of empirical research that takes uncertainty into account, especially for Europe. Only articles based on US data have addressed the uncertainty (e.g. Ambrose et al., 2017; Zhao et al., 2016). Due to (1) the high resource input of immovable assets, (2) the high importance of real estate in changing core business activities, (3) the long-term nature and (4) difficult reversibility of real estate ownership decisions, we argue that its consideration under business uncertainty becomes more relevant. Therefore, this is our main focus.

As mentioned earlier, the strategic decisions over provision of space are substantially affected by the real estate characteristics as immobile resources. Numerous studies have shown that real estate ownership differs according to the industry in which a firm operates (e.g. Seiler et al., 2001; Nappi-Choulet et al., 2009). The requirements placed on real estate by the core business seem to determine the strategic decision of real estate provision. The more specific the requirements for real estate, such as production or laboratory facilities, the more likely it is that the real estate will be held in ownership. As mentioned

above, a significant share of CRE portfolios is specific and can usually only be transferred to new use at a value loss. It should be obvious that in order to avoid negative consequences, corporate real estate management (CREM) carefully considers investments in new specific properties in particular or, in the case of already held real estate holdings, must depreciate their value after transferring them to a new use. However, so far in the discussion about uncertainty and the difficulty of revising the ownership decision, little attention has been paid to the fact that it depends on the CRE specificity.

As a result of these considerations, it becomes clear that it is first necessary to examine the impact of specificity on the real estate strategic decisions of real estate space provision as ownership (H1) under business uncertainty (H2), before the impact of real estate property on company performance is examined (H3) as well as under consideration of business uncertainty (H4). Figure 10-1 shows our corresponding research model with the relations and impacts to be investigated.

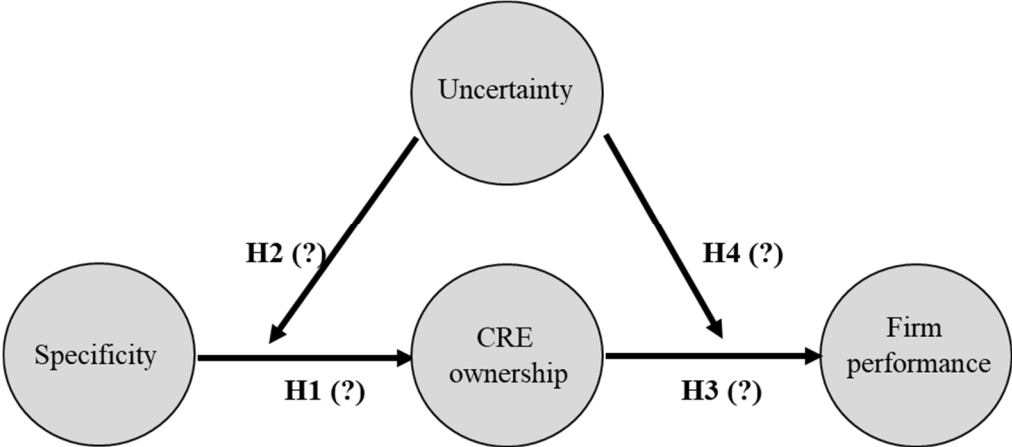


Figure 10-1: Relations and impacts to be investigated in the general cross studies research model

The four investigated hypotheses are derived theoretically in the following sections.

**10.2.1. Real estate ownership and its impact on firm performance**

The discussion about the benefits of ownership and provision alternatives such as rent or leasing is almost as old as the CREM research field itself. Basically, corporates have the choice between rental, leasing and ownership solutions when providing space. Each of these space provision forms is associated with unique advantages and disadvantages. In order to make a general statement about the most appropriate provision variant, the effect of CRE ownership on capital market performance was examined in numerous studies. For this purpose, event studies were used to conduct capital market reactions after announcements of CRE acquisitions or sales (e.g. Rodriguez & Sirmans, 1996; Devaney & Lizieri, 2004; Ting, 2006; Gronlund et al., 2008). Alternatively, balance sheet-accounted real estate assets were examined with regard to their effect on capital market performance. The study situation regarding the

influence on capital market performance is partly contradictory (see Seger et al., (2020) for an overview). Nevertheless, a review of the literature shows that the majority of studies classify ownership as a factor that tends to reduce success. However, there are also studies that come to different results. Reasons for negative or positive effects are shown in Figure 10-2.

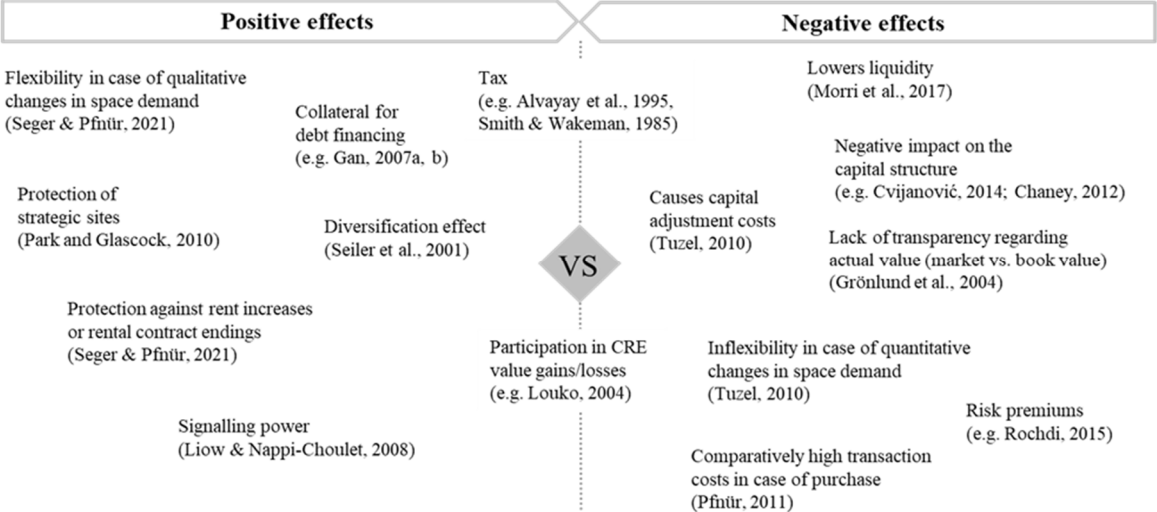


Figure 10-2: Comparison of the advantages and disadvantages of the space provision form of ownership

Which of these effects outweigh depends on further factors such as the country or industry in which a firm operates (Seger et al., 2020), growth opportunities (Du et al., 2014), firm size (e.g. Yu et al., 2009; Liow, 2010), corporate governance (Sing & Sirmans, 2008; Du et al., 2014) and business environmental conditions (e.g. Tuzel, 2010; Ambrose et al, 2017). Thus, the industry in which a company operates is not only crucial for its ownership strategy as described above, but also for its success. This can be traced back to the fact that in some industries the importance of real estate for the core business can vary greatly (Park & Glascock, 2010). Wherever real estate is closely linked to the core business, the real estate is held in ownership. Thus, it is precisely in industries such as the manufacturing sector, with highly company-specific real estate, that ownership is valued more positively than, for example, in the service sector, where the use of real estate is limited to mostly generic and exchangeable office properties (Nappi-Choulet, 2009). A first indication, therefore, that the property with its generic or specific characteristics influences the CRE ownership strategy due to its impact on firm performance.

The business environment of the enterprise also must be taken into consideration. For example, conditions on the real estate markets (Fougère et al., 2019), competition or fluctuations in demand (Ambrose et al., 2017) and associated uncertainties (e.g. Zhao et al., 2016) have a demonstrable influence on the benefits of ownership. Especially with regard to a dynamic business environment, ownership is considered to be unfavourable. A frequently mentioned argument is the lack of flexibility of ownership in the face of quantitative changes in space demand. Ownership can therefore only be disposed of with a delay, which can be attributed not least to the lack of third-party usability due to the high specificity of many properties (Tuzel, 2010). A theoretical discussion about CRE specificity and its relation to the provision

by ownership and how this affects capital market performance has so far only been carried out superficially in the literature. To the best knowledge of the authors, a focused empirical investigation under consideration of business uncertainty has not been done so far. This will be explained in more detail below and then empirically tested.

### **10.2.2. Theoretical relevance of specificity, uncertainty and ownership**

The previous explanations have shown that there are first considerations in the literature about the specificity of a CRE and its holding in ownership. So far, a detailed examination of the term and proof of a connection has not been provided. A positive correlation between the specificity of a property and its provision in ownership is simply assumed. In this context Ambrose et al. (2017, p. 1), for example, note that “a firm can strategically invest in real estate when it plays a special or irreplaceable role; firms typically own such firm-specific facilities”. It requires a more detailed explanation as to why such properties are owned.

Generally, a resource or asset, like corporate real estate, is defined as specific “when they yield greater value if they are deployed in activities by one firm than if they are deployed in the same activities by another” (Zott & Amit, 2006, p. 11). The degree of specificity represents the value difference between first- and second-best use. According to this resourced-based view-related definition, specificity is a resource characteristic that generates abnormal rents and, thus, leads to strategic competitive advantages. Zott and Amit (2006) explain this with their high immobility, not imitability (Rumelt, 1984) and higher efficiency (Jacobides, 2004). These strategic assets have to be held “locked-in” within the firm’s boundaries (Zott & Amit, 2006). In the context of CRE provision, this means that due to their physical design and location, company-specific real estate should be held in ownership (Park & Glascock, 2010). This can also be supported by principal agent and transaction theory. Accordingly, companies should own assets when potentially incomplete contracts expose them to future opportunistic behaviour. This would serve as protection against the lessor being able to extract above-normal values by increasing the lease/rent payments in the amount of the added value that a specific area generates for the lessee (user). More detailed contracts and negotiations to avoid such conflicts would cause agency costs (Smith & Wakeman, 1985).

These theoretical considerations lead us to hypothesis 1 (H1):

*The higher the demand for specific resources, the greater the corporate real estate holdings.*

However, these considerations do not take into account that companies usually operate in a dynamic and uncertain business environment. “Locking-in” of specific resources also means that companies are tied to specific resources in the case of changing business conditions. The higher the level of uncertainty, the greater the risk that a specific resource will have to be transferred from first- to second-best use. This can be argued with the loss of the current best possible use. If the benefit or value of the resource in second-best use is lower than the investment cost, then sunk costs arise. In times of high dynamics and

uncertainty, companies adapt their investment behaviour to specific resources (Ghemawat & Del Sol, 1998).

Transferred to the CRE ownership decision, the question arises whether ownership is more likely to be held with increasing specificity and whether this relationship is weakened by uncertainty. This is in line with Tuzel (2010) who argues that the capital adjustment costs caused by real estate ownership are based on its specificity and the resulting lower resale price. These are incurred when companies are forced to sell their properties due to changing business conditions.

These theoretical considerations lead us to hypothesis 2 (H2):

*Uncertainty weakens the link between specific real estate and the ownership of CRE.*

### **10.2.3. Theoretical relevance of CRE ownership, uncertainty and firm performance**

As mentioned in Chapter 12.2.1, the negative effect of real estate ownership on company performance has been proven in numerous studies (see Seger et al., 2020 for a complete literature review). Consequently, only a few studies will be mentioned here. According to Deng and Gyourko (1999) as well as Brounen and Eichholtz (2005), ownership has a negative influence on risk-adjusted return, whereas according to Seiler et al. (2001) and Ting (2006), no significant correlation can be demonstrated. Du and Ma (2012) can generally demonstrate a negative correlation to abnormal returns, which Demirer et al. (2018) confirms in the short term but identifies as positive in the medium term. At the same time, the studies of Tuzel (2010) and Rochdi (2015) show that ownership is priced in as a risk factor on the capital market.

These theoretical considerations lead us to hypothesis 3 (H3):

*The higher the ownership, the lower the firm performance.*

Especially, the inflexibility and difficult reversibility of ownership under uncertainty serves as an important argument proposed by Tuzel (2010), Zhao et al. (2016) and Ambrose et al. (2017). One reason for this was discussed in Chapter 2.2 with the specificity of ownership. However, this is only one explanation as to how uncertainty could increase or reduce the importance of ownership for firm performance. Thus, in the discussion about the appropriateness of ownership, CREM managers frequently refer to its function as a source of financial resources, especially in uncertain times. Accordingly, if companies experience liquidity bottlenecks in times of crisis, cash flows could be stabilised by selling property, by letting it or even by using it as collateral. Following this anecdotal reasoning, ownership under uncertainty does not necessarily impact firm performance negatively, but could ultimately have a positive effect.

These theoretical considerations lead us to hypothesis 4 (H4):

*Uncertainty weakens/improves the influence of corporate real estate ownership on firm performance.*

In summary we can complement our research model with the hypotheses derived from the literature. We suspect a positive link between specificity and CRE ownership (H1:(+)), which is moderated under uncertainty with a negative effect (H2:(-)). Furthermore, we expect a negative relationship between CRE ownership and firm performance (H3:(-)). This relationship could be affected both positively and negatively by business uncertainty (H4:(+/-)). The following sections describe the research design and methodology used to test the cross-studies research model and verify the four hypotheses.

### 10.3. Research design and methodology

#### 10.3.1. Two consecutive studies as research design

To test the general research model, we conducted two studies. The first study focuses on the left half of the research model and examines the influence of specificity on CRE ownership, taking into account business uncertainty. Based on these findings, the second study centres on the right side of the research model and investigates the impact of CRE ownership on firm performance under consideration of business uncertainty. Figure 10-3 summarises the entire research design.

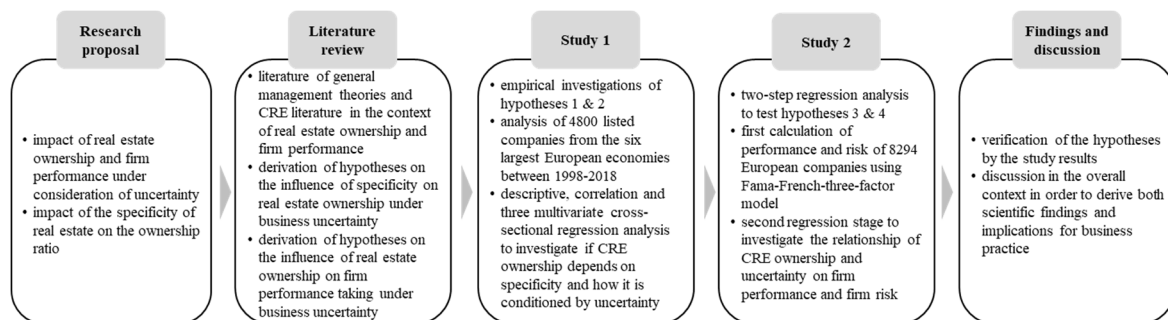


Figure 10-3: Research design.

In the following sections, we explain the methodology of the two studies separately.

#### 10.3.2. Methodology of study 1: specificity and corporate real estate ownership, taking into account business uncertainty

For the first study, the Thomson Reuter Datastream was used to collect balance sheet data. The dataset includes listed non-property companies of the six biggest European economies (according to their level of GDP), including Germany, UK, France, Italy, Spain and Netherlands, for the period 1998–2018. The data were collected quarterly. One of the key variables in this study is the corporate real estate ownership ratio (CRER), which is measured by two proxies. CRER1 is the ratio of the net value of buildings and land to total assets (Rochdi, 2015). CRER2 is based on CRER1 by measuring the relative level of the previously determined ownership ratio to companies in the same industry (Zhao et al., 2016). Another key variable is specificity. This turns out to be difficult because such information is not shown

in the balance sheets and is not measured in CREM. We use as a proxy: how often can specificity be found in studies on capital structure theory? For example, numerous studies measure asset specificity by research and development (R&D) expenditures in relation to total assets (Anderson & Schmittlein, 1984; Kedia et al., 2011; Bhaduri, 2002).<sup>93</sup> This is based on the assumption that “firms that invest heavily in R&D introduce new products and technologies, use nonstandard inputs and require investments in equipment or inventory that are specific to the firm” (Cavanaugh et al., 1997). Following Ambrose et al. (2017), the uncertainty is determined per period using a rolling standard deviation of the sales figures of the past five years. In addition, the control variables firm size, debt ratio and growth opportunities are included. All variables with their calculation formulas are provided in Appendix Table 10-10.

To confirm or reject the first two hypotheses, three models (1.1–1.3) are tested by conducting multivariate cross-sectional regression analysis. Model 1.1 informs if the ownership choice depends on the specificity of resource demand and uncertainty (H1). The repeated running of Model 1.2 on subsamples divided into firms with high and low uncertainty (by dummy variable UC) and Model 1.3. gives information about the extent to which the relationship between the specificity of resource demand and the holding of property changes under uncertainty (H2).

**Model (1.1):**

$$CRER1_{i,t} = \alpha + \beta_1 SPEC_{i,t} + \beta_2 UC_{i,t} + \delta X_{i,t-1} + \lambda_i + \tau_t + \varepsilon_{i,t}$$

**Model (1.2):**

$$CRER1_{i,t} = \alpha + \beta SPEC_{i,t} + \delta X_{i,t-1} + \lambda_i + \tau_t + \varepsilon_{i,t} \quad (\text{for firms under low and high uncertainty})$$

**Model (1.3):**

$$CRER1_{i,t} = \alpha + \beta_1 SPEC_{i,t} + \beta_2 UCDummy_{i,t} + \beta_3 (SPEC_{i,t} * UCDummy_{i,t}) + \delta X_{i,t-1} + \lambda_i + \tau_t + \varepsilon_{i,t}$$

where:

$CRER1_{i,t}$  = represent relative CRE holdings

$SPEC_{i,t}$  = measures of the specificity of resource demand

$UCDummy_{i,t}$  = dummy representing high uncertainty and low uncertainty

$X_{i,t-1}$  = control variables (debt ratio, firm size, growth opportunities)

$\lambda_i, \tau_t$  = time/industry-fixed effects

The data gaps within the initial sample of listed companies of the six largest European economies were too large for multivariate regressions. The models are therefore examined using the German subsample. The sample includes 799 non-property companies and covers the period 1999–2019.

CRE in non-property companies are often debt-financed; thus, a positive correlation between the real estate ownership ratio and the debt ratio is assumed, making it necessary to control the level of debt. In addition, large companies can generally borrow at more favourable conditions, which is why a positive

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<sup>93</sup> As a second and additional measure of specificity, SGA expenses (sales, general and administrative expenses) are used in relation to total assets. This is based on the assumption that the more unique and specific products, services and, thus, resource inputs are, the higher the SGA expenses will be (based on Berger et al. (1997) or Lev and Radhakrishnan (2002)).

correlation is also assumed here. The size factor is expressed and controlled in terms of market capitalisation. In addition, ownership is considered problematic in growth phases due to its high capital tie-up, which cannot be spent for the core business. This is controlled by including the variable growth, which is considered with the ratio of shareholder equity to market capitalisation.

### 10.3.3. Methodology of study 2: corporate real estate ownerships and firm performance under consideration of business uncertainty

The second study has a two-step approach. In the first step, we calculate the performance and risk for every European company available at Thomson Reuters Datastream between 2000 and 2020, and whose core business is not real estate. The second step is a multivariate regression analysis to address our aim of finding the influence of the CRE ownership under uncertainty on firm performance and risk.

We calculate the performance and risk for every company and every year in our time span using the Fama–French three-factor model (Fama & French, 1992). Compared to more widely used methods like CAPM, the Fama–French three-factor model may have greater explanatory power.<sup>94</sup>

#### Model (2.1):

*Fama–French* three-factor model:

$$R_{i,t} - R_{f,t} = \alpha_i + \beta_i * (R_{m,t} - R_{f,t}) + \gamma_i * SMB_t + \delta_i * HML_t + \varepsilon_{i,m}$$

where:

- $R_{i,t}$  = return on company share  $i$  in month  $t$
- $R_{f,t}$  = return on risk-free investment alternative  $f$  in month  $t$
- $R_{m,t}$  = return on market portfolio  $m$  in month  $t$
- $\alpha_i$  = *Alpha* or excess return of company  $i$
- $\beta_i$  = *Beta-factor* or company risk of company  $i$
- $SMB_t$  = size factor in month  $t$
- $HML_t$  = factor for the book/market value ratio in month  $t$
- $\varepsilon_{i,m}$  = error term of portfolio  $i$  in month  $t$ .

Within the regression model, Alpha, also known as Jensen’s alpha, describes an excess return of the individual share compared to the market portfolio. Thus, Alpha corresponds to a portion of the return that cannot be directly explained by the market factors and, therefore, is independent of the return on the market portfolio. Therefore, Alpha can be understood as the corporate performance of a company that is independent of external factors. The Beta-factor is referred to as ‘company risk’.<sup>95</sup>

The raw data for the return of a company is calculated using its total return index. The exact formula of this and other variables is given in Appendix A3. We use the *total return index* as it takes into account not only the price fluctuations of a share but also dividends or distributions, interest, the possibility of

<sup>94</sup> As a robustness check, we also calculated the firm’s risk and performance using CAPM (Sharpe, 1964; Lintner, 1965; Mossin, 1966) within the first regression stage. Due to similar results and a lack of space, we present the Fama–French three-factor model only.

<sup>95</sup> However, due to the added variables in the Fama–French three-factor model, the Beta-factor has fundamentally different values from the Beta-factor in the CAPM. The interpretation of the coefficient remains the same (Womack & Zhang, 2003).

subscription to preference shares and a share split. The monthly return of the market portfolio and the monthly return of the risk-free investment alternative used in this work as well as the monthly size factors (SMB) and the monthly factors for the book/market value ratio (HML) are provided by Dartmouth.<sup>96</sup>

The second regression stage is carried out in order to further investigate the relationship and, above all, the explanatory power of CRE ownership and uncertainty on company performance and company risk. Furthermore, the control variables firm size, debt ratio and growth opportunities are included. This results in the following regression model:

**Model (2.2):**

$$\alpha_{it}/\beta_{it} = \gamma_0 + \gamma_1 * CRER2_{it} + \gamma_5 * UC_{i,t-\tau} + \gamma_8 * (UC_{i,t-\tau} * CRER2_{i,t-\tau}) + X_{i,t-1} + \lambda_i + \tau_t + \theta_i + \varepsilon_i$$

where:

$\alpha_{it}/\beta_{it}$  = represents the firm's market performance *Alpha* or excess return  $\alpha_{i,t}$  or the systematic risk *Beta*-factor  $\beta_{i,t}$  of company *i* in year *t*

$CRER2_{it}$  = average corporate real estate ratio of company *i* in year *t*

$UC_{i,t-\tau}$  = uncertainty of firm *i* in year *t*

$X_{i,t-1}$  = control variables (debt ratio, firm size, growth opportunities)

$\lambda_i, \tau_t, \theta_i$  = time/industry/firm-fixed effects

$\varepsilon_i$  = error term of portfolio *i*.

The average CRER2 is calculated by summing up all land and buildings of a company minus the accrued depreciation of land and buildings and divided through the total assets of a company. Uncertainty is calculated in different ways. In the regression models without an interaction term, uncertainty is the rolling standard deviation of the last five years for the net sales of a company. In regression models with an interaction term, uncertainty is a dummy variable. This dummy variable is 1 if the average rolling net sales of the last five years of the company is lower than the median of the net sales of all companies and 0 otherwise.

The initial data sample comprised all listed companies in Europe that Thomson Reuters Datastream offers. After data cleaning, 8,294 companies remain whose core business is not real estate management. We collected the data in February and March 2020 for the period 2000–2020.

## 10.4. Results

In the following sections, we show the results of each study individually. These results are used to test the research model and verify the hypotheses. We then discuss the results in the overall context. This enables us to present the theoretical relationships beyond the current state of research and to derive implications for business practice.

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<sup>96</sup> [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data\\_library.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html)

### 10.4.1. Results of study 1: specificity and corporate real estate ownerships under consideration of business uncertainty

#### 10.4.1.1. Results of descriptive and pairwise correlation analysis

Descriptive and graphical evaluations provide first hints on whether there is a link between the specificity and CRE ownership in general, and in consideration of business uncertainty. For this purpose, the companies were divided into four quartiles with regard to specificity. The specificity increases from quartile 1 to quartile 4. The companies were subsequently divided into two sub-groups with regard to their business uncertainty based on the median. The ownership rates relative to the industry average were then visualised in Figure 10-4. This was done once on the basis of the six largest European economies and on the basis of Germany, which is the largest economy in terms of GDP, but is averaged and representative of the other five countries in terms of ownership rates (Seger et al., 2020).

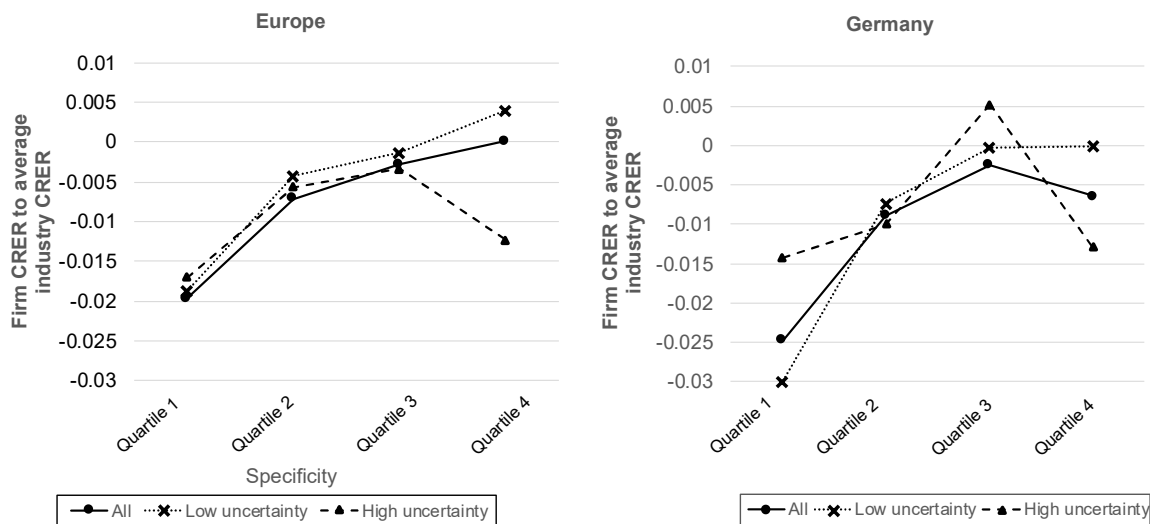


Figure 10-4: Illustration of real estate ownership (CRER1), considering specificity (SPEC1) and uncertainty (Europe=5,939 observations, Germany = 1,967 observations).

These descriptive results indicate that with increasing specificity, real estate ownership increases. A differentiated consideration according to business uncertainty also shows that this trend applies especially to companies that operate under stable conditions with low uncertainty. For firms under high uncertainty, a deviating picture emerges. Initially, the ownership ratio increases with an increasing demand for specific space, but then decreases again. This is a possible indication that investments in specific real estate in particular are being held back under high uncertainty or are decreasing in value and, therefore, are being depreciated.

The results of the pairwise correlation matrix in Table 10-1 indicate a strong correlation between the two specificity proxies. Nevertheless, the proxies exhibit a positive as well as negative, and thus contrary, relationship to ownership. Uncertainty, on the other hand, seems to have only a weak significant negative effect on real estate ownership.

Table 10-1: Correlation matrix of the relationship between specificity and real estate ownership and uncertainty

| Variables   | CRER1                | SPEC1                | SPEC2                | Uncertainty         | Debt Ratio       | Size              | Growth |
|-------------|----------------------|----------------------|----------------------|---------------------|------------------|-------------------|--------|
| CRER1       | 1.000                |                      |                      |                     |                  |                   |        |
| Spec1       | 0.056***<br>(0.000)  | 1.000                |                      |                     |                  |                   |        |
| Spec2       | -0.062***<br>(0.000) | 0.788***<br>(0.000)  | 1.000                |                     |                  |                   |        |
| Uncertainty | -0.013*<br>(0.102)   | 0.024**<br>(0.035)   | -0.008<br>(0.260)    | 1.000               |                  |                   |        |
| Debt ratio  | 0.058***<br>(0.000)  | -0.036***<br>(0.000) | -0.005<br>(0.437)    | 0.002<br>(0.700)    | 1.000            |                   |        |
| Size        | -0.025***<br>(0.000) | -0.064***<br>(0.000) | -0.020***<br>(0.000) | -0.012**<br>(0.032) | 0.001<br>(0.906) | 1.000             |        |
| Growth      | 0.007<br>(0.297)     | 0.003<br>(0.743)     | 0.001<br>(0.864)     | 0.002<br>(0.776)    | 0.000<br>(0.978) | -0.002<br>(0.732) | 1.000  |

(\*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1)

#### 10.4.1.2. Results of the multivariate regression analysis

In the first study, we investigate how specificity is related to the ownership ratio under uncertainty. Models (1.1–1.3) are run with the two specificity measures and, therefore, subdivided in the case of Model 1.1 (for example, as 1.1.1 and 1.1.2). The regression of the variable specificity to ownership ratio shows a positive relation in both Models 1.1.1 and 1.1.2 but is only significant in the second (Table 10-2). The results are significant at the 5% level. Hypothesis 1 can thus be confirmed. In contrast, uncertainty does not seem to have a direct impact on CRER.

A calculation of Model 1.2, with two sub-samples subdivided into firms with high and low uncertainty, is intended to give an indication of the extent to which the uncertainty has a possible indirect influence on the CRE ownership by mediating on the previously demonstrated positive relationship between specificity and CRE ownership. A similar pattern is shown as previously illustrated in Figure 10-4. Under low uncertainty, a high positive relation can be identified (Table 10-3). According to this, under low uncertainty, firms seem to rely on ownership when specific resource demands increase. If the analysis is repeated with companies under uncertainty, then a contrary relationship emerges for both specificity proxies similar to the pairwise correlation. However, the negative relationship is much stronger than the positive one. It seems that the link between specificity and ownership is rather negative when companies operate under high uncertainty.

This picture is confirmed after the calculation of Model 1.3. Uncertainty was included here as a dummy variable (UCdummy) with a value of 1 for companies with high uncertainty and a value of 0 for companies with low uncertainty in interaction with specificity.

Model 1.3.1 shows significant values for the specificity variable, the uncertainty dummy variable and the interaction term between specificity and uncertainty. The specificity is significant on the 10% level and indicates a positive influence on CRE ownership under low uncertainty. The interaction term

considering high uncertainty reverses the positive link between specificity and CRER1. Thus, the positive effect of specificity on CRER1 only applies with low or no uncertainty. Hypothesis 2 (uncertainty weakens the link between specific real estate and CRE ownership) can be confirmed.

**10.4.2. Results of study 2: corporate real estate ownerships and firm performance under consideration of business uncertainty**

**10.4.2.1. Results of descriptive analysis**

A descriptive analysis of CRE ratios allows first insights into the importance of CRE ownership in the European context of 34 included countries. Figure 10-5 shows the average CRE ratio over all countries over the last 20 years. Contrary to a frequently shared opinion of falling ownership ratios, these have increased in Europe as a whole.<sup>97</sup> If the European-wide ownership intensities per industry are included, then a similar trend emerges although the levels per industry differ. For reasons of space, however, they are not presented here.

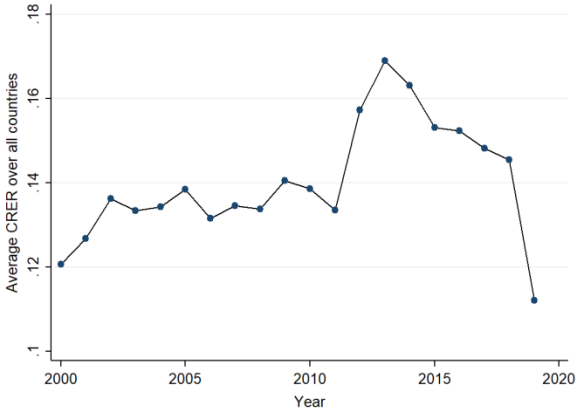


Figure 10-5: Illustration of average real estate ownership over all 34 countries since 2000.

Remarkable is the initially slight upward trend from about 2000 to 2012, which is interrupted by an abrupt rise in 2012, only to fall again continuously until 2020. A presentation over time for each country can be found in Figure 10-7 in the Appendix. According to these, the economically strongest countries in particular have shown stable to very slightly declining ownership ratios over the last 20 years (Germany, France, UK, Netherlands, Spain, Italy, Switzerland, Poland, Hungary, etc.). Particularly strong declines in this ratio can be seen in countries such as Russia, Denmark and Ukraine. According to this, companies in countries such as Norway, Belgium, Hungary, Sweden, Finland and Italy have the lowest ownership ratio (below 10%).

<sup>97</sup> The low ratio in 2019 is due to the data sample being collected at the beginning of 2020. Most companies publish their balance sheets not on the reporting date but in the course of the next year, so the sample is not complete for this year.

Table 10-2: Results of regression Model 1 concerning the influence of specificity and uncertainty on real estate ownership

Standard errors in parentheses (\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1)

| Variables      | (1.1.1)                   | (1.1.2)                     |
|----------------|---------------------------|-----------------------------|
| SPEC1          | 0.1822986<br>(0.1761342)  |                             |
| SPEC2          |                           | 0.033835**<br>(0.0142208)   |
| Uncertainty    | 0.0003204<br>(0.0000215)  | -0.0001664<br>(0.0002208)   |
| Debt ratio(-1) | -0.0045528<br>(0.0031706) | 0.0025454<br>(0.0027957)    |
| Size(-1)       | -1.04e-09<br>(3.32e-10)   | -9.74e-10**<br>(3.74e-10)   |
| Growth(-1)     | -0.0000987<br>(0.0000197) | -0.0000385***<br>(8.79e-06) |
| Constant       | -0.0095936<br>(0.0063796) | -0.0117415**<br>(0.0034656) |
| Year FE        | Yes                       | Yes                         |
| Industry FE    | Yes                       | Yes                         |
| Observations   | 1,983                     | 3,474                       |
| R-squared      | 0.1171                    | 0.0232                      |
| Adj. R-squared | 0.1044                    | 0.0153                      |

Table 10-3: Results of regression Model 2 concerning the influence of specificity on real estate ownership under high and low uncertainty

Standard errors in parentheses (\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1)

| Variables      | Low uncertainty            |                             | High uncertainty             |                             |
|----------------|----------------------------|-----------------------------|------------------------------|-----------------------------|
|                | (1.2.1)                    | (1.2.2)                     | (1.2.3)                      | (1.2.4)                     |
| SPEC1          | 0.3926995*<br>(0.2080137)  |                             | -0.1221225***<br>(0.0203183) |                             |
| SPEC2          |                            | 0.0469518*<br>(0.0249385)   |                              | 0.0231198***<br>(0.0050637) |
| Debt ratio(-1) | -0.005329**<br>(0.0020188) | 0.0012195<br>(0.0022345)    | -0.002076<br>(0.0056698)     | 0.0053179<br>(0.0045575)    |
| Size(-1)       | -1.03e-09**<br>(4.35e-10)  | --9.54e-10**<br>(3.72e-10)  | -9.60e-10***<br>(1.43e-10)   | -7.10e-10***<br>(1.83e-10)  |
| Growth(-1)     | -0.0002981*<br>(0.0001317) | -0.0005988<br>(0.0003941)   | -0.0000923***<br>(0.0000207) | -0.0000252***<br>(4.84e-06) |
| Constant       | -0.0186155*<br>(.0090829)  | -0.0121228**<br>(0.0051864) | 0.0056748***<br>(0.0014443)  | -0.013521**<br>(0.0041252)  |
| Year FE        | Yes                        | Yes                         | Yes                          | Yes                         |
| Industry FE    | Yes                        | Yes                         | Yes                          | Yes                         |
| Observations   | 1,189                      | 2,091                       | 794                          | 1,383                       |
| R-squared      | 0.2036                     | 0.0403                      | 0.0897                       | 0.0601                      |
| Adj. R-squared | 0.1850                     | 0.0277                      | 0.0588                       | 0.0414                      |

Table 10-4: Results of regression Model 3 testing the interaction between specificity and uncertainty on real estate ownership

Standard errors in parentheses (\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1)

| Variables          | (1.3.1)                      | (1.3.2)                     |
|--------------------|------------------------------|-----------------------------|
| SPEC1              | 0.3670757*<br>(0.1732194)    |                             |
| SPEC2              |                              | 0.0376875<br>(0.0254867)    |
| UCDummy            | 0.0214893**<br>(0.0068821)   | -0.001596<br>(0.0123535)    |
| SPEC1*UCDummy      | -0.4462623***<br>(0.0858887) |                             |
| SPEC2*UCDummy      |                              | -0.009033<br>(0.0287991)    |
| Debt ratio(-1)     | -0.0044365<br>(0.0031909)    | 0.0025394<br>(0.0028152)    |
| Size(-1)           | -1.02e-09**<br>(3.39e-10)    | -9.93e-10**<br>(3.80e-10)   |
| Growth(-1)         | -0.0001128***<br>(0.0000238) | -0.0000336**<br>(0.0000111) |
| Constant           | -0.017723**<br>(0.0072221)   | -0.0114092*<br>(0.005874)   |
| Year FE            | Yes                          | Yes                         |
| Industry FE        | Yes                          | Yes                         |
| Observations       | 1,983                        | 3,474                       |
| R-squared          | 0.1226                       | 0.0202                      |
| Adjusted R-squared | 0.1095                       | 0.0120                      |

In contrast, companies from Cyprus, Latvia and Croatia have the highest intensities (over 40%). Possible reasons for these variations are addressed in the discussion section.

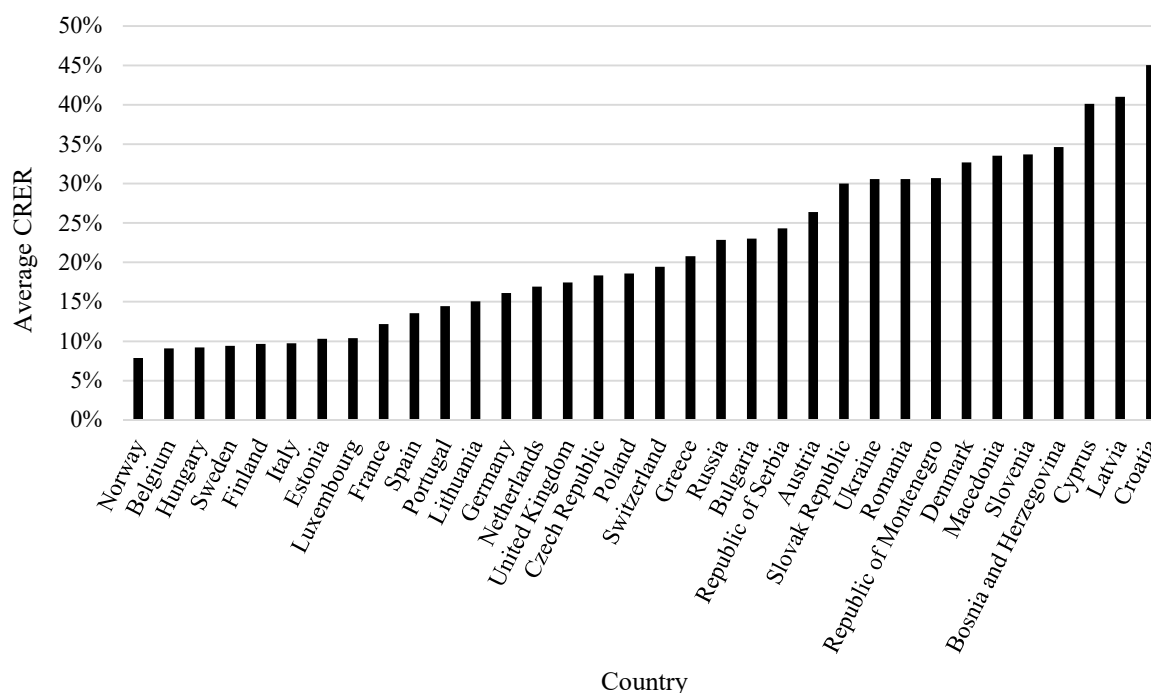


Figure 10-6: Illustration of average CRE ownership per country over all 34 countries since 2000.

The results of the pairwise correlation matrix in Table 10-5 indicate a strong correlation between CRER2 and Alpha and Beta although the relation to the risk is negative. Further, the Growth and Size variable and all other variables are significantly correlated to all other variables. Debt ratio does not seem to show any significant relationship with the other variables.

Table 10-5: Correlation matrix of all variables

| Variables     | $\alpha_{it}$         | $\beta_{it}$           | CRER2                  | Debt ratio             | Size                  | Growth              | Uncertainty |
|---------------|-----------------------|------------------------|------------------------|------------------------|-----------------------|---------------------|-------------|
| $\alpha_{it}$ | 1.000                 |                        |                        |                        |                       |                     |             |
| $\beta_{it}$  | -0.5349***<br>(0.000) | 1.000                  |                        |                        |                       |                     |             |
| CRER2         | 0.0339***<br>(0.0019) | -0.0290***<br>(0.0080) | 1.000                  |                        |                       |                     |             |
| Debt ratio    | 0.0000<br>(0.9972)    | 0.0000<br>(0.9987)     | 0.0094<br>(0.3751)     | 1.000                  |                       |                     |             |
| Size          | -0.0075**<br>(0.0301) | 0.0071**<br>(0.0423)   | -0.1292***<br>(0.0000) | -0.0109***<br>(0.0019) | 1.000                 |                     |             |
| Growth        | 0.1108***<br>(0.000)  | -0.0729***<br>(0.000)  | 0.0817***<br>(0.000)   | -0.0031**<br>(0.4259)  | -0.0359***<br>(0.906) | 1.000               |             |
| Uncertainty   | -0.0001<br>(0.9835)   | 0.0000<br>(0.9993)     | 0.0202*<br>(0.0682)    | -0.0005<br>(0.8830)    | 0.1420***<br>(0.0000) | -0.0002<br>(0.9562) | 1.000       |

(\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ )

### 10.4.2.2. Results of the multivariate regression analysis

As explained in Chapter 10.3.3, in a first step, Jensen's alphas and systematic risk-Betas were estimated. In a second step, the CRER and various control variables were regressed under consideration of firm, industry, country and time fixed-effects, and lagged by one and two years. The analysis is initially performed without the interaction term specified in Model 2.2. This serves to prove a general relationship between ownership and firm performance to confirm hypothesis 3.

In Table 10-6, the regression results with Alpha as a dependent variable show a negative and partly significant relationship between the CRER and excess return. It seems that in the short run, the negative effects of CRE ownership outweigh the positive ones. The debt ratio is also negative and, in 5 out of 10 specifications, significant. Not surprisingly, the growth variable has, in all specifications, a positive and in half of the cases significant influence on Alpha. The sign of the uncertainty variable of a company changes throughout the models; however, only the positive values have a significant influence on the return of a company.

Table 10-6: Regression model on Fama–French three-factor Alpha

| Variables      | (1)                       | (2)                      | (3)                      | (4)                       | (5)                      | (6)                      | (7)                      | (8)                      | (9)                      | (10)                     |
|----------------|---------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| CRER2          | -0.0417<br>(0.0334)       | -0.0437<br>(0.0373)      | -0.000436<br>(0.0136)    | -0.0368<br>(0.0336)       | -0.0634*<br>(0.0331)     | -0.00335<br>(0.0134)     | -0.0565*<br>(0.0332)     | -0.00196<br>(0.0135)     | -0.00644<br>(0.0134)     | -0.00492<br>(0.0134)     |
| Debt ratio     | -0.0136<br>(0.0114)       | -0.0154<br>(0.0116)      | -0.0202***<br>(0.00423)  | -0.0134<br>(0.0114)       | -0.0109<br>(0.0113)      | -0.0205***<br>(0.00424)  | -0.0106<br>(0.0114)      | -0.0204***<br>(0.00424)  | -0.0201***<br>(0.00423)  | -0.0200***<br>(0.00423)  |
| Size           | -0.0302***<br>(0.00253)   | -0.0341***<br>(0.00290)  | -0.00212*<br>(0.00119)   | -0.0301***<br>(0.00256)   | -0.0294***<br>(0.00255)  | -0.00270**<br>(0.00117)  | -0.0291***<br>(0.00258)  | -0.00258**<br>(0.00117)  | -0.00236**<br>(0.00117)  | -0.00221*<br>(0.00117)   |
| Growth         | 0.000134<br>(0.000103)    | 0.000114<br>(0.000107)   | 0.00011***<br>(3.88e-05) | 0.000134<br>(0.000104)    | 0.000112<br>(0.000103)   | 0.00011***<br>(3.89e-05) | 0.000118<br>(0.000103)   | 0.00011***<br>(3.89e-05) | 0.00011***<br>(3.88e-05) | 0.00011***<br>(3.88e-05) |
| Uncertainty    | 9.30e-10***<br>(3.32e-10) | 8.75e-10**<br>(3.44e-10) | -1.59e-10<br>(1.26e-10)  | 9.18e-10***<br>(3.33e-10) | 8.43e-10**<br>(3.30e-10) | -1.51e-10<br>(1.26e-10)  | 8.28e-10**<br>(3.30e-10) | -1.51e-10<br>(1.26e-10)  | -1.58e-10<br>(1.25e-10)  | -1.59e-10<br>(1.25e-10)  |
| Constant       | 0.347***<br>(0.0364)      | 0.392***<br>(0.0404)     | -0.0981***<br>(0.0161)   | 0.353***<br>(0.0481)      | 0.297***<br>(0.106)      | -0.0787***<br>(0.0193)   | 0.307***<br>(0.109)      | -0.0813**<br>(0.0351)    | -0.0970<br>(0.0995)      | -0.0879<br>(0.103)       |
| Company FE     |                           | Yes                      | Yes                      |                           |                          |                          |                          |                          |                          |                          |
| Year FE        |                           |                          | Yes                      |                           |                          | Yes                      |                          | Yes                      | Yes                      | Yes                      |
| Branch FE      |                           |                          |                          | Yes                       |                          |                          | Yes                      | Yes                      |                          | Yes                      |
| Land FE        |                           |                          |                          |                           | Yes                      |                          | Yes                      |                          | Yes                      | Yes                      |
| Observations   | 7,455                     | 7,455                    | 7,455                    | 7,455                     | 7,455                    | 7,455                    | 7,455                    | 7,455                    | 7,455                    | 7,455                    |
| Adj. R-squared | 0.0106                    | -0.1540                  | 0.8470                   | 0.0188                    | 0.318                    | 0.0387                   | 0.325                    | 0.0491                   | 0.342                    | 0.351                    |
| R-squared      | 0.0222                    | 0.0223                   | 0.8709                   | 0.0222                    | 0.0222                   | 0.8709                   | 0.0222                   | 0.8709                   | 0.8709                   | 0.8709                   |

Standard errors in parentheses (\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1)

In contrast, a repetition with lagged variables shows a significant positive relationship between the CRER and Alpha as shown in Table 10-7 for one-year lagged variables and in Table 10-14 in the Appendix for two-year lagged variables. Even though not all values are positive in Table 10-7, there are more positive significant values than negative. Table 10-14 in the Appendix presents a clearer picture of the positive influence with nearly all values positive. It seems that in the medium term the effect is

reversed and the positive effects of CRE ownership outweigh the negative ones. The one-year lagged variables for debt ratio are mixed and for size are mostly negative; in particular, size seems to have a significant influence in the medium term, whereas uncertainty does not play a significant role (Table 10-6).

Table 10-7: Regression model on Alpha with one-year lagged independent variables

| Variables       | (1)                      | (2)                     | (3)                     | (4)                      | (5)                      | (6)                      | (7)                      | (8)                      | (9)                      | (10)                     |
|-----------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| CRER2 (-1)      | 0.0290***<br>(0.00955)   | -0.0606*<br>(0.0353)    | -0.0119<br>(0.0123)     | 0.0260***<br>(0.00976)   | 0.00617<br>(0.0106)      | -3.57e-05<br>(0.00507)   | 0.00359<br>(0.0109)      | -0.00212<br>(0.00518)    | 0.00294<br>(0.00554)     | 0.00190<br>(0.00564)     |
| Debt_ratio (-1) | 0.00409<br>(0.00681)     | 0.00246<br>(0.0113)     | -0.0178***<br>(0.00392) | 0.00437<br>(0.00686)     | 0.00416<br>(0.00707)     | -0.0087***<br>(0.00304)  | 0.00348<br>(0.00712)     | -0.0092***<br>(0.00306)  | -0.0094***<br>(0.00311)  | -0.0102***<br>(0.00312)  |
| Size (-1)       | -0.0034***<br>(0.000628) | -0.0373***<br>(0.00278) | -0.0225***<br>(0.00109) | -0.0037***<br>(0.000653) | -0.0041***<br>(0.000736) | -0.0013***<br>(0.000357) | -0.0046***<br>(0.000779) | -0.0016***<br>(0.000369) | -0.0023***<br>(0.000418) | -0.0028***<br>(0.000436) |
| Growth (-1)     | 5.13e-05<br>(6.34e-05)   | -2.22e-05<br>(0.000105) | -2.16e-05<br>(3.63e-05) | 3.92e-05<br>(6.36e-05)   | -2.14e-05<br>(6.46e-05)  | -1.66e-05<br>(2.60e-05)  | -3.12e-05<br>(6.48e-05)  | -1.99e-05<br>(2.61e-05)  | -4.07e-05<br>(2.65e-05)  | -4.60e-05*<br>(2.66e-05) |
| Uncertainty     | 2.17e-10<br>(1.54e-10)   | 4.18e-10<br>(3.28e-10)  | -1.30e-10<br>(1.14e-10) | 1.98e-10<br>(1.55e-10)   | -6.03e-11<br>(1.68e-10)  | 0<br>(7.45e-11)          | -0<br>(1.68e-10)         | 0<br>(7.47e-11)          | -0<br>(7.80e-11)         | -0<br>(7.81e-11)         |
| Constant        | -0.0431***<br>(0.00888)  | 0.422***<br>(0.0387)    | 0.163***<br>(0.0149)    | -0.0379***<br>(0.00997)  | -0.0377**<br>(0.0151)    | -0.112***<br>(0.00588)   | -0.0337**<br>(0.0160)    | -0.107***<br>(0.00642)   | -0.101***<br>(0.00960)   | -0.0937***<br>(0.0100)   |
| Company FE      |                          | Yes                     | Yes                     |                          |                          |                          |                          |                          |                          |                          |
| Year FE         |                          |                         | Yes                     |                          |                          | Yes                      |                          | Yes                      | Yes                      | Yes                      |
| Branch FE       |                          |                         |                         | Yes                      |                          |                          | Yes                      | Yes                      |                          | Yes                      |
| Land FE         |                          |                         |                         |                          | Yes                      |                          | Yes                      |                          | Yes                      | Yes                      |
| Observations    | 7,601                    | 7,601                   | 7,601                   | 7,601                    | 7,601                    | 7,601                    | 7,601                    | 7,601                    | 7,601                    | 7,601                    |
| Adj. R-squared  | 0.0355                   | -0.145                  | 0.862                   | 0.0400                   | 0.124                    | 0.761                    | 0.122                    | 0.763                    | 0.771                    | 0.772                    |
| R-squared       | 0.0144                   | 0.028                   | 0.883                   | 0.0168                   | 0.0242                   | 0.8759                   | 0.0251                   | 0.8761                   | 0.8766                   | 0.8769                   |

Standard errors in parentheses (\*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1)

With regard to the regression on systematic risk (Beta), the findings are not clear. Thus, a significant and negative influence can only be identified for a one-year lag (see Table 10-8). The lagged CRER has a negative and partly significant influence on risk. As expected, the debt ratio has a positive and significant influence on the systematic risk meaning that companies with a high share of debt are more prone to systematic risk, whereas the influence of the uncertainty variable is very small and nearly zero. The positive and partly significant sign of the growth variable could be interpreted as strong growing companies becoming more dependent on the market, resulting in a higher Beta.

Thus, hypothesis 3 can only be confirmed for Alpha in the short term and for Beta in the medium term. For Alpha in the medium term, the benefits of having real estate predominate.

Table 10-8: Regression model on Beta with one-year lagged independent variables

| Variables       | (1)                     | (2)                      | (3)                      | (4)                      | (5)                      | (6)                     | (7)                      | (8)                     | (9)                      | (10)                     |
|-----------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| CRER2 (-1)      | 0.00611***<br>(0.00190) | -0.000161<br>(0.00433)   | 0.00163<br>(0.00424)     | 0.00539***<br>(0.00195)  | -0.00329<br>(0.00207)    | 0.00548***<br>(0.00183) | -0.00271<br>(0.00211)    | -0.00481**<br>(0.00187) | -0.00220<br>(0.00198)    | -0.00163<br>(0.00203)    |
| Debt_ratio (-1) | 0.00275**<br>(0.00109)  | 0.00269*<br>(0.00138)    | 0.00218<br>(0.00135)     | 0.00283***<br>(0.00109)  | 0.00199*<br>(0.00111)    | 0.00296***<br>(0.00106) | 0.00211*<br>(0.00111)    | 0.00300***<br>(0.00106) | 0.00210*<br>(0.00107)    | 0.00215**<br>(0.00108)   |
| Size (-1)       | 0.0005***<br>(0.000132) | 0.00242***<br>(0.000341) | 0.000964**<br>(0.000377) | 0.00055***<br>(0.000137) | 0.00072***<br>(0.000154) | 0.000187<br>(0.000130)  | 0.00077***<br>(0.000160) | 0.000219<br>(0.000135)  | 0.000298**<br>(0.000151) | 0.000312**<br>(0.000158) |
| Growth (-1)     | 1.56e-05*<br>(9.28e-06) | 3.30e-05**<br>(1.28e-05) | 2.96e-05**<br>(1.25e-05) | 1.70e-05*<br>(9.33e-06)  | 2.05e-05**<br>(9.47e-06) | 1.40e-05<br>(9.01e-06)  | 2.15e-05**<br>(9.51e-06) | 1.54e-05*<br>(9.05e-06) | 1.68e-05*<br>(9.19e-06)  | 1.76e-05*<br>(9.22e-06)  |
| Uncertainty     | -4.12e-11<br>2.72e-11   | -1.97e-11<br>4.02e-11    | -2.38e-11<br>3.94e-11    | -3.93e-11<br>2.74e-11    | -2.12e-11<br>2.84e-11    | -3.68e-11<br>2.63e-11   | -2.13e-11<br>2.85e-11    | -3.54e-11<br>2.65e-11   | -1.93e-11<br>2.74e-11    | -1.95e-11<br>2.75e-11    |
| Constant        | 7.50e-05<br>(0.00184)   | -0.0266***<br>(0.00474)  | -0.00254<br>(0.00513)    | -0.00116<br>(0.00210)    | -0.00254<br>(0.00351)    | 0.00829***<br>(0.00208) | -0.00353<br>(0.00369)    | 0.00758***<br>(0.00230) | 0.00660*<br>(0.00350)    | 0.00637*<br>(0.00366)    |
| Company FE      |                         | Yes                      | Yes                      |                          |                          |                         |                          |                         |                          |                          |
| Year FE         |                         |                          | Yes                      |                          |                          | Yes                     |                          | Yes                     | Yes                      | Yes                      |
| Branch FE       |                         |                          |                          | Yes                      |                          |                         | Yes                      | Yes                     |                          | Yes                      |
| Land FE         |                         |                          |                          |                          | Yes                      |                         | Yes                      |                         | Yes                      | Yes                      |
| Observations    | 7,601                   | 7,601                    | 7,601                    | 7,601                    | 7,601                    | 7,601                   | 7,601                    | 7,601                   | 7,601                    | 7,601                    |
| Adj. R-squared  | 0.00774                 | -0.167                   | -0.115                   | 0.00903                  | 0.0562                   | 0.0415                  | 0.0560                   | 0.0415                  | 0.0888                   | 0.0892                   |
| R-squared       | 0.0041                  | 0.009                    | 0.056                    | 0.0046                   | 0.0071                   | 0.0542                  | 0.0073                   | 0.0544                  | 0.0550                   | 0.0550                   |

Standard errors in parentheses (\*\*\*)  $p < 0.01$ , (\*\*)  $p < 0.05$ , (\*)  $p < 0.1$ )

The inclusion of uncertainty allows a differentiated look at how the before-mentioned short-term negative and then medium-term positive effects on the excess return (alpha) are caused. As before, uncertainty is included as a dummy variable and is 1 if the standard deviation of the net sales is above the median and 0 otherwise. Across most models in Table 10-9, the results indicate that ownership and excess return (Alpha) show a positive relationship. This applies both to a short-term view without time lag and to a view with a one–two-year lag.

The regression coefficients of the interaction term indicate that under uncertainty the positive effect between CRE ownership and the excess return is significantly lower. A repetition of the analysis with one–two-year lags even shows that the negative effect becomes significant in some cases. In regard to hypothesis 4, this means that uncertainty in combination with a high CRER leads to a lower valuation by the capital market.

Table 10-9: Regression model on Alpha with interaction and two-year lagged independent variables

| Variables                    | (1)                      | (2)                     | (3)                     | (4)                      | (5)                      | (6)                      | (7)                      | (8)                      | (9)                      | (10)                     |
|------------------------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| CRER2 (-1)                   | 0.0453***<br>(0.0152)    | -0.0235<br>(0.0452)     | 0.00235<br>(0.0156)     | 0.0433***<br>(0.0153)    | 0.0299*<br>(0.0161)      | -2.64e-05<br>(0.00754)   | 0.0300*<br>(0.0163)      | -0.00137<br>(0.00762)    | 0.00674<br>(0.00791)     | 0.00756<br>(0.00801)     |
| UCDummy (-1)                 | 0.0171***<br>(0.00491)   | 0.0499***<br>(0.00886)  | 0.000528<br>(0.00308)   | 0.0180***<br>(0.00493)   | 0.0208***<br>(0.00503)   | 0.000320<br>(0.00226)    | 0.0219***<br>(0.00505)   | 0.000641<br>(0.00226)    | 0.00157<br>(0.00228)     | 0.00211<br>(0.00228)     |
| UCDummy (-1)<br># CRER2 (-1) | -0.0195<br>(0.0197)      | -0.0543<br>(0.0402)     | -0.0142<br>(0.0138)     | -0.0212<br>(0.0198)      | -0.0351*<br>(0.0204)     | 0.000768<br>(0.00925)    | -0.0393*<br>(0.0206)     | -0.000451<br>(0.00927)   | -0.00537<br>(0.00944)    | -0.00827<br>(0.00949)    |
| Debt_ratio (-1)              | 0.00316<br>(0.00692)     | -0.00198<br>(0.0115)    | -0.0191***<br>(0.00395) | 0.00336<br>(0.00697)     | 0.00206<br>(0.00720)     | -0.0090***<br>(0.00308)  | 0.00144<br>(0.00725)     | -0.0095***<br>(0.00309)  | -0.0101***<br>(0.00314)  | -0.0108***<br>(0.00316)  |
| Size (-1)                    | -0.0044***<br>(0.000693) | -0.0414***<br>(0.00288) | -0.0229***<br>(0.00112) | -0.0049***<br>(0.000721) | -0.0061***<br>(0.000836) | -0.0012***<br>(0.000384) | -0.0066***<br>(0.000881) | -0.0015***<br>(0.000396) | -0.0024***<br>(0.000452) | -0.0029***<br>(0.000471) |
| Growth (-1)                  | 3.61e-05<br>(6.39e-05)   | -2.87e-05<br>(0.000105) | -2.16e-05<br>(3.62e-05) | 2.27e-05<br>(6.41e-05)   | -4.99e-05<br>(6.53e-05)  | -1.65e-05<br>(2.61e-05)  | -6.12e-05<br>(6.56e-05)  | -2.01e-05<br>(2.61e-05)  | -4.12e-05<br>(2.66e-05)  | -4.65e-05*<br>(2.67e-05) |
| Constant                     | -0.0394***<br>(0.00894)  | 0.443***<br>(0.0402)    | 0.176***<br>(0.0151)    | -0.0327***<br>(0.0101)   | -0.0216<br>(0.0157)      | -0.0999***<br>(0.00587)  | -0.0168<br>(0.0166)      | -0.0951***<br>(0.00643)  | -0.0864***<br>(0.00981)  | -0.0790***<br>(0.0102)   |
| Company FE                   |                          | Yes                     | Yes                     |                          |                          |                          |                          |                          |                          |                          |
| Year FE                      |                          |                         | Yes                     |                          |                          | Yes                      |                          | Yes                      | Yes                      | Yes                      |
| Branch FE                    |                          |                         |                         | Yes                      |                          |                          | Yes                      | Yes                      |                          | Yes                      |
| Land FE                      |                          |                         |                         |                          | Yes                      |                          | Yes                      |                          | Yes                      | Yes                      |
| Observations                 | 7,401                    | 7,401                   | 7,401                   | 7,401                    | 7,401                    | 7,401                    | 7,401                    | 7,401                    | 7,401                    | 7,401                    |
| Adj. R <sup>2</sup>          | 0.0330                   | -0.139                  | 0.865                   | 0.0385                   | 0.122                    | 0.761                    | 0.121                    | 0.763                    | 0.770                    | 0.772                    |
| R <sup>2</sup>               | 0.0221                   | 0.037                   | 0.886                   | 0.0237                   | 0.0275                   | 0.8791                   | 0.0280                   | 0.8793                   | 0.8799                   | 0.8802                   |

Standard errors in parentheses (\*\*\*) p < 0.01, \*\* p < 0.05, \* p < 0.1)

## 10.5. Discussion of the results in the related context

The results of the first study in Sections 12.4.1.1 and 12.4.1.2 show that no clear link can be identified between the uncertainty and CRE ownership. For example, the correlation matrix indicates a weak negative relationship. This is in line with the findings of Zhao et al. (2016) and Ambrose et al. (2017). However, the multivariate regression analyses cannot confirm this. This could be due to the characteristics of the CRE itself, especially its specificity. Thus, long-term ownership decisions under uncertainty are not problematic per se. It should only be made with particular caution if the property is specific. In this case, the ownership decision is difficult to revise and the property can only be put to a new use at a value loss. Hypothesis 1, which suggests a positive relationship between specificity and CRE ownership, can be generally confirmed; however, if companies operate under high uncertainty, then particularly specific investments should to be considered critically. A corresponding behaviour can be observed in the data and regression analysis. With increasing specificity, CRE is also increasingly held under stable business environment. Uncertainty has the opposite effect, as the proportion of real estate held falls (H2). This could be explained by the fact that companies avoid specific investments in the case of new CRE investments due to an increased sunk-cost risk, or postpone them into the future or, in the case of existing properties, have to depreciate real estate assets due to a change of use.

The previous argumentation also represents a possible explanation as to why CRE ownership under uncertainty could have a negative impact on firm performance (study 2). A first look at the proportion of real estate assets in Europe shows significant changes. Remarkable is the initially slight upward trend from about 2000 to 2012, which is interrupted by an abrupt rise in 2012, only to fall again continuously until 2020. The abrupt rise in 2012 can possibly be explained by two effects. The strong increase coincides exactly with the peak of the euro crisis. It is reasonable to assume that this caused firms' total assets to decline. These total assets serve as a quotient for calculating the CRE ratio. A decrease in total assets thus increases the ratio of ownership. Another explanation for the sharp increase could be the sample itself. For example, in the period around 2012, companies from more property-intensive countries in particular show corresponding data for the first time (e.g., Macedonia, Serbia, Latvia, Cyprus and Montenegro). The wide range could be related to the sector composition in the respective countries. Accordingly, companies in countries with strong primary and secondary sectors are more likely to own real estate than companies in countries with a highly developed tertiary or service sector.

Considering the high proportion of real estate assets to firms' total assets, it is obvious that their inefficient use will have an impact on firm performance on capital markets. The results of the general model (without taking the interaction between CRER and uncertainty into account) give an indication of this by decreasing Alpha when ownership rises in the same year. This would confirm H3. However, the relationship turns positive for a one-year lag and positive for a two-year lag. This delayed effect could be attributed to information asymmetries. For example, real estate assets are usually only reported on an annual rather than quarterly basis on the balance sheet, whereas procurement costs may already be included quarterly. A full pricing by the capital market is therefore only carried out with a delay. It is also conceivable that the mostly strategic advantages of ownership will only become apparent in the medium to long-term and that a positive correlation to the company's success will therefore only be discernible after a time lag (Seger et al., 2020). The negative relation to the systematic risk (Beta) identified with a two-year lag can be explained by the deviating risk/return profile of real estate and the associated diversifying effect of ownership (Seiler et al., 2001).

Repeated analysis with the interaction term has shown that under low uncertainty, Alpha is positive related to the CRE ratio without and with time lags. In the case of high uncertainty ownership, it seems to have a weak negative effect in the short term and in the medium term with a one–two-year lag on Alpha.

It seems that ignoring uncertainty in the provision of ownership has a negative impact on firm performance. The fact that ownership under uncertainty has a delayed effect on firm performance with annual lags also fits into the picture. This could be explained by the fact that the provided properties under uncertainty initially match the current demand; over time, however, the probability of a changing demand increases, making partly specific real estate ownership a problem. Thus, specific and owned CRE are often difficult to revise, can only be sold at a discount and are a source of sunk costs. In contrast, under a stable business environment, the positive effects of ownership outweigh the negative effects.

For example, strategic competitive advantages are more likely to be realised by holding specific property in such an environment. This is in line with the findings of the first study, according to which companies avoid the aforementioned disadvantages and negative effects on firm performance under uncertainty and adjust the provision of specific space. Especially in uncertain times, CRE ownership in Europe seems to act as a kind of unnecessary ballast. This shows that CREM, with a well-considered ownership strategy, can have a decisive influence on the success of a company in phases of structural changes or during the coronavirus crisis.

For CREM, but also for investors, it should be interesting that by holding ownership it is possible to reduce the systematic risk regardless of the uncertainty in which a company operates. Especially interesting is that companies under high uncertainty underperform (lower Alpha) with increasing ownership. These two insights can help shareholders optimise their portfolio strategy.

## **10.6. Conclusion, further research needs and limitations**

Especially in times of broad structural change and the current pandemic situation, companies are confronted with increasing uncertainty. This becomes a challenge when companies have difficulties in estimating their future space requirements. There is a lack of clarity about the optimal form of provision: ownership, leasing or rental. Ownership is considered particularly bulky in uncertain times when there is an increased risk that the property has to be used for other purposes. Such a generalised statement is problematic, however. Ownership becomes a problem in dynamic times when it is company-specific and a sale is only possible via discounts. Companies seem to anticipate this in their investment behaviour by avoiding or postponing investments in specific properties under uncertainty or even writing-off specific real estate assets due to their transfer to a new use. This serves to avoid negative consequences for firm performance when holding property under uncertainty as demonstrated in relation to excess return. With regard to capital market performance, it appears that positive influences of ownership are overlaid under uncertainty by negative ones. Additionally, it can be observed that the excess returns decrease in the medium term as ownership under uncertainty increases. The results also indicate that regardless of the uncertainty situation ownership reduces the systematic risk. Thus, ownership seems to have a diversifying effect.

However, the study also contains limitations. For example, the key figure used here to measure the ownership ratio is somewhat imprecise. This is due to the fact that the real estate assets shown in balance sheets were accounted differently across Europe for the study period. In addition, the figure calculated here to measure specificity represents a first attempt. A broader selection and alternative proxies could be the starting point for further studies.

# Appendix

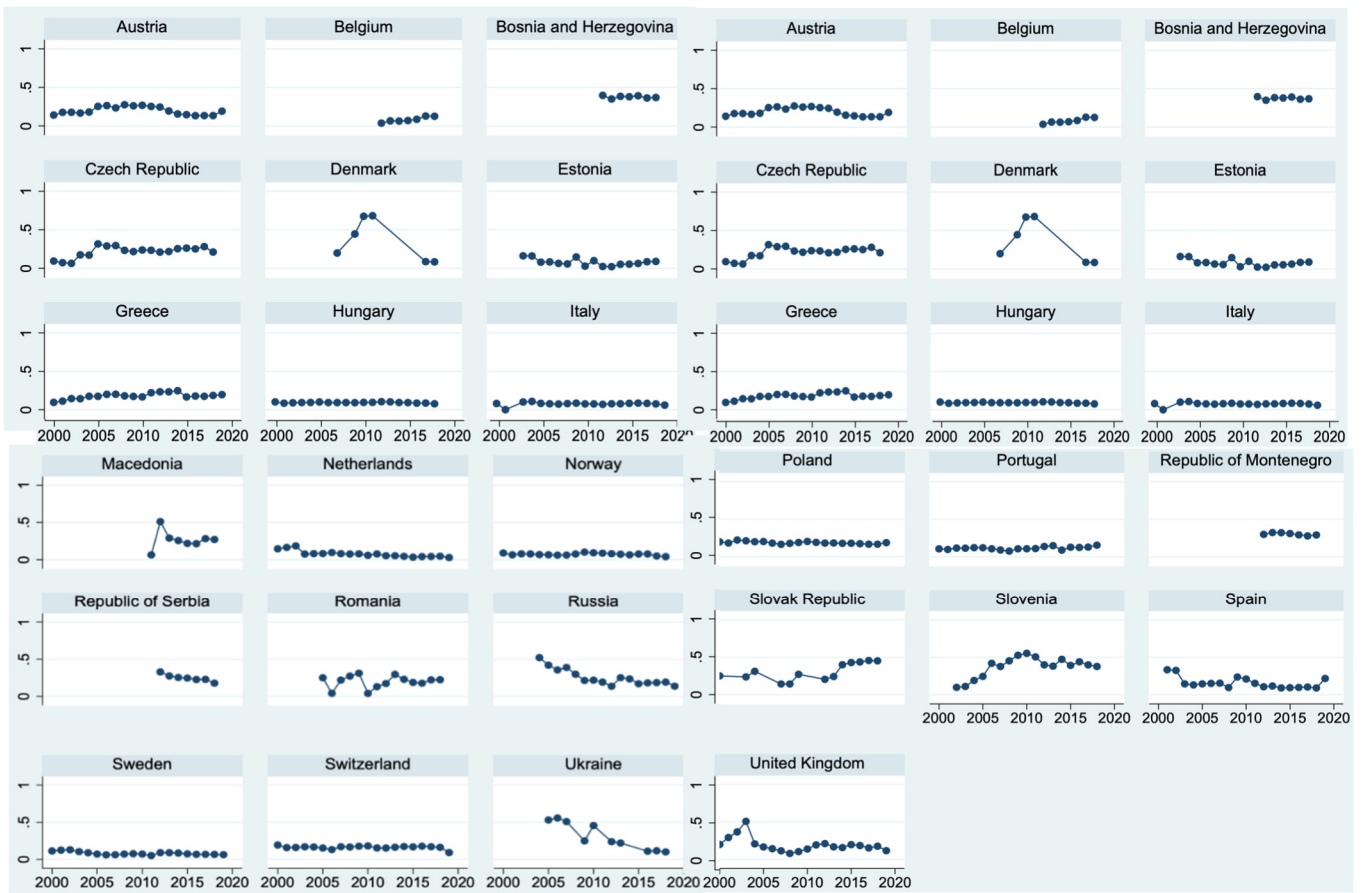


Figure 10-7: CRE ownership ratios over time for each country.

Table 10-10: Description of adopted variables in first study

| Variables  | Formula  |
|--|--|
| Corporate Real Estate Ratio 1<br>(e.g. Zhao et al. 2016)   | $CRER1_{i,t} = \frac{(Land_{i,t} + Buildings_{i,t}) - (AD Land_{i,t} + AD Buildings_{i,t})}{Total\ assets_{i,t}} - \frac{1}{N_t} \sum_{t=1}^{N_t} \frac{(Land_{i,t} + Buildings_{i,t}) - (AD Land_{i,t} + AD Buildings_{i,t})}{Total\ assets_{i,t}}$ |
| Specificity 1<br>(Kedia et al. 2011, Bhaduri 2002)         | $SPEC1_{i,t} = \frac{R\&D\ expenditures_{i,t}}{Total\ assets_{i,t}}$   |
| Specificity 2<br>(e.g. Berger et al. 1997)                 | $SPEC2_{i,t} = \frac{SGA\ expenditures_{i,t}}{Total\ assets_{i,t}}$ <p><i>SGA stands for sales, general, and administrative expenses</i></p>   |
| Uncertainty<br>(Basing on Zhao et al. 2016, Ambrose 2017)  | $UC_{i,t} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (SalesGrowth_{i,t} - \frac{1}{T} \sum_{i=1}^T SalesGrowth_{i,t})^2}$  |
| Level of Debt<br>(e.g. Du et al. 2014)                     | $Debt\ ratio_{i,t} = \frac{longtermDebt_{i,t}}{Total\ assets_{i,t}}$   |
| Firm size<br>(Du et al. 2014, Ambrose 2017)                | $SIZE_{i,t} = \text{Book value of equity}$   |
| Growth opportunities<br>(Yu & Liow 2009, Zhao et al. 2016) | $Growth_{i,t} = \frac{Market\ value\ of\ equity_{i,t}}{Book\ value\ of\ equity_{i,t}}$   |
| Industry<br>(Du et al. 2014, Zhao et al. 2016)             | $Industry_{i,t} = SIC - Code\ classification$  |

Table 10-11: Descriptive statistics of variables in first study

| Variables        | Observation | Mean      | Std. Dev. | Min        | Max       |
|------------------|-------------|-----------|-----------|------------|-----------|
| $CRER1_{i,t}$    | 26,054      | 0.1446545 | 0.2093263 | 4.19e-07   | 0.9962668 |
| $CRER2_{i,t}$    | 25,652      | 0.0000445 | 0.1210303 | -0.7719908 | 0.8066761 |
| $SPEC1_{i,t}$    | 11,878      | .0718172  | .1184047  | 7.60e-07   | .9943125  |
| $SPEC2_{i,t}$    | 34,026      | 0.2196121 | 0.2194648 | 2.01e-06   | 1         |
| $UC_{i,t}$       | 34,128      | 2.508921  | 39.82626  | .005898    | 2094.637  |
| $Leverage_{i,t}$ | 37,233      | .1581024  | .2316301  | 0          | 0.9998462 |
| $SIZE_{i,t}$     | 48,877      | 1292708   | 6281243   | 0          | 1.77e+08  |
| $Growth_{i,t}$   | 39,997      | 2.851139  | 5.141247  | 0.0001411  | 49.7751   |

Table 10-12: Description of adopted variables in second study

| Variables   | Formula   |
|---|---|
| Corporate Real Estate Ratio 1<br>(e.g. Rochdi 2015) | $CRER1_{i,t} = \frac{(Land_{i,t} + Buildings_{i,t}) - (AD Land_{i,t} + AD Buildings_{i,t})}{Total\ assets_{i,t}}$   |
| Return  | $R_{i,t} = \frac{RI_{i,t} - RI_{i,t-1}}{RI_{i,t-1}}$<br><i>RI stands for total return index</i>   |
| Alpha   | $\alpha_{it}$<br>Intercepts in the first-step regressions   |
| Beta  | $\beta_{it}$<br>Slope coefficient in first-step regressions   |
| Level of Debt                                       | $Debt\ Ratio_{it} = \frac{Total\ Debt_{i,t}}{Total\ Assets_{i,t}}$  |
| Firm size<br>(e.g. Du et al. 2014)                  | $size_{i,t} = \ln(Share\ price_{i,t} \cdot Outstanding\ shares_{i,t})$  |
| Growth opportunities                                | $Growth_{i,t} = \frac{Shareholder's\ Equity_{i,t} - Deferred\ Taxes_{i,t}}{Share\ price_{i,t} \cdot Outstanding\ shares_{i,t}} = \frac{Market\ value\ of\ equity_{i,t}}{Book\ value\ of\ equity_{i,t}}$ |
| Uncertainty   | $UC_{i,t} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (net\ sales_{it} - \frac{1}{T} \sum_{i=1}^T net\ sales_{it})^2}$   |

Table 10-13: Descriptive statistics of variables in second study

| Variables           | Observation | Mean       | Std. Dev. | Min        | Max      |
|---------------------|-------------|------------|-----------|------------|----------|
| $CRER2_{i,t}$       | 8,875       | 0.146255   | 0.1498812 | -0.2347198 | 1.710623 |
| $\alpha_{it}$       | 100,273     | -0.0026967 | 18.44388  | -1066.113  | 3981.132 |
| $\beta_{it}$        | 100,273     | 0.0063916  | 1.750885  | -301.8033  | 241.7443 |
| $Debt\ Ratio_{it}$  | 91,209      | 0.3291336  | 11.6773   | -0.0374429 | 3134     |
| $size_{i,t}$        | 84,773      | 4.42e+07   | 3.96e+08  | 0          | 1.41e+10 |
| $Growth_{i,t}$      | 66,769      | 13.02982   | 3424.041  | -286005.4  | 829752.6 |
| $Uncertainty_{i,t}$ | 86,092      | 1867451    | 7.60e+07  | 0          | 2.13e+10 |

Table 10-14: Regression model on alpha with 2 year lagged independent variables.

| Variables       | (1)                      | (2)                     | (3)                     | (4)                      | (5)                      | (6)                      | (7)                      | (8)                      | (9)                      | (10)                     |
|-----------------|--------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| CRER2 (-2)      | 0.0258***<br>(0.00984)   | -0.0198<br>(0.0366)     | 0.0211<br>(0.0129)      | 0.0230**<br>(0.0100)     | 0.0101<br>(0.0110)       | 0.00394<br>(0.00513)     | 0.00638<br>(0.0112)      | 0.00336<br>(0.00524)     | 0.00878<br>(0.00561)     | 0.00894<br>(0.00572)     |
| Debt_ratio (-2) | 0.00652<br>(0.00697)     | 0.0173<br>(0.0115)      | -0.00457<br>(0.00408)   | 0.00701<br>(0.00702)     | 0.00494<br>(0.00724)     | -0.00394<br>(0.00310)    | 0.00460<br>(0.00729)     | -0.00386<br>(0.00311)    | -0.00366<br>(0.00317)    | -0.00386<br>(0.00318)    |
| Size (-2)       | -0.00161**<br>(0.000649) | -0.00564**<br>(0.00286) | -0.0169***<br>(0.00113) | -0.00172**<br>(0.000676) | -0.00159**<br>(0.000759) | -0.00077**<br>(0.000361) | -0.00179**<br>(0.000803) | -0.00087**<br>(0.000373) | -0.0017***<br>(0.000422) | -0.0020***<br>(0.000441) |
| Growth (-2)     | 8.67e-05<br>(6.71e-05)   | 1.60e-05<br>(0.000105)  | 2.62e-05<br>(3.73e-05)  | 8.07e-05<br>(6.73e-05)   | 4.64e-05<br>(6.83e-05)   | 2.58e-05<br>(2.66e-05)   | 4.04e-05<br>(6.84e-05)   | 2.43e-05<br>(2.67e-05)   | 1.35e-05<br>(2.72e-05)   | 9.71e-06<br>(2.72e-05)   |
| Uncertainty     | 6.67e-11<br>(1.65e-10)   | -1.47e-10<br>(3.65e-10) | -1.77e-10<br>(1.29e-10) | 6.96e-11<br>(1.65e-10)   | -1.13e-10<br>(1.80e-10)  | 0<br>(7.92e-11)          | -1.08e-10<br>(1.81e-10)  | 0<br>(7.94e-11)          | 0<br>(8.36e-11)          | 0<br>(8.37e-11)          |
| Constant        | -0.0672***<br>(0.00916)  | -0.00933<br>(0.0397)    | 0.0839***<br>(0.0158)   | -0.0678***<br>(0.0103)   | -0.0692***<br>(0.0153)   | -0.125***<br>(0.00598)   | -0.0687***<br>(0.0163)   | -0.124***<br>(0.00654)   | -0.113***<br>(0.00966)   | -0.108***<br>(0.0101)    |
| Company FE      |                          | Yes                     | Yes                     |                          |                          |                          |                          |                          |                          |                          |
| Year FE         |                          |                         | Yes                     |                          |                          | Yes                      |                          | Yes                      | Yes                      | Yes                      |
| Branche FE      |                          |                         |                         | Yes                      |                          |                          | Yes                      | Yes                      |                          | Yes                      |
| Land FE         |                          |                         |                         |                          | Yes                      |                          | Yes                      |                          | Yes                      | Yes                      |
| Observations    | 7,077                    | 7,077                   | 7,077                   | 7,077                    | 7,077                    | 7,077                    | 7,077                    | 7,077                    | 7,077                    | 7,077                    |
| Adj. R-squared  | 0.0356                   | -0.191                  | 0.851                   | 0.0360                   | 0.0822                   | 0.781                    | 0.0816                   | 0.782                    | 0.788                    | 0.790                    |
| R-squared       | 0.0004                   | 0.0013                  | 0.876                   | 0.0005                   | 0.0008                   | 0.8710                   | 0.0009                   | 0.8711                   | 0.8716                   | 0.8718                   |

Standard errors in parentheses; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1

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