Sustainable Finance

Citation for published version (APA):

Hauptmann, C. V. (2017). *Sustainable Finance: ESG performance and disclosure in the capital market context*. [Doctoral Thesis, Maastricht University]. Datawyse / Universitaire Pers Maastricht.
<https://doi.org/10.26481/dis.20171012ch>

Document status and date:

Published: 01/01/2017

DOI:

[10.26481/dis.20171012ch](https://doi.org/10.26481/dis.20171012ch)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy

If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.

Sustainable Finance

ESG performance and disclosure in the capital market context

Clarissa Hauptmann

Sustainable Finance

ESG performance and disclosure in the capital
market context

Clarissa Hauptmann

*A thesis submitted in fulfillment of the requirements
for the degree of Doctor of Philosophy
at Maastricht University*

© 2017 Clarissa Hauptmann

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission in writing from the author.

Cover by Clarissa Hauptmann and professionally edited by Michael Heissner (www.michaelheissner.com)

Printed by Datawyse - Universitaire Pers Maastricht

ISBN 978 94 6159 755 7

This book was typeset using L^AT_EX.

Sustainable Finance

ESG performance and disclosure in the capital
market context

DISSERTATION

to obtain the degree of Doctor at Maastricht University, on the authority of
Prof. Dr. Rianne M. Letschert, in accordance with the decision of the Board
of Deans, to be defended in public
on Thursday, 12th October 2017, at 10.00 am

by

Clarissa Hauptmann

Supervisors

Prof. Dr. Rob Bauer

Prof. Dr. Stefanie Kleimeier

Prof. Dr. George Serafeim (Harvard Business School)

Co-supervisor

Dr. Stefan Straetmans

Reading Committee

Prof. Dr. Rachel Pownall (Chair)

Dr. Monique Donders (BlackRock Netherlands)

Prof. Dr. Jonas Heese (Harvard Business School)

Prof. Dr. Bert Scholtens (Rijksuniversiteit Groningen)

For Mum and Dad, to whom I owe everything.

Acknowledgements

Pursuing the Ph.D. has been one of the most exciting, challenging, and rewarding journeys of my life so far. It has provided me with tremendous opportunities to develop both academically and personally, to travel the world, and to meet amazing people. As a doctoral candidate, I have been empowered with the tools and knowledge to enable me to contribute to an exhilarating field of research, one that I believe is critical to shaping a bright and sustainable future. The past years of aspiring my Ph.D. have been turbulent and marked by many exciting as well as tough and grinding times. Ultimately, more than 10,000 hours of passionate work and thoughtful dedication have poured into this delicate book that you are holding. I could never have completed such a journey without the strong support and involvement of my dear friends, colleagues, and family. I feel incredibly fortunate to be surrounded by such wonderful people and I would like to take this opportunity to thank them.

First, I would like to express my sincere gratitude to my supervisors at Maastricht University Rob Bauer, Stefanie Kleimeier, and Stefan Straetmans for their continuous support of my Ph.D. study. I first met Stefan in his course “Global Banking” during my Master studies and he played a special role in my Ph.D., being responsible for convincing me to pursue the degree at Maastricht University in the first place. Thank you for your support throughout the years and for helping me make an excellent choice. Furthermore, I am thankful for having the opportunity to work with and learn from Stefanie. I admire her meticulous eye for detail and am grateful for all the valuable feedback she has provided me over the years. It has been a great pleasure to teach her course “Finance and Accounting”, which is very well organized just like she is. I thank Rob for being a fantastic coach and for his strong support and trust in me these past years. He has been like a lighthouse, helping to navigate the calm and, more importantly, stormy seas of Ph.D. life. I admire Rob’s vast experience and skills, and even in his favourite Converse Chucks (more often now Adidas) and casual hoodies he cannot disguise the aura of immense wisdom that he radiates.

During the second half of my Ph.D. journey, I had the exciting opportunity to spend extensive time at Harvard Business School. I am incredibly grateful towards George Serafeim for this amazing learning opportunity and for significantly shaping me as a researcher. George's immense knowledge, research and teaching skills, and his strong drive have inspired me tremendously. I feel extremely fortunate to have the opportunity to collaborate with and learn from such an amazing researcher and could not be more thankful for his mentorship and support.

I would like to thank the members of my reading committee for taking the time to evaluate my dissertation: Dr. Monique Donders, Prof. Dr. Jonas Heese, Prof. Dr. Rachel Pownall, and Prof. Dr. Bert Scholtens. I am honored to have such impressive members in my committee and am grateful for their timely and helpful assessment of the dissertation.

I feel very privileged to have been part of the Finance Department at Maastricht University—a department that is so friendly and supportive, and where faculty as well as students are always happy to discuss research and help one another advance in their fields. The great atmosphere and supportive environment are just some of the qualities reflecting the fantastic mix of members within the department. I would like to thank Jaap Bos for being such a wonderful department head and for always being helpful and open for discussions and supporting my development as a researcher. Juggling the leadership of such a large and growing group, while at the same time being a great researcher and teacher, is certainly not an easy task, even if Jaap makes it look like a breeze. I thank Piet Eichholtz for his advice and encouragement, especially on the executive gender research. He is a very inspiring man. I would especially like to thank Paul Smeets, a very talented researcher and friend, for being the sunshine of the department and brightening up my days.¹ Thank you for the great conversations we have had about research and life, all the way to Boston. I am grateful towards Jeroen Derwall for his support and for his work in our department to advance sustainable finance. He did an excellent job in creating the Masters program in Sustainable Finance, which enables students to get exposed to this exciting new field. It has been a great pleasure to teach courses developed by Georges Hübner and Harry Hummels. I learned a lot myself by teaching and enjoyed many interesting discussions with my students. I would also like to thank Dennis

¹The so called "Paul-effect" is associated with statistically significant rises in "happy hormones". It is no surprise that he has some interesting research on this topic.

Bams, Arvid Hoffmann, Nils Kok, Roger Otten, Joost Pennings, Thomas Post, and Peter Schotman for great conversations, lunches, and for contributing to the wonderful memories I have at Maastricht University.

A special thank you goes out to Els van Aernsbergen, Cecile Luijten, Francien Schijlen, and Carina Wijnands. You are the wheels of our department bus, and without your perfect sense of organisation, expertise, and efficiency we would be nowhere. I appreciate the countless things you have helped me with over the years. Thank you for always supporting me, from near and from far!

I would like to thank the Ph.D. students at Maastricht University. In particular my previous office mates Ehsan Ramezanifar and Tobias Ruof, the most unlikely and combustible combination of individuals in one office - also, the most fun and effective distraction from research at the time. I also thank Alessandro Pollastri for his efforts in distraction, sometimes in terms of battles in mental calculation skills ² and sometimes just by odd crab dances. I thank Patrick Gerhard for being a great office mate, even if only for the last months of his doctoral studies. The parking lot has lost all its glory without your fancy car. I thank Nora Pankratz, an ally in sustainable finance, for great company and smart conversations. I thank Wiebke Eberhard and Iman Honarvar for a phenomenal time during the first-year ASSA trip and beyond. I am also grateful for sharing the doctoral journey with: Hang Sun, Judy Chalabi, Rogier Quaedvlieg, Shusen Qi, Inka Eberhardt, Erdal Aydin, Matteo Bonetti, Marina Gertsberg, Matthijs Korevaar, Mike Langen, Lidwien Sol, Michael Kurz, Runliang Li, Adarajew Tamirat, Nagihan Mimirolu, Luuk Perik, and many more. I thank Sanne Jongen, Sjoke Merk, Pomme Theunissen, and Carl Vandenboorn for nice chats and many laughs in the hallway.

The list of great people that have inspired and supported me during my Ph.D. is long, and it became even longer when I visited Harvard. I would like to thank James Gifford for the interesting discussions we have had on sustainability topics. I admire the change he is creating through his impact investing course at Harvard Kennedy School and his work in the industry. I thank Jody Grewal, a brilliant doctoral researcher who has become a good friend and a co-author. I feel blessed to know and to work with someone as smart, creative, and with such a lovely personality as her. I thank Jee Eun Shin for feeding my coffee addiction. Over the countless breaks we have

²Mental calculation battles were obviously held against a calculator, since this guy is a machine.

had together between research and writing, munching chocolate-covered almonds, she has become a very good friend. I thank all the doctoral students at the Accounting and Management Unit at Harvard Business School for great discussions in- and out-of-class and a fantastic time, especially Jihwon Park, Carolyn Deller, Wei Cai, Rajesh Vijayaraghavan, Aaron Yoon, and Akash Chattopadhyay. I am grateful towards David Freiberg for his excellent research assistance for our projects. I am especially thankful for all the help and support that Peter Simms has provided me with during my stays and for enabling me to benefit so much from my time at HBS. I am grateful for great conversations and research discussions with Anywhere Sikochi, an outstanding researcher who I admire for his talent and ambition. I feel privileged to have had the opportunity to discuss and receive valuable input on my work from Paul Healy. I would like to express my gratitude towards Victoria Ivashina for helpful feedback and insightful discussions. I thank Charles Wang for the excellent doctoral workshops. I learned so much from all the interesting paper discussion we have had. I thank all the faculty from the A&M unit at Harvard Business School for having me there and for being so inspirational.

I feel privileged and grateful for the valuable discussions and suggestions from Christian Leuz, a truly brilliant and inspiring researcher who I greatly admire. I thank Sebastien Pouget and Mike Barnett for their thoughtful feedback on my work. I am grateful for all the wonderful people I met throughout my doctoral studies during conferences, workshops, through friends, or just through some pleasant coincidence.

I am eternally grateful towards my paranymphs for their friendship and support: Paulo Rodrigues and Juan Palacios Temprano. Let's start with Paulo, a Portuguese-German hybrid ³, a brilliant econometrician but an even better friend. Although we met at the start of my Ph.D., it was more than a year later, after I managed to crash into him several times on my skis in the Austrian Alps ⁴ that we broke the ice (pun intended). We discovered a mutual passion for great food and wine and have since gone on marvelous culinary adventure trips from Spain to Miami. His sudden tirades on identification strategies and excruciating lectures on option pricing are a price I am willing to pay for this friendship. Thank you for being awesome. I also thank Juan for being a wonderful friend. I will truly miss ordering pizza from Piano B

³See Benfica obsession and BMW.

⁴Snowboarders serve as excellent breaks for skiers traveling at high speeds who have little or no control.

and working until the wee hours of the night together with him. He literally "had my back" when doing some of this research (we often sat back-to-back in his office, as my office building closes at night). Juan is not only super smart and fun to be around, but he is also a great salsa dancer.⁵ Thank you both for being great friends who I can always rely on 100%.

I owe immense thanks to Florian for his unconditional support and encouragement to keep pursuing my dreams and for believing in me. I thank you for being such a knowledgeable and enthusiastic discussion partner on my research and beyond. Most importantly, I thank you for all the wonderful times we have together.

Last and most importantly, I thank my family. Mum and Dad, there are no words that could describe how grateful I am for everything you have done for me, for your patience, support, guidance, and love– not only in the last four years, but also in the 23 years before that. Everything I am and have ever accomplished is because of you. Jacqueline, you are the best sister in the whole wide world and most valuable present that life has given me. We have celebrated each others successes together, grown stronger from each others failures, and always supported each other in every step of life, and we always will. Liebe Omi und lieber Onkel Volker, vielen Dank, dass ihr mich immer unterstützt habt und wir auch diesen Abschnitt zusammen feiern können. Es ist schön, dass es euch gibt.

I am incredibly lucky to be surrounded by so many magnificent people who have made my doctoral journey so special. Although I could easily write an entire book about these extraordinary people and the many others who I have not even mentioned here, I will stop at this point, so that you can get straight to reading my research on capital markets and sustainability.

Enjoy!

Clarissa Hauptmann

⁵I would like to take some credit for getting him into this.

Contents

Acknowledgements	vii
1 Introduction	1
1.1 The race to short-term profitability	1
1.2 Sustainable finance and long-term value creation	3
1.3 ESG and capital market outcomes	5
1.4 Outline of core chapters	8
2 Bank loan pricing and top executive gender: A cross-cultural perspective	13
2.1 Abstract	13
2.2 Introduction	14
2.3 Existing literature and hypotheses	17
2.4 Data	22
2.4.1 Descriptive statistics	23
2.5 Methodology and empirical results	26
2.5.1 Univariate difference test of spreads	27
2.5.2 Multivariate regression with firm, loan, and macroeconomic controls	28
2.5.3 Propensity score matching	32
2.5.4 Instrumental variable approach	34
2.5.5 Executive characteristics	36
2.5.6 Cultural influence on loan spreads	40
2.5.7 Further robustness analysis	43
2.5.8 What drives these differences?	48
2.6 Conclusion	48
2.7 Appendix	54
3 Corporate Social Responsibility and bank loan pricing: It pays to be good, but only when banks are too.	57
3.1 Abstract	57
3.2 Introduction	58

3.3	Literature review and hypothesis development	62
3.3.1	Sustainability and financial performance	62
3.3.2	Sustainability and bank loan contracting	65
3.3.3	Theoretical hypothesis development	67
3.4	Data and Sample	72
3.4.1	Sample construction	72
3.4.2	Descriptive Statistics	75
3.5	Methodology and empirical results	79
3.5.1	Borrower ESG and loan spreads	81
3.5.2	Sample split into high and low ESG banks	83
3.5.3	Interaction effects	85
3.5.4	Propensity score matching	88
3.5.5	Within firm and within bank spread changes	92
3.5.6	Time effects	96
3.6	Conclusion	100
3.7	Appendix	104
4	Stock Price Synchronicity and Material Sustainability Information	107
4.1	Abstract	107
4.2	Introduction	107
4.3	Motivation and Literature Review	113
4.4	Data and Sample	115
4.4.1	Materiality Data	115
4.4.2	Sustainability Data	117
4.4.3	Measurement of Stock Return Synchronicity	118
4.4.4	Sample Selection	119
4.5	Results	121
4.5.1	Summary Statistics	121
4.5.2	Material Sustainability Information and Stock Price Synchronicity	124
4.5.3	Change model	127
4.5.4	Firm Sustainability Importance	128
4.5.5	Capital Market Participants	130
4.5.6	Intra-industry Information Transfers	135
4.5.7	Additional Analyses	135
	Other Sustainability Disclosures	135
	Validity of Synchronicity Measure	137
	Validity of Disclosure Metric	138

4.6 Conclusion	139
4.7 Appendix	142
5 Conclusion	145
6 Valorisation	149
7 Biography	153
References	155

List of Figures

1.1	The system of ESG and financial resources	4
1.2	Sustainability performance and disclosure effects on capital markets	9
1.3	Key questions addressed in core chapters	11
3.1	Sustainability performance and capital markets	65
3.2	Why should bank sustainability performance matter?	71
3.3	Frequency of observations	75
3.4	Borrower sustainability performance for banks with high and low ESG	89
5.1	Key questions and answers	147

List of Tables

2.1	Descriptive statistics	24
2.2	Loan spread by executive characteristics	25
2.3	Mean difference test on loan spread	27
2.4	Median difference test on loan spread	28
2.5	Multivariate regression of management gender on loan spread	30
2.6	Propensity score matching results	33
2.7	Regression on propensity score matched sample	33
2.8	Instrumental variable regressions	35
2.9	Mean difference test on executive characteristics	37
2.10	Controlling for executive characteristics	39
2.11	Cultural influence on loan spreads	42
2.12	Alternative culture match and ESS culture measure.	44
2.13	Top executive score and subsample of countries	46
2.14	Countries with at least 2 female executives.	47
2.15	High vs. low culture using WVS	49
2.16	High vs. low culture using ESS	50
2.17	Variable definitions	55
2.18	Culture and female representation by country	56
3.1	Frequency distributions	74
3.2	Descriptive statistics	76
3.3	Correlations	77
3.4	Borrower sustainability performance and loan spreads	82
3.5	Split by bank sustainability performance	84
3.6	Interaction effects	86
3.7	Bank and firm fixed effects	87
3.8	Propensity Score Matching - Probit	90
3.9	Propensity Score Matching - Average Treatment effect	90
3.10	Propensity Score Matching - Multivariate regression on matched samples	91
3.11	Within firm and bank spread changes	93

3.12	Average spread over sustainability deciles	94
3.13	Multivariate regressions on within change sample	95
3.14	Time effects	98
3.15	Split by bank sustainability performance and time	99
3.16	Reputation and bank ESG across time periods	100
3.17	Variable definitions	105
3.18	Bank borrower matching	106
4.1	Sample Selection	120
4.2	Frequency Distribution Years	121
4.3	Frequency Distribution Industry	122
4.4	Summary Statistics	124
4.5	Correlations	125
4.6	Relation between Material Sustainability Information and Stock Price Synchronicity	127
4.7	Changes model	129
4.8	Firm Exposure Moderators	131
4.9	Capital Market Participant Moderators	133
4.10	Sell-side Analyst Moderators	134
4.11	Explanatory Power of Industry-level Returns	136
4.12	Other Sustainability Disclosure	137
4.13	Synchronicity Measure Validity	139
4.14	Variable definitions	143

Chapter 1

Introduction

From a traditional finance perspective, the purpose of financial markets is to efficiently allocate capital in order to create and ideally maximize shareholder value. This way, companies can obtain the necessary capital to grow and generate profits while investors receive an appropriate return for the productive use of their capital. Why then should companies care about sustainability and about the social and environmental consequences of their business decisions?

1.1 The race to short-term profitability

Nobel laureate Friedman (1970) famously claimed that the social responsibility of a company is to increase its profits. He postulated that capital flows towards managing sustainability issues are a misappropriation of shareholder funds to benefit the manager. This notion has since been heavily challenged by academics and practitioners alike, with recent empirical research providing substantial evidence that sustainability and profitability are in fact not two incompatible concepts but rather complements that, when implemented well, can enforce each other. This stream of literature began in the early 70s with Bragdon and Marlin (1972) and Moskowitz (1972), who show a positive link between pollution control and corporate performance, and CSR commitment and corporate performance, respectively. Since then, researchers have been working on documenting links between various aspects of sustainability and performance in an attempt to gain clarity and pin down the drivers and channels. Some examples of recent studies show that: Eco-efficiency relates positively to operating performance and market value (Guenster et al., 2011), announcement returns and success of mergers are positively associated with the CSR performance of the acquiring firm (Deng, Kang, and Low,

2013), companies that are reported to behave responsibly toward the environment experience significant stock price increases (Flammer, 2013), more sustainable firms perform better in the long run in terms of both stock market and accounting returns (Eccles, Ioannou, and Serafeim, 2014), and firms with high material sustainability ratings significantly outperform those with poor ratings (Khan, Serafeim, and Yoon, 2016).

In the recent decades, technological advances and the usage of the internet have increased labor productivity, but also connectivity and international competition. Price competition has increased tremendously as consumers can now easily obtain and compare prices from different providers. McKinsey (2011) found that more than 40 percent of internet users visit price comparison websites at least once a month. This pressure is passed on to managers and employees who struggle to prove the economic viability of their positions by often times resorting to short-term measures. This is reinforced by short-term oriented compensation contracts and shareholder pressures. Information asymmetries, moral hazard, and toxic incentives have resulted in a race toward myopic shareholder value creation, accompanied by the looming risk of long-term value destruction. Companies that realize this early on can use this to place themselves ahead of the curve.

Consider, for example, a fashion company that produces extremely cheap garments in a sub-standard factory in Bangladesh. In the short run, this company may benefit from lower costs and manage to crowd out competition, boosting profits. However, in the longer-run, it can take just a small fire or less to take out an entire building due to inadequate safety measures¹, resulting not only in immediate economic costs, but also injuring employees and attracting negative media attention. In a digital world in which news travels faster than ever before, competitive pressure is strong and on a global scale, and consumer awareness is at a historical peak, this type of short-sighted profit-maximizing behavior can be detrimental.

The Volkswagen emissions scandal is another recent example of how short-term profit-maximizing behavior can backfire, resulting in substantial losses: By using software that manipulated emission tests in millions of their vehicles, while at the same time claiming to be environmentally conscious, they were able to achieve a sixfold increase in diesel passenger car sales in the

¹In the recent years there have been many such incidents; notably, the Dhaka factory collapse in April 2013, a factory producing garments for fashion discounter Primark amongst others, that resulted in over 1,000 fatalities.

United States in the short term (Ewing, 2017). However, when the Environmental Protection Agency found Volkswagen to be responsible, the stock price dropped by almost 40% in September 2015. Since then, they have been charged with over 20 billion USD in fines – A substantial amount, even for a 80 billion USD market cap company.

1.2 Sustainable finance and long-term value creation

Sustainable finance is about generating *long-term* shareholder value by focusing on a triple bottom-line that also considers employees, customers, suppliers, the environment and society as a whole. Research in sustainable finance seeks to document and understand the mechanisms of this value creation process. It is a young and cutting-edge field of research with growing opportunities, as the adoption of sustainability reporting expands rapidly and data quality improves. Sustainable finance is important to companies, as they seek to retain high-quality employees, loyal customers and suppliers, and government support. It is important to capital providers, such as investors and banks, who care about and depend on the financial outlook of the companies they invest in. It is important to governments and regulators that aim to maintain a transparent, accountable, and balanced political and economic environment.

Based on the concept of mutuality, input factors to the economy can be sorted into several major categories: the natural resources from the planet (environment), the transformation and value-creation process of these resources through people (social), and finally the financial capital that results and which in turn can be used to improve resources and value-creation further (Roche and Jakub, 2017). Ideally, this system would feature a strong framework that ensures a healthy alignment of interests, transparency, and accountability (governance). Although in the current system there is still an over-emphasis on financial capital alone, capital providers, regulators, and even executives are beginning to understand the interconnectedness and relevance of these other input factors. Based on extensive research, Serafeim (2014) explains that firms which integrate ESG factors in their business, will outperform their competitors in the long run. His findings indicate the need for a more nuanced approach in evaluating sustainability efforts. To truly capture the

FIGURE 1.1: The system of ESG and financial resources

advantages of sustainability in the financial sense, it is important to ensure that the financial resources flow to the appropriate environmental, social, and governance efforts. Considering the large amount of information available, differentiating the relevant from irrelevant information can be daunting. The Sustainability Accounting Standards Board (SASB) addresses this issue by setting sustainability accounting standards that are specific to each industry and can help public corporations disclose as well as investors to identify material, comparable, and decision-useful information. An in-depth analysis of these standards will follow in chapter 4. Other initiatives include the Global Reporting Initiative which set the first global standards for sustainability reporting on economic, environmental, and social impacts and developments with a more broader, stakeholder focus. Khan, Serafeim, and Yoon (2016) show that firms with good performance on material sustainability issues, based on the SASB standards, outperform firms with bad performance on material issues. They find however, that immaterial issues are not predictive of a firm's future financial performance.

A system with a strong governance framework, one that has abundant natural resources, and a strong value-creation process through a productive work force is a system that will be able to generate strong financial returns. When put into good use, this financial capital in turn ensures liquidity, flows to further productive use, which in turn increases financial returns further. Sustainable finance on the one hand illuminates the mechanisms underlying the process from attention to environmental, social, and governance issues to

generating financial returns, but it also highlights the use of using financial returns to further advance ESG.

1.3 ESG and capital market outcomes

Environmental sustainability relates to the natural resources from the planet. It deals with issues such as the reduction of pollution, depletion of resources, and innovation to renewable resources. To exemplify, consider coal energy that has long been known to be a significant contributor to greenhouse gas emission. Not only is it a transient business model due to its limitation by finite resources, but companies that have started to switch to alternative energy sources such as wind and solar energy are able to gain a competitive edge. The recent "Renewable Infrastructure Investment Handbook" by the World Economic Forum documents the dramatic drop in energy production costs: While solar cost were \$600/MWh a decade ago compared to coal and natural gas sources that were and now still are at around \$100/MWh, solar costs have dropped to close to \$100/MWh now, while wind is as low as \$50/MWh in many countries (WEF, 2017). As renewable energy sources are becoming cheaper, they become part of a compelling business case.

Academic research has established various links between environmental sustainability and capital markets. For example, in one of the earliest studies Bragdon and Marlin (1972) show a positive link between pollution control and financial performance. Guenster et al. (2011) determine that eco-efficiency relates positively to operating performance and market value. Flammer (2013) shows how firms reported to behave responsibly towards the environment experience stock price increases. On the debt side, Kleimeier and Viehs (2016) find that the voluntary disclosure of carbon emission levels is related to lower loan costs for opaque borrowers and Sharfman and Fernando (2008) reveal that environmental risk management can be used to improve loan conditions. Chava (2014) shows that firms with environmental concerns pay more on both their debt and equity.

Social sustainability relates to the value-creation process through people. Besides fostering company-internal human capital, it comprises improving social conditions beyond the corporate setting e.g. within the local community. Social sustainability performance relates to factors such as human rights, community responsibility, and matters related to the workforce. The

later includes ensuring work place safety, as exemplified by the Bangladesh factory case above. Customers are becoming more aware and willing to shun companies that do not comply with their ethical standards and beliefs. On the employee side, research by Greening and Turban (2000) has shown that job applicants are more keen to pursue jobs from socially responsible firms. Social responsibility towards a companies own employees but also towards external participants is important. With respect to the later, there is a growing demand from individuals to generate a positive impact and change. Millennials especially, are pressuring governments and organizations to engage in dialogue on environmental and social matters. In a recent 2017 Deloitte Millennial Survey in which 8,000 millennials from 30 countries participated, 76% of individuals are found to see business as a force for positive social impact. They feel that involving employees empowers them to generate this change. Companies that understand this, are able to use it to attract talent, and increase employee loyalty and productivity. An anecdote from my time living in Indonesia: When DB Schenker, a leading logistics solutions provider from Germany, introduced mandatory high-quality safety clothing and shoes for all dock workers in Indonesia, it was at a time when it was common for dock workers to wear flip flops and tank tops at the shipyards. The change was at first greeted with skepticism by the workers themselves, but soon was fully embraced and became a standard that other companies began to adopt, when they realized the substantial improvement in worker safety and resulting productivity. Workers felt that the company cared about their safety and were in turn more dedicated to the company, felt more satisfied, and as a consequence were more productive.

Academic research on social responsibility and capital markets has revealed several links and mechanisms. For example, Becchetti et al. (2012) reveal that an exit from the Domini 400 social index is related to negative abnormal returns. Deng, Kang, and Low (2013) show that acquiring companies with strong social performance have higher merger announcement returns. Eccles, Ioannou, and Serafeim (2014) show a positive link between CSR performance and accounting and stock market performance. Cheng, Ioannou, and Serafeim (2014) show that firms with high CSR performance face lower capital constraints. With respect to the debt contracting, Cheng et al. (2015) as well as Hasan et al. (2017) reveal positive relationships between social capital and loan conditions. Similarly, Goss and Roberts (2011) reveals that social responsibility concerns are related to higher loan spreads and Shi and Sun (2015) show that high CSR scores are related to less restrictions through loan

covenants.

Governance considers, among other issues, board policies and structure, executive compensation, and anti-takeover defenses. Governance is the most researched area in the finance context to date, as reliable social and environmental performance data have only started becoming available in recent years. The appropriate measurement of sustainability and understanding materiality of issues is still one of the major challenges to be solved, and it is addressed more deeply in chapter 4 of this dissertation. The dimension of governance that receives particular attention in this book is that of gender diversity in top executive positions. In the last decade, top executive and board diversity have experienced a significant increase, in part due to improvements in labor flexibility as well as gender quotas that attempt to improve gender equality. Despite this, gender diversity is still low but expected to increase further: Currently, only about 5% of CEOs of the S&P500 are female. Norway was the first country to introduce a gender quota of 40% for female directors that came into effect in 2008 and followed by many countries since. In Germany a 30% rule for board positions was implemented in 2016. This is evidence of substantial change, considering that even until 1977, German law required women to be responsible for the household and they would only be allowed to work with the approval of their husband. These changes in diversity are likely to have significant effects on companies operating, financing, and investing outcomes. It is therefore a particularly interesting time to research this topic and chapter 2 delves into this and investigates the relationship between top executive gender diversity and financing conditions.

In terms of the link between governance and capital markets, academic research has often disaggregated governance into specific focus areas. For example, Yermack (1996) finds that companies with smaller board of directors exhibit higher market valuations. Post and Byron (2015) reveal a positive relationship between female board representation and accounting returns. Minichilli, Corbetta, and MacMillan (2010) find a u-shaped relationship between the ratio of family members in the top management and firm performance. Bauer et al. (2008) find a positive link between corporate governance and the performance of Japanese companies and Bhojraj and Sengupta (2003) show that good corporate governance is related to higher credit ratings and lower loan rates.

1.4 Outline of core chapters

The exponentially growing demand to understand the financial consequences of changes in sustainability, the recent improvement in data availability, and our current lack of knowledge all signal the urgent demand for innovative research in this area. This dissertation attempts to advance our knowledge with a focus on three particular overlapping topics that are highly important yet we lack knowledge on. My choice to address these topics in my dissertation derives from a strong intrinsic motivation after witnessing first-hand the challenges and opportunities that social inequality, environmental pollution, and corruption provide while growing up. At age 12 I moved from one of the most perfectly organized and developed countries in the world, Singapore, to Jakarta, Indonesia. Although Indonesia is one of the most beautiful countries in the world as a tourist destination, living there opened up my eyes to many serious issues, such as the notorious forest fires related to palm oil that kill thousands of animals every year. On the social side, I witnessed the immense inequality between rich and poor, and how escaping poverty seemed like a near impossible task for many. It sensitized me to notice these issues, also in developed countries such as Germany or the United States, and to think about the forgone economic potential. Generating change, even if it is improvement for the better, is a difficult task and it requires not only emotional deliberation but also importantly rational, fact-based reasoning. With this dissertation, I hope to provide supportive evidence for the later with the confidence that a deeper comprehension of the subject matter will help individuals and organizations understand how to implement the business case for sustainability within their own realm of influence.

The following three chapters provide insights into three research projects on capital markets and sustainability. The first two studies concentrate on pricing in the bank loan market, while the third employs a stock market measure to consider pricing of firm-specific information. Using stock market or debt market information has several differences. Stock market information is constantly updated in public markets and changes in the information environment are immediately reflected in stock price changes. In contrast, the debt market is often slower to adjust and price instruments, unless they are traded in the public market such as bonds. Compared to equity markets, when it comes to bank loans, there is typically a much lower variety of capital providers since there is a lower number of banks providing capital than retail and institutional shareholders. In the debt market, principal and coupon

FIGURE 1.2: Sustainability performance and disclosure effects on capital markets

amount are typically known while this is not the case for equity holders who tend to receive the residual amount after creditors are satisfied. Hence, for the purpose of this dissertation, debt market information is used to evaluate the ex ante creditworthiness of companies while stock market information is used to reflect the changing information content.

The first study is governance-focused and examines the relationship between top executive gender diversity and loan conditions. It shows that this relationship is driven by cultural attitudes towards female executives that are country-specific. The next chapter considers ESG performance in a broader manner and its effects on bank loan pricing. This chapter shows why borrowers with high sustainability performance receive better loan spreads, by analyzing the sustainability performance of the corresponding bank as well. The third study, in chapter 4, addresses the issue of sustainability disclosure, rather than sustainability performance, and considers the standard setting role of the Sustainability Accounting Standards Board (SASB) and its effect on stock price synchronicity, reflecting the firm-specific information content. Figure 1.2 presents a bird's eye view of the research agenda.² In the remainder of this chapter, I discuss the main themes and findings of each of the empirical studies.

Chapter 2 examines the relationship between bank loan spreads and the borrowing firm's top management gender in a cross-cultural setting. We use

²As is common in this type of empirical research, we note that endogeneity is an important concern that may restrict our confidence in inferring causality. Are sustainability performance and disclosure resulting capital market outcomes or could it possibly be that capital markets affect sustainability? For example in chapter 2, reverse causality can raise the question whether firms with female executives receive better loan rates or whether firms with better loan rates prefer to hire female top executives. However, we attempt to address these issues as best as we can with the statistical tools available.

LPC Dealscan for loan data and combine it with data from Orbis plus some hand collection. In particular, we show that firms run by female executives exhibit significantly lower bank loan spreads on average than those run by male executives. This result can not be explained by firm, loan, macroeconomic factors, or even executive-specific characteristics. Instead, we find that differences in loan spreads are driven by the cultural attitude towards female executives in the respective country. We find that firms with female top executives receive favorable loan prices in countries with more optimistic expectations of female management skills than their male-run counterparts. These firms however receive worse loan conditions in countries with skeptical cultural attitudes towards female executives. We find that especially firms with more negative attitudes can benefit from updates in their priors. Our results are robust to a wide range of alternative methodologies and robustness tests. This indicates that in the syndicated loan market, spreads are driven by soft information and that cultural attitudes can mitigate against the advantages of gender diversity.

In chapter 3, I take a broader sustainability approach considering environmental, social, and governance performance in the syndicated loan market. Previous studies have found that superior sustainability performance results in better access to capital. In this study, I show that borrowers with high sustainability performance pay lower loan spreads than borrowers with low sustainability performance, but only when the lending bank exhibits high sustainability performance. Banks with low sustainability performance do not provide varying loan spreads to borrowers with different levels of sustainability performance. I determine that the relationship between sustainability performance and loan prices is driven by a premium in loan spreads for borrowers with low sustainability performance, rather than a spread discount for high sustainability performers. I show that this premium is not based on underlying differences in credit risk due to sustainability issues. Instead, I find that the results are indicative of a reputation risk premium that is charged by high-sustainability banks to borrowers with low sustainability performance. The results are robust to a wide range of robustness tests and analyses.

In chapter 4, we examine if, and under what conditions, disclosure of sustainability information identified as investor relevant by market-driven innovations in accounting standard-setting, is associated with stock prices reflecting more firm-specific information and thereby lower synchronicity with market

FIGURE 1.3: Key questions addressed in core chapters

and industry returns. We find that firms voluntarily disclosing more sustainability information, identified as material by the Sustainability Accounting Standards Board (SASB), have lower stock price synchronicity. This result is stronger for firms with higher exposure to sustainability issues, institutional and socially responsible investment fund ownership and coverage from analysts with lower portfolio complexity. Moreover, we find intra-industry information transfers to firms with low sustainability disclosure within industries with high sustainability disclosure. We also document that sustainability information not identified by the accounting standard setting process is not associated with stock price synchronicity.

In chapter 5, I conclude what we can learn from this and provide directions for future research. Finally, in chapter 6, I evaluate the research impact of my dissertation by addressing the relevance of this work, recommend activities, discuss the innovativeness, and implementation opportunities.

Chapter 2

Bank loan pricing and top executive gender: A cross-cultural perspective¹

2.1 Abstract

In this chapter we show if, and under what conditions, loan spreads to firms run by female top executives differ from those provided to borrowing firms that are run by male top executives.² Our research setting exploits the cross-cultural variation between countries with respect to their attitudes towards female executives. We find that firms run by female CEOs and CFOs exhibit significantly lower bank loan spreads on average than those run by male CEOs and CFOs. This advantage, however, only persists in countries with positive cultural attitudes towards female top executives. Firms run by female top executives receive worse loan conditions in countries that have skeptical cultural attitudes towards female executives. Our results are robust to a wide range of methodologies and robustness tests, including propensity score matching, instrumental variable approach, and different subsamples and measures. Our findings indicate that in the syndicated loan market, spreads are driven by soft information and that cultural attitudes can mitigate against the advantages of gender diversity.

¹This chapter is based on a working paper co-authored with Stefanie Kleimeier and Stefan Straetmans from Maastricht University.

²In this chapter we use the term "top executive" interchangeably with "CEO and CFO". We note that we are not referring to full top management teams, which may include e.g. the COO, but focus particularly on the CEO, CFO, or a combination of both.

2.2 Introduction

Lending decisions and loan contract terms are primarily determined by a bank's perception of the borrower's creditworthiness derived from hard information about the borrower's financial performance. However, soft information obtained over the duration of the bank-borrower relationship ranging from management style, diversity, corporate governance and attention to CSR can also play an important role in reducing asymmetric information. Attention to both soft and hard information enables the bank to better identify credit worthy borrowers, structure a suitable loan contract and to consequently develop a sustainable loan portfolio characterized by stable returns and limited loan losses (Altman and Saunders, 1997).

While most studies on the determinants of bank loan pricing primarily focus on factors such as the borrower's underlying credit risk (Berger and Udell, 1990), information asymmetries between bank and borrower (Sufi, 2007), bank-borrower relationships (Ioannidou and Ongena, 2010) and also bank characteristics (Lim, Minton, and Weisbach, 2014), the role of the borrower's management characteristics, including its managerial gender diversity, remains largely unexplored. This is surprising, as managerial quality has been found to be the most important soft factor for credit risk assessment (Günther and Grüning, 2000). Top executives can have a wide scope of power³ in making operational and financial decisions that can impact the profitability and riskiness of the firm and hence its credit terms.

As to date, the empirical literature on bank loan pricing and gender is limited. Francis, Hasan, and Wu (2013) find that US borrowers with female CFOs can borrow at lower interest rates, for longer maturities and will need less collateral than US firms controlled by male CFOs. They suggest that this is due to more reliable accounting information provided by female executives and a reduction in default risk, due to less risky behavior. In contrast, Alesina, Lotti, and Mistrulli (2013) find that female executives pay more for credit in Italy, and their results are not driven by riskiness, lack of credit history, or bank type. This chapter provides a novel explanation that helps to reconcile the contradicting results in the earlier literature, by taking into account the cross-country differences in perceived skills of female and male executives. We exploit the setting of the European corporate loan market,

³Adams, Almeida, and Ferreira (2005) provide evidence that the CEO can influence market and accounting outcomes and that this relationship is mediated by the power of the CEO.

which is characterized by different national cultures in which gender attitudes vary substantially. Europe also has a long history of gradually changing economic and financial integration with national regulation being harmonized by the European Commission (EC). Most European countries share the same currency, have faced coinciding economic and financial crises, are based on democratic political systems, and face low trade barriers. Nevertheless, Europe is culturally heterogeneous in terms of language, traditions, but also in its approaches to entrepreneurship and business. This makes it an ideal setting for the purpose of this study.

Several European member states have already introduced laws and regulations to increase the share of women on *boards*. The trend began in Norway, as the first country that implemented a 40% quota for female directors of listed companies in 2008. Many countries have followed since, including France, Belgium, Italy, Spain, and Germany. Despite that, the EC (2015) calculated that while 60% of university graduates are female, only 18% of board members and 3% of CEO's of the largest listed companies in Europe are women. To further encourage an increase in female representation, the EC has proposed a gender quota of 40% for non-executive board members. While such policies are predominantly motivated by concerns regarding gender equality, there is growing empirical evidence that shifts in female representation in top positions impact corporate performance, risk taking, attention to CSR and accounting conservatism (Adams and Ferreira, 2009; Yu et al., 2010; Vähämaa, 2014; Barua et al., 2010). If these changes in management style can be translated into better corporate governance, comprising less adverse selection and moral hazard between bank and borrower as well as lower credit risk, we expect to observe that these firms are rewarded with more favorable loan conditions for borrowers too.

A bank that is successful and profitable must be able to properly assess the credit risk of their debtors and adjust lending rates accordingly. If the bank sets the spread too high for a given level of risk, it may lose business to another bank. Similarly, if it sets its spreads too low and credit risk is substantial, the bank will not be profitable in the long run. Therefore banks employ significant resources in understanding and evaluating their debtors credit risk. For this purpose, they take into account information such as financial statements, but also private information gathered. The CEO and CFO can impact both the hard facts as well as the soft information and performance outcomes, e.g. Bertrand and Schoar (2003) show that investment, financial, and

organizational outcomes are driven by management. In light of the growing empirical evidence revealing differences in management style of female executives compared to male executives, we expect these differences to be reflected in the loan setting. The most predominantly discussed difference related to credit risk is the higher (accounting) conservatism and generally more careful risk attitude of female executives. These are channels that can be directly linked to credit risk. In the setting of the financial crisis, Palvia, Vähämaa, and Vähämaa (2014) show that banks that were run by female top executives held higher levels of capital indicating more conservative behavior and they document that this in turn resulted in a lower probability of bank failure during the crisis. Based on anecdotal evidence through conversations with banks located in Indonesia, they have expressed an often greater trust in lending to women within a family, not because of greater financial expertise but because they are more careful with how the money is used. While within these families, men have occasionally been found to spend the loan on entertainment and other short-term oriented items, women have proven to be more long-term oriented and careful in deciding how the loan amount is allocated and hence deemed more creditworthy in this setting.

Anticipating our results, we find that firms with female CEOs receive 87 basis points (bps) lower bank loan spreads than firms run by male CEOs, whereas firms with female CFOs receive 55 bps lower spreads compared to firms with male CFOs. In addition to the commonly used control variables, such as loan and firm characteristics, we take into account executive-specific features including age, experience, education, and nationality by combining different data sources and hand collection. We address endogeneity concerns in a number of ways by employing relevant alternative methodologies in addition to controlling for confounding effects. We use propensity score matching to estimate the mean spread differences between matched samples and also run our multivariate sample on one-to-one matched samples. Furthermore, we conduct an instrumental variable analysis using the participation gap in the workforce as our instrument for executive gender. In the second part of the chapter, we show that the culture of the respective country of syndication plays a critical role in driving this relationship. Female-executive-run borrowing firms that receive their loan from a country with progressive views on female top managers are granted better loan conditions than in countries with pessimistic expectations on female executive performance. Our results are robust to alternative specifications of the culture towards female executives, towards the country of syndication, and also hold when the gender of

CEOs and CFOs is jointly considered. Our results indicate that firms may benefit from increasing female representation in top management positions in terms of a lower cost of capital. This result remains stable throughout macroeconomic, firm-specific, loan-related, and even executive-specific controls. However, firms only benefit if the cultural attitude towards female top executives is positive in the country of loan syndication, hence in the regimes with progressive views on gender equality. This emphasizes the necessity of progressive cultural attitudes to fully capture the advantages of managerial gender diversity. We find that particularly firms in countries with the more skeptical views towards female executives benefit most from improving their views on female executive performance.

This chapter contributes to the literature in several ways. First, this is the first *cross-country* examination of the relationship between gender and loan conditions in the European syndicated loan market. This allows us to explore cross-cultural differences in gender attitudes. Thereby we can differentiate between whether differences in loan terms are driven by internal corporate factors, or by a society's attitude towards women. Second, we are the first in this setting to account for executive-specific features, such as their education, experience, age, and nationality thereby allowing us to tease out the gender effect more clearly than previous research. Our finding that both CEO and CFO gender matters, both validates existing and motivates future research in the area of transmission channels. Perhaps most interestingly, we introduce a new perspective in the loan pricing literature: Cultural perceptions as determinants of loan contract terms. This emphasizes the importance of taking soft factors into account, such as cultural regimes, when analyzing capital market outcomes that are exposed to subjective assessment.

The remainder of the chapter proceeds as follows: Chapter reviews the existing literature and develops the hypotheses. Chapter describes the data sources and provides the descriptive statistics. Chapter explains the methodology, the empirical results, and robustness exercises. Chapter concludes.

2.3 Existing literature and hypotheses

The relation between gender and bank loan contracting has mainly been studied in the context of small-business lending. One stream of studies finds

that women are discriminated against, e.g. Fay and Williams (1993) find evidence that women experience discrimination when seeking start-up capital, and loan officers value their level of education more than for otherwise equal male applicants. Mijid and Bernasek (2013) show that loan denial rates are higher for women than men in small businesses, indicating a higher perceived creditworthiness of male-run firms. Similarly, Alesina, Lotti, and Mistrulli (2013) establish for Italy that women pay about 29 bps more for loans than men. Another stream of research however, does not find differences in loan contracting between gender groups. Blanchflower, Levine, and Zimmerman (2003) find that differences in denial rates between genders are negligible in the small-business credit market. Similarly, Storey (2004) do not find any difference in application or rejection rates between gender groups in the micro firms credit market, and Cavalluzzo, Cavalluzzo, and Wolken (2002) do not find that female borrowers pay any higher interest rates than men in small-business financing. Bellucci, Borisov, and Zazzaro (2010) find that although female entrepreneurs face tighter credit availability, they do not pay higher spreads. The only paper to date that investigates gender in the setting of large syndicated loans is by Francis, Hasan, and Wu (2013). In contrast to the studies in the small-business lending market, they find that firms with female CFOs receive lower interest rates, longer maturity contracts, and are less likely to have to provide collateral in their US-based study than their male counterparts. This indicates that in the syndicated loan market female-run firms may be assessed to be more creditworthy.⁴

The literature has also focused on the relation between gender diversity in boards and company performance. Adams and Ferreira (2009) find that more gender diverse boards allocate more effort to monitoring; however they perform worse than those with more male-dominated boards. In order to adapt to changes in leadership diversity, it is critical for us to expand our understanding of bank loan contracting and gender beyond small-business lending. Gender differences that have been established in the general population may not prevail in the top management of large firms, due to strong selection

⁴We build on this line of work by Francis, Hasan, and Wu (2013) and establish the relationship not only for the CFO but also for the CEO. We record 17% (i.e. 35.21bps / 211.21bps) lower spreads for companies run by female CFOs, while they record a difference of 11%. Their sample covers the US in 1994 to 2006, which is coined by a very low number of female executives particularly in the earlier years, while our study captures the more recent period of 2005 to 2015 and explores a non-US international sample. Furthermore, they focus on accounting conservatism as the channel, referring to their related studies, while we focus on a large portion of our study on exploiting cultural heterogeneity to explain cross-sectional differences in the relationship between top executive gender and bank loan pricing.

processes towards the top of the organizational structure. In order to break the glass ceiling, successful female executives may need to possess or develop traits that are unique. In line with this theory, Adams and Funk (2012) discover that "female and male directors differ systematically in their core values and risk attitudes, but in ways that differ from gender differences in the general population". For example, in contrast to empirical evidence from the general population that women are more risk averse, they in fact find that women in board positions are more risk-seeking than their male counterparts. Their findings are supported by Berger, Kick, and Schaeck (2014) who show that higher female board representation increases risk. This encourages us to rethink our current understanding of the impact of top management gender on financing, investing, and operating decisions.

Other papers focus on the relation between measures of accounting conservatism and related company risk aversion and the presence of female executives. Francis et al. (2015) find that hiring a female CFO is related to an increase in accounting conservatism, suggesting a direct link between gender and risk-aversion in the top management. Similarly, Yu et al. (2010) find that companies with female CFOs have more income decreasing discretionary accruals, indicating more conservative financial reporting strategies. This is supported by Vähämaa (2014) who shows that firms shift to more conservative financial reporting policies when a female CFO takes over from a male CFO. In addition, Barua et al. (2010) reveal that firms with female CFOs provide higher quality accrual data. Kim, Surroca, and Tribó (2014a) discuss that if the bank trusts that the borrowers' management is committed to meeting their obligations and to not behave opportunistically, this will reduce monitoring, bonding, searching, and warranty costs associated with the financial contract. Hence, if female CFOs are inherently more reliable and conservative in their accounting data, one expects this to be rewarded in terms of better loan conditions. In support of this idea, Huang and Kisgen (2013) find that firms with female executives have higher announcement returns when acquisitions and debt offerings are announced. However, if accounting conservatism is the channel for differences in loan prices, these differences should no longer prevail when we account for conservatism. Nevertheless, remaining differences in loan spreads could also be driven by corporate factors such as firm performance and size. Perhaps only more established firms have female executives, or those firms that have more tangible assets and a higher leverage ratio. We extend the existing literature, by not only including these firm conditions, together with the commonly considered loan

characteristics and macroeconomic conditions, but also taking into account executive-specific features. Executive gender is only one of several management characteristics. Hence, ignoring other important management features such as age or education may lead to misguided conclusions - in particular as managerial quality has been found to be the most important soft criteria used in evaluating creditworthiness (Grunert, Norden, and Weber, 2005). Aier et al. (2005) find that CFO expertise is negatively related with accounting restatements. Consequently, more experienced CFOs may receive better loan terms, as they provide more reliable financial statements. Managerial experience could be captured by age or years of involvement as the respective executive of the company. Other executive-specific characteristics that may proxy for managerial performance and hence be reflected in the loan price are the education level, university major, and nationality. However, once we control for these executive characteristics in addition to the previously mentioned firm, loan, and macroeconomic conditions, it would be unexpected to find the executive gender to still matter. In this manner, we approach the first research question.

Research question 1: Do firms with female top executives receive different bank loan spreads than those run by male top executives?

In addition to the hard information obtained in financial statements, a second important stream of information for banks to assess the creditworthiness of their borrowers is soft information, in particular management style (Grunert, Norden, and Weber, 2005). Although age, experience, and education may act as signals for management style, the interpretation of such soft information subjective, i.e. is influenced by social structures and cultural views. This is important to investigate, as social constructions may cause unconscious discrimination that is difficult to change (Fay and Williams, 1993).

Therefore, if lending banks have an expectation on how female top executives differ with respect to their male counterparts in terms of performance or capabilities then this should be reflected in their loan pricing, even if these differences are controlled for. Although female top executives are not representative of the average female in the population (Adams and Funk, 2012), lenders may expect the fundamental differences between men and women that have been established for the general population to hold for the top management as well. The empirical observation that women are more risk-averse

than men is one of the most well known empirical stylized facts in behavioral finance (Charness and Gneezy, 2012; Borghans et al., 2009; Eckel and Grossman, 2002; Jianakoplos and Bernasek, 1998). Women are also documented to be less overconfident (Huang and Kisgen, 2013) and worse at negotiating (Stuhlmacher and Walters, 1999) than their male counterparts in the general population. Whether negotiating a loan contract deal, presenting company performance to investors, or determining trade conditions with suppliers, negotiation skills and confidence matter and are vital determinants of the respective outcomes of these situations. Lauterbach and Weiner (1996) find that in negotiations women place more value on involvement and relationships whilst men focus on self-assertion and act more independently. Verheul and Thurik (2001) claim that female entrepreneurs work more often part-time and are more likely to work in service sectors. They also confirm earlier studies that women are more risk averse. Finally, they argue that women typically exhibit less financial management experience and spend less time networking. With regard to financial literacy, women also appear to be less financially knowledgeable than men in the general population (Van Rooij, Lusardi, and Alessie, 2011; Lusardi and Mitchell, 2011; Chen and Volpe, 2002).⁵ Finally, women tend to shy away from competition more than men (Niederle and Vesterlund, 2007) and perform worse under pressure in competitive environments (Gneezy, Niederle, and Rustichini, 2003). Lenders may take these general differences into consideration when pricing loans. Our unique European sample allows for a cross-cultural comparison. Studies on culture in the syndicated loan pricing literature focus on cultural distances between lending banks and borrowing firms (Kleimeier and Chaudhry, 2015; Giannetti and Yafeh, 2012), however not on the effect that the type of culture itself has on the loan terms. This leads us to our second research question.

Research question 2: Do firms with female top executive receive more favorable bank loan spreads than firms with male top executives in countries with more optimistic expectations on female executive performance? In contrast, do female-run firms receive worse loan conditions in countries with more negative expectations on female executive performance?

⁵We note that although we do expect this to impact perceptions on the financial literacy of female top executives, we do not expect the performances differences recorded in the general population to hold in the top management.

2.4 Data

We combine information from various data sources. Loan data is extracted from the Loan Pricing Corporation's (LPC) DealScan database, which is considered the "world's number one source for comprehensive, reliable historical deal information on the global loan markets" (Reuters, 2015). It includes detailed loan contract terms for both public and private firms, such as the loan spread, maturity, deal size and seniority of the loan. In addition, it provides information on the loan purpose, tranche type and senior debt rating.

Executive information and borrowing firm characteristics are gathered from Orbis data solutions. The database provides a comprehensive source of information on over 160 million listed and unlisted firms worldwide, including management and financial statement data. Orbis covers data from renowned databases such as Reach, Amadeus, Osiris and Bankscope and access to historical Orbis data is available from 2005 onward. We thus employ data from 2005 until 2015. Missing data on executive characteristics, including gender, are manually retrieved from online data on the companies' website publications.

Cultural proxies for the borrowing firm countries are retrieved from the World Value Survey (WVS). The WVS conducts regular surveys to capture changing aspects in social and political life in almost 100 countries around the globe. The database seeks to employ the highest-quality research designs in each country and has already been used in hundreds of publications in more than 20 different languages (WVS, 2015). WVS surveys the percentage of respondents in each country that agree with the statement "Men make better business executives than women". This is our main proxy for a country's attitude towards female top executives. For sake of robustness, we also alternatively use the European Social Survey as a culture proxy. The survey provides data for all European countries and "are carried out by the EC for the EU member states and provide insight into the public opinion of the population on various topics, including those related to gender" (ESS, 2015). The attitude within EU member states towards female executives is quantified by the question "When jobs are scarce men should have more right to job than women".⁶

⁶Although this questions does not explicitly capture the cultural attitudes towards top executives, it does reflect the respective business environment towards women and it is available for a larger number of countries than WVS.

The data from these different sources are aggregated to create our sample. The data are cross-checked and sources are compared to ensure quality. Cancelled loans and bonds are removed from the sample. The final sample comprises 3003 loans for firms with CEO gender information, and 2861 loans for firms with CFO gender information from 2005 to 2015. There is an overlap for 2806 firms for which both the CEO and CFO are known.

2.4.1 Descriptive statistics

The descriptive statistics of the key variables are presented in Table 2.1. Of all the loans, approximately 2% are granted to firms with female CEOs and 6% to those with female CFOs. This is line with existing studies, such as Barua et al. (2010) and Francis, Hasan, and Wu (2013) who find 8% and 5% CFOs, respectively. It also reflects the findings of the EC that 2% of large listed European firms are run by female CEOs, validating the representativeness of our sample.

The loan spread is measured by the All-in-spread drawn. This is the amount the borrower pays *over* the LIBOR, including any fees paid to the bank group. In this sense it is a relative measure, as LIBOR rates change over time. The spread ranges from 5 bps to 1,400 bps, with a mean of 211 bps. The spread is in line with previous studies, such as Lim, Minton, and Weisbach (2014) who find a mean spread of 249 bps. The loan size has a mean of €790M, which is comparable to Francis, Hasan, and Wu (2013) \$774M. Maturity is the loan maturity measured in months. The loans in the sample have an average maturity of 60 months, which is similar to Maskara (2010) and Lim, Minton, and Weisbach (2014). The covenants dummy variable captures whether there are any financial or general covenants attached to the loan. Only 1% of the loans are known to have covenants in the sample. The loan type indicator variable reflects the loan type. About half of the loans are term loans, which provide less liquidity concerns for the lender. Most loans in the sample are senior or senior subordinated loans. The multiple tranches dummy variable equals to one if the tranche belongs to a deal with multiple tranches and zero otherwise. 71% of the loans have multiple tranches, slightly higher than the 52% that Maskara (2010) find in their sample.

With regard to the firm characteristics, the average firm has a size of €7,188M assets, similar to the U.S. sample used by Francis, Hasan, and Wu (2013) of \$9,955M. Profitability, as reflected by return on capital, has a mean of 11.62%.

The leverage ratio is on average 57.59%. Tangibility and conservatism limit the sample size. On average the firms have a tangible fixed assets to total assets ratio of 0.27. Conservatism is captured by the market to book ratio, similar to previous loan pricing studies (Francis et al., 2015; Beaver and Ryan, 2000) and has an average of 2.07.

TABLE 2.1: Descriptive statistics

Variables	N	Mean	Standard Dev.	Min.	Max.
CEO gender (indicator)	3003	0.02	0.15	0	1
CFO gender (indicator)	2861	0.06	0.24	0	1
Loan characteristics					
Spread (bps)	3060	211.21	178.52	5	1,400
Loan size (€M)	2982	790.50	1,595.36	1	25,038
Maturity (months)	2820	57.92	37.53	1	372
Covenants (indicator)	3060	0.01	0.07	0	1
Term loan (indicator)	3060	0.48	0.50	0	1
Senior (indicator)	3060	0.98	0.15	0	1
Multiple tranche (indicator)	3060	0.71	0.46	0	1
Firm characteristics					
Firm size (€M)	2435	7,188	43,973	0	1,120,000
Profitability (ratio)	2469	11.62	30.34	-716.62	356.11
Leverage (ratio)	3042	57.59	1,048.84	-83.32	41,232
Private (indicator)	3060	0.43	0.49	0	1
Conservatism (ratio)	1423	2.07	20.71	-389.91	286.98
Tangibility (ratio)	1454	0.27	0.27	0	0.96

Notes: This table depicts the summary statistics for the key variables during the 2005 - 2015 sample period. The number of observations reflects the number of loan tranches observed for each variable. Variable definitions are provided in appendix table 3.17.

We also consider executive characteristics, because they may be reflecting executive capabilities and hence performance which may in return effect loan spreads. Detailed information on the executive characteristics are shown in table 2.2. The CEO age group is considered, as age can be correlated with experience and skills. Our data reveals that older CEOs and CFOs receive better loan spreads. Most CEOs are between 50 and 65 years old. The experience variable captures how many years the executive has been active in his or her respective role. Executives with more "experience" (i.e. number of years being CEO or CFO) receive more favorable loan terms. In terms of education, the executives' degree is measured as Bachelor, Master, MBA, or a doctoral degree. A Master degree seems to coincide with the lowest loan spread for CEOs whereas CFOs who obtained a Ph.D. receive the best loan

TABLE 2.2: Loan spread by executive characteristics

CEO:				CFO:			
	Ø spread	Std. Dev	N		Ø spread	Std. Dev.	N
Age group				Age group			
< 50	246.54	167.61	426	< 50	226.77	179.90	949
50 to 65	193.49	163.21	1595	50 to 65	206.35	186.75	1209
> 65	169.61	187.24	391	> 65	157.55	147.22	88
Unknown	264.37	206.55	591	Unknown	231.48	166.68	615
Experience				Experience			
< 3 years	216.78	186.62	525	< 3 years	242.17	297.84	481
3 to 10 years	203.73	182.21	796	3 to 10 years	210.79	181.87	697
> 10 years	198.50	164.88	795	> 10 years	210.06	187.04	504
Unknown	228.20	183.85	887	Unknown	213.42	166.47	1179
Degree				Degree			
Bachelor	196.41	164.01	405	Bachelor	204.36	174	449
Master	188.57	151.14	580	Master	222.03	201	272
MBA	194.87	169.88	322	MBA	196.85	164	570
Ph.D.	194.02	173.28	330	Ph.D.	148.76	143	150
Unknown	234.63	195.31	1366	Unknown	235.38	184	1420
Total	211.21	178.52	3060	Total	217.02	179.76	2861

Notes: This table depicts the average spread, standard deviation, and number of observations per CEO and CFO characteristic. The number of observations reflects the number of loan tranches observed for each variable. The fourth management characteristic included in the analysis is the degree major, which is not shown in this table as we take into account more than 30 different majors. Variable definitions are provided in appendix table 3.17.

conditions. It seems that for the CFO, as the main person responsible for the firm's finances, a higher education level is more desirable. We also take into account the degree subject, however do not list them here to conserve space. Altogether, table 2.2 indicates that there is quite some heterogeneity in the executive-specific characteristics, signaling that it may be important to consider in the analysis.

With respect to the country distribution, appendix table 2.18 shows that most facilities in the sample are syndicated in the United Kingdom, followed by Spain, Germany, and France. These four countries together represent about 60% of the sample. The table also refers to country culture scores for each country from WVS. The survey participants react to the WVS statement "Men make better business executives than women do". Respondents choose between "Agree strongly", "Agree", "Disagree", and "Strongly disagree". The ratio of participants that respond with "Agree strongly" and "Agree" to total responses is taken to measure the extent a culture agrees with the above statement. Hence, a higher aggregate WVS score represents a more male-dominated business culture, while a lower score represents a more female-friendly management culture. The countries with the most unfavorable attitudes towards female executives, are found in Georgia and Azerbaijan, whereas Sweden and Switzerland exhibit the most progressive views on women in top executive roles. The table reveals that the female representation per country does not correlate with the culture scores. As a robustness check, we also use data from ESS. This proxy is more crudely defined but available for a wider set of countries. It measures the percentage of respondents per country that agree with the statement: "When jobs are scarce men should have more rights to have a job than women".

2.5 Methodology and empirical results

We begin the empirical analysis with a simple univariate analysis of mean and median differences. After establishing the relationship between loan conditions and gender, we consider the effect of gender role cultures in a multivariate setting and with alternative methodologies to overcome endogeneity concerns. Amongst others, we use different propensity score matching and instrumental variable approaches. Finally, we incorporate the effect of cultural heterogeneity to understand the influence of perceptions of female executive performance on bank loan spreads.

2.5.1 Univariate difference test of spreads

TABLE 2.3: Mean difference test on loan spread

Variables	N	Ø spread	Std. Dev.	Combined N	Difference	t-value
Male CEO	2,935	212.92	180.26	3,003	46.89 **	2.13
Female CEO	68	166.03	130.47			
Male CFO	2,694	220.47	182.41	2,861	58.12 ***	4.10
Female CFO	167	162.30	117.51			

Notes: This table provides a univariate mean difference t-test on the loan spread for firms run by female and male CEOs and CFOs. The number of observations refers to the number of loan tranches observed. The mean reveals the average spread for each group of executives. The combined number of observations is provided, followed by the difference in means. The t-value depicts the significance of the difference in means. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

First we test the equality of means between the two gender groups. Table 2.3 provides an overview of the differences in means between male and female CEOs as well as CFOs. We find that firms with female CEOs pay on average 46.89 bps lower spreads, significant at the 5% significance level. Firms with female CFOs also pay lower spreads, and the difference of 58.77 bps is significant at the 1% significance level. To avoid concerns regarding the normality assumptions, we confirm these findings with a median test shown in table 2.4. The test sorts the observations into two categories: observations that are greater than the median and those that are not. A Chi-squared test is used to test for the significance of the difference. For both the CEOs and CFOs the majority of observations lies below the median for female executives and is statistically significant.

The observed variation in loan prices however, may be driven by factors such as firm size or profitability, or even macroeconomic factors. For example, if female executives work in larger firms they may receive better loan conditions due to the fact that these firms may have more stable cash flows. To avoid capturing such selection biases and tackling endogeneity concerns, in the next step we consider a variety of important controls and alternative methodologies to better capture the given relationship.

TABLE 2.4: Median difference test on loan spread

Variables	N ≤ Median	N > Median	Total Obs.	Significance	Chi2(1)
Male CEO	1,485	1,450	2,935	*	3.32
Female CEO	42	26	68		
Male CFO	1,332	1,362	2,694	***	8.51
Female CFO	102	65	167		

Notes: This table provides a univariate median difference test on the loan spread for firms run by female and male CEOs and CFOs. The number of observations refers to the number of loan tranches observed that are smaller or equal to the median value and above the median. The t-value depicts the significance of the difference in means. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

2.5.2 Multivariate regression with firm, loan, and macroeconomic controls

We test the relationship between gender and bank loan prices in a multivariate setting. First, we control for macroeconomic features such as industry, country, and year effects. We control for the industry, as loan spreads differ between industries due to their different operations and consequently their different risk profiles. For example, firms in the retail trade and services industry have an average spread of 273 and 292 bps respectively, whilst finance, insurance, and real estate firms have lower bank loan spreads of about 139 bps. Country and year fixed effects are important to consider as they take into account unobservable differences between countries and years that may influence loan spreads. Factors such as the general political climate and economic situations can be taken into account with these variables.

In the second step we add firm-specific control variables that are available for both private and public firms. For this purpose we add firm size, measured as the natural logarithm of total assets. Larger firms tend to have a longer financial history record and reputation that may result in more stable cash flows (Strahan, 1999). Consequently, in this analysis we need to consider that larger firms receive on average better loan conditions. If our sample of female executives is represented by the larger firms, differences in spreads that may otherwise be attributed to the executive gender must be controlled for. Similarly, we control for the profitability of the firm, as the more profitable a firm is, the better it is able to repay its debt. Adams and Ferreira (2009) find that gender diversity in fact reduces corporate performance, indicating its importance as a control in our study. Clearly, profitability should

not be considered without the other side of the coin, the level of risk. To also consider the related risk, we take into account leverage. A firm that has less leverage is safer in terms of being better able to meet its long-term financial obligations. Furthermore, higher levered firms may face greater moral hazard problems, such as substituting low-risk assets with high-risk assets once they have received sufficient financing (Strahan, 1999). Therefore, we expect that firms with lower leverage receive more favorable bank loan spreads if leverage is exogenously determined. However at the same time, as Corielli, Gatti, and Steffanoni (2010) discuss in their paper, a higher spread is compatible only with lower leverage and hence a situation in which funds are expensive and leverage is high is unlikely resulting in an expected reversal of sign on the leverage estimate.

As our sample covers both private and public firms, it is important to differentiate between these sets of firms. Private firms tend to be more opaque as they are less subject to disclosure and reporting requirements. They may also be less exposed to monitoring, as their shareholder base is often smaller. As loan spreads are also based on such information, we expect that public firms receive lower loan spreads. Due to the fact that loan prices essentially depend on the creditworthiness of the borrower, we control for the senior debt rating of the respective firm with the set of indicator variables captured in "Rating". A firm that is rated as more senior should receive better bank loan prices than one that is less senior.

Next, we extend these firm characteristics by further firm characteristics that are omitted in the previous step as they reduce the sample size. To take into account accounting conservatism, we include the market-to-book ratio, where a higher ratio reveals more conservative accounting (Francis, Hasan, and Wu, 2013). Francis, Hasan, and Wu (2013) attribute their findings in differences in loan spreads between male and female run firms to differences in accounting conservatism. Therefore it is important for us to include this control variable. The market-to-book ratio also serves as an indicator of future profitability or growth opportunities (Strahan, 1999). In this chapter we refer to the market-to-book ratio as "Conservatism". Furthermore, we include the tangibility of assets as an important explanatory variable influencing loan spreads. We expect that firms with more tangible fixed assets are more creditworthy, as tangible assets can be used to cover debt repayment issues thus reducing the expected loss given default.

In the final step we additionally include loan characteristics. Larger loans

TABLE 2.5: Multivariate regression of management gender on loan spread

	Macro		Macro & firm I		Macro & firm II		Macro, firm, & loan	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CEO gender	-94.86*** (3.19)		-81.26** (2.28)		-119.70*** (3.63)		-86.08*** (3.41)	
CFO gender		-36.60** (2.09)		-30.85* (1.67)		-64.25*** (2.88)		-35.21* (1.70)
<u>Firm features</u>								
Firm size			-13.27*** (7.90)	-13.35*** (7.62)	-12.80*** (7.11)	-12.42*** (6.60)	-4.87*** (2.85)	-5.23*** (2.96)
Profitability			-0.06 (0.24)	-0.10 (0.35)	-1.81*** (3.39)	-1.92*** (3.47)	-1.62*** (3.28)	-1.69*** (3.28)
Leverage			-0.72* (1.82)	-0.76* (1.84)	-2.21*** (3.47)	-2.47*** (3.68)	-1.86*** (3.16)	-2.07*** (3.28)
Private			40.42** (2.48)	40.72** (2.44)				
Conservatism					-0.19 (0.82)	-0.10 (0.37)	-0.14 (0.76)	-0.06 (0.27)
Tangibility					-59.08* (1.90)	-45.42 (1.45)	-36.66 (1.35)	-29.79 (1.07)
<u>Loan features</u>								
Loan size							-30.54*** (5.59)	-29.11*** (5.09)
Maturity							-0.23 (1.02)	-0.11 (0.54)
Covenants							-22.53 (0.74)	-4.30 (0.15)
Term loan							51.65*** (4.26)	54.29*** (4.43)
Senior							-142.55*** (5.26)	-143.83*** (5.31)
Multiple tranche							-1.44 (0.14)	-3.31 (0.32)
Loan purpose	No	No	No	No	No	No	Yes	Yes
Rating	No	No	Yes	Yes	Yes	Yes	Yes	Yes
<u>Macro conditions</u>								
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	37.77 (0.85)	32.75 (0.47)	28.42 (0.62)	8.32 (0.19)	62.75 (1.14)	49.86 (0.88)	375.44*** (7.01)	380.92*** (6.19)
Adj. R^2	0.261	0.251	0.345	0.338	0.454	0.471	0.520	0.528
Num. Obs.	3,003	2,861	1,932	1,863	991	946	896	854

Notes: The dependent variable is the loan spread. Columns (1) and (2) reveal the relationship between gender and loan spread whilst controlling for macroeconomic characteristics. In columns (3) and (4) firm controls that are available for both private and public firms are added to the regression. Columns (5) and (6) include additional firm characteristics that are only available for the public firms in the sample. In the last two columns (7) and (8) further loan conditions are added to the regression. Variable definitions can be found in appendix 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

may be riskier for the lender as they reduce the syndicates diversification benefits. On the other hand, larger loans may indicate a higher creditworthiness of the borrowing firm. We find a negative relationship, similar to Strahan (1999), where larger loans receive better loan spreads. The loan maturity in months is taken into account, as on the one hand longer maturities may mean a higher risk exposure for the bank. On the other hand, firms that receive longer maturity loans may actually be the more creditworthy ones. The covenants indicator variable is included to take into account if the loan has either general or financial covenants attached to the loan contract. Covenants can reduce the risk of the lender by mitigating agency conflicts that may arise in the lending relationship. The variable "term loan" accounts for the loan type. Furthermore, it is essential to consider the seniority of the loan as the credit risk for the lender is influenced by the hierarchy of the pay-off structure. For this purpose we include an indicator variable that equals one when the loan is senior or senior subordinated. A more senior loan is paid back before lower ranking loans. Therefore, senior loans receive lower spreads. We also consider whether the loan is a multiple tranche loan or not. When a loan has multiple tranches, it increases the exposure of the syndicates to the borrower similar to the loan size. On the other hand however, multiple tranches may be desirable as they can be developed to better suit the loan contract to the specific needs of the borrower. Finally, we also include a set of instruments to control for the loan purpose. Depending on what the loan is used for it can impact the repayability of the loan and the risk exposure of the borrowing firm. High risk projects may be less desirable for lenders than lower risk loan purposes, in particular if they are large projects, and hence may require to be compensated with higher loan spreads.⁷

The empirical model takes on the following form:

$$\text{Spread} = f(\text{gender}, \text{macroeconomic controls}, \text{firm characteristics}, \text{loan characteristics})$$

The estimation results using OLS and clustering standard errors on the firm

⁷We follow previous literature and do not explicitly take into account bank characteristics, as our focus is on the demand side for loans rather than the supply side. In a free market setting we assume that borrowers will select the bank with the best conditions for their purpose and hence the characteristics of the bank would be endogenous. In untabulated tests we run our analyses using lead arranger fixed effects and find similar results. We note however, that these fixed effects may not be accurately capturing cross-sectional differences between lenders, as the sample includes many bank syndicates with multiple lead arrangers which are not individually considered. This is not the case in chapter 3, as here all lenders have a single lead arranger.

level are shown in Table 2.5. In accordance with the theoretical development of research question 1 and the univariate mean tests, we find that firms with female CEOs and CFOs pay lower syndicated bank loan spreads than those with male executives. This relationship holds throughout the alternative sets of control variables. In the final two columns (7) and (8), firm characteristics, loan features, and macroeconomic controls are all included in the multivariate regression. The sign and significance of the coefficients remain, with the economic impact appearing slightly higher for the CEOs and lower for the CFOs compared to the mean difference test. Firms with female CEOs pay about 86 bps lower bank loans, and firms with female CFOs pay 35 bps less. Similarly, Francis, Hasan, and Wu (2013) find that female-CFO-run companies pay about 11% less than male-run companies in their sample of US firms, compared to our findings of 17% lower spreads. Controlling for these firm-specific characteristics reveals that differences in loan characteristics are not due to the fact that women run different firms than men.

2.5.3 Propensity score matching

As a robustness test we use propensity score matching to examine the relationship between the loan price and top executive gender. In the first step, a probabilistic regression (probit) is estimated to determine the probability of the executive being female (treatment effect). The estimation of the propensity score takes into account firm, macro, and executive characteristics. In particular, we let the propensity of being a female executive depend on the firm size, performance, market-to-book ratio or conservatism, tangibility ratio, leverage, rating, country, year, and industry. In the second step, the difference in spread is computed for observations of the treated versus the untreated group with similar propensity scores using the nearest neighbor matching method. The propensity score matching results in table 2.6 display the average difference in spread between the most similar observations of each group, taking firm and executive characteristics into account. The results support the previous findings that firms with female top executives receive better bank loan prices than those with male executives. The economic magnitude of the difference is comparable with the multivariate regression results, with the gender effect being larger for the CEOs than for the CFOs.

Next, we generate a gender proxy *female_exec* that equals to one if *either* the CEO or CFO is female and is zero otherwise. This provides us with

TABLE 2.6: Propensity score matching results

Variables	N	Matches	Spread Difference	Robust SE	Z value
CEO	733	max. 2	-76.13 ***	5.79	-13.14
CFO	943	max. 4	-45.50 ***	6.51	-6.99
female_exec	988	max. 6	-45.55 **	21.52	-2.12

Notes: This table provides the results of the propensity score matching using a set of executive, firm, and macro characteristics. The treated group is the female subsample, the control group are the male executives. The spread difference is the average difference in spread between both groups. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

a sample that is suitable such that we can run the multivariate regression from the previous section on our matched sample, as using a one-to-one matching approach limits the sample by the number of female executives. We run propensity score matching again to generate our matched sample and, following the literature, use the covariates that were used to calculate the propensity score in the matched sample regression. The results of the propensity score matching are provided in table 2.6. We identify the matched sample including only one-to-one matched firms and find that 57 firms have common support, such that our sample comprises 114 firms altogether. The regression results from the matched sample estimates are provided in table 2.7 and confirm our previous findings, that firms with at least one female top executive pay lower loan spreads than firms run by male top executives. In this case, the result reveals a difference in loan spreads of 47 bps between firms with and without a female top executive.

TABLE 2.7: Regression on propensity score matched sample

Variables	Coefficient	t value	Adj. R^2	N
female_exec	-46.94 ***	3.03		
Firm size	-9.45 ***	3.35		
Profitability	-4.59 ***	-3.61		
Leverage	-0.07	0.11		
Conservatism	0.05	0.05		
Tangibility	8.21	0.23		
Rating	Yes			
Year	Yes			
Industry	Yes			
Country	Yes		0.34	114

Notes: The dependent variable is the loan spread. Variable definitions can be found in appendix 15. The number of observations refers to the number of loan tranches observed. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

2.5.4 Instrumental variable approach

To further address endogeneity, we employ an instrumental variable regression approach. We use the participation gap between active men and active women in the work force of the respective country as our instrument and obtain this data from the World bank for the respective years. The measure *participation gap* is calculated as the male participation rate minus female participation rate in the active workforce of people aged between 16 and 64. In an environment that has more working women in the workforce, relative to available men in the labor force, we assert that the likelihood that a company has a female top executive is higher since there is more supply of suitable prospective female executives. We find that the measures are indeed negatively correlated, also in the probit setting as shown as the first stage regression. Furthermore, we argue that the participation gap and firm-specific loan spread are unrelated otherwise, as we do not expect that an increase in participation gap between male and female workers itself leads to spread changes, unless this occurs through the channel of resulting changes in gender diversity within the company. Hence, in the first step, we run a probit with gender as our dependent variable and all the covariates related to firm and macro characteristics discussed previously and include the participation gap as an additional independent variable. We do not include loan characteristics in this stage, as the loan characteristics are determined jointly.⁸ We document a negative relation between the participation gap and the probability of having a female top executive as shown in table 2.8. In other words, when there are more active women in the workforce relative to men and the participation gap declines, the likelihood of a firm having a female top executive increases, as we hypothesized. In the second step, we use the estimates from the first step probit estimation of executive gender in our multivariate regression with spread as the dependent variable. Our estimation results on the coefficient of executive gender is negative, as our previous tests reveal as well, and show that firms with female executives exhibit lower loan spreads on average. More specifically, the results in table 2.8 reveal that firms with a female top executive pay 146 bps lower loan spreads on their loans, which is even higher than our initial multivariate estimates. The main result remains, that firms run by female top executives pay on average lower loan spreads.

⁸However, in untabulated tests we confirm that our results also hold when we include loan features in the first stage regression.

TABLE 2.8: Instrumental variable regressions

Variables	Stage 1: Dep. var. Executive gender		Stage 2: Dep. var. Spread	
	Coefficient	t value	Coefficient	t value
female_exec			-146.13 **	2.03
Participation gap	-0.10 ***	3.42		
<u>Firm features</u>				
Firm size	0.03	1.16	-4.01 **	2.53
Profitability	0.01	0.23	-1.51 ***	3.65
Leverage	0.01	1.00	-1.20 ***	4.34
Conservatism	-0.01	1.09	-0.22	1.18
Tangibility	-0.79 **	0.00	-5.94	0.33
<u>Loan features</u>				
Loan size			-32.58 ***	9.14
Maturity			-0.29 **	1.98
Covenants			-9.54	0.18
Term loan			71.40 ***	8.74
Senior			-189.02 ***	3.39
Multiple tranche			0.90	0.11
Loan purpose	Yes		Yes	
Rating	Yes		Yes	
<u>Macro conditions</u>				
Industry	Yes		Yes	
Country	Yes		Yes	
Year	Yes		Yes	
Num. Obs.	896		896	

Notes: The first dependent variable is the executive gender measured as 0 if there is not female top executive amongst the CEO and CFO and 1 if one of both are female. The second dependent variable is the loan spread. Variable definitions can be found in appendix 15. The number of observations refers to the number of loan tranches observed. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

2.5.5 Executive characteristics

So far we have established that firms with female executives receive better bank loan prices than those run by male executives. We have found that these differences cannot be attributed to macroeconomic effects such as country or year effects. Also after controlling for the industry and other firm characteristics such as size, profitability, leverage, conservatism and tangibility the gender effect remains. This does not change once further loan characteristics are included into the model. However, the question still remains whether we are capturing the gender effect or another executive-specific feature that may be correlated with gender. Could it be that female executives receive better bank loan prices because they have more experience or are better educated? To date, this problem has not been studied.

Table 2.9 provides an overview of the differences in age groups, experience, and level of education. On the one hand, age can proxy for experience as older executives are more likely to have had a longer career path. On the other hand, older executives may be less innovative, creative and hence less effective managers. Serfling (2014) finds that older CEOs take on less risk, they also invest less in R&D which would be in line with the expectation of less innovation. Huang, Rose-Green, and Lee (2012) reveal that older executives are associated with higher financial reporting quality. Considering the age of the executive therefore helps to take different types of riskiness into account and make sure that the gender effect is not driven by them. The table reveals that female executives, both CEOs and CFOs, are on average younger. If this age difference is related to innovation or reporting quality, these are factors that should be considered in the loan-making process and therefore taken into account in this analysis. As age is an imperfect proxy of experience, we include a variable that reflects how many years the respective executive has been active in his or her role. A more experienced executive may be able to run the firm more effectively and develop more stable relationships with employees, customers, suppliers, and capital providers. If years of experience differs significantly for each gender group, the difference in loan spread that we determined previously may be driven by experience and not gender. Table 2.9 shows that for the CEO the difference is statistically significant, yet not for the CFO. As an alternative to experience, education may drive managers performance. More highly educated ones may be better equipped with knowledge on how to run the firm more effectively, and set up a more suitable capital structure. The mean difference test does not reveal

TABLE 2.9: Mean difference test on executive characteristics

Variables	N	Mean	Std. Dev.	Combined N	Diff.	t-value
Age group (2 if ≤ 50 ; 3 if 50-65; 4 if > 65 y)						
Male CEO	2,364	2.99	0.01	2,412	0.26 ***	3.09
Female CEO	48	2.73	0.08			
Male CFO	2,143	2.62	0.01	2,246	0.10 **	1.71
Female CFO	103	2.52	0.05			
Executive experience (2 if ≤ 3 ; 3 if 3-10; 4 if > 10 y)						
Male CEO	2,067	3.13	0.02	2,116	2.83 ***	2.13
Female CEO	49	2.82	0.09			
Male CFO	1,594	3.02	0.02	1,682	0.07	0.89
Female CFO	88	2.94	0.09			
Educational degree (BSc., MSc., MBA, Ph.D.: 2-5)						
Male CEO	1,598	3.58	0.07	1,637	0.24	0.56
Female CEO	39	3.33	0.15			
Male CFO	1,368	3.37	0.08	1,441	0.04	0.11
Female CFO	73	3.32	0.09			

Notes: The table provides a univariate mean difference t-test on the age group, years of experience, and degree level of the executives in this sample per gender group. It shows the average score for each of the executive characteristics for female and male executives respectively, and tests whether these differ by gender group. The number of observations refers to the number of loan tranches observed. Age group = 2 if the executive is below 50 years old, age group = 3 if the executive is above 50 and below 65, age group = 4 when the executive is older than 65. Executive experience = 2 if the experience is less than 3 years, experience = 3 when the executive is active in his or her role between 3 to 10 years, and experience = 4 for more than 10 years. The degree code ranges from 2 to 5 from Bachelor, Master, MBA, to Ph.D. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

that the level of education differs significantly between male and female executives. In addition to the variables in table 2.9, we also take into account the educational major and nationality of the executive.

Table 2.10 reveals the results of the multivariate regression that includes executive characteristics in addition to the previously discussed loan, firm, and macroeconomic conditions. In the first step, columns (1) and (2), we control for the age group of the executive. In table 2.2 it appears that older age groups receive better bank loan prices. This may be due to the fact that executives gain relevant skills and experience with age, leading them to manage the firm better and hence deserving better loan conditions. The results do not reveal that the age groups are statistically significantly different from zero in the multivariate setting, and adding them to the regression does not change the negative relation of CEO and CFO gender to the bank loan price. In columns (3) and (4) we add years of experience with the respective firm in the current position of either CEO or CFO as an additional explanatory variable. Table 2.2 reveals that loan spreads are slightly lower with higher years of experience. Including experience does not alter the interpretation of the gender coefficients much. In columns (5) and (6) the level of education is included in the regression. In particular the four categories Bachelor, Master, MBA, and Ph.D. are considered. The results reveal that firms with highly educated executives do not receive better bank loan conditions when controlling for firm, loan, and macroeconomic factors. In fact, firms with executives who have a Ph.D. pay higher bank loan spreads in the multivariate setting. Including these controls however does not change the interpretation of the gender variables. In columns (7) and (8) the educational degree is controlled for, such as business, geography, mathematics, or language studies. Due to the wide range of majors, they are not shown explicitly. Including them does not significantly alter the interpretation of the results. This also holds for the last executive characteristic that is considered in this study: the nationality of the CEO or CFO. In the last columns (11) and (12) all executive characteristics are taken into account, in addition to the already discussed firm, loan, and macroeconomic conditions.

The results reveal that even after controlling for executive-specific characteristics, firms with female CEOs and CFOs receive better bank loan conditions than those with male top executives. In particular, firms run by female CEOs

TABLE 2.10: Controlling for executive characteristics

	Executive age		Experience		Education level		Education major		Nationality		All	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CEO gender	-90.82*** (3.43)		-76.19*** (2.85)		-78.66*** (3.08)		-83.93*** (3.10)		-88.05*** (2.98)		-86.71** (2.58)	
CFO gender		-37.47* (1.84)		-32.26 (1.50)		-39.19* (1.70)		-39.25* (1.77)		-46.91* (1.71)		-55.08* (1.86)
<u>Executive features</u>												
Age < 50	-15.55 (0.56)	-10.84 (0.45)									-27.94 (0.83)	-12.59 (0.39)
Age 50 - 65	-5.69 (0.22)	-23.04 (1.00)									3.40 (0.12)	-26.59 (0.97)
Age > 65	-17.23 (0.58)	-1.63 (0.06)									-12.75 (0.41)	-9.52 (0.26)
Exp. < 3 yr			12.21 (0.66)	31.02* (1.82)							19.15 (0.79)	27.16 (1.55)
Exp. 3 - 10 yr			25.27 (1.40)	52.99*** (2.95)							36.29* (1.79)	56.56*** (3.11)
Exp. > 10 yr			16.06 (0.93)	23.20 (1.28)							24.68 (1.24)	23.88 (1.23)
Degree Bachelor					2.56 (0.16)	18.31 (0.86)					-5.04 (0.26)	15.18 (0.52)
Degree Master					16.41 (0.91)	-2.11 (0.10)					13.38 (0.62)	-14.09 (0.63)
Degree MBA					6.67 (0.39)	24.06 (1.34)					8.28 (0.43)	40.87** (2.15)
Degree Ph.D.					46.24* (1.88)	51.19* (1.81)					57.09* (1.79)	50.24 (1.40)
Major Nationality	No	No	No	No	No	No	Yes	Yes	No	No	Yes	Yes
	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
<u>Firm features</u>												
Firm size	-4.66** (2.53)	-4.99*** (2.87)	-5.12*** (3.02)	-4.94*** (2.94)	-5.45*** (3.18)	-5.22*** (3.03)	-4.85*** (2.82)	-5.27*** (3.04)	-4.68*** (2.55)	-7.05*** (3.32)	-5.72*** (2.65)	-6.02*** (3.11)
Profitability	-1.65*** (3.27)	-1.77*** (3.47)	-1.66*** (3.32)	-1.81*** (3.54)	-1.73*** (3.51)	-1.71*** (3.30)	-1.65*** (3.27)	-1.69*** (3.24)	-1.67*** (2.94)	-1.52** (2.39)	-1.94*** (3.46)	-1.70** (2.43)
Leverage	-1.85*** (3.14)	-2.05*** (3.38)	-1.84*** (3.23)	-2.07*** (3.42)	-1.95*** (3.45)	-2.05*** (3.39)	-1.83*** (3.16)	-2.07*** (3.32)	-1.73*** (2.81)	-1.67** (2.06)	-1.81*** (3.11)	-1.74** (2.54)
Conservatism	-0.15 (0.81)	-0.04 (0.18)	-0.12 (0.68)	-0.07 (0.37)	-0.14 (0.74)	-0.09 (0.35)	-0.14 (0.66)	-0.06 (0.28)	-0.12 (0.80)	-0.20 (0.95)	-0.14 (0.91)	-0.19 (1.10)
Tangibility	-37.85 (1.44)	-26.59 (0.95)	-37.56 (1.39)	-29.49 (1.13)	-33.88 (1.20)	-34.19 (1.35)	-37.39 (1.41)	-25.06 (0.89)	-43.89 (1.45)	-43.87 (1.21)	-47.42* (1.70)	-44.75 (1.39)
<u>Loan features</u>												
Loan size	-30.58*** (5.62)	-29.11*** (5.16)	-30.47*** (5.53)	-29.03*** (5.03)	-31.76*** (6.08)	-29.43*** (5.37)	-30.94*** (5.72)	-29.21*** (5.10)	-27.12*** (4.75)	-23.47*** (5.41)	-27.95*** (5.41)	-22.73*** (4.29)
Maturity	-0.24 (1.02)	-0.13 (0.60)	-0.22 (0.98)	-0.05 (0.23)	-0.22 (0.98)	-0.08 (0.36)	-0.22 (0.97)	-0.09 (0.44)	-0.18 (0.68)	-0.13 (0.56)	-0.17 (0.66)	-0.05 (0.20)
Covenants	-23.62 (0.76)	-8.91 (0.29)	-19.44 (0.71)	-9.15 (0.30)	-13.08 (0.46)	-5.71 (0.18)	-25.12 (0.80)	-5.89 (0.19)	-32.58 (0.92)	-17.56 (0.54)	-28.80 (0.94)	-30.44 (0.80)
Term loan	51.20*** (4.23)	53.60*** (4.31)	51.17*** (4.21)	53.63*** (4.48)	47.23*** (4.71)	53.61*** (4.48)	51.48*** (4.27)	54.01*** (4.39)	52.25*** (4.14)	53.60*** (4.92)	46.14*** (4.62)	48.61*** (4.90)
Senior	-142.93*** (5.19)	-146.59*** (5.38)	-140.47*** (5.08)	-135.45*** (5.03)	-146.62*** (4.70)	-136.00*** (5.16)	-143.16*** (5.33)	-146.97*** (5.29)	-145.78*** (3.99)	-163.75*** (4.20)	-142.24*** (3.77)	-147.99*** (4.47)
Multiple tranche	-1.99 (0.20)	-2.10 (0.20)	-2.44 (0.24)	-3.57 (0.35)	-3.42 (0.35)	-4.49 (0.45)	-1.65 (0.17)	-3.99 (0.39)	0.32 (0.03)	2.38 (0.21)	-5.47 (0.54)	1.92 (0.18)
Loan purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rating	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<u>Macro features</u>												
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	381.45*** (6.18)	405.27*** (6.49)	358.40*** (6.39)	341.64*** (4.69)	371.34*** (6.01)	380.85*** (6.10)	372.11*** (5.77)	372.90*** (5.36)	365.95*** (2.14)	199.17** (3.49)	311.55*** (3.49)	189.98*** (1.65)
Adj. R ²	0.520	0.529	0.522	0.542	0.529	0.535	0.521	0.529	0.521	0.534	0.539	0.568
Num. Obs.	896	854	896	854	896	854	896	854	861	743	861	743

Notes: The dependent variable is the loan spread. Columns (1) and (2) control for age of the executive, Columns (3) and (4) include years of experience. In columns (5) to (8) the level of education and subject major are considered. In columns (9) and (10) the nationality of the executive is included. Columns (11) and (12) include all executive characteristics at once. Variable definitions can be found in appendix 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, respectively.

receive 87 bps lower bank loan spreads, and firms run by female CFOs receive 55 bps lower spreads. With an average loan size of €790M, this translates into a difference of about €6.8M and €4.3M on average. This is both a statistically as well as economically significant finding. By including executive characteristics we reduce endogeneity concerns and are able to provide a more in-depth understanding of the underlying mechanisms.⁹

2.5.6 Cultural influence on loan spreads

Up to now, we have established that firms with female executives receive lower bank loan spreads than their male counterparts. The difference persists despite controlling not only for the commonly used loan pricing variables such as macroeconomic variables, loan-specific conditions, and firm characteristics, but also controlling for executive-specific characteristics that may be correlated with the gender indicator variable. Alternative methodologies do not change the results. As internal observable factors do not explain the whole spread difference, we now consider external perceptual factors. With our unique sample of European countries we are able to explore the difference in spreads in more depth. Due to the cultural diversity that the sample covers, we can examine the effect that perceptions of female executive performance have on the loan price-setting.

The second research question is based on the notion that loan prices are not only driven by hard factual information, but also based on soft information. In this context, if banks expect female executives to perform worse than this should be reflected in the loan price, particularly as managerial quality is considered to be the most important soft information (Günther and Grüning, 2000). To measure the attitude towards female executives, we use a culture score from WVS that captures the percentage of respondents in each country of syndication that "Agree strongly" or "Agree" with the statement "Men make better business executives than women". Hence, a higher culture score reflects a higher level of skepticism towards female executive performance. To capture this effect of culture on loan spreads, we include an interaction term of culture with the executive gender. This term indicates whether firms receive differential treatment depending not only on the gender of the executive, but also in which cultural setting the loan is syndicated.

⁹We note that in untabulated tests the propensity score matching approach yields similar results when we incorporate executive characteristics.

The results of the estimation are provided in Table 2.11. To ensure the robustness of the results, we include different sets of control variables as discussed previously. The first column of each set of controls reflects the results related to the CEO, the second set shows the CFO results. First, we include macroeconomic controls. In columns (3) and (4) loan characteristics are added to the macro variables. In columns (5) and (6) we additionally include executive characteristics, and in columns (7) and (8) all characteristics are taken into account. In columns (9) and (10) we increase our sample size again by reducing our firm controls yet still including the most important variables leverage and firm rating. Otherwise, our results for the CEO sample would be driven by a too low amount of female executives and hence lose credibility.

The results reveal a persistent negative relationship between CEO and CFO gender and bank loan spreads. In addition, the table depicts a significantly positive relationship between the interaction term and spread. Columns (1) through (10) provide evidence using different sets of control variables. The results show that although firms with female top executives receive better bank loan conditions on average, when the loan is made in a country with a negative culture towards female top executives, these firms pay higher bank loan spreads. In other words, bank loan spreads are driven by the cultural performance expectations with regard to executive gender. The interaction terms of 355 for the CEOs and 300 for the CFOs indicate that a country with a high culture score, so negative attitude towards female executives, such as Russia would penalize female executives, compared to a country with a low score like Sweden. For example, a firm in a country with an average culture score such as in the United Kingdom would pay approximately 30 bps lower spreads with a female CFO. With an average loan size of €790M, this translates into a saving of about €2.37M. Conversely, a female-led firm that receives a syndicated loan in Russia, having a high culture score of 47.10%, would have to pay a bank loan spread that is 64 bps higher than that of a male executive firm. What this means is that depending on where the loan is syndicated, having a female top executive can be advantageous or disadvantageous for the cost of debt capital of the firm.¹⁰

¹⁰We note that column (7) provides estimates for the CEO sample that differ from all other results. This is driven by the reduction in sample size combined with the low proportion of female CEOs. The sample is driven by approximately 18 female observations and hence should be considered with caution.

TABLE 2.11: Cultural influence on loan spreads

	Macro		Macro & loan		Macro, loan, exec		All I		All II	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
CEO gender	-127.79** (2.42)		-116.93*** (3.10)		-113.39*** (2.85)		-269.42 (0.50)		-107.17*** (2.73)	
CFO gender		-162.3*** (3.87)		-73.62* (2.03)		-80.40* (1.85)		-122.41*** (2.92)		-77.80* (1.77)
Culture	-114.68** (2.06)	-130.96* (1.92)	-97.03* (1.85)	-86.29 (1.33)	-70.69 (0.57)	-389.51 (1.40)	209.06 (0.28)	-396.45 (0.41)	-88.55 (0.71)	-383.62 (1.36)
Culture × CEO gender	460.68*** (3.38)		451.84*** (5.34)		379.03*** (4.05)		1,792.40 (0.49)		355.17*** (3.76)	
Culture × CFO gender		561.05*** (3.49)		314.88* (1.86)		307.41* (1.75)		410.35** (2.43)		300.37* (1.70)
Executive										
Age < 50					4.47 (0.25)	9.70 (0.61)	-12.02 (0.38)	-20.99 (0.86)	-0.37 (0.02)	6.80 (0.44)
Age 50 - 65					-11.21 (0.77)	-6.68 (0.41)	7.56 (0.30)	-27.81 (1.30)	-13.90 (0.95)	-7.13 (0.44)
Age > 65					-8.63 (0.50)	-21.58 (0.67)	-8.67 (0.32)	-17.50 (0.62)	-11.09 (0.64)	-21.85 (0.68)
Exp. < 3 years					29.87** (2.34)	34.63*** (2.70)	14.74 (0.67)	24.66 (1.54)	30.69** (2.40)	33.81*** (2.63)
Exp. 3 - 10 years					14.41 (1.15)	29.42** (2.23)	33.80* (1.79)	44.82*** (2.76)	15.23 (1.22)	25.44* (1.92)
Exp. > 10 years					9.45 (0.76)	23.55 (1.52)	23.96 (1.22)	21.76 (1.22)	11.89 (0.96)	23.08 (1.48)
Degree Bachelor					4.89 (0.34)	-9.59 (0.56)	-2.18 (0.13)	27.95 (1.14)	0.94 (0.07)	-10.93 (0.63)
Degree Master					-6.09 (0.42)	-7.14 (0.34)	12.22 (0.60)	-14.79 (0.69)	-5.43 (0.40)	-9.37 (0.43)
Degree MBA					11.09 (0.81)	-0.57 (0.04)	15.40 (0.94)	-45.98** (2.38)	7.52 (0.55)	-2.09 (0.13)
Degree Ph.D.					17.83 (0.83)	33.86 (1.39)	53.82 (1.81)	51.60* (1.75)	17.70 (0.83)	32.59 (1.35)
Major	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Nationality	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Firm										
Firm size							-5.16*** (2.79)	-5.11*** (2.73)		
Profitability							-1.86*** (4.16)	-1.52*** (2.82)		
Leverage							-1.36** (2.53)	-1.37** (2.52)	-0.24 (1.15)	-0.01 (0.49)
Conservatism							0.13 (0.92)	0.31 (0.29)		
Loan										
Loan size			-35.59*** (12.92)	-34.81*** (12.34)	-32.18*** (11.12)	-31.76*** (9.73)	-29.47*** (6.41)	-27.16*** (6.18)	-32.47*** (11.26)	-31.61*** (9.60)
Maturity			0.48*** (3.06)	0.37** (2.52)	0.35** (1.99)	0.42*** (2.67)	-0.20 (0.84)	-0.03 (0.11)	0.36** (2.07)	0.43*** (2.74)
Covenants			-2.78 (0.09)	5.81 (0.20)	-41.80 (1.13)	4.38 (0.16)	-16.11 (0.42)	-28.91 (0.86)	-40.22 (1.12)	5.55 (0.20)
Term loan			56.63*** (8.25)	57.76*** (8.08)	60.16*** (8.66)	62.94*** (8.27)	50.18*** (4.96)	51.79*** (4.76)	60.68*** (8.84)	62.42*** (8.18)
Senior			-556.14*** (10.68)	-549.90*** (10.49)	-516.27*** (8.16)	-545.88*** (10.17)	-139.24*** (3.99)	-133.44*** (4.34)	-517.92*** (8.25)	-546.43*** (10.16)
Multiple tranche			11.55 (1.43)	9.89 (1.15)	15.50* (1.90)	16.25* (1.73)	-3.59 (0.37)	8.66 (0.92)	14.28* (1.74)	17.77* (1.91)
Loan purpose	No	No	No	No	Yes	Yes	No	No	Yes	Yes
Rating	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Macro										
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country	No	No	No	No	No	No	No	No	No	No
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	160.23*** (4.93)	157.88*** (4.88)	811.55*** (13.13)	797.42*** (12.52)	850.42*** (11.33)	806.60*** (8.90)	505.12*** (3.76)	514.98*** (3.28)	1,017.13*** (12.41)	955.59*** (10.02)
Adj. R ²	0.142	0.140	0.553	0.537	0.566	0.584	0.518	0.553	0.572	0.589
Num. Obs.	2,785	2,653	2,490	2,373	2,271	1,935	910	801	2,256	1,919

Notes: The dependent variable is the loan spread. The table reveals the influence of the perception of executive capabilities on the loan spread. Culture represents the percentage of respondents that agree with the statement "Men make better business executives than women". In columns (1) and (2) only macroeconomic conditions are taken into account. Columns (3) and (4) additionally control for loan characteristics. In columns (5) and (6) executive characteristics are included into the model. In columns (7) and (8) all control variables are taken into account. The final two columns (9) and (10) include all variables except those firm characteristics that significantly reduce the sample size. Variable definitions can be found in appendix Table 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

2.5.7 Further robustness analysis

We conduct multiple further robustness exercises to confirm and deepen our understanding of the results. In Table 2.12 we first match the culture of the country to the country of loan syndication instead of the borrowing country. Particularly for larger loans, such as the syndicated loans in our sample, the loan is likely to be negotiated in the headquarter of the borrowing firm, with the negotiation between the syndicate members continuing in the country of syndication after the main loan terms are already set. However, our robustness test in columns (1) and (2) take into account the possibility that the loan contract terms are set in the country of syndication rather than in the borrowing country. The table shows that the results hold also when matching to country of syndication. The coefficients of the interaction effects remain at around 350 and 300 bps, respectively.

In columns (3) and (4) we use an alternative proxy for culture. Instead of WVS, we use an alternative measure of culture by ESS. The ESS score measures the percentage of respondents in each country that agree than when jobs are scarce, men should have more rights to the job than women. Similarly to the WVS, it measures the cultural attitude of a country towards females in the business environment, the executive positions being the most ultimate form of a business environment. Although this measure does not capture the attitude towards top executives as directly as the WVS score, it is more broad and available for a wider range of countries. The same control variables for executive characteristics, firm features, loan conditions, and macroeconomic conditions are taken into account as in the previous analysis. The coefficient of interest, the interaction term of culture with gender, is significant and positive. This reflects that in countries that with higher discrimination against women in the business environment is particularly high, spreads for firms with female executives are higher too. This is in support of our initial findings using WVS. In columns (5) and (6) we conduct the same analysis but matching the culture scores to the country of loan syndication instead of the borrowing firms country. The results persist and are similar in terms of magnitude.

To continue our robustness analysis, we consider the CEO and CFO jointly. For this purpose, we generate a score that equals 0 if neither the CEO nor the CFO are female. It equals 1 when one of the two top executives are female, and equals 2 when both the CEO and CFO are female. Table 2.13 provides the

TABLE 2.12: Alternative culture match and ESS culture measure.

	WVS		ESS		ESS	
	country of synd.		borrowing country		country of synd.	
	(1)	(2)	(3)	(4)	(5)	(6)
CEO gender	-105.69 *** (2.74)		-128.6 ** (2.78)		-125.66 ** (2.71)	
CFO gender		-77.68 * (1.89)		-59.12 (1.70)		-58.17 (1.76)
<u>Culture</u>						
Culture	-44.09 (0.45)	-174.4 (1.07)	-154.29 *** (4.95)	-155.06 (1.83)	-126.06 *** (3.96)	-123.26 (1.53)
Culture * gender	349.19 *** (3.75)	299.69 * (1.85)	438.56 ** (2.91)	192.75 * (2.04)	426.29 ** (2.84)	189.72 * (2.21)
<u>Controls</u>						
Executive	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Loan	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.573	0.592	0.565	0.587	0.564	0.587
Num. Obs.	2,270	1,932	2,443	2,081	2,443	2,081

Notes: The dependent variable is the loan spread. The table reveals the effect of cultural perceptions of executive gender on bank loan spreads. A high cultural score represents a less favorable environment for female executives. Columns (1) and (2) show the results using WVS as the culture score and matching to the country of syndication instead of borrowing firm country. Columns (3) to (6) use an alternative culture measure from ESS. In columns (3) and (4) the culture is matched to the borrowing country. In columns (5) and (6) it is matched to the country of syndication. We control for macroeconomic, loan, executive, and firm characteristics, with a reduced form of controls for firm characteristics here. Variable definitions can be found in appendix 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

results using this alternative measure of female representation in the top executive position. Columns (1) and (2) provide the results using WVS and ESS as the respective culture scores. We find that the interaction effect does not change much in magnitude or significance. Our results are strengthened by the finding that an increase in female representation in the top executive positions is reflected in favorable loan prices in countries with progressive views on female top executives, and worse rates in the countries with less regard for female executives. We continue our robustness analysis by including only the countries with at least one female and one male executive. This allows us to remove any biases that may be introduced by countries that only represent one gender. In columns (3) and (4) we show that the coefficient remains stable with this subsample. Finally, we conduct our initial analysis from Table 2.11 with the subsample of countries with both genders represented in our sample. Also here the results remain strong.

In our third set of robustness tests we restrict our sample further by including only countries with at least two females per executive class. For each executive classification we drop those countries completely that have only one female, such as Russia for the CEO. This ensures that our results are not driven by outliers that are determined by just one female. The results are provided in Table 2.14. In the first two columns the results are shown using WVS as the culture measures, in the next two columns ESS is used instead, and in the final two columns the results for both WVS and ESS are shown using the executive score instead of the particular CEO or CFO position.

To summarize this section, we have used a wide range of specifications, alternative measures, and different samples to confirm a strong relationship between bank loan pricing and top executive gender depending on the cultural setting of the firm. Our empirical results indicate that although on average firms with female executives benefit from having female top executives, this benefit depends on the cultural perception towards female top executive performance in each country. When a skeptical cultural attitude towards female executives persists, firms with female executives in fact receive worse loan conditions than their male counterparts. Hence, a more progressive attitude towards executives in top management positions is accompanied by better loan prices.

TABLE 2.13: Top executive score and subsample of countries

	Countries > 0% &< 100% female execs					
	Top executive score		Top executive score		WVS	
	WVS	ESS	WVS	ESS	CEO	CFO
	(1)	(2)	(3)	(4)	(5)	(6)
Executive gender	-86.85 *** (2.74)	-77.40 **	-92.05 *** (2.78)	-73.55 **	-113.73 *** (2.71)	-80.71 *
<u>Culture</u>						
Culture	-51.75 (0.79)	-120.04 ** (2.78)	-82.08 (1.23)	-123.41 * (1.96)	176.56 * (1.66)	-431.65 (1.54)
Culture × gender	357.65 ** (2.45)	251.49 ** (2.34)	380.39 ** (2.24)	232.67 * (1.92)	345.03 *** (3.14)	314.67 * (1.78)
<u>Controls</u>						
Executive	No	No	No	No	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Loan	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.560	0.558	0.563	0.559	0.573	0.591
Num. Obs.	2,309	2,501	2,244	2,317	1,857	1,877

Notes: The dependent variable is the loan spread. The table reveals the influence of the perception of executive capabilities on the loan spread. In columns (1) to (4) the number of female top executives is considered joining both the CEO and CFO positions. Columns (1) and (2) show the results for the WVS and ESS score, respectively. In columns (3) and (4) the analysis is repeated for a subsample of countries that has > 0 % and < 100 % female executives. Columns (5) and (6) show the initial WVS culture score analysis for the subsample that includes only the countries with both female as well as male executives. We control for macroeconomic, loan, executive, and firm characteristics, where we use a reduced form of controls for firm characteristics here. Variable definitions can be found in appendix 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

TABLE 2.14: Countries with at least 2 female executives.

	WVS		ESS		Top executive score	
	CEO	CFO	CEO	CFO	WVS	ESS
	(1)	(2)	(3)	(4)	(5)	(6)
Executive gender	-179.78 *** (3.40)	-82.11 * (1.87)	-153.02 ** (2.52)	-64.87 (1.66)	-85.43 *** (2.94)	-78.38 ** (2.64)
<u>Culture</u>						
Culture	-233.88 (1.48)	-378.10 (1.32)	-191.07 *** (6.57)	-168.24 (1.88)	-44.60 (0.68)	-122.96 ** (2.91)
Culture $\times$ gender	820.89 *** (3.98)	303.90 * (1.71)	592.23 ** (2.52)	203.03 * (1.94)	351.47 ** (2.44)	253.62 ** (2.36)
<u>Controls</u>						
Executive	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Loan	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.616	0.590	0.605	0.589	0.559	0.558
Num. Obs.	1,823	1,817	2,010	1,979	2,279	2,471

Notes: The dependent variable is the loan spread. The table reveals the effect of cultural perceptions of executive gender on bank loan spreads. A high cultural score represents a less favorable environment for female executives. This table reveals the regression results for the sample of countries that have at least two female observations per country and per executive type. Columns (1) and (2) show the results using WVS as the culture score. Columns (3) and (4) use the culture measure from ESS. In columns (5) and (6) the top executive score that ranges from 0 to 2 is used for both the WVS and the ESS culture measure. We control for macroeconomic, loan, executive, and firm characteristics, with a reduced form of controls for firm characteristics here. Variable definitions can be found in appendix 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

2.5.8 What drives these differences?

In order to gain a deeper understanding of the subject matter, we disaggregate the sample into high and low culture countries. This allows us to better determine what the results are driven by. For each group of executives - the CEO, CFO, and top executive score - we list the countries sorted by culture that have female subjects in their respective sample and simply split the countries in the middle. Then we run the analysis on the subsample of high and low culture countries. First we conduct it for the CEO and CFO separately, thereafter we use the top executive score that comprises both. Finally, we ensure that our results are robust to alternative high-low splits by using the median culture score to disentangle the high from the low culture countries instead. Table 2.15 reveals the results using WVS as the culture score. For further robustness, the same analysis is conducted using the ESS score. The results of the later are provided in Table 2.16.

We find that the positive and significant interaction effect between culture and gender that we focused on in the previous subsection is mostly driven by the countries with high WVS scores. The interaction effect is insignificant for the countries with low WVS scores. In other words, improving the cultural attitude towards female top executives is beneficial for firms with female executives in female-unfriendly environments. Countries that already have very progressive views and do not expect men and women to differ much in terms of managerial performance do not benefit anymore from further improvements of attitude towards female executives.

2.6 Conclusion

In this chapter we examine the relationship between top executive gender and bank loan spreads in the syndicated loan market and ask to what extent cross-country cultural differences influence this relationship. Using a multivariate regression approach, we find that firms run by female CEOs receive approximately 87 bps lower bank loan spreads than firms with male CEOs, which translates into an average difference per loan of €6.8M. Firms with female CFOs receive 55 bps lower bank loan spreads than their male executive counterparts, hence pay on average €4.3M less. Considering that the average loan spread is 211 bps, or €16.7M, this is an economically significant difference. Moreover, and next to control variables like loan characteristics, firm

TABLE 2.15: High vs. low culture using WVS

	CEO WVS		CFO WVS		Top exec WVS		Top exec 2 WVS	
	low	high	low	high	low	high	low	high
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exec. gender	-392.80 (0.81)	-844.35*** (4.35)	-254.59 (0.70)	-207.38** (2.38)	109.09 (0.98)	-163.44 (1.48)	113.86 (0.82)	-69.22 (0.99)
<u>Culture</u>								
Culture	-1,424.39*** (2.98)	-344.20** (2.43)	1,588.13 (1.04)	433.80 (1.04)	1,293.12** (3.37)	270.46*** (3.11)	1,707.05*** (4.34)	66.57 (0.70)
Culture $\times$ gen	2,166.14 (0.66)	1,724.19*** (4.59)	1,373.79 (0.56)	536.57* (2.63)	-954.08 (1.25)	465.53 (1.98)	*-1,011.22 (1.09)	301.82* (1.67)
<u>Controls</u>								
Executive	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.616	0.535	0.618	0.662	0.615	0.476	0.628	0.461
Num. Obs.	1,551	431	1,474	271	1,641	372	1,389	920

Notes: The dependent variable is the loan spread. The table reveals the effect of cultural perceptions of executive gender on bank loan spreads. A high cultural score represents a less favorable environment for female executives. In this table the regression is run for low culture and high culture countries separately to determine which of these groups drive the results. Columns (1) and (2) show the results for the CEO, (3) and (4) for the CFO, (5) and (6) with the executive score. For columns (7) and (8) the countries are split at the median instead. We control for macroeconomic, loan, executive, and firm characteristics, with a reduced form of controls for firm characteristics here. Variable definitions can be found in appendix 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

TABLE 2.16: High vs. low culture using ESS

	CEO ESS		CFO ESS		Top exec ESS		Top exec 2 ESS	
	ESS low	high	low	high	low	high	low	high
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Exec. gender	-314.66 (1.75)	-241.65 * (2.31)	145.58 (1.56)	-128.14 ** (2.63)	7.83 (0.24)	-137.94 ** (2.65)	-22.56 (0.70)	-131.53 ** (2.48)
<u>Culture</u>								
Culture	505.54 * (2.18)	-288.56 ** (3.32)	644.80 (1.53)	-48.21 (0.84)	291.49 (1.57)	-191.69 *** (8.32)	385.12 * (2.06)	-163.90 *** (5.49)
Culture × gen	1,608.96 (1.33)	727.66 ** (2.75)	1,023.24 (1.77)	367.60 ** (3.20)	-154.53 (0.56)	369.08 ** (2.86)	-25.12 (0.10)	357.18 ** (2.67)
<u>Controls</u>								
Executive	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.601	0.506	0.623	0.554	0.611	0.415	0.609	0.407
Num. Obs.	1,588	855	1,498	583	1,768	733	1,715	786

Notes: The dependent variable is the loan spread. The table reveals the effect of cultural perceptions of executive gender on bank loan spreads. A high cultural score represents a less favorable environment for female executives. In this table the regression is run for low culture and high culture countries separately to determine which of these groups drive the results. Columns (1) and (2) show the results for the CEO, (3) and (4) for the CFO, (5) and (6) with the executive score. For columns (7) and (8) the countries are split at the median instead. We control for macroeconomic, loan, executive, and firm characteristics, with a reduced form of controls for firm characteristics here. Variable definitions can be found in appendix 3.17. The number of observations refers to the number of loan tranches observed. Standard errors are adjusted for within-firm clustering. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

features, and macroeconomic factors, we also take into account executive-specific characteristics. In particular, we include factors that may influence risk taking and performance such as age, years of experience, level of education, degree subject, and nationality. This allows us to capture the gender effect more effectively than previous studies have been able to so far. To address endogeneity concerns, we employ propensity score matching to estimate the spread difference between similar firms with male and female executives and also run the full multivariate regression on a one-to-one matched sample of firms and find similar results. Furthermore, we conduct an instrumental variable approach regression in two stages in which we use the labor force participation gap as our instrument. Our findings are consistent with previous literature that finds that firms with female CFOs provide more conservative and high-quality financial reporting data (Yu et al., 2010; Vähämaa, 2014; Barua et al., 2010) and that gender diversity may lead to economic gains (Campbell and Minguez-Vera, 2008). Despite controlling for a wide range of factors, we find that the executive gender still matters. Our results are stable across various specifications and robustness tests, including different sets of control variables in multivariate regression models, propensity score matching, and instrumental variable methods.

Our European sample enables us to consider different cultural settings and their effect on the relationship between executive gender and bank loan prices. We reveal that firms with female CEOs and CFOs operating in countries with more skeptical views on female executive performance receive higher loan spreads than those firms operating in countries with higher expectations of female executive performance. We discuss that countries with more traditional gender cultures are subject to conventional beliefs on gender differences, such as higher risk-aversion, lower confidence, worse negotiation skills, and lower financial literacy of women (Charness and Gneezy, 2012; Huang and Kisgen, 2013; Stuhlmacher and Walters, 1999; Lusardi and Mitchell, 2011). As this is soft information that can be related to lower creditworthiness, we find that firms with female top executives receive relatively worse loan conditions in countries that do not put trust in the capabilities of female executives relative to the more progressive countries.

Our results hold throughout different methodologies and specifications, such as alternative cultural proxies, in which we use the European Social Survey data instead of World Value Survey data, and country matches according to country of loan syndication and borrowing firm. We also consider the CEO

and CFO jointly using a score that ranges from 0 to 2, depending on the number of female top executives in the respective firm. Furthermore, we conduct several analyses on country subsamples that include at least both female and male executives in our sample, and even more restricted subsamples with at least 2 females per executive class. The interaction term of culture and gender remains stable and economically and statistically significant. In the final step we analyse the high and low score culture countries separately to determine what these results are driven by. We find that the interaction of culture with gender is driven by the female-skeptical countries. More specifically, in these countries, improving attitudes towards female executives goes hand in hand with better bank loan prices. This is not the case for the countries that already have progressive views on female top executives.

A number of caveats apply to our findings and interpretations. Although we do our utmost best to address any endogeneity concerns by considering a wide range of possible confounding effects and employing various methodologies that have been designed to alleviate potential issues, we cannot make use of a natural experiment setting that would allow us to draw causal inferences and rule out all possible endogeneity issues. Furthermore, although we employ high quality survey data, it is possible that responses to the survey are biased in a number of ways. However, by using a large number of different countries and survey responses we do not expect individual biases within countries to greatly impact our results. Next, although our unique European data provides a valuable setting for the purpose of this study, we cannot confirm whether our findings are applicable to situations outside of this setting. However, due to the heterogeneity of countries that we take into account in our sample, we expect it to be a good representation of the developed world. As Europe is at the forefront of driving gender diversity in the workforce it could provide valuable indication on future developments and possibilities, also for more dissimilar and developing countries. Finally, we note that results for the CEO and CFO may not be directly applicable to other members of the top management team, as their influence on the credit risk of the respective firm may not be as clear.

Our results have several practical implications. Firms may be able to improve their financing costs by hiring female executives in countries with more progressive views on gender roles, whereas they may be better off with male executives in more traditional countries. Similarly, banks in countries with traditional gender views may be able to increase their competitiveness by

offering more favorable borrowing conditions to firms with female executives in countries with traditional gender views. Institutional and private investors can use this information to identify firms with lower debt costs, resulting in higher cash flows available to equity holders. Finally, regulators can use these outcomes as an anchor for developing policies that improve gender equality, since "equality between women and men is one of the fundamental principles of EU law" (Fontecha, 2013). The results indicate that gender quotas may be insufficient in improving economic welfare if they are not accompanied by advances in cultural attitudes towards female executives. The full advantages of gender diversity can only be attained when complemented by progressive cultural attitudes.

2.7 Appendix

TABLE 2.17: Variable definitions

Variable	Definition	Source
Executive gender		
CEO gender (indicator)	Indicator variable = 1 if the loan is raised by a borrower with a female CEO in the year of loan signing, 0 otherwise.	Orbis
CFO gender (indicator)	Indicator variable = 1 if the loan is raised by a borrower with a female CFO in the year of loan signing, 0 otherwise.	Orbis
Culture		
Culture score (ratio)	The culture score represents the percentage of respondents that "Agree" or "Agree strongly" with the statement "Men make better business executives than women" as measured by the WVS for the borrowing country in the main analysis, and country of loan syndication in the robustness exercise.	WVS
Executive features		
Age group (indicator)	The age of the respective executive is in one of the following groups: Below 50 years of age, between 50 and 65, above 65, and unknown.	Orbis
Experience (indicator)	The number of years of experience the respective CEO or CFO has in his or her current executive role in the company is filed into one of the following categories: less than 3 years, between 3 and 10 years, more than 10 years of experience, and unknown.	Orbis
Degree (indicator)	The highest educational degree that the CEO or CFO obtained: Bachelor, Master, MBA, Ph.D., or unknown.	Orbis
Major (indicator)	The educational major that the CEO or CFO received, e.g. Business, Physics, Medicine.	Orbis
Nationality (indicator)	The country of nationality of the CEO or CFO.	Orbis
Firm characteristics		
Firm size (€M)	The natural logarithm of total assets, where assets are measured in million Euros.	Orbis
Tangibility (ratio)	Tangible fixed assets to total assets.	Orbis
Conservatism (ratio)	Market to book value.	Orbis
Profitability (ratio)	Return on capital.	Orbis
Leverage (ratio)	Debt to total assets ratio.	Orbis
Rating (indicator)	Firm's long-term senior debt rating.	DealScan
Loan characteristics		
Loan size (€K)	The firm's tranche size measured as the natural logarithm in thousand Euros.	DealScan
Term loan (indicator)	Indicator variable = 1 if the loan type is a term loan, 0 otherwise.	DealScan
Covenants (indicator)	Indicator variable = 1 if covenants are attached to the loan, 0 otherwise.	DealScan
Sponsored (indicator)	Indicator variable = 1 if the firm has a private equity investor controlling > 20% of the equity stake, 0 otherwise.	DealScan
Multiple tranche (indicator)	Indicator variable = 1 if the deal has multiple tranches, 0 otherwise.	DealScan
Maturity (months)	The maturity of the loan facility in months.	DealScan
Loan purpose (indicator)	Set of indicator variables that capture the purpose of the loan.	DealScan
Macro factors		
Industry (indicator)	Industry group based on the firm's SIC code.	DealScan
Country (indicator)	Country in which the loan has been syndicated.	DealScan
Year (indicator)	Year of deal signing.	DealScan

Notes: The table provides variable definitions of the key variables. All variables are recorded at time t , where t ranges from 2005 to 2015. Further information on the variables can be found from the respective data sources.

TABLE 2.18: Culture and female representation by country

Country	Culture score		CEO		CFO	
	WVS	ESS	% female	N	% female	N
Austria		54.00%	0%	21	0%	11
Azerbaijan	74.70%	78.60%	0%	2	0%	2
Belgium		17.70%	0%	14	0%	14
Croatia		26.70%	50%	4	100%	4
Denmark		4.80%	0%	46	0%	46
Finland	17.80%	9.70%	0%	31	3.23%	31
France	14.19%	21.00%	3.68%	299	14.29%	280
Georgia	63.50%	46.00%	0%	5	0%	5
Germany	16.00%	12.80%	0.33%	299	0.68%	294
Greece		44.90%	0%	12	0%	12
Hungary	32.00%	53.40%	0%	6	0%	2
Iceland		12.80%	0%	1	0%	1
Ireland		12.10%	0%	57	23.21%	56
Italy	15.50%	20.90%	0%	96	2.38%	84
Kazakhstan	51.90%	45.30%	100%	4	0%	4
Latvia		17.90%	0%	4	0%	4
Lithuania		29.90%	0%	2	100%	2
Luxembourg		27.00%	0%	40	0%	40
Malta		48.80%	0%	3	0%	2
Netherlands	15.70%	13.60%	2.06%	97	0.97%	103
Norway	18.80%	7.40%	0%	29	0%	18
Poland	25.40%	29.40%	0%	19	0%	19
Portugal		29.40%	0%	14	50.00%	16
Romania	43.30%	39.80%	0%	2	0%	2
Russian Federation	47.10%	39.20%	0.48%	207	12.75%	204
Slovenia	20.10%	16.40%	0%	11	0%	8
Spain	16.70%	15.00%	0.90%	332	4.71%	340
Sweden	8.40%	5.10%	0%	30	19.23%	26
Switzerland	13.10%	18.40%	0%	41	18.92%	37
Turkey	50.90%	72.60%	0%	209	1.56%	128
Ukraine	45.80%	50.50%	0%	6	0%	6
United Kingdom	15.70%	17.20%	4.15%	1060	3.58%	1,060
Total	21.11%	22.69%	2.26%	3003	5.87%	2861

Notes: The table provides an overview of the percentage of female CEOs and CFOs in each country and the respective WVS culture scores. The culture score refers to the percentage of respondents in each country that "Agree" or "Agree strongly" with the statement "Men make better business executives than women". The number of observations refers to the total number of observations of both male and female CEOs and CFOs, respectively.

Chapter 3

Corporate Social Responsibility and bank loan pricing: It pays to be good, but only when banks are too.

3.1 Abstract

We examine if, and under which circumstances, strong corporate sustainability performance is reflected in loan prices for borrowers in the syndicated loan market. We show that borrowing firms with high sustainability performance pay lower loan spreads than borrowers with low sustainability performance, but only when the lending bank exhibits high sustainability performance. Banks with low sustainability performance do not reflect borrower sustainability performance in their loan pricing. This finding is robust to a wide range of robustness tests and analyses, including interaction effects, propensity score matching, and within-firm and within-bank changes. We find that the relationship between sustainability performance and loan prices is driven by a premium in loan spreads for borrowers with low sustainability performance, rather than a spread discount for high sustainability performers. We discuss that this penalty is indicative of a reputation risk premium charged by banks with high sustainability performance to borrowers with low sustainability performance. Consistent with the notion that the financial crisis increased public scrutiny and reputation risk for banks, we find that the relationship between borrower sustainability performance and loan pricing is stronger in more recent periods, and particularly the post 2008 period. We document that this coincides with an increase in reputation risk for banks with high sustainability performance.

3.2 Introduction

Over the recent years, waves of corporate scandals, fueled by a highly critical media, have ignited a sharp rise in consumer and investor consciousness. News on unethical working conditions and environmental pollution spread like wildfire, often resulting in serious consequences for the respective firms. Sustainability is no longer dismissed as the fuzzy concern of tree-huggers and hippies, but has become a key topic for many corporations.¹ This can be seen in the increasing number and depth of voluntary corporate sustainability reports, but also in the rise in regulations and listings that mandate the disclosure of environmental, social, and governance (ESG) efforts (Ioannou and Serafeim, 2014). Sustainability has been identified as a source of opportunity and lever for competitive advantage. A large body of empirical research has revealed the direct effects that CSR (Corporate Social Responsibility) has on businesses, such as better access to valuable resources (Waddock and Graves, 1997), improved media coverage (Cahan et al., 2015), and more optimistic analyst assessments (Ioannou and Serafeim, 2010). Corporations with a long-term, stakeholder-oriented perspective have been more successful at attracting socially responsible consumers and shareholders (Hillman and Keim, 2001; Kapstein, 2001) and enjoy a higher reputation and attractiveness as employers (Turban and Greening, 1997).

A growing stream of research has found that more socially and environmentally responsible firms are able to capture these advantages and translate them into financial outperformance (Bragdon and Marlin, 1972; Cochran and Wood, 1984; Brammer and Millington, 2008; Scholtens, 2009; Flammer, 2013; Deng, Kang, and Low, 2013; Eccles, Ioannou, and Serafeim, 2014; Khan, Serafeim, and Yoon, 2016), which in turn has been documented to result in better access to capital (Bauer and Hann, 2010; Dhaliwal et al., 2011; Goss and Roberts, 2011; Cheng, Ioannou, and Serafeim, 2014; Chava, 2014; Kim, Surroca, and Tribó, 2014b; Kleimeier and Viehs, 2016).

In the past, the link between the shareholder equity side and ESG has been heavily studied by academics (Neubaum and Zahra, 2006; David, Bloom, and Hillman, 2007; Sjöström, 2008; Glac, 2014). Much however remains to be learned about the liability side. How do debt holders, in particular banks, value the sustainability efforts of their borrowers? The financial crisis of 2008

¹We note that the terms "Sustainability", "CSR", and "ESG performance" are used somewhat interchangeably in this chapter, although their individual definitions may differ within the literature.

has severely damaged the reputation of financial institutions. This has forced them to invest considerable effort in rebuilding their reputation and regaining public trust. Large banks, such as Bank of America and Deutsche Bank, are now publishing detailed sustainability reports in which they emphasize their commitment to sustainability and responsible lending practices. In its 2015 sustainability report, Deutsche Bank states that it is willing to decline new business opportunities if they do not meet the ethical standards required from them: "Business initiatives with a potentially negative effect on the environment or society are subjected to painstaking scrutiny. Internal standards guarantee that certain transactions in sensitive sectors can be excluded" (Deutsche Bank, 2016). Deutsche Bank emphasizes its commitment by the fact that a record high number of 1,346 transactions were screened against environmental and social benchmarks in 2015. In a similar tone, Bank of America signals its commitment by setting up a Global Corporate Social Responsibility Governance Committee in 2014 dedicated to overseeing the bank's sustainability initiatives. The overall trend is an increase in commitment to and awareness of sustainability, both in the financial and non-financial sectors.

In this chapter we aim to gain a deeper understanding of the link between the sustainability performance of corporations and that of the financial institutions that provide them with bank loan capital. Bank loans are of a particular interest, as they represent the most important source of financing; internationally they are larger than equity and bonds while in the U.S. they approximate bond financing (Scholtens, 2006).

We begin by exploring the relationship between borrower sustainability performance and bank loan spreads. Similar to the existing literature (Goss and Roberts, 2011; Cheng, Ioannou, and Serafeim, 2014; Chava, 2014; Kim, Surroca, and Tribó, 2014b; Cheng et al., 2015; Hasan et al., 2017; Kleimeier and Viehs, 2016) we find that borrowers with strong sustainability performance receive better access to capital in terms of lower loan prices. A one standard deviation improvement in borrower ESG performance results in approximately 10.95 bps or almost 10% of the average syndicated loan spread.² This is a substantial economic effect. Based on these findings, we analyze

²Table 3.4 column (1) reveals a coefficient of -53.74 for borrower ESG performance on spread. A one standard deviation of borrower ESG performance is 0.20, hence $0.20 \times -53.74 = 10.95$. The average syndicated loan spread in the sample is 128.48.

the role of the corresponding lending banks and how their own commitment to sustainability drives this relationship. We find that borrower sustainability performance is only beneficial to borrowers, in terms of lower loan spreads, when the lending bank has high sustainability performance as well. A wide range of econometric analyses provide us with evidence on this, including sample splits by bank sustainability performance using seemingly unrelated regressions to compare coefficients, multivariate regression interaction effects between bank and borrower sustainability performance, propensity score matching, and within-firm and within-bank spread variations. The within-firm and within-bank tests reveal that the difference in spreads is driven by high-sustainability banks penalizing low-sustainability borrowers with higher spreads, rather than by favoring high-sustainability borrowers with lower spreads. We document an average spread difference of 56.01 bps between borrowers with low and high sustainability performance, for the same bank with strong sustainability performance.³ To further understand the underlying reasons for this finding, we explore the time dynamics of this relationship. Consistent with our expectation, that sustainability has become more important in the recent years and the financial crisis has increased scrutiny on banks in particular in terms of sustainability, we find the effect to be stronger in later years. In particular, we find that borrower sustainability is only fully reflected in loan prices after the financial crisis. We discuss that this is likely to be driven by an increase in reputation risk of banks. We explore this by using two measures for reputation risk: A measure from RepRisk, that uses ESG and business conduct data to capture reputation risk, as well as the correlation between bank and borrower ESG to capture the strength of co-movement and hence sensitivity. We find reputation risk to have increased for banks after the crisis, and in particular so for the banks with strong ESG performance.

Summarizing, we show that the relationship between strong sustainability performance and lower loan spreads is driven by banks with high sustainability performance. High sustainability performance is rewarded in terms of a reduction in penalty for borrowers. The relationship is stronger in more recent periods and particularly driven by the post 2008 period. We discuss and show that this is likely to be driven by the increase in scrutiny and reputation risk for banks after the crisis.

This chapter contributes to the literature in several ways. To date, studies

³See Table 3.11 Panel B.

have focused on aggregate borrower sustainability performance but also individual aspects of ESG performance and how these factors mediate access to debt financing, as discussed in the literature review. The general notion is that sustainability performance affects loan conditions through changes in credit risk. However, considering that bank loans are contractual obligations negotiated between two parties, surprisingly little attention has been given to the role of banks in this context. This is the first study to take into account the sustainability performance of banks in the context of borrower sustainability and access to debt capital. Creditworthiness of borrowers is assessed through hard and soft information criteria which require interpretation by the corresponding bank. Consequently, assessments may be subject to biases due to certain experiences or values and differ between banks accordingly. As an example, imagine a prospective borrower that has superior sustainability performance, particularly in terms of environmental performance. A bank that values and understands the implications of environmental performance is likely to take this aspect of the borrower into account, compared to a bank that does not care or believe in value-effects of ESG on performance. Consequently, considering bank sustainability commitment is necessary in order to properly understand the underlying mechanisms. Beyond validating the relationship between sustainability performance and loan spreads, as discussed in previous literature, in this chapter we disentangle the relationship with the lending bank to better understand how and why firms with stronger sustainability performance attain more favorable loan spreads on average. Our findings have significant practical implications, as they provide evidence on the source of price differentiation, namely in terms of a reduction in penalty for borrowers with weak sustainability performance. From a research standpoint, being able to point out the angle of spread differentiation clarifies the source of correlation and provides insights into causality. By gaining a deeper understanding of the dynamics between bank and borrower ESG performance, we help to uncover the role of financial institutions in promoting sustainability. This is extremely important as there is "much more scope for finance to promote socially and environmentally desirable activities and to discourage detrimental activities than has been acknowledged in the academic literature so far" (Scholtens, 2006). Up to now, research has been centered around the equity side and influence of shareholders on sustainability outcomes. As bank loans are one of the most important sources of capital, understanding the role of debt capital providers, particularly banks, in this context is highly important and a central contribution of this chapter.

Our findings highlight to policy makers the importance of encouraging sustainability in the finance sector, as only banks that are thoughtful and vigilant about sustainability and related issues consider, act on, and hence promote sustainability. Only with a strong understanding of the subject matter will financial institutions be able to maximize their potential as key drivers in the economy.

The remainder of the chapter is set up as follows. Section 3.3 reviews the literature on sustainability and financial performance, access to capital, and the role of banks. Section 3.4 introduces the data and provides the descriptive statistics. In section 3.5 the methodology is discussed and empirical results are presented. Section 3.6 concludes.

3.3 Literature review and hypothesis development

The recent spike in public interest on understanding and promoting corporate sustainability performance has largely been motivated by the prospect of capturing a competitive advantage and ultimately generating financial out-performance. Consequently, most of the existing academic literature focuses on the relationship between sustainability and financial performance, primarily in terms of book- and market value of the firm. More recently, the scrutiny on the equity side has been shifted over to the liability side, revealing insightful information on the relevance of different ESG factors on access to debt capital. We begin by delivering an overview of the development of research in CSR and financial performance, followed by the more recent research on the liability side. Finally, we provide our theoretical hypothesis development.

3.3.1 Sustainability and financial performance

Almost 50 years have passed since Friedman (1970) first ignited the debate on corporate social responsibility with his controversial statement that the only social responsibility a firm has, is to increase its profits. In his famous New York Times article, he condemns corporate social responsibility as a misallocation of shareholder funds and suggests to separate out social goals by financing them privately. Researchers were quick to follow-up with empirical evidence: The first studies on the relationship between corporate social

responsibility and firm performance were published by Bragdon and Marlin (1972) and Moskowitz (1972). Bragdon and Marlin (1972) provide initial evidence on a positive relationship between environmental sustainability and financial performance in the context of pollution control. Around the same time, Moskowitz (1972) analyzes a selection of socially responsible companies more deeply and finds that they are able to financially outperform their peers. In the decades following, academics and practitioners have struggled to understand the impact of corporate social responsibility on organizational behavior and ultimately on how it affects a firm's bottom line.

To date, most empirical findings support the notion that more sustainable firms are rewarded with higher financial performance. The literature explores different measures of sustainability - from environmental, social, and governance measures, to charitable giving, inclusion in sustainability indexes and other more aggregate proxies of sustainability. Cochran and Wood (1984) show that within different industry groups, firms with higher corporate social responsibility ratings outperform their peers financially. They use various measures for financial outperformance, including operating earnings to sales, operating earnings to assets, and excess value. Waddock and Graves (1997) postulate that corporate social performance depends on resource availability and therefore firms with higher prior financial performance outperform socially as they have the capacity to invest in social advancements. They also find that good social performance results in better future financial performance and discuss two possible mechanisms for this link. First, it may be driven by the proactive nature of sustainability which recognizes problematic domains before they become an issue. Second, engaging in social responsibility may be a tool to boost reputation, employee and shareholder relations which translate into higher financial performance. In one of the earliest comprehensive studies on sustainability and financial performance, Preston and O'bannon (1997) discuss a range of possible causal sequences. They find no evidence for a negative correlation, but instead they find a positive relationship between social and financial performance for large US firms, in favor of stakeholder value theory. Heal (2005) discusses that CSR can improve corporate profits and reduce reputational risk. He claims that it is especially important when there are conflicts of interest. Brammer and Millington (2008) add the time dimension to the existing research and show that in the short-run, firms with low social performance outperform financially, while in the long-run social performance pays off. Bauer et al. (2008) investigate the governance dimension and find that good corporate governance

is beneficial in the Japanese setting. Guenster et al. (2011) show that there is a positive link between eco-efficiency and operating performance as well as market value. Becchetti et al. (2012) find that on average, firms that exit the Domini 400 social index suffer from negative abnormal returns, indicating that shareholders value social engagement. Flammer (2013) conducts an event study around announcements on environmental news and finds that positive news is related with a positive stock market reaction while negative news results in a drop in the share price. Using the setting of mergers and acquisitions, Deng, Kang, and Low (2013) find that high CSR acquirers have better merger announcement returns, higher long-run stock performance, and achieve faster, more successful mergers. Eccles, Ioannou, and Serafeim (2014) show that social performance is related to better stock market and accounting performance, more non-financial disclosure, a longer-term orientation, and increased stakeholder engagement processes. Furthermore, they find that the board of directors is more likely to be responsible for sustainability, and top executive compensation is a function of sustainability metrics for firms with higher CSR performance. Serafeim (2014) summarizes that collectively his research indicates that financial performance and sustainability are not mutually exclusive: By adopting a long-term horizon, understanding the materiality of sustainability issues, regulations, societal expectations, innovation, and corporate governance it is possible to achieve financial out-performance through sustainability. Gollier and Pouget (2014) coin the term "washing machine" strategy as the method of gaining positive abnormal returns by investing in non-responsible firms and turning them more responsible. Pouget (2014) argues that positive and negative SRI screening strategies can only produce benefits when markets are not fully efficient. With active strategies, such as with the "washing machine", investors are able to produce more reliable positive financial outcomes. Similarly, Fatemi, Fooladi, and Tehranian (2015) show that under certain conditions, CSR expenditures can lead to shareholder value creation that can even offset the upfront costs of CSR engagement in the intermediate and long term. Krüger (2015) identifies that stock markets react negatively to positive CSR news, when agency problems persist. They react more favorably when agency problems are less likely to be present.

Metastudies by Margolis and Walsh (2003), Orlitzky, Schmidt, and Rynes (2003), Margolis, Elfenbein, and Walsh (2007), and more recently Friede, Busch, and Bassen (2015) reveal that most empirical evidence indicates a positive relationship between social and financial performance, with the link being

FIGURE 3.1: Sustainability performance and capital markets

stronger for accounting-based measures than for market-based ones. A few, less recent studies oppose this relationship: Hong and Kacperczyk (2009) find that sin stocks - public companies involved in alcohol, tobacco, and gaming - financially outperform their peers. This may be driven by the fact that they are in industries with low cyclicalities, resulting in more stable cash flows especially during market downturns. Renneboog, Ter Horst, and Zhang (2008) discuss that SRI investors may be willing to accept sub-optimal financial performance to pursue social or ethical objectives, although they generally do not find a significant difference in performance. From their survey of the existing literature at the time, they conclude that the causality between CSP and CSR is not fully understood yet. Finally, Surroca and Tribó (2008) show that in the case when managers are entrenched and implement socially responsible actions, this has negative effects on financial performance.

Although it appears that most research to date supports the positive link between sustainability performance and financial performance, the underlying mechanisms have not yet been clearly established. Hence, this makes it particularly relevant to understand the transmission channels of performance and motivates research into the related field of debt financing.

3.3.2 Sustainability and bank loan contracting

A fundamental relationship between corporate sustainability performance and financial performance postulates that corporate sustainability performance must be fundamentally linked to the underlying cash flows of the

firm. With debt contracting being highly dependent on cash flow stability and creditworthiness, this naturally motivates research on the relationship between ESG performance and bank loan financing. This is a particularly important topic considering the huge economic significance of the bank loan market in which slight changes in loan conditions can result in massive re-allocations of capital. Bhojraj and Sengupta (2003) reveal that corporate governance matters for loan conditions. They find that firms with greater institutional ownership and stronger outside board control receive lower bond yields and higher ratings due to a reduction in agency costs. Goss and Roberts (2011) find that firms with social responsibility concerns pay more on their bank debt. They discuss two opposing views. On the one hand, the risk mitigation view postulates that CSR reduces idiosyncratic risk exposure, which can translate into better creditworthiness. On the other hand, according to the overinvestment view, managers benefit from overinvestment in CSR at the expense of capital providers. In this case, good CSP does not result in better credit conditions. Their empirical results reveal that the risk reduction view outweighs, and CSR concerns have a negative impact on bank loan conditions. In other words, superior CSR performance is related to better loan conditions. Similarly, Chava (2014) who looks more specifically at environmental concerns, finds that these are related to a higher cost of debt and equity. With more lenders adopting environmentally sensitive lending policies, lenders may refuse to lend to certain firms that lack environmental responsibility, as this may pose a reputation risk for them. Other studies that focus on the environmental dimension of sustainability include Bauer and Hann (2010) and Sharfman and Fernando (2008). Bauer and Hann (2010) show that environmental concerns are associated with a significantly higher cost of debt financing and lower credit ratings. They find that proactive environmental practices are associated with a lower cost of debt. Similarly, Sharfman and Fernando (2008) reveal that improved environmental risk is associated with a lower cost of capital, a shift from equity to debt capital, and associated tax benefits from adding debt. Kim, Surroca, and Tribó (2014b) find that ethical behavior is related to better syndicated loan spreads and that the similarity in ethical domain between the borrower and bank improves loan conditions. Instead of focusing on spreads, Shi and Sun (2015) look at the number of loan covenants and find that a high CSR score is related to less bond covenants, more financial flexibility and generally less restrictions. Their results are strongest for traded bonds with potential agency

problems and high bid-ask spreads. Aiming at improving our understanding of the transmission channel, Stellner, Klein, and Zwergel (2015) analyze credit risk in terms of credit ratings and z-spreads. They find that good social performance is only seen as risk-reducing when it is recognized by the environment, measured as country social performance. Finally, Cheng et al. (2015) find that higher social capital in terms of involvement in community activities on the county level is indicative of better bank loan spreads.

3.3.3 Theoretical hypothesis development

Negotiations are important in establishing loan contract terms, especially so in the syndicated loan market (Giannetti and Yafeh, 2012). Therefore, when examining loan negotiation contracts it is beneficial to consider both parties of the transaction. This chapter extends the literature on the relationship between corporate sustainability performance and cost of debt by taking into account the role of the lending bank's sustainability performance. Doing so enables us to explore the channels as to why lenders value sustainability performance in their borrowers, providing valuable insights into how and when it is beneficial to engage in sustainability measures.

An increasing number of banks are claiming their heightened awareness of social responsibility in their role as financial intermediaries. This has resulted in increased voluntary reporting on sustainability efforts within firms and CSR reports are becoming common place. Currently more than 90% of the world's largest 250 corporations report on their sustainability performance (GRI, 2016). Furthermore, initiatives such as the Sustainability Accounting Standards Board (SASB), Global Reporting Initiative (GRI), Principles for Responsible Investment (PRI), and the Equator Principles have been driving the transparency and comparability of sustainability efforts. SASB, for example, has developed industry-specific sustainability reporting standards to increase transparency and comparability in reporting. Their guidelines are investor-focused and designed to channel attention to those sustainability issues that are material for the respective firm. Similarly, the GRI sets guidelines for sustainability reports to help communicate the impact that organizations have on environmental and social outcomes. Their stakeholder-oriented guidelines provide the most widely used sustainability reporting standards in the world, with more than 7,500 organizations making use of them. From an investment management perspective, the PRI promote six

main principles that encourage investors to use a voluntary set of investment principles with the objective to incorporate ESG factors into their investment practice. Currently there are more than 1,500 signatories from over 50 countries with approximately 60 trillion USD assets under management. Finally, also with the aim of promoting corporate sustainability awareness, the Equator Principles is a risk management framework specifically for financial institutions with the goal of determining, assessing and managing environmental and social risk in projects. It sets a minimum standard for due diligence in responsible risk decision-making. Over the last decade, sustainability has become central to organizations, and finance providers are beginning to understand their responsibility in providing capital in a conscientious fashion. In contrast to equity capital, bank debt generates new finance in a concentrated manner that enables stronger control and monitoring (Scholtens, 2006). Consequently, banks have a wide-reaching scope of improving sustainability in businesses. In recent years, banks are increasingly implementing screening criteria in their decision-making process and disclosing information on their sustainability initiatives in their sustainability reports, websites, and other sources of media communication.

The recent literature has revealed that superior sustainability performance not only pays off for non-financial institutions, but that banks also reap benefits. Simpson and Kohers (2002) investigate the relationship between social and financial performance for a subset of banks and find that the positive link between social and financial performance holds for them as well. Although Chih, Chih, and Chen (2010) do not find significant results on this relationship for a broad set of international firms from the financial industry, they do find that financial institutions engage more in CSR when competition is more intense, in order to gain a competitive advantage. Wu and Shen (2013) discuss three potential driving motives for banks to engage in CSR: Strategic choice, altruism, and greenwashing. Their results show that bank CSR performance is related to higher financial performance and less non-performing loans, indicating that strategic choice is the primary motive for banks to pursue CSR. Despite it being a strategic and not altruistic choice, Barigozzi and Tedeschi (2014) conclude that ethical banks improve welfare by implementing projects with positive externalities on society while themselves benefiting from lower default rates. Scholtens (2009) reveals that the social responsibility of banks has improved in the years 2000 to 2005 and is related to banks having become signatories to more codes of conduct, improved transparency

on social responsibility, and the expansion in variety of responsible financial products. Considering that the existing literature shows that CSR affects banks operating and financing performance, it seems highly relevant to take bank sustainability into account when examining the relationship between corporate sustainability performance and access to bank debt.

We hypothesize that banks with high sustainability performance price the sustainability efforts of their borrowers into the bank loan contracts more than banks with low sustainability performance. This can either be justified by a better assessment of credit risk, or based on factors unrelated to credit risk such as trust and the preservation of bank reputation. If sustainability performance impacts credit risk, then banks that are more capable of understanding and assessing borrower sustainability will price this in their loans.⁴

According to the risk mitigation view by Goss and Roberts (2011), sustainability efforts reduce risk exposure and hence can improve credit risk. Supporting their reasoning, Lee and Faff (2009) show that investing in a portfolio with high CSR performing firms results in less idiosyncratic risk. Firms with high ESG performance also tend to be more long-term oriented (Eccles, Ioannou, and Serafeim, 2014). Consequently, managers may be less tempted to boost the share price with risky, myopic actions and instead focus on long-term projects. This can result in favor to creditors, as these firms shift away from a short-term share price maximization perspective, to a longer-term profitability view. Furthermore, sustainable borrowers may be exposed to fewer legal fines e.g. due to environmental catastrophes. Such fines directly impact cash flows and are reflected in a decline in creditworthiness. Along the same lines, employee and customer relationships tend to be more stable when the motivation to work at a specific company or buy from a particular brand is not purely price-driven but rather by a socially conscious worker or consumer (Turban and Greening, 1997; Greening and Turban, 2000). In other words, this means that both reduced consumer price elasticity as well as employee turnover improve cash flow stability and hence the creditworthiness of the firm. Furthermore, in a society of increasing consumer awareness,

⁴We note that for financial institutions, environmental pollution may be less of a material concern than for firms that operate e.g. in the non-renewable resources sector. The SASB materiality map, available at www.sasb.org/materiality/sasb-materiality-map/, provides insights into the relative importance of various sustainability areas. This means that a bank's primary impact on environmental sustainability arguably derives from their lending operations, rather than direct uses of resources. Nevertheless, the total impact of a bank can still be substantial e.g. through cutting down on paper waste or energy consumption. Consider, for example, Bank of America which has more than 200,000 employees. Here, relatively minor changes can in aggregate have a dramatic impact.

the media plays a significant role in communicating to stakeholders. Due to the fact that sustainability performance is positively related to media coverage (Cahan et al., 2015), this can positively influence customer loyalty and, through reduced consumer price elasticity, the firm's cash flow stability. Due to all of the above, sustainability can reduce credit risk. However, this is only reflected in the loan conditions when it is actually recognized by the lender. Stellner, Klein, and Zwergel (2015) find that in the context of country-specific sustainability, social responsibility efforts are only beneficial when they are recognized by the environment that they operate in. Similarly, bank ESG performance can be seen as a major part of the operating environment of the borrower. As Barigozzi and Tedeschi (2014) discuss, ethical banks prefer to fund projects that are more ethical, reducing loan default rates at the same time. If they are more skilled at valuing these advantages of superior ESG performance due to their own ESG performance, this will be reflected in the loan spreads.

However, even if considering sustainability performance is not warranted on the basis of credit risk, there are several behavioral reasons why sustainability should matter more to banks with high sustainability performance. For example, when both bank and borrower have a similar attitude towards sustainability, there is a higher level of trust in the relationship. This reduces information frictions, resulting in improved access to finance. Lewicki, McAllister, and Bies (1998) discuss that convergent interests provide a solid foundation for trust, in terms of a positive expectation on the desired behavior. Similarly, Fulmer and Gelfand (2012) find in their review of the trust literature, that shared characteristics between two parties increase trust. This also holds true for the specific case of group membership: Williams (2001) reveals that group membership impacts the beliefs about group members' trustworthiness. The existing literature indicates that similarity in sustainability may increase trust, whether measured as convergence in interests (Lewicki, McAllister, and Bies, 1998), shared characteristics (Fulmer and Gelfand, 2012), or group membership (Williams, 2001). Building on this, a related strand of literature indicates that trust is important in the setting of bank loan contracts. Here, information asymmetries play a major role (Dennis and Mullineaux, 2000). When information asymmetries and agency problems are severe, loans contain additional and more restrictive covenants (Drucker and Puri, 2009). In their study, Ring and Ven (1992) establish that trust indeed plays a central role in loan contracting. In fact, trust has been found to reduce the perceived probability of losses (Nooteboom, Berger, and

If borrower sustainability **reduces credit risk**, banks with stronger sustainability performance may be better able to value this.

Similarity and trust in sustainability between bank and borrower can **increase trust** between the contracting parties, reduce information asymmetries, and reflect in better lending rates.

Banks with high sustainability performance may be exposed to **reputation risk** and hence require a reputation premium when lending to borrowers with weak sustainability performance.

FIGURE 3.2: Why should bank sustainability performance matter?

Noorderhaven, 1997). This links directly to loan contracting through the perceived credit risk. Studies to date indicate that trust and similarity may improve access to finance. Trust has been found to reduce credit constraints in SMEs (Moro and Fink, 2013). Bottazzi, Da Rin, and Hellmann (2016) reveal that venture capitalists are more likely to fund entrepreneurs in countries whose citizens they trust more. Focusing on syndicated bank loans, Giannetti and Yafeh (2012) find that a higher cultural distance between borrower and lead arranging bank increases loan spreads, limits the loan size, and reduces risk sharing. Most related to this line of reasoning is the work of Kim, Surroca, and Tribó (2014b). They find that loan spreads are more favorable for borrowers when bank and borrower exhibit ethical similarity, as this helps to reduce capital market frictions. When lenders and borrowers are similar, information frictions are reduced, and familiarity as well as trust in non-opportunistic behavior between the parties increases (Kim, Surroca, and Tribó, 2014b). This results in lower costs of formalizing transactions and reduced monitoring costs. Hence, if a smaller cultural ESG distance results in reduced information asymmetries, this could be reflected in lower bank loan spreads.

Another non-credit risk reason is that banks with high sustainability performance may seek to protect their reputation from shocks that may occur through lending to irresponsible borrowers. For example, if a bank with a reputation for excellent sustainability behavior provides loans to a firm that reveals major sustainability issues, this can reflect negatively on the bank

and result in a damage to its reputation. This, in turn, can lead to damages to financial performance and access to credit for the bank (Simpson and Kohers, 2002; Wu and Shen, 2013; Barigozzi and Tedeschi, 2014). Consequently, high sustainability-performing banks may require a premium to lend to low sustainability-performing borrowers to compensate for the reputation risk they face. These same banks are more willing to provide capital to borrowers with high sustainability behavior. The existing literature reveals that superior corporate social performance enhances corporate reputation (Fombrun, Gardberg, and Barnett, 2000). Particularly firms with a high exposure to litigation risk can be shielded by superior social performance from shocks in firm value (Koh, Qian, and Wang, 2014) and insured from downside risk at no cost (Peloza, 2006). This is highly important for financial intermediaries, as they are only able to act as credible information producers if they have a good reputation (Chemmanur and Fulghieri, 1994). In the syndicated loan market, loans are more likely to be syndicated when the syndicate's managing agent is more reputable (Dennis and Mullineaux, 2000). Banks are highly scrutinized by the media and government regarding their social performance, due to their key role in the economy and the fact that they employ public resources paid for by society (Wu and Shen, 2013). Consequently, bank reputation may be especially sensitive to sustainability performance shocks. Therefore, banks with high sustainability performance may require a higher spread premium when lending to borrowers with low sustainability performance to offset for the reputation risk they take on.

3.4 Data and Sample

3.4.1 Sample construction

Our sample is constructed by combining data from LPC DealScan, Orbis Data Solutions, Thomson Reuters Asset4, and Thomson Reuters Eikon.⁵ Detailed data on the syndicated loans is retrieved from LPC DealScan. DealScan is considered the "world's number one source for comprehensive, reliable historical deal information on the global loan markets" (Reuters, 2015). The

⁵DealScan data is obtained from Harvard Business School. Orbis, Asset4, and Eikon data are obtained from Maastricht University.

database includes detailed loan contract terms such as the loan spread, maturity, deal size, and seniority of the loan. In addition, it provides information on the loan purpose, tranche type, and senior debt rating. Borrowing firm characteristics are gathered from Orbis Data Solutions. Orbis provides a comprehensive source of management and financial statement data on over 160 million listed and unlisted firms worldwide. It combines data from several renowned databases including Reach, Amadeus, Osiris, and Bankscope. We collect sustainability data for both the lending banks and the borrowing firms from Thomson Reuters Asset4. Asset4 is a Swiss-based firm that uses more than 250 key performance indicators and over 750 individual data points along with their original data sources to determine the environmental, social, and governance performance of companies.⁶ These three major categories cover the key topics as follows: The environmental dimension considers resource, innovation, and emissions data. The social performance measure integrates employment quality, health and safety, but also diversity, product responsibility, and human rights. Governance is assessed by considering compensation, shareholder rights, board composition and strategy. The ESG data is collected from public sources (e.g. annual reports, sustainability reports, NGO websites) and transformed to consistent units by Asset4 analysts. Updates occur on a bi-weekly basis. Asset4 data is used by professional investors who are interested in integrating sustainability factors into their analysis. Currently, an estimate of 2.5 trillion in assets under management employ this data (Cheng, Ioannou, and Serafeim, 2014).

Our sample selection begins with the Asset4 universe of 6,140 firms and banks; going back to the first year of coverage, 2002, approximately 1000 firms are covered. We merge it with LPC DealScan, drop non-US firms and remove firms that do not have required financial information. We only include syndicated loans with a single lead arranger, in order to clearly identify the lead arranging bank and relevant lender sustainability performance. Our final sample covers 484 unique borrowing firms and 39 unique lending banks, resulting in 1,226 loan observations from 2002 to 2015. In Table 3.1, we provide the frequency distributions of the data. Panel A reveals the distribution across sectors and Panel B provides the distribution across years. The later is visualized in a historical distribution graph in figure 3.3.

⁶Detailed definitions on the employed ESG measures can be found in appendix 3.17.

TABLE 3.1: Frequency distributions

Panel A: Industry

SIC Industry classification	N loans
1 Mining and construction	142
2 Manuf. food, textile, lumber, publishing, chemicals, petroleum	193
3 Manuf. plastics, leather, concrete, metal, machinery, equipment	253
4 Transportation, communications, electric, gas, sanitary services	146
5 Trade	139
6 Finance, insurance, real estate	211
7 Personal, business, and entertainment services	92
8 Professional services	50
Total	1,226

Panel B: Years

Year	N loans
2002	136
2003	93
2004	124
2005	151
2006	109
2007	94
2008	114
2009	57
2010	66
2011	71
2012	68
2013	58
2014	44
2015	41
Total	1,226

Notes: The table provides an overview of the frequency distribution of loan observations by SIC major industry group of the borrowing firms, in Panel A, and by year of loan syndication, in Panel B.

FIGURE 3.3: Frequency of observations

3.4.2 Descriptive Statistics

The descriptive statistics of the key variables are presented in Table 3.2 Panel A. The sustainability performance (ESG) falls within the range of 0 to 100%, where 100% represents the highest sustainability performance. The sustainability performance is available for each borrower and bank on an annual basis and is sub-divided into the subcategories environmental, social, and governance performance. The table reveals that the sustainability performance of the borrowers is on average slightly lower than that of the banks. While the mean borrower sustainability performance is 50%, that of the banks is on average higher at 75%. In all subcategories of sustainability measures, the borrower sustainability performance is on average lower than that of the banks. The standard deviation of scores however is higher for the borrowers than for the banks. This appears to be driven by the larger downside variation in borrower sustainability scores.

With regard to the borrower characteristics, firms size is measured as $\ln(\text{total assets})$ with a mean at 15.82, equivalent to 27MM. The EBIT margin is on average 0.16 with a minimum of -1.79 and maximum of 3.49. The market to book value is at 3.96%, which seems low but is driven by negative market to book ratios. Leverage is measured as total debt to assets and is on average 27.36%. Stock price volatility is at

TABLE 3.2: Descriptive statistics

Panel A: Summary statistics

Variable	N	Mean	Std. Dev.	Min	Max	Skew	Kurt
<u>ESG characteristics</u>							
Borrower ESG score	1,226	0.50	0.20	0.09	0.97	0.64	2.46
Borrower ENV score	1,226	0.37	0.28	0.09	0.97	0.94	2.37
Borrower SOC score	1,226	0.40	0.27	0.04	0.98	0.58	2.05
Borrower GOV score	1,226	0.73	0.17	0.03	0.97	-1.33	4.99
Bank ESG score	1,226	0.75	0.14	0.24	0.96	-1.30	3.98
Bank ENV score	1,226	0.76	0.26	0.10	0.97	-1.56	3.92
Bank SOC score	1,226	0.72	0.20	0.12	0.99	-1.15	3.74
Bank GOV score	1,226	0.79	0.11	0.08	0.96	-1.69	8.57
<u>Borrower characteristics</u>							
Firm size	1,226	15.82	1.36	12.05	20.84	0.84	3.92
EBIT	1,226	0.16	0.21	-1.79	3.49	2.57	59.89
MTB	1,226	3.96	27.51	-157.84	901.66	28.17	928.98
Leverage	1,226	27.36	17.53	0.00	69.26	0.40	2.41
Pricevol	1,226	28.10	9.00	11.68	66.13	0.64	3.15
Tangibility	1,226	-1.16	0.75	-5.76	-0.14	-1.62	6.23
<u>Loan characteristics</u>							
Spread	1,226	128.48	113.70	0.00	850.00	2.03	9.50
Secured	1,226	0.21	0.41	0.00	1.00	1.42	3.02
Numlenders	1,226	1.82	1.00	0.00	3.50	-0.52	2.29
Maturity	1,226	38.54	22.44	3.00	120.00	0.09	2.07
Loansize	1,226	19.70	1.15	16.31	22.36	-0.07	3.03
Perfpricing	1,226	0.45	0.50	0.00	1.00	0.21	1.04
Covenants	1,226	0.61	0.49	0.00	1.00	-0.43	1.19

Panel B: Bank-borrower spread matrix

Median split:	High borrower ESG	Low borrower ESG	t-stat
High bank ESG	121.98	160.98	4.07
Low bank ESG	100.78	130.98	3.53
t-statistic	2.42	3.22	
Quartile split:	High borrower ESG	Low borrower ESG	t-stat
High bank ESG	91.06	175.96	5.27
Low bank ESG	83.71	146.76	1.19
t-statistic	0.40	4.56	

Notes: The tables provide an overview of the descriptive statistics of the variables employed in this study. Panel A reveals the summary statistics. The matrix in Panel B shows the average loan spread for the respective bank-borrower ESG combinations. The t-statistic refers to the mean difference between the spread of high and low borrower ESG categories, and high and low bank ESG categories. Variable definitions can be found in appendix 3.17.

TABLE 3.3: Correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Borrower ESG	1.00																			
(2) Borrower ENV	0.88	1.00																		
(3) Borrower SOC	0.88	0.67	1.00																	
(4) Borrower GOV	0.66	0.39	0.42	1.00																
(5) Bank ESG	0.10	0.13	0.05	0.05	1.00															
(6) Bank ENV	0.07	0.11	0.03	0.02	0.91	1.00														
(7) Bank SOC	0.09	0.10	0.04	0.07	0.85	0.67	1.00													
(8) Bank GOV	0.06	0.07	0.05	0.01	0.25	0.01	-0.05	1.00												
(9) Firm size	0.33	0.32	0.34	0.10	0.07	0.02	0.09	0.08	1.00											
(10) EBIT	-0.05	-0.06	-0.03	-0.02	0.01	0.03	0.02	-0.06	0.17	1.00										
(11) MTB	0.00	0.02	-0.01	0.00	-0.01	-0.02	-0.01	0.01	-0.03	0.00	1.00									
(12) Leverage	-0.02	0.06	-0.07	-0.06	0.06	0.06	0.07	-0.01	0.24	0.12	0.04	1.00								
(13) Pricevol	-0.17	-0.18	-0.18	-0.01	0.09	0.08	0.06	0.05	-0.27	-0.20	0.02	-0.12	1.00							
(14) Tangibility	0.00	-0.02	-0.03	0.06	-0.06	-0.02	-0.07	-0.06	-0.53	-0.13	-0.23	-0.42	0.05	1.00						
(15) Spread	-0.17	-0.12	-0.17	-0.12	0.14	0.17	0.07	0.02	-0.20	-0.08	-0.02	0.17	0.44	-0.05	1.00					
(16) Secured	-0.14	-0.12	-0.14	-0.08	0.04	0.04	0.07	-0.04	-0.23	-0.09	-0.02	0.05	0.40	0.12	0.41	1.00				
(17) Numlenders	0.06	0.02	0.06	0.08	-0.18	-0.19	-0.18	0.06	0.21	0.03	-0.03	-0.01	-0.16	-0.02	-0.34	-0.10	1.00			
(18) Maturity	-0.11	-0.10	-0.10	-0.07	0.14	0.14	0.13	0.01	-0.27	0.02	0.01	-0.03	0.15	0.18	0.17	0.22	0.02	1.00		
(19) Loansize	0.29	0.27	0.27	0.14	0.04	-0.01	0.02	0.14	0.50	0.10	0.01	0.18	-0.18	-0.16	-0.19	-0.06	0.40	0.02	1.00	
(20) Perpricing	-0.05	-0.05	-0.06	0.01	-0.07	-0.06	-0.07	-0.01	-0.21	-0.07	-0.02	-0.11	-0.01	0.19	-0.10	0.09	0.25	0.14	0.09	1.00
(21) Covenants	-0.09	-0.09	-0.10	0.00	-0.01	0.00	-0.01	-0.02	-0.24	-0.05	-0.03	-0.12	0.10	0.20	0.06	0.27	0.11	0.13	0.02	0.65

Notes: The table provides the pairwise correlations between the variables employed in this study. Correlations depicted in bold are significant at the 10% or higher level. Variable definitions can be found in appendix 3.17.

28%. Tangibility is represented by the log of net tangible assets to total assets with its mean is at a ratio of -1.16.

The main loan characteristic of interest is the loan spread, measured by the All-in-spread drawn. This is the amount that the borrower pays over the LIBOR, including any fees. It is on average 128.48 bps and ranges from 0 to 850 bps. This is similar to the existing literature such as Goss and Roberts (2011) who find an average spread of 101 bps and Kleimeier and Viehs (2016) with 238 bps. All loans included in this sample have one lead arranger and one borrower. About 21% of the loans are secured. Number of lenders is provided in logs, on average 1.82 or approximately 9 lenders. The loan maturity is on average 38 months and ranges from 3 to 120 months. This is similar to Maskara (2010) and Lim, Minton, and Weisbach (2014) who find average maturities of 58 and 46 months, respectively. The loan tranche size is measured in logs and has a mean of 19.7. The table reveals that 45% of loans are performance priced. The covenants indicator variable reveals that the majority of the loans have covenants attached.

Panel B of Table 3.2 visualizes the average loan spread for different combinations of banks and borrowers in a matrix. The upper matrix splits the sample by median bank ESG performance, while the lower matrix goes further into the tails of the distribution and captures the quartiles. High borrower ESG is classified as zero if the borrower's sustainability performance is in the bottom quartile (or below median), and it is coded as one when sustainability performance is in the top quartile (or above median). Similarly, high bank ESG is zero when bank sustainability performance is in the lower quartile (or below median) and one if it is in the top quartile (or above median). A mean-difference t-test reveals the univariate difference in spreads for these combinations. The table provides a first understanding of the data and shows that banks with high ESG performance provide higher loan spreads on average to borrowers with low ESG performance. Considering the quartile-split matrix and without accounting for relevant control variables, it appears that borrowers with high sustainability performance do not receive different spreads from low vs. high sustainability banks. However, there seems to be a significant difference for borrowers with low sustainability performance.

Table 3.3 provides the pairwise correlations between the variables. We find that environmental, social, governance measures are positively correlated for banks and well as for borrowers. By construction, they are correlated with the aggregate ESG measure. There does not appear to be any concern of multicollinearity between the variables based on this table.

3.5 Methodology and empirical results

We analyze the relationship between borrower sustainability performance and bank loan spreads in a multivariate setting. First, we examine the relationship between borrower sustainability performance and bank loan spreads and confirm that borrowers with high sustainability performance pay lower loan spreads on average. We then split the sample in to two categories depending on whether the lending bank has high or low sustainability performance. The previous analysis is conducted for these subgroups and we find that, in line with our hypothesis, the relationship between borrower sustainability performance and loan spreads only holds for the subgroup that borrowers from banks with high sustainability performance. Our results hold for different splits, and also for the individual ESG dimensions: Environmental, social, and governance performance. Next, we confirm this result using interaction effects, as well as bank and borrower fixed effects to control for unobserved variables. We do propensity score matching and measure the average treatment effect on the treated, as well as running the multivariate model on the matched sample. Furthermore, we conduct within-bank and within-firm analyses to understand differences in spreads within each group. We map out the differences in spreads between high and low sustainability banks depending on borrower sustainability performance to gain a deeper understanding on when the relationship starts. Finally, we explore time dynamics to determine whether the documented relationship is stronger in the more recent years with the increase in monitoring and scrutiny of banks, as well as availability of information. We conduct the sample splits for pre 2009 and post 2008 subsamples to gain understanding of the mechanisms. We show how reputation risk of banks changed between these time periods and discuss potential implications.

In order to capture the ESG performance effect, we need to control for a wide range of borrower and loan characteristics. We employ a multivariate panel model, controlling for relevant effects and clustering standard errors by the bank-borrower relationship. The Hausman test indicates that the errors are correlated with the regressors and hence we should use a fixed effects model. In terms of borrower characteristics, we control for firm size measured as the natural logarithm of total assets. Larger firms may on average receive better loan conditions, as they tend to have a longer financial history record and stronger reputation which results in more stable cash flows (Strahan, 1999). We control for firm performance, measured in ROA, to account for the fact that - all else equal - more profitable firms tend to be more creditworthy. Leverage is an important determinant of creditworthiness, as the more levered a firm is, the more diluted the claim on assets. In the case of financial distress, tangible fixed assets can be liquidated to help settle outstanding claims and hence we expect tangibility of assets to decrease loan spreads. This is most likely to be found

in the tails of the distribution, when borrowers are in financial distress situations. We account for this by including tangibility, measured as tangible assets to total assets. The loan spread is determined depending on other loan contract terms. For example, a longer loan maturity may increase the risk exposure of the bank. However, the relationship to spread can be the other way around if it is capturing the fact that more creditworthy firms receive longer maturity loans. We include loan maturity measured as the natural logarithm in months. Another important loan term we include is the loan size. On the one hand, larger loans may reduce the syndicates diversification benefits and hence be seen as more risky. On the other hand, a larger loan size may be indicative of a higher creditworthiness of the borrower, as the bank ultimately decides on the loan amount. We include an indicator variable that captures whether there are any kinds of general or financial covenants attached to the loan. Covenants can be used as a tool to reduce agency conflicts within the lending relationship. We include an indicator variable for performance pricing. Performance pricing can help align interests and reduce agency problems with managers. However, it may be seen negatively by debt holders if it encourages excessive risk taking to achieve certain performance benchmarks. Collateral is commonly used in loan contracting to secure a loan. On the one hand, more collateral may indicate lower creditworthiness of the borrower. In contrast, a bank that decides that no collateral is needed may signal that it expects the borrower to repay the loan without issues. All else equal however, more collateral increases the probability that the loan will be repaid, even in financial distress and hence could reduce loan spreads. We use the indicator variable secured to capture this. As we are dealing with syndicated loans, we capture the number of borrowers to take into account any risk-diversification effects that may influence the loan pricing. We also include a range of fixed effects to capture the senior debt rating of the borrower, the purpose of the loan, and type of loan. To take into account macroeconomic factors, we include fixed effects for the industry and year. We later also include bank and firm fixed effects to account for any unobservable differences between banks or borrowers that do not vary over time.⁷

⁷Bank characteristics are typically not employed as control variables in loan pricing studies, as they do not influence the creditworthiness of the borrower. In contrast, borrower characteristics such as size and profitability have been documented to be of considerable importance. A more profitable or less levered borrower may be better able to repay their loans. In this study, we hypothesize that borrower sustainability performance has an impact of perceived creditworthiness or loan pricing, however we do not expect other factors such as bank size or bank profitability to influence the loan setting procedure other than through their correlation with sustainability performance. For robustness reasons, we nevertheless include bank and firm fixed effects to capture additional differences, however neither set of fixed effects alters the findings.

3.5.1 Borrower ESG and loan spreads

We begin the analysis by looking at the relationship between borrower ESG performance and loan spreads. The empirical model takes on the following form:

$$\text{Spread} = f(\text{Borrower sustainability performance, firm characteristics, loan characteristics, macroeconomic controls})$$

The results are provided in Table 3.4. In line with the existing literature, we find that borrowers with better sustainability performance pay less on their bank loans.⁸

Column (1) reveals that a one standard deviation improvement in ESG performance results in a decrease in loan spreads of approximately 10% of a standard deviation or 11 bps. The individual ESG dimensions are disaggregated in columns (2) to (4). The results indicate that better ESG performance in each of the individual dimensions is related to lower loan spreads. While environmental and social performance have similar economic effect sizes, borrower's governance score reveals a significantly larger magnitude. This is in line with our expectation that banks are able to value corporate governance of their borrowers better. A recent report from Allianz Global Investors summarizes the current research on ESG in the bond context. They find that "corporate governance is perceived to be the strongest credit risk contributor along the ESG dimensions" considered by rating agencies (Hörter, 2016). In line with this, in a credit policy report of Fitch Ratings they state that "poor governance practices, including country-specific and issuer-specific corporate governance matters, can result in lower ratings than typical quantitative and qualitative credit factors may otherwise imply" (Gits, Watson, and Waterman, 2015). Interpreting the control variables, our results indicate that increased leverage increases loan spreads, supporting the recognized notion that leverage increases credit risk. We also find a significant relationship between the secured indicator variable and loan spreads. The estimate shows that loans that are secured are charged higher spreads. This implies that secured loans are on average more risky, as the risk reduction from securing the loan does not outweigh the higher initial risk of these loans. We do not find a significant coefficient on loan size and hence cannot conclusively claim whether in our sample the effect of increased risk due to larger loan size or the signaling of lower risk outweighs.

Altogether, Table 3.4 is in accordance with the existing literature that finds that better ESG performance improves access to capital (Goss and Roberts, 2011; Chava, 2014;

⁸We note that, consistent with chapter 2, gender diversity is a component of the aggregate ESG measure employed in this study. In particular, the measure includes items on board gender diversity. Disentangling the top management gender diversity from the aggregate ESG measure to determine partial effects is beyond the scope of this study.

TABLE 3.4: Borrower sustainability performance and loan spreads

Dep.: Spread	(1)	(2)	(3)	(4)
Borrower ESG	-53.74 *** (3.00)			
Borrower ENV		-28.16 ** (2.28)		
Borrower SOC			-33.37 *** (2.63)	
Borrower GOV				-41.82 *** (2.66)
<u>Borrower characteristics</u>				
Firm size	-0.96 (0.24)	-2.04 (0.52)	-1.45 (0.35)	-3.59 (0.92)
EBIT	11.87 (0.43)	9.86 (0.36)	11.66 (0.43)	11.81 (0.43)
MTB	-0.19 ** (2.01)	-0.19 ** (2.02)	-0.19 ** (2.06)	-0.19 ** (2.02)
Leverage	0.76 *** (3.34)	0.79 *** (3.45)	0.74 *** (3.25)	0.78 *** (3.48)
Pricevol	3.92 *** (7.16)	3.86 *** (7.03)	3.87 *** (7.09)	3.95 *** (7.05)
Rating	1.90 (1.51)	2.21 * (1.74)	1.99 (1.58)	1.87 (1.48)
Tangibility	-17.36 ** (2.58)	-17.98 *** (2.70)	-18.07 *** (2.66)	-18.7 *** (2.73)
<u>Loan characteristics</u>				
Secured	42.71 *** (5.02)	43.52 *** (5.11)	43.73 *** (5.2)	42.57 *** (4.93)
Numlenders	-8.77 *** (2.62)	-9.37 *** (2.80)	-8.9 *** (-2.64)	-8.5 ** (-2.54)
Maturity	0.53 ** (2.21)	0.56 ** (2.32)	0.54 ** (2.27)	0.54 ** (2.23)
Loansize	-7.04 (1.45)	-7.07 (1.45)	-7.31 (1.52)	-7.38 (1.51)
Perfpricing	-12.18 * (1.76)	-11.86 * (1.71)	-12.39 * (1.79)	-13.17 * (1.87)
Covenants	1.57 (0.17)	1.68 (0.19)	1.87 (0.21)	2.99 (0.33)
<u>Fixed effects</u>				
Type	Yes	Yes	Yes	Yes
Purpose	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Constant	120.62 (1.52)	123.46 (1.55)	118.14 (1.52)	172.23 ** (2.21)
adj. R^2	0.64	0.64	0.64	0.64
N	1,226	1,226	1,226	1,226

Notes: The dependent variable is the loan spread. Column (1) reveals the relationship between the aggregate borrower ESG measure and loan conditions. Columns (2) to (4) look at the individual ESG factors of the borrower. Variable definitions can be found in appendix 3.17. Standard errors are clustered on the bank-borrower relationship level. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

Kim, Surroca, and Tribó, 2014b; Kleimeier and Viehs, 2016; Cheng, Ioannou, and Serafeim, 2014). In contrast to the existing empirical research however, this study neither takes on a purely high-level approach e.g. looking at aggregate concerns or strengths (Goss and Roberts, 2011), nor does it focus only on a specific factor such as environmental concerns (Chava, 2014; Kleimeier and Viehs, 2016) or ethics (Kim, Surroca, and Tribó, 2014b). In the previous chapter, we focused in-depth on a specific aspect of ESG, namely top executive gender diversity. In this chapter we look at both the aggregate ESG score, but also the individual constituents, i.e. the environmental, social, and governance dimensions, and find that the negative relationship between sustainability performance and loan spreads persists.

3.5.2 Sample split into high and low ESG banks

Our hypothesis postulates that borrower sustainability performance is reflected in bank loan spreads more strongly, when the corresponding bank has high sustainability performance. To test this hypothesis, ESG scores from Asset4 are matched into the database to the appropriate lending banks. This enables us to consider both bank as well as borrower sustainability in our analysis. We run the multivariate regression from Table 3.4 for two subsamples of banks: Banks with high sustainability performance and banks with low sustainability ESG performance. The sample is split at the median sustainability performance of banks such that we have two equally sized samples.

Spread = f(Borrower sustainability performance, firm characteristics, loan characteristics, macroeconomic controls) if banks has high ESG performance vs. low ESG performance

The results are presented in Table 3.5. Columns (1) and (2) reveal the split results for the aggregate ESG measure. We find that the negative relationship between borrower sustainability performance and loan spreads only holds for banks with high sustainability performance. In columns (3) to (8) we conduct the analysis for the individual categories of environmental, social, and governance performance. The finding that borrower sustainability performance only matters for banks that are in the top half of sustainability performance holds for the individual categories as well. Similar to Table 3.4, we find the coefficient of borrower governance to be the largest negative coefficient of the ESG measures, indicating that banks consider governance to be the most highly relevant. The coefficients for the low sustainability performance banks are not only statistically insignificant on the regular confidence

TABLE 3.5: Split by bank sustainability performance

Dep.: Spread	Bank ESG		Bank ENV		Bank SOC		Bank GOV	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)	Low (7)	High (8)
Borrower ESG	-22.39 (1.07)	-91.54*** (3.38)						
Borrower ENV			-23.49 (1.59)	-38.72* (1.93)				
Borrower SOC					-0.53 (0.03)	-58.09*** (3.31)		
Borrower GOV							-32.08 (1.27)	-60.01*** (3.03)
<u>Borrower characteristics</u>								
Firm size	-10.17** (2.00)	1.09 (0.22)	-5.28 (1.12)	-7.27 (1.33)	-18.2*** (3.41)	8.60* (1.77)	-11.45** (1.99)	-0.82 (0.16)
EBIT	-45.89* (1.79)	32.33 (1.32)	-62.73*** (2.62)	28.96 (1.13)	-25.3 (0.54)	34.39 (1.24)	58.21** (2.21)	-34.52 (0.95)
MTB	-1.22** (2.58)	-0.09 (1.29)	-0.19*** (3.35)	-1.00** (2.55)	-1.82*** (2.75)	-0.08 (1.15)	-2.35* (1.74)	-0.03 (0.55)
Leverage	0.44 (1.54)	0.63* (1.93)	0.87*** (3.38)	0.66* (1.89)	0.47 (1.29)	0.88*** (3.29)	0.58* (1.92)	1.05*** (3.52)
Pricevol	3.42*** (5.38)	4.12*** (5.91)	3.88*** (5.22)	3.49*** (4.95)	3.61*** (5.37)	4.04*** (5.86)	4.17*** (5.85)	3.96*** (5.66)
Rating	2.24 (1.31)	1.17 (0.67)	2.14 (1.26)	0.26 (0.15)	0.99 (0.52)	1.57 (0.91)	-0.38 (0.22)	1.45 (0.82)
Tangibility	-39.06*** (3.80)	-12.97 (1.49)	-21.36*** (3.06)	-17.56* (1.83)	-46.65*** (4.79)	2.23 (0.28)	-34.61*** (3.51)	-2.67 (0.34)
<u>Loan characteristics</u>								
Secured	39.65*** (3.60)	42.33*** (3.31)	47.07*** (4.00)	43.91*** (3.28)	40.05*** (3.50)	42.19*** (3.49)	45.36*** (3.90)	37.04*** (2.65)
Numlenders	-10.64** (2.05)	-6.31 (1.28)	-10.31** (2.37)	-8.46 (1.64)	-7.69 (1.43)	-9.83** (2.10)	-10.51* (1.89)	-6.29 (1.47)
Maturity	0.15 (0.55)	0.88** (2.47)	0.48* (1.70)	0.64* (1.80)	-0.02 (0.08)	1.16*** (3.55)	0.37 (1.20)	0.50 (1.55)
Loansize	3.57 (0.80)	-9.50 (1.46)	1.69 (0.32)	-10.39* (1.70)	3.24 (0.71)	-16.32** (2.36)	-2.56 (0.55)	-10.78* (1.73)
Perfpricing	-13.06 (1.20)	-20.12** (2.09)	-3.01 (0.27)	-21.34** (2.31)	-19.75* (1.81)	-13.52 (1.56)	-2.00 (0.22)	-20.66* (1.74)
Covenants	10.21 (0.87)	-1.96 (0.15)	3.15 (0.28)	-1.73 (0.13)	18.67 (1.59)	-6.27 (0.45)	1.83 (0.17)	5.64 (0.38)
<u>Fixed effects</u>								
Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Purpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	137.11 (1.50)	142.01 (1.31)	-7.61 (0.09)	300.31*** (2.62)	209.65** (2.00)	160.33 (1.49)	162.8* (1.94)	248.81** (2.39)
adj. R^2	0.71	0.66	0.69	0.67	0.71	0.66	0.72	0.63
N	613	613	613	613	613	613	613	613

Notes: The dependent variable is the loan spread. Columns (1) and (2) reveal the relationship between borrower ESG and loan conditions after splitting observations by the median Bank ESG performance. Columns (3) and (4) consider environmental performance, (5) and (6) social performance, (7) and (8) governance. Variable definitions can be found in appendix 3.17. Standard errors are clustered on the bank-borrower relationship level. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

levels, but they are also much lower in their magnitude compared to their high-sustainability counterparts. The control variables remain fairly stable compared to the previous specification, indicating that they are not driving the results.

In untabulated tests we further split the sample into thirds and quartiles of high and low bank sustainability performance. We find that our results hold and even are stronger in the smaller subsample analyses. In seemingly unrelated regression models based on these sample-split regressions and comparing the coefficients of borrower sustainability between the regression subsamples, we find evidence that the coefficients are also statistically significantly different from each other across samples. Furthermore, in untabulated tests we control for CDS spreads in addition to already controlling for credit rating, to more closely determine whether sustainability performance is related to credit worthiness and find that the sample split results hold also controlling for CDS spreads.

3.5.3 Interaction effects

In the next step, we construct an interaction effect between bank and borrower sustainability performance to capture the relationship more precisely. The results are provided in Table 3.6. We find that when both bank and borrower sustainability performance are higher, loans spreads are lower. In column (1) the result is shown for the aggregate ESG measure. In columns (2) to (4) the individual sustainability measures are investigated separately. The table reveals that all three factors - environmental, social, and governance performance - interacted with the respective bank dimension load negatively and significantly. This supports our previous findings that borrower sustainability performance reduces loan spreads especially when bank sustainability performance is high. The positive level effect of borrower sustainability performance reveals that this is otherwise not the case.

As an additional robustness exercise, we include bank and firm fixed effects to control for any unobservable differences between banks and between firms that do not change over time and are not absorbed by our existing control variables. The results are shown in Table 3.7. We do not find evidence that our results are additionally driven by fixed effects as our coefficients are similar to the previous model including firm and loan controls. The high adjusted R-squared of almost 70% indicates that our models have a strong predictive power in explaining the variation in syndicated loan spreads.

For additional robustness we conduct all previous analyses on a sample that excludes financial and utility companies in untabulated tests, although we control for industry fixed effects in our models. The literature often excludes firms in these categories, as they are considered to be quite different to other industries and may have

TABLE 3.6: Interaction effects

Dep.: Spread	(1)	(2)	(3)	(4)
Borrower score	125.92 ** (2.00)	77.40 * (1.84)	25.24 (0.84)	125.62 ** (2.24)
Bank score	116.13 ** (2.40)	22.27 * (1.88)	23.36 (1.00)	163.04 *** (2.93)
Bank × Borrower ESG	-234.13 *** (2.77)			
Bank × Borrower ENV		-136.90 ** (2.50)		
Bank × Borrower SOC			-81.15 * (1.87)	
Bank × Borrower GOV				-225.01 *** (2.98)
<u>Borrower characteristics</u>				
Firm size	-1.17 (0.30)	-1.89 (0.48)	-1.22 (0.30)	-3.78 (1.00)
EBIT	13.00 (0.48)	9.98 (0.36)	12.39 (0.45)	12.50 (0.46)
MTB	-0.19 ** (1.99)	-0.18 ** (2.02)	-0.19 ** (2.02)	-0.19 ** (1.99)
Leverage	0.75 *** (3.30)	0.77 *** (3.38)	0.75 *** (3.31)	0.77 *** (3.41)
Pricevol	3.86 *** (7.20)	3.86 *** (7.14)	3.83 *** (7.21)	3.96 *** (7.10)
Rating	1.81 (1.44)	2.02 (1.61)	1.80 (1.43)	1.52 (1.20)
Tangibility	-17.41 *** (2.62)	-18.25 *** (2.80)	-17.88 *** (2.65)	-18.56 *** (2.71)
<u>Loan characteristics</u>				
Secured	43.5 *** (5.07)	44.12 *** (5.15)	44.34 *** (5.22)	42.96 *** (4.96)
Numlenders	-8.69 ** (2.57)	-9.47 *** (2.84)	-9.06 *** (2.69)	-8.37 ** (2.49)
Maturity	0.53 ** (2.26)	0.57 ** (2.38)	0.54 ** (2.32)	0.56 ** (2.33)
Loansize	-6.90 (1.45)	-7.02 (1.44)	-7.47 (1.57)	-7.25 (1.48)
Perfpricing	-13.02 * (1.88)	-12.09 * (1.74)	-13.28 * (1.92)	-13.90 * (1.96)
Covenants	2.09 (0.23)	1.14 (0.13)	2.81 (0.32)	4.55 (0.49)
<u>Fixed effects</u>				
Type	Yes	Yes	Yes	Yes
Purpose	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Constant	33.82 (0.43)	103.5 (1.30)	93.16 (1.22)	53.94 (0.62)
adj. R^2	0.64	0.64	0.64	0.64
N	1,226	1,226	1,226	1,226

Notes: The dependent variable is the loan spread. Column (1) reveals the relationship between borrower ESG and loan conditions including an interaction effect by Bank ESG performance. Columns (2) to (4) consider environmental performance, social, and governance performance. Borrower score and bank score are the respective baseline variables of the interactions. Variable definitions can be found in appendix 3.17. Standard errors are clustered on the bank-borrower relationship level. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

TABLE 3.7: Bank and firm fixed effects

Dep.: Spread	(1)	(2)	(3)	(4)
Borrower score	124.74 ** (2.03)	72.06 * (1.74)	26.60 (0.89)	124.22 ** (2.22)
Bank score	123.69 ** (2.48)	24.61 ** (2.02)	30.31 (1.15)	168.61 *** (3.05)
Bank × Borrower ESG	-231.1 *** (2.82)			
Bank × Borrower ENV		-129.39 ** (2.42)		
Bank × Borrower SOC			-82.14 * (1.91)	
Bank × Borrower GOV				-220.66 *** (2.95)
<u>Borrower characteristics</u>				
Firm size	-1.26 (0.32)	-1.95 (0.49)	-1.43 (0.35)	-3.84 (1.00)
EBIT	13.81 (0.51)	10.76 (0.39)	13.04 (0.48)	13.25 (0.49)
MTB	-0.19 ** (2.02)	-0.19 ** (2.04)	-0.2 ** (2.10)	-0.19 ** (2.02)
Leverage	0.77 *** (3.40)	0.79 *** (3.47)	0.77 *** (3.37)	0.79 *** (3.52)
Pricevol	3.93 *** (7.34)	3.94 *** (7.27)	3.93 *** (7.34)	4.02 *** (7.23)
Rating	1.66 (1.33)	1.86 (1.50)	1.76 (1.40)	1.39 (1.11)
Tangibility	-16.9 ** (2.57)	-17.75 *** (2.74)	-17.63 *** (2.64)	-18.06 *** (2.66)
<u>Loan characteristics</u>				
Secured	43.52 *** (5.00)	43.95 *** (5.06)	43.23 *** (5.09)	43.01 *** (4.90)
Numlenders	-9.02 *** (2.69)	-9.79 *** (2.95)	-9.19 *** (2.70)	-8.71 *** (2.61)
Maturity	0.54 ** (2.33)	0.58 ** (2.44)	0.55 ** (2.37)	0.57 ** (2.39)
Loansize	-6.69 (1.38)	-6.76 (1.37)	-7.06 (1.46)	-7.03 (1.41)
Perfpricing	-12.64 * (1.80)	-11.71 * (1.67)	-12.78 * (1.82)	-13.49 * (1.89)
Covenants	2.00 (0.22)	1.08 (0.12)	2.44 (0.27)	4.41 (0.48)
<u>Fixed effects</u>				
Type	Yes	Yes	Yes	Yes
Purpose	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes
Constant	20.13 (0.25)	95.37 (1.20)	88.6 (1.15)	40.81 (0.48)
adj. R^2	0.65	0.64	0.64	0.68
N	1,226	1,226	1,226	1,226

Notes: The dependent variable is the loan spread. Column (1) reveals the relationship between borrower ESG and loan conditions including an interaction effect by Bank ESG performance. Columns (2) to (4) consider environmental performance, social, and governance performance. Borrower score and bank score are the respective baseline variables of the interactions. Variable definitions can be found in appendix 3.17. Standard errors are clustered on the bank-borrower relationship level. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

different cash flow risk exposures. For this study we are able to confirm that our results are robust to the exclusion of such firms.

Furthermore, we consider how the relationship changes over time. For this purpose, we split the sample into three equal buckets and re-run the interaction effects. We find that the coefficient estimates are more negative in later periods. This may indicate that banks value sustainability performance of their borrowers more strongly in the more recent periods, consistent with the notion that sustainability is becoming increasingly important to capital market participants. For the sake of completeness, the baseline models without interaction effects are computed as well with similar results: The coefficients on ESG, ENV, SOC, and GOV are more negative in later periods.

3.5.4 Propensity score matching

A natural concern is whether the results are driven by matching between banks and borrowers. If high ESG borrowers are generally more creditworthy and high ESG banks lend to them more than to other borrowers, then we may be capturing this effect. To visualize this concern, figure 3.4 shows the distribution of borrower ESG scores for banks in the upper and lower half of ESG bank performance. The distribution for banks with high ESG performance is more platykurtic compared to that of the banks with lower ESG performance, however their mean and median values appear to be similar. We address the matching concern by first investigating differences in variables for the sample of borrowers that borrow from high vs. low ESG banks.⁹ We then use propensity score matching to, in the first step, estimate the probability that a borrower selects into a high or low ESG bank or borrower, and in the second step, use the estimated propensity to compute the average treatment effect on the syndicated loan spread for the matrix of four possible bank-borrower combinations. In accordance with our findings indicating that the difference is driven by a penalty for borrowers with low sustainability performance, the subsets of low ESG borrowers and high ESG banks are of particular interest to us.

The results of the first stage probit are shown in Table 3.8. We use the borrower-specific control variables from our multivariate regression models to estimate the probability that the corresponding bank is of high or low sustainability. The probit model regresses the high-ESG-bank instrument on size, EBIT, MTB, Leverage, Pricevol, Rating, and Tangibility. For the sample A of low ESG borrowers, larger and more price-volatile borrowers borrow from high ESG banks. For the sample

⁹A simple mean difference t-test between borrowers that borrow from high vs. low ESG banks reveals differences in stock price volatility, but most other covariates do not differ between the two groups. The results of the mean difference between high and low ESG banks for the firm characteristics can be found in appendix Table 3.18.

FIGURE 3.4: Borrower sustainability performance for banks with high and low ESG

B of high ESG borrowers they tend to be more levered when the bank has high ESG performance. Samples C and D provide the probit models for the samples of high and low ESG banks, respectively.

In the second step, the difference in loan spread is computed for observations of the treated compared to the untreated group that have similar propensity scores. Table 3.9 shows the average treatment effect of the treated group for each sample. The results are in line with our previous findings, indicating that borrowers with low sustainability scores receive higher loan spreads when borrowing from a bank that has high sustainability performance. In terms of magnitude, the average treatment effect for borrowers with low ESG performance borrowing from high ESG banks is 81 to 90 bps in difference, as shown in Table 3.9 in samples A and C. We document that using the same propensity score matching procedure, we do not find a significant average treatment effect for borrowers with high sustainability scores, as seen for sample B, or banks with low sustainability performance, as seen for sample D.

Next, we run the multivariate regression from the previous section on our propensity score matched sample. The results are provided in Table 3.10. We document similar results for the propensity score matched samples as in the multivariate models with sample splits and interaction effects. For the sample of low ESG borrowers, sample A, the table reveals that these borrowers receive rates that are 63.15 bps higher, while this is not the case for high ESG borrowers, shown in sample B. Similarly, for the sample of high ESG banks, in sample C, borrowers with high ESG performance pay lower spreads of 58.85 bps, after controlling for other possible confounding variables. This does not hold for sample D which comprises low ESG banks.

TABLE 3.8: Propensity Score Matching - Probit

Dep. Var.	Low-high ESG bank (A)		Low-high ESG bank (B)		Low-high ESG borrower (C)		Low-high ESG borrower (D)	
Firm size	0.24	*	0.07		0.37	***	0.72	***
	1.92		0.73		3.40		4.61	
EBIT	-0.63		1.05		-0.18		-2.89	***
	-1.10		1.20		-0.40		-3.09	
MTB	-0.02		0.00		0.01		0.09	***
	-1.56		-0.02		1.10		2.86	
Leverage	0.01		0.03	**	0.00		-0.01	
	0.78		2.32		-0.34		-0.62	
Pricevol	0.07	***	0.00		-0.03	**	0.01	
	4.77		0.02		-2.29		0.34	
Rating	0.08		0.03		-0.07		-0.04	
	1.46		0.60		-1.35		-0.76	
Tangibility	-0.02		0.08		0.39	*	0.90	***
	-0.07		0.33		1.73		3.27	
Constant	-6.36	***	-1.65		-4.01	**	-10.27	***
	-3.12		-0.94		-2.15		-4.24	
Pseudo R2	0.07		0.07		0.21		0.27	
N	144		96		140		122	
Sample:	A		B		C		D	
	Low ESG borrowers		High ESG borrowers		High ESG banks		Low ESG banks	

Notes: The table reveals the first stage results of the propensity score matching in which the propensity of being in a bank with high ESG performance or borrower with high ESG performance is estimated according to firm characteristics. The dependent variables are calculated as a dummy that equals zero for banks and borrowers in the lower quartile of ESG performance, and it is one when ESG performance is in the top quartile. Variable definitions can be found in appendix 3.17. Standard errors are clustered on the bank-borrower relationship level. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

TABLE 3.9: Propensity Score Matching - Average Treatment effect

Sample	Treated	Control	Diff.	S.E.	T-statistic	Treated	Controls	N
(A)	186.88	106.03	80.85	19.15	4.22	70	74	144
(B)	91.31	83.15	8.17	18.60	0.44	48	48	96
(C)	97.19	186.88	-89.69	19.46	-4.61	70	70	140
(D)	83.15	95.15	-12.00	17.83	-0.67	48	74	122

Notes: The table provides the average treatment effect on the treated, where the treated is the dependent variable of the first stage probit and the treatment effect is the spread difference between the treated and untreated (control) group. Sample A to D follows the definition shown in first stage probit table.

TABLE 3.10: Propensity Score Matching - Multivariate regression on matched samples

Dep.: Spread	Sample A	Sample B	Sample C	Sample D
Bank ESG (dummy)	63.15 ** (2.17)	27.36 (0.81)		
Borrower ESG (dummy)			-58.85 ** (2.00)	19.42 (0.66)
<u>Firm characteristics</u>				
Firm size	-38.12 ** (2.00)	28.75 (1.67)	7.97 (0.30)	-10.44 (0.60)
EBIT	-5.70 (0.06)	-171.37 (1.31)	-58.96 (1.38)	-173.01 ** (2.14)
MTB	-4.91 (0.86)	-5.89 (1.01)	1.34 (0.77)	-7.22 (1.61)
Leverage	1.44 (1.11)	4.53 ** (2.57)	2.68 ** (2.56)	0.53 (0.41)
Pricevol	5.87 ** (2.46)	2.62 (1.56)	2.88 (1.51)	4.04 ** (2.13)
Rating	-1.52 (0.29)	13.16 ** (2.17)	5.63 (1.15)	6.87 (1.19)
Tangibility	-22.66 (0.62)	-6.99 (0.19)	66.92 (1.64)	-36.26 (1.23)
<u>Loan characteristics</u>				
Secured	51.73 (1.58)	53.94 (1.40)	64.44 (1.47)	11.35 (0.31)
Numlenders	-45.15 *** (2.81)	-6.78 (0.42)	-6.50 (0.41)	3.64 (0.29)
Maturity	1.67 (1.59)	-0.66 (1.03)	0.84 (0.71)	-0.13 (0.17)
Loan size	-8.23 (0.59)	-28.07 * (1.88)	-20.03 (1.50)	19.23 (1.44)
Perfpricing	17.27 (0.54)	66.02 (1.41)	69.40 * (1.79)	-69.82 ** (2.05)
Covenants	-59.05 (1.50)	-79.53 (1.56)	-111.17 * (1.90)	62.70 ** (2.30)
<u>Fixed Effects</u>				
Type	Yes	Yes	Yes	Yes
Purpose	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Constant	741.20 (2.30)	-16.85 (0.06)	397.16 (0.82)	-305.35 (1.15)

Notes: The table shows the results of the multivariate regression on spread using the matched samples determined through propensity score matching. Sample A includes low ESG performance borrowers and observes the spread difference between high and low ESG banks. Sample B includes high ESG borrowers and shows the difference between high and low ESG banks. Sample C includes the high ESG performance banks and shows the spread difference for low and high ESG borrowers. Sample D includes low ESG banks and shows the spread difference between high and low ESG borrowers. Variable definitions can be found in appendix 3.17. Standard errors are clustered on the bank-borrower relationship level. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

3.5.5 Within firm and within bank spread changes

To ensure that our multivariate results using panel data are not driven by cross-sectional variation but that these results can also be recorded within firms and banks, we analyse differences in spreads for borrowing firms that borrow from different banks and we analyze spreads of banks that lend to different borrowers. The results are shown in Table 3.11. In Panel A, we focus on borrowing firms that borrow from banks with different levels of sustainability performance. According to our hypothesis, borrower sustainability performance should vary when borrowing from a bank with high sustainability performance, as these banks price the information. We therefore split the borrowers into borrowers with low sustainability performance and borrowers with high sustainability performance, where the cut-off point is determined at the 25% level. The results reveal that low ESG borrowers receive better loan spreads from low sustainability banks, than from high sustainability banks. The difference is on average 64 bps for the aggregate ESG measure. We find that this differences can also be found in the subcategories, especially for environmental performance but also for social performance. For governance, we find slight evidence that high governance borrowers receive better loan spreads from high governance banks. Altogether, the within-firm analysis however indicates that the difference is largely driven by low sustainability borrowers, rather than high-performers in sustainability. This supports the notion that we are looking at a premium for bad behavior, rather than a discount for good behavior.

In Panel B, we consider within-bank differences in loan spreads for banks that lend to borrowers that have different levels of sustainability performance. The split is in accordance with Panel A. We find that for the aggregate ESG measure, banks with high ESG performance provide different loan spreads to borrowers depending on their sustainability performance. The average difference is 56 bps, which is similar to the differences documented in Panel A that borrowers experience depending on the different banks that they receive credit from. Observing the loan spread differences for the subcategories of ESG performance, we find that for environmental sustainability, both banks with high and low distinguish between their borrowers sustainability performance. However, in terms of magnitude, the banks with high environmental performance provide 80 bps difference in spreads while low environmental banks provide only 21 bps difference and only at the 10% significance level. For social and governance performance of banks, we find that only banks with high sustainability performance take these factors into account when pricing loans.

The results in this table provide evidence that sustainability performance is only priced by banks with high performance. More specifically, this table shows us that the variation in spreads is driven by a downside premium, rather than an upside discount for borrowers that are considered more sustainable. In an open market, banks

TABLE 3.11: Within firm and bank spread changes

Panel A: Firm perspective

Category		N	Mean	Std. Dev.	Diff.	t-stat.
Low ESG borrower:	Low ESG bank	88	102.35	86.73	-63.62 ***	3.28
	High ESG bank	56	165.96	146.34		
High ESG borrower:	Low ESG bank	65	75.92	82.32	7.16	0.66
	High ESG bank	91	68.76	53.92		
Low ENV borrower:	Low ENV bank	89	102.86	94.05	-174.29 ***	5.38
	High ENV bank	19	277.15	231.47		
High ENV borrower:	Low ENV bank	67	77.06	83.32	-7.10	0.46
	High ENV bank	37	84.16	56.08		
Low SOC borrower:	Low SOC bank	105	126.01	91.73	-44.65 **	2.53
	High SOC bank	76	170.66	145.33		
High SOC borrower:	Low SOC bank	84	99.98	102.37	10.02	0.69
	High SOC bank	102	89.96	95.94		
Low GOV borrower:	Low GOV bank	142	155.72	137.09	20.29	1.15
	High GOV bank	94	135.43	124.53		
High GOV borrower:	Low GOV bank	112	127.29	109.79	23.95 *	1.55
	High GOV bank	110	103.34	101.93		

Panel B: Bank perspective

Category		N	Mean	Std. Dev.	Diff.	t-stat.
Low ESG bank:	Low ESG borrower	331	97.61	80.01	15.65	1.47
	High ESG borrower	72	81.97	89.62		
High ESG bank:	Low ESG borrower	274	148.72	114.94	56.01 ***	4.98
	High ESG borrower	129	92.70	81.14		
Low ENV bank:	Low ENV borrower	121	111.31	88.40	21.72 *	1.66
	High ENV borrower	81	89.59	94.15		
High ENV bank:	Low ENV borrower	102	200.52	132.56	80.85 ***	5.15
	High ENV borrower	125	119.67	103.84		
Low SOC bank:	Low SOC borrower	92	129.73	94.37	18.96	1.21
	High SOC borrower	87	110.77	114.77		
High SOC bank:	Low SOC borrower	105	156.47	127.25	67.01 ***	4.35
	High SOC borrower	106	89.46	94.20		
Low GOV bank:	Low GOV borrower	305	135.44	124.94	21.11	1.49
	High GOV borrower	98	114.33	111.81		
High GOV bank:	Low GOV borrower	295	120.51	108.07	20.66 *	1.73
	High GOV borrower	108	99.85	99.89		

Notes: The table provides the mean difference of spreads for within firm changes of bank in Panel A, and within bank changes of firms in Panel B. More specifically, Panel A provides the average spread for firms that borrow from banks with different ESG scores and uses a mean difference t-test to compare the spreads in both groups. Similarly, Panel B encompasses banks that have borrowers with different ESG scores and compares the average spreads that these borrowers receive in each group. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

TABLE 3.12: Average spread over sustainability deciles

	Low bank ESG (I)	High bank ESG (II)	Difference (I) - (II)
Borrower ESG decile 1	159.65	175.18	15.53
Borrower ESG decile 2	154.38	188.88	34.50
Borrower ESG decile 3	112.69	155.17	42.48
Borrower ESG decile 4	102.91	157.47	54.56
Borrower ESG decile 5	120.21	132.47	12.26
Borrower ESG decile 6	100.62	170.81	70.19
Borrower ESG decile 7	93.32	125.28	31.96
Borrower ESG decile 8	111.95	120.61	8.66
Borrower ESG decile 9	105.05	114.63	9.58
Borrower ESG decile 10	91.98	94.57	2.59

Notes: The table provides the mean spread for banks with high vs. low sustainability performance for ten deciles of borrower sustainability performance, showing how differences in spread change depending on borrower sustainability levels.

are in competition to retain customers and lending relationships. Increasing loan spreads may result in a loss of business and should therefore be considered with caution. Why do borrowers with low sustainability performance take loans from banks with high sustainability performance? As this is the first study to examine and document this effect, it is possible that the respective borrowers are not aware of the counterfactual situation, had they turned to a less sustainable bank. Another explanation is that banks with strong ESG performance tend to be larger and hence easier accessible. If the cost of reaching out to a smaller, less accessible bank is higher than the additional spread charge, this is an economically sound reason to borrow from a bank with strong sustainability performance as a low-sustainability borrower. Similarly, if lending relationships have persisted and switching costs are high, borrowers may prefer to remain with the bank. In the case of the later two arguments, the important role of banks in fostering sustainability is apparent, as borrowers that do not want to or cannot switch will benefit from strengthening their sustainability performance.

In Table 3.12, we show how the relationship evolves over different deciles of borrower sustainability performance. The table provides the mean spread for loans from high vs. low ESG banks split at the median. The last column shows the difference in spreads. Borrower ESG decile 1 encompasses the loans with the lowest

TABLE 3.13: Multivariate regressions on within change sample

Dep.: Spread	(1)	(2)	(3)	(4)
Bank ESG (dummy)	67.57*** (2.89)	-22.07 (-1.51)		
Borrower ESG (dummy)			3.14 (0.25)	-32.97*** (-2.67)
<u>Firm characteristics</u>				
Firm size	-5.37 (-0.40)	15.78 (1.49)	-13.37** (-2.46)	4.85 (0.76)
EBIT	-60.49 (-0.67)	-122.77 (-1.58)	-50.83* (-1.79)	-11.83 (-0.36)
MTB	-1.43 (-1.21)	0.14 (0.08)	-1.03*** (-3.42)	-0.16 (-0.23)
Leverage	0.92 (1.01)	0.30 (0.64)	-0.01 (-0.04)	0.71* (1.78)
Pricevol	6.12*** (2.93)	2.02 (1.48)	2.86*** (3.86)	3.04*** (3.53)
Rating	6.22 (1.29)	6.26** (2.45)	2.10 (1.12)	5.35** (2.21)
Tangibility	-8.70 (-0.41)	-11.09 (-0.69)	-31.66*** (-3.44)	1.32 (0.12)
<u>Loan characteristics</u>				
Secured	90.33*** (3.67)	61.30 (1.42)	47.89*** (3.98)	36.86* (1.85)
Numlenders	-23.79 (-1.58)	12.95** (2.23)	-8.65 (-1.58)	-7.45 (-1.14)
Maturity	1.28* (1.71)	0.09 (0.27)	-0.39 (-1.33)	1.22*** (3.18)
Loan size	-17.58 (-1.36)	-7.45 (-1.28)	7.57 (1.59)	-14.64** (-2.02)
Perfpricing	27.16 (0.91)	3.24 (0.19)	-11.03 (-0.72)	-17.45 (-1.24)
Covenants	-26.43 (-0.81)	8.11 (0.42)	-1.01 (-0.06)	-11.04 (-0.59)
<u>Fixed effects</u>				
Loan purpose FE	Yes	Yes	Yes	Yes
Loan type FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Constant	165.17 (0.68)	-260.37 (-1.43)	168.99* (1.67)	197.61 (1.54)
N	144	156	403	403
Adj. R^2	0.66	0.65	0.59	0.54

Notes: The table provides the results for the multivariate regression based on within-firm and within-bank differences in bank ESG and borrower ESG, respectively. Column (1) comprises borrowers with low ESG performance that borrower from both high and low ESG banks. Column (2) comprises high ESG borrowers that borrower from both high and low ESG banks. Column (3) shows the results for the sample of low ESG banks that lend to both high and low ESG borrowers. Finally, column (4) shows the results for the sample of high ESG banks that lend to both high and low ESG borrowers.

sustainability performance of borrowers, while Borrower ESG decile 10 includes borrowers with the top 10% of sustainability performance. Eyeballing the table reveals that borrowers in the most sustainable decile receive the lowest loan spreads. However, the difference in loan spreads is more pronounced for the sample of high ESG banks. Our findings seem to be driven by the earlier deciles of borrowers, indicating that particularly when borrowers are considered less sustainable, the difference in spreads depending on the type of bank is large.

Finally, we repeat the multivariate regression on the sample of banks and borrowers that lend to both high and low ESG borrowers and borrow from banks with high and low ESG performance, respectively. The results are shown in table 3.13. Column (1) incorporates the sample of borrowers with low ESG performance that borrow from banks with different levels of ESG performance. We document a spread difference of 67.57 bps. Column (2) shows the results for the sample of borrowers with high ESG performance which also borrow from banks with different levels of ESG performance. In accordance with our expectations, we do not find differences in loan spreads depending on bank ESG performance. In columns (3) and (4) the results are shown for the bank samples, where column (3) comprises banks with low ESG performance and column (4) banks with high ESG performance. We find that also within the sample of banks that lend to different types of borrowers, the result only holds for banks with high ESG performance and borrowers with low ESG performance. This setting allows us to ensure a robust documentation of the findings by reducing any effects of correlated omitted variables.

3.5.6 Time effects

To attain a deeper understanding of the relationship between borrower sustainability and loan spreads, we take into account time dynamics. The financial crisis in 2008 resulted not only in immediate economic and social consequences, but also in a severe disruption of trust in the financial system. From ordinary citizens, who stored their entire life savings at banks, to governments and regulators, everyone was devastated by the suddenly crystallized fragility of the financial system. Banks in particular came under the intense scrutiny of the media, regulators, and ordinary citizens and were often blamed for unethical and careless decisions, such as lending and re-securitizing opaque sub prime mortgages. This resulted in great pressure on banks to improve their practices and hence, we expect sustainability to be a more prominent topic for banks in the wake of the crisis than prior to it. To mention some examples of shifts towards sustainability, Bank of America began regularly publishing CSR reports from 2011 onwards, Barclays updated their sustainability reporting in 2013 from a more simple version that existed since 1998, and Wells Fargo developed a new CSR strategy in 2009 and started publishing regular reports from 2011

onwards. As our sample runs from 2002 to 2015, we are able to examine how the pricing of sustainability developed over time. We hypothesize that the pricing of borrower sustainability into loan spreads increases over this time frame, with the increase in public monitoring and improvement in data availability.

To examine this empirically, we employ an interaction term between year and borrower ESG in our basic regression of borrower ESG on loan spreads. The results are presented in Table 3.14. Columns (1) to (4) depict the interaction effects for the full sample using year interactions with borrower ESG performance. The coefficient estimates indicate that with progression of time, borrower ESG performance has a stronger relationship with loan spreads.

For columns (5) to (8), we construct a dummy variable that equals 0 for the years 2002 to 2008 and it equals 1 for the years 2009 to 2015. This provides a broader measurement of the time dynamics by splitting the sample around the crisis. The interaction term of this dummy variable with borrower ESG measures reveals that the pricing of borrower sustainability is stronger after the crisis, consistent with our expectation that the importance of borrower sustainability for banks increased after the crisis.

To further understand the dynamics, we run the sample split regression between banks with high and low sustainability performance for two separate time period subsamples. The results are presented in table 3.15. Panel A includes observations in the years 2002 to 2008 and Panel B includes the years 2009 to 2015. The results show that the effect that banks consider ESG performance more for borrowers with high sustainability performance is driven by the later period of 2009 to 2015. This supports our previous findings that borrower sustainability is integrated into the setting of loan prices by banks with high sustainability performance. However, it also shows that this is a rather recent phenomenon, in line with our hypothesis that increased scrutiny and pressure on banks has resulted in an increase in awareness.

We hypothesize that banks with higher ESG performance are exposed to greater ESG reputation risk, particularly after the crisis. A more careful consideration of lending practices may help to reduce any spillover effects that may arise from borrowers with ESG issues. Reputation is measured using RepRisk data, the world's largest due diligence database on ESG and business conduct risks, which takes into account ESG and business conduct risks related to clients, investments, and business relationships. It captures ESG and business conduct data that can have reputational, compliance, and financial impacts on the bank. As a second measure of reputation, we consider the correlation between bank and borrower ESG performance. A higher

TABLE 3.14: Time effects

	Year interactions				Post crisis interactions			
Dep. Spread	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Time × ESG	-15.52*** (4.31)				-129.25*** (4.20)			
Time × ENV		-10.54*** (3.99)				-93.59*** (4.20)		
Time × SOC			-10.57*** (4.02)				-94.08*** (4.01)	
Time × GOV				-16.42*** (3.94)				-116.54*** (3.18)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,226	1,226	1,226	1,226	1,226	1,226	1,226	1,226
Adj. R^2	0.51	0.51	0.51	0.51	0.58	0.57	0.57	0.57

Notes: The table shows the interaction borrower ESG performance with time. Columns (1) to (4) depict time measured as years, while columns (5) to (8) employ a dummy variable that equals one when the year is 2009 or above, it is zero otherwise. All control variable are included from the previous multivariate regression models, including loan and firm controls, fixed effects, and the main effects of the interactions. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

correlation between the ESG of banks with their respective borrowers over time can be viewed as a reputation risk, as it may be indicative of a relationship between borrower ESG and bank ESG. We note that we are not able to claim causality between ESG performance of banks and borrowers by analyzing these simple correlations, however the data does give interesting insights into the relationship. The results are presented in Table 3.16. We balance the samples to ensure that both samples include the same banks. In untabulated tests we conduct the same tests with the unbalanced sample and find similar results. Table 3.16 Panel A reveals the results using the RepRisk measure for reputation risk. We find that banks with high ESG performance had a lower reputation risk than banks with low ESG performance in the pre-2009 period. After 2008, the reputation risk for banks with high ESG performance increased, even exceeding that of banks with low ESG performance. In Panel B, we use an alternative measure for reputation risk. We capture the correlation between bank and borrower ESG performance during the two subperiods. The correlation between the ESG performance of the banks and their respective borrowers indicates how closely they move with one another and hence can be seen as a risk. We note that this is an imperfect proxy in the sense that we cannot claim directional risk from the borrower to the bank. The results are in line with the RepRisk measure, indicating that reputation risk increased substantially for banks with high

TABLE 3.15: Split by bank sustainability performance and time

Panel A: Years 2002 to 2008

Dep. Spread	Bank ESG		Bank ENV		Bank SOC		Bank GOV	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)	Low (7)	High (8)
ESG	6.24 (0.30)	-30.53 (0.99)						
ENV			-7.33 (0.45)	-11.19 (0.41)				
SOC					11.77 (0.81)	-15.07 (0.75)		
GOV							1.84 (0.08)	-33.69* (1.67)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	463	358	455	366	390	431	417	404
Adjusted R^2	0.55	0.46	0.53	0.44	0.54	0.48	0.54	0.47

Panel B: Years 2009 to 2015

Dep. Spread	Bank ESG		Bank ENV		Bank SOC		Bank GOV	
	Low (1)	High (2)	Low (3)	High (4)	Low (5)	High (6)	Low (7)	High (8)
ESG	-95.12 (1.54)	-150.21*** (3.23)						
ENV			-12.83 (0.32)	-77.47** (2.42)				
SOC					13.76 (0.30)	-118.11** (2.60)		
GOV							-42.11 (0.75)	-137.99*** (2.64)
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Main effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	150	255	158	247	223	182	196	209
Adjusted R^2	0.63	0.66	0.68	0.65	0.62	0.68	0.70	0.54

Notes: The table shows the sample split regression for banks with strong sustainability performance ("High") and banks with weak sustainability performance ("Low"), split at the median and for two time periods. Panel A provides the results for the sample from years 2002 to 2008. Panel B shows the results for the years 2009 to 2015. All control variable are included from the previous multivariate regression models, including loan and firm controls, fixed effects, and the main effects of the interactions. Absolute values of the t-statistics are in parenthesis. Significance at the 10%, 5%, and 1% levels are indicated by *, **, ***, respectively.

TABLE 3.16: Reputation and bank ESG across time periods

<i>Panel A: RepRisk</i>				
Median split:	2002 to 2008	2009 to 2015	Diff.	t-stat
High bank ESG	31.18	48.14	-16.96	8.31
Low bank ESG	39.17	44.36	5.19	2.45
Diff.	-7.99	3.78		
t-statistic	4.88	2.13		
<i>Panel B: Correlation between bank and borrower ESG ($\times 100$)</i>				
Median split:	2002 to 2008	2009 to 2015		
High bank ESG	1.59	11.64		
p-value	0.76	0.06		
Low bank ESG	5.40	4.58		
p-value	0.25	0.58		

Notes: The table presents the results of the reputation risk during the years 2002 to 2008 and 2009 to 2015. In Panel A, the RepRisk measure is employed, while in Panel B we use the correlation between bank and borrower ESG to capture the risk. The t-statistic refers to the mean difference between the spread between the two time periods, and high and low bank ESG categories.

ESG performance during the crisis. In untabulated tests we find that banks with high sustainability performance have a lower correlation of loan pricing with the CDS market than banks with weaker performance and this holds particularly after the 2008 crisis.

3.6 Conclusion

This chapter reveals that although superior borrower sustainability performance reduces loan spreads, this only holds true when the corresponding banks exhibit high sustainability performance as well. Using sample splits, interaction effects, propensity score matching, as well as within-firm and within-bank identification methods we find that variation in loan spreads due to sustainability performance of borrowers is only found when banks have high sustainability performance. By disentangling the effects, we find that the difference in spreads is based on a premium for borrowers with low sustainability performance rather than a discount due to good sustainability performance. In other words, it appears that being more sustainability is not beneficial, but rather it is a necessity in order to achieve desirable loan spreads from banks that care about sustainability. We find that of the ESG dimensions, governance seems to be the predominantly important factor for banks, while environmental and social are of similar importance. The measurement and comparability

of governance has been established for a longer time than environmental and social sustainability and hence may be easier to integrate in the decision-making process. It is also likely to be of primary importance to banks due to the contractual nature of the relationship with the borrowing corporation. A borrower that has governance concerns and misaligned incentives may not ensure that capital flows are employed to the best usage for the bank, but rather to the benefit of stakeholders with stronger power, such as executives or directors.

The results indicate that the spread premium is not driven by credit risk due to several reasons. In our multivariate and propensity score setting we control to a large extent for variables associated with credit risk, such as credit rating, leverage, and tangibility, but also for borrower fixed effects. In the within-firm samples we find that the same borrower receives different rates from banks with different ESG performance, although their credit risk would not be impacted by the choice of lender. The third reason why we exclude credit risk as the determinant of the spread difference, is that we use CDS spreads to test whether banks with strong or weak sustainability performance are more aligned with the market-based pricing and find that CDS pricing is more closely aligned with banks with weak sustainability performance. Furthermore, our results do not indicate that the difference in loan spreads is driven by cultural similarity due to two reasons. First, not one of the results shows that banks with lower sustainability performance offer preferable loan rates to borrowers with lower sustainability performance. The effect solely holds for banks with strong sustainability performance. Second, the similarity argument would project a discount in loan rates for similar behavior, however we document a premium for dissimilarity rather than a discount for similarity. We discuss that the spread difference is likely to be driven by reputation risk: Banks that have high sustainability risk exposure are more careful to whom they lend as potentially the sustainability performance of borrowers with sustainability concerns may be projected on to them. We show that the relationship between borrower sustainability performance and loan rates is stronger in more recent years and in particular since the financial crisis 2008. In line with our expectation that the financial crisis increased reputation risk, scrutiny, and monitoring of banks, we document an increase in reputation risk for banks with high sustainability performance that coincides with the financial crisis. The findings in this chapter provide insightful evidence on how and why sustainability performance is reflected in loan spreads.

This chapter provides first insights into the role of sustainability in the relationship between banks and their borrowers and motivates further research into the area. Previous literature has so far focused on aggregate effects, regardless of lender sustainability, however these results indicate that the literature may benefit and improve causality inferences by disentangling these effects. We are the first to our knowledge to show that the relationship between sustainability and access to bank loan

capital is driven only by more sustainable banks, that the spread difference is based on a premium rather than a discount, and also add to the literature by using different approaches to gain an understanding of the causality behind these findings. We are careful to acknowledge the limitations of our study. First, the international representativeness of our results remains to be tested, as our study is based on U.S. data.¹⁰ Although we attempt to achieve a clean bank sustainability effect by considering only loans with one lead arranger, the question remains if and how other lenders within the syndicate and their sustainability performance may affect loan pricing.¹¹ Furthermore, we recognize that ESG data may be subject to measurement errors and validity concerns, as standardization and coverage or sustainability reporting is still being developed. However, our ESG data source Asset4 runs extensive quality controls to ensure high quality of the data. Their data is collected from public sources in one of the largest ESG content collection operations in the world and undergoes more than 400 built-in error checks. This is followed by about 300 further automated screeners that capture inconsistencies. Finally, the data undergoes independent audits and in-depths management checks. This provides us with sufficient confidence on the quality of the data for the purpose of this study. Another question that remains outstanding at this point is why borrowers with low sustainability performance borrow from banks with high sustainability in the first place, if they would be receiving better loan spreads from less sustainable banks. There can be several possible explanations, including availability of banks and learning, that need to be investigated into. A deeper analysis of bank characteristics may be useful for this purpose. We also believe that a thorough analysis of the individual ESG factors and how their components drive the results will be helpful to researchers and practitioners alike. Finally, the reputation risk premium can further be investigated into, to understand what the premium is based on, how sensitive bank reputation is to borrower shocks, and which factors mediate this relationship. Further examining the significant downside variation of borrower ESG scores may provide interesting insights. We acknowledge the aforementioned caveats and extended research questions and encourage future research to address these points.

¹⁰For example, Hoepner et al. (2016) find that country sustainability scores, in particular environmental sustainability, are associated with cost of debt. Their study implies that it is important to consider the setting in which the loan is made, similar to our findings in the previous chapter of this dissertation. Considering that this is a single-country study, we are in a sense controlling for differences in sustainability scores between countries. However, the findings of Hoepner et al. (2016) indicate that even within the United States there may be effects on the state level that could be influencing the results. We do not consider state-level sustainability in this study, but conclude that this would be an interesting extension to consider.

¹¹In untabulated analyses we use a cross-country sample with multiple lead arrangers and find similar results using weighted-average lead arranger sustainability scores. Due to the trade-off between bank sustainability score precision and international representativeness, we decided in favor of precision and to focus on loans with only one lead arranger, limiting our sample to the U.S. data.

Bank loans are the most important source of capital and yet to date we lack a clear understanding of the role of banks in whether and how they value the sustainability performance of their borrowers. This chapter is one of the first studies to attempt to provide clarity on this matter by taking into account both the bank and borrower side of the loan contract. This enables us to pinpoint under which circumstances sustainability performance is financially beneficial, provides evidence on the underlying mechanisms, and offers direction into relevant future research paths.

3.7 Appendix

TABLE 3.17: Variable definitions

Variable	Definition	Source
ESG criteria		
ESG score	The equally weighted rating of environmental, social and corporate governance performance.	Asset4
ENV score	The environmental pillar measures a company's impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value.	Asset4
SOC score	The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its license to operate, which are key factors in determining its ability to generate long term shareholder value.	Asset4
GOV score	The corporate governance pillar measures a company's systems and processes, which ensure that its board members and executives act in the best interests of its long term shareholders. It reflects a company's capacity, through its use of best management practices, to direct and control its rights and responsibilities through the creation of incentives, as well as checks and balances in order to generate long term shareholder value.	Asset4
Borrower characteristics		
Firm size	The natural logarithm of total assets, where assets are measured in million Euros.	Orbis
EBIT	Earnings before interest and taxes.	Orbis
MTB (ratio)	Market to book value.	Orbis
Leverage (ratio)	Debt to total assets ratio.	Orbis
Pricevol	Stock price volatility.	Orbis
Tangibility (ratio)	The natural logarithm of net tangible assets to total assets.	Orbis
Rating (indicator)	Firm's long-term senior debt rating.	DealScan
Loan characteristics		
Spread	Spread over the LIBOR, including any fees.	DealScan
Secured (indicator)	Indicator = 1 if the loan type is secured, 0 otherwise.	DealScan
Numlenders	Number of lending banks in the syndicate.	DealScan
Maturity	Natural log of the maturity of the loan facility in months.	DealScan
Loansize	The firm's tranche size measured as the natural logarithm in thousand Euros.	DealScan
Perf. pricing (indicator)	Indicator = 1 if performance pricing, 0 otherwise.	DealScan
Covenants (indicator)	Indicator = 1 if covenants attached to loan, 0 otherwise.	DealScan
Loan type	Indicators that capture the type of loan e.g. term loan, revolver, other.	DealScan
Loan purpose	Indicators that capture the purpose of the loan.	DealScan

Notes: The table provides variable definitions of the key variables. All variables are recorded at time t , where t ranges from 2002 to 2015. Further information on the variables can be found from the respective data sources.

TABLE 3.18: Bank borrower matching

Variables	N	Mean spread	Std. Dev.	Difference	t-value
Total assets	331	15,200,000.00	38,700,000.00	686,403.90	0.21
	282	14,500,000.00	42,900,000.00		
EBIT	331	0.18	0.18	0.02	0.91
	282	0.16	0.26		
MTB	331	3.61	5.67	1.09	1.42
	282	2.53	12.49		
Leverage	331	28.70	18.59	2.08	1.40
	282	26.62	18.18		
Pricevol	331	27.91	7.86	-2.87	-4.25
	282	30.78	8.87		
Tangibility	331	0.39	0.21	-0.00	-0.12
	282	0.39	0.21		

Notes: The table shows the mean difference in borrower characteristics for borrowers with below median ESG scores that borrower from low vs. high ESG banks, respectively. The number of observations is not balanced, as we do not re-split the sample into different sets of bank ESG scores after excluding high sustainability borrowers. Instead, we use the former classification based on the entire sample, such that any differences in these subsamples remain evident. The unbalanced sample further indicates that borrowers with lower sustainability performance have slightly more loans with low-sustainability banks rather than high sustainability banks as we expected.

Chapter 4

Stock Price Synchronicity and Material Sustainability Information¹

4.1 Abstract

We examine if, and under what conditions, disclosure of sustainability information identified as investor relevant by market-driven innovations in accounting standard-setting, is associated with stock prices reflecting more firm-specific information and thereby lower synchronicity with market and industry returns. We find that firms voluntarily disclosing more sustainability information, identified as material by the Sustainability Accounting Standards Board (SASB), have lower stock price synchronicity. Our result is robust to including controls for analysts, insider trading, institutional ownership, earnings quality, other voluntary disclosure activity and specifications that examine changes in disclosure practices. This result is stronger for firms with higher exposure to sustainability issues, institutional and socially responsible investment fund ownership and coverage from analysts with lower portfolio complexity. Moreover, we find intra-industry information transfers to firms with low sustainability disclosure within industries with high sustainability disclosure.

4.2 Introduction

The number of companies disclosing and investors using sustainability information has grown rapidly in the past few years. While only a few companies disclosed

¹This chapter is based on a working paper co-authored with Jody Grewal and George Serafeim. Jody Grewal is a doctoral candidate at Harvard Business School. George Serafeim is the Jakurski Family Associate Professor of Business Administration at Harvard Business School.

such information in the early 2000s, it has now become common practice for companies to communicate the relevance of such information for their business strategy and operations. However, in the United States, but also internationally, such disclosures are not yet guided by a set of accounting standards that define investor relevant disclosure requirements. This stands in contrast to financial reporting, which is largely driven by requirements set in financial accounting standards. The formation of financial accounting standards is considered an important element of the development of capital markets and the efficient allocation of capital in an economy (Levitt, 1998; Healy and Palepu, 2001) and a long line of research examines the effect of standards on economic outcomes (see for example Barth, Landsman, and Lang (2008), Naughton, Petacchi, and Weber (2015), and Bratten, Choudhary, and Schipper (2013)).

Recent survey findings suggest that a large number of market participants consider the development of standards to account for firms' environmental and social inputs and outcomes, such as energy and water consumption, employee and workplace practices, product safety, and access to affordable products for customers, is important, as these metrics constitute relevant information to understanding the risks and opportunities that an organization faces (Amel-Zadeh and Serafeim, 2017). As a result, standards have emerged that companies can voluntarily adopt to disclose investor relevant sustainability information. While it is early to judge the potential market adoption of the standards and the effects on markets and organizations, publicly listed companies, such as JetBlue, NRG Energy and Kilroy Realty, have decided to adopt the standards thereby generating a need for systematic research on the characteristics of the information identified in the standards.

To exploit this opportunity, we examine whether firms that voluntarily disclosed sustainability information that is later identified in the standards as investor relevant, exhibited lower stock price synchronicity, consistent with voluntary disclosure of sustainability information enabling the incorporation of firm-specific information in stock prices. In other words, we examine whether the disclosure of material sustainability information is capitalized into stock prices, as measured by stock price synchronicity. Stock price synchronicity captures firm-specific information, as it reflects the variation in returns that is unexplained by either the market or industry returns and is hence considered to be specific to the respective firm. This allows us to evaluate not only the value of sustainability disclosure in general, but also the value relevance of the current voluntary accounting standards.

Our research setting is the accounting standards developed by the Sustainability Accounting Standards Board (SASB). SASB adopts an investor viewpoint and has identified sustainability metrics that are likely to be of relevance to investors. Large asset managers, such as BlackRock, Capital Group, and State Street, participate in

the investor advisory group of SASB, while the board of directors comprise a group of individuals with deep accounting and capital markets expertise, including former accounting standards setters from the Financial Accounting Standards Board (FASB) and SEC commissioners. According to SASB, specific sustainability issues are more or less investment relevant depending on a company's industry and, as a result, accounting standards are industry-specific. To construct a measure of material sustainability disclosure for each firm, we create a disclosure score using Bloomberg data items that have been mapped to the SASB issues for each industry. Therefore, the data items that comprise the disclosure score are industry-specific and each firm scores according to its disclosure practices in relation to metrics deemed financially material for that industry.

Our measure of firm-specific information in stock prices is the measure of stock price synchronicity that has been extensively used in prior research (Wurgler, 2000; Durnev, Morck, and Yeung, 2004; Piotroski and Roulstone, 2004; Crawford, Roulstone, and So, 2012). It is based on a regression of market and industry returns on firm-specific stock returns. The explanatory power of the market and industry returns, as measured by the R^2 of this regression, is inversed to capture the variation in firm stock returns that is not explained by either market or industry returns and is hence considered reflective of firm-specific information. Using sustainability data between 2007 and 2014 for a sample of 1,333 US-listed companies, we find a negative and significant association between our measure of material sustainability information and stock price synchronicity. This association is not mediated when we control for whether the firm issues a sustainability report. In addition, we find that the association between synchronicity and the presence of a sustainability report is insignificant. In additional analyses, we document that sustainability disclosures not identified by the standards and compliance with sustainability disclosure standards that do not cater to investors are also not correlated with stock price synchronicity. Moreover, we find that our results are robust to controlling for a number of proxies for voluntary disclosure through management forecasts and conference calls, as well as earnings quality metrics. Furthermore, we examine changes in material sustainability disclosure and we show that increases (decreases) in disclosure are followed by decreases (increases) in synchronicity. The changes specification mitigates concerns that unobservable firm-specific variables might cause the relation of interest.

We find that the documented association between material sustainability information and stock price synchronicity is moderated by several variables. These moderating effects provide new insights into the firm and capital market characteristics that enable the incorporation of sustainability information in stock prices, while increasing our confidence that the sustainability information rather than a correlated omitted variable drives the association with stock price synchronicity. Moreover, these results increase our confidence that in our setting, the measure of stock price

synchronicity reflects the incorporation of firm-specific news rather than noise in stock prices (Li, Rajgopal, and Venkatachalam, 2014). Two key sets of variables are included as moderators: firm characteristics and capital market participant characteristics.

On the firm side, we expect the negative relation between stock price synchronicity and material sustainability information to be stronger for firms for which sustainability issues are more important. We construct two proxies for the importance of sustainability issues. The first is a measure of a company's exposure to sustainability issues using data from Morgan Stanley Capital International (MSCI). While SASB defines sustainability issues that are material at the industry level, different companies within the same industry have varying degrees of exposure to the same issues. For example, an apparel company with a long supply chain in Bangladesh is more exposed to human rights issues compared to an apparel company with a supply chain in Canada. Similarly, a real estate company with properties in Miami Beach is more exposed to climate change and rising sea levels compared to a real estate company with properties in a non-coastal US city. The second proxy is a measure from Thomson Reuters ASSET4 of the integration of sustainability issues in a company's business strategy and operations. For example, while a consumer goods company might have made access to healthier products core to its business, transitioning their product portfolio away from unhealthy options and creating a strong brand around this issue, another consumer goods company might have introduced additional options for consumers while keeping a balanced portfolio. The former company develops a strong identification of the entire company and brand with the focal sustainability issues, while the latter does not. We find that both variables significantly moderate the association between material sustainability information and stock price synchronicity.

On the capital markets side, we expect that investors with higher information processing capabilities will be more effective at incorporating material sustainability information in stock prices. Our first measure is the percentage of institutional investors holding the outstanding shares of each company, as institutional investors are more likely to be able to process the valuation implications of new types of information, such as sustainability information, compared to retail investors. The second proxy is the percentage of shares outstanding held by funds labeled as socially responsible. While these funds are not the only funds using sustainability information, their long history of using the information might increase their processing ability. We find that both measures significantly moderate the association between material sustainability information and stock price synchronicity. Finally, we document that firms covered by analysts with higher portfolio complexity (i.e. analysts that cover more firms) have a weaker association between material sustainability information and stock price synchronicity. This is consistent with analysts that have

higher processing costs, due to a higher workload, being less capable of processing sustainability information.

We also examine the presence of intra-industry information transfers (see Foster (1981) and Gleason, Jenkins, and Johnson (2008)) in the context of sustainability information. If information transfers exist, we expect that stock returns of firms that disclose little information about their sustainability issues will exhibit higher co-movements with industry returns, if they belong to an industry where companies' disclosure levels are high. In contrast, we expect no effect on co-movements with industry returns for firms that disclose little information but belong to industries where on average companies' disclosure levels are low. We measure the level of industry information in stock returns as the difference between the explanatory power of market and industry returns versus only market returns, following Piotroski and Roulstone (2004). The higher this difference, the more a firm's stock returns contain industry-level information. We find strong evidence that, within the whole sample, firms with low material sustainability disclosure exhibit high industry-level synchronicity, and that this result is driven only by firms in industries with rich information environments (i.e. the average material sustainability disclosure scores within the industry are above the average material sustainability disclosure scores across industries).

We conduct a series of robustness tests to assess the validity of our results, such as assessing the association between sustainability disclosures which have not been identified by the accounting standards as material and synchronicity. In addition, we control for earnings quality and other voluntary disclosure proxies. Moreover, following the recommendations of Li, Rajgopal, and Venkatachalam (2014), we conduct additional analyses to examine whether the association with stock price synchronicity is indicative of news or noise in stock prices. Li, Rajgopal, and Venkatachalam (2014) recommend controlling for beta in regressions that use stock price synchronicity as the dependent variable to assess whether the documented relation changes sign or disappears. In our case, we find that there is still a negative and significant association when controlling for both market and industry beta, suggesting that the association between sustainability disclosures and both synchronicity and idiosyncratic volatility yields consistent results.

This study contributes to four different streams of literature. First, an emerging literature examines the development of accounting standards for disclosure of sustainability information (Khan, Serafeim, and Yoon, 2016). We build on this line of work to examine how firm disclosures around material sustainability issues are associated with firm-specific information being reflected in market prices. In contrast to Khan, Serafeim, and Yoon (2016), we examine variation in firms' disclosure practices rather

than ratings of firms' sustainability performance as our independent variable of interest.² Disclosure and ratings of performance are different theoretical constructs, as data providers interpret a wide array of information to evaluate a company's performance, but are also empirically distinct, as evidenced by their low (albeit positive) correlation.³ In addition, Khan, Serafeim, and Yoon (2016) focus on implications for future market and accounting returns, whereas we focus on implications for the level of firm, industry and market information in stock prices. Our results suggest that firms with higher material sustainability disclosures have stock returns that exhibit lower co-movement with market and industry returns, consistent with stock prices moving more because of firm-specific information.

Moreover, we motivate and empirically examine the conditions under which material sustainability disclosures are most effective in the price discovery process. We document that the association between return synchronicity and material sustainability disclosure is a function of a company's competitive positioning and strategy as well as its ownership base, building on a literature that examines the role of strategy and ownership base on the association between voluntary disclosure and capital market outcomes (Healy and Palepu, 2001; Bushee and Miller, 2012). Relatedly, we contribute to a literature that documents the influence of sustainability disclosures and ratings on analyst recommendations (Ioannou and Serafeim, 2015) and forecasts (Dhaliwal et al., 2012). We find that portfolio complexity moderates the relation between sustainability information and synchronicity, highlighting the role of sell-side analysts in intermediating the price discovery process.

This chapter also contributes to a literature that seeks to understand innovations in accounting practices because of standards developed by market forces rather than regulatory forces (Allee and Yohn, 2009; Serafeim, 2011). Our results build on this literature and suggest that market forces, in our case a focal NGO with the participation of companies, investors and information intermediaries, could develop accounting standards that reflect investor relevant firm-specific information, complementing the regulatory process through which financial accounting standards have been developed.

²Khan et al. (2016) measure sustainability *outcomes* such as environmental performance (e.g. level and intensity of greenhouse gas emissions), social performance (e.g. employee satisfaction and human rights scandals) and governance performance (e.g. corruption charges), whereas we measure the level of sustainability *disclosure* (e.g. transparency around emissions, employment practices, human rights policies, and anti-corruption metrics).

³The correlation between our disclosure score and the performance rating used in Khan et al. (2016) is approximately 0.1. Moreover, controlling for their rating in our models does not change any of our inferences. We note that Grewal, Riedl and Serafeim (2017) also document low, positive correlations between sustainability disclosure and performance (i.e., 0.13). One explanation for these low correlations is that disclosure represents a mixed signal about the performance of the company where for some companies it represents a signal of good performance while for other companies it represents a signal of concerns in the organizational processes and products (Grewal and Serafeim, 2017).

Finally, this chapter makes a contribution to a literature on intra-industry information transfers of regulated financial information. In contrast to the prior literature that examines intra-industry information transfers whereby an idiosyncratic event that affects the short-window stock price of one firm also affects the contemporaneous short-window stock price of another firm in the same industry (Foster, 1981; Gleason, Jenkins, and Johnson, 2008) or that documents cross-firm stock return predictability as a function of accounting quality (Chen et al., 2016), we document significantly higher industry-level synchronicity for firms that exhibit low levels of sustainability information disclosure but that are members of industries with relatively high levels of sustainability information disclosure.

The remainder of the chapter proceeds as follows. Chapter 4.3 discusses the motivation for this study and provides a literature review. Chapter 4.4 presents the data and sample for the study. Chapter 4.5 discusses the results of the analysis. Chapter 4.6 concludes with a discussion of caveats to our results and opportunities for future research.

4.3 Motivation and Literature Review

Reporting of sustainability information increased exponentially over the past two decades. The number of companies measuring and reporting environmental (i.e. carbon emissions, water consumption, waste generation, etc.), social (i.e. employee, product, customer related, etc.), and governance (i.e. political lobbying, anticorruption, board diversity, etc.) data, collectively ESG data, grew significantly.⁴ While fewer than 20 companies disclosed ESG data in the early 1990s, the number of companies issuing sustainability or integrated reports had increased to nearly 9,000 by 2016.

Investor interest in ESG data also grew rapidly. Signatories to the UN Principles for Responsible Investment (PRI), launched in 2006, commit to incorporating ESG issues into their investment analysis and ownership policies and practices. As of 2016, the principles had about 1,400 signatories with total assets under management of about \$60 trillion.⁵ As a further sign of the institutionalization of ESG data, Bloomberg terminals integrated ESG data in 2010, dramatically increasing the diffusion of ESG information. As of 2016, more than 100 rating agencies provided ESG data, including large data providers such as Thomson Reuters and MSCI.

⁴We use 'ESG' and 'sustainability' interchangeably, and we use 'material sustainability' in reference to SASB's classification of investor-relevant sustainability issues.

⁵United Nations Principles for Responsible Investment, www.unpri.org/signatories.

With this increasing investor interest in ESG data, researchers began exploring its decision usefulness from an investment perspective (Dhaliwal et al., 2012; Cheng, Ioannou, and Serafeim, 2014; Grewal, Riedl, and Serafeim, 2017).⁶ Although an increasing number of investors have committed to incorporate ESG data in their investment decisions, investors view the lack of reporting standards for material sustainability information as the major impediment for using the data (Amel-Zadeh and Serafeim, 2017). According to a recent study that surveyed senior investment professionals from organizations representing 43% of institutional assets under management, the lack of reporting standards for material sustainability information leads to a lack of comparability of reported information across firms and time, increases costs of gathering and analyzing sustainability information, and increases the probability of general and boilerplate disclosures (Amel-Zadeh and Serafeim, 2017). All these factors limit investors' ability to use ESG information in investment decisions.

To fill this reporting void, SASB has developed industry-specific reporting standards for financially material sustainability information. SASB uses the SEC definition of materiality as interpreted by the U.S. Supreme Court.⁷ The Public Company Accounting Oversight Board (PCAOB) also refers to the U.S. Supreme Court interpretation of securities laws in its materiality guidance, which defines material information as presenting a substantial likelihood that the disclosure of the omitted fact would have been viewed by the reasonable investor as having significantly altered the total mix of information made available. Like the PCAOB, SASB defines material information as information that represents a substantial likelihood that its disclosure will be viewed by the reasonable investor as significantly altering the total mix of information made available.

Despite the objectives of SASB's reporting standards, we lack evidence about whether the standards indeed provide investors with useful, firm-specific information, and whether investors integrate this information into their valuation of firms that disclose even prior to the development of the standards. Analogous to studies that examine how new accounting standards affect capital market outcomes (e.g. Beatty, Chamberlain, and Magliolo (1996), Cornett, Rezaee, and Tehranian (1996), and Dechow, Hutton, and Sloan (1996)) as well as studies examining the value relevance of specific accounting line items over time (e.g. Collins, Maydew, and Weiss (1997),

⁶These studies document that voluntary disclosure of ESG leads to a reduction in the firm's cost of capital, while attracting dedicated institutional investors and analyst coverage (Dhaliwal et al. 2011); that firms with better ESG performance face significantly lower capital constraints (Cheng et al. 2014); and that stock price reactions to mandated ESG disclosure regulation vary predictably based on ex-ante ESG performance (Grewal et al. 2017).

⁷*TSC Industries v. Northway, Inc.*, 426 U.S. 438, 449 (1976). See also *Basic, Inc. v. Levinson*, 485 U.S. 224 (1988).

Francis and Schipper (1999), and Barth, Li, and McClure (2017)) we evaluate market-driven innovations in sustainability reporting, due to their possible influence on voluntary disclosure practices and standard setters. Specifically, there may be widespread market adoption of SASB across firms and, if the SEC were to mandate sustainability reporting, it could prescribe SASB standards. Moreover, prior research has documented the influence of political and professional characteristics of standard setters on accounting standards (e.g. Allen and Ramanna (2013) and Ramanna (2008)). Given the lengthy, negotiated and multi-stakeholder process that SASB standards evolved from – including the input and involvement of hundreds of companies – evaluating SASB standards is critical given the uncertainty surrounding whether SASB achieved its objective of developing metrics that provide value-relevant firm-specific information, as opposed to being influenced by the objective functions of participants in the standard-setting process.

We view the inquiry in this chapter as a step towards understanding whether SASB standards could mitigate the impediments to the use of sustainability data in investment decisions. In other words, if SASB standards do not capture value-relevant, firm-specific information that is incorporated in stock prices, it is unlikely that the standards will have a significant effect on the use of sustainability information by investors. This is because even if SASB standards increase comparability, timeliness and specificity of the disclosed sustainability information in the future, this information will still lack relevance. In other words, in a principal-agent setting in which information asymmetries persist, the information that is material can potentially reduce uncertainty and improve market efficiency, as market participants are better able to integrate this information into their decisions as reflected in a decrease in synchronicity. Moreover, our tests allow us to assess whether capital markets incorporate this information before the development and release of standards that could raise the comparability, timeliness and specificity of information. Therefore, our results could provide a baseline for evaluating the effect of these standards on future disclosure and capital market outcomes.

4.4 Data and Sample

4.4.1 Materiality Data

Our data collection is driven by the availability of materiality guidance from SASB, which is an independent 501(c)3 non-profit whose mission is to develop and disseminate sustainability accounting standards that help publicly-listed corporations disclose material factors in compliance with SEC requirements. SASB standards are

designed for the disclosure of material sustainability issues in mandatory SEC filings, such as the Form 10-K and 20-F. SASB is accredited to establish sustainability accounting standards by the American National Standards Institute (ANSI), and such accreditation is intended to signify that SASB's procedures to develop sustainability accounting standards meet the Institute's requirements for openness, balance, consensus, and due process. SASB's board comprises a mix of regulators, academics, lawyers, and investors, including two former Chairwomen of the SEC and a former Chairman of the FASB.

SASB adopts an investor viewpoint and, as a result, a topic might be classified as immaterial from an investor standpoint although such a topic could be important for other stakeholders. The investor focus of SASB is different from that of other organizations such as the Global Reporting Initiative (GRI), which has a multi-stakeholder focus. In a joint op-ed, the Chief Executives of GRI and SASB explained how the two are complements rather than substitutes. They suggest that "rather than being in competition, GRI and SASB are designed to fulfill different purposes for different audiences... The GRI standards are designed to provide information to a wide variety of stakeholders and consequently, include a very broad array of topics. SASB's are designed to provide information to investors and consequently, focus on the subset of sustainability issues that are financially material."⁸

SASB's standards are developed via a multi-stakeholder process consisting of research supported by Bloomberg technology, data and analytical tools; balanced, multi-stakeholder industry working groups; a public comment period; and review by an independent Standards Council comprised of experts in standards development, securities law, environmental law, metrics and accounting.⁹ SASB convenes industry working groups—consisting of 1/3 corporations, 1/3 market participants, and 1/3 other stakeholders—to provide feedback on SASB's draft sustainability accounting standards. More than 3,000 experts representing more than \$30 trillion in assets under management and \$15 trillion in company market capitalization participated in SASB's industry working groups between 2013 and 2016. Importantly, although the standards include a crowd-sourcing of industry expert opinions, a scanning of regulated filings for mentions of different sustainability issues and documentation of cases of impacts on revenues, costs, assets and liabilities, the standard setting process involves no large scale quantitative analysis. Thereby, there is a need for examining the characteristics of these standards and their association with market outcomes.

⁸<https://www.greenbiz.com/article/how-approach-corporate-sustainability-reporting-2017>

⁹See www.sasb.org

4.4.2 Sustainability Data

We retrieve data on sustainability disclosure practices from the Bloomberg database. Bloomberg is the leading source of corporate and financial data on public companies. Bloomberg tracks more than 300 different metrics, covering all aspects of ESG, from political donations to number of environmental spills.¹⁰ Bloomberg has recently integrated a transparent mapping of its ESG disclosure metrics to SASB reporting standards. Given that SASB standards differ across industries, we manually collected for each industry all Bloomberg ESG data items that were mapped to SASB topics. We then constructed disclosure scores by taking into account these industry-specific Bloomberg ESG data items.¹¹

We compute the SASB material sustainability disclosure score for each firm-year combination (MaterialDisc) as the ratio of number of disclosed SASB ESG metrics to total number of metrics mandated by SASB and available in Bloomberg. We note that not all of SASB's metrics have corresponding Bloomberg ESG metrics. For example, in the Automobiles industry, SASB has proposed "Average recyclability of vehicles sold, by weight" as a material sustainability metric, but Bloomberg does not collect data pertaining to this metric. Data coverage is different for different industries. This is by construction, as SASB standards are industry specific. For the different sectors, we document on average SASB data coverage of 80% for Renewables, 78% for Non-Renewables, 75% for Transportation, 61% for Consumption, 61% for Resource Transformation, 54% for Technology & Communications, 52% for Services, and 45% for Health Care. While incomplete coverage could create noise in our estimates thereby biasing them towards zero, it is not clear that it will introduce bias in a positive or negative direction.¹² Our estimates are within a SIC6 industry and therefore differential data coverage across SIC6 industries should not affect our results. Moreover, it is unlikely that firms are disclosing a significant amount of SASB metrics that are not available in Bloomberg. Per our discussion with an ESG analyst at Bloomberg, the reason why Bloomberg does not collect data points for all of SASB's metrics is because some SASB metrics constitute innovations in sustainability reporting and are not yet being disclosed by firms. Therefore, we view the relative scores of each company within its industry as a fairly accurate rating of its

¹⁰See Framework, Behind the Terminal: Understanding the Bloomberg ESG Numbers, www.framework-llc.com/wp-content/uploads/2016/01/Bloomberg-ESG-Infographic.pdf.

¹¹A concern when measuring disclosure levels is that not all disclosures are applicable to all firms (e.g. only if a firm chooses to have operating leases does it need to disclose future cash payments relating to those leases). A nice feature of our setting, however, is that SASB has identified sustainability topics that are relevant across all firms in a given industry; as a result, our measure reflects disclosure levels across these relevant topics and is comparable across firms.

¹²We replicate all our analyses excluding industries where Bloomberg has data for fewer than 60% of the SASB issues and we find similar results.

disclosure practices.¹³ We observe that the SASB metrics not covered by Bloomberg are more granular – but very similar in scope – as other SASB metrics that are covered by Bloomberg. For example, in Oil & Gas, “Gross global Scope 1 emissions” is a SASB metric covered by Bloomberg, while “Global Scope 1 emissions from (1) combustion, (2) flared hydrocarbons, (3) process emissions, (4) directly vented releases, and (4) fugitive emissions” is a SASB metric not covered by Bloomberg. Clearly, the second metric is much more detailed than the first, while they both relate to the same disclosure topic (greenhouse gas emissions) that is financially relevant in this industry.

In terms of ESG categories, we note that SASB focuses mostly on environmental and social factors, while governance plays only a minor role. Typically, of the three major categories, governance is very different from the former two, as it is more standardized and measurable, while at the same time there is an ongoing debate on what constitutes good governance, e.g. the appropriate structure of executive compensation. SASB includes governance factors that are related to business ethics and transparency, rather than traditional topics of board structure and compensation. This is more closely aligned with the environmental and social categories, such that we are not concerned that traditional corporate governance factors could be driving our results.

As SASB does not recommend weights for metrics within an industry, we adjust for double counting of metrics that fall into several topics. For example, within the SASB Sustainable Industry Classification System (SICS) industry “Containers and Packaging”, the metric “Human Rights Policy” belongs to two disclosure topics: “Security, Human Rights, and Rights of Indigenous Peoples” and “Community Relations”. For our total disclosure score, we only account for “Human Rights Policy” once. Our resulting sustainability disclosure ratio reflects material ESG disclosure according to SASB standards and can range from 0 to 100 percent.¹⁴

4.4.3 Measurement of Stock Return Synchronicity

A growing literature in both accounting and finance examines the relation between firm-specific variation in stock returns and several aspects of the firm’s information

¹³It could, however, be the case that only the SASB metrics available in Bloomberg are financially material, while the ones that are not available (and that firms do not disclose) are immaterial. This would mean that our inferences are not generalizable to all SASB disclosures.

¹⁴Bloomberg metrics in some cases are not the exact measure that SASB specifies in its standards but a proxy for that measure. We recalculate our measuring excluding all Bloomberg data items that are proxies. We find that this new disclosure metric is very highly correlated with our overall measure (0.88) and that all our results are similar to the ones we report in the chapter.

or governance environment (e.g. Wurgler (2000), Durnev, Morck, and Yeung (2004), Piotroski and Roulstone (2004), Ferreira, Ferreira, and Raposo (2011), and Crawford, Roulstone, and So (2012)). These studies proxy for the mix of firm-specific and industry- and market-wide information available about the firm using stock return synchronicity (measured as the R^2 value from a regression of firm returns on market and industry returns) where lower R^2 reflects stock prices with greater firm-specific information. Therefore, in this chapter, we assess whether firms that voluntarily disclose more information, as later prescribed by SASB standards, have lower stock price synchronicity.

We compute stock return synchronicity consistent with previous literature (Roll, 1988; Piotroski and Roulstone, 2004; Crawford, Roulstone, and So, 2012; Li, Rajgopal, and Venkatachalam, 2014). We collect daily firm stock returns, value-weighted industry returns, and market returns for our sample from CRSP. We winsorize the returns at the 1 and 99 level to remove potential outliers. Following Crawford, Roulstone, and So (2012) we require a minimum of 50 daily observations. We exclude firm-year combinations that have less than 12 trading days for each month, as in Li, Rajgopal, and Venkatachalam (2014). For each year, we then estimate firm-specific regressions using daily market and industry returns. In other words, our dependent variable is the daily firm return and the independent variables are the daily industry and market returns that are relevant for the respective firm. We extract the R^2 from each of these regressions to compute firm-year synchronicity, defined as follows:

$$Synchronicity_{i,t} = \log(R^2/1 - R^2)$$

A higher synchronicity value indicates a greater explanatory power of industry and market returns on firm returns. Conversely, lower synchronicity value reflects lower stock co-movements with industry and market, revealing a higher firm-specific information content of stock returns.

4.4.4 Sample Selection

We begin our data collection process by identifying firms included in the Bloomberg ESG coverage index from 2007 to 2014, which encompasses 9,064 firms. The Bloomberg ESG coverage index includes large and liquid stocks of interest to institutional investors and represents more than 90% of the total global market capitalization of all equity stocks. Table 4.1 shows how we arrive at our final sample of firm-year observations. As SASB standards use the SEC's definition of materiality and are tailored toward companies traded on U.S. exchanges, we exclude non-US listed firms, reducing our sample to 2,893 unique US firms.¹⁵ In addition, SASB has kindly provided us

¹⁵Some of the larger firms in our sample may also have international operations, however we do not expect this to greatly alter the relevance of their sustainability disclosures, unless

TABLE 4.1: Sample Selection

	Unique firms
Bloomberg ESG coverage	9,064
Less: Non-US listed firms	(6,171)
Less: Financial and utility companies	(563)
Less: Missing ESG disclosure data	(528)
Less: Missing required financial information	(469)
Total number of unique firms in sample	1,333
	Firm years
Unique firms × number of years	10,664
Less: Missing year-specific financial information	(257)
Total number of firm-year observations in sample	10,407

with a mapping between its proprietary Sustainable Industry Classifications System (SICS) and U.S. exchange-traded securities, allowing us to determine with precision which sustainability issues are material, per SASB, for each firm. Following prior literature in synchronicity, we remove financial institutions and utility companies from our sample, leaving us with 2,330 firms.¹⁶ We collect financial information for the remaining firms from Bloomberg. 528 firms are missing all required sustainability disclosure data and another 469 firms are missing all required financial information and information such as insider trading, leaving us with a final sample of 1,333 unique US companies. This translates into 10,664 firm-year observations over our time period of eight years. Required financial information for 257 firm-year observations is missing, resulting in our final sample comprising 10,407 observations. This sample represents about 56% of the market capitalization value of US firms and more than 80% of the market capitalization of US firms, excluding financial institutions and utilities, in Bloomberg's ESG coverage index.

The following two tables provide the frequency distributions of observations in our sample. In Table 4.2, we provide an overview of the distribution across years. All years have an approximately equal number of observations. In Table 4.3, we show the distribution across industries. Industry is defined according to SASB's Sustainable Industry Classification System (SICS), which categorizes companies not only based on their sources of revenue, as typically is the case, but also considers intangibles such as shared resource intensity, and sustainability risks and opportunities.¹⁷

the nature of the business changes dramatically through this. For example, an airline company that mainly operates in the US is still subject to the same sustainability factors, even if it extends some of its operations to Europe.

¹⁶We note that financial and utility companies are more heavily regulated than other industries. In addition, stock returns of financial institutions in our period of study are heavily influenced by the financial crisis.

¹⁷See www.sasb.org/sics

TABLE 4.2: Frequency Distribution Years

Year	Frequency	Percent
2007	1,267	12.17
2008	1,310	12.59
2009	1,312	12.61
2010	1,317	12.65
2011	1,326	12.74
2012	1,326	12.74
2013	1,324	12.72
2014	1,225	11.77
Total	10,407	100

Our sample covers 62 industries in 8 major SICs sectors: Health Care, Technology & Communications, Non-renewable Resources, Transportation, Services, Resource Transformation, Consumption, and Renewable Resources & Alternative Energy. The table reveals that our sample is not heavily tilted toward any specific industry, with the most frequently represented industry being “Industrial Machinery & Goods”, comprising 7% of the sample. Panel B also reports for each industry the number of data items from Bloomberg that are mapped to the SASB industry-specific standard and the percentage of SASB issues that have data coverage in Bloomberg. Given that the standards are industry specific and that we have differential data coverage across industries, we include industry fixed effects in all our specifications to account for those differences.¹⁸

4.5 Results

4.5.1 Summary Statistics

Table 4.4 shows the summary statistics for the variables we employ in this study. Our synchronicity measure has a mean of -0.52 and standard deviation of 1.15, comparable to Piotroski and Roulstone (2004). A negative average synchronicity measure is representative of the existing literature and reveals that on average firm-specific variation accounts for more than half of the variation in stock returns. We find that sustainability disclosure according to SASB standards (MaterialDisc) is on average

¹⁸We also included time-varying industry effects multiplying year and industry effects and all our results remain similar.

TABLE 4.3: Frequency Distribution Industry

Industry - Level 3	# obs.	%sample closure items	% SASB issues covered	# of dis- closure items	Industry - Level 3	# obs.	%sample closure items	% SASB issues covered	# of dis- closure items
Advertising & Marketing	48	0.46%	25%	11	Household & Personal Products	141	1.35%	20	55%
Aerospace & Defense	230	2.21%	44%	15	Industrial Machinery & Goods	771	7.41%	20	67%
Agricultural Products	80	0.77%	73%	59	Internet Media & Services	100	0.96%	25	40%
Air Freight & Logistics	78	0.75%	83%	42	Iron & Steel Producers	111	1.07%	46	100%
Airlines	62	0.60%	94%	31	Leisure Facilities	112	1.08%	9	67%
Alcoholic Beverages	32	0.31%	73%	38	Managed Care	100	0.96%	30	40%
Apparel, Accessories & Footwear	431	4.14%	70%	20	Marine Transportation	48	0.46%	32	71%
Appliance Manufacturing	39	0.37%	4	4	Meat, Poultry & Dairy	52	0.50%	54	71%
Auto Parts	132	1.27%	15	15	Media Production & Distribution	192	1.84%	12	27%
Automobiles	68	0.65%	17	17	Medical Equipment & Supplies	536	5.15%	36	50%
Biofuels	23	0.22%	28	28	Metals & Mining	119	1.14%	51	71%
Biotechnology	302	2.90%	31	31	Multiline Retailers	589	5.66%	23	64%
Building Products & Furnishings	164	1.58%	12	12	Non-Alcoholic Beverages	45	0.43	40	50%
Cable & Satellite	23	0.22%	25	25	Oil & Gas - Exploration & Prod	436	4.19%	54	55%
Car Rental & Leasing	16	0.15%	3	3	Oil & Gas - Midstream	56	0.54%	18	92%
Casinos & Gaming	72	0.69%	9	9	Oil & Gas - Refining & Marketing	82	0.79%	43	70%
Chemicals	375	3.60%	9	9	Oil & Gas - Services	299	2.87%	33	74%
Coal Operations	21	0.20%	46	46	Pharmaceuticals	266	2.56%	22	47%
Construction Materials	79	0.76%	51	51	Processed Foods	149	1.43%	48	60%
Containers & Packaging	135	1.30%	39	39	Professional Services	436	4.19%	20	70%
Cruise Lines	8	0.08%	33	33	Pulp & Paper Products	30	0.29%	33	100%
Drug & Convenience Stores	31	0.30%	16	16	Rail Transportation	40	0.38%	39	87%
E-Commerce	64	0.61%	32	32	Restaurants	197	1.89%	26	61%
Education	92	0.88%	14	14	Road Transportation	94	0.90%	36	92%
Electronic & Electronic Equipment	270	2.59%	16	16	Semiconductors	504	4.84%	31	61%
Electronic Manufacturing Services	63	0.61%	27	27	Software & IT Services	707	6.79%	41	55%
Food Retailers & Distributors	86	0.83%	28	28	Solar Energy	38	0.37%	46	90%
Fuel Cells & Industrial Batteries	31	0.30%	18	18	Telecommunications	218	2.09%	18	59%
Hardware	460	4.42%	17	17	Tobacco	46	0.44%	4	43%
Health Care Delivery	235	2.26%	13	13	Toys & Sporting Goods	39	0.37%	4	25%
Health Care Distributors	72	0.69%	14	14					
Hotels & Lodging	32	0.31%	26	26	Total	10,407	100%		

17.2% with a standard deviation of similar magnitude, indicating considerable variation in material sustainability disclosure scores in our data.

Following the literature, we account for potential correlated omitted factors with an array of control variables. Firm size is measured as the natural logarithm of market value of equity (MarketCap). GRI compliance is an indicator variable that equals one if the firm is following GRI reporting guidelines; it is zero otherwise (GRICompl). In our sample, approximately 8.3% of firms are GRI compliant. In a similar manner, we report that 18.3% of our sample provides a separate sustainability report (SustReport).¹⁹ We find that on average 76.8% of the shares are held by institutional investors (InstOwn) within our sample. Further, we account for analyst forecast revisions measured as the natural logarithm of number of forecast revisions (AnalystRev). Our measure is very similar to Piotroski and Roulstone (2004), who advocate the consideration of analyst revisions as relevant factors to the information environment and in particular synchronicity. Additionally, we use the price to book ratio (MTB), standard deviation of return on assets (StdDevROA), and insider trading (InsiderTrades), measured as the natural logarithm of the absolute value of net trading by insiders scaled by annual trading volume. Our summary statistics are all broadly in line with the existing literature, supporting the representativeness of our sample for the US market.

We also tabulate statistics for other variables that we later use in our analyses. We follow Dechow and Dichev (2002), using the residuals from estimating a model of working capital accruals on lagged, current and future cash flows to estimate poor earnings quality (PoorEQ). MgmtGuidance is the natural logarithm of one plus all guidance events during the year as measured by Capital IQ. ConferenceCalls is the natural logarithm of one plus all conference calls during the year as measured by Capital IQ. NumberCompanies is the average number of companies covered by all analysts that follow a focal firm in any given year. ESGExposure is a measure of a company's exposure to sustainability issues, obtained from MSCI Intangible Value Assessment (IVA) product, which identifies key ESG-driven risk and opportunity exposures relevant to a firm. It takes the value of one if the firm has above-median exposure to ESG issues. Integrated is a measure collected from Asset4, Thomson Reuters' principal product for sustainability information. It is an indicator variable that reflects whether sustainability issues are highly integrated in management discussions and reviewed in the annual report. MarketBeta and IndustryBeta are the estimated coefficients from the firm-specific regressions that we use to calculate synchronicity. As expected, MarketBeta is on average significantly lower than when

¹⁹Dhaliwal et al. (2011) use a sample of U.S. firms from 1993 to 2007 and document that 9.14% of their sample provides a separate sustainability report. Given our sample period of 2007 to 2014 and the significant increase in ESG interest during this period our percentage is higher.

TABLE 4.4: Summary Statistics

Variable	N	Mean	Std. Dev.	Q1	Median	Q3
Synchronicity	10,407	-0.52	1.15	-1.06	-0.44	0.14
MaterialDisc	10,407	0.17	0.18	0.00	0.13	0.27
ESGExposure	10,407	0.51	0.50	0.00	1.00	1.00
Integrated	10,407	0.40	0.24	0.00	0.00	1.00
SRIOwn (%)	10,407	0.12	0.47	0.00	0.01	0.70
NumberCompanies	9,371	16.47	3.32	14.64	16.49	18.40
MarketBeta	10,407	0.45	0.43	0.08	0.33	0.69
IndustryBeta	10,407	0.36	0.38	0.05	0.23	0.54
MarketCap	10,407	21.16	1.74	19.92	20.97	22.25
GRICompl	10,407	0.08	0.28	0.00	0.00	0.00
SustReport	10,407	0.18	0.39	0.00	0.00	0.00
InstOwn	10,407	0.77	0.25	0.66	0.83	0.94
AnalystRev	10,407	0.87	1.03	0.00	0.70	1.61
MTB	10,407	3.62	5.71	1.34	2.23	3.81
StdDevROA	10,407	0.06	0.08	0.01	0.03	0.04
InsiderTrades	10,407	0.11	0.28	0.01	0.02	0.10
PoorEQ	10,051	0.08	0.14	0.03	0.06	0.10
MgmtGuidance	4,493	1.50	0.87	1.10	1.61	2.20
ConferenceCalls	4,493	1.78	0.96	1.10	1.95	2.57

Notes: This table presents descriptive statistics. All variables are winsorized at the 1- and 99-percent levels, and defined in Appendix 4.14.

estimated in a market model setting that excludes industry returns.

Table 4.5 shows the univariate pairwise correlations between our variables. The highest correlation at 0.63 is between the GRI compliance and sustainability report indicator variables. This is expected, as firms that are GRI compliant also issue a sustainability report. We note that correlations between our synchronicity measure and the control variables are consistent with prior literature (e.g. Piotroski and Roulstone (2004), Crawford, Roulstone, and So (2012), and Peterson, Schmardebeck, and Wilks (2015)).

4.5.2 Material Sustainability Information and Stock Price Synchronicity

We examine the relevance of SASB accounting standards for sustainability disclosure using a multivariate regression model. We regress one-year ahead stock price synchronicity on material sustainability disclosure according to SASB standards and

TABLE 4.5: Correlations

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
(1) Synchronicity	1.00																			
(2) MaterialDisc	0.26	1.00																		
(3) ESGExposure	0.27	0.28	1.00																	
(4) Integrated	-0.07	-0.34	-0.18	1.00																
(5) SRIOwn	0.07	0.01	0.03	-0.04	1.00															
(6) NumCompanies	0.02	0.02	0.07	-0.14	0.04	1.00														
(7) FirmExperience	0.14	0.27	0.13	-0.24	-0.01	0.21	1.00													
(8) LowDisclosure	-0.24	-0.80	-0.24	0.25	-0.01	-0.03	-0.22	1.00												
(9) MarketBeta	-0.03	-0.17	-0.15	0.12	-0.01	-0.05	-0.10	0.14	1.00											
(10) IndustryBeta	0.23	0.08	0.21	-0.10	0.02	0.12	0.02	-0.06	-0.40	1.00										
(11) MarketCap	0.54	0.59	0.45	-0.41	0.04	0.08	0.31	-0.51	-0.30	0.28	1.00									
(12) GRICmpl	0.17	0.45	0.23	-0.23	0.01	0.02	0.21	-0.32	-0.10	0.10	0.42	1.00								
(13) SustReport	0.24	0.54	0.30	-0.30	0.02	0.02	0.26	-0.42	-0.11	0.10	0.54	0.63	1.00							
(14) InstOwn	0.31	0.11	0.08	-0.13	0.07	0.08	0.17	-0.13	-0.09	0.09	0.30	0.02	0.05	1.00						
(15) AnalystRev	0.20	0.21	0.27	-0.15	0.04	0.04	0.02	-0.17	-0.11	0.23	0.33	0.14	0.18	0.15	1.00					
(16) MTB	0.01	0.02	0.02	-0.03	-0.01	-0.02	-0.02	-0.02	-0.04	0.07	0.08	0.02	0.02	-0.03	-0.03	1.00				
(17) StdDevROA	-0.28	-0.19	-0.05	0.12	-0.03	0.06	-0.15	0.17	0.10	0.08	-0.33	-0.09	-0.14	-0.25	-0.05	0.11	1.00			
(18) InsiderTrades	-0.06	-0.02	-0.06	-0.01	-0.01	-0.03	-0.11	0.02	-0.01	-0.05	-0.01	-0.05	-0.07	-0.07	-0.03	0.04	-0.06	1.00		
(19) PoorEQ	-0.09	-0.09	-0.01	0.07	-0.02	0.03	-0.09	0.08	0.04	0.03	-0.15	-0.05	-0.08	-0.10	-0.01	0.10	0.40	0.00	1.00	
(20) MgmtGuidance	-0.05	-0.10	-0.02	0.03	0.03	0.01	0.06	0.06	0.03	-0.05	-0.13	-0.10	-0.11	0.08	-0.01	-0.02	-0.05	0.03	-0.02	1.00
(21) ConferenceCalls	-0.01	-0.11	-0.01	0.05	0.03	0.01	0.05	0.06	0.02	0.03	-0.07	-0.04	-0.08	0.06	0.04	-0.01	0.01	0.00	-0.01	0.41

Notes: This table presents Pearson correlations; boldface numbers represent significance at 5% level or higher. All variables are winsorized at the 1- and 99-percent levels, and defined in Appendix 4.14.

relevant control variables. The lag ensures that the sustainability information is disseminated in the market. Our regression model is set up as follows:²⁰

$$\begin{aligned} Synchronicity_{i,t+1} = & \beta_0 + \beta_1 materialESGdisclosure_{i,t} + \beta_2 \ln(MVE_{i,t}) + \beta_3 InstOwn_{i,t} + \beta_4 \ln(Nrev_{i,t}) + \\ & \beta_5 PricetoBook_{i,t} + \beta_6 SD(ROA_{i,t}) + \beta_7 \ln(InsiderTrade_{i,t}) + \sum_{k=1}^{62} \gamma_k Industry_{i,t} + \\ & \sum_{l=1}^8 \delta_l year_{i,t} + \epsilon_{i,t} \end{aligned}$$

The results, presented in Table 4.6, reveal that material sustainability disclosure according to SASB standards is negatively associated with stock price synchronicity. Column (1) shows the baseline result. Material sustainability disclosure produces a statistically significant coefficient of -0.51. Economically, this result indicates that an increase in material ESG disclosure by one standard deviation, i.e. 0.18 units, translates into a decrease in synchronicity of 0.09, or approximately 8% of the standard deviation of synchronicity.²¹ To ensure that this result is driven by sustainability disclosures identified by the SASB standard setting process, and not by general ESG disclosure, we control for GRI compliance in column (2) and the issuance of a sustainability report in column (3). GRI compliance signifies disclosure of broad, multi-stakeholder focused sustainability information according to GRI guidelines. Similarly, in column (3) we control for the issuance of a sustainability report, to account for general sustainability reporting. We note that neither GRI compliance nor the sustainability reporting controls are significant and controlling for them does not alter the result. The results in Table 4.6 are consistent with the hypothesis that disclosure of sustainability information according to SASB standards is associated with stock prices reflecting more firm-specific information.²²

Firms that disclose more material sustainability information could also have different financial accounting characteristics, importantly earnings quality, and different voluntary disclosure practices. Although not assessing disclosures, Kim, Park, and Wier (2012) find that firms with good performance ratings on sustainability issues have higher earnings quality. Thus, earnings quality could be a correlated omitted variable if material sustainability disclosure is related to earnings quality. Prior literature is inconclusive on the relation between earnings quality and synchronicity. Durnev et al. (2003), Ferreira and Laux (2007) and Hutton, Marcus, and Tehranian (2009) document that poor earnings quality is associated with lower firm-specific return variation, while Fernandes and Ferreira (2008) and Gul, Srinidhi, and Ng (2011)

²⁰We also estimated this model estimating separately each cross-sectional regression and averaging across years to calculate coefficients and t-stats as in Fama and MacBeth (1973). Our results were qualitatively similar.

²¹ $coefficient \times SD(MaterialDisc) \div SD(Synchronicity) = 0.51 \times 0.18 \div 1.15 \approx 8\%$

²²In untabulated results, we also control for industry concentration (log of a revenue-based Herfindahl index of industry-level concentration). Consistent with Fernandes and Ferreira (2008), the coefficient on industry concentration is negative but insignificant, and our main results remain unchanged.

TABLE 4.6: Relation between Material Sustainability Information and Stock Price Synchronicity

Dep.: Syn- chronicity	(1)		(2)		(3)		(4)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
MaterialDisc	-0.51	-4.47	-0.50	-4.29	-0.47	-3.90	-0.58	-3.58
GRICompl			-0.01	-0.24				
SustReport					-0.05	-1.05	0.01	0.04
PoorEQ							-0.02	-0.25
MgmtGuidance							0.03	0.03
ConferenceCalls							0.02	1.28
MarketCap	0.38	24.48	0.38	24.35	0.38	23.92	0.37	17.54
InstOwn	0.60	6.89	0.60	6.87	0.59	6.88	0.55	4.63
AnalystRev	-0.01	-0.62	-0.01	-0.62	-0.01	-0.62	-0.01	-0.75
MTB	0.01	0.81	0.01	0.81	0.01	0.77	0.01	0.16
StdDevROA	-0.98	-3.80	-0.98	-3.80	-0.97	-3.78	-1.18	-3.39
InsiderTrades	-0.11	-2.24	-0.11	-2.25	-0.11	-2.32	-0.07	-1.53
Intercept	-8.64	-25.09	-8.65	-24.89	-8.71	-24.30	-8.25	-19.58
N	10,407		10,407		10,407		4,355	
Adjusted- R^2	0.57		0.57		0.57		0.58	
Fixed effects	Year, Ind.		Year, Ind.		Year, Ind.		Year, Ind.	

Notes: This table presents results of multivariate analyses of stock return synchronicity regressed on material sustainability disclosure and other control variables. All variables are winsorized at the 1- and 99-percent levels, and defined in Appendix 4.14. Regressions include year and industry fixed effects, with standard errors clustered by firm. Variable definitions can be found in appendix 4.14.

find no relation between earnings quality and synchronicity. In column (4) we find that our results are unchanged when we control for other voluntary disclosure practices and earnings quality. Given that our sample is significantly smaller because of missing observations for those variables, we do not include them in subsequent analyses.²³ However, all our results remain unchanged if we control for them.

4.5.3 Change model

In Table 4.7 we examine the change in synchronicity subsequent to a change in material sustainability disclosure. We follow the methodology in Gul, Srinidhi, and Ng (2011) and examine two sub-samples of firm-years with increasing and decreasing

²³As another proxy for earnings quality, we compute the absolute value of firm accruals scaled by the absolute value of cash flow from operations (ABS_ACCR). All of our aforementioned results are robust to controlling for ABS_ACCR .

material sustainability disclosures. For each sub-sample, we regress synchronicity on post-event indicator variables for the years after the increase or decrease in disclosure. In each regression we include firm-years one year before and after the first change in disclosure for any given firm. The coefficients on the indicator capture the difference in synchronicity one year before to one year after the change in disclosure.²⁴

Consistent with disclosure overall increasing over time, the increase subsample is larger than the decrease subsample. We find a significant decrease in synchronicity for the sample that increased material sustainability disclosure (column 1 of Table 4.7) and a significant increase in synchronicity in the sample that decreased material sustainability disclosure (column 2 of Table 4.7). Economically, the coefficient of -0.11 reflecting a positive change, translates into a decrease in synchronicity of 10% of a standard deviation, similar to the previous multivariate setting. Both results are consistent with material sustainability disclosures revealing investor relevant firm-specific information.

4.5.4 Firm Sustainability Importance

We expect the relation between material sustainability disclosure and stock price synchronicity to be moderated by the importance of sustainability issues. Firms for which sustainability matters more should experience a stronger association between material sustainability disclosure and the firm-specific information content of the stock market.

To capture firm sustainability importance, we employ two proxies. The first is a measure of a company's exposure to sustainability issues, obtained from MSCI Intangible Value Assessment (IVA) product, which identifies key ESG-driven risk and opportunity exposures relevant to a firm. Firms receive an annually updated, firm-specific rating that allows for a direct comparison between firms on their exposure to ESG issues. The second proxy is collected from Asset4, Thomson Reuters' principal product for sustainability information. It captures how well sustainability issues are integrated with financial issues as well as in a company's procedures. More specifically, our measure reflects whether these issues are integrated in management discussions and reviewed in the annual report. We expect firms with greater exposure to and integration of sustainability issues will experience a stronger firm-specific

²⁴This test is well suited to the phenomenon we study given the persistence over time in material sustainability disclosure score. The first-order autocorrelation coefficient is 0.968 for the whole sample. Similarly, the first-order autocorrelation coefficient for synchronicity is also very high at 0.714. Given such time-series persistence in our dependent and independent variables, including firm-fixed effects would not lead to precise estimation.

TABLE 4.7: Changes model

Depend. var.: Synchronicity Sample:	(1) Material Disclosure Increase Events		(2) Material Disclosure Decrease Events	
	Coef.	t-stat	Coef.	t-stat
PosChangeYrs	-0.11	-3.49		
NegChangeYrs			0.09	2.05
SustReport	-0.12	-2.02	-0.09	-1.29
MarketCap	0.32	13.15	0.35	12.35
InstOwn	0.37	2.65	0.60	3.72
AnalystRev	-0.02	-1.43	-0.05	-1.96
MTB	0.00	1.01	-0.01	-0.99
StdDevROA	-0.87	-2.08	-1.47	-2.41
InsiderTrades	-0.09	-1.49	-0.10	-1.30
Intercept	-7.46	-12.89	-7.85	-12.04
N	2,331		1,368	
Number of events	777		456	
Adjusted- R^2	0.61		0.58	
Fixed effects	Year, Industry		Year, Industry	

Notes: This table presents results of multivariate analyses of stock return synchronicity regressed on an indicator equal to 1 in years on, and after, an increase (in column 1) or a decrease (in column 2) in material disclosure for a given firm. Only the first increase or decrease 'event' is kept for a particular firm. All variables are winsorized at the 1- and 99-percent levels, and defined in Appendix 4.14. Regressions include year and industry fixed effects, with standard errors clustered by firm.

information effect in returns as disclosure of material sustainability information increases.

The results are provided in Table 4.8. In column (1) we include the interaction effect between a dummy variable equal to one if a firm has above-average sustainability exposure in year t , $ESGExposure$ (mean=0.45, standard deviation=0.54), and ESG disclosure, revealing a significant negative coefficient. Interpreting the coefficients in column (1), we find that material sustainability disclosure reduces stock price synchronicity more when the firm-exposure to ESG risks and opportunities according to MSCI IVA is above average. The economic effect is substantial for firms with high exposure to ESG risks and opportunities explaining 11% of one standard deviation of variation in synchronicity. Column (2) provides the result for the interaction with above-average integration of sustainability issues, $Integrated$ (mean=0.55, standard deviation=0.36), also producing a negative significant coefficient. We find that firms that integrate financial and ESG issues in their business, experience a stronger negative effect of material sustainability disclosure on stock price synchronicity; this effect is approximately 12% of a standard deviation in synchronicity. Finally, we include both interactions together as shown in column (3). Both effects are significant suggesting that the effects are more pronounced for firms that are more economically exposed to sustainability issues and for firms that have integrated sustainability issues more into their business. The joined economic effect for the sample of firms that score one for both indicators is almost 20% of one standard deviation change in synchronicity.

4.5.5 Capital Market Participants

We expect that capital market participants who are more adept at processing information will moderate a stronger effect of material sustainability disclosure on stock price synchronicity.²⁵ Our first measure captures the level of institutional ownership. Institutional investors are expected to be more proficient in integrating sustainability disclosure into stock prices compared to retail investors. Our second measure reflects the percentage shares of a firm that is held by socially responsible investment (SRI) funds. SRI funds have a history of integrating sustainability information in their investment decisions and consequently are expected to exhibit higher information-processing skills, particularly for information of this nature.

²⁵ Although our sample captures mostly US-based investors, we do not expect the information processing abilities to differ for those that are not based in the US purely due to location. The relevant sustainability information is accessible globally.

TABLE 4.8: Firm Exposure Moderators

Dep.: Synchronicity	(1)		(2)		(3)	
	Exposure to		Integrated		Both moderators	
	Sust. issues		Sust. issues			
Variable	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
MaterialDisc	-0.20	-1.07	-0.10	-0.58	0.27	1.25
MaterialDisc $\times$ ESGExp	-0.40	-2.09			-0.47	-2.41
MaterialDisc $\times$ Integrated			-0.53	-3.59	-0.59	-4.11
Integrated			0.02	0.37	0.09	2.27
ESGExposure	0.09	2.14			0.04	0.76
SustReport	-0.03	-0.79	-0.06	-1.35	-0.05	-1.07
MarketCap	0.38	22.85	0.38	23.12	0.38	22.05
InstOwn	0.58	6.81	0.59	6.85	0.58	6.78
AnalystRev	-0.01	-0.59	-0.01	-0.62	-0.01	-0.56
MTB	0.01	0.86	0.01	0.70	0.0015	0.81
StdDevROA	-0.97	-3.83	-0.99	-3.83	-0.99	-3.88
InsiderTrades	-0.12	-2.4	-0.12	-2.34	-0.12	-2.44
Intercept	-8.74	-23.31	-8.64	-22.29	-8.74	-21.40
N	10,407		10,407		10,407	
Adjusted- R^2	0.57		0.57		0.57	
Fixed effects	Year, Industry		Year, Industry		Year, Industry	

Notes: This table presents results of multivariate analyses of stock return synchronicity regressed on material sustainability disclosure interacted with firm-level variables of exposure to ESG issues, and other control variables. All variables are winsorized at the 1- and 99-percent levels. Regressions include year and industry fixed effects, with standard errors clustered by firm. Variable definitions can be found in appendix 4.14.

The results are provided in Table 4.9. Column (1) shows the results using institutional ownership as the moderator. We find that an increase in institutional ownership by one standard deviation, or 0.25, is associated with a larger magnitude in synchronicity decrease for firms with higher material sustainability disclosure; 13% of a standard deviation of synchronicity. In column (2), SRI fund ownership is used in the interaction and finally both moderators are considered jointly in column (3). For all specifications, we find a negative significant interaction effect. When including both measures of investor expertise together, we find that both institutional ownership as well as SRI ownership matter. Our results support our hypothesis that the relationship between material sustainability disclosure and stock price synchronicity is more negative when capital market participants are more proficient at processing sustainability information.

Moreover, we examine the role of sell-side analysts in moderating the relationship between sustainability information and synchronicity. Past literature has studied the relation between sustainability disclosures and ratings, and analyst recommendations (Ioannou and Serafeim, 2015) or forecasts (Dhaliwal et al., 2012). Past research has also examined the relation between synchronicity and analyst forecasting intensity (which we control for in all of our models), documenting a positive relationship between the two (Piotroski and Roulstone, 2004).

Consistent with our previous argument, we expect that analysts with lower information processing costs, due to lower portfolio complexity, will exhibit a stronger negative relationship between sustainability information and synchronicity. Following Clement (1999), and using data from I/B/E/S, we proxy for portfolio complexity using the number of stocks an analyst covers within a year. Analysts who cover a large number of different stocks may not be able to invest the same amount of research into any individual stock as compared to analysts who cover few stocks. To construct a firm-year measure of information processing costs, *NumberCompanies* (mean=16.47, standard deviation=3.31), we average the number of stocks across all analysts covering a firm in a given year. In the first column of Table 4.10, the positive coefficient on the interaction between material sustainability disclosure and the average number of companies covered by the analysts covering the respective firm ($\text{MaterialDisc} \times \text{NumberCompanies}$) confirms that the relationship between sustainability information and synchronicity is less negative for firms with higher analyst portfolio complexity, suggesting that analysts are important intermediaries of sustainability information.

TABLE 4.9: Capital Market Participant Moderators

Dep.: Synchronicity	(1)		(2)		(3)	
	Inst. Ownership Coef.	t-stat	SRI Ownership Coef.	t-stat	Both moderators Coef.	t-stat
MaterialDisc	0.82	1.86	-0.46	-3.84	0.82	1.85
MaterialDisc $\times$ InstOwn	-1.66	-3.10			-1.65	-3.08
MaterialDisc $\times$ SRIOwn			-1.81	-2.31	-1.44	-1.84
SRIOwn			0.05	2.57	0.05	2.34
SustReport	-0.04	-0.90	-0.04	-1.04	-0.04	-0.89
MarketCap	0.38	24.02	0.38	23.87	0.38	23.96
InstOwn	0.80	7.37	0.59	6.81	0.79	7.30
AnalystRev	-0.01	-0.64	-0.01	-0.66	-0.01	-0.68
MTB	0.01	0.78	0.01	0.76	0.01	0.77
StdDevROA	-0.91	-3.58	-0.97	-3.77	-0.90	-3.56
InsiderTrades	-0.12	-2.37	-0.11	-2.31	-0.12	-2.36
Intercept	-8.74	-24.75	-8.70	-24.28	-8.74	-24.72
N	10,407		10,407		10,407	
Adjusted- R^2	0.57		0.57		0.57	
Fixed effects	Year, Industry		Year, Industry		Year, Industry	

Notes: This table presents results of multivariate analyses of stock return synchronicity regressed on material sustainability disclosure interacted with firm-level variables of institutional ownership and SRI fund ownership, and other control variables. All variables are winsorized at the 1- and 99-percent levels. Regressions include year and industry fixed effects, with standard errors clustered by firm. Variable definitions can be found in appendix 4.14.

TABLE 4.10: Sell-side Analyst Moderators

Dep.: Synchronicity	(1) Analyst Portfolio Complexity	
	Coef.	t-stat
MaterialDisc	-1.26	-3.20
MaterialDisc $\times$ NumComp	0.05	2.50
NumberCompanies	-0.01	-0.77
SustReport	-0.03	-0.62
MarketCap	0.36	24.14
InstOwn	0.36	4.75
AnalystRev	-0.02	-2.16
MTB	0.01	0.98
StdDevROA	-0.6	-2.67
InsiderTrades	-0.14	-2.62
Intercept	-7.99	-26.07
N	9,371	
Adjusted- R^2	0.58	
Fixed effects	Year, Industry	

Notes: This table presents results of multivariate analyses of stock return synchronicity regressed on material ESG disclosure interacted with a firm-level variable of analyst coverage, and other control variables. All variables are winsorized at the 1- and 99-percent levels. Regressions include year and industry fixed effects, with standard errors clustered by firm. Variable definitions can be found in appendix 4.14.

4.5.6 Intra-industry Information Transfers

An important stream of literature documents intra-industry information transfers whereby an idiosyncratic event that affects the short-window stock price of one firm (e.g., an earnings announcement by one firm, or an accounting restatement by one firm) also affects the contemporaneous short-window stock price of another firm in the same industry (Foster, 1981; Gleason, Jenkins, and Johnson, 2008). Similarly, recent research documents cross-firm stock return predictability as a function of firm characteristics, specifically accounting quality, rather than to an information event (Chen et al., 2016).

In this chapter we investigate if intra-industry information transfers happen in the context of material sustainability information. If information transfers exist, we expect that stock returns of firms that disclose little information about their material sustainability issues might exhibit higher co-movement with industry returns, if they belong to an industry where companies' disclosure levels are high. In contrast, we expect no effect on co-movement with industry returns for firms that disclose little information but belong to industries where companies' disclosure levels are low. We measure a firm's industry level information in stock returns following Piotroski and Roulstone (2004) as the difference between the explanatory power of market and industry returns versus only market returns. The higher the difference, the more a firm's stock returns contain industry-level information.

Table 4.11 present the results for this analysis. We find strong evidence that firms with low disclosure levels exhibit high industry-level synchronicity within the whole sample and that this result is driven only by firms in industries with rich information environment (i.e. industries having above average industry-level sustainability disclosure scores). In untabulated results, we document that intra-industry information transfers are stronger for firms with greater exposure to sustainability issues and with a higher percentage of shares held by institutional investors.

4.5.7 Additional Analyses

Other Sustainability Disclosures

In testing for the relation between material sustainability disclosures and synchronicity we have controlled for both compliance with GRI standards and whether a firm issues a sustainability report. However, firms disclose a wealth of sustainability information through other mediums, primarily their websites, even if they do not issue

TABLE 4.11: Explanatory Power of Industry-level Returns

Dep.: Synchronicity	(1) Full Sample		(2) Rich Info Environment		(3) Poor Info Environment	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
LowDisclosure	0.02	2.83	0.03	4.32	-0.01	-1.06
SustReport	0.01	0.99	0.01	1.32	-0.01	-0.25
MarketCap	0.06	30.91	0.06	22.67	0.06	23.06
InstOwn	0.05	5.00	0.06	3.91	0.04	3.15
AnalystRev	-0.01	-0.30	0.01	0.43	-0.01	-1.44
MTB	-0.01	-0.54	-0.01	-0.46	-0.01	-0.49
StdDevROA	-0.09	-3.03	-0.15	-2.55	-0.07	-2.40
InsiderTrades	-0.04	-6.82	-0.05	-6.21	-0.02	-3.08
Intercept	-1.08	-23.77	-1.13	-18.58	-1.01	-17.20
N	9,371		5,534		4,873	
Adjusted- R^2	0.65		0.64		0.66	
Fixed effects	Year, Industry		Year, Industry		Year, Industry	

Test for (2) > (3)
Null hypothesis: (2) = (3)

P-value = 0.0002

Notes: This table presents results of R2Diff regressed on our variables of interest. R2Diff equals the incremental explanatory power of industry-level returns over market returns to explain variation in firm-level returns. We regress R2Diff on LowDisclosure, defined in Appendix A. We do this for the full sample in column 1, for the sample of firms that have a Rich Information Environment in column 2 (i.e. firms belonging to industries in which material ESG disclosure is above average) and for the sample of firms that have a Poor Information Environment in column 3 (i.e. firms in industries having below average material ESG disclosure). Below the Rich/Poor Information Environment specifications, we report the statistical significance of the differences in coefficient estimates for our variables of interest, based on a system of seemingly unrelated regressions that jointly estimates the models and takes into account correlations in residuals across the regressions (Zellner 1962). This procedure uses a common sample for the two regressions and allows to explicitly test whether the coefficients on the various independent variables are different across the two models. Variable definitions can be found in appendix 4.14.

TABLE 4.12: Other Sustainability Disclosure

Dep.: Synchronicity	(1)		(2)	
	Coef.	t-stat	Coef.	t-stat
OtherSustDisc	0.02	0.10	-0.08	-0.44
SustReport			-0.04	-0.82
MaterialDisc			-0.48	-3.76
MarketCap	0.35	27.70	0.38	23.36
InstOwn	0.63	7.05	0.59	6.86
AnalystRev	-0.01	-0.83	-0.01	-0.62
MTB	0.01	0.84	0.01	0.78
StdDevROA	-0.99	-3.81	-0.97	-3.79
InsiderTrades	-0.10	-2.01	-0.12	-2.33
Intercept	-8.17	26.42	-8.72	-24.06
N	10,407		10,407	
Adjusted- R^2	0.57		0.57	
Fixed effects	Year, Industry		Year, Industry	

Notes: This table presents robustness results of stock return synchronicity regressed on both material sustainability disclosure and other (non-material) sustainability disclosure, and other control variables. All variables are winsorized at the 1- and 99-percent levels, and defined in Appendix A. Regressions include year and industry fixed effects, with standard errors clustered by firm. Variable definitions can be found in appendix 4.14.

a separate report. We attempt to understand whether a firm's sustainability disclosures not included in SASB standards also have a negative association with synchronicity. Therefore, we construct a measure of ESG disclosure that is comprised of the total ESG disclosure score that Bloomberg calculates after orthogonalizing this measure with our materiality disclosure score.²⁶ Effectively, this score captures a firm's level of ESG disclosure that is unrelated to its level of material sustainability disclosure. In Table 4.12 we find that this measure exhibits an insignificant association with synchronicity. In untabulated tests, we do not find that the measure is correlated with synchronicity in any of our moderating variable tests.

Validity of Synchronicity Measure

Li, Rajgopal, and Venkatachalam (2014) suggest that lower synchronicity could be a proxy for firm-specific information or noise in stock prices. Motivated by the fact that examining stock price synchronicity and idiosyncratic volatility sometimes produce different inferences, they suggest that researchers should understand if their

²⁶The Bloomberg disclosure score is calculated taking into account all ESG data items in the Bloomberg database.

results are robust when controlling for betas, and testing if the hypothesized relation between the independent variable of interest and synchronicity changes sign or remains the same. This is because a decrease in synchronicity could be driven by a decrease in beta and/or an increase in idiosyncratic volatility. If it changes sign, then this would be inconsistent with the proposed theory, as it would provide evidence that the relation between the independent variable of interest and idiosyncratic volatility is opposite to what is being predicted.

In Table 4.13 we control for the market and industry betas in our regression model. We find that even when we control for market beta in columns (1) and (2), the relationship between material sustainability disclosure and synchronicity is negative and significant suggesting that firms with higher material sustainability disclosure have higher idiosyncratic volatility. In columns (3) and (4) we control for industry beta, and finally in columns (5) and (6) we control for both market and industry beta together. Across all specifications, the coefficient on material sustainability disclosure remains negative and significant.

Validity of Disclosure Metric

Our disclosure metric relies on data from Bloomberg and the mapping of that data to SASB standards. First, as we report in Table 4.3, Bloomberg does not have data on all SASB issues. It is not clear whether and how incomplete coverage could affect our analyses. If Bloomberg selects the more relevant and material items from the pool of all material SASB items, then we would expect the relationship to be even stronger (weaker) when Bloomberg has a lower (higher) SASB coverage. To understand whether our results hold for samples with close to complete data coverage we restrict the sample to industries where data coverage is more than 60% or 75%. We find strong associations between disclosure and synchronicity, and we find that all the moderating analyses hold.

A second concern with our measure is that some of the Bloomberg data items are only proxies for the key performance indicators identified in SASB standards and not the exact measure. Excluding all these proxy measures and recalculating the disclosure metrics, we find a correlation of 0.88 between the disclosure metric used throughout the chapter and this adjusted disclosure metric. All results are very similar when we use this adjusted disclosure metric instead.

Moreover, given that Bloomberg ESG data inform our measure, a concern could be that only G (governance) is driving our results. However, this is not the case for multiple reasons. First, SASB standards generally do not include governance indicators, such as board independence or executive compensation metrics, as key performance indicators. Governance issues identified by SASB as material include

TABLE 4.13: Synchronicity Measure Validity

Dep.: Synchronicity	(1)		(2)		(3)	
	Coef.	t-stat	Coef.	t-stat	Coef.	t-stat
MaterialDisc	-0.47	-4.07	-0.45	-4.05	-0.36	-3.26
MarketBeta	0.35	9.39			0.52	11.78
IndustryBeta			0.45	12.16	0.63	13.26
MarketCap	0.40	24.62	0.35	22.77	0.37	23.29
InstOwn	0.60	6.94	0.58	6.84	0.57	6.91
AnalystRev	-0.01	-0.55	-0.02	-1.93	-0.02	-2.37
MTB	0.00	0.92	0.00	0.38	0.00	0.30
StdDevROA	-1.05	-4.18	-1.05	-4.11	-1.19	-4.81
InsiderTrades	-0.11	-2.29	-0.09	-1.90	-0.09	-1.82
Intercept	-9.31	-24.63	-8.07	-24.10	-8.81	-24.36
N	10,407		10,407		10,407	
Adjusted- R^2	0.58		0.58		0.61	
Fixed effects	Year, Industry		Year, Industry		Year, Industry	

Notes: This table presents robustness results of stock return synchronicity regressed on material sustainability disclosure and other control variables. We control for the market and industry betas in our regression model. All variables are winsorized at the 1- and 99-percent levels, and defined in Appendix 4.14. Regressions include year and industry fixed effects, with standard errors clustered by firm.

business ethics and transparency of payments or political lobbying. Indeed, in none of the industries do we include executive compensation metrics in our disclosure ratios. Moreover, we find that governance data are not included at all in 53 out of 65 industries we examine. Advertising and marketing is the industry that has the highest percentage of governance data included in the disclosure score at 22% of the data being governance data, with media and production second at 18% and casinos and gaming third at 11%.

4.6 Conclusion

This chapter seeks to provide evidence on the characteristics of emerging accounting standards for sustainability information. Given that a large number of institutional investors seek sustainability data and have committed to use sustainability data, it is becoming increasingly important to develop a robust accounting infrastructure for the reporting of such information. In this chapter, we test whether companies that voluntarily disclosed information, before the standards identified this information as investor-relevant, exhibit lower stock price synchronicity.

We find strong evidence that this is the case. Perhaps more importantly, we find that this association is moderated in predictable ways. The association is stronger for firms that are more exposed to sustainability issues and for firms that have integrated sustainability issues more into their business operations and strategy. We also find that the association is stronger when investors with higher sustainability information processing capabilities hold the shares of the firm. These results not only increase our confidence that sustainability information rather than a correlated omitted variable drive the association, but also shed incremental light on firm and capital market characteristics that accentuate the relation. Furthermore, we document intra-industry information transfers, measured as increases in industry-level stock price synchronicity, for firms that have low transparency but are in industries with relatively high levels of material sustainability disclosure. We also document that analysts' portfolio complexity moderates the relation between material sustainability information and synchronicity, adding new insights to the studies that examine analysts and sustainability information (Ioannou and Serafeim, 2015; Dhaliwal et al., 2012) as well as analyst activities and synchronicity (Piotroski and Roulstone, 2004).

From a practitioner perspective, these results improve the understanding of the value relevance and usefulness of sustainability disclosures. In addition to showing that the SASB accounting standards have so far been successful at identifying the material disclosure items from the immaterial items, which amongst others may help investors to focus their research efforts on the relevant items, our findings reveal under which circumstances such information is more strongly integrated in the market. Next to investors, this is also relevant for company management in their decision to allocate resources to the appropriate items, by using the SASB accounting standards as a guideline. Going forward, these findings are highly relevant to regulators and governmental institutions that strive to improve transparency and accountability in the public market and may in the future consider adopting a mandatory rather than voluntary accounting disclosure of sustainability items.

A number of caveats apply to our results and inferences. First, as we have described above, the data are incomplete for some industries (i.e. not all SASB data items have coverage in the Bloomberg dataset), although for most industries we cover almost 70 percent of all SASB data items. Whether these missing data items have fundamentally different capital market implications and whether the results documented in this chapter generalize to these data items are questions for future research. Moreover, similar to the vast majority of the prior research examining the capital market consequences of firm financial and voluntary disclosures, we lack a natural or quasi-natural experiment that would lead to causal inference. We take several steps to

mitigate the likelihood of spurious correlations due to omitted variable bias by controlling for a number of variables, supplementing our results using a changes specifications and using multiple moderator variables to examine whether our results are stronger in settings that theory would predict; nevertheless, we cannot completely rule out all possible endogeneity concerns.

This chapter is a first attempt to understand development of accounting standards for disclosure of sustainability information. Although SASB standards are still new, preventing researchers from documenting robust consequences from these standards, there will be exciting opportunities for research in the future. First, there is a need for field research that examines how companies react and use the standards in managing and reporting performance on different sustainability issues. Which companies adopt the standards first and why? What drives diffusion of standards across companies? Second, there is a need for empirical work that examines the consequences that standards have on the comparability of reported information. Do disclosures converge within an industry and diverge across industries? Third and perhaps most importantly, how do standards drive change inside organizations? Do they elevate the importance of sustainability issues inside organizations by assigning responsibility over sustainability issues at the board level, or using these metrics in executive compensation plans (Eccles, Ioannou, and Serafeim, 2014)? These and other questions represent fruitful avenues for future research.

4.7 Appendix

TABLE 4.14: Variable definitions

Variable	Definition
Synchronicity _{<i>i,t</i>}	Firm <i>i</i> 's stock price synchronicity in year <i>t</i> , measured as $\log(R^2/1 - R^2)$ from the annual firm-specific regression of daily firm returns on value-weighted market and industry returns.
MaterialDisc _{<i>i,t</i>}	Ratio of the number of disclosed SASB ESG metrics to the total number of SASB ESG metrics available in Bloomberg, for firm <i>i</i> in year <i>t</i> .
MarketCap _{<i>i,t</i>}	The natural logarithm of market capitalization for firm <i>i</i> in year <i>t</i> , from Compustat.
GRICmpl _{<i>i,t</i>}	A Bloomberg variable equal to 1 if firm <i>i</i> is compliant with GRI guidelines in year <i>t</i> , 0 otherwise.
SustReport _{<i>i,t</i>}	A variable equal to 1 if firm <i>i</i> issues a sustainability report in year <i>t</i> , 0 otherwise. Computed using data from Thomson Reuters Asset4, CorporateRegister and Bloomberg.
InstOwn _{<i>i,t</i>}	The percentage of firm <i>i</i> 's ownership by institutional shareholders in year <i>t</i> , from Thomson Reuters Ownership.
AnalystRev _{<i>i,t</i>}	Natural logarithm of the number of analyst revisions for firm <i>i</i> in year <i>t</i> from I/B/E/S.
MTB _{<i>i,t</i>}	Market to book value for firm <i>i</i> in year <i>t</i> , computed using data from Compustat.
StdDevROA _{<i>i,t</i>}	Standard deviation of quarterly ROA, measured over three years preceding and including <i>t</i> for firm <i>i</i> , using Compustat.
InsiderTrades _{<i>i,t</i>}	Natural log of absolute value of net trading by insiders scaled by annual trading volume for firm <i>i</i> in year <i>t</i> , using CRSP.
ESGExposure _{<i>i,t</i>}	A variable equal to 1 if firm <i>i</i> has above-median exposure to ESG-driven risks and opportunities in year <i>t</i> , as defined by MSCI IVA, 0 otherwise.
Integrated _{<i>i,t</i>}	A variable equal to 1 if firm <i>i</i> has above-median integration of sustainability issues across its core business in year <i>t</i> , as defined by Thomson Reuters Asset4, 0 otherwise.
SRIOwn _{<i>i,t</i>}	The percentage of firm <i>i</i> 's ownership by socially responsible investment funds in year <i>t</i> , calculated using Thomson Reuters Ownership data and Bloomberg.
MarketBet _{<i>i,t</i>}	Coefficient estimate of market returns from the regression of daily firm returns on value-weighted market and industry returns, for firm <i>i</i> in year <i>t</i> .
IndustryBeta _{<i>i,t</i>}	Coefficient estimate of industry returns from the regression of daily firm returns on value-weighted market and industry returns, for firm <i>i</i> in year <i>t</i> .
R2Diff _{<i>i,t</i>}	The difference between the explanatory power from the annual firm-specific regression of daily firm returns on value-weighted market and industry returns and the explanatory power from value-weighted market returns.
LowDisclosure _{<i>i,t</i>}	An indicator variable taking the value of one for firms with below average MaterialDisc in year <i>t</i> .
NumberCompanies _{<i>i,t</i>}	The average number of companies in analyst coverage across all analysts covering firm <i>i</i> in year <i>t</i> .
PoorEQ _{<i>i,t</i>}	The absolute value of a firm-specific residual from a cross-sectional annual industry regression of working capital accruals on lagged, contemporaneous, and leading cash flows, all scaled by lagged total assets (Dechow and Dichev, 2002).
MgmtGuidance _{<i>i,t</i>}	The natural logarithm of one plus all guidance events during the year as measured by Capital IQ.
ConferenceCalls _{<i>i,t</i>}	The natural logarithm of one plus all conference calls during the year as measured by Capital IQ.

Chapter 5

Conclusion

This dissertation provides insightful empirical evidence on the relationship between sustainability and capital market outcomes. By investigating into and solving a series of novel and pressing questions in this field, this dissertation contributes to elucidating the path forward toward a sustainable and long-term oriented business environment. It contributes to a deeper understanding of the value creation process and how sustainability can be part of a compelling business case.

The focus of this dissertation is on sustainability and capital providers, both the equity and debt side of capital. Chapters 2 and 3 have focused on the debt side of capital providers, while chapter 4 employs an equity market focus. Capital providers are of a particular interest, as they focus on extracting the highest possible return for the lowest risk¹. As providers of capital they often have significant influence over the companies e.g. in terms of direct activism, monitoring, or shunning certain companies. Therefore, it is particularly important to understand how these capital market participants incorporate and act on sustainability information. Only by understanding the current state of situation can continuous improvement and advancement be attained.

To briefly summarize, chapter 2 reveals that firms with female top executives receive better loan spreads than firms run by male top executives. This relationship is stable across a wide range of methodologies and robustness tests, including propensity score matching and instrumental variable approach. In this chapter we show that this difference is driven by cultural perceptions of female top executive behaviour, and that the relationship reverses in countries that are sceptical toward female top executives. It is stronger in countries that exhibit progressive attitudes toward female top executives.

In chapter 3, I show that borrowing firms with better sustainability performance receive more favourable loan spreads, however that this relationship only holds when

¹Debt providers naturally have limited upside potential and are therefore considered to be more focused on the downside or credit risk, while equity providers theoretically have unlimited upside potential.

the lending bank exhibits high sustainability performance. Furthermore, the chapter shows that the difference in loan spreads is driven by a downside penalty that borrowing firms are objected to when they exhibit low sustainability performance and borrow from a bank with strong sustainability performance, rather than a discount for strong sustainability performance. I document that the relationship between borrower sustainability performance and loan spreads is stronger in more recent periods and particularly so since the 2008 financial crisis. Breaking down the sample reveals that in line with the hypothesis that the crisis increased media attention, public scrutiny, and hence reputation risk of banks, banks with strong sustainability performance price the sustainability performance of their borrowers particularly in later periods and after 2008. The data indicates that this is due to an increase in reputation risk that banks face after the crisis and hence higher loan spreads granted to borrowers with low sustainability performance can be viewed as a reputation risk premium.

Chapter 4 moves from sustainability performance to sustainability disclosure and reveals the firm-specific value relevance of material sustainability disclosure, according to standards set by the sustainability accounting standards board. The chapter reveals that sustainability reporting according to these voluntary standards provides relevant firm-specific information as evidenced by a reduction in stock price synchronicity. Furthermore, the chapter reveals which factors mediate this relationship. We show that the types of investors matter, and firms with more institutional and SRI investors exhibit a stronger reduction in stock price synchronicity. From an internal perspective, we reveal that firms that are more exposed to sustainability issues and integrate sustainability into their business are more affected by this. We document that analysts that have less firm-specific experience and lower portfolio complexity incorporate this type of information more. In addition, we find intra-industry information transfers to firms with low sustainability disclosure within industries that exhibit high sustainability disclosure.

A main limitation or concern of all chapters is endogeneity. We attempt to address this issue as best as we can in each chapter by employing different methodologies specifically to address endogeneity concerns, using appropriate control variables, and investigating into alternative channels. The findings have a wide range of practical implications for institutions, governments, and individuals, which are summarized in the valorisation chapter which is chapter 6.

Going forward, there are many interesting and promising areas that require further investigation within the topic. Chapter 2 instigates, for example, the question as to why firms with female executives receive better loan spreads on average and which policies and actions are effective at generating progress in cultural attitudes towards female executives. There is a lot more to learn and build on chapter 3 to understand

Chapter 2 Do firms run by female top executives pay different loan conditions than their male counterparts? Does the cultural setting matter?	Chapter 3 Do borrowing firms pay more favorable loan conditions when they exhibit better sustainability performance? Under which conditions and why?	Chapter 4 Does material sustainability disclosure provide firm-specific information that reduces stock price synchronicity? Which factors influence this relationship?
Firms run by female top executives pay lower loan spreads than firms run by male CEOs and CFOs. This difference is driven by cultural attitudes towards female top executives that differs between countries and the effect reverses in countries with skeptical attitudes towards female executives.	Firms that exhibit strong sustainability performance pay lower loan spreads only when the lending bank exhibits strong sustainability as well. This difference is due to a downside premium for borrowers with weak sustainability and it is indicative of a reputation risk premium. The effect is stronger in recent years.	Material sustainability disclosure according to SASB standards reduces stock price synchronicity, reflecting firm-specific information content. This relationship is mediated by institutional investors and SRI funds, internal exposure to sustainability issues, and analyst features. In high-disclosure industries, inform. transfers to low disclosers.

FIGURE 5.1: Key questions and answers

more precisely why banks with high sustainability performance care more about sustainability performance in their borrowers and to provide clearer evidence on the exact transition mechanisms. Understanding the dynamics between banks and borrowers in the context of sustainability is an area that requires much research and I hope to continue to contribute to this in the near future as well. Chapter 4 provides first evidence on the first standard setting procedures for sustainability information. Due to the novelty of the setting and its tremendous potential, there are many interesting opportunities for research in the future. The economic consequences of the standards are only just beginning to be documented, and there is much to discover with regard to the types of companies that disclose, their motivation, and the consequences. The research projects in this dissertation provide exciting and relevant insights, but also reveal many promising avenues for further research.

Chapter 6

Valorisation

The true value of academic research does not derive solely from producing innovative ideas, using high-quality data, or from a researcher's skills to conduct a systematic investigation into the research question. These are merely the prerequisites for generating good research. For it to be truly valuable to our society and to have an impact, research must be communicated to the relevant audience in a practically suitable manner. This chapter summarizes the results and implications of the research findings with some useful suggestions on practical applications.

This thesis provides evidence on the value of sustainability information in the context of capital markets. Altogether, we find that sustainability matters to capital market participants and there is still ample room to integrate sustainability information into the decision-making procedures. Therefore, advancing research in this field is particularly beneficial and important, as it is still a largely unexplored domain, that promises great potential. The research in this book reveals the importance and potential influence of different stakeholders within the economy on driving sustainability, e.g. banks that channel large amounts of capital to certain projects or causes can play a critical role in promoting sustainability. If they refuse to lend or offer higher loan rates to borrowers that exhibit unsustainable practices this will impact how corporations operate and to what extent they integrate sustainability in their business thinking, regardless of the reason banks care and whether it is because they expect a different credit risk or whether they are protecting their own reputation. The findings in this book provide empirical evidence to all types of stakeholders that advancing in sustainability matters is possible without sacrificing financial benefits. It provides explicit information and evidence on particular cases in the debt and equity market in which sustainability (be it in terms of ESG performance, only governance, or non-financial disclosures) on potential mechanisms which can be employed in a practical setting. The next paragraphs explain in more detail the practical implications drawn from the individual chapters and briefly summarize only the main points of the main chapters, to put the practical conclusions into a more convenient context.

Chapter 2 assesses the relationship between top executive gender and the loan spreads of the respective company. In a broad sense, this chapter reveals that the debt market reflects whether the firm is run by a male or female top executives. By doing so, it provides useful evidence on the debate on whether the characteristics of the top executive matter at all. However, it shows even more than that: Using a cross-country sample allows us to identify whether differences in loan spreads are driven by internal corporate factors, or by society's attitude towards women in leadership positions. In terms of internal corporate factors, we account for executive-specific features, such as education, experience, age, and nationality in addition to loan, company, and economic characteristics, which may be driving loan spreads. In terms of external factors, we introduce cultural perceptions of female top executive skills as a new determinant in the loan pricing literature. Our results reveal that firms with female top executives receive better loan conditions than companies with male top executives, when cultural attitudes are progressive towards female executives. Otherwise, they receive worse loan conditions. The findings of this study indicate that having a female top executive is beneficial and companies may be able to reduce financing costs by strategically promoting female executives in countries with progressive attitudes, while companies may be better off with male executives in less progressive countries. Banks that are aware of this bias should look into their lending policies to detect whether they may be able to increase their competitiveness by offering more competitive loan spreads to companies run by female executives in countries with skeptical views on female top executive behavior in particular. Institutional and private investors can use this information to identify firms with lower debt costs, and hence higher cash flows to equity holders. They may also assert their influence on the firm to seek more favorable loan conditions based on the knowledge of this study. Regulators should find these results valuable in developing policies to improve gender equality. The results indicate that gender quotas may be insufficient in improving equality and economic welfare if they are not accompanied with the appropriate openness and acceptance. The full advantages of gender diversity can only be reached, when societal values support the integration of women in leadership positions.

Chapter 3 provides an in-depth investigation of the relationship between sustainability performance and loan spreads. We show that achieving superior sustainability performance is associated with lower, more favorable loan spreads, however we find that this only holds true when the corresponding lending bank produces good sustainability performance as well. Compared to previous research in this field, in chapter 3 we gain a deeper understanding of the causality *why* more sustainable companies receive better loan spreads by considering the sustainability behavior of the contracting counter-party. The findings provide a wide range of information relevant for practical implications. More generally, it provides insights into the

loan pricing behavior of financial institutions and helps to uncover the role of financial institutions in promoting sustainability throughout the economy. The first finding is that sustainability performance translates into better loan spreads on average. Therefore companies that are aware of this relationship should be able to improve their funding terms by strategically managing their sustainability performance. Furthermore, we show that the relationship is driven by a downside penalty for less sustainable firms, rather than an upside cost reduction for more sustainable firms. This indicates that sustainability performance should be more considered a requirement rather than a competitive edge and laggards that do not realize this yet are penalized. Furthermore, the results provide insightful information for financial institutions who may not even be aware of the differences in loan pricing between institutions. This research encourages banks and future research to investigate the creditworthiness aspect of sustainability more deeply. Our results reveal that more sustainable banks may require a risk premium, which less sustainable banks do not require. Hence, the credit pricing of less sustainable banks is more in line with that of the market. We consider though, that the market is an imperfect proxy for actual credit risk as it itself is subject to evaluation errors. Our findings highlight to policy makers the importance of encouraging sustainability performance in the financial services sectors. As key intermediaries of the economy, financial institutions play an important role in incentivizing capital market participants to transit from a myopic perspective to a long-term, sustainable business model. This is particularly important in the wake of the financial crisis, in which the trust in the global banking system has taken a great hit. Improving trust, transparency, and accountability are the path to a solid financial system.

Chapter 4 shifts the perspective from sustainability performance to sustainability disclosure. Unlike accounting disclosures, there is no set of required accounting standards that specify relevant sustainability disclosures yet. In this study, we examine whether firms that voluntarily disclose sustainability information, later identified as material by the Sustainability Accounting Standards Boards (SASB), exhibit lower stock price synchronicity. This indicates the level of relevant firm-specific information that the sustainability disclosures capture, as suggested by the standards. We show that material sustainability disclosure reduces stock price synchronicity and provide evidence which factors and conditions mediate this relationship. Our findings are relevant for policy makers, investors, and companies alike, as they signal the significance of disclosing sustainability information and evaluate the relevance of the standards. The chapter suggests that market forces, here the NGO SASB together with companies, investors, and experts in the area, can develop accounting standards that reflect investor relevant firm-specific information, complementing the regulatory process through which financial accounting standards have been developed. We show that firms with greater exposure to sustainability risks and

opportunities exhibit a strong reduction in stock price synchronicity, similarly firms that integrate financial and sustainability issues in their business have a stronger effect. For stakeholders of these types of firms, our results provide evidence that material sustainability disclosures are particularly important. Considering capital market participants, we find that both higher institutional and SRI fund ownerships magnify the synchronicity-reducing effects. An implication for firms that exhibit these investor bases is that they should consider disclosing to provide valuable firm-specific information to their investors. Furthermore, we consider the role of analysts and find that portfolio complexity moderates the relationship between sustainability information and synchronicity, revealing the information effect of sell-side analysts. Financial institutions and investors should be aware of the reduction in information-processing capabilities of sustainability information when analysts are faced with greater portfolio complexity. Finally, the chapter provides evidence on intra-industry information transfers of regulated financial information. We document higher industry-level synchronicity for firms that have low levels of sustainability information disclosure but are members of industries with relatively high levels of sustainability information disclosure. In other words, firms with few disclosures but in industries with a lot of disclosure co-move more than their industry counterparts, indicating that increasing sustainability disclosure may be even more beneficial to such firms to reduce co-movements with the respective industry.

Altogether, the studies in this dissertation provide answers to a range of pressing questions on sustainability and capital markets. The findings are relevant and can be applied to a variety of different stakeholders. Given the novelty of the research stream, there is immense value in understanding and incorporating the practical implications of this study into corporate behavior.

Chapter 7

Biography

Clarissa Hauptmann was born on August 11th, 1990 in Singapore. She holds a Bachelor degree in Economics from Georg-August-Universität Göttingen, Germany. In 2013 she received her Masters degree in Financial Economics with a major in Banking with distinction from Maastricht University, The Netherlands. Prior to her doctoral studies, Clarissa gained practical experience at several financial institutions including Barclays Bank, Deutsche Bank, and Bank Central Asia. Clarissa is a CFA® charterholder.

Clarissa joined the Finance Department at Maastricht University as a Ph.D. candidate in October 2013. During her doctoral studies, Clarissa was a visiting scholar at Harvard Business School and an affiliate of the European Center for Corporate Engagement. The main results of her doctoral studies are presented in this book. Her research investigates how sustainability performance and disclosures affect capital markets. She has presented her work at numerous international conferences and workshops. Next to her research, Clarissa has been responsible for teaching the courses "Finance & Accounting", "Financial Management & Policy", "Ethics, Organizations, and Society", organizing the CFA Institute Research Challenge, and supervising bachelor and master students at Maastricht University.

As of October 2017, Clarissa is a Postdoctoral Research Fellow at Oxford University Saïd Business School.

References

- Adams, Renée B, Heitor Almeida, and Daniel Ferreira (2005). "Powerful CEOs and their impact on corporate performance". In: *The Review of Financial Studies* 18.4, pp. 1403–1432.
- Adams, Renée B and Daniel Ferreira (2009). "Women in the boardroom and their impact on governance and performance". In: *Journal of Financial Economics* 94.2, pp. 291–309.
- Adams, Renee B and Patricia Funk (2012). "Beyond the glass ceiling: Does gender matter?" In: *Management Science* 58.2, pp. 219–235.
- Aier, Jagadison et al. (2005). "The financial expertise of CFOs and accounting restatements". In: *Accounting Horizons* 19.3, pp. 123–135.
- Alesina, Alberto F, Francesca Lotti, and Paolo Emilio Mistrulli (2013). "Do women pay more for credit? Evidence from Italy". In: *Journal of the European Economic Association* 11.s1, pp. 45–66.
- Allee, Kristian D and Teri Lombardi Yohn (2009). "The demand for financial statements in an unregulated environment: An examination of the production and use of financial statements by privately held small businesses". In: *The Accounting Review* 84.1, pp. 1–25.
- Allen, Abigail and Karthik Ramanna (2013). "Towards an understanding of the role of standard setters in standard setting". In: *Journal of Accounting and Economics* 55.1, pp. 66–90.
- Altman, Edward I and Anthony Saunders (1997). "Credit risk measurement: Developments over the last 20 years". In: *Journal of Banking & Finance* 21.11, pp. 1721–1742.
- Amel-Zadeh, Amir and George Serafeim (2017). "Why and How Investors Use ESG Information: Evidence from a Global Survey". In: *Available at SSRN*.
- Barigozzi, Francesca and Piero Tedeschi (2014). "Credit Markets with Ethical Banks and Motivated Borrowers". In: *Review of Finance* 19.3, pp. 1281–1313.
- Barth, Mary E, Wayne R Landsman, and Mark H Lang (2008). "International accounting standards and accounting quality". In: *Journal of Accounting Research* 46.3, pp. 467–498.

- Barth, Mary E, Ken Li, and Charles G McClure (2017). "Evolution in Value Relevance of Accounting Information". In: *Available at SSRN*.
- Barua, Abhijit et al. (2010). "CFO gender and accruals quality". In: *Accounting Horizons* 24.1, pp. 25–39.
- Bauer, Rob and Daniel Hann (2010). "Corporate environmental management and credit risk". In: *Available at SSRN*.
- Bauer, Rob et al. (2008). "The impact of corporate governance on corporate performance: Evidence from Japan". In: *Pacific-Basin Finance Journal* 16.3, pp. 236–251.
- Beatty, Anne, Sandra Chamberlain, and Joseph Magliolo (1996). "An empirical analysis of the economic implications of fair value accounting for investment securities". In: *Journal of Accounting and Economics* 22.1, pp. 43–77.
- Beaver, William H and Stephen G Ryan (2000). "Biases and lags in book value and their effects on the ability of the book-to-market ratio to predict book return on equity". In: *Journal of Accounting Research* 38.1, pp. 127–148.
- Becchetti, Leonardo et al. (2012). "Corporate social responsibility and shareholder's value". In: *Journal of Business Research* 65.11, pp. 1628–1635.
- Bellucci, Andrea, Alexander Borisov, and Alberto Zazzaro (2010). "Does gender matter in bank–firm relationships? Evidence from small business lending". In: *Journal of Banking and Finance* 34.12, pp. 2968–2984.
- Berger, Allen N, Thomas Kick, and Klaus Schaeck (2014). "Executive board composition and bank risk taking". In: *Journal of Corporate Finance* 28, pp. 48–65.
- Berger, Allen N and Gregory F Udell (1990). "Collateral, loan quality and bank risk". In: *Journal of Monetary Economics* 25.1, pp. 21–42.
- Bertrand, Marianne and Antoinette Schoar (2003). "Managing with style: The effect of managers on firm policies". In: *The Quarterly Journal of Economics* 118.4, pp. 1169–1208.
- Bhojraj, Sanjeev and Partha Sengupta (2003). "Effect of corporate governance on bond ratings and yields: The role of institutional investors and outside directors". In: *The Journal of Business* 76.3, pp. 455–475.
- Blanchflower, David G, Phillip B Levine, and David J Zimmerman (2003). "Discrimination in the small-business credit market". In: *Review of Economics and Statistics* 85.4, pp. 930–943.
- Borghans, Lex et al. (2009). "Gender differences in risk aversion and ambiguity aversion". In: *Journal of the European Economic Association* 7.2-3, pp. 649–658.

- Bottazzi, Laura, Marco Da Rin, and Thomas Hellmann (2016). "The importance of trust for investment: Evidence from venture capital". In: *The Review of Financial Studies* 29.9, pp. 2283–2318.
- Bragdon, Joseph H and JA Marlin (1972). "Is Pollution Profitable?" In: *Risk Management* 19, pp. 9–18.
- Brammer, Stephen and Andrew Millington (2008). "Does it pay to be different? An analysis of the relationship between corporate social and financial performance". In: *Strategic Management Journal* 29.12, pp. 1325–1343.
- Bratten, Brian, Preeti Choudhary, and Katherine Schipper (2013). "Evidence that market participants assess recognized and disclosed items similarly when reliability is not an issue". In: *The Accounting Review* 88.4, pp. 1179–1210.
- Bushee, Brian J and Gregory S Miller (2012). "Investor relations, firm visibility, and investor following". In: *The Accounting Review* 87.3, pp. 867–897.
- Cahan, Steven F et al. (2015). "Corporate social responsibility and media coverage". In: *Journal of Banking & Finance* 59, pp. 409–422.
- Campbell, Kevin and Antonio Mínguez-Vera (2008). "Gender diversity in the boardroom and firm financial performance". In: *Journal of Business Ethics* 83.3, pp. 435–451.
- Cavalluzzo, Ken S, Linda C Cavalluzzo, and John D Wolken (2002). "Competition, small business financing, and discrimination: Evidence from a new survey". In: *The Journal of Business* 75.4, pp. 641–679.
- Charness, Gary and Uri Gneezy (2012). "Strong evidence for gender differences in risk taking". In: *Journal of Economic Behavior and Organization* 83.1, pp. 50–58.
- Chava, Sudheer (2014). "Environmental externalities and cost of capital". In: *Management Science* 60.9, pp. 2223–2247.
- Chemmanur, Thomas J and Paolo Fulghieri (1994). "Investment bank reputation, information production, and financial intermediation". In: *The Journal of Finance* 49.1, pp. 57–79.
- Chen, Haiyang and Ronald P Volpe (2002). "Gender differences in personal financial literacy among college students". In: *Financial Services Review* 11.3, pp. 289–307.
- Chen, Wen et al. (2016). "Cross-Firm Return Predictability and Accounting Quality". In: *Available at SSRN*.
- Cheng, Beiting, Ioannis Ioannou, and George Serafeim (2014). "Corporate social responsibility and access to finance". In: *Strategic Management Journal* 35.1, pp. 1–23.

- Cheng, CS et al. (2015). "Bowling Alone, Bowling Together: Is Social Capital Priced in Bank Loans?" In: *Available at SSRN*.
- Chih, Hsiang-Lin, Hsiang-Hsuan Chih, and Tzu-Yin Chen (2010). "On the determinants of corporate social responsibility: International evidence on the financial industry". In: *Journal of Business Ethics* 93.1, pp. 115–135.
- Clement, Michael B (1999). "Analyst forecast accuracy: Do ability, resources, and portfolio complexity matter?" In: *Journal of Accounting and Economics* 27.3, pp. 285–303.
- Cochran, Philip L and Robert A Wood (1984). "Corporate social responsibility and financial performance". In: *Academy of Management Journal* 27.1, pp. 42–56.
- Collins, Daniel W, Edward L Maydew, and Ira S Weiss (1997). "Changes in the value-relevance of earnings and book values over the past forty years". In: *Journal of Accounting and Economics* 24.1, pp. 39–67.
- Corielli, Francesco, Stefano Gatti, and Alessandro Steffanoni (2010). "Risk shifting through nonfinancial contracts: effects on loan spreads and capital structure of project finance deals". In: *Journal of Money, Credit and Banking* 42.7, pp. 1295–1320.
- Cornett, Marcia Millon, Zabihollah Rezaee, and Hassan Tehranian (1996). "An investigation of capital market reactions to pronouncements on fair value accounting". In: *Journal of Accounting and Economics* 22.1, pp. 119–154.
- Crawford, Steven S, Darren T Roulstone, and Eric C So (2012). "Analyst initiations of coverage and stock return synchronicity". In: *The Accounting Review* 87.5, pp. 1527–1553.
- David, Parthiban, Matt Bloom, and Amy J Hillman (2007). "Investor activism, managerial responsiveness, and corporate social performance". In: *Strategic Management Journal* 28.1, pp. 91–100.
- Dechow, Patricia M and Ilia D Dichev (2002). "The quality of accruals and earnings: The role of accrual estimation errors". In: *The Accounting Review* 77.1, pp. 35–59.
- Dechow, Patricia M, Amy P Hutton, and Richard G Sloan (1996). "Economic consequences of accounting for stock-based compensation". In: *Journal of Accounting Research* 34, pp. 1–20.
- Deng, Xin, Jun-koo Kang, and Buen Sin Low (2013). "Corporate social responsibility and stakeholder value maximization: Evidence from mergers". In: *Journal of Financial Economics* 110.1, pp. 87–109.

- Dennis, Steven A and Donald J Mullineaux (2000). "Syndicated loans". In: *Journal of Financial Intermediation* 9.4, pp. 404–426.
- Deutsche Bank (2016). *Corporate governance: Taking on responsibility in the banking business*, Last Accessed: 2017-08-08. URL: db.com/cr/en/responsible-business/responsible-business.
- Dhaliwal, Dan S et al. (2011). "Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of corporate social responsibility reporting". In: *The accounting review* 86.1, pp. 59–100.
- Dhaliwal, Dan S et al. (2012). "Nonfinancial disclosure and analyst forecast accuracy: International evidence on corporate social responsibility disclosure". In: *The Accounting Review* 87.3, pp. 723–759.
- Drucker, Steven and Manju Puri (2009). "On loan sales, loan contracting, and lending relationships". In: *Review of Financial Studies* 22.7, pp. 2835–2872.
- Durnev, Art, Randall Morck, and Bernard Yeung (2004). "Value-enhancing capital budgeting and firm-specific stock return variation". In: *The Journal of Finance* 59.1, pp. 65–105.
- Durnev, Artyom et al. (2003). "Does greater firm-specific return variation mean more or less informed stock pricing?" In: *Journal of Accounting Research* 41.5, pp. 797–836.
- EC (2015). *Women and men in decision-making*, Last Accessed: 2015-04-13. Securities and Exchange Commission. URL: ec.europa.eu/justice/gender-equality/gender-decision-making/database/index.
- Eccles, Robert G, Ioannis Ioannou, and George Serafeim (2014). "The impact of corporate sustainability on organizational processes and performance". In: *Management Science* 60.11, pp. 2835–2857.
- Eckel, Catherine C and Philip J Grossman (2002). "Sex differences and statistical stereotyping in attitudes toward financial risk". In: *Evolution and Human Behavior* 23.4, pp. 281–295.
- ESS (2015). *European Social Survey*, Last Accessed: 2017-08-08. URL: european-socialsurvey.org.
- Ewing, Jack (2017). *Faster, Higher, Farther: The Volkswagen Scandal*. Norton & Company.
- Fatemi, Ali, Iraj Fooladi, and Hassan Tehranian (2015). "Valuation effects of corporate social responsibility". In: *Journal of Banking & Finance* 59, pp. 182–192.
- Fay, Michael and Lesley Williams (1993). "Gender bias and the availability of business loans". In: *Journal of Business Venturing* 8.4, pp. 363–376.

- Fernandes, Nuno and Miguel A Ferreira (2008). "Does international cross-listing improve the information environment". In: *Journal of Financial Economics* 88.2, pp. 216–244.
- Ferreira, Daniel, Miguel A Ferreira, and Clara C Raposo (2011). "Board structure and price informativeness". In: *Journal of Financial Economics* 99.3, pp. 523–545.
- Ferreira, Miguel A and Paul A Laux (2007). "Corporate governance, idiosyncratic risk, and information flow". In: *The Journal of Finance* 62.2, pp. 951–989.
- Flammer, Caroline (2013). "Corporate social responsibility and shareholder reaction: The environmental awareness of investors". In: *Academy of Management Journal* 56.3, pp. 758–781.
- Fombrun, Charles J, Naomi A Gardberg, and Michael L Barnett (2000). "Opportunity platforms and safety nets: Corporate citizenship and reputational risk". In: *Business and Society Review* 105.1, pp. 85–106.
- Fontecha, Leyre Maiso (2013). "Women on boards". In: *ERA Forum*. Vol. 14. 3. Springer, pp. 315–318.
- Foster, George (1981). "Intra-industry information transfers associated with earnings releases". In: *Journal of Accounting and Economics* 3.3, pp. 201–232.
- Francis, Bill, Iftekhar Hasan, and Qiang Wu (2013). "The impact of CFO gender on bank loan contracting". In: *Journal of Accounting, Auditing and Finance* 28.1, pp. 53–78.
- Francis, Bill et al. (2015). "Gender differences in financial reporting decision making: Evidence from accounting conservatism". In: *Contemporary Accounting Research* 32.3, pp. 1285–1318.
- Francis, Jennifer and Katherine Schipper (1999). "Have financial statements lost their relevance?" In: *Journal of accounting Research* 37.2, pp. 319–352.
- Friede, Gunnar, Timo Busch, and Alexander Bassen (2015). "ESG and financial performance: aggregated evidence from more than 2000 empirical studies". In: *Journal of Sustainable Finance & Investment* 5.4, pp. 210–233.
- Friedman, Milton (1970). "The social responsibility of business is to increase its profits". In: *New York Times*, pp. 122–124.
- Fulmer, C Ashley and Michele J Gelfand (2012). "At what level (and in whom) we trust trust across multiple organizational levels". In: *Journal of Management* 38.4, pp. 1167–1230.
- Giannetti, Mariassunta and Yishay Yafeh (2012). "Do cultural differences between contracting parties matter? Evidence from syndicated bank loans". In: *Management Science* 58.2, pp. 365–383.

- Gits, Frederic, James Watson, and Chris Waterman (2015). "Evaluating Corporate Governance". In: *Fitch Ratings Credit Policy*.
- Glac, Katherina (2014). "The influence of shareholders on corporate social responsibility". In: *Economics, Management and Financial Markets* 9.3, p. 34.
- Gleason, Cristi A, Nicole Thorne Jenkins, and W Bruce Johnson (2008). "The contagion effects of accounting restatements". In: *The Accounting Review* 83.1, pp. 83–110.
- Gneezy, Uri, Muriel Niederle, and Aldo Rustichini (2003). "Performance in competitive environments: Gender differences". In: *The Quarterly Journal of Economics* 118.3, pp. 1049–1074.
- Gollier, Christian and Sébastien Pouget (2014). "The "Washing Machine": Investment Strategies and Corporate Behavior with Socially Responsible Investors". In: *Available at SSRN*.
- Goss, Allen and Gordon S Roberts (2011). "The impact of corporate social responsibility on the cost of bank loans". In: *Journal of Banking & Finance* 35.7, pp. 1794–1810.
- Greening, Daniel W and Daniel B Turban (2000). "Corporate social performance as a competitive advantage in attracting a quality workforce". In: *Business & Society* 39.3, pp. 254–280.
- Grewal, Jyothika, Edward J Riedl, and George Serafeim (2017). "Market Reaction to Mandatory Nonfinancial Disclosure". In: *Available at SSRN*.
- Grewal, Jyothika and George Serafeim (2017). "The Value Relevance of Corporate Sustainability Disclosures: An Analysis of a Dataset from One Large Asset Owner." In: *Harvard Business School Working Paper*.
- GRI (2016). *About GRI*, Last Accessed: 2016-07-25. URL: globalreporting.org/information/about-gri.
- Grunert, Jens, Lars Norden, and Martin Weber (2005). "The role of non-financial factors in internal credit ratings". In: *Journal of Banking & Finance* 29.2, pp. 509–531.
- Guenster, Nadja et al. (2011). "The economic value of corporate eco-efficiency". In: *European Financial Management* 17.4, pp. 679–704.
- Gul, Ferdinand A, Bin Srinidhi, and Anthony C Ng (2011). "Does board gender diversity improve the informativeness of stock prices?" In: *Journal of Accounting and Economics* 51.3, pp. 314–338.
- Günther, T and Michael Grüning (2000). "Einsatz von Insolvenzprognoseverfahren bei der Kreditwürdigkeitsprüfung im Firmenkundenbereich". In: *Betriebswirtschaft Stuttgart* 60.1, pp. 39–59.

- Hasan, Iftekhhar et al. (2017). "Social capital and debt contracting: Evidence from bank loans and public bonds". In: *Journal of Financial and Quantitative Analysis*, pp. 1–31.
- Heal, Geoffrey (2005). "Corporate social responsibility: An economic and financial framework". In: *The Geneva papers on risk and insurance Issues and practice* 30.3, pp. 387–409.
- Healy, Paul M and Krishna G Palepu (2001). "Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature". In: *Journal of Accounting and Economics* 31.1, pp. 405–440.
- Hillman, Amy J and Gerald D Keim (2001). "Shareholder value, stakeholder management, and social issues: what's the bottom line?" In: *Strategic Management Journal* 22.2, pp. 125–139.
- Hoepner, Andreas et al. (2016). "The effects of corporate and country sustainability characteristics on the cost of debt: an international investigation". In: *Journal of Business Finance & Accounting* 43.1-2, pp. 158–190.
- Hong, Harrison and Marcin Kacperczyk (2009). "The price of sin: The effects of social norms on markets". In: *Journal of Financial Economics* 93.1, pp. 15–36.
- Hörter, Steffen (2016). "ESG in Investment Grade Corporate Bonds". In: *Allianz Global Investors*.
- Huang, Hua-Wei, Ena Rose-Green, and Chih-Chen Lee (2012). "CEO age and financial reporting quality". In: *Accounting Horizons* 26.4, pp. 725–740.
- Huang, Jiekun and Darren J Kisgen (2013). "Gender and corporate finance: Are male executives overconfident relative to female executives?" In: *Journal of Financial Economics* 108.3, pp. 822–839.
- Hutton, Amy P, Alan J Marcus, and Hassan Tehranian (2009). "Opaque financial reports, R 2, and crash risk". In: *Journal of Financial Economics* 94.1, pp. 67–86.
- Ioannidou, Vasso and Steven Ongena (2010). "'Time for a change': loan conditions and bank behavior when firms switch banks". In: *Journal of Finance* 65.5, pp. 1847–1877.
- Ioannou, Ioannis and George Serafeim (2010). "The Impact of Corporate Social Responsibility on Investment Recommendations". In: *Academy of Management Proceedings*. Vol. 2010. 1. Academy of Management, pp. 1–6.
- (2014). "The consequences of mandatory corporate sustainability reporting: evidence from four countries". In: *Harvard Business School Research Working Paper* 11-100.

- (2015). “The impact of corporate social responsibility on investment recommendations: Analysts’ perceptions and shifting institutional logics”. In: *Strategic Management Journal* 36.7, pp. 1053–1081.
- Jianakoplos, Nancy Ammon and Alexandra Bernasek (1998). “Are women more risk averse?” In: *Economic Inquiry* 36.4, pp. 620–630.
- Kapstein, Ethan B (2001). “The corporate ethics crusade”. In: *Foreign Affairs*, pp. 105–119.
- Khan, Mozaffar, George Serafeim, and Aaron Yoon (2016). “Corporate sustainability: First evidence on materiality”. In: *The Accounting Review* 91.6, pp. 1697–1724.
- Kim, Moshe, Jordi Surroca, and Josep A Tribó (2014a). “Impact of ethical behavior on syndicated loan rates”. In: *Journal of Banking & Finance* 38, pp. 122–144.
- (2014b). “Impact of ethical behavior on syndicated loan rates”. In: *Journal of Banking & Finance* 38, pp. 122–144.
- Kim, Yongtae, Myung Seok Park, and Benson Wier (2012). “Is earnings quality associated with corporate social responsibility?” In: *The Accounting Review* 87.3, pp. 761–796.
- Kleimeier, Stefanie and Sajid M Chaudhry (2015). “Cultural differences and the structure of loan syndicates”. In: *Finance Research Letters* 15, pp. 115–124.
- Kleimeier, Stefanie and Michael Viehs (2016). “Carbon disclosure, emission levels, and the cost of debt”. In: *Available at SSRN*.
- Koh, Ping-Sheng, Cuili Qian, and Heli Wang (2014). “Firm litigation risk and the insurance value of corporate social performance”. In: *Strategic Management Journal* 35.10, pp. 1464–1482.
- Krüger, Philipp (2015). “Corporate goodness and shareholder wealth”. In: *Journal of Financial Economics* 115.2, pp. 304–329.
- Lauterbach, Karen E and Bryan J Weiner (1996). “Dynamics of upward influence: How male and female managers get their way”. In: *The Leadership Quarterly* 7.1, pp. 87–107.
- Lee, Darren D and Robert W Faff (2009). “Corporate sustainability performance and idiosyncratic risk: A global perspective”. In: *Financial Review* 44.2, pp. 213–237.
- Levitt, Arthur (1998). “The importance of high quality accounting standards”. In: *Accounting Horizons* 12.1, p. 79.

- Lewicki, Roy J, Daniel J McAllister, and Robert J Bies (1998). "Trust and distrust: New relationships and realities". In: *Academy of Management Review* 23.3, pp. 438–458.
- Li, Bin, Shivaram Rajgopal, and Mohan Venkatachalam (2014). "R2 and idiosyncratic risk are not interchangeable". In: *The Accounting Review* 89.6, pp. 2261–2295.
- Lim, Jongha, Bernadette A Minton, and Michael S Weisbach (2014). "Syndicated loan spreads and the composition of the syndicate". In: *Journal of Financial Economics* 111.1, pp. 45–69.
- Lusardi, Annamaria and Olivia S Mitchell (2011). *Financial literacy and planning: Implications for retirement wellbeing*. Tech. rep. National Bureau of Economic Research.
- Margolis, Joshua D, Hillary Anger Elfenbein, and James P Walsh (2007). "Does it pay to be good? A meta-analysis and redirection of research on the relationship between corporate social and financial performance". In: *Ann Arbor* 1001, pp. 48109–1234.
- Margolis, Joshua D and James P Walsh (2003). "Misery loves companies: Rethinking social initiatives by business". In: *Administrative Science Quarterly* 48.2, pp. 268–305.
- Maskara, Pankaj Kumar (2010). "Economic value in tranching of syndicated loans". In: *Journal of Banking and Finance* 34.5, pp. 946–955.
- McKinsey (2011). *Internet Matters: The Net's sweeping impact on growth, jobs, and prosperity*, Last Accessed: 2017-07-17. McKinsey Global Institute. URL: www.mckinsey.com/industries/high-tech/our-insights/internet-matters.
- Mijid, Naranchimeg and Alexandra Bernasek (2013). "Gender and the credit rationing of small businesses". In: *The Social Science Journal* 50.1, pp. 55–65.
- Minichilli, Alessandro, Guido Corbetta, and Ian C MacMillan (2010). "Top management teams in family-controlled companies: 'familiness', 'faultlines', and their impact on financial performance". In: *Journal of Management Studies* 47.2, pp. 205–222.
- Moro, Andrea and Matthias Fink (2013). "Loan managers' trust and credit access for SMEs". In: *Journal of Banking & Finance* 37.3, pp. 927–936.
- Moskowitz (1972). "Choosing Socially Responsible Stocks". In: *Business and Society Review* 1, pp. 71–75.
- Naughton, James, Reining Petacchi, and Joseph Weber (2015). "Public pension accounting rules and economic outcomes". In: *Journal of Accounting and Economics* 59.2, pp. 221–241.

- Neubaum, Donald O and Shaker A Zahra (2006). "Institutional ownership and corporate social performance: The moderating effects of investment horizon, activism, and coordination". In: *Journal of Management* 32.1, pp. 108–131.
- Niederle, Muriel and Lise Vesterlund (2007). "Do women shy away from competition? Do men compete too much?" In: *The Quarterly Journal of Economics* 122.3, pp. 1067–1101.
- Nooteboom, Bart, Hans Berger, and Niels G Noorderhaven (1997). "Effects of trust and governance on relational risk". In: *Academy of Management Journal* 40.2, pp. 308–338.
- Orlitzky, Marc, Frank L Schmidt, and Sara L Rynes (2003). "Corporate social and financial performance: A meta-analysis". In: *Organization Studies* 24.3, pp. 403–441.
- Palvia, Ajay, Emilia Vähämaa, and Sami Vähämaa (2014). "Are female CEOs and chairwomen more conservative and risk averse? Evidence from the Banking Industry during the Financial Crisis". In: *Journal of Business Ethics*, pp. 1–18.
- Peloza, John (2006). "Using corporate social responsibility as insurance for financial performance". In: *California Management Review* 48.2, pp. 52–72.
- Peterson, Kyle, Roy Schmardebeck, and T Jeffrey Wilks (2015). "The earnings quality and information processing effects of accounting consistency". In: *The Accounting Review* 90.6, pp. 2483–2514.
- Piotroski, Joseph D and Darren T Roulstone (2004). "The influence of analysts, institutional investors, and insiders on the incorporation of market, industry, and firm-specific information into stock prices". In: *The Accounting Review* 79.4, pp. 1119–1151.
- Post, Corinne and Kris Byron (2015). "Women on boards and firm financial performance: A meta-analysis". In: *Academy of Management Journal* 58.5, pp. 1546–1571.
- Pouget, Sébastien (2014). "On the Financial Performance of Socially Responsible Investments". In: *Bankers, Markets & Investors* 128, pp. 31–35.
- Preston, Lee E and Douglas P O'bannon (1997). "The corporate social-financial performance relationship: A typology and analysis". In: *Business & Society* 36.4, pp. 419–429.
- Ramanna, Karthik (2008). "The implications of unverifiable fair-value accounting: Evidence from the political economy of goodwill accounting". In: *Journal of Accounting and Economics* 45.2, pp. 253–281.

- Renneboog, Luc, Jenke Ter Horst, and Chendi Zhang (2008). "Socially responsible investments: Institutional aspects, performance, and investor behavior". In: *Journal of Banking & Finance* 32.9, pp. 1723–1742.
- Reuters, Thomson (2015). *Loanconnector*, last accessed August 2015.
- Ring, Peter Smith and Andrew H Van de Ven (1992). "Structuring cooperative relationships between organizations". In: *Strategic Management Journal* 13.7, pp. 483–498.
- Roche, Bruno and Jay Jakub (2017). *Completing Capitalism: Heal Business to Heal the World*. Berrett-Koehler Publishers.
- Roll, Richard (1988). "R2". In: *Journal of Finance* 43.2, pp. 541–566.
- Scholtens, Bert (2006). "Finance as a driver of corporate social responsibility". In: *Journal of Business Ethics* 68.1, pp. 19–33.
- (2009). "Corporate social responsibility in the international banking industry". In: *Journal of Business Ethics* 86.2, pp. 159–175.
- Serafeim, George (2011). "Consequences and institutional determinants of unregulated corporate financial statements: Evidence from embedded value reporting". In: *Journal of Accounting Research* 49.2, pp. 529–571.
- (2014). "Turning a profit while doing good: aligning sustainability with corporate performance". In: *Available at SSRN*.
- Serfling, Matthew A. (2014). "{CEO} age and the riskiness of corporate policies". In: *Journal of Corporate Finance* 25, pp. 251–273. ISSN: 0929-1199. DOI: <http://dx.doi.org/10.1016/j.jcorpfin.2013.12.013>.
- Sharfman, Mark P and Chitru S Fernando (2008). "Environmental risk management and the cost of capital". In: *Strategic Management Journal* 29.6, pp. 569–592.
- Shi, Guifeng and Jianfei Sun (2015). "Corporate bond covenants and social responsibility investment". In: *Journal of Business Ethics* 131.2, pp. 285–303.
- Simpson, W Gary and Theodor Kohers (2002). "The link between corporate social and financial performance: Evidence from the banking industry". In: *Journal of Business Ethics* 35.2, pp. 97–109.
- Sjöström, Emma (2008). "Shareholder activism for corporate social responsibility: what do we know?" In: *Sustainable Development* 16.3, pp. 141–154.
- Stellner, Christoph, Christian Klein, and Bernhard Zwergel (2015). "Corporate social responsibility and Eurozone corporate bonds: The moderating role of country sustainability". In: *Journal of Banking & Finance* 59, pp. 538–549.

- Storey, David J (2004). "Racial and gender discrimination in the micro firms credit market?: Evidence from Trinidad and Tobago". In: *Small Business Economics* 23.5, pp. 401–422.
- Strahan, Philip E (1999). "Borrower risk and the price and nonprice terms of bank loans". In: *FRB of New York Staff Report* 90.
- Stuhlmacher, Alice F and Amy E Walters (1999). "Gender differences in negotiation outcome: a meta-analysis". In: *Personnel Psychology* 52.3, pp. 653–677.
- Sufi, Amir (2007). "Information asymmetry and financing arrangements: Evidence from syndicated loans". In: *Journal of Finance* 62.2, pp. 629–668.
- Surroca, Jordi and Josep A Tribó (2008). "Managerial entrenchment and corporate social performance". In: *Journal of Business Finance & Accounting* 35.5-6, pp. 748–789.
- Turban, Daniel B and Daniel W Greening (1997). "Corporate social performance and organizational attractiveness to prospective employees". In: *Academy of Management Journal* 40.3, pp. 658–672.
- Vähämaa, Emilia (2014). "Executive Turnover, Gender, And Earnings Management: An Exploratory Analysis". In: *Accounting Perspectives* 13.2, pp. 103–122.
- Van Rooij, Maarten, Annamaria Lusardi, and Rob Alessie (2011). "Financial literacy and stock market participation". In: *Journal of Financial Economics* 101.2, pp. 449–472.
- Verheul, Ingrid and Roy Thurik (2001). "Start-up capital: does gender matter?" In: *Small Business Economics* 16.4, pp. 329–346.
- Waddock, Sandra A and Samuel B Graves (1997). "The corporate social performance financial performance link". In: *Strategic management journal*, pp. 303–319.
- WEF (2017). *Renewable Infrastructure Investment Handbook: A Guide for Institutional Investors*. World Economic Forum.
- Williams, Michele (2001). "In whom we trust: Group membership as an affective context for trust development". In: *Academy of Management Review* 26.3, pp. 377–396.
- Wu, Meng-Wen and Chung-Hua Shen (2013). "Corporate social responsibility in the banking industry: Motives and financial performance". In: *Journal of Banking & Finance* 37.9, pp. 3529–3547.
- Wurgler, Jeffrey (2000). "Financial markets and the allocation of capital". In: *Journal of Financial Economics* 58.1, pp. 187–214.
- WVS (2015). *World Values Survey, last accessed August 2015* URL: www.worldvaluessurvey.org.

- Yermack, David (1996). "Higher market valuation of companies with a small board of directors". In: *Journal of Financial Economics* 40.2, pp. 185–211.
- Yu, Susana et al. (2010). "Female executives and earnings management". In: *Managerial Finance* 36.7, pp. 629–645.