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Three Essays on Asymmetric Information, Bank Regulation, and the Optimal Structure of Corporate Debt

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Summary

Asymmetric information and the resulting agency conflicts are key determinants of firms' financing decisions. The impact of asymmetric information on firms' debt financing is subject of an emerging strand of empirical research. This dissertation contributes to this literature by empirically analyzing samples of syndicated loans to borrowing companies worldwide as well as data on firms' mixtures of public and private debt (debt structure).

For a comprehensive, hand-matched sample of syndicated loans, I find evidence suggesting that agency conflicts which result from borrowing firms' opacity lead to more concentrated syndicates of banks. Good creditor rights protection can mitigate this effect. From the lending banks' perspective, different bank regulations across countries are exploited in order to benefit from regulatory arbitrage when granting syndicated loans across borders. With respect to firms' debt structures, I show for a sample of US non-financial firms that companies have target debt structures to which they partially adjust over time. In line with agency theory, opaque firms and firms whose managers have strong equity incentives have higher target bank debt ratios. Managers with high incentive compensation adjust more quickly towards their targets.

Zusammenfassung

Asymmetrische Information und die damit einhergehenden Prinzipal-Agenten-Konflikte beeinflussen die Finanzierungsentscheidungen von Unternehmen. Die jüngste empirische Forschung untersucht speziell den Einfluss von asymmetrischer Information auf Fremdkapitalfinanzierungen. Darauf aufbauend untersucht diese Dissertation Daten zu syndizierten Krediten an Unternehmen auf der ganzen Welt sowie zur Fremdkapitalstruktur von US-Unternehmen.

Ich zeige für eine umfassende Stichprobe von syndizierten Krediten, dass Informationsasymmetrien zu konzentrierten Bankensyndikaten führen. Ein guter rechtlicher Gläubigerschutz kann diesem Effekt entgegenwirken. Zudem finde ich Hinweise, dass kreditgebende Banken Unterschiede in der nationalen Bankenregulierung und -aufsicht nutzen, um bei Auslandskrediten Regulierungsarbitrage zu betreiben. Im Hinblick auf die Zusammensetzung des Fremdkapitals von Unternehmen zeige ich, dass Firmen Zielfremdkapitalstrukturen haben und sich diesen über die Zeit annähern. Dabei enthält die optimale Mischung von Anleihen und Krediten bei intransparenten Firmen und solchen mit starken Eigenkapitalanreizen der Geschäftsführer mehr Bankkredite. Manager mit besonders hoher Aktien- und Aktienoptionsvergütung schließen die Lücke zwischen der tatsächlichen und der Zielfremdkapitalstruktur besonders schnell.

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Nomenclature

APRA	Australian Prudential Regulation Authority
BIS	Bank for International Settlements
BD	bank debt
cf.	confer, compare
CEO	chief executive officer
c.p.	ceteris paribus
CPI	consumer price index
CRD	Capital Requirements Directive
CRSP	Center for Research in Security Prices
e.g.	exempli gratia
EBA	European Banking Authority
EBIT	earnings before interest and taxes
EBITDA	earnings before interest, taxes, depreciation and amortization
EPS	earnings per share
et al.	et alii, and others
etc.	et cetera
EU	European Union
FAS	Financial Accounting Standards
fe	fixed effect
Fed	Federal Reserve System
fren	French legal origin
GAAP	generally accepted accounting principles
GDP	gross domestic product

ger	German legal origin
GLM	generalized linear model
GUO	Global Ultimate Owner
HHI	Herfindahl-Hirschman Index
i.e.	id est
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IBES	Institutional Brokers' Estimate System
ICE	imputation by chained equations
ICRG	International Country Risk Guide
ID	identification, identifier
IFRS	International Financial Reporting Standards
ind.	indicator
IPO	initial public offering
JEL	Journal of Economic Literature
LIBOR	London Interbank Offered Rate
LLSV	LaPorta, Lopez-de-Silanes, Shleifer, Vishny
ln	logarithmus naturalis, natural logarithm
log	logarithm
LPC	Loan Pricing Corporation
max	maximum
NAICS	North American Industry Classification System
no.	number
NPV	net present value
obs.	observations
OECD	Organisation for Economic Co-operation and Development
OLS	ordinary least squares
OSFI	Office of the Superintendent of Financial Institutions

P	percentile
p.	page
p.a.	per annum
pp.	pages
PPE	property, plant, and equipment
PPS	pay-performance sensitivity
Q	quarter
R&D	research and development
ROA	return on assets
S&P	Standard and Poor's Corporation
scan	Scandinavian legal origin
SIC	Standard Industrial Classification
soc	Socialist legal origin
sub.	subordinated
std. dev.	standard deviation
TD	total debt
UK	United Kingdom
US	United States
USA	United States of America
USD	United States Dollars
VIF	variance inflation factor
vs.	versus
WDI	World Development Indicators

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1 Introduction

In 2001, the finance researchers George Akerlof, Michael Spence, and Joseph E. Stiglitz were jointly awarded The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in Economic Science "for their analyses of markets with asymmetric information" Nobel Media AB (2001). Information asymmetries denote situations in which one party has more information than the other. Prominent examples in the context of corporate financing are borrowers who have more information about their creditworthiness than lenders, or managers who have more information about the firm's profitability and risk than shareholders and debtholders. The most fundamental information asymmetry models are adverse selection and moral hazard. In adverse selection models, a less informed party (e.g., a buyer of a product) contracts with an informed party (the seller). The information asymmetry results in an adverse selection of low-quality goods (Nobel Media AB, 2001). A famous example is Akerlof (1970)'s market for lemons. In moral hazard models, one party lacks information on the fulfillment of a contract agreed upon by the other party. A solution to adverse selection problems is presented by Michael Spence, the second Nobel Prize winner. He showed that the informed party can have an incentive to transmit private information to the uninformed party, through costly signaling, to improve their market outcome (Spence, 1973). Another solution to the adverse selection problem was proposed by the third Nobel Prize winner, Joseph E. Stiglitz, who showed that screening by the uninformed party can reveal private information from the informed party and thereby mitigate the adverse selection problem (Nobel Media AB, 2001; Stiglitz, 1975).

Since the early 1970s, based on the discussed fundamental work by Akerlof, Spence, and Stiglitz, a growing strand of research has examined questions of how information asymmetries affect principal-agent problems between shareholders and managers, as well as between shareholders and different kinds of debtholders (inter alia Jensen and Meckling (1976); Myers and Majluf (1984); Parrino and Weisbach (1999)). In this context, banks as debtholders play an important role, because banks as financial intermediaries acquire private borrower information through bank mon-

itoring (Diamond, 1984; Ramakrishnan and Thakor, 1984; Allen, 1990). In addition to this direct effect, firms which borrow from banks build up a reputation by exposing themselves to bank monitoring, which alleviates adverse selection and moral hazard problems when raising financing from other sources as a second step (Diamond, 1991). In this thesis, I empirically examine three research questions related to information asymmetries and agency conflicts in the context of corporate debt financing, especially bank financing. The first research question is how borrowing firms' opacity and country-level creditor rights affect the structure of bank syndicates when firms raise debt through syndicated loans. The second study focuses on lending banks rather than borrowers and examines whether banks benefit from differences in country-level bank regulation and supervision when granting loans to foreign borrowers. This study incorporates the incentives of informed agents (here: the banks) to evade monitoring by state institutions. The third question ties in empirical research on asymmetric information and the choice between public and private debt, analyzing firms' potential target debt structures, their speed of adjustment, and how both are influenced by principal-agent conflicts. The three studies are described in the following.

1.1 Research Questions

1.1.1 Information Asymmetry, Creditor Rights, and Syndicated Loans Worldwide

In the first study of this dissertation, I empirically assess how banks form syndicates when granting syndicated loans, depending on how opaque the borrowing company is and how creditor rights are protected in each respective country. For syndicated loans, the borrowing firm's opacity induces two different agency conflicts. The first conflict arises between the borrower and the syndicate's lead bank, whose task it is to assess the creditworthiness of the borrower, mitigate adverse selection problems, and monitor the borrower after the loan decision is made to prevent moral hazard, i.e., to preclude borrowers from increasing credit risk after the loan is granted (asset substitution, cf. Jensen and Meckling (1976)). The second agency conflict occurs within the syndicate of banks. The lead bank has an information advantage about the quality of the borrower and therefore about the loan. If borrower quality if low, the lead bank has an incentive to keep a small loan share and let the participating banks take on more risk (adverse selection). Moreover, the lead bank has an incentive

to reduce its monitoring effort once the loan is granted if its share in the loan deal is small (moral hazard). As the other syndicate banks anticipate this behavior, lead banks must keep larger loan shares to signal high borrower quality and a strong monitoring effort.

Prior empirical research provides evidence that asymmetric information between borrowers and lenders of syndicated loans is associated with certain syndicate designs. For a sample of US firms between 1994 and 2002, Sufi (2007) finds that lead banks, which lend to more opaque borrowers, keep larger loan shares and form more concentrated bank syndicates with banks geographically closer to the borrower. Ivashina (2009) focuses on loan prices and examines the relationship between lead banks' loan shares, information asymmetries within the syndicate, and loan spreads. Using a sample of syndicated loans to US companies between 1993 and 2004, Ivashina (2009) argues that when determining an optimal syndicate structure, lead banks trade off increasing their loan share as a positive signal to participating banks, versus reducing their loan share for diversification. Ivashina (2009) finds that information asymmetries within bank syndicates are associated with higher lead arranger shares and higher loan spreads. These studies provide empirical evidence based on US samples; however, empirical evidence based on comprehensive international samples is still rare.

Creditor rights protection is another way to mitigate information asymmetry problems in a lending relationship, as banks are less likely to lose money in a credit event when creditor rights are well protected. In this case, costly information acquisition and monitoring by lead banks are less important, and the need of lead banks to keep larger loan shares for signaling is smaller. There are empirical studies about the relationship between creditor rights and bank loans. For a sample of 129 countries, Djankov et al. (2007) find empirical evidence that good creditor rights protection is associated with higher ratios of private credit to GDP. However, contradictory results are found by Vig (2013) in a study of secured lending in India. The author finds that a strengthening in creditor rights comes along with a decrease in the quantity of secured lending, which may be due to extra borrower costs to fulfill stricter regulations. For individual loans, Esty and Megginson (2003), Qian and Strahan (2007) and Bae and Goyal (2009) find empirical evidence that creditor rights, or their enforceability, are associated with longer loan maturities and lower interest rates. Nevertheless, findings about creditor rights and the design of the banking syndicate are not clear. While Esty and Megginson (2003) find that stronger creditor rights are associated with more concentrated syndicates, Qian and Strahan (2007) observe

more concentrated syndicates (implying larger loan shares held as a signal by lead banks) when borrowers are small and opaque. Consequently, information asymmetries and creditor rights both seem to determine the design of bank syndicates when granting syndicated loans, especially for international banks and borrowers.

In my analysis, I accommodate the double influence and examine how information asymmetries in syndicated lending and country-level creditor rights are associated with the structure of bank syndicates. I employ a comprehensive sample of syndicated loans, in 44 countries, granted between 1987 and 2002, and thereby base my analysis on a much larger dataset than previous studies. Extending the research by Qian and Strahan (2007) and Bae and Goyal (2009), I take into account the interaction between country-level creditor rights and firm-level information asymmetries, while I employ sophisticated proxies for firm opacity by using analyst forecast data. I find that lead banks who grant loans to transparent borrowers keep smaller loan shares and form less concentrated syndicates than in the case of opaque borrowers. These findings support moral hazard and adverse selection arguments. Similar results are found for strong, country-level creditor rights protection, suggesting a substitution effect between firm-level borrower transparency and country-level protection of lenders' claims. Moreover, the existence of public credit registries seems to directly mitigate adverse effects of borrower opacity on syndicate structure. The main contributions to empirical research result from the comprehensive dataset and the interaction effect between creditor rights and asymmetric information. Furthermore, insights about bank lending behavior in different countries have gained relevance against the background of the recent financial crisis.

1.1.2 Bank Regulatory Arbitrage in International Syndicated Lending

In the second study of this dissertation, I switch to the banks' perspective being confronted with different regulations and supervision across countries when granting loans internationally. I analyze whether banks benefit from regulatory arbitrage by granting loans via certain entities, such as the parent banks, foreign branches, or subsidiaries. Bank regulation of a foreign affiliate depends on whether it is a subsidiary or a branch. While branches are mostly regulated by the parent bank's home country, foreign subsidiaries are mainly subject to host country regulation

and supervision.[1] As a result, banks in weakly regulated countries may use their competitive advantage to expand their loan business in countries where local banks are regulated more strictly, by lending through the parent bank or foreign branches. Moreover, banks in countries with strong regulation may evade home country regulation by shifting their loan business to foreign subsidiaries.

The relationship between regulation and bank activities has been widely studied in empirical research. Barth et al. (2001) introduce the World Bank dataset on country-level bank regulation and supervision in more than 100 countries, which is utilized in this dissertation in its latest version. In subsequent articles, Barth et al. (2004) find that bank activity restrictions are negatively associated with banking sector development and stability, while regulations that enhance private monitoring of banks are associated with positive outcomes. The authors study the relationships between banking regulations and outcomes in the same country, rather than examining cross-country bank activities. Focusing on cross-border lending between Germany and Austria, Fidrmuc and Hainz (2013) find that differences in bank regulation are associated with easier access to credit for borrowers in spatial proximity to the border. In a worldwide empirical study, Houston et al. (2012) examine how differences in country-level bank regulation influence bank flows across countries. They find that funds flow to countries with weaker bank regulation, especially to developed countries with good creditor rights protection. Moreover, Houston et al. (2012) examine if banks set up foreign branches or subsidiaries based on the level of bank regulation in foreign countries. For some aspects of regulation, Houston et al. (2012) find that banks are more likely to open foreign affiliates when regulation in their home country is strong but is weak in the host country. My analysis builds on the findings of Houston et al. (2012) but additionally differentiates between foreign branches and subsidiaries and takes into account the extent of regulatory differences between the respective countries. This captures the idea that stronger differences in bank regulation and supervision set stronger incentives for regulatory arbitrage.

In my study, I test the hypotheses that (1) it is more likely that a foreign bank grants a loan through a subsidiary in the borrower's country if bank regulation in the borrower's country is weaker than in the foreign bank's home country (regulatory arbitrage), and (2) it is more likely that a foreign bank grants a loan through the parent bank entity or a branch if bank regulation in the bank's home country

[1] Cf. Ongena et al. (2013, p. 729) who refer to the EU Capital Requirements Directive (available under `http://ec.europa.eu/internal_market/bank/regcapital/index_en.htm`), which assigns branches to the parent bank's home country regulation, while subsidiaries are primarily subject to the host country's regulation.

is weaker than in the borrower's country. Moreover, I exploit individual syndicated loan data to test if banks that benefit from regulatory arbitrage, keep larger loan shares, or grant loans with longer maturities and/or lower spreads. Analyzing a sample of syndicated loans granted to borrowers in 102 countries between 1996 and 2012, I find evidence that the likelihood that a bank lends through a subsidiary in the borrower's country increases with the regulatory advantages of the borrower's country, compared with the foreign bank's home country. Consistently, I find that banks prefer to grant loans through the parent bank or a branch if regulation in the borrower's country is stronger than in the bank's home country. Moreover, banks that benefit from cross-country differences in regulation provide larger loan shares in banking syndicates and grant loans with longer maturities. Besides contributing to the discussed strands of literature, these findings have practical relevance against the background of globally integrated financial markets and international bank competition in the syndicated loan business. Moreover, the study contributes to the current debate on tighter post-crisis bank regulation and emphasizes the limitations of single-country efforts to regulate bank activities.

1.1.3 Public Debt vs. Bank Debt: Do Firms Adjust to Optimal Debt Structures?

In the third study of this dissertation, I investigate if firms have target mixtures of public and private debt and how fast they adjust to these potential targets over time. Moreover, I examine if these targets, as well as the target adjustment speeds, differ depending on firms' management incentives and opacity. Several theoretical arguments suggest that firms may have optimal mixtures of private and public debt, when the main difference between debt types is the renegotiation option of private debt (Detragiache, 1994; Hackbarth et al., 2007). On the one hand, the option to renegotiate debt, in case of a credit event, is especially valuable for firms with a high default probability (Detragiache, 1994). This suggests that risky firms have more bank debt in their target debt structures. On the other hand, holding public debt and thereby forgoing this option potentially serves as a signal of creditworthiness to other debtholders. Hackbarth et al. (2007) argue that in the classical trade-off theory of capital structure, firms have optimal debt structures, which depend on a firm's bargaining power in a renegotiation. Moreover, banks have an information advantage compared to bondholders, as they invest in information acquisition when granting the loan and thereby mitigate potential adverse selection. Subsequent bank

monitoring prevents firms from increasing risk at debtholders' expense (asset substitution, cf. Jensen and Meckling (1976)). For these reasons, private debt is assumed to be more important when firms are opaque and when managers' incentives are closely aligned with those of shareholders. Taking transaction costs into account, firms are assumed to partially adjust to their target debt structure over time (following the partial target adjustment arguments of Flannery and Rangan (2006)). Firms whose managers have strong incentives are assumed to adjust more quickly to the optimum than their less-incentivized counterparts.

Recent empirical articles examine the probability that a firm will issue public or private debt, depending on its characteristics (Denis and Mihov, 2003; Gomes and Phillips, 2012; Meneghetti, 2012). Unlike these papers, I estimate a precise target bank debt to total debt ratio for each firm and year, which provides deeper insights into a firm's mix of public and private debt. For this purpose, I apply empirical estimation methods from classical capital structure theory (cf. Flannery and Rangan (2006)). Besides general firm characteristics, firm opacity and management incentives play an important role in a firm's choice between public and private debt. Empirical evidence suggests that managers with high incentive compensation prefer private to public debt. Albring et al. (2011) and Meneghetti (2012) find a positive relationship between CEOs' incentive alignment with shareholders and raising debt via loans rather than issuing public debt. Although the authors argue that incentive compensation increases the risk of asset substitution by management, bank monitoring mitigates this risk (Meneghetti, 2012, p. 65). These empirical findings suggest that firms have more bank debt in their optimal debt structure when management incentives are well aligned with those of shareholders. With respect to firm opacity, Denis and Mihov (2003) find indicative evidence that less opaque firms prefer public debt, whereas more opaque firms tend to choose private debt. For both debt and equity, Gomes and Phillips (2012) find that firms are more likely to raise funds from private sources if information asymmetries are large.

In my study, I empirically show that firms have target debt structures to which the partially move over time. I find that target bank debt ratios are 7-10 percentage points higher for opaque firms and 10-15 percentage points higher for firms whose managers have above-median equity incentives, ceteris paribus. I find that firms close about 50 percent of the gap between their actual and optimal bank debt levels within one year. Firms whose managers have above-average equity incentives adjust faster to their targets, closing yearly about five percentage points more of the gap. In my study, I contribute to both strands of empirical research about firm

opacity, management incentives, and the choice between public and private debt. Moreover, to the best of my knowledge, this paper is the first to estimate the speed of adjustment towards firms' target debt structures and to relate this adjustment speed to management incentives.

1.2 Structure

The dissertation is structured as follows. In Chapter 2, I examine the first research question about the relationship between firm opacity and the structure of bank syndicates lending to these companies, for a unique and comprehensive worldwide dataset. Chapter 3 analyzes regulatory arbitrage, when banks that grant loans internationally benefit from their corporate affiliates abroad. In Chapter 4, I present empirical evidence about a firm's choice between public and private debt, in the context of management incentives and information asymmetry. Chapter 5 offers conclusions, discusses implications, and provides suggestions for future research.

2 Information Asymmetry, Creditor Rights, and Syndicated Loans Worldwide

Abstract

I empirically examine how information asymmetries between borrowers and lenders of syndicated loans, and the legal protection of lender claims, affect the structure of lending syndicates in 44 countries between 1987 and 2012. In line with moral hazard and adverse selection arguments, lead bank lenders to transparent borrowers keep smaller loan shares and form larger and less-concentrated bank syndicates, as opposed to lenders to opaque borrowers. Similar results are found for strong, country-level creditor rights protection, suggesting a substitution effect between firm-level borrower transparency and country-level protection of lenders' claims. In addition, the existence of public credit registries directly mitigates adverse effects of borrower opacity on the syndicate structure.

Keywords: Asymmetric Information, Moral Hazard, Bank Lending, Property Rights, Business Bankruptcy Law
JEL Classification: D82, G21, K11, K22

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2.1 Introduction

Syndicated loans are an important source of corporate financing, with a yearly lending volume of USD 3.2 trillion worldwide in 2012. In the first quarter of 2013, syndicated lending increased by 9.5% compared to Q1, 2012 to a global volume of USD 833.1 billion. Besides volume growth, the market for syndicated loans is increasingly international with US borrowers accounting for only 49% of global lending volumes in 2012, while European loans represented 21%, Asian-Pacific loans 11%, and Japanese loans 10%. In addition, developing and emerging economies play an expanding role with, for example, annual growth rates of, e.g., 12.2% for the Africa/Middle East/Central Asia region in 2012 compared to 2011.[1]

Syndicated loans have been studied in financial research at both the firm and country levels. The relationship between information asymmetries in syndicated loans, loan contract terms, and syndicate structure has been studied in recent articles on opacity. Ivashina (2009) finds that information asymmetries within the syndicate lead to higher lead arranger shares and higher loan spreads. Sufi (2007) investigates how information asymmetries between borrowers and lenders affect syndicate structure and composition. He finds that lead banks form more concentrated syndicates and keep larger loan shares if borrowers are opaque. These studies mostly focus on loans within one country.

Another strand of literature examines the effect of creditor rights on syndicated loans in cross-country studies. For instance, Qian and Strahan (2007) find that syndicates are more concentrated, loan maturities are longer, and interest rates are lower in countries with strong creditor rights. Bae and Goyal (2009) examine the impact of different legal protections on syndicated loan terms. They find that poor contract enforceability leads to smaller loan amounts, shorter maturities, and higher loan spreads. In an event study from India, Vig (2013) shows that a strengthening of creditor rights led to a decrease in total and secured debt, as well as debt maturities. In these studies on creditor rights, borrower-level information asymmetries are not included.

The main contribution of this article is to examine the effects of firm-level information asymmetries on the bank syndicate structure of loans across 44 countries, which opens the opportunity to study the interaction effects of information asymmetries and creditor rights. I thereby link both strands of literature and answer the emerging question of potential substitution effects between transparency and

[1] Cf. Thomson-Reuters (2012, pp. 1-2), Thomson-Reuters (2013, p. 1).

creditor rights protection. In contrast to other studies, I do not limit my sample to special types of syndicated loans or selected countries. In addition, I examine the role of information-sharing agencies for the relationship between opacity and syndicate characteristics.

Agency theory suggests that information asymmetry between borrowers and lead banks induces necessary, but unobservable, due diligence and monitoring effort by the lead arrangers, which causes moral hazard problems within the syndicate. In addition, there is an adverse selection problem of the lead arrangers who (having superior information about the borrowers as compared to the participant banks) have an incentive to syndicate larger loan shares to participants if loans prove to be riskier than expected. The anticipation of moral hazard and adverse selection by the lending syndicate forces lead arrangers to keep larger loan shares in order to signal high borrower creditworthiness and monitoring commitment. Consequently, I expect that loans to opaque borrowers will result in the lead banks forming a more concentrated syndicate and retaining a larger share of the loan, in order to signal creditworthiness and monitoring commitment to the syndicate banks. Moreover, if the legal protection of lenders' claims is weak, the expected loss in the case of a credit event is higher and the probability of a credit event is more uncertain when the borrower is opaque. Therefore, the opacity effect on syndicated loans should be stronger in countries with weak creditor rights.

I regress syndicate structure characteristics on measures of borrower transparency and creditor rights protection across 44 countries. I find that borrower opacity, as well as weak creditor rights, are associated with a larger number of lead arrangers, a more concentrated syndicate, and a larger loan share kept by the lead bank. These findings are robust to controlling for borrowers' credit risk. In addition to creditor rights in written law, I examine the relationship between law enforcement measures and syndicate structure, and find evidence that the relevance of law enforcement varies across countries with different legal origins. Moreover, I find that stronger law enforcement is associated with a smaller number of lead arrangers, a less concentrated syndicate, and a smaller loan share kept by the lead arranger. I draw three main conclusions from these analyses. First, if information asymmetries between the informed lead arranger and participant banks are large, the lead arranger holds a larger loan share in order to signal borrower quality, as well as its monitoring effort, to the participant banks. Second, if lenders' claims are subject to weak legal protection, due diligence and monitoring by the lead arranger are more important compared to the strong creditor rights countries, so that lead arrangers are brought

to signal loan quality and monitoring effort by keeping a larger loan share. Third, there is a substitution effect between borrower transparency and strong creditor rights protection with respect to the lending syndicate structure.

I further examine if the adverse effect of a borrower's opacity on the syndicate structure is mitigated by the existence of credit registries in the borrower's country. Credit registries serve as information-sharing institutions providing potential lenders with information about the borrower. I find that the existence of a public credit registry is associated with smaller lead arranger shares for opaque borrowers. This finding underlines the interaction between firm-level information asymmetry and country-level regulation and institutions.

The paper proceeds as follows: Section 2.2 presents the related strands of literature and recent research on similar research questions. Section 2.3 first discusses the sample selection, matching across databases and creation the final loan sample in Subsection 2.3.1. In Subsection 2.3.2, proxies for country-level creditor rights protection are discussed and presented for the countries where the sample borrowers are located. In Subsection 2.3.3, descriptive statistics combine country-level creditor rights and firm-level borrower opacity with respect to loan contract terms and lending syndicate structures. Section 2.4 presents the regression results. Section 2.5 concludes.

2.2 Literature Review

The effects of firm-level borrower opacity and country-level creditor rights protection on syndicated loans have been studied in two separate, but lately converging, strands of literature.

The first strand of research examines the effects of firm-level information asymmetries between borrowers and lenders on loan contract terms and the lending syndicate. Sufi (2007) examines the impact of borrower opacity on the structure and composition of the lending syndicate. In line with predictions about moral hazard, Sufi (2007, p. 629) finds that lenders to more opaque borrowers keep a larger part of the loan and include a smaller number of participants in the lending syndicate that are closer to the borrower, both geographically and in terms of deal history. Sufi (2007, pp. 642-643) distinguishes three degrees of borrower opacity to which he assigns his sample companies. Most opaque are borrowers who are neither listed on a stock exchange nor rated. Included in the medium-transparent group are the unrated firms that are listed, while the transparent group includes all borrowing

companies that are both rated and listed. Sufi's measure of borrower opacity is applied here. Focusing on pricing, Ivashina (2009, p. 316) estimates the relation among the lead arranger's loan share, information asymmetry within the syndicate, and loan spreads. Ivashina (2009, pp. 300, 317) illustrates that the lead banks trade-off increasing their loan share as a positive signal for mitigating the moral hazard problem arising from information asymmetry within the syndicate against decreasing their loan share for reasons of diversification. As the relationship between the lead bank's share and the cost of debt is endogenous, Ivashina (2009, p. 316) uses shifts in the lead bank's diversification as an instrument to isolate the information asymmetry effect on the lead bank's stake. The author finds that a nine percentage point increase in the lead bank's share is associated with a 29 basis point increase in the loan spread or four percent in total credit costs. Similarly, Wittenberg-Moerman (2009) examines how information asymmetry, as measured by the bid-ask spread of traded loans, influences the maturity and interest rates of subsequently granted loans. She finds that information asymmetries between borrowers and lenders, as well as between secondary loan market participants, increase loan interest rates (Wittenberg-Moerman, 2009). Further, higher borrower opacity is associated with shorter loan maturities. In all three papers from Sufi (2007), Ivashina (2009), and Wittenberg-Moerman (2009), the analyses are based on syndicated loan data from the LPC DealScan database and samples are limited to the United States.

The second strand of research investigates the relationship between country-level creditor rights protection and firms' financing. In their path-breaking papers from 1996, 1997, and 1998, La Porta et al. examine the laws for shareholders and creditor protection in 49 countries, their origins, enforcement, as well as firms' ownership concentrations.[2] La Porta et al. (1997, p. 1131) find that countries with weak protection of investors and lenders have both smaller equity and debt capital markets. These authors' analyses (in the three papers noted above) focused on the country level rather than the borrower level. Advancing the ideas and proxies of La Porta et al. (1998), but focusing on debt financing, Djankov et al. (2007) examine what determines private credit at the country level for an extended sample of 129 countries. Besides the modified proxies from La Porta et al. for legal origin, and for creditor and investor protection, Djankov et al. (2007, pp. 299, 303-304) include another determinant of debt financing, which is the presence of information-sharing institutions in a country. They find that a country's legal origin influences creditor

[2]Cf. for example La Porta et al. (1998, p. 1113), La Porta et al. (1996). For a more detailed description of LSSV's proxies for creditor rights protection, see Section 2.3.2.

rights and information-sharing institutions, which determine the volume of private credit. Better creditor rights protection is associated with higher ratios of private credit to GDP. The idea of analyzing the relationship between information-sharing institutions and lending activity goes back to Jappelli and Pagano (2002), who argue that information-sharing between lenders mitigates the moral hazard and adverse selection problems and, therefore, enhances lending and lowers default rates. Jappelli and Pagano (2002, p. 2017) find more bank lending and lower default rates in countries with either public or private information-sharing institutions, as compared to countries without such institutions. In a more recent event study of a legal creditor rights reform in India, Vig (2013) investigates how a strengthening in creditor protection affects the quantity of secured debt. Vig (2013, pp. 881-882) finds a decrease in secured lending, which contradicts the law and finance argument that there is a positive effect of strong creditor rights on lending. As a possible explanation, Vig (2013, p. 884) suggests that there is an extra cost to borrowers due to stronger creditor rights leads to a decrease in loan demand.

In addition to these strands of literature, there are recent articles that examine loan-level outcomes across countries with unequal protection of creditor rights. Esty and Megginson (2003) investigate the relation between a country's creditor rights and law enforcement, and the structure of lending syndicates, for a sample of 495 project finance loans from 61 countries. Esty and Megginson (2003, p. 37) find that in countries with good creditor rights protection and strong law enforcement, lending syndicates are smaller and more concentrated than in countries with poor creditor rights protection. Similarly, Bae and Goyal (2009) examine how creditor rights and enforceability of debt contracts in 48 countries affect the three aspects of loan contracting: namely, loan size, maturity, and the syndicated loan spread. Even though Bae and Goyal (2009, pp. 824-825) do not find a significant impact of creditor rights on loan contract terms, they find that a country's contract enforceability plays an important role for syndicated loans. Better contract enforceability is associated with larger loans, longer loan maturities, and lower loan spreads.

Qian and Strahan (2007, pp. 2804, 2814-2815) examine how a country's creditor rights influence lending terms for a sample of 4,321 syndicated loans to borrowers in 43 countries, excluding the United States. In line with Esty and Megginson (2003), they find that lending syndicates are more concentrated in countries with strong creditor rights. Moreover, Qian and Strahan (2007, p. 2830) find that stronger creditor rights are associated with longer loan maturities and lower interest rates. In addition, Qian and Strahan (2007, p. 2818) find that the effect of country-level

creditor rights protection on loan terms varies across borrower characteristics. For instance, syndicates are observed to be more concentrated when borrowers are small and opaque (in the sense of not being rated). The authors indicate that borrower opacity might be an important determinant in how creditor rights are associated with syndicated lending terms, but they only marginally touch the issue and thereby motivate further research.

2.3 Dataset and Summary Statistics

2.3.1 Sample Construction and Syndicated Loan Data

The starting point of the sample construction is syndicated loans from Loan Pricing Corporation's (LPC's) DealScan database. DealScan provides detailed information on syndicated loans, especially on credit terms, borrower characteristics, and syndicate structure. I download all 252,521 loan tranches from January 1, 1987 to June 30, 2012, which form 178,663 syndicated loans to borrowers in 164 countries.

In order to obtain firm-level information on the borrower, I match the borrower's parent company from DealScan to Compustat for loans in the United States and from DealScan to Worldscope for non-US loans.[3] For US syndicated loans, I use the updated DealScan-Compustat linking table by Chava and Roberts (2008).[4] For non-US syndicated loans, I manually match the borrower's parent company from DealScan with Worldscope. Matching criteria are company name, industry group, and ticker symbol, if available.

I exclude all observations of borrowers in countries that are not covered by Djankov et al. (2007) and require a minimum of five country-year observations. The observa-

[3] I match the borrower's parent company instead of the borrowing subsidiary itself for two reasons. First, it is common practice that lenders demand a letter of comfort from the borrower's parent company. For this reason, loans are designed and priced based on the parent company's creditworthiness and the creditor rights protection of its home country. In case of a credit event, the lenders make a claim on the parent company (or guarantor, if available), instead of liquidating the assets of the borrowing subsidiary company. Second, if the borrower and its parent differ, the parent company is more often a listed corporation and covered by Compustat and Worldscope. If the country of the matched borrower's parent company, as shown by Compustat/Worldscope, differs from the country of the borrowing subsidiary, as shown in DealScan, the syndicated loan is reassigned to the country where the parent company is headquartered.

[4] See Chava and Roberts (2008): How does Financing Impact Investment? The Role of Debt Covenants, Journal of Finance 2008, 2085-2121 (formerly entitled "Is Financial Contracting Costly? An Empirical Analysis of Debt Covenant Violations"). The updated linking table comprises US syndicated loans in DealScan from 1983 to August 2012 and therefore covers the complete sample period.

tions excluded due to non-coverage by Djankov et al. (2007) (after all other exclusions were conducted), are from Bahrain, Bermuda, British Virgin Islands, Cayman Islands, Cyprus, Estonia, Iceland, Luxembourg, and Qatar. In line with Ivashina (2009, p. 304), I exclude loans to borrowers in regulated industries with primary SIC codes 40-45 and loans to financial firms with primary SIC codes 60-64. Further, I exclude all loan observations for which the SIC code, loan amount, loan maturity, or sales information are missing. The final sample consists of 71,214 syndicated loans to 18,159 borrowers in 44 countries between January 1987 and June 2012. Observations are matched to Compustat or Worldscope, yielding 62,070 loans to 13,421 companies in 44 countries.

Figure 2.1: Geographic and Temporal Distribution of Syndicated Loan Observations

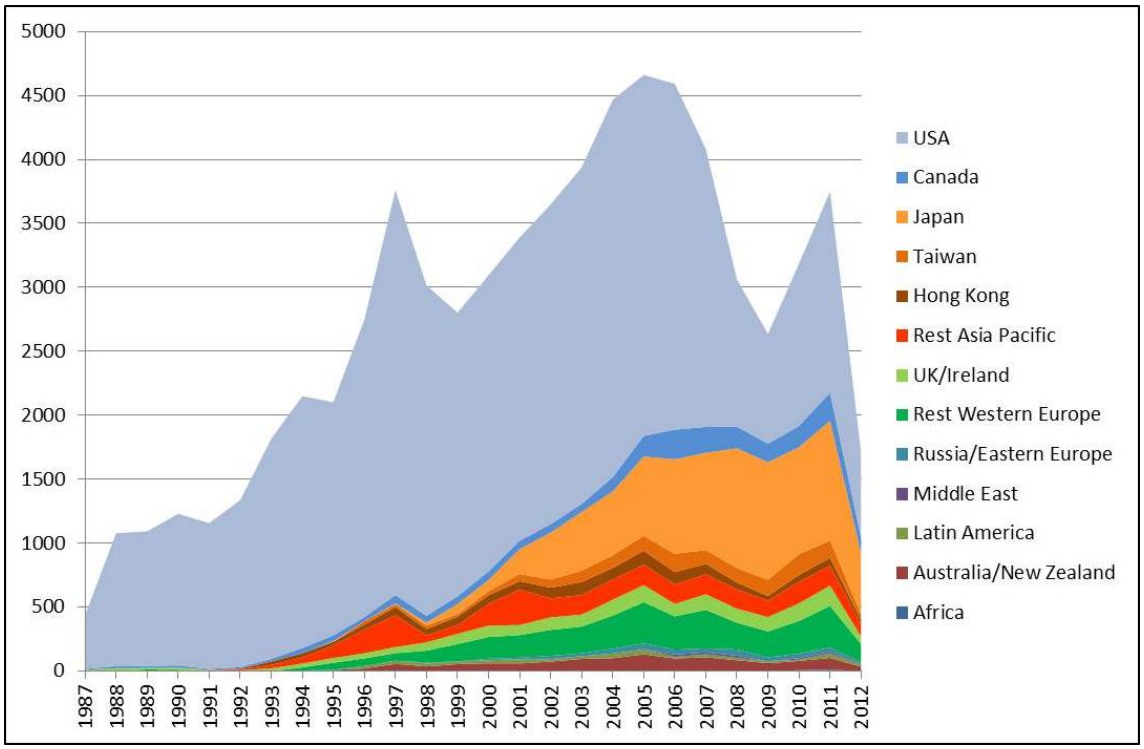

Figure 2.1 shows the geographic distribution of the loan observations over the sample period. Countries are grouped by geographic regions. A complete list of the 44 countries is displayed in Appendix A. Until the late 1990s, syndicated loans from the United States dominate the sample. This can be explained by the fact that the interest of the Loan Pricing Corporation (LPC) until the early 1990s concentrated on the United States.(Bae and Goyal, 2009, p. 826) Especially since 1998/1999, the share of other countries in the sample has continuously increased and outnumbered

the US by 2008 onwards. The main geographic regions besides the US are Japan, Taiwan, Hong Kong and other Asian Pacific countries as well as the UK, Ireland and continental Western Europe. The total sample size peaked between 2004 and 2006 at above 4,500 observations p.a.. After a low point in the financial crisis years 2008/2009, which reduced loan volumes especially in the US, the number of loans has again grown pemanently emphasizing the increasing international relevance of syndicated lending. The drop in the graph in 2012 is due to the fact that only loans until June 2012 were included in the sample.

In total, most observations are loans to firms in the United States that make 67.29% (47,919 loans) of the total sample size. The second largest geographic group are observations from Japan with 11.14% (7,933 loans) of the sample, followed by Canada with 3.07% (2,187 loans), United Kingdom with 2.49% (1,776 loans), Taiwan with 1.94% (1,385 loans), Hong Kong with 1.77% (1,259 loans), and Australia with 1.56% (1,110 loans). The remaining 10.74% (7,645 loans) are distributed among 37 countries worldwide.

The largest industry group in the sample are loans to manufacturing firms (primary SIC codes 2000-3990) with a share of 41.05% (29,232 loans). The second largest group of loans are granted to firms from service industries (primary SIC codes 7000-8900) with 14.19% (10,106 loans) followed by transportation, communications, electrics, gases, and sanitary services (primary SIC codes 4011-4991) with 12.09% (8,609 loans) and retail trade (primary SIC codes 5200-5990) with 7.96% (5,669 loans). The remaining 17,598 loans are granted to companies from all other sectors excluding financial firms and regulated industries.

Table 2.1 presents summary statistics for the final sample of syndicated loan tranches. The mean sales of borrowing companies are USD 4,263 million in the fiscal year that terminates prior to the loan grant. All dollar values are inflation-adjusted and converted to dollar values in the year 2000 using the US consumer price index (CPI). Median sales are USD 523 million. Average (median) total assets amount to USD 10,285 (1,491) million. In the mean (median), borrowing companies hold USD 438 (59) million of cash and have a total debt ratio of 33% (31%). The 71,214 sample loans have a mean (median) principal amount of USD 356.60 (113.79) million and mature after 46.61 (41.45) months. Borrowers pay an average (median) interest rate spread of 239.38 (185) basis points above their base rate, which is LIBOR in most cases. The mean (median) spread paid on drawn funds, including fees, is 203.19 (175) basis points. Here, the all-in spread is less than the spread due to differences in the loan samples for which the respective information is available.

Table 2.1: Summary Statistics of Syndicated Loan Deals

	Obs.	Mean	Std. Dev.	P10	Median	P90
Borrower Characteristics						
Sales (USD million)	71,214	4,262.84	14,718.62	45.83	523.17	9,463.75
S&P Debt Rating Indicator	71,214	0.3830	0.4861			
Borrower Parent Characteristics						
Total Assets (USD million)	42,796	10,284.71	30,008.46	126.50	1,491.20	23,426.83
Cash (USD million)	37,353	437.87	1,399.13	2.34	59.10	940.30
Debt Ratio	42,710	0.3272	0.2263	0.0677	0.3098	0.5784
Syndicated Loan Characteristics						
Loan Amount (USD million)	71,214	356.60	993.68	13.17	113.79	792.33
Maturity (months)	71,214	46.61	32.78	11.97	41.45	83.04
Spread/Margin	54,794	239.38	232.49	37.5	185	455
All-in Spread Drawn	48,586	203.19	148.16	40	175	388
No. of Tranches	71,214	1.45	0.8676	1	1	3
Term Loan Indicator	71,214	0.2787	0.4484			
Secured Loan Indicator	33,945	0.7161	0.4509			
Syndicate Structure						
No. of Lenders per Tranche	71,028	6.2364	7.2431	1	4	15
No. of Lead Arrangers	71,214	1.6050	1.8170	1	1	2
Loan Share kept by Lead	24,805	0.4634	0.3569	0.0909	0.3333	1
Amount kept by Lead	24,805	59.89	176.21	5.17	28.25	118.58

Continued on next page.

Table 2.1 continued

	Obs.	Mean	Std.Dev.	10th	Median	90th
Syndicate Concentration (Herfindahl index)	24,189	0.4669	0.3741	0.0746	0.3333	1
Loan Purpose Indicators						
Corporate Purposes	71,214	0.3885	0.4874			
Debt Repayment	71,214	0.1783	0.3828			
Working Capital	71,214	0.1686	0.3744			
Acquisition-related	71,214	0.1280	0.3341			
Other	71,214	0.1366	0.3434			

The table shows summary statistics for 71,214 sample loans to 18,159 borrowers in 44 countries from January 1987 to June 2012. Loan data is taken from DealScan. Firm-level data (except for sales) comes from Compustat North America for US-based loans and Worldscope for all non-US loans. All firm-level accounting data is from the fiscal year that ended prior to the loan origination. Borrower sales represents the borrower's parent company sales from Compustat/Worldscope or from DealScan, if the former source is not available. Amounts are denominated in USD million. Spread/margin and all-in spread drawn are denominated in basis points above the base rate. The Herfindahl index ranges between zero and one, where one denotes a maximum concentration on one syndicate bank.

On average, loan deals consist of 1.45 tranches, include a term loan in 28% of the cases, and 71.61% are secured.

Summary statistics on the syndicate structure show that the average (median) number of lenders per loan tranche is 6.24 (4). The average syndicate has 1.6 lead banks, which keep 46.34% of the loan amount or USD 59.89 million, while the rest is distributed among participant banks in the syndicate. In the subsample of 24,189 loans (for which all syndicate bank shares in the loan are available), I compute the Herfindahl index, which measures the concentration of the loan amount holdings in the syndicate, as the sum of the squared shares of all syndicate banks in the loan. The value ranges between zero and one, where one denotes perfect concentration of the loan on a single syndicate bank. In the mean (median), the Herfindahl index yields 0.4669 (0.3333). The majority of 38.85% of sample loans is used for unspecified corporate purposes, 17.83% is used to repay debt falling due, 16.86% is used for working capital purposes, and 12.8% is needed in the context of mergers and acquisitions.

2.3.2 Country-level Creditor Rights Protection

There are several accepted proxies for country-level creditor rights and their protection in the finance literature. As discussed by La Porta et al. (1998, p. 1122), Reynolds and Flores (1989) set the literature cornerstone with their classification of countries according to the legal origin of company law or commercial code. Their classification was employed by La Porta et al. and thereby introduced in the finance literature on country creditor rights. La Porta et al. (1998) and their previous papers use four legal families: namely, countries with English common law, French commercial code, German commercial code, or Scandinavian civil law. Djankov et al. (2007, p. 306) add a Socialist legal origin. La Porta et al.'s legal families are still widely used in recent research on the relation between country creditor rights and syndicated loans, such as Jappelli and Pagano (2002) and Qian and Strahan (2007). As previous research like La Porta et al. (1998, p. 1138) has shown, the legal origin matters when looking at creditor rights. English common law countries usually have greater creditor rights protection, while French civil law countries are associated with weaker creditor rights (La Porta et al., 1998).

Together with countries' classifications by legal origin, La Porta et al. (1996, 1997, 1998) established their creditor rights index in financial research. As described by La Porta et al. (1998, p. 1124), the index adds one point if restrictions exist

when a company wants to file for reorganization (e.g., creditor consent) and another point if there is no automatic stay on assets (meaning that secured creditors can take possession of their collateral once the reorganization petition is approved). A third point is given if secured creditors are the first to settle their claims from the bankrupt firm's sale of assets and a fourth point is added if the old management does not stay during the reorganization. The index ranges between zero and four, with four representing the best creditor rights score. La Porta et al. (1998, pp. 1136-1137) construct the creditor rights index for 47 of their 49 sample countries. Mainly following La Porta et al. (1998), Djankov et al. (2007, pp. 299, 302) extend the creditor rights dataset to 129 countries and compute the creditor rights index in an unbalanced panel for every January between 1978 and 2003. Their version of the creditor rights score has been adopted in subsequent research: for example, by Bae and Goyal (2009). Applying La Porta et al.'s creditor rights index, Qian and Strahan (2007, pp. 2808-2809, 2830) find that strong creditor rights protection is associated with more concentrated lending syndicates, longer loan maturities, and lower interest rates.

Besides proxies of creditor rights, there exist various measures for the quality of law enforcement. Berkowitz et al. (2003, p. 182) measure a country's law and order tradition based on five enforcement variables: namely, efficiency of the judiciary, rule of law, absence of corruption, risk of expropriation, and risk of contract repudiation. As presented by La Porta et al. (1998, pp. 1124-1125), these five enforcement variables are provided by the International Country Risk Guide (ICRG) and index an assessment of the respective risk on a scale from zero to ten, with lower scores reflecting a higher risk (i.e., a lower law enforcement quality). Bae and Goyal (2009, p. 857) aggregate three of the five enforcement variables - corruption, risk of contract repudiation, and risk of expropriation - into their property rights index. Bae and Goyal (2009, pp. 824, 826) find that weak contract enforceability is associated with more concentrated syndicates, longer loan maturities, and higher loan amounts. These findings suggest that the quality of legal enforcement has a similar impact on syndicated lending as firm-level transparency towards outside lenders. An additional proxy for legal enforcement quality was introduced by Djankov et al. (2007, p. 303) who estimated the number of days it takes to enforce a debt contract worth 50% of the country's GDP per capita through courts. Their estimates are available for January 2003.

The third group of proxies refers to a country's infrastructure with respect to the availability of information about borrowers to potential lenders. Jappelli and Pagano

(2002, p. 2032) collect data on the existence of either a private or public credit registry and the kind of borrower information the respective registry provides to potential lenders. Based on data by Jappelli and Pagano (2002), Qian and Strahan (2007, p. 2810) employ an information-sharing indicator that equals one if there is either a private or public credit registry in the respective sample country. Djankov et al. (2007, pp. 302-303) follow the same approach and extend the sample to 133 countries. As a country's good infrastructure for information-sharing partially solves the problem of borrower opacity for potential future lenders - given their is a credit history for the respective borrower - it can be expected that the availability of information-sharing registries is a substitute for firm-level transparency towards lenders. For borrowing companies with a high degree of firm-level transparency, the presence of a credit registry is supposed to be dispensable for lenders and therefore is expected to have no or only a small impact on syndicaed lending terms.

Table 2.2 shows the values of the creditor rights proxies for all sample countries. Loans are granted to borrowers in 15 countries with an English legal origin, 4 countries with a Scandinavian legal origin, 15 countries with a French legal origin, and 9 countries with a German legal origin. There is only one country (Russia) with a Socialist legal origin. Public registry denotes a public information-sharing agency where potential lenders can gather information about borrowers. These public credit registries are especially prevalent in countries with a French legal origin, but are not found at all in countries with Scandinavian or Socialist legal roots. Private bureau denotes a private credit agency. These bureaus are located in all sample countries except Belgium, China, India, Indonesia, Russia, and Saudi Arabia.

Table 2.2: Legal Origin, Creditor Rights, and Law Enforcement across Sample Countries

Country	public registry	private bureau	creditor rights	property rights	rule of law	contract enforcement
English legal origin:						
Australia	no	yes	3	27.5	6	157
Canada	no	yes	1	26.5	6	346
Hong Kong	no	yes	4	24.67	4.5	211
India	no	no	2	21.5	4	425
Ireland	no	yes	1	25.83	6	217
Israel	no	yes	3	24.83	5	585
Malaysia	yes	yes	3	22.17	3	300

Continued on next page.

Table 2.2 continued

Country	public registry	private bureau	creditor rights	property rights	rule of law	contract enforcement
New Zealand	no	yes	4	29.17	6	50
Pakistan	yes	yes	1	20.5	3	395
Saudi Arabia	yes	no	3	21.33	5	360
Singapore	no	yes	3	27.5	5	69
South Africa	no	yes	3	22.75	1.75	277
Thailand	no	yes	2	21.5	2.5	390
United Kingdom	no	yes	4	27.5	6	288
United States	no	yes	1	26.67	5	250
Mean English origin:			*2.53*	*24.66*	*4.58*	*288*
Scandinavian legal origin:						
Denmark	no	yes	3	29.17	6	83
Finland	no	yes	1	30	6	240
Norway	no	yes	2	28.33	6	87
Sweden	no	yes	1	29.17	6	208
Mean Scandinavian origin:			*1.75*	*29.17*	*6*	*154.5*
French legal origin:						
Argentina	yes	yes	1	23.17	1.5	520
Belgium	yes	no	2	26.67	5	112
Brazil	yes	yes	1	24.67	1.5	566
Chile	yes	yes	2	23.17	5	305
France	yes	no	0	25	4.5	75
Greece	no	yes	1	23.17	3	151
Indonesia	yes	no	2	20.67	2	570
Italy	yes	yes	2	23.17	3.25	1,390
Kuwait	no	yes	3	21.33	5	390
Mexico	no	yes	0	22.33	2	421
Netherlands	no	yes	3	28.33	6	48
Philippines	no	yes	1	22.33	2	380
Portugal	yes	yes	1	25.83	5	320
Spain	yes	yes	2	25.83	4.5	169
Turkey	yes	yes	2	20.75	4.25	330
Mean French origin:			*1.53*	*23.76*	*3.63*	*383.13*

Continued on next page.

Table 2.2 continued

Country	public registry	private bureau	creditor rights	property rights	rule of law	contract enforcement
German legal origin:						
Austria	yes	yes	3	28.33	6	374
China	yes	no	2	22.33	4.5	241
Czech Republic	yes	yes	3	24.17	5	300
Germany	yes	yes	3	27.08	5	184
Japan	no	yes	2	25.83	5	60
Poland	no	yes	1	23.33	4	1,000
South Korea	no	yes	3	24.17	4.5	75
Switzerland	no	yes	1	26.5	5	170
Taiwan	yes	yes	2	25	4	210
Mean German origin:			*2.22*	*25.19*	*4.78*	*290.44*
Socialist legal origin:						
Russian Federation	no	no	2	18.08	4	330
Overall mean:			*2.05*	*24.72*	*4.41*	*309.75*
Overall standard deviation:			*1.02*	*2.83*	*1.39*	*244.03*

The table shows country-level proxies for information sharing among lenders, legal creditor rights, and law enforcement in the countries where the sample loan borrowers are located. Public registry and private bureau mean that there is an information-sharing agency that is either publically or privately run, as of 2003. The creditor rights index measures the rights of secured lenders in cases of borrower bankruptcy. It ranges between 0 and 4, with higher scores representing stronger creditor rights. Property rights are an additive score that is comprised of three equally weighted indices: namely, corruption, risk of expropriation, and risk of contract repudiation by the government. The score ranges from 0 to 30, with higher values reflecting more respect towards private property. The rule of law score varies between 0 and 6, with higher values reflecting a stronger law-and-order tradition. Days to contract enforcement measures the number of days it takes to enforce a simple debt contract through a country's legal system.

The third column in Table 2.2 displays the creditor rights index computed by Djankov et al. (2007), as of 2003. The score shows a maximum value of four for Hong Kong, New Zealand, and the UK, indicating legally well-established rights of the secured debtholders. The weakest creditor rights with a score of zero are found

in France and Mexico. In general, creditor rights scores are lower for French civil law countries. The score of one for the United States was already discussed in the paper by Djankov et al. (2007, p. 304). They state that the United States only attained one point for secured lenders being paid first in the case of borrower bankruptcy. The other three points are not given, as there are no restrictions when companies file for reorganization, there is an automatic stay on assets, and the old management remains during a reorganization.

The fourth column in Table 2.2 shows the additive property rights score, which is calculated based on the method of Bae and Goyal (2009), using data from the International Country Risk Guide (ICRG). The property rights index ranges between zero and 30, with high values indicating high levels of respect towards private property. High scores are found in the Scandinavian countries, such as Finland with a maximum of 30 points, and New Zealand (29.17 points), followed by the Netherlands and Austria (28.33 points). The lowest values for property rights are found in Russia (18.08 points), Pakistan (20.5 points), and Indonesia (20.67 points).

Column 5 in Table 2.2 shows the sample country scores for rule of law. The proxy ranges between zero and six, with high values indicating a stronger rule of law, i.e. a strong law-and-order tradition. Rule of law shows high scores in the Scandinavian countries, Australia, New Zealand, UK, and Canada (with the maximum score of six). There is only one French civil law country (the Netherlands) and one German law country (Austria) that also attain the maximum score. The weakest rule of law score is found in Argentina and Brazil, with a value of 1.5, as well as in South Africa, with a value of 1.75. South Africa has a creditor rights score of 3, but a weak rule of law, suggesting that not only written law, but also enforcement, is a relevant aspect of creditor rights protection. The last column of Table 2.2 shows the number of days required to enforce a simple debt contract through a country's legal system. The data is provided by Djankov et al. (2007) and refers to the year 2003. Lenders' claims are enforced the fastest in the Netherlands (where is takes 48 days), followed by New Zealand (50 days), Japan (60 days), and Singapore (69 days). Lenders wait the longest in Italy (1,390 days or 3.8 years) and Poland (1,000 days or 2.7 years). The mean duration of debt contract enforcement across all countries is 309.75 days.

Table 2.3: Cell Means by Measures of Information Asymmetry and Creditor Rights

	opaque	transparent	weak creditor rights	strong creditor rights
Loan Characteristics				
borrower sales (USD million)	2,830.26 (48.75)	8,896.73 (167.37)	3,339.97 (58.50)	6,846.96 (128.90)
loan amount (USD million)	216.74 (2.67)	808.99 (12.58)	357.12 (3.94)	355.13 (8.85)
maturity (months)	46.48 (0.14)	47.05 (0.24)	46.77 (0.14)	46.16 (0.27)
multiple tranches indicator	0.30 (0.002)	0.28 (0.004)	0.32 (0.002)	0.23 0.003)
loan includes term tranche	0.32 (0.002)	0.14 (0.003)	0.21 (0.002)	0.46 (0.004)
Syndicate Structure				
no. of lead arrangers	1.59 (0.01)	2.04 (0.04)	1.31 (0.01)	2.91 (0.05)
by loan size:				
- smallest 1/3	1.13	1.09	1.03	1.35
- middle 1/3	1.40	1.32	1.20	1.95
- largest 1/3	2.29	2.31	1.81	3.91
no. of lenders per tranche	5.35 (0.05)	12.76 (0.14)	6.56 (0.06)	8.16 (0.10)
if loan shares reported:				
lead arranger loan share	0.55 (0.003)	0.24 (0.004)	0.53 (0.003)	0.32 (0.003)
lead arranger loan amount	42.49 (0.83)	104.79 (3.51)	55.86 (1.03)	55.53 (2.68)
Herfindahl index	0.52 (0.003)	0.21 (0.004)	0.50 (0.003)	0.28 (0.003)

The table shows estimated means and standard errors by measure of firm opacity and creditor rights protection for 71,214 sample loans from January 1987 to June 2012. Opaque denotes the subsample of loans to borrowers that are classified as private or unrated: i.e., that are neither rated nor listed or listed but unrated. Transparent classifies the residual group of loans to listed and rated borrowers. Weak creditor rights group sample loans in countries with a creditor rights score of 0 or 1, while strong creditor rights have a score of 2 to 4. The Herfindahl index measures the concentration of loan holdings in the syndicate and ranges between 0 and 1. Standard errors are reported in parentheses.

2.3.3 Borrower Opacity, Creditor Rights, and Syndicated Loans

In this section, loan contract terms and syndicate structure are related to borrower opacity and country creditor rights, using mean estimations. Table 2.3 shows the estimated cell means of sample loan characteristics and syndicate structure variables grouped by firm-level opacity and country-level creditor rights. "Opaque" denotes loans to borrowers that are either classified as private (i.e., having neither a rating nor a stock listing) or unrated (i.e., having a listing but no rating). "Transparent" classifies the residual group (i.e., loans to borrowers with both a rating and listing). These groups are introduced by Sufi (2007, pp. 644, 649) who also aggregates the private and unrated companies to form the "opaque" group. "Weak creditor rights" group loans to borrowers in countries with a creditor rights score of 0 or 1 (out of 4), while "strong creditor rights" identifies the residual group of loans in countries with a creditor rights score of 2 to 4.

In line with more cautious lending in uncertain environments, Table 2.3 shows that loans to opaque borrowers with a mean notional amount of USD 217 million are significantly smaller than loans to transparent firms whose mean loan amount is USD 809 million. The mean maturities of loans to opaque firms are half a month shorter (46.5 months) as compared to 47 months for transparent borrowers. Further, loans to opaque firms are split into multiple tranches more often and borrowers are smaller, as measured by sales. For loans to countries with weak versus strong creditor rights, I find a similar relationship. Loans in weak creditor rights countries are split into multiple tranches more often and are granted to smaller borrowers. Loan notional amounts and maturities do not significantly differ between high and low creditor protection countries. These findings are in line with theoretical considerations: that is, loans to opaque borrowers are associated with higher uncertainty of the lead arranger in assessing the borrowers' creditworthiness. This problem worsens in countries where creditor rights are poorly protected and a misjudgment by the lead bank would result in more severe losses.

Regarding the syndicate structure, Table 2.3 shows that the mean loan share kept by the lead arranger is significantly larger for opaque borrowers (55%) as compared to transparent borrowers (24%). The same holds true for loans in countries with poor creditor rights, where the lead bank holds 53% compared to 32% in countries with good creditor protection. The number of both lead banks and participant banks is smaller for loans associated with opacity and weak creditor rights, while

the number of lead arrangers seems to depend on loan size. The Herfindahl index, which measures the concentration of loan holdings within the syndicate and ranges between zero and one, is significantly higher for opaque borrowers and countries with weak creditor rights protection. This suggests that the lead banks that are confronted with opaque borrowers, especially in countries with poor legal protection, form more concentrated syndicates and keep larger loan shares in order to reduce information asymmetry problems within the syndicate.

2.4 Empirical Results

2.4.1 Borrower Transparency, Country-level Creditor Rights, and Syndicate Structure

Table 2.4 shows the coefficient estimates from regressing characteristics of the lending bank syndicate on borrower transparency, country-level creditor rights scores, and controls for 24,744 loans. In column one, the number of lead arranger banks in the lending syndicate is regressed on borrower transparency, the creditor rights index, and controls. The number of lead arrangers is significantly smaller if borrowers are transparent rather than opaque. The creditor rights coefficient is positive (0.478) and statistically significant at the ten percent level, indicating that a one standard deviation increase in creditor rights is associated with an expected 0.49 increase in the number of lead arranger banks for opaque borrowers and 1.59 for transparent borrowers. This result is in line with the outcomes of the mean estimations in Table 2.3. Column two of Table 2.4 regresses the total number of lenders as a proxy for syndicate size on the same regressors. The coefficient for the transparent indicator shows that bank syndicates are about three banks larger if borrowers are transparent and that banks form smaller syndicates if information asymmetries are large. Here, the coefficients on creditor rights are not significant.

Columns three and four of Table 2.4 analyze the relationship between borrower transparency, creditor rights, and the magnitude of the lead arranger's loan share that might serve as a signal to participant banks in the cases of high information asymmetry or legal uncertainty. In column three, the natural logarithm of the loan amount that is kept by the lead arranger bank is the dependent variable. In line with agency theory arguments, the loan amount kept by the lead arranger is smaller if the borrower is transparent: that is, if information asymmetries are small. A strengthening of creditor rights reduces the lead arranger's loan amount

Table 2.4: Syndicate Structure, Borrower Transparency, and Creditor Rights

	no. of lead arrangers	no. of lenders	ln(amount kept by lead)	loan share kept by lead	Herfindahl index
regression model	OLS	OLS	OLS	GLM	GLM
transparent firm	-1.191***	3.041***	-0.291***	-0.493***	-0.570***
	(0.518)	(1.028)	(0.0795)	(0.159)	(0.143)
				[-0.123***]	[-0.141***]
creditor rights	0.478**	0.529	-0.0908**	-0.227*	-0.269*
	(0.198)	(0.404)	(0.0449)	(0.119)	(0.159)
				[-0.0564*]	[-0.0666*]
creditor rights*transparent	1.081**	-0.776	0.0913*	0.381***	0.487***
firm	(0.452)	(0.727)	(0.0531)	(0.143)	(0.166)
				[0.0949***]	[0.121***]
ln(borrower sales)	0.0474	0.0182	-0.0136	-0.0191	-0.0002
	(0.0460)	(0.175)	(0.0119)	(0.0224)	(0.0215)
ln(loan amount)	0.266	2.841***	0.682***	-0.697***	-0.784***
	(0.180)	(0.164)	(0.0171)	(0.148)	(0.161)
ln(loan amount)*middle	-0.0971**	-0.354***	-0.0011	-0.0653***	-0.0698***
	(0.0400)	(0.110)	(0.0060)	(0.0082)	(0.0075)
ln(loan amount)*large	-0.0706**	-0.149***	-0.0145***	-0.0500***	-0.0546***
	(0.0342)	(0.0493)	(0.0032)	(0.0079)	(0.0074)
ln(maturity in months)	0.0440	0.327*	-0.0827***	-0.212***	-0.212***
	(0.0708)	(0.182)	(0.0125)	(0.0405)	(0.0459)
multiple tranches	0.161	-0.0400	0.158***	0.415***	0.471***
	(0.100)	(0.216)	(0.0367)	(0.0702)	(0.0756)
term loan indicator	0.246	0.438	-0.0825	-0.137	-0.0965
	(0.161)	(0.357)	(0.0628)	(0.0892)	(0.0937)

Continued on next page.

Table 2.4 continued

	no. of lead arrangers	no. of lenders	ln(amount kept by lead)	loan share kept by lead	Herfindahl index
regression model	OLS	OLS	OLS	GLM	GLM
loan purpose fe	Yes	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes	Yes
constant	-1.008	-7.872***	1.042***	5.052***	5.333***
	(0.812)	(0.882)	(0.103)	(0.954)	(0.957)
observations	24,744	24,744	24,706	24,744	22,407
max VIF	5.87	5.87	5.87		
R-squared	0.265	0.476	0.776		

The table shows coefficient estimates from regressing bank syndicate structure characteristics on borrower transparency, country creditor rights, and controls. Transparent firm is an indicator equal to one if the firm is both listed and rated. The creditor rights index measures the rights of secured lenders in the case of borrower bankruptcy. It ranges between 0 and 4, with higher scores representing stronger creditor rights. Columns (1) to (3) display OLS regression results, while columns (4) and (5) report GLM regression results. Margins at the mean are reported in square brackets. Max VIF denotes the maximum variance inflation factors, excluding the factors for year, industry, and loan purposes. Using OLS, robust standard errors are two-way clustered at the country and borrower levels. Using GLM, robust standard errors are clustered at the country level. Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Table 2.5: Identification of Country Effects: Syndicate Structure, Borrower Transparency, and Creditor Rights

	no. of lead arrangers	no. of lenders	ln(amount kept by lead)	loan share kept by lead	Herfindahl index
regression model	OLS	OLS	OLS	GLM	GLM
transparent firm	-1.196***	2.940***	-0.286***	-0.427*	-0.391*
	(0.398)	(1.121)	(0.0966)	(0.252)	(0.231)
				[-0.106*]	[-0.0970*]
creditor rights*transparent	1.157***	-0.564	0.0571	0.233**	0.229**
firm	(0.312)	(0.760)	(0.0539)	(0.118)	(0.0891)
				[0.0581**]	[0.0568**]
controls as in Table 2.4	Yes	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes	Yes
country fe	Yes	Yes	Yes	Yes	Yes
constant	-0.105	-6.868***	0.904***	4.887***	5.202***
	(0.537)	(0.778)	(0.107)	(0.916)	(0.869)
observations	24,744	24,744	24,706	24,744	22,407
max VIF	6.46	6.46	6.46		
R-squared	0.388	0.499	0.790		

The table shows coefficient estimates from regressing bank syndicate structure characteristics on borrower transparency, the transparency-country creditor rights interaction term, country indicators, and controls, as in Table 2.4. Columns (1) to (3) display OLS regression results, while columns (4) and (5) report GLM regression results. Margins at the mean are reported in square brackets. Max VIF denotes the maximum variance inflation factors excluding factors for year, industry, and loan purposes. Using OLS, robust standard errors are two-way clustered at the country and borrower levels. Using GLM, robust standard errors are clustered at the country level. Standard errors are reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

for opaque borrowers, while there is no difference for transparent borrowers. This finding suggests that there is a substitution effect between firm-level transparency and country-level creditor rights protection in the design of lending syndicates. In column four, the loan share kept by the lead arranger is regressed on borrower transparency, creditor rights, and controls by applying GLM.[5] The marginal effects show that the loan share kept by the lead arranger is 12.3% smaller if borrowers are transparent. An increase in country-level creditor rights by one standard deviation is associated with a 3.9 percentage-point increase in the lead arranger share for transparent borrowers and a 5.8 percentage-point decrease in the lead share for opaque borrowers. Again, strong country-creditor rights and firm-level transparency seem to be substitutes for each other with respect to borrower size. Regarding magnitude, the increase in the lead arranger share for opaque borrowers would be compensated by a two-point increase in the creditor rights score.

In the last column of Table 2.4, syndicate concentration is regressed on borrower transparency, creditor rights, and controls. In line with agency theory and the findings of Sufi (2007, p. 647), the syndicate of banks is less concentrated if borrowers are transparent. An increase in creditor rights protection is associated with a decrease in syndicate concentration for opaque borrowers, supporting the substitution hypothesis of firm-level transparency and country-level creditor rights. For transparent borrowers, stronger creditor rights are associated with an increase in syndicate concentration.[6]

As the results in Table 2.4 could be driven by country-specific factors and the creditor rights index does not fully control for country fixed effects, Table 2.5 shows the same regressions as Table 2.4, including country indicators. The creditor rights index is excluded to prevent collinearity, though controlling for country fixed effects allows for the inclusion of the creditor rights-transparency interaction term. As Table 2.5 shows, the results from Table 2.4 are robust to controlling for country-specific effects.

Addressing concerns that differences in syndicate structure might also be determined by borrower risk, Tables 2.6 and 2.7 include additional proxies for the credit risk of the borrowers, as proposed by Bae and Goyal (2009): namely, firm size,

[5]Because the dependent variable is bounded between zero and one, I apply the generalized linear model (GLM) and additionally display margins at the mean in square brackets.

[6]Note that results in columns four and five are robust to conducting a logit transformation on the dependent variable and applying OLS regressions. In this inferior approach, observations for which the dependent variable is exactly zero or one are lost, which significantly reduces the sample size and range of possible values for the dependent variable. Regression coefficients are economically slightly smaller, but still statistically significant.

Table 2.6: Controlling for Credit Risk: Lead Arranger Share, Borrower Transparency, and Creditor Rights

	(1)	(2)	(3)	(4)	(5)	(6)
transparent firm	-0.492***	-0.527***	-0.478***	-0.522***	-0.211	-0.515***
	(0.161)	(0.154)	(0.148)	(0.156)	(0.185)	(0.163)
	[-0.109***]	[-0.117***]	[-0.105***]	[-0.116***]	[-0.0443]	[-0.113***]
creditor rights	-0.163*	-0.167*	-0.153	-0.161*	0.0378	-0.156*
	(0.0977)	(0.0957)	(0.0950)	(0.0922)	(0.0724)	(0.0916)
	[-0.0360*]	[-0.0369*]	[-0.0335]	[-0.0358*]	[0.0079]	[-0.0342*]
creditor rights*	0.289**	0.294**	0.280**	0.290**	0.0358	0.282**
transparent firm	(0.114)	(0.115)	(0.112)	(0.113)	(0.0791)	(0.111)
	[0.0638**]	[0.0652**]	[0.0613**]	[0.0644**]	[0.0075]	[0.0620**]
ln(total assets)	0.0028					0.0029
	(0.0318)					(0.0335)
	[0.0006]					[0.0006]
profitability		-0.0449				-0.0656
		(0.129)				(0.128)
		[-0.010]				[-0.0144]
leverage			-0.0346			-0.0585
			(0.0661)			(0.0668)
			[-0.0076]			[-0.0128]
asset tangibility				-0.124		-0.0923
				(0.116)		(0.0956)
				[-0.0276]		[-0.0203]
growth					0.0063	
					(0.0122)	
					[0.0013]	

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Table 2.6 continued

	(1)	(2)	(3)	(4)	(5)	(6)
controls as in Table 2.4	Yes	Yes	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes	Yes	Yes
constant	3.609***	3.601***	3.428***	3.606***	2.697***	3.402***
	(0.872)	(0.806)	(0.904)	(0.806)	(0.525)	(1.013)
observations	14,886	14,222	14,481	14,239	7,183	13,780

The table shows coefficient estimates from regressing the loan share kept by the lead arranger in the syndicate on borrower transparency, borrower credit risk proxies, country-level creditor rights, and controls by applying GLM. Transparent firm is an indicator equal to one if the firm is both listed and rated, and zero otherwise. The creditor rights index measures the rights of secured lenders in the case of borrower bankruptcy. It ranges between 0 and 4, with higher scores representing stronger creditor rights. Margins at the mean are reported in square brackets. Robust standard errors are clustered at the country level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

profitability, leverage, tangibility of assets, and growth.[7] As additional data on the borrower is required, Tables 2.6 and 2.7 only include loans to borrowers that were matched to Compustat for US firms and to Worldscope for non-US firms. Regression results show that the findings from Table 2.4 are robust to the inclusion of borrower risk.

Table 2.6 shows the coefficient estimates from regressing the loan share kept by the lead arranger on borrower transparency, borrower riskiness proxies, country-level creditor rights, and controls. Across most specifications, loans to transparent borrowers are associated with a smaller loan share kept by the lead arranger. Stronger creditor rights are also associated with smaller lead arranger shares, suggesting a substitution effect of firm-level borrower transparency and country-level creditor rights. For loans to transparent borrowers, stronger creditor rights are associated with larger lead bank loan shares. Focusing on the last column, the loan share kept by the lead bank is expected to be 11.3 percentage points smaller if borrowers are transparent, as compared to the base group of loans to opaque borrowers. A one standard deviation increase in creditor rights is associated with a 3.5 percentage-point decrease in the lead bank's share if borrowers are opaque. This finding supports the substitution hypothesis of firm-level borrower transparency and country-level creditor rights protection with respect to syndicate formation. If borrowers are transparent, a one standard deviation of stronger creditor rights is associated with a 2.8 percentage point increase in the lead arranger's loan share.

Table 2.7 shows the results from regressing syndicate concentration, as measured by the Herfindahl index of loan shares within the syndicate, on borrower transparency, borrower credit risk proxies, country-level creditor rights, and controls. Across the different specifications, the regression results show that banks form less-concentrated syndicates if borrowers are transparent. This finding is in line with the results of Sufi (2007). If borrowers are opaque: that is, if information asymmetry is large, an increase in creditor rights is associated with less-concentrated syndicates, thereby partly mitigating the information asymmetry problem. If borrowers are transparent, banks form more concentrated syndicates in countries with stronger creditor rights. The results from regressing the number of lead arrangers on borrower transparency, creditor rights, credit risk proxies, and controls are shown in Table A1 in Appendix A.

[7] Note that ratings as a measure of borrower risk are inferior to accounting proxies because requiring a rating from DealScan data reduces the sample size dramatically. In addition, the existence of a credit rating is part of the transparent indicator construction. For a recommendation of borrower risk proxies, see Bae and Goyal (2009, p. 830).

Table 2.7: Controlling for Credit Risk: Syndicate Concentration, Borrower Transparency, and Creditor Rights

	(1)	(2)	(3)	(4)	(5)	(6)
transparent firm	-0.553***	-0.577***	-0.522***	-0.574***	-0.214	-0.569***
	(0.125)	(0.118)	(0.110)	(0.118)	(0.225)	(0.121)
	[-0.116***]	[-0.122***]	[-0.108***]	[-0.121***]	[-0.0416]	[-0.118***]
creditor rights	-0.191	-0.184	-0.169	-0.180	0.0650	-0.181
	(0.129)	(0.122)	(0.122)	(0.118)	(0.0770)	(0.119)
	[-0.0400]	[-0.0388]	[-0.0350]	[-0.0380]	[0.0127]	[-0.0377]
creditor rights*.	0.374***	0.377***	0.362***	0.374***	0.0631	0.364***
transparent firm	(0.132)	(0.133)	(0,130)	(0.131)	(0.0865)	(0.126)
	[0.0785***]	[0.0795***]	[0.0749***]	[0.0789***]	[0.0123]	[0.0756***]
ln(total assets)	0.0282					0.0289
	(0.0307)					(0.0324)
	[0.0059]					[0.0060]
profitability		-0.0514				-0.0894
		(0.115)				(0.113)
		[-0.0108]				[-0.0186]
leverage			-0.0777			-0.117*
			(0.0628)			(0.0611)
			[-0.0161]			[-0.0244*]
asset tangibility				-0.156		-0.115
				(0.154)		(0.138)
				[-0.0328]		[-0.0239]
growth					-0.0016	
					(0.0217)	
					[-0.0003]	

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Table 2.7 continued

	(1)	(2)	(3)	(4)	(5)	(6)
controls as in Table 2.4	Yes	Yes	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes	Yes	Yes
constant	3.728***	3.800***	3.565***	3.805***	2.560***	3.457***
	(0.960)	(0.913)	(0.954)	(0.917)	(0.496)	(1.041)
observations	12,912	12,284	12,523	12,298	5,660	11,860

The table shows coefficient estimates from regressing the Herfindahl index of loan share holdings in the syndicate on borrower transparency, borrower credit risk proxies, country-level creditor rights, and controls by applying GLM. The Herfindahl index ranges between 0 and 1, with higher values representing stronger concentrations of loan holdings within the syndicate. Transparent firm is an indicator equal to one if the firm is both listed and rated, and zero otherwise. The creditor rights index measures the rights of secured lenders in the case of borrower bankruptcy. It ranges between 0 and 4, with higher scores representing stronger creditor rights. Margins at the mean are reported in square brackets. Robust standard errors are clustered at the country level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

2.4.2 Borrower Transparency, Law Enforcement, and Syndicate Structure

The creditor rights index measures only creditor rights in written law. As legal rights need practical enforceability so that lenders can benefit from them, the impact of different law enforcement measures on syndicate structure is examined as follows.

In Table 2.8, the number of lead arrangers in the bank syndicate is regressed on bank transparency, different law enforcement measures, borrower credit risk proxies, and controls. The coefficients on the different law enforcement measures show the expected signs. In column one, the coefficient of the transparent firm indicator is negative, suggesting that loans to transparent rather than opaque borrowers have a smaller number of lead arrangers, though it is not statistically significant. The coefficient of the property rights index is negative and significant at the 1% level. An increase in the property rights score by one standard deviation is associated with an expected 0.6 decrease in the number of lead arrangers. Column two shows that the impact of the property rights score varies across countries with different legal origins. While higher property rights are associated with a lower number of lead arrangers in English legal origin countries, the number of lead banks is slightly higher in countries with French legal origin. German, Scandinavian and Socialist legal origin countries do not significantly differ from English common law countries in the relationship between property rights and the number of lead arrangers in the syndicate.

In column three of Table 2.8, the coefficient of the rule of law variable is negative and statistically significant at the 1% level. An increase by one standard deviation in a country's law-and-order tradition proxy is associated with an expected 0.6 decrease in the number of lead arrangers. The coefficient of the natural logarithm of the number of days it takes to enforce a simple debt contract is positive, indicating that poor legal enforcement is associated with a higher number of lead banks in the syndicate, though the coefficient is not statistically significant.

In Table 2.9, the loan share kept by the lead arranger and syndicate concentration, as measured by the Herfindahl index of loan holdings in the syndicate, are regressed on borrower transparency, borrower credit risk proxies, the different law enforcement measures, and controls. The coefficient of the transparent firm indicator is negative and statistically significant in all specifications. As shown in column one of Table 2.9, loans to transparent firms are associated with a 6.6 percentage point smaller loan share kept by the lead arranger as compared to loans to opaque borrowers. The

Table 2.8: Number of Lead Arrangers, Borrower Transparency, and Property Rights

	(1)	(2)	(3)	(4)	(5)
transparent firm	-0.352	-0.316	-0.427	-0.606***	-0.374
	(0.274)	(0.233)	(0.267)	(0.231)	(0.240)
property rights	-0.216***	-0.211*			-0.199
	(0.0705)	(0.110)			(0.189)
prop.rights*fren		0.399*			0.492**
		(0.204)			(0.216)
prop.rights*ger		-0.241			-0.149
		(0.396)			(0.339)
prop.rights*scan		0.0080			-0.340
		(0.438)			(0.482)
prop.rights*soc		0.0301			0.0330
		(0.0519)			(0.0675)
rule of law			-0.462***		0.146
			(0.159)		(0.428)
ln(enforcement days)				0.396	0.517
				(0.267)	(0.417)
credit risk proxies	Yes	Yes	Yes	Yes	Yes
controls as in Table 2.4	Yes	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes	Yes
constant	3.306	3.637	-0.177	-4.849**	-0.268
	(2.588)	(3.248)	(1.648)	(1.934)	(4.951)
observations	13,780	13,780	13,780	13,780	13,780
R-squared	0.242	0.273	0.242	0.237	0.277

The table shows coefficient estimates from regressing the number of lead arranger banks on borrower transparency, borrower credit risk proxies, country-level property rights, and controls by applying OLS. Transparent firm is an indicator equal to one if the firm is both listed and rated and zero otherwise. Property rights is an index ranging between 0 and 30, with high values indicating high levels of respect towards private property. "Fren" is an indicator equal to one if the country's legal origin is French. "Ger" denotes German legal origin, "scan" represents Scandinavian legal origin, and "soc" Socialist legal origin. English legal origin countries form the base group. Legal origin indicators are included in the regressions for variation in the intercept (not reported). Rule of law measures a country's law-and-order tradition and ranges between zero and six, with higher values reflecting a stronger law-and-order tradition. ln(enforcement days) is the natural logarithm of the number of days needed to enforce a simple debt contract. Robust standard errors are two-way clustered at the country and borrower levels, and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

relationship between property rights and the loan share kept by the lead bank or syndicate concentration varies across countries with different legal origins, as well as across regression specifications. As of column one, an increase in the property rights score of one standard deviation is associated with an 8.2 percentage-point increase in the loan share if the borrower's country has an English legal origin, and a 5.9 percentage-point decrease if the borrower's country has a Scandinavian legal origin. The other legal origins do not significantly differ from the English common law group.

Table 2.9: Lead Arranger Share, Syndicate Concentration, Borrower Transparency, and Property Rights

	loan share kept by lead	loan share kept by lead	HHI	HHI
transparent firm	-0.298**	-0.244**	-0.298**	-0.252*
	(0.124)	(0.108)	(0.152)	(0.138)
	[-0.0655**]	[-0.0536**]	[-0.0618*]	[-0.0522*]
French legal origin	1.298	2.934**	1.026	2.494
	(1.518)	(1.454)	(1.783)	(1.635)
	[0.285]	[0.643**]	[0.213]	[0.517]
German legal origin	-1.749	-1.081	3.092	2.979
	(4.407)	(2.613)	(4.787)	(3.587)
	[-0.384]	[-0.237]	[0.641]	[0.617]
Scandinavian legal origin	6.045***	2.565	7.952***	5.954
	(1.896)	(3.415)	(1.792)	(3.688)
	[1.326***]	[0.562]	[1.649***]	[1.233]
Socialist legal origin	0.600	-0.0547	0.914**	0.196
	(0.419)	(0.358)	(0.444)	(0.372)
	[0.132]	[-0.0120]	[0.190**]	[0.0406]
property rights	0.131***	-0.0020	0.139***	-0.0064
	(0.0464)	(0.0484)	(0.0494)	(0.0487)
	[0.0288***]	[-0.0004]	[0.0289***]	[-0.0013]
property rights*French	-0.0567	-0.115*	-0.0437	-0.0918
legal origin	(0.0602)	(0.0592)	(0.0711)	(0.0666)
	[-0.0124]	[-0.0252*]	[-0.0091]	[-0.0190]
property rights*German	0.0492	0.0234	-0.154	-0.145
legal origin	(0.172)	(0.103)	(0.189)	(0.144)
	[0.0108]	[0.0051]	[-0.0319]	[-0.0300]

Continued on next page.

Table 2.9 continued

	loan share kept by lead	loan share kept by lead	HHI	HHI
property rights*Scandnavian	-0.226***	-0.106	-0.284***	-0.215*
legal origin	(0.0668)	(0.118)	(0.0623)	(0.126)
	[-0.0497***]	[-0.0233]	[-0.0590***]	[-0.0446*]
rule of law		0.381***		0.454***
		(0.141)		(0.140)
		[0.0835]***		[0.0941***]
ln(enforcement days)		-0.0034		0.0932
		(0.142)		(0.154)
		[-0.0007]		[0.0193]
credit risk proxies	Yes	Yes	Yes	Yes
controls as in Table 2.4	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes
constant	-0.305	1.399	-0.381	0.742
	(1.282)	(1.592)	(1.417)	(1.802)
observations	13,780	13,780	11,860	11,860

The table shows coefficient estimates from regressing the loan share kept by the lead arranger and the Herfindahl index of loan share holdings in the syndicate on borrower transparency, borrower credit risk proxies, country-level property rights, and controls by applying GLM. The Herfindahl index (HHI) ranges between 0 and 1, with higher values representing a higher concentration of loan holdings within the syndicate. Transparent firm is an indicator equal to 1 if the firm is both listed and rated. Property rights is an index ranging between 0 and 30, with high values indicating high levels of respect towards private property. French legal origin is an indicator equal to 1 if the country's legal origin is French. German, Scandinavian, and Socialist legal origin are indicator variables equal to one for the respective legal origins. English legal origin countries form the base group. The interaction term of property rights and Socialist legal origin is omitted because of collinearity. Rule of law measures a country's law-and-order tradition, ranging between 0 and 6, with higher values reflecting a stronger law-and-order tradition. ln(enforcement days) is the natural logarithm of the number of days needed to enforce a simple debt contract. Margins at the mean are reported in square brackets. Robust standard errors are clustered at the country level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

As shown in columns two and four, the coefficients of the rule of law proxy are all positive and statistically significant at the one percent level. In column two, a one standard deviation increase in the rule of law measure is associated with an 11.6 percentage-point increase in the lead arranger's loan share. The coefficients of the natural logarithm of the number of days needed for contract enforcement is positive, indicating that more difficult law enforcement is associated with a larger loan share kept by the lead arranger and more concentrated syndicates, though the coefficient is not statistically significant. The results from Table 2.9 suggest that lead banks keep a smaller loan share and form less-concentrated syndicates if borrowers are transparent (when controlling for the quality of law enforcement). Different enforcement proxies provide diverse results, with a stronger law-and-order tradition associated with larger lead arranger shares and more concentrated syndicates, and the opposite relationships are found for the number of enforcement days.

2.4.3 Opaque Borrowers and Credit Registries

In this section, I analyze the impact of the existence of credit registries in the borrower's country on the loan share kept by the lead arranger. If borrowers are transparent, information asymmetries between borrowers and lead arrangers, as well as between lead arrangers and participant banks, are of minor importance and the banks' information-gathering benefit from credit registries is limited. In contrast, if borrowers are opaque, credit registries mitigate the information asymmetry problem both between borrowers and lead banks, and within the syndicate.

Table 2.10 displays the coefficient estimates from regressing the lead arranger share (which can be seen as a signal of loan quality and the monitoring effort of the lead bank due to information asymmetry) on the existence of public or private credit registries in the borrower's home country for loans to opaque borrowers. As indicated in columns one and two of Table 2.10, the public registry indicator has a negative coefficient, which is highly significant both economically and statistically. Further, the coefficient of the creditor rights score in column two stays significantly negative. Comparing columns one and two, the lead arranger share of the loan is 17 percentage points lower if there is a public registry present in the opaque borrower's home country. If creditor rights increase by one standard deviation, the loan share is 5 percentage points lower. There are no significant results for private credit bureaus, though the creditor rights score stays significant.

Evidence that the presence of credit registries as an information source does not

Table 2.10: Lead Arranger Share and Information-sharing for Opaque Borrowers

	(1)	(2)	(3)	(4)
public registry	-0.702***	-0.685***		
	(0.263)	(0.237)		
	[-0.174***]	[-0.169***]		
private bureau			0.0982	0.156
			(0.226)	(0.199)
			[0.0243]	[0.0387]
creditor rights		-0.183**		-0.197*
		(0.0920)		(0.105)
		[-0.0453**]		[-0.0488*]
controls as in Table 2.4	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes
constant	5.036***	5.126***	5.000***	5.034***
	(1.076)	(1.130)	(1.044)	(1.130)
observations	19,473	19,473	19,473	19,473

The table shows coefficient estimates from regressing the loan share kept by the lead arranger on the availability of information-sharing agencies in the borrower's country and controls for the subsample of opaque borrowers by applying GLM. A borrower is defined as opaque if it is neither listed nor rated. Public registry (private bureau) is an indicator variable equal to one if there is a public (private) credit registry present in the borrower's home country. Margins at the mean are reported in square brackets. Robust standard errors are clustered at the country level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

affect the syndicate structure for transparent firms can be found in the regression results in Table A2 in Appendix A.

2.5 Conclusion

The growing global volume of syndicated loans and expanding international opportunities for cross-country analyses offer different settings for research on information asymmetries. In this paper, I examine how firm-level borrower opacity and country-level creditor rights protection affect the structure of loan syndicates. I further analyze interactions and substitution effects between borrower transparency and creditor rights, using loan- and borrower-level data across 44 countries between

January 1987 and June 2012.

I find that borrower transparency is associated with a smaller number of banks acting as lead arrangers, smaller loan shares kept by lead arrangers, and less concentrated syndicates. For loan shares held by lead banks and syndicate concentration, I find similar relationships for strong creditor rights. I conclude that in line with agency theory, borrower opacity increases information asymmetries between the informed lead banks and participant banks. Due to potential adverse selection in the syndication of loan shares to the participant banks, as well as moral hazard problems in the lead bank's monitoring of borrowers, the lead arranger keeps a larger loan share as a signal to the banks in the syndicate. This effect increases in countries with weak creditor rights protection: that is, if the expected losses in the case of a credit event are larger.

As shown by the interaction term between creditor rights and firm transparency, the impact of good creditor rights protection on the syndicate is reduced if firms are transparent. This provides empirical evidence of a substitution effect between borrower transparency and the legal protection of lender claims. These interaction effects, as well as opacity mitigation through credit registries, support the importance of studying information asymmetries in syndicated loans at the cross-country level.

3 Bank Regulatory Arbitrage in International Syndicated Lending

Abstract

This paper investigates whether banks pursue regulatory arbitrage by choosing certain lending entities, such as foreign branches or subsidiaries, in order to benefit from cross-country differences in bank regulation and supervision when granting loans internationally. Moreover, this paper examines whether banks that benefit from regulatory advantages provide larger loan shares within bank lending syndicates and/or grant loans with longer maturities or lower loan spreads.

For a sample of syndicated loans granted between 1996 and 2012 to borrowers in 102 countries, I find empirical evidence for the likelihood that a bank's granting of a loan through a subsidiary in the borrower's country increases with the regulatory advantage of the borrower's country as compared with the foreign bank's home country. Consistently, I find evidence that banks prefer to grant loans through the parent bank or a branch if regulation in the borrower's country is stronger than in the bank's home country. Moreover, banks that benefit from cross-country differences in regulation provide larger loan shares in banking syndicates and grant loans with longer maturities.

The key aspects of regulation are those regarding the incentives and power of private investors monitoring banks, transparency of bank financial statements, and rules on official loan classification; thus, suggesting the importance of non-state bank stakeholders in bank regulation and supervision.

Keywords: Syndicated Loans, Bank Regulation, Regulatory Arbitrage, International Lending
JEL Classification: G21, G28, F34

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Current Status: Working paper

3.1 Introduction

In recent years, banks have engaged heavily in international lending. According to the Bank for International Settlements (BIS), banks in the BIS reporting countries had outstanding claims from foreign loans of USD 19.99 trillion, of which USD 6.83 trillion were claims to the non-bank sector as of December 2013 (BIS, 2014, pp. A.16, A.18). Cross-border lending is especially prominent in the global syndicated loan business (Haselmann and Wachtel, 2011, p. 2679), which had a total volume of USD 4.2 trillion as of December 2013, 29% more than in 2012 (Thomson-Reuters, 2013, p. 1).

Against the background of increasingly integrated global financial markets, the relation between a national bank regulation and a bank's foreign loan business gains importance. Despite recent efforts to coordinate bank regulation on a transnational level, countries still vary considerably in their levels of bank regulation and supervision.[1] Consequently, banks competing in the international primary market for syndicated loans are subject to different regulatory restrictions depending on their home countries. This entails several potential consequences: First, international competition might lead banks to evade certain regulatory restrictions at home by granting syndicated loans through subsidiaries in countries with a weaker regulation. Second, banks that are weakly regulated and supervised in their home countries may use this competitive advantage to expand their loan business in countries where local banks are regulated more strictly. This paper examines the research questions of whether banks make use of regulatory differences across countries when granting loans in international syndicates, by lending via a special type of legal entity (i.e., the parent bank, a branch, or a subsidiary), by lending more (less) in terms of loan share in bank lending syndicates, and by granting loan tranches with longer maturities and/or lower (higher) loan spreads if regulation of the lending entity is weak (strong)? These questions are especially relevant in the current debate on tighter post-crisis bank regulation and limitations on the effectiveness of single-country efforts of regulating bank activities.

The paper contributes to two strands of literature. The first research strand deals with the effects of cross-country differences in bank regulation on cross-border lending. Houston et al. (2012, p. 1845) find that banks shift funds to countries with weaker bank regulation, especially when the respective countries are developed

[1] For a detailed presentation of cross-country differences in bank regulation, cf. Barth et al. (2013a).

and have strong creditor rights. Moreover, Houston et al. (2012, p. 1891) find evidence that banks in countries with high strictness in certain regulations are more likely to open a branch or subsidiary in other countries with weaker regulations. Ongena et al. (2013, p. 727) find that certain higher bank regulatory standards in domestic markets are associated with lower standards which are met by the same banks lending abroad. Fidrmuc and Hainz (2013, p. 1310) show both empirically and in a theoretical model that differences in country-level bank regulation affect bank competition and the cross-border loan business. This paper extends the study of Houston et al. (2012) by considering loan-level characteristics and including post-crisis data, and complements the findings of Ongena et al. (2013) and Fidrmuc and Hainz (2013) by extending their scope of analysis to the global primary market for syndicated loans rather than only European countries.

The second strand of literature examines the effect of bank regulation on syndicated loans, and thereby sheds light on the impact of differences in bank regulation on syndicated loan characteristics. Hao et al. (2012, p. 1247) analyze how differences in regulation regarding banking-commerce integration and banking sector concentration affect loan spreads. As in my analysis, Hao et al. (2012, p. 1255) use DealScan data on syndicated loans and bank regulation data from the World Bank Survey as provided by Barth et al. (2004). In my paper, I also study the relation between the differences in bank regulation and loan characteristics, such as loan spread and maturity, and individual bank shares in syndicated loans; however, I do not limit the analysis to restrictions on bank ownership of non-financial firms, but rather include a larger array of regulatory aspects.

The paper proceeds as follows: Section 3.2 reviews the relevant literature and derives the testable hypotheses. Section 3.3 covers the databases and sample selection for the empirical analysis and presents the summary statistics. Section 3.4 presents the empirical results. Section 3.5 presents robustness checks, and Section 3.6 concludes the paper.

3.2 Review of Prior Research and Hypotheses Development

The impact of bank regulation and supervision on bank activities has been widely studied in recent years. In their general and descriptive studies on global bank regulation, Barth et al. (2006) introduce the World Bank dataset on country-level bank

regulation and supervision collected through a repeated survey in more than 100 countries, which has been widely adopted in the empirical literature.[2] In their earlier paper, Barth et al. (2004) investigate the relation between bank regulation and supervision, and the development and stability of the banking sector. The authors find that bank activity restrictions are negatively associated with banking sector development and stability. They find no evidence on capital regulations being positively related to banking sector outcomes, whereas they found a strong and negative relation between generous deposit insurance and banking sector stability. However, regulations that enhance private monitoring of banks are associated with positive outcomes. The studies of Barth et al. focus on the relation of bank regulations and banking outcomes in the same country, rather than on examining cross-country bank activities. Fidrmuc and Hainz (2013) investigate, using a theoretical model and an empirical analysis of cross-border lending near the German-Austrian border, how differences in bank regulation of neighboring states affect bank lending across borders. They find that differences in country-level bank regulation are associated with easier access to credit for borrowers in spatial proximity to the border. Moreover, Fidrmuc and Hainz (2013) find that banks that are subject to stronger regulation charge lower interest rates if they are located near more weakly regulated competitors. In a worldwide empirical study, Houston et al. (2012) examine how differences in country-level bank regulation affects bank flows across countries. The authors find that funds are directed to countries with weaker bank regulation, especially to developed countries with good creditor rights protection. In addition, Houston et al. (2012) investigate whether banks set up foreign branches or subsidiaries based on the level of bank regulation in the respective foreign country. For some aspects of capital regulation, they find evidence that banks are more likely to open foreign affiliates when regulation in their home country is strong and regulation in the host country is weak, thus, suggesting regulatory arbitrage.

On the basis of these findings and extending the research of Houston et al. (2012) by including the degree of regulatory differences across countries and by further differentiating between banks' foreign branches and subsidiaries, I derive the first hypothesis.

Hypothesis 3.1. *It is more likely that a foreign bank grants a loan through a subsidiary in the borrower's country, if bank regulation in the borrower's country is weaker than in the foreign bank's home country (regulatory arbitrage).*

[2] Articles using the World Bank survey data for empirical research on bank regulation include but are not limited to Laeven and Levine (2009), Hao et al. (2012), and Houston et al. (2012).

A bank's foreign affiliates, that is, subsidiaries and branches, are not treated equally with respect to their regulation and supervision. While a bank's foreign subsidiary is mainly subject to the respective foreign country's bank regulation; for a bank's foreign branch, the parent bank's home country regulation largely applies.[3] Consequently, the first hypothesis assumes that banks benefit from regulatory arbitrage only if their foreign affiliate in a more weakly regulated country is a subsidiary. A stronger regulatory advantage of the borrower's country over the parent bank's country, that is, a larger difference between the parent bank's and the borrower's/subsidiary's country, is expected to increase the likelihood that the lending entity is a subsidiary in the borrower's country.

In the opposite case, where the foreign bank's home country regulation is weaker than the regulation in the borrower's country, foreign banks may choose to grant loans either through the parent bank entity or through a branch in order to benefit from a weaker home-country regulation as compared to that of competitors in the borrower's country. The second hypothesis captures this idea. Empirically, a stronger regulatory advantage (disadvantage) for the borrower's country over the parent bank's country is expected to decrease (increase) the likelihood that the foreign bank will grant the loan by itself or through a foreign branch.

Hypothesis 3.2. *It is more likely that a foreign bank grants a loan through the parent bank entity or a branch, if bank regulation in the bank's home country is weaker than in the borrower's country.*

Focusing on syndicated loans, which usually have multiple lending banks, cross-country differences in bank regulation and supervision could give foreign banks an incentive to provide larger loan shares if they benefit from regulatory arbitrage. The third hypothesis captures this argument. Empirically, foreign banks' subsidiaries in the respective borrowers' countries are expected to hold larger loan shares, thus, the more they will benefit from regulatory arbitrage.

Hypothesis 3.3. *The greater the foreign bank's regulatory advantage by granting the loan through a subsidiary in the borrower's country is, the larger is the loan share to the lending syndicate that is provided by the foreign bank.*

[3] For a detailed discussion, please compare Ongena et al. (2013, p. 729) who point to the EU Capital Requirements Directive (available under `http://ec.europa.eu/internal_market/bank/regcapital/index_en.htm`) which assigns branches to the parent bank's home country regulation, while subsidiaries are primarily subject to the host country's regulation. For countries not limited to Europe, Houston et al. (2012) state the same principle. For a detailed discussion, please compare Houston et al. (2012, p. 1887). Note that this country allocation may only hold for certain aspects of bank regulation and may differ across individual countries.

Another strand of literature examines the relation between bank regulation and various borrower and loan characteristics. Ongena et al. (2013) find empirical evidence from European countries that stricter bank regulation in banks' home countries is associated with lower lending standards abroad. In detail, they find that lower entry barriers and higher bank activity restrictions in banks' home countries are associated with lending to more opaque borrowers abroad. Ongena et al. (2013) focus on foreign lending through subsidiaries that would benefit from weaker regulation in the host country. In an empirical study across 29 countries, Hao et al. (2012) analyze how cross-country regulatory differences affect loan spreads of syndicated loans. The authors focus on one specific regulatory aspect, namely if banks are allowed to own and control non-financial companies (banking-commerce integration). They examine the joint impact of regulation and the concentration of the banking sector on secured lending. Hao et al. (2012) argue that market entry of foreign banks encourages competition that leads to more competitive loan spreads. Domestic banks have a competitive advantage in information acquisition and monitoring if they are more closely affiliated with borrowing companies, for example, through holding their borrowers' equity, allowing them to reduce loan spreads. Moreover, Hao et al. (2012) hypothesize that larger banking sector concentration is accompanied by higher market power of banks, which in turn extract higher rents by increasing loan spreads. Both integration and concentration are supposed to affect domestic and foreign banks differently. Hao et al. (2012) find that higher banking-commerce integration, that is, banks owning and controlling non-financial firms, leads to lower loan spreads given bank competition is high. As the banking sector becomes more concentrated, this spread reducing effect seems to be offset. Taking these findings to a more general level supposes that the banks which benefit from regulatory advantages in international syndicated lending may have competitive advantages when compared to other banks. Thus, contributing to this strand of literature, I hypothesize that lending banks which are subject to weaker regulation grant loans with longer maturities and/or lower loan spreads, ceteris paribus.

Hypothesis 3.4. *If foreign banks benefit from regulatory advantages, they grant loans with longer maturities and/or lower loan spreads.*

3.3 Dataset and Summary Statistics

3.3.1 Data Sources, Sample Selection and Lender Categories

The dataset is based on five data sources: LPC DealScan for syndicated loan data, BankScope for information about the respective lending banks, the World Bank Survey data on country-level bank regulation and supervision provided by Barth et al. (2013b), and the World Development Indicators (WDI) provided by the World Bank for macro-economic control variables such as GDP, population, or trade openness. Finally, I add data on country-level creditor rights protection provided by Djankov et al. (2007).

The country-level regulation data by Barth, Caprio, and Levine (2004, 2006, 2008, and 2013) comprise four rounds of a worldwide survey on bank regulation and supervision. The extensive survey questionnaire by the World Bank covered more than 400 questions and was completed by bank regulatory officials. From these answers, Barth, Caprio, and Levine (2004, 2006, 2008, and 2013) constructed over 50 indexes measuring different dimensions of bank regulation and supervision. Overall, the dataset of Barth et al. (2013b, pp. 112-114) covers 181 countries, of which 73 participated in all four survey rounds, between 1999 and 2011. The assignment of the respective survey round of regulation data for the years in the sample period is adopted from Houston et al. (2012, p. 1857), who use the regulation data from the first survey round for the years 1996-1999, from the second survey round for 2000-2003, and from the third survey round for 2004-2007. As my sample period is extended to 2012, I assign the bank regulation and supervision data from the fourth survey round of 2011, which was recorded in 2012, for the 2008-2012 period. Table B1 in Appendix B displays the main variables used in this paper, their definitions, and data sources.[4]

To construct the sample, I use all bank-loan tranche observations from LPC DealScan of syndicated loans granted between January 01, 1996 and December 31, 2012.[5] The DealScan download yields 379,184 bank-loan tranche observations from 10,333 banks. Lending banks from LPC DealScan are manually matched to BankScope. However, from 10,333 different lender names from DealScan, 6,020 could be matched to BankScope which correspond to 3,404 unique banks in BankScope.[6]

[4]For a more detailed description of the regulatory variables, please compare Barth et al. (2013b, pp. 18-19, 52-60).

[5]One observation represents one bank's lending role in one loan tranche, with the lender's share denoting the bank's percentage share in the respective tranche.

[6]Please note that the larger number of lender names from DealScan mainly results from different

Consequently, the number of observations is reduced to 340,365. I exclude all observations for which the tranche amount and/or lender share are missing or for which a share of more than 100% is reported.

In the next step, the information on the lending entities from LPC DealScan and their respective Global Ultimate Owner (GUO) from BankScope are used to classify each lender in the dataset into one of the following categories: (1) domestic bank, (2) foreign bank, (3) foreign bank's domestic subsidiary, (4) foreign bank's domestic branch, (5) foreign bank's foreign subsidiary, and (6) foreign bank's foreign branch. According to the category, I assign the country whose regulation the lender is subject to. Domestic banks are defined as lending banks headquartered in the borrower's home country. They are subject to the borrower country's banking regulation and supervision. Foreign banks are defined as banks with headquarters outside the borrower's home country. These banks underlie the respective foreign regulation of the countries where their physical headquarters are located. A foreign bank's domestic subsidiary is a bank subsidiary in the borrower's home country whose parent bank is headquartered abroad. In this case, the assigned country of regulation for the bank subsidiary is the borrower's country. Foreign bank's domestic branches are defined as bank branches located in the borrower's home country while the main bank is located abroad. In this case, the branch is mainly subject to the foreign country's bank regulation. A foreign bank's foreign subsidiary is a subsidiary of a bank headquartered outside the borrower's country, which itself is located in a different foreign country. The foreign subsidiary is primarily subject to the bank regulation and supervision of the country where it is located. Foreign bank's foreign subsidiaries which are located in their parent banks' home countries are subject to the same regulation as their parents, and therefore are classified as foreign banks. Foreign bank's foreign branches are bank branches outside the borrower's country that are also subject to the banking regulations of the foreign bank's home country. Foreign branches in the same country as their foreign bank parents are matched with the foreign bank regarding determination of the applicable regulation and are thus classified as foreign banks. As bank loans granted by domestic banks are unlikely to be affected by cross-country differences in bank regulation, loan tranche observations with lending entities being classified as domestic lenders are excluded from the sample. As domestic lenders accounted for 49.5% of the observations, the final sample size is reduced accordingly.

Further, country-level data on bank regulation and supervision from the repeated

spellings of the names of the same banks.

World Bank Survey provided by Barth et al. (2013b) is matched to the dataset by the borrower's country, the respective country of regulation of the lending entity (which is necessary in the case of foreign bank's foreign subsidiaries), and the parent bank's home country. Observations for these countries that are not covered in the dataset of Barth et al. (2013b) are excluded.[7] I add creditor rights controls from Djankov et al. (2007) and macro-economic control variables such as GDP from the World Development Indicators (WDI) provided by the World Bank, and exclude those observations for which creditors rights and macro-economic controls are missing. The final sample comprises 167,108 bank-loan tranche observations of loans granted between January 1996 and December 2012 to borrowers in 102 countries. The respective lenders are subject to bank regulation and supervision in 82 different countries.

3.3.2 Summary Statistics

Table 3.1 displays the summary statistics in three panels with respect to syndicated loan characteristics, bank lending entity categories, and country-level bank regulation proxies. As shown in Panel A, the mean (median) loan amount of the 167,108 bank-loan tranche observations is 1,127 (400) million USD, while the mean (median) tranche amount is 677 (250) million USD. In the mean (median), the respective lending bank held 10.17% (6.13%) of the tranche amount in lending syndicates of banks. The mean (median) loan tranche maturity is 51 (48) months, and the mean (median) loan spread over LIBOR is 118.05 (83) basis points.

Regarding the lender categories in Panel B, 72% of the lending entities are classified as foreign (parent) banks, 9% are foreign bank subsidiaries in the respective borrower's country, 6% are foreign bank branches in the borrower's country, 10% are classified as foreign bank subsidiaries in third countries, and 3% are foreign bank branches in third countries.

Summary statistics of the proxies for different aspects of country-level bank regulation and supervision in the foreign banks' home countries and borrowers' countries are presented in Panel C.[8] While there are country-level regulation proxies assigned to each of the 167,108 observations in the sample, the number of observations here denotes the number of unique country-years. The mean (median) score of overall

[7] The countries included in the LPC DealScan dataset that are not covered by Barth et al. (2013b) are Andorra, Bahamas, Barbados, Bermuda, Brunei, Curaçao, Iran, Laos, Libya, Mauritania, Monaco, Mongolia, Netherlands Antilles, and Uzbekistan.

[8] For detailed definitions of the regulatory proxies, please compare Table B1 in Appendix B.

Table 3.1: Summary Statistics

	Mean	Std. Dev.	P10	Median	P90	Obs.
Panel A: Syndicated Loan Characteristics						
Loan amount (million USD)	1,127.4460	2,305.9910	63.0955	400	2,610	167,108
Tranche amount (million USD)	676.8937	1,389.597	40	250	1,600	167,108
Bank's loan share (%)	0.1017	0.1316	0.0190	0.0613	0.2143	167,108
Maturity (months)	50.6545	38.9915	12.0331	48.2975	84.4959	164,294
Loan spread (basis points)	118.0463	114.0404	22.5	83	250	146,762
Panel B: Bank Lending Entity Categories						
Foreign (parent) bank	0.7199	0.4491	0	1	1	167,108
Foreign bank's domestic subsidiary	0.0903	0.2866	0	0	1	167,108
Foreign bank's domestic branch	0.0589	0.2355	0	0	0	167,108
Foreign bank's foreign subsidiary	0.0965	0.2952	0	0	0	167,108
Foreign bank's foreign branch	0.0345	0.1824	0	0	0	167,108

Continued on next page.

Table 3.1 continued

	Mean	Std. Dev.	P10	Median	P90	Obs.
Panel C: Country-level Regulation Proxies						
Overall activity restrictions						
Foreign bank's home country	6.6218	2.1426	4	7	9	1,384
Borrower's country	7.0033	2.0859	4	7	10	909
Restrictions of banks owning non-financial firms						
Foreign bank's home country	2.4081	0.8697	1	2	3	1,338
Borrower's country	2.5061	0.8808	1	3	4	903
Private monitoring index						
Foreign bank's home country	8.4131	1.3970	7	8	10	1,333
Borrower's country	8.2951	1.3886	6	8	10	862
Loan classification leniency						
Foreign bank's home country	529.3074	193.8582	270	630	637	475
Borrower's country	500.8861	208.1980	213	570	635	439
Financial statement transparency						
Foreign bank's home country	5.2316	0.7976	4	5	6	1,426
Borrower's country	5.1592	0.9208	4	5	6	963
Capital regulatory index						
Foreign bank's home country	6.2477	1.8390	4	6	9	1,361
Borrower's country	6.1741	1.9116	4	6	9	901
External ratings and creditor monitoring						
Foreign bank's home country	2.4988	1.0263	1	2	4	1,038
Borrower's country	2.5420	1.0353	1	2.5	4	660

bank activity restrictions is 6.62 (7) in the foreign banks' home countries and 7 (7) in borrowers' countries, ranging between 3 and 12. The score of restrictions of banks in owning and controlling non-financial firms is 2.4 (2) in the mean (median) in the foreign banks' countries and 2.5 (3) in borrowers' countries. It ranges between 0 and 12. The private monitoring index measures the power of private investors in bank monitoring. The mean (median) index score is 8.41 (8) in the foreign banks' home countries and 8.3 (8) in borrowers' countries, ranging between 0 and 12. Loan classification leniency reports the number of days beyond which a loan in arrears must be classified as substandard, then as doubtful, and finally as a loss. It yields 529 (630) days in the mean (median) in the foreign banks' countries and 501 (570) days in borrowers' countries. Financial statement transparency ranges between 0 and 6, and is 5.23 (5) in the mean (median) in the banks' home countries and 5.16 (5) in borrowers' countries, that is, approximately only one point below the maximum attainable score. The capital regulatory index adds one point if certain risk elements like credit risk are considered in capital requirements, if specific market value losses are subtracted from capital before the minimum capital adequacy is computed, and if certain funds can be employed to initially capitalize a bank. It ranges between 0 and 10 and yields 6.25 (6) in the mean (median) in the banks' home countries and 6.17 (6) in borrowers' countries. External ratings and creditor monitoring ranges between 0 and 5, and has a mean (median) score of 2.5 (2) in the foreign bank's home countries and 2.54 (2.5) in borrower's home countries. Except for loan classification leniency, higher values of the respective proxies indicate a higher stringency of a country's bank regulation and supervision.

From Table 3.1, there seem to be minor differences in the distribution of most regulatory proxies across the two sets of countries. Only for overall activity restrictions and loan classification leniency, the difference between the two country sets seems to be of a larger magnitude. Nevertheless, the difference between two values of one proxy of the two respective countries in each observation is the determining factor in this context (difference in cross-country regulation for each observation), thus limiting the informative value of the summary statistics in Table 3.1 to a variable description and leaving the empirical evidence to the analysis in Section 4.

3.4 Empirical Results

3.4.1 Differences in Bank Regulation and Foreign Banks' Lending Entity Choices

In this section, I empirically test the hypotheses on the relation between cross-country differences in bank regulation and the choice of foreign banks' lending entity types. Table 3.2 shows the results from testing hypothesis 3.1, that it is more likely that a foreign bank grants a loan through a subsidiary in the borrower's country if bank regulation in the borrower's country is weaker than in the foreign bank's home country. The dependent variable is an indicator equal to one if the loan's lending entity is a foreign bank's subsidiary in the borrower's country, and zero otherwise. I apply a logit regression model. Margins at the mean are reported in square brackets. Heteroskedasticity robust standard errors are clustered at the (parent) bank level and reported in parentheses.

The logit regression results in Table 3.2 document that a regulatory advantage, in terms of weaker bank regulation or supervision in the borrowers countries as compared to the foreign banks' home countries, increases the probability that foreign banks lend through subsidiaries in the borrowers' countries. The index in column one of Table 3.2 measures the incentives for private monitoring in a country. Points are added to the score, which ranges between 0 and 12, if banks are obliged to release consolidated financial statements, disclose off-balance sheet information, or be audited by certified auditors. The values of the Δprivate monitoring index result from deducting the mean-centered values for the index from foreign banks' countries and respective borrowers' countries.[9] The weaker the private monitoring incentives in borrower's country compared with those in a foreign bank's home country, the higher the probability that the foreign bank will choose to grant a loan through its subsidiary company in the borrower's country. The coefficient is significant at the 1-% level. The marginal effect of 0.0062 suggests that a one standard deviation increase in the Δprivate monitoring index is associated with a 1.14 percentage point higher likelihood that a foreign bank will choose to grant a loan through a subsidiary in the borrower's country.[10] Interestingly, the private monitoring index is a measure of the power of private investors in conducting bank monitoring rather than the supervisory power exercised by state authorities directly. In column two of Table

[9] For a detailed description of the regulatory variables, see Table B1 in Appendix B.

[10] The standard deviation of the cross-country difference in the mean-centered values of the private monitoring index is 1.8373.

Table 3.2: Foreign Banks' Subsidiaries: Cross-country Regulatory Differences and Foreign Banks' Lending Entity Choices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Private monitoring index	0.1000*	0.2744***						
	(0.0550)	(0.0599)						
	[0.0062*]	[0.0166***]						
ΔPrivate monitoring index*Basel II		-0.0323						
		(0.0943)						
		[-0.0020]						
ΔLoan classification leniency			-0.0031*	-0.0028				
			(0.0016)	(0.0023)				
			[-0.0000*]	[-0.0000]				
ΔLoan classification leniency*Basel II				0.0031				
				(0.0048)				
				[0.0000]				
ΔFinancial statement transparency					0.2137***	0.4709***		
					(0.0788)	(0.1154)		
					[0.0134***]	[0.0311***]		
ΔFinancial statement transparency*Basel II						-0.4045**		
						(0.1936)		
						[-0.0267**]		
ΔCapital regulatory index							0.0471	0.1363**
							(0.0441)	(0.0531)
							[0.0029]	[0.0085**]
ΔCapital regulatory index* Basel II								-0.1068
								(0.0777)
								[-0.0067]

Continued on next page.

Table 3.2 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Basel II		0.2405		2.4301***		0.0537		0.3545
		(0.4034)		(0.5500)		(0.3698)		(0.3597)
		[0.0146]		[0.0068]		[0.0035]		[0.0221]
Trade openness	-0.0453	0.1573	0.8347**	1.4439***	0.0031	0.2218	-0.1016	0.2210
in foreign	(0.2749)	(0.2836)	(0.3749)	(0.4650)	(0.2850)	(0.2939)	(0.2923)	(0.2933)
bank's country	[-0.0028]	[0.0095]	[0.0030]	[0.0040]	[0.0002]	[0.0146]	[-0.0063]	[0.0138]
Trade openness	0.3519**	-0.0024	1.5162***	0.7952	0.3747**	0.0321	0.3797**	0.0911
in borrower's	(0.1720)	(0.2058)	(0.5642)	(0.8355)	(0.1560)	(0.1857)	(0.1704)	(0.2031)
country	[0.0217*]	[-0.0001]	[0.0055**]	[0.0022]	[0.0235**]	[0.0021]	[0.0234**]	[0.0057]
ln(GDP in	0.0440	-0.0563	-0.8308*	-1.5455**	0.0487	0.0639	0.0092	-0.1310
foreign bank's	(0.1936)	(0.1791)	(0.4824)	(0.7310)	(0.1823)	(0.1742)	(0.1967)	(0.1852)
country)	[0.0027]	[-0.0034]	[-0.0030]	[-0.0043*]	[0.0031]	[0.0042]	[0.0006]	[-0.0082]
ln(GDP in	0.3332**	-0.1653	-1.1188***	-2.3326***	0.3852***	-0.0589	0.3261***	-0.1150
borrower's	(0.1307)	(0.1653)	(0.3856)	(0.6805)	(0.1244)	(0.1656)	(0.1230)	(0.1668)
country)	[0.0206]	[-0.0100]	[-0.0040**]	[-0.0065]	[0.0241**]	[-0.0039]	[0.0201**]	[-0.0072]
ln(population	0.1828	0.3105*	-0.0245	0.9063	0.3105**	0.4204**	0.2453	0.5228***
in foreign	(0.1602)	(0.1925)	(0.4868)	(0.6159)	(0.1560)	(0.1693)	(0.1643)	(0.1991)
bank's country)	[0.0113]	[0.0188*]	[-0.0001]	[0.0025]	[0.0195**]	[0.0277**]	[0.0151]	[0.0326***]
ln(population	0.0631	-0.0001	2.0849***	1.9609**	-0.0617	-0.2433	0.0411	-0.0194
in borrower's	(0.0952)	(0.1482)	(0.5698)	(0.9259)	(0.0931)	(0.1494)	(0.1002)	(0.1489)
country)	[0.0039]	[-0.0000]	[0.0075**]	[0.0055]	[-0.0039]	[-0.0160]	[0.0025]	[-0.0012]
ln(loan tranche	-0.2998***	-0.1840***	-0.3368***	-0.3736***	-0.2856***	-0.1688***	-0.2978***	-0.1671***
amount in	(0.0434)	(0.0376)	(0.0975)	(0.1213)	(0.0438)	(0.0433)	(0.0446)	(0.0389)
USD)	[-0.0185***]	[-0.0112***]	[-0.0012*]	[-0.0010]	[-0.0179***]	[-0.0111***]	[-0.0183***]	[-0.0104***]

Continued on next page.

Table 3.2 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Loan maturity	0.0001	0.0003	0.0177***	0.0139***	0.0006	0.0008	0.0003	0.0010
in months	(0.0009)	(0.0010)	(0.0028)	(0.0025)	(0.0009)	(0.0010)	(0.0009)	(0.0010)
	[0.0000]	[0.0000]	[0.0001*]	[0.0000]	[0.0000]	[0.0001]	[0.0000]	[0.0001]
Creditor rights	yes	yes	yes	yes	yes	yes	yes	yes
Year fe	yes	yes	yes	yes	yes	yes	yes	yes
Constant	-17.2439***	-2.1271	11.9633	46.9764***	-19.0905***	-6.4078	-16.7934***	-5.9583
	(6.3732)	(6.1343)	(8.9989)	(13.6166)	(6.0306)	(6.1462)	(6.1267)	(6.3597)
Observations	143,630	68,399	5,223	3,909	158,003	77,552	143,659	68,884
Pseudo R-squared	0.0857	0.0934	0.3730	0.4380	0.0899	0.1030	0.0847	0.0820

The table shows coefficient estimates from logit regressions of an indicator variable, which is equal to one if the lending bank is a foreign bank's subsidiary in the borrower's country and zero otherwise on differences in country-level bank regulation, country-level creditor rights proxies, and controls. Variables capturing country-level regulatory differences equal to the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over a bank's home country regulation. For Δloan classification leniency, higher values are associated with larger regulatory disadvantages. Basel II is an indicator variable equal to one in years after the Basel II regulation was implemented in the respective country. Margins at the means are reported in square brackets. Robust standard errors are clustered at the (parent) bank level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

3.2, the private monitoring index is interacted with an indicator variable that is equal to one if the Basel II regulation has been implemented in the respective country and year. The introduction of Basel II is assumed to play an important role in this context because the joint introduction of comparable bank regulatory regimes in multiple countries and efforts to enhance group reporting might have reduced banks' opportunities to benefit from the differences in individual countries' regulations and to evade their home country bank regulations.[11] In column 2, the coefficient of the Δprivate monitoring index is economically large and statistically significant at the one percent level. The interaction term of the Δprivate monitoring index with the Basel II indicator has a negative sign, suggesting a repealing effect on the relation between cross-country differences in private monitoring and bank's lending entity choices. Although the economic interpretation of the interaction term supports Hypothesis 3.1, the coefficient is not statistically significant. The same holds for the effect of the Basel II introduction indicator variable itself.[12]

Column three in Table 3.2 shows the same regression as in column 1 with the Δloan classification leniency as the variable of interest. In line with Hypothesis 3.1, the coefficient is negative suggesting that a larger difference in loan classification leniency, in terms of a smaller number of days in the borrower's country beyond which a loan in arrears must be classified as substandard, doubtful, or loss, is associated with a lower probability of the foreign bank lending through a subsidiary bank in the borrower's countries.[13] Column four shows the same regression as in column three including an interaction term of the difference in loan classification rules and the Basel II implementation indicator. In line with Hypothesis 3.1 and the findings in column two, the coefficient of the interaction term shows the opposite sign as the

[11] When creating the Basel II implementation indicator, the following years of implementation are employed: 2006 for Austria, Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, the United Kingdom (BIS, 2004, pp. 1-2), as well as Canada (OSFI, 2012, p. 1), and Taiwan (Deloitte et al., 2005, p. 5); 2007 for South Korea (Deloitte et al., 2005, p. 5); 03/2007 for Japan and Singapore (Deloitte et al., 2005, p. 5); 2008 for Indonesia (Deloitte et al., 2005, p. 5), Australia (APRA, 2007, p. 4), and New Zealand (BIS, 2013, p. 14); 2009 for Thailand (Deloitte et al., 2005, p. 5); 03/2009 for India (APRA, 2007, p. 1); and 2010 for Malaysia (Deloitte et al., 2005, p. 5).

[12] Please note that columns two, four, six, and eight only cover the subsample of the countries for which information about the Basel II implementation is available. For this reason, the coefficients of the Δregulation proxies and the interaction terms are not directly comparable to the results in columns one, three, five, and seven.

[13] Please note, that for the Δloan classification leniency, higher values represent stricter regulation in the borrower's country as compared with the foreign bank's home country, which is the opposite relation for all other Δregulation proxies. For this reason, the opposite sign of the coefficient of the Δloan classification leniency is in line with the other regression results.

coefficient of the Δloan classification leniency alone, suggesting an alleviating effect on this relation, although it is neither statistically nor economically significant. Moreover, the coefficient of the Basel II indicator itself is economically relevant and statistically significant at the one percent level. This possibly positive relation between the introduction of Basel II and foreign banks' choices to grant loans through subsidiaries in the borrower's countries might hint at a reduction of entry barriers due to regulatory harmonization. Although the sign remains positive in the different regression specifications in Table 3.2, the coefficient is only statistically significant in column four.

Column five in Table 3.2 shows the logit regression results from regressing the lending entity indicator for foreign banks' subsidiaries in the borrowers' countries on differences in bank regulation regarding the transparency of financial statements. Financial statements are defined to be more transparent if banks must publish consolidated financial statements, disclose off-balance sheet items, if unpaid interest is documented in the profit and loss statement etc. The regression results suggest that the lower financial statement transparency is in the borrowers' countries as compared with the foreign banks' home countries, the higher is the likelihood that the bank lends through a subsidiary in the country with a lower financial statement transparency. The coefficient of 0.2137 is economically and statistically highly significant. The marginal effect at the mean of the difference in transparency is 0.134, indicating that, a one standard deviation increase in the regulatory advantage is associated with an increase of 1.39 percentage points in the likelihood that the foreign bank will lend via the more weakly regulated subsidiary bank.[14] The effect is significant at the one percent level. Column six in Table 3.2 adds the Basel II indicator and the interaction term to the regression. The coefficient and the marginal effect of the Δfinancial statement transparency before the implementation of the Basel II accord are positive, economically relevant, and statistically highly significant. At the mean, a one unit increase in the Δfinancial statement transparency is associated with a three percentage point of a higher likelihood that the foreign bank will choose to lend through a subsidiary in the borrower's country. The coefficient of the interaction term is negative and statistically significant at the ten percent level reducing the effect of differences in financial statement regulation on the choice of lending through a bank subsidiary in the borrower's country. After the implementation of Basel II, the coefficient of the Δfinancial statement transparency is reduced

[14] The standard deviation of the cross-country difference in the mean-centered values of the financial statement transparency score is 1.0357.

to 0.0664, still being statistically significantly different from zero.

Column seven in Table 3.2 documents that cross-country differences in bank capital requirements do not seem to influence foreign bank's lending entity decisions. The coefficient of the Δcapital regulatory index is positive, but not statistically significant. One explanation may be that capital requirements may more often be subject to group regulation so that banks cannot easily evade capital requirements by shifting business to foreign subsidiaries. As country-level regulations regarding this matter may be very heterogenous in an international setting, this possibility cannot be finally assessed. Another explanation might be that banks just focus on other aspects of regulation when pursuing potential regulatory arbitrage. In column eight, the Basel II indicator and the interaction term of the Basel II dummy with the Δcapital regulatory index are added to the regression. Here, the coefficient of the difference in capital requirements is positive and statistically significant at the five percent level, while the coefficient of the interaction term and the Basel II indicator remain and are not significantly different from zero.

Overall, Table 3.2 supports Hypothesis 3.1 that the likelihood of foreign banks to grant loans through subsidiaries in the borrower's countries increases with the regulatory advantage of these countries with respect to certain aspects of bank regulation and supervision. In other words, the hypothesis which states that differences in country-level bank regulation and supervision do not influence banks' lending entity choices can be rejected. The most relevant aspects of cross-country regulatory differences are the incentives and power of private investors to monitor banks and financial statement transparency. Both aspects facilitate bank regulation through market participants rather than limiting regulation to direct control through state authorities. The other relevant regulatory aspect is loan classification leniency, which may be interpreted as a proxy for a certain degree of banks' flexibility to increase business risk by lending to riskier borrowers without direct feedback by its stakeholders. These findings are consistent with those of Barth et al. (2004) who find a positive relation between private monitoring and the development of a country's banking sector while capital regulations do not seem to have an impact on it. Comparing these results to Houston et al. (2012, p. 1888), I find similar results for loan classification leniency and financial statement transparency, while I do not find significant results for the capital regulatory index and - in unreported results - for restrictions of banks to own and control non-financial firms and overall bank activity restrictions. In this analysis, I focus more on the regulations facilitating bank monitoring through other market participants and therefore, add the private monitoring

index to my empirical analysis, which is not done by Houston et al. (2012). As the regression coefficients are highly significant, this seems to contribute new insights on bank behavior against the background of bank regulation. Moreover, the focus on foreign bank subsidiaries in the respective borrowers' countries rather than on foreign bank affiliates in borrower countries as implemented by Houston et al. (2012), may more precisely measure the potential for regulatory arbitrage, as branches that belong to the affiliates are less likely to be regulated differently from the parent bank. If regulatory arbitrage is a focal motivation of a foreign bank's lending entity choice, they will prefer lending through subsidiaries rather than branches in order to better evade the home bank's regulation and supervision.

In Table 3.3, I empirically examine Hypothesis 3.2, which is related to Hypothesis 3.1 and states that the weaker the bank regulation and supervision are in the foreign banks' home countries as compared with the borrowers' home countries, the higher is the likelihood that foreign banks will choose to grant loans through the foreign (parent) banks or branches. Table 3.3 shows the results from a logit regression of an indicator, which is equal to one if the lending bank is a foreign (parent) bank or a foreign bank's branch, and zero otherwise on differences in bank regulation and supervision between the banks' and borrowers' home countries and controls. Margins at the mean are reported in square brackets. As Hypothesis 3.2 is complementary to Hypothesis 3.1, the signs of the differences in the regulation as explanatory variables are expected to exhibit the opposite signs as in Table 3.1.

In column one of Table 3.3, the indicator variable, which is equal to one if the lending entity is a foreign (parent) bank or branch, and if otherwise zero, is regressed on the cross-country difference in the private monitoring index. The coefficient of -0.0684 (margin at the mean of -0.0096) shows the expected sign meaning that the larger the regulatory advantage in the borrower's country, the lower is the likelihood that a foreign bank will choose to grant a loan via the foreign parent bank or a branch. However, the coefficient is not statistically significant. In column two of Table 3.3, a dummy variable which is equal to one if the Basel II regulation has been implemented in the respective country and year is added to the regression and interacted with the Δprivate monitoring index. Here, the coefficient of the cross-country difference in private monitoring incentives and power is negative, economically relevant, and statistically significant at the five percent level. The marginal effect at the mean of -0.0177 suggests that a one unit increase in the cross-country difference in the private monitoring index - in the form of a one unit higher advantage of the

Table 3.3: Foreign Banks and Branches: Cross-country Regulatory Differences and Foreign Banks' Lending Entity Choices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔPrivate monitoring index	-0.0684	-0.1185**						
	(0.0504)	(0.0601)						
	[-0.0096]	[-0.0177**]						
ΔPrivate monitoring index*Basel II		-0.0861						
		(0.0902)						
		[-0.0129]						
ΔLoan classification leniency			0.0017*	0.0041**				
			(0.0010)	(0.0018)				
			[0.0002]	[0.0004*]				
ΔLoan classification leniency*Basel II				-0.0043**				
				(0.0020)				
				[-0.0004*]				
ΔFinancial statement transparency					-0.2213***	-0.3672***		
					(0.0788)	(0.1011)		
					[-0.0310***]	[-0.0545***]		
ΔFinancial statement transparency*Basel II						0.4538***		
						(0.1716)		
						[0.0673**]		
ΔCapital regulatory index							0.0199	-0.0467
							(0.0382)	(0.0470)
							[0.0028]	[-0.0070]
ΔCapital regulatory index*Basel II								0.1585**
								(0.0743)
								[0.0236**]

Continued on next page.

Table 3.3 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Basel II		0.1083		0.9603		0.1433		-0.0669
		(0.2803)		(0.6005)		(0.2247)		(0.2260)
		[0.0162]		[0.0845]		[0.0212]		[-0.0100]
Trade openness in	0.6652	0.5504	0.8178**	1.2015**	0.6794	0.5495	0.7423	0.5380
foreign bank's	(0.4086)	(0.3865)	(0.3961)	(0.4799)	(0.4317)	(0.4176)	(0.4598)	(0.4141)
country	[0.0923]	[0.0822]	[0.0940**]	[0.1057**]	[0.0951]	[0.0815]	[0.1040]	[0.0802]
Trade openness in	0.0198	0.1035	0.1597	0.6025**	-0.0011	0.0855	0.0062	0.0852
borrower's country	(0.0954)	(0.1067)	(0.2105)	(0.2987)	(0.00921)	(0.0980)	(0.0999)	(0.1084)
	[0.0028]	[0.0155]	[0.0184]	[0.0530*]	[-0.0002]	[0.0127]	[0.0009]	[0.0127]
ln(GDP in	0.4167	0.4371	1.3367***	1.8751***	0.3171	0.2796	0.4527	0.4879*
foreign bank's	(0.2727)	(0.2828)	(0.4777)	(0.6090)	(0.2518)	(0.2609)	(0.2891)	(0.2942)
country)	[0.0587]	[0.0653]	[0.1537**]	[0.1650**]	[0.0444]	[0.0415]	[0.0634]	[0.0727*]
ln(GDP in	-0.0013	0.0526	-0.3504	0.2991	-0.0237	0.0069	0.0076	0.0663
borrower's	(0.0705)	(0.0858)	(0.2335)	(0.5063)	(0.0670)	(0.0872)	(0.0665)	(0.0883)
country)	[-0.0002]	[0.0079]	[-0.0403]	[0.0263]	[-0.0033]	[0.0010]	[0.0011]	[0.0099]
ln(population in	-0.4243**	-0.4019*	-1.1661***	-1.2777***	-0.3812**	-0.3493*	-0.4707**	-0.5364**
foreign bank's	(0.2155)	(0.2201)	(0.9550)	(0.4686)	(0.1808)	(0.1797)	(0.2304)	(0.2385)
country)	[-0.0598**]	[-0.0600*]	[-0.1341***]	[-0.1124***]	[-0.0534**]	[-0.0518**]	[-0.0660**]	[-0.0800**]
ln(population in	-0.0747	0.0200	-0.0041	0.0231	-0.0147	0.1358	-0.0544	0.0305
borrower's	(0.0586)	(0.0803)	(0.1991)	(0.3573)	(0.0540)	(0.0845)	(0.0606)	(0.0752)
country)	[-0.0105]	[0.0030]	[-0.0005]	[0.0020]	[-0.0021]	[0.0201]	[-0.0076]	[0.0046]
ln(loan tranche	0.1936***	0.1430***	-0.0434	0.1513	0.1818***	0.1350***	0.1939***	0.1362***
amount in USD)	(0.0387)	(0.0295)	(0.0847)	(0.0989)	(0.0386)	(0.0318)	(0.0386)	(0.0291)
	[0.0273***]	[0.0214***]	[-0.0050]	[0.0133]	[0.0255**]	[0.0200***]	[0.0272***]	[0.0203***]

Continued on next page.

Table 3.3 continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Loan maturity	-0.0017**	-0.0016*	-0.0030	-0.0068**	-0.0017*	-0.0017**	-0.0018**	-0.0020**
in months	(0.0008)	(0.0009)	(0.0025)	(0.0035)	(0.0008)	(0.0009)	(0.0008)	(0.0008)
	[-0.0002*]	[-0.0002*]	[-0.0003]	[-0.0006*]	[-0.0002**]	[-0.0002*]	[-0.0002**]	[-0.0003**]
Creditor rights	yes	yes	yes	yes	yes	yes	yes	yes
Year fe	yes	yes	yes	yes	yes	yes	yes	yes
Constant	-2.2355	-5.3616	0.7496	-28.4122**	-0.6914	-2.9209	-3.0705	-4.5746
	(5.0043)	(5.4906)	(6.9616)	(13.4599)	(5.2232)	(5.7092)	(5.0732)	(5.4219)
Observations	143,630	72,458	5,271	3,918	158,003	82,127	143,659	72,968
Pseudo R-squared	0.0583	0.0538	0.3880	0.4570	0.0615	0.0601	0.0587	0.0543

The table shows the coefficient estimates from logit regressions of an indicator variable, which is equal to one if the lending bank is a foreign bank or a branch of it and zero otherwise on differences in country-level bank regulation, country-level creditor rights proxies and controls. Variables capturing country-level regulatory differences equal to the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over the bank's home country regulation. For the Δloan classification leniency, higher values are associated with larger regulatory disadvantages. Basel II is an indicator variable equal to one in the years after the Basel II regulation was implemented in the respective country. Margins at the means are reported in square brackets. Robust standard errors are clustered at the (parent) bank level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

borrower's country over the foreign bank's home country - is associated with a 1.8 percentage point lower likelihood that the foreign bank will choose to lend through the parent bank entity or a branch. The interaction term and the Basel II indicator are not statistically significant.

Column three of Table 3.3 shows logit regression results with the regressor of interest being the difference in the loan classification leniency. As for this proxy, higher values measure a larger regulatory disadvantage - in terms of stricter regulation - in the borrower's country as compared with the foreign bank's home country; whereas the positive sign of the coefficient suggests that the stricter the regulation with respect to the classification of loans in arrears in the borrower's county, the higher is the probability that the foreign bank will choose to grant a loan via the - more weakly regulated - parent bank or a branch. The coefficient of 0.0017 (marginal effect at the mean of 0.0002) is statistically significant at the ten percent level. A one standard deviation increase in the Δloan classification leniency is associated with a 4.49 percentage point higher likelihood that foreign banks will choose to grant their cross-border loans through the respective parent bank entity or a branch.[15] This result supports Hypothesis 3.2. In column four of Table 3.3, the Basel II indicator is added to the regression and interacted with the Δloan classification leniency. As expected, the coefficient of the difference in the loan classification is positive and statistically significant at the ten percent level. The marginal effect at the mean of 0.0004 suggests that - at the mean - a one unit increase in the difference in the loan classification is associated with a 0.4 percentage point higher likelihood that a foreign lender will choose to grant a loan through the parent entity or a branch. The coefficient of the interaction term with the Basel II indicator is negative, statistically significant at the ten percent level, and economically with a value of -0.0043 of a similar size like the Δloan classification leniency coefficient. Together with the coefficient and marginal effect of the Δloan classification leniency, these results suggest that before the implementation of Basel II, cross-country differences in the regulatory treatment of loans in arrears were one motivation of foreign banks' lending entity choices, while this effect has been dissolved with the implementation regulatory harmonization by the Basel II accord.[16]

[15] The standard deviation of the cross-country difference in the mean-centered values of the loan classification leniency score is 224.4213.

[16] As in Table 3.2, please note that columns two, four, six, and eight in Table 3.3 only cover the subsample of observations in countries for which information about the Basel II implementation is available. For this reason, the coefficients of the Δregulation proxies and the interaction terms are not directly comparable to the results in columns one, three, five, and seven in Table 3.3.

In column five of Table 3.3, the coefficient of -0.2213 of the Δfinancial statement transparency has a negative sign and is statistically significant at the one percent level. At the mean, a one standard deviation increase in the difference in the mean-centered transparency scores in the borrowers' and lenders' home countries is associated with a 3.21 percentage point decrease in the probability that the foreign bank will lend through the foreign (parent) bank or a branch. This finding is in line with Hypothesis 3.2. In column six, the regression is expanded with the Basel II indicator variable and the interaction term of the Δfinancial statement transparency and the Basel II dummy. In line with the logic behind Hypothesis 3.2, the coefficient of the Δfinancial statement transparency is negative, economically meaningful with a marginal effect of -0.0545, and statistically significant at the one percent level. This suggests - before the implementation of the Basel II accord - that a one unit increase in the Δfinancial statement transparency is associated with a 5.5 percentage point higher likelihood that the foreign bank will choose to lend via the parent bank entity or a branch. The interaction term with the Basel II indicator is positive, statistically significant at the one percent level, and economically offsets the effect from the cross-country difference in financial statement regulation after the implementation of Basel II. This finding underlines the role of cross-country harmonization of bank regulation in the international syndicated loan business.

Column seven of Table 3.3 displays the logit regression results where the key cross-country regulatory difference is the Δcapital regulatory index. The coefficient of 0.0199 (marginal effect at the mean 0.0028) shows the expected positive sign but is statistically not significantly different from zero. Similar to the results in Table 3.2, this finding suggests that capital regulation rules do not seem to be the key drivers behind potential bank regulatory arbitrage. Column eight shows regression results including the Basel II indicator and an interaction term of Basel II with the Δcapital regulatory index. Again, the coefficient of the cross-country difference in capital regulation is not significant. The coefficient of the interaction term is positive and significant at the ten percent level. The opposite sign of the interaction term as compared with the base effect of the Δcapital regulatory index suggests an offsetting effect in the role of bank capital regulation in the lending entity choice after the implementation of Basel II. Nevertheless, the empirical evidence remains weak in columns seven and eight.

Overall, Table 3.3 displays empirical evidence in favor of Hypothesis 3.2 stating that it is more likely that a foreign bank grants a loan through the parent bank entity or a branch, if bank regulation in its home country is weaker than that

in the borrower's country. In statistical terms, the hypothesis that cross-country differences in bank regulation and supervision are not associated with foreign banks' lending entity decisions can be rejected. As in Table 3.2, the key drivers seem to be incentives and the power of private investors in bank monitoring, rules on the classification of loans in arrears, and differences in the transparency of bank financial statements. Again, differences in capital regulation do not seem to impact lending entity decisions. This contradicts the findings of Houston et al. (2012, pp. 1888-1890), who find that the capital regulatory index plays a role when looking at the lending entity choice generally proxied by a foreign affiliate indicator. As argued for Table 3.2, the distinction of affiliates as branches and subsidiaries can be argued to be more precise than looking at the affiliates in general, thereby being one key difference between this analysis and those of Houston et al. (2012). Again, the high significance of private monitoring incentives and the transparency of bank's financial statements emphasize the role of non-state stakeholders in bank regulation and supervision, which seems to be a focal determinant in banks' lending decisions.

3.4.2 Differences in Bank Regulation and Foreign Banks' Shares in Syndicated Loans

In this subsection, I empirically test Hypothesis 3.3, which states that the more the bank benefits from the regulatory advantages by granting a loan through a subsidiary in the borrower's country, the larger the loan share provided by the foreign bank will be. The sample, here, is limited to loan-bank observations where the lenders are foreign bank subsidiaries in the respective borrowers' countries. Table 3.4 shows results from regressing the loan share (in the syndicate) supplied by the respective bank on differences in cross-country regulation, from which the bank might take advantage, and controls by applying a generalized linear regression model (GLM). Margins at the mean are reported in square brackets.

Table 3.4: Cross-country Regulatory Differences and Foreign Banks' Domestic Subsidiaries' Loan Shares

	(1)	(2)	(3)	(4)
ΔRestrictions of banks owning	0.0996**			
non-financial firms	(0.0442)			
	[0.0101**]			
ΔPrivate monitoring index		0.0436**		

Continued on next page.

Table 3.4 continued

	(1)	(2)	(3)	(4)
		(0.0203)		
		[0.0044**]		
ΔExternal ratings and			0.1355**	
creditor monitoring			(0.0586)	
			[0.0136**]	
ΔCapital regulatory index				-0.0098
				(0.0167)
				[-0.0010]
Trade openness in parent	0.7546***	0.4820**	0.1501	0.4412*
bank's country	(0.2541)	(0.2091)	(0.2775)	(0.2456)
	[0.0765***]	[0.0489**]	[0.0150]	[0.0447*]
Trade openness in	-0.0616	-0.0886**	-0.0993	-0.0674
subsidiary's country	(0.0426)	(0.0426)	(0.0604)	(0.0422)
	[-0.0062]	[-0.0090**]	[-0.0099*]	[-0.0068]
ln(GDP in parent bank's	0.5177**	0.5898**	-0.0489	0.6505***
country)	(0.2292)	(0.2313)	(0.2638)	(0.2342)
	[0.0525**]	[0.0599**]	[-0.0049]	[0.0660***]
ln(GDP in subsidiary	0.0108	0.0227	0.0161	0.0041
bank's country)	(0.0421)	(0.0415)	(0.0507)	(0.0456)
	[0.0011]	[0.0023]	[0.0016]	[0.0004]
ln(population in parent	-2.4633*	-1.4041	0.4104	-1.1677
bank's country)	(1.3958)	(1.4975)	(1.5873)	(1.5770)
	[-0.2496*]	[-0.1425]	[0.0411]	[-0.1184]
ln(population in	-0.0543	-0.1022**	-0.1460***	-0.0944*
subsidiary's country)	(0.0577)	(0.0455)	(0.0548)	(0.0492)
	[-0.0055]	[-0.0104**]	[-0.0146***]	[-0.0096*]
ln(loan tranche amount	-0.5045***	-0.4857***	-0.5490***	-0.4885***
in USD)	(0.0553)	(0.0539)	(0.0651)	(0.0543)
	[-0.0511***]	[-0.0493***]	[-0.0549***]	[-0.0495***]
Loan maturity in months	-0.0017	-0.0015	-0.0014	-0.0015
	(0.0011)	(0.0010)	(0.0013)	(0.0010)
	[-0.0002*]	[-0.0002]	[-0.0001]	[-0.0002]
Creditor rights	yes	yes	yes	yes
Parent bank fe	yes	yes	yes	yes
Year fe	yes	yes	yes	yes

Continued on next page.

Table 3.4 continued

	(1)	(2)	(3)	(4)
Constant	32.9088	14.6436	3.3241	9.7346
	(20.5036)	(21.9664)	(23.8100)	(24.2613)
Observations	11,530	12,508	8,580	12,448

The table shows coefficient estimates from regressing the loan share kept by the bank, which is a foreign bank's subsidiary in the borrower's country on differences in country-level bank regulation, country-level creditor rights proxies, and controls applying GLM. Variables capturing the country-level regulatory differences equal the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over the bank's home country regulation. Margins at the means are reported in square brackets. Robust standard errors are clustered at lender-borrower country pairs and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

In column one of Table 3.4, the lending banks' loan shares are regressed on cross-country differences in overall bank activity restrictions (such as restrictions to engage in securities, insurance, or real estate activities). The coefficient of 0.0996 is positive and statistically significant at the five percent level. With a marginal effect at the mean of 0.0101, a one standard deviation increase in the Δrestrictions of banks to own and control non-financial firms is associated with a 1.38 percentage point higher loan share kept by the bank.[17] This result is in line with Hypothesis 3.3, which implies that fewer restrictions of banks owning non-financial firms in the borrower's country as compared with the foreign bank's home country encourage foreign banks - taking advantage of that difference by lending through a subsidiary in the borrower's country - to provide a larger loan share in the syndicate.

Column two of Table 3.4 displays results from regressing foreign bank subsidiaries' loan shares on cross-country differences in the private monitoring index and controls. In line with Hypothesis 3.3, the coefficient of 0.0436 is positive, suggesting a positive relation between regulatory advantages with respect to the private monitoring of foreign banks' subsidiaries in their borrowers' countries and the loan share they provide. The coefficient is statistically significant at the five percent level. Econom-

[17] For the subsample of observations in which the lender is a foreign bank's subsidiary in the borrower's country, the standard deviation of the cross-country difference in the mean-centered values of the score measuring the restrictions of banks to own and control non-financial firms is 1.3701.

ically, a one standard deviation increase at the mean in the Δprivate monitoring index is associated with an increase in the bank's loan share of 0.74 percentage points.[18]

In column three of Table 3.4, the bank's loan share is regressed on the cross-country difference in the score measuring external ratings and creditor monitoring. The extent of external rating agencies' evaluations and creditor monitoring to which banks in the respective country are subject to is measured by this proxy.[19] Higher values of the Δexternal ratings and private monitoring show a regulatory advantage in the form of weaker bank regulation in the borrower's country as compared with the foreign bank's home country. The coefficient of the Δexternal ratings and private monitoring is positive, suggesting a positive relation between regulatory advantages the foreign bank's subsidiary benefits from, and the loan share provided by the foreign bank. The coefficient of 0.0436 (marginal effect at the mean of 0.0044) is statistically significant at the five percent level. Economically, a one standard deviation increase in the Δexternal ratings and private monitoring is associated with a 1.19 percentage point higher loan share being provided by the foreign bank's subsidiary; that is, the larger the regulatory benefit, the higher the foreign bank's commitment in the loan.

Consistent with the results from Tables 3.2 and 3.3, column four in Table 3.4 shows that the Δcapital regulatory has no significant impact on the bank's decision regarding the loan share. The coefficient and the margin at the mean are negative, economically small, and statistically not significant. This result suggests that cross-country differences in capital requirements do not seem to influence the degree to which foreign banks' subsidiaries engage in lending. As in Tables 3.2 and 3.3, the proxies for regulation regarding bank regulation and monitoring by stakeholders other than state authorities, like investors, creditors, and rating agencies, seem to play a more relevant role in bank lending decisions when granting loans internationally. Aspects of bank regulation related to general restrictions supervised by state authorities like overall activity restrictions, which lie in the focus of prior literature (cf. e.g., Houston et al. (2012)) do not seem to be the key drivers in the foreign banks' loan share decisions. In unreported results, there was no empirical evidence for these aspects of regulation to play a role in the degree of commitment by foreign banks in loan contracts. Moreover, the proxies measuring cross-country differences

[18] For this subsample, the standard deviation of the cross-country differences in the mean-centered values of the private monitoring index amounts to 1.6879.

[19] For a detailed definition of the proxy for external ratings and creditor monitoring, please compare Table B1 in Appendix B.

in loan classification leniency and financial statement transparency that played a role in foreign banks' decisions to use a certain lending entity type (compare Tables 3.2 and 3.3) did not yield significant results in this context. One explanation for this finding may be that banks are influenced by the aspects of regulation regarding transparency (i.e., the classification of loans in arrears and the transparency of bank financial statements) that may be more visible to their home country stakeholders when deciding on their lending entity type. However, the degree of commitment as measured by the loan share is more dependent on the restrictions of banks to own and control other firms, and the dependency on financial rating agencies. The incentives and power of private investors to engage in bank monitoring is a key driver in both, the lending entity type and the loan share decision of foreign banks. Overall, the empirical evidence from Table 3.4 supports Hypothesis 3.3 that the loan share in the lending syndicate provided by the foreign bank is larger, the more the foreign bank benefits from a regulatory advantage by granting the loan through a subsidiary in the borrower's country. In statistical terms, the hypothesis that cross-country regulatory differences do not influence foreign bank subsidiaries loan share decisions can be rejected. It is important to note that - except for regulations regarding private investors' bank monitoring - different aspects of regulation impact the loan share decision as compared with foreign banks' lending entity type decisions.

3.4.3 Differences in Bank Regulation and Syndicated Loan Characteristics

In this subsection, I empirically assess Hypothesis 3.4, which states that if foreign banks benefit from regulatory advantages between their home and borrowers' countries when granting syndicated loans, they undertake more lending by granting loans with longer maturities and/or make use of their competitive advantage by charging smaller loan spreads. For both analyses in Tables 3.5 and 3.6, regressions are conducted on the subsample of observations for which the lending entity is a foreign bank's subsidiary in the borrower's country. The underlying logic is that these lending entities are most likely to make use of cross-country regulatory differences.

Table 3.5 shows coefficient estimates from regressing the natural logarithm of the loan maturity in months on cross-country differences in bank regulation and controls, by applying ordinary least squares estimation with two-way clustering of standard

Table 3.5: Cross-country Regulatory Differences and Loan Maturity

	(1)	(2)	(3)	(4)
ΔOverall activity	0.0120*			
restrictions	(0.0071)			
ΔRestrictions of banks		0.0693***		
owning non-financial firms		(0.0258)		
ΔExternal ratings and			-0.0407**	
creditor monitoring			(0.0163)	
ΔCapital regulatory index				0.0031
				(0.0100)
ln(loan tranche amount	0.0855***	0.0845***	0.0913***	0.0860***
in USD)	(0.0082)	(0.0079)	(0.0113)	(0.0082)
ln(borrower sales	-0.0798***	-0.0800***	-0.0822***	-0.0810***
in USD)	(0.0059)	(0.0058)	(0.0081)	(0.0060)
Industry fe	yes	yes	yes	yes
Loan purpose fe	yes	yes	yes	yes
Parent bank fe	yes	yes	yes	yes
Year fe	yes	yes	yes	yes
Country-level controls	yes	yes	yes	yes
Creditor rights	yes	yes	yes	yes
Constant	-14.6463***	-8.2935***	-15.1671***	-15.8130***
	(0.4115)	(2.9287)	(1.7988)	(0.9493)
Observations	4,753	4,748	3,713	4,811
R-squared	0.3318	0.3331	0.3128	0.3297

The table shows coefficient estimates from regressing the natural log of the loan maturity in months on differences in country-level bank regulation, country-level creditor rights proxies, and controls applying OLS. Variables capturing country-level regulatory differences equal to the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over the bank's home country regulation. Country-level controls include the natural logarithm of GDP, trade openness, and the natural log of population size for both the parent bank's and the borrower's home country. Robust standard errors are two-way clustered at the parent banks and borrower countries and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

errors at the parent banks' and borrowers' countries.[20] The regressions include industry, loan purpose, parent bank, and year fixed effects in addition to country-level macro and creditor rights controls, and loan characteristics. From Hypothesis 3.4, a positive relation between the cross-country regulatory difference and the loan maturity would be expected. In column one of Table 3.5, the log of loan maturity in months is regressed on cross-country differences in overall activity restrictions. The coefficient of 0.012 is positive, suggesting a positive relation between the regulatory advantages in the borrower's country over the foreign bank's home country from which the foreign bank's subsidiary benefits, and the granted loan's maturity. This result is in line with Hypothesis 3.4. The coefficient is statistically significant at the ten percent level. Column two of Table 3.5 displays coefficient estimates where the key regulatory difference is on the restrictions of banks to own and control non-financial firms. Again, the coefficient is positive, indicating that the larger regulatory advantages from which the foreign bank's subsidiary might benefit with respect to such restrictions is associated with longer loan maturities. The coefficient of 0.0693 is statistically highly significant at the one percent level. The key variables of interest in columns one and two, that is, overall activity restrictions and restrictions of banks to own and control non-financial firms, are those widely applied in existing research (cf. e.g., Houston et al. (2012)) and they yield significant results in this context.

In column three of Table 3.5, the natural logarithm of loan maturity in months is regressed on cross-country differences in the score for external rating and creditor monitoring. This proxy measures the extent to which banks are subject to evaluations by external rating agencies and creditor monitoring. The score is higher if, for example, banks must be rated by external rating agencies, and if all top ten banks in a country are subject to monitoring by national and international rating agencies.[21] Higher values of the Δexternal ratings and creditor monitoring show laxer regulation in this respect in the borrower's country as compared with the foreign bank's home country. Contradicting to Hypothesis 3.4, column three shows a negative coefficient for the Δexternal ratings and creditor monitoring which is statistically significant at the five percent level. This result suggests a negative relation between advantages in bank monitoring through creditors and external rating agencies and the maturity of the respective syndicated loan. One explanation might be that banks prefer being monitored by external rating agencies as a positive signal

[20] In order to estimate the two-way clustered standard errors, I apply the Stata code "cgmreg.ado," which was developed by Cameron et al. (2006) and is available at the website `http://www.econ.ucdavis.edu/faculty/dlmiller/statafiles/` by the author, Doug Miller.

[21] For a detailed description of the regulatory variables, compare Table B1 in Appendix B.

to their stakeholders, when engaging in long-term loan contracts. Column four in Table 3.5 shows regression results where the key regulatory difference refers to the capital regulatory index. Consistent with the regression results in all prior tables, the coefficient of 0.0031 shows the expected sign, but is not statistically significant. Again, the capital requirements do not seem to be a key determinant in decisions of contracts' terms in international syndicated loans.

Overall, Table 3.5 yields mixed evidence regarding the relation between loan maturity and cross-country differences in bank regulation and supervision. While for certain aspects of bank regulation, regulatory advantages are associated with longer loan maturities, I found opposite results for differences in external rating regulation and no significant results regarding capital requirements.

Table 3.6 shows coefficient estimates from regressing the natural logarithm of the loan spread over LIBOR in basis points on cross-country differences in bank regulation, and controls, by applying ordinary least squares estimation with two-way clustering of standard errors at parent banks' countries and borrowers' countries. As in Table 3.5, I include industry, loan purpose, parent bank, and year fixed effects in addition to country-level macro and creditor rights controls, and loan characteristics. From Hypothesis 3.4, negative coefficients of the Δregulation regressors indicating that banks make use of regulatory advantages by charging lower, that is, more competitive loan spreads, are expected. In column one of Table 3.6, the variable of interest on the right-hand side of the regression equation is the Δoverall activity restrictions. The respective coefficient of 0.0104 is positive and statistically insignificant. A similar relation is found in column three for the Δexternal ratings and creditor monitoring. Here, the coefficient of 0.0416 is positive and not statistically significant.

Column two of Table 3.6 displays coefficient estimates from regressing the natural logarithm of loan spreads over LIBOR on the Δrestrictions of banks to own and control non-financial firms. The coefficient of -0.0151 is negative and supports Hypothesis 3.4, although it is not statistically significant. A similar result is found in column four of Table 3.6, where the loan spread is regressed on cross-country differences in the capital regulatory index. Here, the coefficient of -0.0069 exhibits the expected sign but is not statistically significant. Taken together, considering all the dimensions of regulation, there are no significant results on the relation between regulatory differences and loan spreads. In statistical terms, the null hypothesis that cross-country differences in bank regulation do not affect loan spreads cannot

Table 3.6: Cross-country Regulatory Differences and Loan Spread over LIBOR

	(1)	(2)	(3)	(4)
ΔOverall activity restrictions	0.0104			
	(0.0115)			
ΔRestrictions of banks		-0.0151		
owning non-financial firms		(0.0369)		
ΔExternal ratings and			0.0416	
creditor monitoring			(0.0353)	
ΔCapital regulatory index				-0.0069
				(0.0061)
ln(loan tranche amount	-0.1642***	-0.1647***	-0.1692***	-0.1658***
in USD)	(0.0177)	(0.0165)	(0.0187)	(0.0154)
ln(borrower sales	-0.1360***	-0.1360***	-0.1223***	-0.1340***
in USD)	(0.0155)	(0.0180)	(0.0120)	(0.0145)
Industry fe	yes	yes	yes	yes
Loan purpose fe	yes	yes	yes	yes
Parent bank fe	yes	yes	yes	yes
Year fe	yes	yes	yes	yes
Country-level controls	yes	yes	yes	yes
Creditor rights	yes	yes	yes	yes
Constant	24.4338**	23.1490*	7.5373	27.7613***
	(10.2036)	(12.8735)	(10.0340)	(4.5086)
Observations	4,397	4,397	3,389	4,441
R-squared	0.6238	0.6238	0.6209	0.6274

The table shows coefficient estimates from regressing the natural logarithm of the loan spread over LIBOR in basis points on differences in country-level bank regulation and creditor rights proxies, and controls applying OLS. Variables capturing country-level regulatory differences equal the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over the bank's home country regulation. Country-level controls include the natural log of GDP, trade openness and the natural log of population size for both the parent bank's and the borrower's home country. Robust standard errors are two-way clustered at the parent bank countries and at the borrowers' countries and are reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

be rejected. In their paper, Hao et al. (2012, p. 1274) show that the impact of international differences in bank regulation on loan spreads may be dependent on the level of banking sector concentration in the respective country. The fact that I do not control for the banking sector concentration in Table 3.6, may be one explanation for the insignificance of the results as positive and negative effects - depending on the level of bank concentration, they may offset each other.

Summarizing Tables 3.5 and 3.6 with respect to Hypothesis 3.4, I find some empirical evidence that when banks benefit more from regulatory advantages in international syndicated lending, they grant loans with longer maturities. Regarding loan spreads, I do not find empirical support of the hypothesis that banks charge more competitive loan spreads when they benefit more from the differences in cross-country bank regulation and supervision.

3.5 Robustness Checks

As alternative explanations to the impact of cross-country differences in bank regulation and supervision on a bank's lending decisions, differences in taxation and in the prevailing accounting regimes may influence a bank's decisions in international syndicated lending. In this section, I examine the impact of cross-country differences in tax rates and the introduction of IFRS accounting standards on banks' lending entity decisions in international syndicated loans. I thereby challenge the results from Tables 3.2 and 3.3 and test their robustness.

3.5.1 The Lending Entity Choice and Cross-country Tax Differences

A broad empirical research on corporate tax evasion lists a range of cross-sectional determinants of firm-level tax avoidance (such as leverage (Graham and Tucker, 2006; Lisowsky, 2010), the extent of foreign operations (Rego, 2003; Dyreng and Lindsey, 2009), and managerial incentives (Phillips, 2003; Gaertner, 2014; Armstrong et al., 2012)), country-level regulatory aspects facilitating tax evasion (such as information-sharing through credit registries and bank branch networks (Beck et al., 2014), and tax system characteristics (Atwood et al., 2012)). Dyreng and Lindsey (2009) find that firms with operations in tax havens have lower tax burdens than otherwise comparable companies. Lisowsky (2010) shows that multinational companies with subsidiaries in tax havens exhibit a higher likelihood of tax shelter.

One channel of avoiding home country taxation for multinational firms is tax-motivated income shifting, which is studied in a related strand of literature (compare e.g., Clausing (2003); Foley et al. (2007)). Dharmapala and Riedel (2013) investigate the effect of an exogenous earnings shock at the parent entity of a multinational firm on the firm's high-tax versus low-tax subsidiaries. The authors find that a positive earnings shock at the parent level is associated with an increase in pretax profits of the firm's low-tax subsidiaries. Huizinga and Laeven (2008) model the impact of cross-country tax differences on firms' incentives to shift profits. They predict that firms' income shifting depends on the average tax differences of all countries where the firm has its parent entity or foreign affiliates. Empirically, Huizinga and Laeven (2008, p. 1164) find that European firms shift their profits within Europe depending on tax differences. Instead of shifting profits to foreign subsidiaries that are subject to lower taxation than the parent company via cash holdings or intra-firm pricings, multinational companies can - depending on the respective countries' taxation legislations - shift their business activities to low-tax subsidiaries. For instance, Devereux et al. (2008) examine the question of whether OECD countries compete over capital and profit tax rates and find respective empirical evidence.

Transferring these findings to foreign banks granting syndicated loans internationally, differences in taxation between the banks' home countries and borrower countries may drive bank decisions about whether to grant a loan through the respective parent bank entity (or branch) or a subsidiary in the borrower's country. Table 3.7 tests this possible effect by regressing an indicator variable equal to one if the lending entity is a foreign bank's subsidiary in the borrower's country and zero otherwise on cross-country differences in bank regulation and differences in the respective total tax rates.[22] Control variables are the same as in Table 3.2 including loan characteristics, year fixed effects, country-level macro variables such as the natural logarithm of GDP and population, and trade openness, as well as creditor rights proxies including an information-sharing indicator for credit registries as proposed by Beck et al. (2014) as a potential driver of tax evasion incentives.

Column one of Table 3.7 shows coefficient estimates from regressing the indicator variable, which is equal to one if the lending entity is a foreign bank's subsidiary in the borrower's country and zero otherwise on the difference in the total tax rates in the foreign bank's home country and the borrower's country. A higher value in the Δtotal tax rate shows a larger tax advantage in the form of a lower total tax rate

[22] In unreported results, these regressions were conducted using corporate tax rates, which did not significantly change the results.

Table 3.7: Robustness Check: Cross-country Differences in Taxes and Banks' Lending Entity Choices

	(1)	(2)	(3)	(4)	(5)
ΔTotal tax	0.0088	0.0103	0.0307*	0.0120	0.0071
rate	(0.0098)	(0.0109)	(0.0186)	(0.0108)	(0.0100)
	[0.0007]	[0.0008]	[0.0002]	[0.0009]	[0.0006]
ΔPrivate		0.1524*			
monitoring		(0.0905)			
index		[0.0125*]			
ΔLoan			-0.0025		
classification			(0.0021)		
leniency			[-0.0000]		
ΔFinancial				0.4932***	
statement				(0.1683)	
transparency				[0.0371***]	
ΔCapital					0.0442
regulatory index					(0.0591)
					[0.0035]
ln(loan tranche	-0.2923***	-0.2783***	-0.4164**	-0.2761***	-0.2676***
amount in USD)	(0.0440)	(0.0451)	(0.1799)	(0.0459)	(0.0463)
	[-0.0227***]	[-0.0228***]	[-0.0027*]	[-0.0208***]	[-0.0214***]
Loan maturity	0.0002	-0.0006	0.0192***	-0.0006	-0.0006
in months	(0.0014)	(0.0015)	(0.0047)	(0.0015)	(0.0015)
	[0.0000]	[-0.0000]	[0.0001*]	[-0.0000]	[-0.0000]
Country-level	yes	yes	yes	yes	yes
macro controls					
Creditor rights	yes	yes	yes	yes	yes
Year fe	yes	yes	yes	yes	yes
Constant	-15.1214**	-13.8527**	24.5745*	-15.5385**	-13.6474**
	(7.4005)	(6.9250)	(12.9691)	(6.7967)	(6.5399)
Observations	50,576	42,784	1,111	44,711	44,076
Pseudo	0.1030	0.1010	0.2840	0.1090	0.0970
R-squared					

The table shows coefficient estimates from logit regressions of an indicator variable, which is equal to one if the lending bank is a foreign bank's subsidiary in the borrower's country and zero otherwise on differences in country-level bank regulation, tax rates, and country-level creditor rights proxies and controls. Variables capturing country-level regulatory differences equal the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over the bank's home country regulation. For the Δloan classification leniency, higher values are associated with larger regulatory disadvantages. Margins at the means are reported in square brackets. Robust standard errors are clustered at the (parent) bank level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

in the borrower's country as compared with the foreign bank's home country. The coefficient of 0.0088 (marginal effect at the mean of 0.0007) is positive, indicating a positive relation between cross-country tax advantages and the choice of granting loans through a subsidiary in a low-tax country. However, the coefficient and the marginal effect are economically small and statistically not significant.

Columns two to five of Table 3.7 combine the cross-country difference in total tax rates with the respective differences in bank regulation and controls.[23] In column two of Table 3.7, the indicator variable for foreign bank subsidiaries in borrower countries is regressed on the cross-country difference in total tax rates and the private monitoring index. As in column one, the coefficient of the difference in taxation is positive but economically small and statistically not significant. The coefficient of the Δprivate monitoring index is positive and significant at the ten percent level, suggesting robustness of the relation between differences in power and incentives of private investors for bank monitoring and the foreign bank's lending entity choice to tax differences.

Column three of Table 3.7 displays regression results where the explanatory variables of interest are Δtotal tax rate and Δloan classification leniency. The coefficient of the Δtotal tax rate of 0.0307 (marginal effect at the mean of 0.0002) is positive and statistically significant at the ten percent level. As in column three of Table 3.2, the coefficient of the Δloan classification leniency is negative, suggesting that a regulatory disadvantage in the borrower's country in the form of lower flexibility when classifying a loan in arrears as substandard, doubtful, or loss is associated with a smaller likelihood that the foreign bank will choose to grant a loan through a subsidiary in the more strictly regulated country. However, the weak statistical significance of the coefficient in column three of Table 3.2 completely disappears here.

In column four of Table 3.7, the indicator for foreign bank subsidiaries in the respective borrowers' countries is regressed on cross-country differences in the total tax rate, financial statement transparency, and controls. In line with the findings from Table 3.2, the coefficient of the Δfinancial statement transparency of 0.4932 is positive and statistically highly significant at the one percent level. The marginal effect of 0.0371 suggests that a one standard deviation increase in the Δfinancial statement transparency at the mean is associated with a 3.84 percentage point higher likelihood that the foreign bank will choose to grant a loan via a subsidiary in the

[23] Note that columns two to five in Table 3.7 are equivalent to columns one, three, five, and seven in Table 3.2 with the Δtotal tax rate as an additional explanatory variable.

borrower's country instead of through the parent bank entity or a branch.[24] The coefficient of the Δtotal tax rate is positive but not statistically significant indicating an irrelevant role in foreign banks' lending entity decisions. Regression results from column four of Table 3.7 document the robustness of the relation between cross-country differences in financial statement transparency and foreign banks' lending entity choices as displayed in Table 3.2 to differences in taxation. Differences in taxes do not seem to be a key determinant of foreign banks' decisions for a certain lending entity.

Column five of Table 3.7 shows the respective regression results where the explanatory variables of interest are the cross-country differences in the total tax rates and in the capital regulatory index. In line with the previous results, the coefficient for the capital requirements proxy is positive and thereby exhibits the expected sign while it stays statistically insignificant. The coefficient of the difference in total tax rates is, again, positive and statistically not significant. Overall, the regression results from Table 3.7 indicate that tax advantages in the form of a lower total tax rate in the borrower's country as compared with the foreign bank's home country do not significantly drive foreign banks' lending entity choices. Moreover, the roles of cross-country bank regulation and supervision for foreign banks' choices of a lending entity are robust to the inclusion of tax differences to the multivariate regressions. As the regression coefficient of the Δtotal tax rate in column one of Table 3.7, where no differences in regulation are considered, is also insignificant, there is no empirical evidence for tax differences being a key driver in foreign banks' lending entity decisions.

While results from Table 3.7 support the robustness of my previous findings, the question arises why differences in tax rates do not induce foreign banks to lend through subsidiaries in lower-tax countries. One possible explanation is that banks are mostly subject to worldwide taxation, which precludes banks that lend through foreign subsidiaries from evading higher home country taxation. Moreover, using total tax rates as a proxy for bank taxation may be problematic, because that measure neglects regulations regarding taxes deducted at source, taxes creditable in a bank's home country, as well as tax allowances. Therefore, the difference in total tax rates may not measure the part of difference in cross-country taxation, which might be relevant for foreign banks' lending entity choices.

[24]The standard deviation of the Δfinancial statement transparency here is 1.0357.

3.5.2 The Impact of Accounting Regulation: The Adoption of IFRS Accounting Standards

The adoption of IFRS accounting standards as released by the International Accounting Standards Board (IASB) by banks might have affected the respective foreign banks' lending entity decisions. First, the adoption of IFRS accounting standards increases accounting quality and reduces banks' incentives for certain types of earnings management. Gebhardt and Novotny-Farkas (2011, pp. 289, 292) find that banks in twelve EU countries significantly reduced their income smoothing actions after adopting IFRS rules (especially the IAS 39 impairment rules). Second, IFRS rules are supposed to increase transparency (cf. e.g., Leventis et al. (2011, p. 103). For a European sample, Armstrong et al. (2010, pp. 32-33) find empirical evidence that especially banks with a lower pre-adoption information quality face positive investor reactions when adopting IFRS, suggesting information quality benefits and thereby lower costs of capital. In the context of this paper, an increase in transparency, that is, a reduction in bank opacity, may lead to a decline in the potential for regulatory arbitrage.

Moreover, global promotion of IFRS accounting rules enhance the comparability of bank financial statements (cf. e.g., Hoogendoorn (2006, p. 24)). Therefore, home country bank stakeholders face lower costs in understanding financial information on banks' foreign subsidiaries. Consequently, the more countries require IFRS accounting (at least for listed banks), the fewer possibilities banks have to make use of the differences in regulation without detection. Accordingly, the adoption of IFRS accounting rules should be associated with a lower likelihood that foreign banks will lend through subsidiaries in the respective borrowers' countries.

Table 3.8 tests this prediction by regressing an indicator, which is equal to one if the lending entity is a foreign bank's subsidiary in the borrower's country and zero otherwise on cross-country differences in bank regulation and supervision, and a dummy variable indicating whether the lending bank abides IFRS accounting rules. A logit regression model is applied. Data on the applied accounting regime is taken from BankScope.[25] Column one of Table 3.8 displays coefficient estimates from regressing the foreign bank subsidiary indicator on the cross-country difference in the private monitoring index, the IFRS accounting indicator, and controls. The coefficient of the Δprivate monitoring index of 0.1587 (marginal effect at the mean

[25]Please note that the variables in Table 3.8 are equivalent to those in columns one, three, five, and seven of Table 3.2 including the additional indicator for the bank's accounting regime.

Table 3.8: Robustness Check: The Lending Entity Choice and the Adoption of IFRS Accounting Standards

	(1)	(2)	(3)	(4)
Δ Private monitoring index	0.1587*			
	(0.0876)			
	[0.0094*]			
ΔLoan classification leniency		0.0025*		
		(0.0015)		
		[0.0000]		
ΔFinancial statement transparency			0.5068***	
			(0.1689)	
			[0.0269***]	
ΔCapital regulatory index				0.0892
				(0.0658)
				[0.0052]
IFRS accounting	-2.3726***	-6.6105***	-2.3057***	-2.4009***
	(0.3712)	(1.2202)	(0.3631)	(0.3672)
	[-0.1403***]	[-0.0015]	[-0.1223***]	[-0.1387***]
ln(loan tranche amount in USD)	-0.2778***	-0.2352	-0.2682***	-0.2693***
	(0.0480)	(0.2469)	(0.0467)	(0.0481)
	[-0.0164***]	[-0.0001]	[-0.0142***]	[-0.0156***]
Loan maturity in months	0.0013	0.0217***	0.0012	0.0010
	(0.0017)	(0.0067)	(0.0017)	(0.0018)
	[0.0001]	[0.0000]	[0.0001]	[0.0001]
Country-level macro controls	yes	yes	yes	yes
Creditor rights	yes	yes	yes	yes
Year fe	yes	yes	yes	yes
Constant	-12.6432	40.1108***	-15.5522**	-12.6481*
	(8.0743)	(11.7331)	(7.9251)	(7.4122)
Observations	59,351	1,745	62,856	60,682
Pseudo R-squared	0.2340	0.6710	0.2430	0.2340

The table shows coefficient estimates from logit regressions of an indicator variable, which is equal to one if the lending bank is a foreign bank's subsidiary in the borrower's country and zero otherwise on differences in country-level bank regulation, tax rates, and country-level creditor rights proxies and controls. Variables capturing country-level regulatory differences are equal to the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over the bank's home country regulation. For the Δloan classification leniency, higher values are associated with larger regulatory disadvantages. IFRS accounting is an indicator variable, which is equal to one if the lending bank has adopted IFRS standards, and zero otherwise. Margins at the means are reported in square brackets. Robust standard errors are clustered at the (parent) bank level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

of 0.0094) is positive and statistically significant at the ten percent level. This result is in line with column one in Table 3.2, suggesting a robustness of the relation between differences in the private monitoring power and incentives, and foreign banks' lending entity choice to controlling for accounting regimes. The coefficient of the IFRS indicator of -2.3726 (marginal effect of -0.1403) is negative and statistically significant at the one percent level. This result suggests that foreign banks that have adopted IFRS accounting standards are less likely to lend via subsidiaries in their borrowers' countries.

In column two of Table 3.8, the indicator variable, which is equal to one if the lending entity is a foreign bank's subsidiary in the borrower's country and zero otherwise is regressed on cross-country differences in loan classification leniency, the IFRS accounting dummy, and controls. Unlike the results in column three of Table 3.2, the coefficient of the Δloan classification leniency of 0.0025 is positive and statistically only weakly significant at the ten percent level. The marginal effect at the mean of 0.0000 is economically negligible and statistically insignificant. The estimated coefficient of the IFRS accounting indicator of -6.6105 (margin at the mean of -0.0015) is again negative and statistically highly significant, supporting the relation indicated by column one of Table 3.8.

Column three of Table 3.8 shows regression results where the explanatory variables of interest are the Δfinancial statement transparency and IFRS accounting indicator. Consistent with the results in column five of Table 3.2, the coefficient of the cross-country difference in financial statement transparency of 0.5068 (marginal effect of 0.0269) is positive and statistically significant at the one percent level. As in column one of Table 3.8, the relation between larger regulatory advantages in the borrower's country as compared with the foreign bank's home country being associated with a higher likelihood that the foreign bank will choose to grant loans through subsidiaries in the more weakly regulated country is robust to the inclusion of accounting regimes. As before, the coefficient of the IFRS accounting indicator of -2.3057 (margin at the mean of -0.1223) is negative and statistically significant the one percent level.

In column four of Table 3.8, the foreign bank's subsidiary indicator is regressed on the Δcapital regulatory index, the IFRS accounting indicator, and controls. In line with the prior results, for example, in column seven of Table 3.2, the coefficient of the cross-country difference in the capital regulatory index is positive but not statistically significant. This supports the prior finding that cross-country differences in capital requirements do not impact banks' lending entity decisions. In column four of Table 3.8, the coefficient of the accounting indicator of -2.4009 (marginal

effect at the mean of -0.1387) is negative and statistically significant at the one percent level. Overall, all columns in Table 3.8 exhibit negative and statistically highly significant coefficients of the IFRS accounting indicator variable.

Taken together, Table 3.8 provides empirical evidence in two respects: First, the relation between larger cross-country regulatory advantages and the associated higher likelihood that foreign banks lend via subsidiaries in the more weakly regulated country is robust to the inclusion of banks' accounting regimes. This especially holds for cross-country differences in private monitoring power and incentives as well as regulations regarding financial statement transparency. Second, banks that adopted IFRS accounting standards are less likely to grant international loans through subsidiaries in their borrowers' countries compared with banks which only adhere to their home country's local GAAP accounting regime.

3.6 Conclusion

Despite regulators' efforts to coordinate bank regulation and to capture banks' foreign affiliates without causing competitive advantages for certain banks, regulation and supervision is still largely driven by national laws and different degrees of bilateral administrative cooperation between countries. For instance, EU countries that have implemented the Basel II Accord into national law based on the Capital Requirements Directive (CRD), still put bank subsidiaries mainly under host country supervision while branches are mostly subject to home country supervision (Fiechter et al., 2011, p. 17). Bank regulation and supervision with third countries are still mainly coordinated on a bilateral level, for example, with a supposed memoranda of understanding that, for instance, Germany concludes with other countries individually (Bafin, 2013, pp. 41-42). As regulatory and supervisory coordination is still improving, there currently may remain room for banks to take advantage from cross-country differences in bank regulation and supervision.

In this paper, I find empirical evidence that the likelihood of a bank granting a loan through a certain entity; that is, the parent bank, a branch, or a subsidiary, as well as the geographic location of this entity depends on regulatory differences across countries. Banks are more likely to grant loans through subsidiaries in their borrowers' countries if national bank regulations in the borrowers' states are weaker than in the banks' home countries. Consistently, banks are more likely to grant a loan through the parent bank or a branch if the regulation in the bank's home country is weaker than in the borrower's country. These findings suggest that banks

pursue regulatory arbitrage by shifting their business to entities that may be subject to weak regulation and supervision. Moreover, banks provide larger loan shares within their lending syndicates and they grant loan tranches with longer maturities if they benefit from cross-country regulatory advantages. Interestingly, the most relevant aspects of bank regulation and supervision concern the incentives and power of private investors in bank monitoring, transparency of bank financial statements, and rules on when to officially classify loans in arrears accordingly. These features of bank regulation focus on stakeholder bank monitoring, rather than classical bank supervision by state institutions.

The empirical findings in this paper suggest that banks which benefit from regulatory differences across countries have competitive advantages. Thus, growing international competition; for example, in the syndicated loans business, may encourage further regulatory arbitrage. This conclusion directly emphasizes the importance of transnational reforms and reductions of national differences in regulations towards a coordinated cross-national answer to increasingly integrated global financial markets.

4 Public Debt vs. Bank Debt: Do Firms Adjust to Optimal Debt Structures?

Abstract

Using a comprehensive sample of non-financial firms in the US between 2000 and 2013, I empirically show that firms do have target bank debt ratios to which they partially adjust over time. I find evidence that these target bank debt to total debt ratios are seven to ten percentage points higher for firms with higher information asymmetry and 10-15 percentage points higher for firms whose managers have above-median equity incentives, ceteris paribus. When estimating how quickly firms adjust to the optimal target bank debt ratios, I find that firms close about 50 percent of the gap between their actual and target bank debt levels, per annum. Firms whose chief executive officers (CEOs) have above-median equity incentive compensations adjust more quickly to their target, closing about five percentage points more within one year.

Keywords: Asymmetric information, monitoring, renegotiation, firm financial structure, speed of adjustment, managerial incentives
JEL Classification: D82, G32, J33

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Current Status: Working paper

4.1 Introduction

Firms' optimal decisions regarding their capital structure have been widely studied both theoretically and empirically. Although the optimal choice between debt and equity appears to be well explained by various approaches, such as the pecking order, market timing, and different versions of the trade-off theory, firms' optimal choice between public and private debt has not yet been completely understood. While there is theoretical research on the differences between public and private debt and firms' optimal choice in an agency conflict context (e.g., Diamond (1991); Chemmanur and Fulghieri (1994); Detragiache (1994)), empirical research in this field is relatively young (Denis and Mihov, 2003; Albring et al., 2011; Gomes and Phillips, 2012; Meneghetti, 2012). Although these papers find empirical evidence of firms pursuing optimal choices among public and private debt, there is a lack of empirical research on whether firms follow some kind of pecking order in debt financing or if they adjust to targets that may originate in a trade-off.

This article empirically examines the research question of whether firms do have target debt structures in the sense of an optimal mix of bank debt and public debt. I investigate if managerial incentives and informational opacity affect that debt structure target. Finally, I test if firms adjust partially to their target debt structure over time, estimate their speed of adjustment, and examine the effect of management incentives on firms' target adjustment behavior.

This paper makes multiple research contributions. First, it contributes to the emerging strand of research on the optimal choice between public and private debt. Unlike other empirical papers (e.g., Denis and Mihov (2003); Gomes and Phillips (2012); Meneghetti (2012)), I do not analyze the probability of a firm issuing public or private debt based on certain firm characteristics, but instead estimate a precise target bank debt ratio, which provides deeper insights into a firm's mix of public and private debt. I apply empirical methods from classical capital structure research established, for example, by Flannery and Rangan (2006). In addition, this paper combines two emerging strands of literature: research on the relationship between managerial incentives and a firm's choice of debt type (Albring et al., 2011; Meneghetti, 2012) and empirical studies on the impact of a firm's information asymmetry on the source of financing (Gomes and Phillips, 2012). Theoretically, both managerial incentives and information asymmetries belong to agency cost theories on both the relationship between shareholders and managers as well as with debtholders in the context of public and private debt financing (Myers and Majluf,

1984; Detragiache, 1994). The main research contribution stems from the last part of my empirical analysis, where I examine if and how fast firms adjust to target debt structures. Here I apply established methodologies used in studies of target leverage adjustment speed in the context of debt structure adjustment. In addition, I analyze the impact of managerial incentives on the speed at which firms adjust to their targets. To the best of my knowledge, this paper is the first such attempt to study empirically the target adjustment speed in debt structures and the respective impact of managerial incentives.

This paper is organized as follows: Section 4.2 provides a literature overview, from the classical trade-off theory of capital structure to the trade-off theory applied on corporate debt structure and research on the determinants of the choice between public and private debt. I then develop the empirically testable hypotheses. Section 4.3 describes the dataset and sample selection criteria, and determines in Subsection 4.3.1 the classification of the different debt types into bank debt and public debt to determine the primary dependent variable in Subsection 4.3.2, and the determinants of corporate debt structure which serve as explanatory variables in Subsection 4.3.3. In addition, Section 4.3 presents the summary statistics. In Section 4.4, I detail the empirical results and the robustness checks. Section 4.5 concludes the paper.

4.2 Literature Review and Hypotheses Development

4.2.1 Trade-off Models in Capital Structure Theory

In existing studies, the idea of an optimal debt structure is based on capital structure models on the choice between debt and equity. Apart from the pecking order theory, where firms prefer internal over external financing and, when internal funds are not sufficient, prefer debt over equity (Myers, 1984; Shyam-Sunder and Myers, 1999), and the market timing approach, where equity market timing impacts the capital structure (Baker and Wurgler, 2002; Welch, 2004), there is a strand of research that assumes an optimal capital structure, which is determined in trade-off models.

Static trade-off models assume that firms have an optimal or target capital structure. These models differ in the determinants that are traded-off in order to determine the optimal mix between equity and debt. In the early studies by Kraus and Litzenberger (1973), Miller (1977), and Bradley et al. (1984), firms are modeled

to trade-off tax shields of debt against expected bankruptcy costs. The optimal capital structure is determined by equating marginal costs and marginal benefits of leverage (Shyam-Sunder and Myers, 1999, p. 220). Subsequent research incorporates agency problems in the static trade-off model (cf. e.g., Jensen and Meckling (1976) and Myers (1977)). As Jensen and Meckling (1976) argue, firms trade-off agency costs of outside equity, where managers spend money at shareholders' expense to maximize their own monetary and non-monetary utility, against agency costs of debt. The latter facilitate conflicts between equityholders and debtholders of a firm. Equityholders have an incentive to go for asset substitution, i.e., increasing risk at debtholders' expense, which is anticipated by debtholders, who impose monitoring costs to be finally paid by the firm (Jensen and Meckling, 1976, pp. 312, 333-334, 338). Empirical tests of static trade-off theory models do not reflect realistic firm behavior that unfolds over several periods of time. Therefore, static trade-off models of capital structure neglect retained earnings and mean reversion over time (Frank and Goyal, 2008, p. 145). By excluding the possibility of mean reversion, static trade-off theories do not model firms' target adjustment behavior, but dynamic trade-off models do this.

Dynamic models of the trade-off theories of capital structure involve multiple periods and include firms' expectations and target adjustment costs (Frank and Goyal, 2008, p. 145). The basic idea is that firms adjust their capital structure toward a target over time. Models assuming continuous time with uncertainty, taxes, and bankruptcy costs, include those by Brennan and Schwartz (1984) and Kane et al. (1984). Both studies neglect transaction costs and assume that firms rebalance to their target immediately after external shocks have sidetracked firms from their optimal capital structure. Dynamic models incorporating transaction costs include those by e.g., Fischer et al. (1989) and Leary and Roberts (2005). These models implicate that firms cannot immediately and without cost adjust their capital structure to their target. Fischer et al. (1989, p. 20) allow firms' actual capital structure to drift away from their target within a certain range. Costly rebalancing of the capital structure is pursued when a boundary of the range is reached. Leary and Roberts (2005) find empirical evidence supporting this argument and numerical solutions of a target leverage range are provided by Fischer et al. (1989). Leary and Roberts (2005, p. 2611) find that although firms seem to make use of equity market timing, they do rebalance to optimal capital structures primarily by increasing or decreasing their outstanding debt.

Based on these dynamic trade-off models, a subsequent strand of literature ex-

amines how quickly firms adjust towards their target capital structures. Building on the partial target adjustment approach of Leary and Roberts (2005), Flannery and Rangan (2006) show that firms do have target capital structures and that they partially adjust to them by closing the gap to their target over time. Thus, Flannery and Rangan (2006) incorporate the possibility of partial adjustment and subsequently estimate the speed of target adjustment. Byoun (2008) further examines the questions of when and how firms (partially) adjust their capital structures to their targets depending on changes in external capital needs. Byoun (2008, pp. 3093-3094) finds that companies make use of their financial deficit or surplus to move towards their target capital structure. In addition, Byoun (2008, pp. 3072, 3092-3094) shows that the extent of transaction costs and/or asymmetric information costs when issuing debt or external equity impacts firms' target adjustment speeds. Examining further potential determinants of companies' speeds of adjustment to the target capital structure, Öztekin and Flannery (2012) analyze empirically the impact of country-level institutional features such as the political, legal, and financial traditions and regulations. In line with the dynamic trade-off theory, Öztekin and Flannery (2012, p. 88) find empirical evidence for better institutional environments lowering transaction costs and thereby increasing firms' speed of target adjustment.

In empirical work on dynamic trade-off models and analyses of target adjustment speeds, the problem arises that firms' target capital structures are unobservable and researchers must rely on proxies such as historical mean leverage ratios, three-year or five-year moving averages, or targets estimated on the basis of firm characteristics that are assumed to determine firms' financing decisions. In this paper, I empirically apply a dynamic trade-off model from capital structure theory to the context of debt structure and empirically build on the models of Flannery and Rangan (2006) and Byoun (2008) to examine firms' speed of adjustment to a potential target debt structure. I apply econometric models established in this strand of research on the debt structure setting, e.g., when estimating the target debt structure and the annual speed of adjustment. The applicability of a trade-off approach in analyzing corporate debt structures is discussed in Section 4.2.2. The determinants of firms' target debt structures are taken from the literature on the choice between public and private debt as reviewed in Section 4.2.3.

4.2.2 Trade-off Theory Extended to Corporate Debt Structure

In recent research on firms' choices between public and private debt, the trade-off models from capital structure theory have been extended to the question of an optimal debt structure. There is broad consensus for the view that firms do have optimal mixtures of public and private debt. In an early theoretical paper on the optimal choice of debt types, Detragiache (1994, p. 327) assumes public and private debt to be perfect substitutes except for the renegotiation option of private debt, which translates into lower renegotiation costs in cases of financial distress. The renegotiation option is beneficial for the borrower in cases of insolvency but increases the asset substitution problem ex ante (Detragiache, 1994, p. 327).[1] As borrowing firms using private debt know that they can renegotiate debt at a lower cost, they might increase risk as the threat of liquidation is lower than if they are financed with public debt. Public debt, however, has a disciplining effect limiting asset substitution incentives ex ante. Therefore, firms trade off benefits of private debt where the renegotiation option facilitates investment and avoids inefficient liquidation against costs of higher ex-ante asset substitution incentives of the borrowing firm (Detragiache, 1994, p. 350). Thus, Detragiache (1994, p. 350) finds that firms optimally finance investment with a mix of both public and private debt.

In a theoretical model, Hackbarth et al. (2007, p. 1389) examine optimal debt composition and priority structure of debt when firms issue bank debt as well as public debt, where bank debt has the option to renegotiate outside bankruptcy. The authors show that the optimal mix of public vs. private debt depends on the relation of firms' and banks' bargaining power in case of potential renegotiations. Although weak firms rely on bank debt exclusively, firms with a strong bargaining position use a mix of public debt and senior bank debt as they have a lower bank debt capacity (Hackbarth et al., 2007, p. 1389). Their optimal debt structure is determined by raising bank debt to their bank debt capacity and then lever up with public debt until the marginal bankruptcy costs of public debt equal the marginal tax benefits (Hackbarth et al., 2007, p. 1391). In summary, Hackbarth et al. (2007) find that within the trade-off theory of capital structure, firms do have optimal debt structures. Both theoretical papers, i.e., Detragiache (1994) and Hackbarth et al.

[1] For a sample of US listed companies, Roberts and Sufi (2009, p. 159) show that renegotiation of private debt contracts exists. They find that 90 percent of long-term private credit agreements are renegotiated before maturity, mostly before a default occurs.

(2007), ignore different issuing costs of loans and bonds as well as the monitoring function of bank debt. While not testing their models empirically, Detragiache (1994) and Hackbarth et al. (2007) both find that firms have an optimal mix of public and private debt. From this insight follows the first hypothesis:

Hypothesis 4.1. *Firms have target bank debt ratios to which they partially adjust over time.*

Partial adjustment over time seems reasonable as I assume that firms cannot adjust to their optimal debt structure without incurring any costs. Because of this reason, I use a partial adjustment model inspired by Flannery and Rangan (2006) that takes into account target adjustment costs. For empirically testable models of the choice between public and private debt, it seems likely that the renegotiation option of private debt is more important for firms with certain characteristics, such as firms faced with a Myers (1977)'s underinvestment problem. The opposite effect, i.e., signaling discipline by issuing public debt without the possibility to renegotiate, might be more important for firms that are more likely suspected of engaging in asset substitution, e.g., because of managerial incentives favoring shareholders' interests. In addition, the monitoring function of private debt is likely to be more important for firms with a high need for monitoring such as small and young firms or firms with high information asymmetries with outside stakeholders. Fixed issuing costs of public debt might prevent small firms or firms with low financing needs to issue bonds, thereby shifting firms' preferences for public over private debt. Taken together, it is likely that the optimal debt structure differs in the cross-section depending on certain firm characteristics. In this paper, these firm characteristics are collected from empirical studies on the choice between public and private debt as described in Section 4.2.3.

4.2.3 Determinants of the Optimal Debt Structure: Public vs. Private Debt

In this section, I detail the factors that are likely to empirically explain (a) firms' optimal or target debt structures and (b) why some firms adjust more quickly to these targets than others.

Firm Risk and the Likelihood of Financial Distress

With respect to the basic trade-off coming along with bank debt, i.e., the ex-post benefit of higher investment (as a solution to Myers (1977)'s underinvestment problem) and no inefficient liquidation in case of financial distress vs. the ex-ante cost of a larger asset substitution problem (Detragiache, 1994), the renegotiation option of private debt - and thereby the optimal portion of bank debt as opposed to public debt - is likely to be more valuable/higher for riskier firms or firms that are more prone to financial distress. In further theoretical work, this idea was implemented by, for example, Chemmanur and Fulghieri (1994) who model the optimal choice between public debt and bank loans. They show that while in equilibrium, companies prefer bank loans as banks put more effort into evaluating potential liquidation decisions than bondholders do; they also find that firms with a lower likelihood of distress prefer public debt.

Empirically, the role of risk or firm-level probability of financial distress when firms choose between public and private debt, is accounted for inter alia by Meneghetti (2012) who examines the choice between public and private debt based on individual debt issuances against the background of cross-country differences in managerial incentives. Meneghetti (2012, p. 71) controls for the likelihood of financial distress using leverage, interest coverage, Altman (1977)'s Z-score and an S&P credit rating indicator. For firm risk, Meneghetti (2012, p. 71) uses volatility of firms' return on assets (ROA), industry median sales growth volatility as well as asset tangibility. Albring et al. (2011, p. 1450) examine the choice between public and private debt empirically. To control for firm default risk, the authors include the inverse of Altman (1977)'s Z-score, a credit rating indicator variable, a five-year standard deviation of firms' earnings before interest, taxes, depreciation, and amortization (EBITDA) to sales ratios, leverage, and profitability. These proxies were already implemented in empirical research on the public vs. private debt choice by Denis and Mihov (2003, p. 18) who also study firms' choices between public and private debt and only deviate in firm risk proxies by analyzing the fraction of firms with a Z-score below 1.81, defined as being in financial distress. Denis and Mihov (2003, pp. 20-21) find that firms with a higher probability of financial distress are more likely to borrow from banks than from public bond markets. Following the argument of firms that are likely subject to the underinvestment problem, and for whom the renegotiation option of bank debt is especially valuable, i.e., firms with a high probability of default, I expect a positive relationship between firms' likelihood of

financial distress as well as overall firm risk and the (target) bank debt ratio.[2]

Management Incentives

The incentives of firms' managers are likely to impact firms' debt structure choices as argued theoretically and shown empirically. Although raising debt and submitting the firm to bank monitoring decreases agency conflicts between shareholders and managers, leverage raises agency problems between managers/equityholders and debtholders.[3] According to the asset substitution problem as introduced by Jensen and Meckling (1976), equityholders of a levered company have an incentive to increase risk (i.e., substitute safe for risky assets) and thereby increase the value of equity at debtholders' expense. If managers have their incentives closely aligned with those of equityholders, e.g., by stock or stock option holdings in their compensation scheme, they are assumed to behave accordingly and increase shareholder value at debtholders' cost through asset substitution. Parrino and Weisbach (1999, p. 4) argue that these managers will act in shareholders' interests and avoid investments in safe, positive net present value projects that only benefit debtholders (underinvestment). In contrast, managers will have an incentive to invest in risky projects - even with a negative net present value - where debtholders' value decreases whereas equityholders' value increases (overinvestment) (Parrino and Weisbach, 1999, p. 4). As debtholders anticipate management behavior, public bondholders will demand higher returns as compensation, which would increase firms' costs of debt, while banks could mitigate the asset substitution threat through covenants and monitoring.[4]

If firms issue both public and bank debt, a certain minimum of bank debt with the accompanying bank monitoring could possibly mitigate bondholders' concerns. Therefore, incentive compensation is assumed to be associated with higher bank debt. The intuitive implication of this is that the optimal bank debt ratio should

[2]For the empirical proxies applied in this paper, cf. Section 4.3. For the respective summary statistics, please compare Table 4.2.

[3]As argued by Almazan and Suarez (2003, pp. 237-238), bank monitoring has a similar mitigating effect on the shareholder-manager agency problem as management incentive compensation, as both monitoring and incentive compensation prevent managers from extracting private benefits at shareholders' expense.

[4]Kwan and Carleton (2010, p. 907) find empirical evidence that private placement bonds more often have restrictive covenants than bonds from public placements, which is in line with stronger monitoring by private debtholders. They argue that firms choose the debt source that minimizes borrowing costs. Kwan and Carleton (2010, pp. 911, 927) conclude that owing to better bonding and monitoring by debtholders from private placements, costs of debt from private placements can be decreased as opposed to public bond yields.

be higher given the firm's managerial incentives are closely aligned with those of shareholders. Further arguments for managers with strong equity incentives to prefer private debt are provided by, for example, Denis and Mihov (2003, p. 7) who argue that these managers choose the optimal type of debt, i.e., if bank debt is optimal, they are more likely to decide accordingly than are managers with low equity incentives. In addition, managers with high firm ownership have greater power allowing them to protect themselves against monitoring pressure from outside debtholders (Denis and Mihov, 2003, p. 7). On the other hand, managers with low equity incentives would not expose themselves to the scrutiny and influence of bank monitoring but prefer to issue public debt (Denis and Mihov, 2003, p. 7).

Hypothesis 4.2. *Firms with strong management incentives have higher target bank debt ratios.*

In empirical research, the fact that the alignment of management incentives with those of shareholders is driven by the respective executive compensation scheme is widely documented. Mehran (1995, p. 163) finds that firm performance as measured by Tobin's Q and ROA is positively related to managers' equity compensation. Datta et al. (2001, p. 2299) show that managers with high equity-based compensation make acquisition decisions, which result in higher stock returns around the acquisition announcement, thereby benefitting shareholders more than managers with low equity-based compensation.

With regard to the relationship between managerial incentives and the optimal choice between public and private debt, there exists broad empirical evidence to suggest that managers with high incentive compensation prefer private to public debt. Denis and Mihov (2003) analyze the determinants of firms' choice between public debt, bank debt, and non-bank private debt. Their sample comprises more than 1,500 new debt issues by US listed firms between 1995 and 1996 (Denis and Mihov, 2003, p. 26). Apart from their main finding of credit quality being the primary driver of firms' debt financing source, Denis and Mihov (2003, pp. 26-27) document that firms borrowing from banks and non-bank private lenders have managers with higher equity ownership than firms that prefer raising debt in public bond markets (Denis and Mihov, 2003, p. 19).[5] Albring et al. (2011) examine the relationship between CEO equity incentive compensation and the choice between syndicated loans and public bonds for a sample of US listed firms from 1980 to 2010. They argue that

[5]Denis and Mihov (2003, p. 12) also control for firms' public and private debt outstanding at the time of new debt issue that I do in my analysis as well.

bank monitoring limits managers' ability to extract private benefits from the firm at shareholders' expense and therefore mitigates agency problems between shareholders and managers. Incentive compensation remunerates managers for the value increase coming from such external monitoring (Albring et al., 2011, p. 1448). Empirically, Albring et al. (2011, pp. 1454-1455) find a positive relation between CEOs' incentive alignment with shareholders through equity-incentive compensation and raising debt via syndicated loans rather than public debt.

After setting up a theoretical model assuming perfect information, Meneghetti (2012, pp. 65, 70) similarly analyzes firms' choice between bank loans and public bond issues for a sample of nearly 700 US firms between 1993 and 2005. The author argues that incentive compensation solves the agency conflict between shareholders and managers but gives managers an incentive for asset substitution to benefit shareholders at debtholders' expense (Meneghetti, 2012, p. 65). In line with the above reasoning, Meneghetti (2012) predicts that public bondholders demand compensation as they anticipate the asset substitution problem thereby increasing the costs of debt, while banks can mitigate the asset substitution problem through monitoring (Meneghetti, 2012, p. 65). Meneghetti (2012, p. 86) finds empirical evidence of a positive relationship between managerial incentive compensation and the likelihood that firms raise debt from banks rather than from public bond markets. She does not explicitly include firms' debt structure but tests how the fraction of new bank debt to total debt is related to management incentives (Meneghetti, 2012, pp. 76-78, 80-82) thereby ignoring existing bank debt levels.

Multiple proxies to measure managerial incentives are accepted in the literature. Denis and Mihov (2003, pp. 5, 17) measure managerial incentives by managers' stock ownership, which they define as the fraction of shares outstanding owned by officers and directors. Albring et al. (2011, pp. 1450, 1452, 1454) measure the alignment of managers' incentives with those of shareholders, focusing on the CEO's equity incentives rather than incentives of the whole group of a firm's directors and officers. The authors apply three different proxies for CEO's equity incentives coming from stock options: the number of the respective CEO's options exercisable at fiscal year-end, the option delta expressing the value change in the CEO's stock and option portfolio from one percent change in the firm's share price, and the option vega (Albring et al., 2011, p. 1450). Meneghetti (2012, p. 66) measures the alignment of managerial incentives with that of shareholders with CEO's pay-performance sensitivity (PPS). In line with Aggarwal and Samwick (2003), she defines PPS as the dollar sensitivity of the CEO's portfolio of stocks and stock options resulting

from a USD 1,000 increase in the firm's equity value (Meneghetti, 2012, p. 71). PPS is widely accepted as proxy for the alignment of managerial incentives with that of shareholders when examining other research questions (cf. e.g., Jensen and Murphy (1990), Yermack (1995)). Although I follow the approach of Meneghetti (2012) and compute PPS from CEO stockholdings and options, I break down the proxy into three measures, that is, PPS from the CEO shareholdings only, PPS from the CEO's stock option portfolio, and PPS from both stocks and options.[6]

In keeping with the above arguments, public bondholders would demand compensation through higher returns in response to bank debt ratios below the target, as the extent of bank monitoring would not suffice to eliminate bondholders' asset substitution concerns. Firm managers whose incentives are driven by shareholder value will not bear the value loss of higher costs of debt but would rather hurry to get back to their target debt structure.

Hypothesis 4.3. *Firms with strong management incentives adjust more quickly to their target debt structure.*

There is empirical research on management incentives and firms' dynamic target adjustments with respect to the debt-equity capital structure (e.g., Lewellen (2006); Frank and Goyal (2007); Liao et al. (2013)), but the impact of managerial incentive alignment on the speed of adjustment to the target debt structure has been widely neglected in scientific research. This paper contributes to the growing literature on management incentives and (target) corporate debt structure and expands existing research with respect to the dynamic target debt structure adjustment speed.

Information Asymmetry

There are several information-based explanations for a firm's choice between public and private debt. As summarized by Kale and Meneghetti (2011, p. 6), banks as providers of private debt have an information production function with which they can comply at lower costs than public lenders, they monitor borrowing firms better after granting a loan to mitigate moral hazard problems, and banks are the preferred debt source of firms with confidential information.

The role of financial intermediaries such as banks in information acquisition about borrowers when information asymmetries exist has been documented in finance research e.g., in early theoretical models by Diamond (1984), Ramakrishnan and

[6]For a detailed description of how PPS is defined and computed here, cf. Section 4.3.3.

Thakor (1984) and Allen (1990). Hauswald and Marquez (2006) and Banerjee (2005) show that information production about the borrower plays an important role in bank competition. Increasing competition in the banking industry can give banks an additional incentive to engage in information acquisition in order to soften price competition (Hauswald and Marquez, 2006, pp. 989-990). Agarwal and Hauswald (2010, p. 2783) find that a bank's proximity to the borrower - both in a spatial and relationship way - facilitates information acquisition. This finding is in line with the view that information production by banks is likely to be less costly than by arm's-length bondholders and that-given this condition-firms favor bank debt over public debt (Kale and Meneghetti, 2011, p. 6).

The fact that monitoring of the borrower by banks is superior to monitoring by public bondholders is broadly documented in the literature (Leland and Pyle, 1977; Diamond, 1984; Fama, 1985). Taking into account the pecking order theory of capital structure, Myers (1984) states that after using internal funds, firms will raise external financing from sources that are least sensitive to new information. Within the different classes of debt, Denis and Mihov (2003, p. 6) argue that the value of bank debt is less sensitive to new information being revealed than is public debt. It follows that in line with the pecking order theory, companies with high information asymmetries will borrow from banks before they issue bonds (Denis and Mihov, 2003, p. 6). On the other hand, Lin et al. (2013, p. 525) argue that opaque firms anticipate intense scrutiny and monitoring by banks, which they might want to avoid by issuing public debt instead. However, raising debt at public bond markets would induce bondholders, who do not monitor, to demand a higher return as compensation for agency conflicts arising from the firm's opacity. As a result, firms with higher information asymmetry with outside stakeholders are assumed to prefer bank debt over public debt - at least until the monitoring function is sufficiently fulfilled by the bank debt in place. A certain level of bank debt, in the presence of information asymmetries, is in line with the model of Diamond (1991, p. 716), which predicts that firms need to borrow from banks first and thereby expose themselves to bank monitoring in order to build up reputation, which alleviates moral hazard and adverse selection problems when issuing bonds in the second step. It follows that opaque firms have higher (target) bank debt ratios compared to more transparent companies.

In addition to the above arguments, there could arise a situation where firms choose to be opaque to outsiders because they own proprietary information. In an early theoretical paper on firms' optimal financing when firms own private infor-

mation, Campbell (1979, p. 915) argues that certain kinds of inside information are valuable only when not disclosed to the public. As a result, managers might not be willing to overcome information asymmetries by revealing this information without decreasing the firm's returns. Therefore, these firms will finance investment projects by issuing securities privately so that secret information can remain confidential (Campbell, 1979, pp. 915). This argument supports the conclusion of Kale and Meneghetti (2011, p. 7), who state that receiving favorable terms for public debt financing would necessitate disclosure of inside information.[7] Thus, firms that try to avoid increased costs of debt and keep private information confidential through deliberate opacity should prefer bank debt over public debt, at least until bank monitoring of existing bank debt suffices to mitigate the information asymmetry problem from public bondholders' perspectives. All these theories on information asymmetries and the source of debt financing result in the empirical prediction that higher informational opacity is associated with higher (target) bank debt ratios.

Hypothesis 4.4. *Firms with high information asymmetry with outside stakeholders have higher target bank debt ratios.*

There exists recent empirical research on firms' choice between public and private debt in the context of informational opacity. For a sample of more than 1,500 new debt issues by US firms between 1995 and 1996, Denis and Mihov (2003, pp. 3, 9) examine the determinants of firms' choice among public debt, bank debt, and non-bank private debt. Other than their primary finding that the choice of debt source depends on the credit quality of the borrowing firm (Denis and Mihov, 2003, p. 3), the authors find indicative evidence that firms with less informational opacity prefer public debt whereas more opaque firms tend to choose private debt from either banks or other private sources (Denis and Mihov, 2003, p. 19). Analyzing a broader field, Gomes and Phillips (2012) examine firms' choice among equity, convertibles, and debt as well as the respective public or private financing source. For a sample of US listed firms between 1995 and 2003, the authors find that for all three forms of financing, firms are more likely to choose a private over a public security if information asymmetries are large (Gomes and Phillips, 2012, pp. 620, 627).

A number of measures of opacity have been used in empirical research. Denis and Mihov (2003, pp. 16, 18) use firm size, the fixed assets ratio, and R&D expenditures

[7] For a detailed overview of theoretical papers dealing with proprietary information, cf. Kale and Meneghetti (2011).

and Meneghetti (2012, p. 86) employs firm size terciles as proxies for informational asymmetries. As argued by Campbell (1979, p. 915), strategic proprietary information is often more important than technological information, which can be protected, for example, via patents. For this reason, R&D expenditures might not be a suitable proxy to use here. Like R&D expenditures, firm size is likely to be related to the choice of debt source (and therefore controlled for in the later empirical analyses); moreover, large firms can be deliberately opaque. Gomes and Phillips (2012, p. 629) rely on two proxies that have been proven to be strongly associated with informational opacity, which are dispersion of analysts' forecasts and analyst earnings surprise.[8] In the empirical analysis presented in Section 4.4, I will employ these two measures as proxies for information asymmetry between firm insiders and outsiders.

4.3 Dataset and Summary Statistics

4.3.1 Data Sources and Sample Selection

To examine my research question empirically, I use annual data on corporate debt structure from Capital IQ for all companies with headquarters in the US that could be matched to Compustat for the sample period of 2000-2013. I use firm characteristics from Compustat North America and require firms to have positive total assets and positive total debt. I then exclude financial firms with primary SIC 6000-6799 (cf. Hovakimian and Li (2011), Albring et al. (2011), and Denis and Mihov (2003)) and companies from regulated industries with primary SIC 4900-4999 (cf. Lin et al. (2013, pp. 520-521)).

I then match these companies to Execucomp for data on management compensation of the respective CEOs, which is used for computing PPS together with stock price data from The Center for Research in Security Prices (CRSP). Finally, I match the sample firms to Institutional Brokers' Estimate System (IBES) to enrich the dataset with analyst forecast data to compute, for example, the dispersion of analysts' forecasts to proxy for information asymmetry.

The final sample consists of 14,326 firm-year observations for which at least Capital IQ and Compustat data is available. Managerial incentive proxies based on CRSP and Execucomp are computed for 5,975 firm-CEO years and dispersion of

[8] As shown by Lang and Lundholm (1996, p. 467), companies with more informative corporate disclosure policies exhibit lower values for analyst forecast dispersion and more accurate forecasts. For implementation of both proxies for information asymmetry in empirical research, cf. e.g., Thomas (2002).

analyst forecasts is computed using IBES for 11,865 sample-company years. Owing to the need for stock market and analyst forecast data, the sample is biased toward large and listed firms.

4.3.2 Classification of Debt Types: Bank Debt vs. Public Debt

To analyze firms' debt structure, I use data on the different debt types a company holds at its fiscal year end from Capital IQ. The database distinguishes among seven types of debt that are identified using capital structure subtype IDs and level IDs: revolving credit, term loans, senior bonds and notes, subordinated bonds and notes, commercial paper, capital leases, and other debt.[9] Capital IQ reports the USD amount of each debt type that adds up to total debt. The amount of bank debt is computed by summing revolving credit and term loans for each company year. The amount of public debt is defined as the sum of senior bonds and notes, subordinated bonds and notes, and commercial paper. Thus, total debt is equivalent to the sum of bank debt, public debt, capital leases, and other debt.[10] For reasons of comparability, I examine the ratios of the respective debt types to total debt in the following empirical analyses. These definitions are in line with recent research using Capital IQ (cf. Lin et al. (2013, pp. 521, 523)).

Table 4.1 shows summary statistics for the seven different debt type ratios as well as the aggregated bank debt and public debt ratios. Panel A in Table 4.1 displays the distribution of the usage of the different debt types across the sample companies. In the mean, 31 percent of total debt is held in revolving credit and 16 percent in term loans, which adds up to 37 (42) percent bank debt in the mean (median). Senior bonds and notes are the most prevalent debt type accounting for 33 percent of total debt in the mean of all firm-year observations. Subordinated bonds and loans amount to seven percent of total debt in the mean and commercial paper is

[9] The respective capital structure subtype IDs are as follows: 1 for commercial paper, 2 for revolving credit, 3 for term loans, 4 and level ID 1 for senior bonds and notes, 4 and level ID different from 1 for subordinated bonds and notes, 5 for capital leases, and 6, 7, and 9 for other debt types.

[10] Please note that until 2006, pension obligations had mostly been reported off-balance sheet. Since the introduction of the Financial Accounting Standards (FAS) 158 in 2006, companies are required to report the net pension asset or liability position but the total pension obligation does not appear on the balance sheet. The sample period covers the years before and after this regulatory change. In addition, Capital IQ does not include pension information in their debt structure database. Therefore, my analysis of corporate debt does not include corporate pension obligations.

Table 4.1: Summary Statistics of Debt Structure

Panel A: Sample distribution of debt types

	Obs.	Mean	Std. Dev.	P5	P25	Median	P75	P95
Revolving credit	14326	.3076	.3640	0	0	.1333	.5830	1
Term loans	14326	.1631	.2912	0	0	0	.1987	.9527
Senior bonds & notes	14326	.3280	.3754	0	0	.1129	.6738	1
Sub. bonds & notes	14326	.0729	.2121	0	0	0	0	.5968
Commercial paper	14326	.0117	.0653	0	0	0	0	.0384
Capital leases	14326	.0830	.2458	0	0	0	.0104	1
Other debt	14326	.0338	.1267	0	0	0	.0017	.2005
Bank debt	14326	.4706	.4027	0	.0146	.4207	.9471	1
Public debt	14326	.4126	.3952	0	0	.3525	.8114	1

Panel B: Usage of debt types over the sample period

sample years	revolving credit	term loans	senior bonds & notes	sub. bonds & notes	commercial paper	capital leases	other debt	bank debt	public debt
2000/2001	0.2415	0.1398	0.3229	0.1152	0.0194	0.0984	0.0629	0.3813	0.4575
2002/2003	0.2477	0.1433	0.3344	0.1118	0.0136	0.1026	0.0467	0.3909	0.4598
2004/2005	0.2472	0.1425	0.3685	0.1010	0.0120	0.0925	0.0363	0.3897	0.4815
2006/2007	0.2724	0.1680	0.3421	0.0768	0.0130	0.0973	0.0306	0.4404	0.4318
2008/2009	0.3219	0.1897	0.3108	0.0548	0.0098	0.0833	0.0297	0.5116	0.3754
2010/2011	0.3859	0.1692	0.3133	0.0397	0.0085	0.0590	0.0243	0.5551	0.3615
2012/2013	0.4244	0.1775	0.2930	0.0259	0.0103	0.0487	0.0202	0.6019	0.3292
Overall	0.3076	0.1631	0.3280	0.0729	0.0117	0.0830	0.0338	0.4706	0.4126

This table shows the summary statistics of the ratios of the different debt types the sample companies apply. The ratios measure the respective debt amounts divided by total debt at fiscal year-end. Panel A displays the overall summary statistics of the sample of 14,326 firm-year observations between 2000 and 2013. Panel B presents mean ratios of debt types over the respective two-year periods as well as the mean debt type shares for the overall sample period.

the least used debt type accounting for one percent of total debt in the mean. Taken together, the public debt ratio is 41 (35) percent in the mean (median). Capital leases comprise eight percent of total debt and other debt accounts for three percent of total debt in the mean. Overall, bank debt and public debt account for up to 88 percent of total debt, where the bank debt ratio is slightly higher than the public debt ratio.

Panel B of Table 4.1 shows the mean ratios of the respective debt types to total debt over the sample period of 2000-2013, where two subsequent sample years are summarized. This presentation facilitates the identification of potential trends in debt type usage over the sample period. For revolving credit, there seems to be a clear upward trend of use over time with a mean ratio of 24 percent in the years 2000-2001 to 32 percent in 2008 /2009 and finally 42 percent of total debt in the sample years 2012/2013. A similar development can be observed for the term loan ratio, which starts with 14 percent in 2000/2001 growing to its peak of 19 percent in 2008/2009 and ending at 18 percent in 2012/2013. Taken together, the bank debt ratio grew over the sample period from 38 percent in 2000 and 2001 to its maximum of 60 percent at the end of the sample period in 2012/2013. Considering public debt types, the ratio of senior bonds and notes to total debt is more stable and moves between 29 and 36 percent over the sample years. In contrast, the ratio of subordinated bonds and notes decreased over time, starting with 12 percent in 2000/2001, over six percent in 2008/2009, reaching its minimum of three percent at the end of the sample period. The use of commercial paper is low in all sample years with a maximum ratio of two percent in 2000/2001 and a minimum of less than one percent in 2010/2011. Aggregated to the public debt ratio, these debt types account for 46 percent of total debt at the beginning of the sample period, grow to a maximum of 48 percent in 2004- 2005 and then decrease to 33 percent at the end of the observation period in 2012/2013. The ratio of capital leases to total debt stays at about 10 percent until 2006/2007 and then decreases to five percent in 2012/2013. The ratio of other debt to total debt started with seven percent at the beginning of the observation period and then fell to 2 percent in 2012/2013. Overall, the use of public debt clearly dominated the use of bank debt at the beginning of the sample period with 46 percent, as opposed to 38 percent bank debt. This relation reversed in 2006/2007 where both aggregated debt types have similar amounts and then ended with bank debt outnumbering public debt with 60 percent compared to 33 percent at the end of the sample period. Given that firm characteristics of the sample companies do not systematically change over the sample period, promoting

the use of bank debt over public debt, there seem to be an exogenous time trend, which may reflect changing market conditions for public debt and bank debt.

4.3.3 Determinants of Corporate Debt Structure

To model the target debt structure, i.e., the target ratio of bank debt to total debt, I use proxies for management incentives and firm opacity, as well as several firm characteristics, which are known from the literature to influence the choice between public and private debt. Definitions and the expected impact on a firm's target debt structure of the employed determinants are described in the following paragraphs.

Management Incentives

As proxies for managerial incentives, I compute the pay-performance-sensitivity (PPS) of the CEO for each firm-year. PPS measures by how much a manager's private wealth changes if the shareholder value of the company he or she manages changes by USD 1,000. Thereby, I distinguish between PPS that comes from the CEO's shareholdings in the company ($\text{PPS}_{\text{stocks}}$), PPS that results from stock options held by the CEO of the respective company's shares ($\text{PPS}_{\text{options}}$), and the additive PPS from both shareholdings and stock options ($\text{PPS}_{\text{stocks+options}}$), which measures the total PPS of a firm's CEO. $\text{PPS}_{\text{stocks}}$ is defined in line with Aggarwal and Samwick (2003, p. 1621) and simply denotes the fraction in the company that the manager owns. For example, a five percent stock ownership in the firm would translate into a $\text{PPS}_{\text{stocks}}$ of USD 50 when the total shareholder value increases by USD 1,000. $\text{PPS}_{\text{options}}$ is computed consistently with prior research (cf. e.g., Jensen and Murphy (1990), Yermack (1995), Core and Guay (1999, p. 154)) and is defined as the option portfolio delta, i.e., the partial derivative of the option price with respect to the price of the underlying stock. This approach is based on the option pricing model by Black and Scholes (1973), which was extended by Merton (1973) to account for dividends and applied, for example, by Core and Guay (1999, pp. 180-181) and defined here as follows:

$$C = e^{-\delta T} S N(d_1) - X e^{-r_f T} N(d_2) \tag{4.1}$$

$$
\begin{array}{lrll}
\text{where} & d_1 & = & \frac{ln(\frac{S}{X})+(r_f-\delta+\frac{\sigma^2}{2})T}{\sigma\sqrt{T}} \\
& d_2 & = & d_1 - \sigma\sqrt{T} \\
& \text{C} & = & \text{price of call option} \\
& \text{S} & = & \text{price of the underlying stock} \\
& \text{X} & = & \text{exercise price of the option} \\
& \text{T} & = & \text{time-to-maturity of the option in years} \\
& \sigma & = & \text{expected stock return volatility over the option's lifetime} \\
& r_f & = & \text{risk-free interest rate for the option's time-to-maturity} \\
& \text{N} & = & \text{cumulative probability function of the normal distribution} \\
& \delta & = & \text{continuous dividend yield of the underlying stock}
\end{array}
$$

For the model that includes dividend payouts, the option delta is then defined as

$$\Delta = e^{-\delta T} N(d_1) \tag{4.2}$$

$$\text{where} \quad \Delta = \text{call option delta, partial derivative of the call price with respect to the price of the underlying stock}$$

As described by Aggarwal and Samwick (2003, p. 1621), the option delta is then multiplied with the fraction of the firm's equity for which the respective options are written. For option portfolios with different option characteristics, the option deltas are multiplied with the corresponding stock fraction. Then, the option package values for PPS are added up to $\text{PPS}_{\text{options}}$. For computing the $\text{PPS}_{\text{options}}$, I use Execucomp data for the stock price at fiscal year-end, the exercise price, and the time to maturity. Stock return data are taken from CRSP. The expected stock return volatility is calculated, following Aggarwal and Samwick (2003, p. 1621), as standard deviation of monthly returns of the underlying stock over the 60 months preceding the sample year, which calls for a minimum of 12 months of data. It is then multiplied by $\sqrt{12}$. Risk-free rates are computed on the basis of treasury yield curve rates provided by the data center of the US Department of the Treasury. [11] The treasury yield curve rates are then interpolated to fit the corresponding time-to-maturity of the respective option portfolio.

Higher values for the PPS imply that CEOs' incentives are aligned more with shareholders' interests. Managers' whose incentives are closely aligned with those of equity holders are associated with a stronger asset substitution problem as they

[11] The treasury rates are downloaded from the data center website (`http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yieldAll` as of November 15, 2014.)

benefit more from increasing risk at debtholders' expense. As this is anticipated by debtholders, such firms either face higher costs of debt or mitigate this effect by more (bank) monitoring. As only bank debt facilitates the second solution, firms with strongly incentivized managers are expected to exhibit higher (target) bank debt ratios. Regarding the speed of adjustment to an optimal bank debt ratio, I expect firms whose CEOs have stronger incentives to adjust faster to their target in order to avoid costs of target deviation (e.g., higher costs of debt in case of bank debt ratios below the target not facilitating the optimal extent of bank monitoring).

Information Asymmetry

I measure information asymmetry, in the sense of opacity of companies toward outside stakeholders, by dispersion of analyst forecasts and analyst earnings surprise. Dispersion of analyst forecasts is defined as the standard deviation of outstanding analysts' earnings forecasts normalized by the stock price.[12] I apply analyst forecast data from IBES where I choose earnings-per-share (EPS) forecasts for the next fiscal-year end.[13] Data on the respective stock price at fiscal year-end is taken from CRSP. Analyst earnings surprise is defined as the absolute value of the difference between the median EPS forecast and the actual EPS value normalized by the stock price at fiscal year-end. Again, data on analyst forecasts are taken from IBES, where the median forecast is reported in the summary file. The actual EPS data is taken from the IBES details actuals file. The stock price at fiscal year-end comes from CRSP.

For both proxies, dispersion of analyst forecasts and analyst earnings surprise, higher values indicate greater firm opacity toward outside stakeholders. Higher information asymmetry is associated with a larger benefit of bank monitoring as information acquisition costs of banks are smaller than similar costs of bondholders. Therefore, I expect more opaque firms to have higher (target) debt ratios. I have no explicit prediction for the impact of opacity on the target adjustment speed.

Further Firm Characteristics

Firm characteristics that are known from prior research to be related to the choice between public and private debt include measures of firm size and profitability,

[12] Note that a minimum of two forecasts is required to compute the standard deviation.

[13] Note that annual forecasts for the next fiscal year-end are identified with a forecast period indicator of one. The IBES statistical period denotes the time when summary data is reported in IBES. I require this date to be before the forecast period end date and - if multiple statistical period dates are available - I choose the one closest to the fiscal year-end.

a company's need for funds, credit rating, and growth opportunities, as well as overall firm riskiness and the likelihood of financial distress. The employed controls are in line with recent research on the choice between public and private debt by Albring et al. (2011), Gomes and Phillips (2012), and Meneghetti (2012). The major database employed is Compustat North America. Firm size is measured as the natural logarithm of a firm's total assets in million dollars. Profitability is proxied by ROA, which is defined as operating income before depreciation divided by total assets. The S&P credit rating indicator is equal to one if there is an S&P debt rating available in the Compustat Ratings File. A company's need for funds is measured by the internal funding deficit, defined as capital expenditures plus the change in net working capital minus cash flow from operations. As argued by Gomes and Phillips (2012, p. 630), a smaller need for funds may induce firms to choose debt from private markets rather than public debt because of lower costs of raising bank debt. I control for growth opportunities by using two proxies, which are R&D intensity and the market-to-book ratio. R&D intensity is defined as R&D expenditures divided by total assets. The market-to-book ratio is computed as the sum of the book value of total debt and the market value of common equity divided by the book value of total assets.

Overall, firm risk is measured using four different proxies: ROA volatility, the median industry sales growth volatility, asset tangibility, and firm age. ROA volatility and the median industry sales growth volatility are computed according to Meneghetti (2012, pp. 71, 74). ROA volatility is defined as the six-year standard deviation of ROA, where a minimum of three out of six observations is required. The median industry sales growth volatility is defined as the industry median of the standard deviation of annual sales growth over the six preceding years where at least three out of six observations are required and industries are identified using the six-digit North American Industry Classification System (NAICS) industry classification code. In addition, I include asset tangibility, which is computed as the ratio of net property, plant, and equipment to total assets and firm age, which is the number of years since the firm's initial public offering (IPO) reporting in Compustat North America.

The likelihood of financial distress is measured by three proxies, which are leverage, interest coverage, and the inverse of Altman (1977)'s Z-score. In line with Meneghetti (2012, p. 71), leverage is computed as the sum of the book value of long-term debt and debt in current liabilities divided by the sum of the book value of total debt and the market value of common equity, and interest coverage is de-

fined as the ratio of operating income before depreciation to interest expense. While Meneghetti (2012, p. 71) applies Altman (1977)'s Z-score as additional proxy for the likelihood of financial distress, Gomes and Phillips (2012, p. 630) use a financial distress indicator, which equals one if Altman (1977)'s Z-score is smaller than 1.81 and zero otherwise. Denis and Mihov (2003, p. 15) include the fraction of observations with Altman (1977)'s Z-score below 1.81. I follow the approach of Albring et al. (2011, p. 1450) and use the inverse of Altman (1977)'s Z-score. In unreported results, findings are robust to alternative definitions of financial distress based on the Z-score. Therefore, I compute the inverse of the Z-score, defined as $\frac{1.2*working\,capital+1.4*retained\,earnings+3.3*EBIT+0.999*sales}{total\,assets}+0.66*\frac{market\,value\,of\,equity}{book\,value\,of\,liabilities}$. A higher likelihood of financial distress is expected to be associated with higher target bank debt ratios because the renegotiation option of private debt is more valuable when the likelihood of financial distress is higher.

Table 4.2 shows summary statistics of the determinants of corporate debt structure. Pay-performance sensitivities can be computed for the CEOs of 5,975 firm-year observations. The mean (median) PPS from shareholdings is 7.44 (0.96). Therefore, in the mean, a CEO's wealth from shareholdings increases by 7.44 USD if the overall equity value of the firm he governs increases by 1,000 USD. PPS from stock options of the company's shares is 5.35 (1.43) in the mean (median), i.e., a 1,000 USD increase in the firms' market value of equity is associated with a mean

Table 4.2: Summary Statistics of Debt Structure Determinants

	Obs	Mean	Std. Dev.	P10	Median	P90
Management incentives						
PPS_{stocks}	5,975	7.44	32.49	.06	.96	13.08
$PPS_{options}$	5,975	5.34	12.85	.06	1.43	13.88
$PPS_{stocks+options}$	5,975	12.78	38.24	.17	3.03	27.36
Information asymmetry						
dispersion of analyst forecasts	11,865	.01	.66	0	0	.01
analyst earnings surprise	14,096	.04	.98	0	0	.03
Firm size and profitability						
total assets (USD million)	14,323	4,036.45	22,280.68	61.28	523.79	6,213.71
ROA	14,313	.07	.24	-.11	.11	.23

Continued on next page.

Table 4.2 continued

	Obs	Mean	Std. Dev.	P10	Median	P90
Need for funds and credit rating						
S&P credit rating	13,254	.9	.3	1	1	1
internal funding deficit	2,826	-250.15	1,317.08	-116.54	-14.99	6.06
Growth opportunities						
R&D intensity	8,731	.09	.16	0	.04	.22
market-to-book	14,218	1.72	1.62	.64	1.26	3.21
Overall firm risk						
ROA volatility	14,194	.11	.85	.01	.04	.18
median sales growth volatility	14,326	.29	1.98	.11	.23	.43
asset tangibility	14,316	.27	.24	.04	.19	.68
firm age (years)	8,744	10.05	5.99	2.67	9.42	18.09
Likelihood of financial distress						
leverage	14,215	.23	.32	0	.16	.57
interest coverage	13,101	41.09	1,284.17	-6.08	7.11	66.93
inverse Altman's Z-score	13,533	.36	9.86	.05	.28	.77

The table shows summary statistics for the determinants of corporate debt structures. PPS denotes the pay-performance sensitivity of a firm's CEO and is computed for the manager's stock holdings, for the options portfolio, and for both combined. For stocks, PPS represents the fraction of the firm the manager owns and is denoted as USD-change in the manager's stock holdings when the overall shareholder value of the firm changes by USD 1,000. For options, the fraction of the firm's shares on which the options are written is multiplied with the options' delta. Dispersion of analyst forecasts is the standard deviation of outstanding analyst EPS forecasts divided by the stock price at fiscal year-end. Analyst earnings surprise is the absolute value of the difference between the median EPS forecast and the firm's actual EPS. Total assets are denominated in USD millions. ROA is defined as operating income before depreciation divided by total assets. S&P credit rating is an indicator equal to one if the firm has an S&P credit rating. The internal funding deficit is defined as capital expenditures plus the change in net working capital minus cash flow from operations. R&D intensity is the ratio of R&D expenditures to total assets. Market-to-book is the sum of book value of debt and market value of common equity divided by total assets. ROA volatility is the six-year standard deviation of ROA. The median sales growth volatility is the NAICS industry-median six-year standard deviation of firms' sales growth. Asset tangibility divides net property, plant, and equipment (PPE) by total assets. Firm age is the number of years since the firm's IPO. Leverage is the sum of the book value of long-term debt and debt in current liabilities divided by the sum of the book value of debt and the market value of equity. Interest coverage is the ratio of operating income before depreciation to interest expense. Inverse Altman's (1970) Z-score is 1 divided by Altman's Z-score defined in Subsection 4.3.3. All USD values are deflated to represent USD as of the year 2000.

(median) 5.34 (1.43) USD value increase of the CEO's wealth from his or her stock option portfolio. PPS_{stocks} and $PPS_{options}$ add up to PPS from shareholdings and stock options of 12.78 (3.03) in the mean (median). A 1,000 USD increase in shareholder value comes along with a 12.87 (3.03) USD increase in the mean (median) CEO wealth. With respect to the proxies for information asymmetry, dispersion of analyst forecasts can be calculated for 11,865 firm-year observations, while analyst earnings surprise is available for 14,096 observations. The mean value for analyst forecast dispersion is 0.01 whereas the mean earnings surprise is 0.04. These values are relatively small, as only the forecasts closest to the forecast period end-date are considered. For dispersion of analyst forecasts, the standard deviation is 0.66. The standard deviation of analyst earnings surprise is 0.98.

Regarding the other firm characteristics, which are known from the literature to influence the choice between public and private debt, firm size as proxied by total assets is USD 4,036 (523) million in the mean (median) and available for 14,323 firm-year observations. For the 90th percentile, the sample firms have total assets worth USD 6.2 billion, which underlines the role of very large companies in the sample. The mean (median) ROA is seven (11) percent, whereas for the 10th percentile, the ROA is negative with minus 11 percent. At the 90th percentile, sample firms' ROA is 23 percent. An S&P credit rating is available for 90 percent of the 13,254 observations for which this information was available in Compustat. The internal funding deficit has a negative value of -250.15 million USD (-14.99) in the mean (median) with a standard deviation of 1,317. In the mean (median) sample firms spend nine percent worth of their total assets for research and development. At the tenth percentile, there are no R&D expenditures, whereas at the 90th percentile, expenditures for research and development account for 22 percent of firms' total assets. The proxy is available for 8,731 firm-year observations. The second proxy for growth opportunities, the market-to-book ratio, is available for 14,218 observations and has a mean (median) value of 1.72 (1.26) in the mean (median). Although the ratio is 0.64 at the tenth percentile, it is 3.21 at the 90th percentile.

ROA volatility as the first proxy of overall firm risk has a mean (median) value of 0.11 (0.04) with a standard deviation of 0.85. The measure is available for 14,194 firm-years. The industry-median sales growth volatility is 0.29 (0.23) in the mean (median) and has a standard deviation of 1.98. The third overall firm risk proxy is asset tangibility, which is available for 14,316 firm-year observations. The mean (median) firm has 27 (19) percent tangible assets. At the tenth percentile of the distribution, asset tangibility is only four percent, whereas it is 68 percent at the

90th percentile. The last firm risk proxy is firm age, which is ten (nine) years in the mean (median). The standard deviation is six years. Because of a lower data coverage in Compustat for this item, firm age is only available for 8,744 firm-year observations. The likelihood of financial distress is first measured by the leverage ratio, which is 0.23 (0.16) in the mean (median). At the tenth percentile, firms have no leverage at all, whereas the ratio is 0.57 at the 90th percentile of the distribution. Interest expenses are covered 41 (seven) times by firms' operating income before depreciation in the mean (median). At the tenth percentile, the interest coverage ratio is negative indicating a negative operating income for these sample firms. At the 90th percentile, interest expenses are covered 67 times by sample firms' operating income before depreciation. Finally, the inverse of Altman (1977)'s Z-score is 0.36 in the mean and 0.28 in the median. At the tenth percentile, the value is 0.05 and at the 90th percentile, 0.77 indicating that these firms are in financial distress when following the definition of Gomes and Phillips (2012, p. 630).[14] The inverse of Altman (1977)'s Z-score can be computed for 13,533 firm-year observations.

4.4 Empirical Results

4.4.1 Target Debt Structure Estimation

In this section, I empirically estimate the target debt structure, defined as the target bank debt to total debt ratio, using a vector of explanatory variables described in Section 4.3.[15] First, I regress the observed bank debt ratio in period t on the potential debt structure determinants in period t-1. The respective results are displayed in Table 4.3. After performing the regressions, I predict the target debt structure as a linear prediction from the fitted regression model. A graphical comparison of actual and target debt structures is shown in Figures 4.1-4.3. Two-group t-tests of these predicted target bank debt ratios for subsamples, according to management incentives and information asymmetry, are shown in Table 4.4. The following equation expresses how the target bank debt to total debt ratio is predicted. This approach is in line with established target capital structure definitions (cf. Flannery

[14]Note that a Z-score below 1.81 defining financial distress corresponds to an inverse Z-score of 0.55 or larger.

[15]Note that all USD values are deflated to represent the year 2000. In addition, all explanatory variables are winsorized at the first and the 99th percentile.

and Rangan (2006, p. 472), Hovakimian and Li (2011, pp. 35-36)).

$$\frac{BD_{i,t+1}}{TD_{i,t+1}}^{*} = \beta X_{i,t} \tag{4.3}$$

where $\frac{BD_{i,t+1}}{TD_{i,t+1}}^{*}$ = target bank debt to total debt ratio of company i in period t+1
β = coefficient vector
$X_{i,t}$ = vector of debt structure determinants of company i in period t

The components of the vector of debt structure determinants are described in detail in Section 4.3. Under hypothesis 4.1, which states that firms do have target debt structures, β should be significantly different from zero. Coefficient estimates from regressing the observed debt structure on the potential debt structure determinants (i.e., before predicting the target debt structure as a linear prediction from the fitted model) are shown in Table 4.3.[16]

Column one of Table 4.3 shows OLS regression results with two-way clustering of standard errors at both firm and year level. The coefficient of high $\text{PPS}_{\text{stocks+options}}$ of 0.0725 is positive and statistically significant at the one percent level. Economically, this coefficient indicates that firms whose managerial incentives are aligned with those of shareholders above the median have 7.25 percent higher bank debt ratios than the less incentivized comparison group. This result is in line with hypothesis 4.2 that firms with strong equity management incentives have higher (target) bank debt ratios. The coefficient of dispersion of analysts' forecasts of 1.1737 is positive and statistically significant at the ten percent level. A one standard deviation increase in informational opacity, as measured by dispersion of analyst forecasts, is associated with a 77 percentage point higher bank debt ratio.[17] This result provides the first empirical evidence in favor of hypothesis 4.4 that firms subject to high information asymmetries have higher target debt ratios.

With respect to the control variables, the coefficient of the natural logarithm of total assets is negative and statistically significant at the one percent level. This

[16] Empirical research on target capital structure estimation employ similar techniques. Hovakimian and Li (2011, p. 37) regress the observed capital structure on capital structure determinants in panel ordinary least squares (OLS) regressions with and without firm-fixed effects. Frank and Goyal (2009, pp. 19, 21-22) use OLS regressions in the cross-section for each decade in their sample period and state that panel OLS regressions yield the same results. Byoun (2008, p. 3080) estimate the target leverage ratio on an annual basis as fitted values from cross-sectional regressions. An analysis based on yearly regressions can be found in Tables C2 and C3 Appendix C.

[17] Note that the standard deviation of dispersion of analyst forecast is 0.66 as displayed in Table 4.2. The relationship between the bank debt ratio and analyst forecast dispersion is economically less extreme in the other regressions of Table 4.3.

Table 4.3: Managerial Incentives, Firm Opacity, and Bank Debt Levels

	(1)	(2)	(3)	(4)	(5)	(6)
			panel OLS	panel OLS	impute	impute
regression model	OLS	OLS	firm fe	firm fe	missing	missing
high $PPS_{stocks+options}$	0.0725***	0.0285	0.0690***	-0.0149	0.0597***	0.0678***
	(0.0209)	(0.0501)	(0.0155)	(0.0368)	(0.0154)	(0.0149)
dispersion of	1.1737*	2.9810	0.1200	-1.1073	0.1446	0.3146
analyst forecasts	(0.6106)	(2.0086)	(0.5534)	(1.9526)	(0.6636)	(0.4096)
ln(total assets)	-0.0969***	-0.1389***	0.0457**	-0.1055	0.0270	-0.0011
	(0.0060)	(0.0200)	(0.0204)	(0.0880)	(0.0223)	(0.0141)
ln(internal funding deficit)		-0.0245		-0.0462*	-0.0080	-0.0046
		(0.0335)		(0.0240)	(0.0070)	(0.0062)
ln(total assets)*		0.0030		0.0064**	0.0009	0.0004
ln(internal funding deficit)		(0.0046)		(0.0032)	(0.0008)	(0.0008)
ROA	0.2228***	0.3893*	0.0921	0.4130*	0.0745	0.0747
	(0.0528)	(0.2043)	(0.0617)	(0.2133)	(0.0695)	(0.0486)
S&P credit rating		-0.0532		0.1725	0.1725	0.0650
		(0.1067)		(0.1304)	(0.1304)	(0.0754)
R&D intensity	-0.1153	-0.0728	0.3965***	0.5948	0.2663**	0.0253
	(0.1114)	(0.3209)	(0.1157)	(0.3781)	(0.1221)	(0.0570)
market to book	-0.0377***	-0.0479***	-0.0220***	-0.0301	-0.0225***	-0.0294***
	(0.0067)	(0.0158)	(0.0058)	(0.0194)	(0.0062)	(0.0058)
ROA volatility	-0.2202***	-0.4609	-0.2609**	0.1343	-0.1959	-0.1938*
	(0.0744)	(0.3260)	(0.1201)	(0.3264)	(0.1208)	(0.0865)
industry median sales	-0.1053*	-0.2450*	0.3078***			
growth volatility	(0.0630)	(0.1430)	(0.1127)			

Continued on next page.

Table 4.3 continued

	(1)	(2)	(3)	(4)	(5)	(6)
			panel OLS	panel OLS	impute	impute
regression model	OLS	OLS	firm fe	firm fe	missing	missing
asset tangibility	0.0113	0.2450	0.1194	0.9522**	0.1232	0.0671
	(0.0481)	(0.1573)	(0.1249)	(0.4679)	(0.1339)	(0.0813)
firm age		0.0094*		0.0395***	0.0063***	0.0039***
		(0.0051)		(0.0085)	(0.0012)	(0.0008)
leverage	-0.0868	-0.3195**	-0.2125***	-0.2459	-0.2217***	-0.2037***
	(0.0585)	(0.1531)	(0.0548)	(0.1564)	(0.0567)	(0.0404)
interest coverage		0.0001		0.0001	-0.0000	-0.0000
		(0.0001)		(0.0001)	(0.0001)	(0.0000)
inverse Altman's Z-score	0.0003	-0.0253**	0.0003	-0.0059	-0.0001	0.0002
	(0.0004)	(0.0101)	(0.0003)	(0.0119)	(0.0004)	(0.0002)
Constant	1.1528***	1.4171***	0.0651	0.4893	0.0352	0.4120***
	(0.0723)	(0.1869)	(0.1447)	(0.5762)	(0.8570)	(0.1206)
Observations	7,070	615	7,070	615	6,477	10,806
R-squared	0.1446	0.2478	0.0399	0.2043	0.7079	0.7128
firm fe	no	no	yes	yes	yes	yes

The table shows coefficient estimates from regressing firms' observed bank debt to total debt ratios in period t on firm-level debt structure determinants in period t-1. Columns 1 and 2 show OLS regressions with robust standard errors, which are two-way clustered, at the firm and year level. Columns 3-6 show panel OLS regressions with firm-fixed effects. In columns 5 and 6, missing values are multiply imputed according to imputation by chained equations (ICE). High $PPS_{stocks+options}$ is an indicator variable equal to one if the observation has a value of $PPS_{stocks+options}$ above the median. Further explanatory variables are defined in Section 4.3.3. Heteroskedasticity-robust standard errors are clustered at the firm level (and year level in columns 1 and 2) and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

relationship indicates that larger firms, which may be more capital market-oriented and might pursue larger investment projects, issue bonds more often. This result is in line with Denis and Mihov (2003, p. 20) and Meneghetti (2012, p. 76) who both find that firm size is negatively associated with the likelihood that firms issue bank debt rather than public debt. The coefficient of ROA is positive and statistically highly significant. This indicates that more profitable firms rely more on bank debt. Regarding the proxies for growth opportunities, the coefficient on R&D intensity is not statistically significant, whereas market-to-book yields a negative coefficient of -0.0377, which is significant at the one percent level. Both findings are in line with economic theory and previous empirical studies. As theoretically argued by Campbell (1979, p. 915), firms focus more on strategic rather than technological information when protection of proprietary information - and consequently the respective financing choice - is concerned. Empirically, Meneghetti (2012, p. 76) finds no significant impact of R&D intensity on firms' choice between public and private debt. For market-to-book, the coefficient of -0.0377 is negative and statistically significant at the one percent level. A one standard deviation increase in the market-to-book ratio is associated with a six percentage point lower level of the bank debt ratio.[18] This result is consistent with Meneghetti (2012, p. 76) who finds a statistically significant negative effect of market-to-book on the likelihood that firms prefer bank over public debt. She argues that market-to-book could also be seen as proxy for profitability rather than growth opportunities, which implies more profitable firms need less bank monitoring (Meneghetti, 2012, p. 73).

ROA volatility, the industry median sales growth volatility, as well as asset tangibility measure the overall firm risk. The coefficients of ROA volatility and the industry median sales growth volatility exhibit negative and statistically significant coefficients indicating that firms with a higher overall firm risk rely less on bank debt. This result seems counter-intuitive, but it is not robust to the application of other regression models as shown in the subsequent columns of Table 4.3. In Meneghetti (2012, p. 76), the respective coefficients are not robust to different regression models either. In line with the other proxies for firm risk, the coefficient of asset tangibility is positive but not statistically significant. Economically, asset tangibility is also a proxy for a firm's potential collateral that especially facilitates loan financing. The coefficient of leverage is negative but not statistically significant just like the coefficient of the inverse of Altman (1977)'s Z-score.

Column two of Table 4.3 shows coefficient estimates from the same regression

[18]Note that the standard deviation of the market-to-book ratio is 1.62 as shown in Table 4.2.

model as in column one with additional explanatory variables. The coefficients of the variables of interest, i.e., high $PPS_{stocks+options}$ and dispersion of analyst forecasts, keep their signs, which is in line with hypotheses 4.2 and 4.4, but lose their statistical significance. With respect to the additional regressors, the natural logarithm of firms' internal funding deficits as well as the respective interaction term with the natural logarithm of total assets yield no significant coefficients, which indicates that firms' need for funds is not a primary determinant of choice between private and public debt. The coefficient of the S&P credit rating indicator of -0.0532 is negative suggesting that the availability of a credit rating serves as sufficient signal to arm's-length investors for not demanding compensation for uncertainty. However, the coefficient is statistically not significantly different from zero. Firm age serves as an additional proxy for overall firm risk. It yields a positive coefficient of 0.0094 that is significant at the ten percent level but the effect is economically insignificant. The last additional explanatory variable is interest coverage, where lower values should reflect a higher likelihood of financial distress. The coefficient of 0.0001 is positive but neither statistically nor economically significant. Including the additional regressors in column two, compared to column one, increases the R-squared from 0.14 to 0.25 because lowering the coverage of certain variables decreases the number of observations from 7,070 to only 615, thereby limiting the explanatory power of the second regression.

Columns three and four of Table 4.3 display coefficient estimates from panel OLS regressions with firm-fixed effects using the same combinations of explanatory variables as in columns one and two. Owing to the results of a Hausman test, only panel OLS regressions with firm-fixed effects are reported. Consistent with the results in column one, the coefficient of the high $PPS_{stocks+options}$ indicator variable of 0.0690 is positive and statistically significant at the one percent level, i.e., both the economic magnitude and statistical significance are as in column one. Firms whose managers have above-median equity incentives have seven percentage points higher bank debt ratios than firms with below-median equity incentives, which supports hypothesis 4.2. The coefficient of dispersion of analyst forecasts is positive suggesting that firms with higher information asymmetries have higher fractions of bank debt, although the coefficient is not statistically significant. With respect to the control variables, the coefficient of firm size is positive and statistically significant, which only holds in this regression specification. The coefficient of R&D intensity of 0.3965 is positive and statistically highly significant. This finding suggests that firms with significant yet uncertain growth opportunities rely more on bank debt, which is in line with

both the value of the information acquisition and monitoring function of banks as well as the protection of proprietary information when using bank debt.

Similar to columns one and two, the coefficients of market-to-book and ROA volatility are negative and significantly different from zero. Unlike previous results, the coefficient of the industry median sales growth volatility is positive and economically relevant with a value of 0.3078, and statistically significant at the one percent level. That is, firms operating in riskier industries have higher bank debt ratios, which is in line with economic reasoning as the renegotiation option of private debt is especially valuable for these companies. Similar to the second regression, the coefficient of leverage is negative and statistically significant. This finding supports the argument that firms initially borrow from banks first to build up reputation and/or signal sufficient monitoring and then borrow from public bondholders in the second stage.

In column four of Table 4.3, the right-hand side variables are the same as in column two, when a panel OLS model with firm-fixed effects is applied. The coefficients of both variables of interest, i.e. high $\text{PPS}_{\text{stocks+options}}$ and dispersion of analyst forecasts, switch signs and are not statistically different from zero. Most control variables exhibit insignificant coefficients as well. There are only four significant regressors. The coefficient of the internal funding deficit, which serves as proxy for a firm's need for funds, is negative and statistically significant, suggesting that firms with higher financing needs rely more on public debt, which is in line with the argument of high fixed transaction costs of public debt issues. The interaction term with firm size is positive but small. Similar to the regressions before, the coefficient of asset tangibility is positive, but in the fourth regression model, it is statistically different from zero. This finding supports the collateral provision argument favoring private debt. Finally, firm age again exhibits a positive and significant coefficient. Similar to column two, the sample size with the applied set of regressors is decreased significantly, limiting the explanatory power of the fourth regression model.

Columns five and six in Table 4.3 show panel OLS regression results with firm-fixed effects, where the missing values for the different regressors are filled using multiple imputation, which is technically based on a multivariate normal model with five imputations.[19] In Column five of Table 4.3, only the missing values of the additional explanatory variables in columns two and four of Table 4.3 are imputed, i.e., missing values from the interest coverage ratio, internal funding deficit, and

[19] This approach is based on a similar imputation of missing values done by Frank and Goyal (2009, p. 21). The Stata command employed here is mi impute mvn.

firm age. In column six, other weakly covered explanatory variables are imputed, which are R&D intensity, the inverse of Altman (1977)'s Z-score, and the industry median sales growth volatility, in addition to those imputed in column five. In both cases, all other explanatory variables are used as factors for the imputation. Multiple imputation increases the sample size to 6,477 in column five and to 10,806 in column six. In both regressions, the R-squared is above 0.7. Both panel OLS regressions yield positive and statistically highly significant coefficients for the high $\text{PPS}_{\text{stocks+options}}$ indicator variable. Economically, the bank debt ratio is six to seven percentage points higher if the firm's CEO benefits from incentive compensation above the sample median. This finding is consistent with the results from columns one and three and provides empirical evidence in favor of hypothesis 4.2. The coefficients of dispersion of analyst forecasts is positive but statistically insignificant in both columns five and six. Regarding control variables, there are statistically significant coefficient estimates for the market-to-book ratio, firm age, and leverage. For market-to-book, the coefficient yields -0.0225 in column five and -0.0294 in column six. Both coefficients are statistically significant at the one percent level. Based on Column 6, a one standard deviation increase in the market-to-book ratio is associated with a 4.8 percentage point lower bank debt level. For firm age, the coefficient in Column 5 yields 0.0063 and in Column 6, 0.0039. Both coefficients are positive and statistically significant at the one percent level, although the economic implications are small. The last significant coefficients are found for leverage with -0.2217 in column five and -0.2037 in column six. The economic magnitude as well as the statistical significance are comparable to the coefficient in column three. As argued before, this finding suggests that firms tend to borrow from banks first to build up reputation and signal sufficient monitoring to outside investors, before borrowing from public bondholders.

Taken together, the results from Table 4.3 support hypothesis 4.1 that firms do have target debt structures because at least some regressors determine observed debt structures. In addition, there is empirical evidence in favor of hypothesis 4.2, which states that firms with strong management incentive alignment with shareholders' interests have higher (target) bank debt ratios. There is only weak evidence of hypothesis 4.4 that firms with high informational asymmetries with outsiders have higher bank debt ratios.

After performing the regressions displayed in Table 4.3, I estimate the prediction of the dependent variable, i.e., firms' bank debt ratios, from the fitted linear model in order to measure firms' target bank debt ratios. This approach is well established

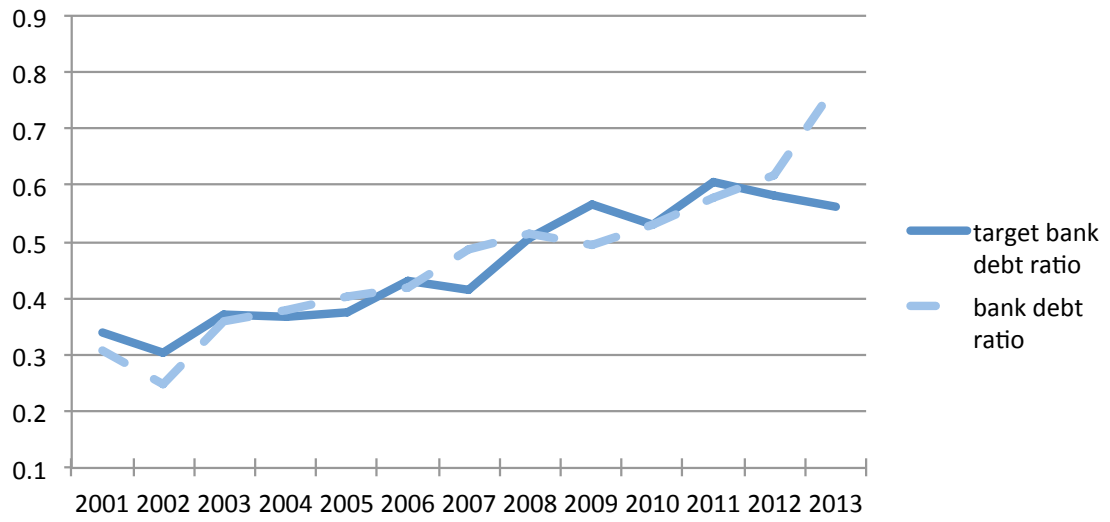

Figure 4.1: Average Target and Observed Bank Debt Ratios

in empirical research on target capital structures (cf. e.g., Fama and French (2002, pp. 18-19), Byoun (2008, pp. 3078, 3080)). Figure 4.1 shows graphically how the target bank debt ratios predicted from the fitted linear model relate to the observed bank debt ratios in yearly means.[20] Consistent with the summary statistics on debt structure in Table 4.1, the observed bank debt ratio fluctuates but follows an ascending trend over time. The average target bank debt ratio is closely related to the average observed bank debt ratio and has a more stable development over time.[21]

To assess whether managerial incentives and informational opacity impact target bank debt ratios, Figures 4.2 and 4.3 graphically display annual mean target and observed bank debt ratios for subsamples divided as being above vs. below median $PPS_{stocks+options}$ and dispersion of analyst forecasts, respectively. Figure 4.2 shows

[20] The target bank debt ratios in Figures 4.1-4.3 correspond to the predicted values of the regression model in column four of Table 4.3.

[21] The abrupt rise in the observed bank debt ratio in 2013 is consistent with macro data from the US Federal Reserve stating that net corporate bond issues by nonfinancial corporate businesses decreased 43.7 USD billion or 13.5 percent from 2012 to 2013, whereas the flow of loans to the domestic nonfinancial sectors increased by 92.5 USD billion or 22.4 percent in the same period (FED, 2015, pp. 57-58). One potential explanation is the relative increase in the attractiveness of loan financing compared to bond market conditions (i.e., market timing behavior of borrowing firms). For recent empirical research on debt market timing, cf. e.g., Gomes and Phillips (2012, p. 631) who control for bond market conditions by including the difference between Baa and Aaa bond yields. In addition, cyclical bank loan supply could drive firms' observed bank debt ratio irrespective of firm-level target debt structures as found, for example, by (Becker and Ivashina, 2014). The lower mean value of the target bank debt ratio potentially stems from the time lag in the target estimation as this is based on data from the previous year.

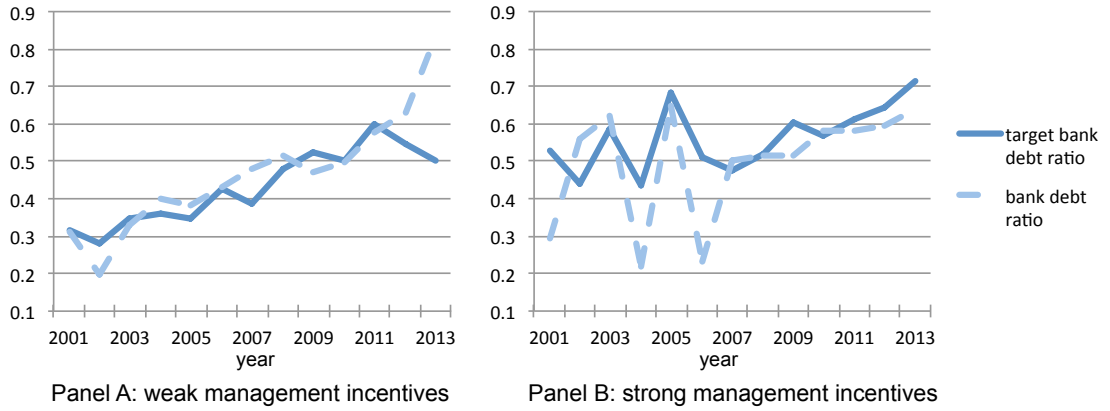

Figure 4.2: Target and Observed Bank Debt Ratios for Companies with Weak vs. Strong Management Incentives

yearly average (target) bank debt ratios for the subsamples divided according to the alignment of managerial incentives with shareholder interests. While the graph of the subsample with weak management incentives, i.e., firms whose CEOs have a PPS below the sample median, shows a close relation of the observed and the target bank debt ratio, the high-incentive subsample provides a different picture. For the subsample of firms with strong CEO equity incentives and therefore stronger agency problems with debtholders, the graph shows a generally higher level of both observed and target bank debt ratios, which is in line with the results from Table 4.3 and supports hypothesis 4.2. In addition, the observed level of bank debt is mostly below the target and fluctuates more than does the target bank debt level. This graph raises the question of target adjustment speed, which is examined in Section 4.4.2.

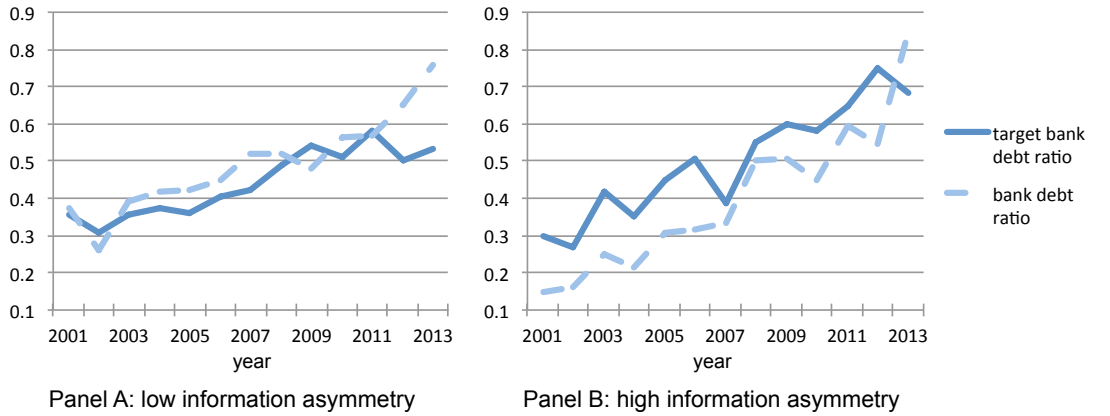

Figure 4.3: Target and Observed Bank Debt Ratios for Companies with Low vs. High Information Asymmetry

Figure 4.3 shows yearly average target and observed bank debt levels for subsamples of informational opacity, i.e., firms with below vs. above median analyst forecast dispersion. For the low-opacity subsample, the graph shows a close relationship between target and observed bank debt structure with a pattern following the general trend shown in Figure 4.1; however, for the other subsample there are distinctive features. Compared to the low-opacity subsample, the increasing time trend is stronger with a lower starting point and a higher level at the end of the sample period. In addition, the observed mean bank debt ratio always stays below its target except for the last period. From Figure 4.3, as from Table 4.3, there is no clear empirical evidence to support hypothesis 4.4.

Table 4.4: Target Bank Debt: Two-group t-tests

	(1) low incentive compensation	(2) high incentive compensation	difference=(1)-(2)
target bank debt ratio (Table 4.3, Column 3)	0.3952 (0.1103)	0.4939 (0.0785)	-0.0987***
target bank debt ratio (Table 4.3, Column 4)	0.4120 (0.2780)	0.5650 (0.3251)	-0.1530***
	(3) low information asymmetry	(4) high information asymmetry	difference=(3)-(4)
target bank debt ratio (Table 4.3, Column 3)	0.4028 (0.1127)	0.4715 (0.0915)	-0.0687***
target bank debt ratio (Table 4.3, Column 4)	0.4314 (0.2847)	0.5280 (0.3150)	-0.0966***

The table shows means and standard deviations in parentheses of the target bank debt ratios estimated from Table 4.3. The subsamples are built as follows: Low incentive compensation denotes firms with a PPS from shareholdings and stock options below the sample median and high incentive compensation identifies the subsample of companies with above median PPS. The low information asymmetry subsample denotes firms with dispersion of analyst forecasts below the sample median; high information asymmetry identifies firms with dispersion of analyst forecasts above the sample median. ***, **, and * indicate significant differences between groups at the 1%, 5%, and 10% level.

For a better assessment of differences in target bank debt ratios being potentially determined by management incentives and information asymmetry, Table 4.4 shows results of a two-group t-test for target debt ratios of the respective subsamples. The table displays means and standard deviations in parentheses of the predicted target bank debt levels, which stem from columns three and four of Table 4.3. The last column shows the difference in mean target bank debt levels, with the asterisks denoting the respective statistical significance. With respect to the two-group t-tests for the subsamples, according to managerial incentives as in column three of Table 4.3, the target bank debt to total debt ratio for the low incentive compensation subsample is 0.3952 with a standard deviation of 0.1103. The respective high incentive compensation subsample exhibits a target bank debt ratio of 0.4939, i.e., 10 percentage points higher, with a standard deviation of 0.0785. The difference of 9.87 percentage points is statistically significant at the one percent level. This finding is in line with previous results and supports hypothesis 4.2 that firms with strong management equity incentives have higher target bank debt ratios. The two-group t-test for the low-incentive vs. high-incentive compensation subsamples as in column four of Table 4.3 draws an even clearer picture with a mean target bank debt level of 41.2 percent and a standard deviation of 0.2780 for the low-incentive compensation group, and 56.5 percent and a standard deviation of 0.3251 for the high-incentive compensation group. The difference of 15.3 percentage points is again highly significant.

With respect to the two-group t-test for the low vs. high information asymmetry group, as in column three in Table 4.3, the low opacity group has a mean target bank debt ratio of 0.4028 with a standard deviation of 0.1127, whereas the high opacity group exhibits a mean target bank debt ratio of 0.4715 and a standard deviation of 0.0915. The difference between the means of 6.87 percentage points of target bank debt is statistically significant at the one percent level. The two-group t-test of target bank debt levels as in column four in Table 4.3 provides a distinct result with a mean target bank debt level of 43.14 percent and a standard deviation of 0.2847 for the low-opacity group and a mean target bank debt level of 52.8 percent with a standard deviation of 0.3150 for the high-opacity group. The difference between the means of 9.66 percentage points is statistically significant at the one percent level. The results for the two-group t-tests for the information asymmetry subsamples support hypothesis 4.4 that firms with high informational opacity have higher target bank debt ratios, although the results are less obvious than for the managerial incentives hypothesis.

4.4.2 Partial Adjustment to the Target Debt Structure

In this section, I empirically analyze if and how quickly firms adjust their debt structures to their target bank debt levels over time.[22] First, I examine how firms change their observed bank debt level in the next period conditional on being below or above their target bank debt level in the current period. The result is presented graphically in Figure 4.4. As a next step, I perform regression analyses of the panel dataset to find out about firms' yearly target adjustment speed. On the right-hand side of the regression equation, I include the proxies for managerial incentives to assess hypothesis 4.3 that firms whose CEOs have strong equity incentives adjust faster to their target debt structure than firms with weakly incentivized managers.

Under hypothesis 4.1 that firms have target bank debt ratios to which they partially adjust over time, I expect firms with below-target bank debt ratios to increase their share of bank debt in the subsequent year, whereas firms with above-target bank debt are expected to decrease their bank borrowing relative to total debt. Figure 4.4 shows a bar chart where the sample is split into quarters based on how much firms' observed bank debt levels deviate from their target bank debt levels. The dark blue bars represent the mean distance from the target of the respective quartile subsample, where the distance is computed as the target bank debt ratio minus the observed bank debt ratio. Therefore, a positive sign of the mean distance from target means that the firms have too little bank debt, whereas a negative sign means that firms have above-target bank debt levels. The bars are sorted from left to right according to their mean distance to target. For the quartile subsample with the lowest value for the distance to target bank debt, firms have 57 percentage points of too much bank debt in the mean when compared to the target. The second quartile of the sample exhibits a bank debt ratio that is 11 percentage points too high. The third quartile of firms has 20.7 percentage points of too little bank debt, and the fourth quartile has 50 percentage points of too little bank debt.

In Figure 4.4, the light blue bars show the mean change in firms' bank debt levels in the subsequent year. This change is computed as the observed bank debt ratio in period t+1 minus the observed bank debt ratio in period t. A positive sign denotes an increase and a negative sign a decrease in the bank debt ratio. The quartile with the lowest distance to the target, i.e., the quartile of firms that have too high debt ratios of 56 percentage points in the mean, decrease their bank debt levels by 4.7

[22] Note that all USD values are deflated to represent USD as of the year 2000. In addition, all explanatory variables are winsorized at the first and the 99th percentile.

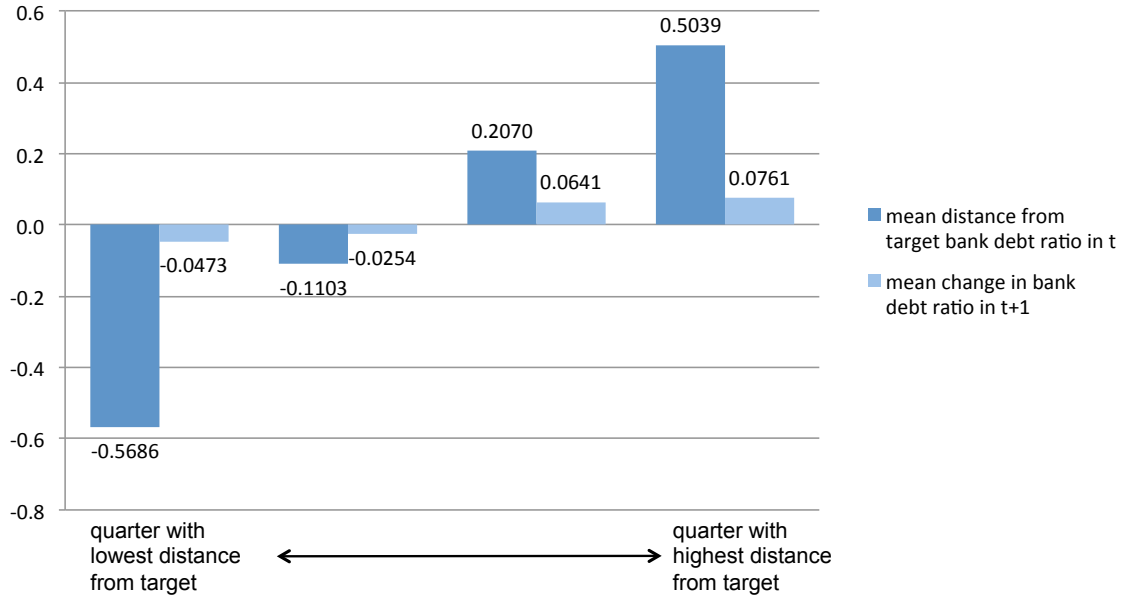

Figure 4.4: Mean Distance from Target and Subsequent Year's Change in the Bank Debt Ratio

percentage points in the mean in the subsequent year. For the second quartile of firms that have a debt level of 11 percentage points above their optimum, Figure 4.4 shows that these firms decrease their bank debt level by 2.5 percentage points in the next year, while moving toward their target. In the third quartile of firms, which have bank debt ratios of 20.7 percentage points below their target in the mean, I find an increase in the bank debt ratio of 6.4 percentage points in the mean in the subsequent year, implying that firms close nearly one third of the gap. For the fourth quartile of firms that have 50 percentage points of too little bank debt, Figure 4.4 shows that these firms increase their bank debt by 7.6 percentage points in the following year.

Taken together, Figure 4.4 shows that firms do adjust to their target debt structure by increasing (decreasing) bank debt levels when they are below (above) their optimal bank debt level. This finding supports hypothesis 4.1. Regarding the magnitude of the mean change in the bank debt ratio, the absolute adjustment is larger for the quartiles with more extreme deviations from the target, whereas the adjustment relative to the distance to the optimum is larger for the inner quartiles. One reason for the decreasing relative adjustment when the distance is more extreme could be target adjustment costs.[23]

[23]Explaining larger adjustment steps, which are decreasing relative to the total distance for the outer quartiles is in line with the target adjustment cost argument from capital structure the-

In the next step, I empirically assess firms' target adjustment speed using regression analysis of the panel dataset to look for additional evidence supporting hypothesis 4.1. In addition, I control for measures of managerial incentives to find out if the data support hypothesis 4.3 that firms whose CEOs are subject to strong incentive alignment adjust to the target debt structure more quickly than firms whose managers are weakly incentivized. The following regression equation shows how the target adjustment speed is ascertained. The development of the regression equation is adopted from Flannery and Rangan (2006, p. 472) who model target leverage and target leverage adjustment speed for the optimal mix of debt and equity. A standard partial adjustment can be modeled as

$$\frac{BD_{i,t+1}}{TD_{i,t+1}} - \frac{BD_{i,t}}{TD_{i,t}} = \lambda(\frac{BD_{i,t+1}}{TD_{i,t+1}}^{*} - \frac{BD_{i,t}}{TD_{i,t}}) + \epsilon_{i,t+1} \tag{4.4}$$

where
$\frac{BD_{i,t+1}}{TD_{i,t+1}}$ = bank debt to total debt ratio of company i in period t+1
$\frac{BD_{i,t}}{TD_{i,t}}$ = bank debt to total debt ratio of company i in period t
$\frac{BD_{i,t+1}}{TD_{i,t+1}}^{*}$ = target bank debt to total debt ratio of company i in period t+1
λ = proportion of the gap between the target bank debt ratio in period t+1 and the actual bank debt ratio in period t closed
$\epsilon_{i,t+1}$ = error term of company i in period t+1.

Each year, firms close a fraction of λ of the gap between their actual and their target debt structure. Substituting the target debt structure equation (4.3) in the partial adjustment model (4.4) yields the following regression equation:

$$\frac{BD_{i,t+1}}{TD_{i,t+1}} = (\lambda\beta)X_{i,t} + (1-\lambda)\frac{BD_{i,t}}{TD_{i,t}} + \epsilon_{i,t+1} \tag{4.5}$$

Equation 4.5 can be interpreted as follows. Each year, firms close (1-λ) of the gap between their actual bank debt ratio $\frac{BD_{i,t}}{TD_{i,t}}$ and their target bank debt ratio estimated from $X_{i,t}$. The long-term effect of $X_{i,t}$ on the bank debt ratio is given by the estimated coefficient β divided by λ. For a more detailed model in the capital structure context, cf. Flannery and Rangan (2006, pp. 471-472). The regression results from equation 4.5 are shown in Table 4.5.

ories employed by such scholars as Flannery and Rangan (2006). The authors argue that firms trade-off adjustment costs and costs of operating with sub-optimal leverage, which explains partial rather than complete adjustment toward optimal leverage (Flannery and Rangan, 2006, p. 472). The target adjustment cost view could be transferred to target adjustment toward an optimal debt structure.

Table 4.5: Estimating Partial Target Adjustment in the Debt Structure

	(1) Fama-Macbeth	(2) panel OLS	(3) panel OLS
bank debt ratio$_{i,t}$	0.7657***	0.4811***	0.4503***
	(0.0453)	(0.0278)	(0.0270)
high PPS$_{stocks+options}$	0.0260*	0.0556***	0.0356**
	(0.0137)	(0.0142)	(0.0140)
bank debt ratio$_{i,t}$*high PPS$_{stocks+options}$	-0.0013	-0.0540*	-0.0448*
	(0.0209)	(0.0276)	(0.0267)
dispersion of analyst forecasts	1.1865	-0.2485	-0.7101
	(0.9162)	(0.8046)	(-0.7101)
bank debt ratio$_{i,t}$*dispersion	-1.4433	0.7093	0.9571
of analyst forecasts	(1.1684)	(1.0442)	(1.0369)
ln(total assets)	-0.0233***	0.0312**	-0.0158
	(0.0058)	(0.0142)	(0.0157)
ROA	0.0341	0.0948	0.0394
	(0.0604)	(0.0583)	(0.0599)
R&D intensity	-0.1799**	0.2180**	0.0393
	(0.0740)	(0.1100)	(0.1153)
market to book	-0.0075	-0.0145***	-0.0096**
	(0.0046)	(0.0055)	(0.0055)
ROA volatility	-0.0902*	-0.1556	-0.1036
	(0.0426)	(0.0953)	(0.0969)
industry median sales growth	-0.0316	0.1806*	0.1424
volatility	(0.0333)	(0.0965)	(0.0976)
asset tangibility	0.0052	0.0723	0.1422
	(0.0110)	(0.0950)	(0.0929)
leverage	-0.0917***	-0.1763***	-0.1854***
	(0.0215)	(0.0429)	(0.0446)
inverse Altman's Z-score	-0.0054	0.0003	0.0002
	(0.0031)	(0.0003)	(0.0003)
Constant	0.3137***	-0.0079	0.3725***
	(0.0591)	(0.1039)	(0.1159)
firm fe	no	yes	yes
year fe	no	no	yes

Continued on next page.

Table 4.5 continued

	(1) Fama-Macbeth	(2) panel OLS	(3) panel OLS
Observations	6,251	6,251	6,251
R-squared	0.6671	0.2320	0.2529

The table shows regression results from the model $\frac{BD_{i,t+1}}{TD_{i,t+1}} = (\lambda\beta)X_{i,t} + (1-\lambda)\frac{BD_{i,t}}{TD_{i,t}} + \epsilon_{i,t+1}$. Column 1 displays the Fama-Macbeth (1973) regression results. Column 2 shows OLS panel regression results with firm-fixed effects. Column 3 displays panel OLS regression results with both firm-fixed and year-fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. In column 1, heteroskedasticity and autocorrelation consistent Newey-West (1987) standard errors are reported in parentheses. In columns 2 and 3, heteroskedasticity-robust standard errors are clustered at the firm level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

Table 4.5 displays regression results from applying equation 4.5 to my dataset. Column one shows results from a Fama-Macbeth regression, column two panel OLS regression results with firm-fixed effects, and column three panel OLS results with firm- and year-fixed effects.[24] All explanatory variables are lagged by one year compared to the dependent variable. The coefficient estimates from the Fama-Macbeth regression in column one show a coefficient λ of 0.7657, which is statistically significant at the one percent level. The economic interpretation is that firms close 1-0.7657, i.e., 0.2342 or 23.42 percent of the gap between the actual and their target bank debt ratio within one year. Consequently, firms need four to five years to reach their optimal bank debt level, ceteris paribus. The coefficient of high $\text{PPS}_{\text{stocks+options}}$ of 0.0260 is positive and statistically significant at the ten percent level, indicating that firms whose CEOs have strong equity incentives have higher bank debt ratios, which is, again, evidence in favor of hypothesis 4.2. The interaction term of the bank debt ratio in the preceding year and the high $\text{PPS}_{\text{stocks+options}}$ indicator variable of -0.0013 is negative. Economically, when this coefficient is added to the λ of 0.7657, it decreases the coefficient of the bank debt ratio in the previous year by 0.0013 for the high-PPS subsample of firms. Thereby, the proportion of the gap with the optimal bank debt level is closed by 1-0.7644 or 23.56 percent, i.e., faster than for the base group of firms with weakly incentivized managers. This finding is

[24] Note that this choice of econometric models is based on those applied in Flannery and Rangan (2006, p. 478).

in line with hypothesis 4.3 stating that firms whose managers have strong equity incentives adjust more quickly to their target debt structure, although the coefficient of the interaction term is neither statistically significant nor of a magnitude that is economically relevant.

As detailed in column one of Table 4.5, the dispersion of analysts' forecasts and the interaction term of forecast dispersion and the high $PPS_{stocks+options}$ indicator variable yield coefficient estimates that are statistically not different from zero. Therefore, information asymmetries between firm insiders and outside stakeholders do not seem to affect firms' target adjustment speed. With respect to the control variables, I find a negative coefficient of -0.0233 for firm size as measured by the natural logarithm of total assets, which is statistically significant at the one percent level. This coefficient indicates that larger firms have smaller long-run bank debt levels, which is in line with transaction cost motives preventing small firms with a lower reputation and smaller financing needs from issuing public bonds. R&D intensity yields a negative coefficient of -0.1799, which is statistically significant at the five percent level. The sign of the coefficient is not stable across regressions in Table 4.5, which is the case for the target debt structure estimation in Table 4.3 as well, limiting the possibilities of economic interpretation. ROA volatility as proxy for overall firm risk exhibits a negative coefficient of -0.0902, which is economically small and statistically weakly significant at the ten percent level. Economically, this coefficient indicates that riskier firms have higher bank debt ratios, which is consistent with the results from Table 4.3. The last significant control variable is leverage, with a negative coefficient of -0.0917, which is statistically different from zero at the one percent significance level. This finding is, again, consistent with the coefficients found in Table 4.3 and indicates that firms with higher leverage ratios rely relatively less on bank debt, but issue more public bonds.[25]

As argued by Flannery and Rangan (2006, p. 477), the Fama-Macbeth regressions have some favorable features but do not appropriately account for the panel structure of the dataset. Therefore, the authors argue that panel regressions with fixed effects should be preferred (Flannery and Rangan, 2006, p. 477). Column two of Table 4.5 shows coefficient estimates of a panel OLS regression with firm-fixed effects.

The estimated coefficient of the bank debt ratio in the preceding year, λ, yields 0.4811 and is statistically significant at the one percent level. Economically, firms close 1-0.4811 or 51.89 percent of the gap between their actual and desired debt

[25] For a more detailed economic interpretation of the control variables and their relationship with firms' bank debt ratios, cf. Section 4.4.1.

structure within one year. This means that firms would need two years to close the gap completely, ceteris paribus. This faster target adjustment speed than that in column one can be explained by the different regression model that recognizes the panel structure of the data in column two. Flannery and Rangan (2006, p. 478) find much higher target leverage adjustment speeds for panel OLS models with fixed effects than for Fama-Macbeth regressions.[26] The coefficient of the high $PPS_{stocks+options}$ dummy is again positive and statistically significant at the one percent level. This indicates that firms whose managers have above-median equity incentives have higher bank debt ratios, supporting hypothesis 4.2. The coefficient of the interaction term of the bank debt ratio in the previous year and the high PPS indicator variable of -0.0540 is negative and statistically significant at the ten percent level. For the group of firms with above-median incentivized managers, λ is therefore decreased by 0.0540 of 5.4 percentage points to 0.4271, i.e., these firms close 1-0.4271 or 57.29 percent of the gap between their actual and their target bank debt ratio within one year. Expressed differently, firms with strong managerial equity incentives close about five percentage points more of the gap between their actual and their target bank debt ratio p.a. than firms with weak managerial equity incentives. This finding supports hypothesis 4.3.

With respect to the control variables in column two of Table 4.5, I find a positive coefficient for firm size as measured by the natural logarithm of total assets, which is statistically significant at the five percent level. The sign is inconsistent with column one, although a switching sign across regression models already appears in the target debt structure estimation in Table 4.3. R&D intensity has a positive coefficient supporting the argument by Campbell (1979, p. 915) that firms with valuable proprietary information rely more on bank debt. The coefficient of the market-to-book ratio is negative and statistically significant at the one percent level. The negative sign is consistent with the findings from Table 4.3 where higher market-to-book ratios are associated with lower bank debt ratios and is in line with empirical evidence provided by Meneghetti (2012, p. 76) who also finds a statistically significant negative relationship between market-to-book and the probability that firms choose bank debt rather than public debt. The estimated coefficient for the industry median sales growth volatility, which serves as a proxy for overall firm

[26] Econometrically, the higher target adjustment speed might stem from the addition of firm-fixed effects, which is reasonable whenever firms have unobserved determinants of their debt structure targets that are stable over time. Alternatively, the reason might lie in the assumption of panel regressions that the coefficients are constant over time. For a more detailed discussion, cf. Flannery and Rangan (2006, pp. 477-478).

risk, is positive and statistically significant at the ten percent level. Economically, this result is consistent with a higher value of the renegotiation option of private debt for firms that are subject to higher risks. Finally, the coefficient of leverage of -0.1863 is negative and statistically highly significant, which supports all prior findings on the relationship between leverage and debt structure.

Column three of Table 4.5 shows regression results from a panel OLS regression with both firm- and year-fixed effects. The estimated coefficients are similar to those in column two. The coefficient of the bank debt ratio in the preceding year, λ, is 0.4503, i.e., firms close 1-0.4503 or 54.97 percent of the gap with their target debt structure within one year. They would need slightly less than two years to ceteris paribus reach their optimal bank debt level. λ in column three of Table 4.5 is of a comparable economic magnitude as in column two. The coefficient of the high $\text{PPS}_{\text{stocks+options}}$ indicator variable of 0.0356 is, again, positive and statistically significant at the ten percent level. In support of hypothesis 4.2 and the findings from Table 4.3, firms whose managers' incentives are closely aligned with shareholders' interests have higher bank debt ratios. The interaction term between the bank debt ratio in the previous year and the high PPS dummy variable has, again, a negative and statistically significant coefficient. For the group of firms whose managers have strong equity incentives, λ is decreased to 0.4055 meaning that firms close 1-0.4055 or 59.45 percent of the gap between their current and their target bank debt ratio within one year. Thus, firms with strong CEO incentives adjust about 5 percentage points more to their target debt structure than their comparison group of firms with weak CEO incentives. This provides further empirical evidence in favor of hypothesis 4.3. Regarding control variables, Column three of Table 4.5 exhibits two more statistically significant coefficients. In line with column two, the coefficient of the market-to-book ratio is negative, which is in line with previous findings e.g., by Meneghetti (2012, p. 76). The second statistically significant coefficient is found for leverage as explanatory variable, which is in line with previous findings as well as theoretical arguments.

In summary, Table 4.5 provides empirical evidence in multiple respects. First, the significant regression results for the bank debt ratios in the previous year support hypothesis 4.1 that firms do have target debt ratios to which they partially adjust over time. In addition, all regression specifications yield positive and statistically significant coefficients for the proxy for equity incentives, which supports hypothesis 4.2 that firms with strong managerial incentives have higher (target) bank debt ratios. Information asymmetries do not seem to impact firms' speed of adjustment to

their target debt structures. Finally, Table 4.5 provides the first empirical evidence to support hypothesis 4.3 that firms with strong managerial equity incentives adjust about five percentage points p.a. more quickly toward their target debt structure. This finding comprises the main research contribution of this paper.

4.4.3 Robustness Check: Alternative Target Proxies and Test of Mean Reversion

As the target debt structures estimated in Section 4.4.1 could be weak proxies for firms' long-term optimal bank debt ratios, additional proxies for firms' long-run target debt structures could provide additional evidence. As shown e.g., by Shyam-Sunder and Myers (1999, p. 226), an easy way to find empirical evidence for target adjustment behavior in the capital structure context is to use historical means and moving averages of the respective leverage ratio as target proxies. Inter alia, the authors utilize historic sample mean debt ratios as well as three- and five-year moving average debt ratios (Shyam-Sunder and Myers, 1999, p. 228). When this argument is transferred from capital structure to debt structure and given firms' target bank debt ratios do not fluctuate too much over time, mean-reverting behavior should be observable. As a robustness check on the findings favoring hypothesis 4.1, I test for mean reversion by applying the following regression specification:

$$\Delta \frac{BD_{i,t}}{TD_{i,t}} = \alpha + \beta \left(\frac{BD_{i,t}}{TD_{i,t}}^{*} - \frac{BD_{i,t-1}}{TD_{i,t-1}} \right) + \epsilon_{i,t} \tag{4.6}$$

where
$BD_{i,t}$ = bank debt of company i in period t
TD_{it} = total debt of company i in period t
α = intercept
β = target adjustment coefficient
$\frac{BB_{i,t}}{TD_{i,t}}^{*}$ = target bank debt ratio of company i in period t
$\epsilon_{i,t}$ = error term of company i in period t

For the target bank debt ratio, I employ the historical sample mean bank debt ratio as well as the three-year and the five-year moving average bank debt ratios. The results are presented in Table 4.6.

The target adjustment coefficients in Table 4.6 are all positive and statistically significant at the one percent level. The fact that $\beta > 0$ indicates mean reverting

Table 4.6: Target Adjustment in the Share of Bank Debt to Total Debt

	(1) change in bank debt ratio	(2) change in bank debt ratio	(3) change in bank debt ratio
deviation from historical mean	0.5729***		
	(0.0146)		
deviation from 3-year moving average		0.1931***	
		(0.0149)	
deviation from 5-year moving average			0.1868***
			(0.0174)
Constant	0.0567**	0.0165	0.0638*
	(0.0285)	(0.0280)	(0.0356)
year fe	yes	yes	yes
Observations	10,924	5,338	3,207
R-squared	0.3010	0.0528	0.0604

The table shows coefficient estimates from regressing the change in the bank debt to total debt ratio on the same firms' deviations from their long-term mean bank debt ratios in the preceding period. In column one, the main independent variable is the deviation of the firm's bank debt to total debt ratio from its historical mean over the sample period. In column two, the independent variable of interest is deviation of the private debt ratio in the previous year from the preceding three-year moving average of the private debt ratio. Column three applies a five-year moving average, respectively. All regressions include year-fixed effects. Robust standard errors are clustered at the firm level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

behavior of the sample firms, whereas $\beta < 1$ implies that firms face positive adjustment costs and therefore, only adjust partially.[27] Column one of Table 4.6 shows regression results where the proxy for firms' long-term target debt structure is the historical sample mean of the bank debt ratio, which covers the longest possible time span within the sample period. The coefficient of 0.5729 presents the fraction of the gap between the actual and the target bank debt ratio that is closed within one year, i.e., firms close 57 percent of this gap in one year thereby needing less than two years to close the complete gap, ceteris paribus. Column two of Table 4.6 displays regression results where the three-year moving average of the bank debt

[27] For a more detailed discussion about target adjustment coefficients, cf. e.g., Shyam-Sunder and Myers (1999, p. 226).

ratio prior to the observation period serves as the target proxy. The coefficient of 0.1931 is much smaller and indicates that firms close 19 percent of the gap between the currently observed and their long-run target debt structure. They would need about five years to close the gap. In column three of Table 4.6, the target debt structure proxy is the five-year moving average bank debt ratio of the years preceding the observation period. The target adjustment coefficient of 0.1868 is of similar magnitude as in column two and indicates that firms close about 19 percent of the gap with their target per year and need, ceteris paribus, about five years to reach their long-term target.

In summary, Table 4.6 documents the clear target adjustment behavior of the sample firms. Depending on which historical average bank debt ratio serves as the target proxy, the target adjustment coefficient changes in economic magnitude. One potential explanation is the varying number of observations owing to lower data availability for the five-year- and to a smaller degree the three-year-moving averages as these measures require complete data on firms' bank debt structure for the respective periods preceding the observation period. Nonetheless, all target adjustment coefficients are statistically highly significant and economically relevant. Therefore, Table 4.6 provides empirical evidence for long-term mean reversion, additionally favoring hypothesis 4.1 that firms do have target debt structures to which they partially adjust over time.

4.4.4 Robustness Check: Bank Debt Definition Includes Capital Leases

As firms' bank debt to total debt ratio is the central measure of debt structure in this paper, analyses using alternative definitions of this measure could provide further insights on the robustness of results. In Tables 4.7 and 4.8, the main analyses are repeated applying a bank debt ratio that includes capital leases in the private debt portion. With respect to the estimation of firms' target debt structures, Table 4.7 shows that the results from Table 4.3 are robust to changes in the debt structure definition. The economic magnitude as well as the statistical significance of the regression coefficients are very similar to the main results of this study.

Table 4.7 shows the coefficient estimates from OLS regressions of the alternative bank debt ratio, including leasing on proxies of management incentives and opacity as well as further determinants of firms' target debt structures. In column one, the indicator variable, which identifies firms whose CEOs have above-median PPS, ex-

Table 4.7: Bank Debt Including Leasing: Managerial Incentives, Firm Opacity, and Bank Debt Levels

	(1)	(2)	(3)	(4)	(5)	(6)
			panel OLS	panel OLS	impute	impute
regression model	OLS	OLS	firm fe	firm fe	missing	missing
high $PPS_{stocks+options}$	0.0615***	0.0134	0.0687***	-0.0082	0.0631***	0.0693***
	(0.0192)	(0.0477)	(0.0143)	(0.0348)	(0.0143)	(0.0139)
dispersion of	1.1770**	3.0472	0.0492	-0.9964	-0.1433	0.1461
analyst forecasts	(0.5944)	(2.1183)	(0.4398)	(1.8855)	(0.5485)	(0.3614)
ln(total assets)	-0.1082***	-0.1377***	0.0268	-0.0794	0.0141	-0.0106
	(0.0050)	(0.0169)	(0.0192)	(0.0773)	(0.0206)	(0.0132)
ln(internal funding deficit)		-0.0222		-0.0424*	-0.0052	-0.0022
		(0.0286)		(0.0216)	(0.0054)	(0.0064)
ln(total assets)*		0.0030		0.0058**	0.0005	0.0002
ln(internal funding deficit)		(0.0039)		(0.0028)	(0.0006)	(0.0008)
ROA	0.2119***	0.4362**	0.1538***	0.3889*	0.1287**	0.0929**
	(0.0472)	(0.1933)	(0.0538)	(0.2069)	(0.0643)	(0.0466)
S&P credit rating		-0.0945			0.1786	0.0684
		(0.0917)			(0.1313)	(0.0757)
R&D intensity	-0.1196	-0.0291	0.3533***	0.6516*	0.3065***	0.0333
	(0.0967)	(0.2861)	(0.1009)	(0.3578)	(0.1130)	(0.0531)
market to book	-0.0342***	-0.0507***	-0.0181***	-0.0264	-0.0193***	-0.0242***
	(0.0061)	(0.0130)	(0.0050)	(0.0179)	(0.0055)	(0.0050)
ROA volatility	-0.1366**	-0.3982	-0.1727*	0.1022	-0.1301	-0.1455*
	(0.0599)	(0.2569)	(0.1017)	(0.3269)	(0.1065)	(0.0758)
industry median sales	-0.1254**	-0.2943**	0.1901			
growth volatility	(0.0600)	(0.1377)	(0.1023)			

Continued on next page.

Table 4.7 continued

	(1)	(2)	(3)	(4)	(5)	(6)
			panel OLS	panel OLS	impute	impute
regression model	OLS	OLS	firm fe	firm fe	missing	missing
asset tangibility	-0.0066	0.2011	0.0864	1.0096**	0.1022	0.0637
	(0.0450)	(0.1438)	(0.1187)	(0.4252)	(0.1251)	(0.0745)
firm age		0.0070		0.0364***	0.0050***	0.0032***
		(0.0047)		(0.0072)	(0.0010)	(0.0007)
leverage	-0.2185***	-0.3779**	-0.2531***	-0.2712*	-0.2580***	-0.2253***
	(0.0559)	(0.1591)	(0.0505)	(0.1511)	(0.0527)	(0.0377)
interest coverage		0.0001		0.0001	0.0000	0.0000
		(0.0001)		(0.0001)	(0.0000)	(0.0000)
inverse Altman's Z-score	0.0003	-0.0219**	0.0002	-0.0065	0.0000	0.0001
	(0.0004)	(0.0090)	(0.0002)	(0.0105)	(0.0003)	(0.0002)
Constant	1.2985***	1.5313***	0.2681*	0.3757	0.1649	0.5064***
	(0.0595)	(0.1626)	(0.1385)	(0.5145)	(0.1881)	(0.1164)
Observations	7,070	615	7,070	615	6,477	10,806
R-squared	0.2154	0.2827	0.0395	0.2077	0.7306	0.7320
firm fe	no	no	yes	yes	yes	yes

The table shows coefficient estimates from regressing firms' observed bank debt, including capital leasing to total debt ratios in period t, on firm-level debt structure determinants in period t-1. Columns 1 and 2 show OLS regressions with robust standard errors that are two-way clustered, at the firm and year level. Columns 3-6 show panel OLS regressions with firm-fixed effects. In columns 5 and 6, missing values are multiply imputed according to imputation by chained equations (ICE). High $PPS_{stocks+options}$ is an indicator variable equal to one if the observation has a value of $PPS_{stocks+options}$ above the median. Further explanatory variables are defined in Section 4.3.3. Heteroskedasticity-robust standard errors are clustered at the firm level (and year level in columns 1 and 2) and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

hibits a coefficient of 0.0615, which is statistically significant at the one percent level. This coefficient is 1.1 percentage points lower than in Table 4.3 where the standard definition of the bank debt ratio is used. Economically, the group of companies with managerial incentives, which are more closely aligned with those of shareholders, have target debt ratios, which are 6.15 percentage points higher than in the control group of firms with less incentivized managers. The coefficient of dispersion of analysts' forecasts of 1.177 is nearly identical to the respective coefficient in Table 4.3 and suggests that a one standard deviation increase in the opacity proxy is associated with a 77 percentage point higher target bank debt ratio. Columns two to six show regression results that correspond to the respective columns in Table 4.3 but use the bank debt ratio including leasing as a dependent variable. Similar to column one of Table 4.7, the other regressions exhibit very similar results to those in Table 4.3. The findings from Table 4.3 are thus robust to including capital leases in the private debt portion when estimating target debt structures.

Table 4.8: Bank Debt Including Leasing: Estimating Partial Target Adjustment in Debt Structure

	(1)	(2)	(3)
	Fama-Macbeth	panel OLS	panel OLS
bank debt ratio$_{i,t}$	0.7765***	0.4797***	0.4497***
	(0.0509)	(0.0266)	(0.0257)
high PPS$_{stocks+options}$	0.0036	0.0555***	0.0372***
	(0.0225)	(0.0137)	(0.0133)
bank debt ratio$_{i,t}$*high	0.0528	-0.0422	-0.0326
PPS$_{stocks+options}$	(0.0607)	(0.0257)	(0.0245)
dispersion of analyst forecasts	1.2516	0.0455	-0.3955
	(1.0309)	(0.7274)	(0.7170)
bank debt ratio$_{i,t}$*dispersion	-3.2958	0.0086	0.2524
of analyst forecasts	(2.6953)	(0.9911)	(0.9773)
ln(total assets)	-0.0260***	0.0149	-0.0275**
	(0.0049)	(0.0127)	(0.0139)
ROA	0.2121	0.1299**	0.0793
	(0.1202)	(0.0509)	(0.0524)
R&D intensity	0.1898	0.1908**	0.0245
	(0.3192)	(0.0930)	(0.0973)
market to book	-0.0099***	-0.0105**	-0.0058

Continued on next page.

Table 4.8 continued

	(1) Fama-Macbeth	(2) panel OLS	(3) panel OLS
	(0.0031)	(0.0047)	(0.0048)
ROA volatility	0.1321	-0.1061	-0.0572
	(0.1479)	(0.0787)	(0.0790)
industry median sales growth	-0.1800	0.0933	0.0602
volatility	(0.1629)	(0.0823)	(0.0841)
asset tangibility	0.0090	0.0228	0.0866
	(0.0132)	(0.0874)	(0.0849)
leverage	-0.0787*	-0.1755***	-0.1876***
	(0.0367)	(0.0400)	(0.0409)
inverse Altman's Z-score	0.0098	0.0001	0.0001
	(0.0121)	(0.0002)	(0.0002)
Constant	0.3101***	0.1431	0.4950***
	(0.0725)	(0.0954)	(0.1083)
firm fe	no	yes	yes
year fe	no	no	yes
Observations	6,251	6,251	6,251
R-squared	0.7003	0.2372	0.2586

The table shows regression results from the model $\frac{BD_{i,t+1}}{TD_{i,t+1}} = (\lambda\beta)X_{i,t} + (1-\lambda)\frac{BD_{i,t}}{TD_{i,t}} + \epsilon_{i,t+1}$. Column 1 displays the Fama-Macbeth (1973) regression results. Column 2 shows OLS panel regression results with firm-fixed effects. Column 3 displays panel OLS regression results with both firm- and year-fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. Column 1 reports heteroskedasticity and autocorrelation consistent Newey-West (1987) standard errors in parentheses. In columns 2 and 3, heteroskedasticity-robust standard errors are clustered at the firm level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

Table 4.8 shows Fama-Macbeth and panel OLS regression results from estimating the partial target adjustment speed where the bank debt definition includes capital leases. The coefficients of the lagged bank debt ratio are of similar magnitude as in the main table (cf. Table 4.5). In column one, the Fama-Macbeth estimation yields a coefficient of 0.7765, which is statistically significant at the one percent level. Firms whose managers have a below-median PPS close 22.35 (i.e., 1-0.7765) percent of the gap with their target private debt ratio. With this speed of adjustment, these

firms need four to five years to meet their target debt structure. Columns two and three exhibit panel OLS regression results with coefficients of 0.4797 and 0.4497, which are of very similar magnitude as in the main table and both are statistically significant at the one percent level. In contrast to the results from Table 4.5, the interaction term of the lagged bank debt ratio and the indicator variable identifying firms with strong CEO incentives yields a positive, yet statistically not significant coefficient in column one. This contradicts the results from the main table. In the panel OLS regressions in columns two and three, the coefficients of the interaction term of the lagged bank debt ratio and the high PPS indicator are both negative supporting hypothesis 4.3, but are not statistically significant.

The impact of the high PPS indicator itself is in line with prior findings. The coefficients in all three regressions in Table 4.8 are positive and in columns two and three statistically significant at the one percent level. The interaction term of the lagged bank debt ratio and the opacity proxy, dispersion of analyst forecasts, yields no significant coefficients in either regression. The regression coefficients of the control variables are largely in line with the results in Table 4.5.

Taken together, the findings regarding the existence of a target debt ratio (hypothesis 4.1), with respect to the positive relationship between managerial incentives and the level of target bank debt ratios (hypothesis 4.2) and the positive association of firm opacity with target debt structures (hypothesis 4.4) seem robust to the alternative definition of the bank debt ratio, which includes leasing. For the findings from Table 4.5 on the faster target adjustment speed for firms whose CEOs have strong equity incentives, the findings from the main table do not seem robust to including capital leases in the private debt ratio. As firms' motivation for using capital leases as a source of financing are not the topic of this paper, future research would be necessary to shed more light on the subject.

4.4.5 Robustness Check: Sample Excludes Firms With Only One Debt Class

In this section, I test if the results regarding firms' (partial) target adjustment speed are robust to excluding all firms from the sample, which either only borrow from banks or solely raise public debt. This additional sample selection criterion limits the sample to firms whose managers are more likely to manage actively the firm's debt structure taking both private and public sources of debt financing into account. The disadvantage of this sample limitation is that firms whose target debt structure is

either zero or 100 percent of bank debt are excluded under the wrong assumption of a lack of debt structure management. For this reason, this sample selection criterion serves only as robustness check for the findings from the unlimited sample.

Table 4.9: Subsample of Firms with Both Public and Bank Debt: Estimating Partial Target Adjustment in Debt Structure

	(1)	(2)	(3)
	Fama-Macbeth	panel OLS	panel OLS
bank debt ratio$_{i,t}$	0.6500***	0.2967***	0.2956***
	(0.0354)	(0.0344)	(0.0341)
high PPS$_{stocks+options}$	0.0685**	0.0390**	0.0349**
	(0.0255)	(0.0155)	(0.0153)
bank debt ratio$_{i,t}$*high PPS$_{stocks+options}$	-0.0955**	-0.0741**	-0.0743**
	(0.0425)	(0.0332)	(0.0329)
dispersion of analyst forecasts	0.7637	0.2015	-0.0537
	(1.3402)	(0.8377)	(0.8159)
bank debt ratio$_{i,t}$*dispersion	-4.1895	0.8256	0.8074
of analyst forecasts	(2.9389)	(1.3059)	(1.2888)
ln(total assets)	-0.0466***	0.0033	-0.0243
	(0.0034)	(0.0172)	(0.0187)
ROA	0.1381*	0.1516*	0.0893
	(0.0673)	(0.0849)	(0.0908)
R&D intensity	-0.2580***	-0.0888	-0.2215
	(0.0810)	(0.1413)	(0.1493)
market to book	-0.0443*	-0.0128	-0.0133
	(0.0236)	(0.0087)	(0.0091)
ROA volatility	0.1326*	0.0659	0.1139
	(0.0642)	(0.1615)	(0.1630)
industry median sales growth	-0.0005	-0.2215	-0.2027
volatility	(0.0283)	(0.1383)	(0.1427)
asset tangibility	-0.0800***	-0.0197	0.0237
	(0.0178)	(0.1144)	(0.1163)
leverage	-0.2286***	-0.2507***	-0.2645***
	(0.0404)	(0.0480)	(0.0504)
inverse Altman's Z-score	0.0003	-0.0000	-0.0001
	(0.0152)	(0.0003)	(0.0003)
Constant	0.6467***	0.4454***	0.7515***

Continued on next page.

Table 4.9 continued

	(1) Fama-Macbeth	(2) panel OLS	(3) panel OLS
	(0.0609)	(0.1349)	(0.1550)
firm fe	no	yes	yes
year fe	no	no	yes
Observations	3,634	3,634	3,634
R-squared	0.6450	0.1212	0.1396

The table shows regression results from the model $\frac{BD_{i,t+1}}{TD_{i,t+1}} = (\lambda\beta)X_{i,t} + (1-\lambda)\frac{BD_{i,t}}{TD_{i,t}} + \epsilon_{i,t+1}$. Column 1 displays Fama-Macbeth (1973) regression results. Column 2 shows OLS panel regression results with firm-fixed effects. Column 3 displays panel OLS regression results with both firm- and year-fixed effects. Heteroskedasticity-robust standard errors are reported in parentheses. In column 1, heteroskedasticity and autocorrelation consistent Newey-West (1987) standard errors are reported in parentheses. In columns 2 and 3, heteroskedasticity-robust standard errors are clustered at the firm level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

In line with the above argument of active debt structure management, the results in Table 4.9 exhibit an even faster target adjustment speed and clearer results with respect to the impact of firm opacity and CEO incentives on partial target adjustment behavior. Column one of Table 4.9 shows a regression coefficient λ of 0.65, which means that firms close $(1-\lambda)$ 35 percent of the gap between their actual and their target debt structure per year. Taking into account the interaction term between high PPS of managers and the lagged bank debt ratio, firms whose managers have strong equity incentives close 9.55 percentage points more, or 44.55 percent in total, of the gap with their optimal debt structure, per annum. The high PPS indicator variable suggests that firms whose CEOs have above-median equity incentives have higher bank debt ratios in the subsequent year. Results with respect to firm opacity as measured by analyst forecast dispersion are not significant. As of columns two and three of Table 4.9, panel OLS regressions exhibit even stronger target adjustment speeds of 70 percent of the gap to be closed per year. Firms with strong CEO equity incentives show even faster target adjustment speeds and close about 77 percent of the gap with their optimal debt structure within one year. These findings support hypothesis 4.3 and provide further robustness for the results

from the main Table 4.5.

4.5 Conclusion

In this study, I start by analyzing if firms do have target bank debt to total debt ratios toward which they adjust partially over time. For a comprehensive sample of listed US non-financial firms between 2000 and 2013, I analyze corporate debt structures and their potential determinants as identified in existing research. Applying target estimation techniques from classical capital structure trade-off theories as well as empirical determinants of firms' choices between public and private debt, I estimate firms' optimal debt structures. Then, I test if these target debt ratios depend on firms' informational opacity as well as managerial incentives. Finally, I test firms' speed of adjustment to their optimal debt structures and examine whether managerial incentives impact firms' target adjustment speeds.

First, I find empirical evidence that firms do have a target compositions of bank debt and public debt to which they partially adjust over time. These target bank debt ratios are about seven to ten percentage points higher for firms with high information asymmetries with outside stakeholders. This finding supports theoretical arguments of banks fulfilling a superior information production function (Diamond, 1984; Ramakrishnan and Thakor, 1984; Allen, 1990) and monitoring borrowers at lower costs (Leland and Pyle, 1977; Diamond, 1984; Fama, 1985), and are preferred by firms with sensitive proprietary information (Campbell, 1979) compared to arm's-length bondholders. Moreover, I find that target bank debt ratios are about ten to 15 percentage points higher for firms whose CEOs have above-median equity incentive compensation. This finding fits theories stating that incentive alignment between managers and shareholders facilitates managers' asset substitution incentives. As public bondholders will anticipate this threat and demand higher returns as compensation, thereby increasing firms' cost of debt, banks can mitigate this agency problem through monitoring. Managers who are especially interested in increasing shareholders value likely prefer submitting themselves to bank monitoring rather than bearing higher costs of public debt. Finally, I find that firms do partially adjust to their target bank debt ratios closing about half of the gap between their actual and their target bank debt level per year. Firms whose managers have strong equity incentives adjust faster, closing about five percentage points more of the gap within one year. The speed of partial adjustment to target debt structures as well as the respective impact of management incentive compensations constitute the main

research contributions of this study.

Although this paper provides empirical evidence favoring an optimal debt structure, one limitation is that the paper does not fully explain cross-sectional variation in debt structure choices. Moreover, the sample limits the empirical evidence to listed firms, as analyst coverage is required for the measure of information asymmetry. In addition, there are still many open research questions regarding the exact trade-off that determines this target, the influence of macro-economic conditions and financial crises, which impact the supply of either bank or public debt. Consequently, there are many opportunities for future research to increase the understanding of firms' debt structure decisions.

5 Conclusion

This chapter summarizes the main results from the three previous empirical analyses, illustrates the contributions to the literature as well as the practical implications, and depicts potential avenues for future research.

5.1 Main Results

5.1.1 Information Asymmetry, Creditor Rights, and Syndicated Loans Worldwide

In the second chapter, I analyse a comprehensive worldwide dataset of syndicated loans to borrowers in 44 countries that were granted between 1987 and 2002. I examine the research question of how firm-level opacity and country-level creditor rights affect the lending banks' syndicate structure. Information asymmetries are associated with higher information acquisition costs and higher incentives for lead banks for adverse selection by syndicating large parts of a possibly low-quality loan to the other syndicate banks. In addition, lead banks have an incentive to reduce monitoring once the loan is granted (moral hazard) if their loan share is small. As other syndicate members anticipate this behaviour they demand compensation or a credible signal by the lead banks which these provide by keeping larger loan shares. In line with this argumentation, I find empirical evidence that lead banks form larger syndicates and keep smaller loan shares if borrowers are transparent, i.e. if information asymmetries are small.

Moreover, I find that strong protection of creditor rights at the country-level is associated with smaller loan shares kept by the lead arranger banks and larger syndicates. This indicates that strong creditor rights have a similar effect as firm transparency, both mitigating information asymmetry problems. As a concequence, there is a potential substitution effect between firm transparency and country-level creditor rights. The existence of public credit registries that share information about borrowers seem to have a prominent role in this setting as they directly reduce

asymmetric information between borrowers and lenders.

5.1.2 Bank Regulatory Arbitrage in International Syndicated Lending

In the third chapter, I combine a comprehensive dataset on syndicated loans that were granted between 1996 and 2012 with the World Bank dataset on country-level bank regulation and supervision (Barth et al., 2013a) and other datasets in order to answer the research question of whether banks pursue regulatory arbitrage when granting international syndicated loans. The fact that in most countries, parent banks and their foreign branches are subject to the parent bank's home country regulation and supervison while foreign subsidiaries are mostly subject to host country regulation offers banks the opportunity to circumvent strict regulation by granting loans through less regulated entities. I find empirical evidence that the likelihood that banks lend via a subsidiary in the borrower's country increases with the regulatory advantage of the borrower's country as compared to the bank's home country. Consistently, the likelihood that banks choose to grant loans though the parent bank or a branch rather than through a subsidiary is higher if regulation in the bank's home country is weaker than in the borrower's country. These findings suggest that banks pursue regulatory arbitrage when they grant syndicated loans across borders. In addition, banks that benefit from regulatory arbitrage grant loans with longer maturities and keep larger loan shares within the banking syndicate.

It is interesting to note that the key regulatory aspects influencing the banks' choice of lending entity are those regarding private monitoring of banks by investors, transparency of banks' financial statements and the classification of loans in arrears. This finding emphasizes the importance of non-state institutions in bank regulation and supervision.

5.1.3 Public Debt vs. Bank Debt: Do Firms Adjust to Optimal Debt Structures?

In the fourth chapter of this dissertation, I analyze a comprehensive sample of US non-financial companies between 2000 and 2013 in order to answer the reserach question if firms have target mixtures between public and private debt, how fast they adjust to these target debt structures, and in how far management incentives and firm opacity impact this behaviour. I find that firms have target debt structures

to which they partially adjust over time. Target bank debt to total debt ratios are seven to ten percentage points higher for opaque firms. This finding suggests that bank monitoring mitigates information asymmetry problems and therefore serves as a respective signal for bondholders, once loans are granted. In addition, target bank debt ratios are 10-15 percentage points higher if managers have above-median equity incentive compensation, ceteris paribus. This is consistent with the argument that managers expose themselves to bank monitoring in order to signal that they do not increase risk at debtholders' expense (asset substitution) so that bondholders do not demand higher interest as compensation.

Regarding the target adjustment speed, I find that firms close about 50 percent of the gap between their actual and their target bank debt ratio per year. Managers who have strong incentives to increase shareholder value close five percentage points more of the gap towards their target debt structure.

5.2 Contribution and Implications

This dissertation contributes to a better understanding of how information asymmetries impact firms' debt financing and to the related strands of literature that are discussed in the following.

The first study contributes to the literature on firm-level asymmetric information and syndicated loans where loan contract terms and syndicate structure are examined empirically (Sufi, 2007; Ivashina, 2009). My findings that the syndicate of banks is more concentrated and the lead arranger share is larger if the borrowing companies are opaque are consistent with prior results from the literature. But unlike prior empirical studies of Sufi (2007) and Ivashina (2009) that are limited to US borrowers and sample periods ending before 2005, my results are based on a hand-matched worldwide dataset which is novel and unique in its large scale and quality covering more than 70,000 loans in 44 countries between 1987 and 2012. In addition, the study contributes to the empirical literature on the relationship between country-level creditor rights and (syndicated) loans (Qian and Strahan, 2007; Bae and Goyal, 2009; Vig, 2013) which are mostly studied in the cross-section across countries. As I study the relationship between information asymmetries and bank syndicate structure at the firm level for a comprehensive worldwide sample across countries with different creditor rights, I examine substitution effects between firm transparency and creditor rights and thereby link both strands of literature which is new in the empirical reserach of the field. I find that the interaction term between

firm transparency and creditor rights is highly significant. This supports the argument that as most banks and many firms operate internationally, it is important to consider both, firm-level opacity and firm characteristics as well as country-level regulation when studying syndicated loans.

The second study on bank regulatory arbitrage in international syndicated bank lending contributes to two strands of literature: First, my study extends recent empirical research on the impact of cross-country differences in bank regulation on cross-border lending (Houston et al., 2012; Fidrmuc and Hainz, 2013; Ongena et al., 2013). Second, it contributes to the literature on the effects of bank regulation on syndicated loans (Hao et al., 2012). My finding that banks choose their lending entity in order to benefit from regulatory differences across countries and thereby evade stricter regulation and supervision in either their home or the host country has practical implications in the current debate on stricter post-crisis bank regulation. My study emphasizes the need for joint cross-country efforts of harmonization in bank regulation.

The third study on firms' optimal debt structures contributes to the understanding of how firms choose between public and private debt and how asymmetric information and management incentives impact this choice. In contrast to the hitherto existing articles that estimate the probability that firms raise public or private debt based on firm characteristics (Denis and Mihov, 2003; Gomes and Phillips, 2012; Meneghetti, 2012), I estimate the precise target bank debt ratio for each firm and thereby provide a deeper understanding of firms choice between public and private debt. In addition, this paper combines and extends two strands of literature: empirical reserach on the effect of managerial incentives on firms' choice of debt types (Albring et al., 2011; Meneghetti, 2012) and studies on information asymmetries on the source of financing (Gomes and Phillips, 2012). To the best of my knowledge, this dissertation is the first to estimate firms' speed of adjustment to their target debt structure. In addition, I extend existing research by showing that the speed of adjustment to target debt structures differs depending on CEO incentives.

5.3 Avenues for Future Research

The findings of the three empirical analyses in this dissertation open several avenues for future research. With respect to the structure of syndicate banks that lend to transparent or opaque borrowers, it would be interesting to examine how loan securitization and sales in the secondary market have impacted the structure of the

bank syndicates. If a syndicated loan to an opaque borrower is sold to third-party investors, is the uncertainty that is associated with the asymmetric information reflected adequately in the security's characteristics such as its rate of return?

At first glance, the findings of this dissertation suggest that asymmetric information between firms and debtholders are associated with disadvantages for the borrowing company. As firm opacity is to a certain extent chosen by firms, research on firms' motives to be opaque - in addition to the known argument of keeping proprietary information (Campbell, 1979) - would provide valuable insights. Moreover, is there an optimal level of opacity?

Regarding bank regulatory arbitrage against the background of cross-country differences in bank regulation and supervision, my findings emphasize the importance of joint efforts of multiple countries to harmonize and coordinate their bank regulation activities. After the recent financial crisis and against the background of the ongoing debate on stricter bank regulation, it would be interesting to investigate whether first European attempts of joint bank regulation such as the introduction of the European Banking Authority (EBA) in 2011 have already reduced bank regulatory arbitrage. In addition, the second study in this dissertation revealed the special role of bank monitoring by investors rather than state institutions. As global investors could assume such a role beyond national borders, comparing banks with large institutional investors as blockholders with banks owned by free float shareholders could provide additional insights.

With respect to firms adjustment towards target debt structures, it would be interesting to examine how firms' ownership structures affect target bank debt levels as well as target adjustment speeds. As blockholders have an impact on agency conflicts, future research on optimal debt structures and partial target adjustment could account for firm ownership.

Appendix

Appendix A

Sample Loans' Borrower Home Countries

1. Argentina
2. Australia
3. Austria
4. Belgium
5. Brazil
6. Canada
7. Chile
8. China
9. Czech Republic
10. Denmark
11. Finland
12. France
13. Germany
14. Greece
15. Hong Kong
16. India
17. Indonesia
18. Ireland
19. Israel
20. Italy
21. Japan
22. Kuwait
23. Malaysia
24. Mexico
25. Netherlands
26. New Zealand
27. Norway
28. Pakistan
29. Philippines
30. Poland
31. Portgual
32. Russian Federation
33. Saudi Arabia
34. Singapore
35. South Africa
36. South Korea
37. Spain
38. Sweden
39. Switzerland
40. Taiwan
41. Thailand
42. Turkey
43. United Kingdom
44. United States of America

Table A1: Controlling for Credit Risk: Number of Lead Arrangers, Borrower Transparency, and Creditor Rights

	(1)	(2)	(3)	(4)	(5)	(6)
transparent	-1.415**	-1.406**	-1.376**	-1.420**	0.392	-1.444**
	(0.567)	(0.579)	(0.561)	(0.579)	(1.092)	(0.594)
creditor rights	0.374**	0.380**	0.396**	0.391**	0.254	0.350*
	(0.184)	(0.185)	(0.183)	(0.183)	(0.208)	(0.182)
creditor rights*	1.051**	1.048**	1.042**	1.048**	0.365	1.054**
transparent	(0.437)	(0.439)	(0.436)	(0.443)	(0.383)	(0.438)
ln(total assets)	0.0837					0.0828
	(0.0659)					(0.0663)
profitability		-0.571				-0.782*
		(0.403)				(0.411)
leverage			-0.337			-0.421
			(0.291)			(0.312)
asset tangibility				-0.215		-0.173
				(0.214)		(0.230)
growth					0.0379	
					(0.0645)	
controls as in Table 2.4	Yes	Yes	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes	Yes	Yes
constant	-2.791**	-2.511*	-2.432*	-2.494*	-5.726***	-2.635**
	(1.294)	(1.333)	(1.296)	(1.335)	(1.557)	(1.283)
observations	14,886	14,222	14,481	14,239	7,183	13,780
max VIF	5.38	5.31	5.33	5.29	4.29	5.34
R-squared	0.263	0.262	0.262	0.262	0.294	0.265

The table shows coefficient estimates from regressing the number of lead arranger banks in the syndicate on borrower transparency, borrower credit risk proxies, country-level creditor rights, and controls by applying OLS. Transparent is an indicator variable equal to 1 if the firm is both listed and rated, and zero otherwise. The creditor rights index measures the rights of secured lenders in the case of borrower bankruptcy. It ranges between 0 and 4, with higher scores representing stronger creditor rights. Max VIF denotes the maximum variance inflation factors, excluding factors for year, industry, and loan pruposes. Robust standard errors are two-way clustered at the country and borrower levels and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Table A2: Lead Arranger Share and Information-sharing for Transparent Borrowers

	(1)	(2)	(3)	(4)
public registry	0.0562	0.0490		
	(0.0984)	(0.112)		
	[0.0091]	[0.0080]		
private bureau			0.221	0.201
			(0.263)	(0.296)
			[0.0358]	[0.0326]
creditor rights		0.0689		0.0644
		(0.0474)		(0.0500)
		[0.0112]		[0.0104]
controls as in Table 2.4	Yes	Yes	Yes	Yes
loan purpose fe	Yes	Yes	Yes	Yes
industry fe	Yes	Yes	Yes	Yes
year fe	Yes	Yes	Yes	Yes
Constant	4.271***	4.232***	3.998***	3.987***
	(0.271)	(0.265)	(0.411)	(0.407)
Observations	5,271	5,271	5,271	5,271

The table shows coefficient estimates from regressing the loan share kept by the lead arranger on the availability of information-sharing agencies in the borrower's country, and controls for the subsample of transparent borrowers by applying GLM. A borrower is defined as transparent if it is both listed and rated. Public registry (private bureau) is an indicator variable equal to 1 if there is a public (private) credit registry present in the borrower's home country. Margins at the mean are reported in square brackets. Robust standard errors are clustered at the country level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *, respectively.

Appendix B

Table B1: Variable Definitions and Data Sources

Regulatory Variables		
Variable Name	Definition	Data Source
Overall activity restrictions	The extent to which banks are allowed to engage in security activities (underwriting, brokering, dealing, as well as all aspects of the mutual fund business), insurance activities (underwriting and selling), and real estate activities (investment, development, and management). For each group of activities, a 1 is assigned if the activities are unrestricted; 2 if they are permitted but must be fully or partly conducted by subsidiaries; 3 if activities are restricted, that is, can only partly be conducted; and 4 if they are prohibited to both the bank and the bank's subsidiaries. The variable captures the sum of assigned points. It ranges between 3 and 12 with higher values indicating greater restrictiveness.	Barth et al. (2006, 2008, 2013)
ΔOverall activity restrictions	Difference between the mean-centered values of activity restrictions in the bank's home country and the borrower's country. Higher values indicate relatively weaker bank activity restrictions in the borrower's country.	
Restrictions of banks owning non-financial firms	The extent to which a bank is allowed to own and control non-financial firms. For each group of activities, a 1 is assigned if the activities are unrestricted; 2 if they are permitted but must be fully or partly conducted by subsidiaries; 3 if activities are restricted, that is, can only partly be conducted; and 4 if they are prohibited to both the bank and the bank's subsidiaries. It ranges between 1 and 4 with higher values indicating greater restrictiveness.	Barth et al. (2006, 2008, and 2013)

Continued on next page.

Table B1 continued

ΔRestrictions of banks owning non-financial firms	Difference between the mean-centered values of restrictions of banks owning non-financial firms in the bank's home country and the borrower's country. Higher values indicate a relatively weaker regulation in the borrower's country.	
Private monitoring index	Extent to which there are incentives and/or ability for private monitoring of firms. Points are added, for example, if banks must publish consolidated statements, be audited by certified international auditors, or disclose off-balance sheet items. It ranges between 0 and 12. Higher values indicate more power of private investors in bank monitoring.	Barth et al. (2006, 2008, and 2013)
ΔPrivate monitoring index	Difference between mean-centered values of the private monitoring index in the bank's home country and the borrower's country. Higher values indicate a relatively lower empowerment of private investors in bank monitoring in the borrower's country.	
External ratings and creditor monitoring	The extent to which banks are subject to evaluations by external rating agencies and creditor monitoring. Points are added if certain subordinated debt is allowed as part of capital, if banks must be evaluated by external rating agencies, and if all top ten banks in a country are rated by national and international rating agencies. It ranges between 0 and 5, with higher values indicating stronger monitoring.	Barth et al. (2006, 2008, and 2013)
ΔExternal ratings and creditor monitoring	Difference between the mean-centered values of the external ratings and creditor monitoring variable in the bank's home country and the borrower's country. Higher values indicate relatively laxer monitoring in the borrower's country.	

Continued on next page.

Table B1 continued

Loan classification leniency	The number of days beyond which a loan in arrears must be classified as substandard, then doubtful, then loss. Higher values indicate less stringency.	Barth et al. (2006, 2008, and 2013)
ΔLoan classification leniency	Difference between mean-centered values of the number of days for loan classification as substandard, doubtful, and loss in the bank's home country and the borrower's country. Higher values indicate relatively stricter loan classification regulation in the borrower's country.	
Financial statement transparency	The degree of transparency of banks' financial statements. One point is added to the index if banks must prepare consolidated statements, if accrued but unpaid principal and interest enters the income statement for performing and for non-performing loans, if banks disclose off-balance sheet items and their governance and risk management framework, and if directors are legally liable for the published information. It ranges between 0 and 6. Higher values indicate a greater transparency.	Barth et al. (2006, 2008, and 2013)
ΔFinancial statement transparency	Difference between mean-centered values of the financial statement transparency index in the bank's home country and the borrower's country. Higher values indicate a relatively lower financial statement transparency in the borrower's country.	
Capital regulatory index	An index that adds one point if certain risk elements like credit risk are considered in capital requirements, if specific market value losses are subtracted from capital before the minimum capital adequacy is computed, and if certain funds can be employed to initially capitalize a bank. It ranges between 0 and 10. Higher values indicate greater capital stringency.	Barth et al. (2006, 2008, and 2013)

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Table B1 continued

ΔCapital regulatory index	Difference between mean-centered values of the capital regulatory index in the bank's home country and the borrower's country. Higher values indicate a relatively weaker capital regulation in the borrower's country.	
Strength of external audit	An index measuring the effectiveness of banks' external audit. One point is added if a professional external auditor is required, if the auditor must be certified, if there are specific requirements for the extent or nature of the audit, if supervisors receive a copy of the auditors' reports, if supervisors can directly communicate with auditors without approval of the bank, if auditors must report on any potential misconduct of bank managers to the supervisor, and if the supervisor can take actions against external auditors in case of an inadequate audit. It ranges between 0 and 7. Higher values indicate more effective external audits.	Barth et al. (2006, 2008, and 2013)
ΔStrength of external audit	Difference between mean-centered values of the strength of external audit index in the bank's home country and the borrower's country. Higher values indicate a relatively lower effectiveness of external audits in the borrower's country.	
	Country-level Variables	
Trade openness	Ratio of the sum of a country's imports and exports of goods and services to its GDP.	World Development Indicators; Taiwanese Bureau of Foreign Trade for Taiwan

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Table B1 continued

ln(GDP)	Natural logarithm of a country's gross domestic product in USD.	World Development Indicators; Econstats.com for Taiwan
ln(population)	Natural logarithm of a country's population.	World Development Indicators; Econstats.com for Taiwan
Creditor rights	Two country-level proxies for creditor rights: The first proxy is the creditor rights score based on the concept of La Porta et al. (1998), which assigns one point when the following rights of secured lenders are established in a country's laws and regulations: There are restrictions like creditor consent if a borrower files for reorganization, there is no automatic stay on assets once the reorganization petition is filed, secured lenders are paid first in case of a bankrupt firm's liquidation, and management does not stay in case of reorganization. It ranges between 0 and 4 with higher values indicating stronger creditor rights. The second proxy is the information-sharing indicator, which equals to one if either a public credit registry or a private credit bureau operates in a country, and zero otherwise. Both proxies are used as of 2003 and included for both the borrower's and the bank's home country.	Djankov et al. (2007)
	Borrower and Loan Characteristics	
Loan share kept by the lead bank	Fraction of the total loan amount that is kept by the lead arranger bank.	LPC DealScan
ln(tranche amount)	Natural logarithm of the respective loan tranche amount in USD.	LPC DealScan

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Table B1 continued

Loan maturity in months	Difference between tranche end date and deal active date measured in months.	LPC DealScan
ln(loan maturity in months)	Natural logarithm of the difference between tranche end date and deal active date measured in months.	LPC DealScan
ln(loan spread in bps)	Natural logarithm of the loan spread over LIBOR in basis points.	LPC DealScan
ln(borrower sales)	Natural logarithm of the borrower's latest sales before the loan is granted in USD.	LPC DealScan
	Bank Entity Types	
Foreign bank indicator	An indicator variable, which is equal to one if the lending bank's headquarters is outside the borrower's home country, and zero otherwise.	DealScan, BankScope
Foreign bank's domestic subsidiary	An indicator variable is equal to one if the lending bank is a bank subsidiary in the borrower's home country whose parent bank's headquarters is located outside the borrower's home country, and zero otherwise.	DealScan, BankScope
Foreign bank's domestic branch	An indicator variable equal to one if the lending bank is a branch located in the borrower's home country of a bank located outside the borrower's home country, and zero otherwise.	DealScan, BankScope
Foreign bank's foreign subsidiary	An indicator variable, which is equal to one if the lending bank is a bank subsidiary outside the borrower's home country whose parent bank's headquarters is located outside the borrower's home country, and zero otherwise.	DealScan, BankScope

Continued on next page.

Table B1 continued

Foreign bank's foreign branch	An indicator variable is equal to one if the lending bank is a branch located outside the borrower's home country and belongs to a parent bank which is located outside the borrower's home country, too, zero otherwise.	DealScan, BankScope

Table B2: Cross-country Regulatory Differences and Foreign Banks' Lending Entity Choices - Fixed Effects Model

	(1)	(2)	(3)	(4)
ΔPrivate monitoring index	-0.1855**			
	(0.0751)			
	[-0.0046***]			
ΔLoan classification leniency		-0.0084***		
		(0.0023)		
		[-0.0000]		
ΔFinancial statement transparency			-0.0427	
			(0.1076)	
			[-0.0011]	
ΔCapital regulatory index				-0.0143
				(0.0449)
				[-0.0004]
ln(loan tranche amount in USD)	-0.2082***	-0.3361**	-0.1882***	-0.2058***
	(0.0393)	(0.1430)	(0.0403)	(0.0399)
	[-0.0051***]	[-0.0005]	[-0.0050***]	[-0.0053***]
Loan maturity in months	0.0038***	0.0266***	0.0037***	0.0033***
	(0.0008)	(0.0044)	(0.0008)	(0.0008)
	[0.0001***]	[0.0000]	[0.0001***]	[0.0001***]
Constant	2.6449***	-2.7508	2.2021**	2.5164***
	(0.8840)	(3.2408)	(0.8749)	(0.9008)
Year fe	yes	yes	yes	yes
Lender country fe	yes	yes	yes	yes
Observations	140,913	2,975	155,010	141,032
Pseudo R-squared	0.3530	0.6280	0.3380	0.3430

The table shows coefficient estimates from logit regressions of an indicator variable, which is equal to one if the lending bank is a foreign bank's subsidiary in the borrower's country and zero otherwise on differences in country-level bank regulation, loan contract controls, and year- and country-fixed effects. Variables capturing country-level regulatory differences equal the difference between the mean-centered regulation proxy in the bank's home country and the respective mean-centered regulation proxy in the borrower's country. Higher values are associated with larger advantages of the borrower country's regulation over the bank's home country regulation. For Δloan classification leniency, higher values are associated with larger regulatory disadvantages. Margins at the means are reported in square brackets. Robust standard errors are clustered at the (parent) bank level and reported in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *.

Appendix C

Table C1: Yearly Debt Structure Estimation: Mean and Median Annual Parameter Estimates

	(1)	(2)	(3)	(4)
high $PPS_{stocks+options}$	0.0112	-0.0010	-0.0067	0.0102
	(24.8112)	(-0.0315)	(-0.9727)	(0.1107)
dispersion of	-0.0270	0.0667	15.5194	10.0312
analyst forecasts	(-1.2985)	(0.0476)	13.2054	(0.5146)
ln(total assets)	-0.0988	-0.0923	-0.1458	-0.1642
	(-461.9109)	(-0.98649)	(-52.5743)	(-2.2028)
ln(internal funding deficit)			-0.0281	-0.0162
			(-6.3410)	(-0.1014)
ln(total assets)*			0.0036	0.0034
ln(internal funding deficit)			(5.6264)	(0.1264)
ROA	0.1868	0.1607	0.5222	0.5891
	(139.0751)	(1.0028)	(22.5803)	(0.5983)
S&P credit rating			0.1025	0.1564
			(6.6344)	(0.4115)
R&D intensity	-0.2447	-0.1579	-0.6825	-0.9461
	(-59.5932)	(-0.6280)	(-14.0376)	(-0.8748)
market to book	-0.0302	-0.0278	-0.0464	-0.0006
	(-196.8560)	(-1.8545)	(-14.9179)	(-0.0268)
ROA volatility	-0.2044	-0.1431	-0.4413	-0.0942
	(-62.6553)	(-0.8130)	(-6.5511)	(-0.2351)
industry median sales	-0.0875	-0.1157	-0.0474	-0.0408
growth volatility	(-63.8614)	(-0.9588)	(-2.4216)	(-0.1104)
asset tangibility	0.0572	0.0437	0.4387	0.2279
	(66.9474)	(0.4358)	(20.5872)	(0.8594)
firm age			0.0065	0.0036
			(9.1326)	(0.2078)
leverage	-0.0730	-0.0680	-0.5919	-0.4808
	(-38.2287)	(-0.6020)	(-35.0729)	(-0.9565)
interest coverage			-0.0001	-0.0001
			(-5.2895)	(-0.2304)
inverse Altman's Z-score	-0.0033	-0.0027	0.0360	-0.0221
	(-52.3343)	(-0.3319)	(2.1115)	(-0.4319)
Constant	1.1712	1.0368	1.2825	1.0696
	(367.0670)	(11.3749)	(41.6642)	(2.0957)
Observations	7,053	7,053	599	599
R-squared		0.1425		0.4786

The table shows means and medians of yearly parameter estimates from the model $\frac{BD_{i,t}}{TD_{i,t}}^* = \beta X_{i,t-1}$ applying ordinary least squares estimation. Columns 1 and 3 show mean coefficients. Columns 2 and 4 display the medians of yearly coefficients. Mean and median t-statistics are reported in parentheses, respectively. Regression results for each year are reported in Tables C2 and C3 in Appendix C.

Table C2: Yearly Debt Structure Estimation - Short Version

year	2001	2002	2003	2004	2005	2006	2007
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
high $PPS_{stocks+options}$	0.0701	0.0352	0.0908*	-0.0413	0.0129	0.0097	-0.0212
	(1.0459)	(0.6535)	(1.7763)	(-0.7680)	(0.2257)	(0.1649)	(-0.6001)
dispersion of	-0.5712	0.0667	0.8949	-1.2330	1.3337	2.6958	0.7025
analyst forecasts	(-0.2704)	(0.0476)	(0.4364)	(-0.4453)	(0.2991)	(1.1066)	(0.2486)
ln(total assets)	-0.0821***	-0.0874***	-0.0923***	-0.0932***	-0.0822***	-0.0860***	-0.0778***
	(-7.0014)	(-9.4725)	(-9.8649)	(-10.0595)	(-8.4513)	(-9.1676)	(-7.5037)
ROA	0.1687	0.1061	0.1240	0.3719**	0.0806	0.2057	0.2790*
	(1.0929)	(0.7480)	(0.6750)	(2.5418)	(0.4904)	(1.4209)	(1.8495)
R&D intensity	0.2318	-0.1153	-0.1579	0.0631	-0.2240	-0.3606	-0.0989
	(0.7560)	(-0.5023)	(-0.6236)	(0.2347)	(-0.7597)	(-1.3474)	(-0.3679)
market to book	-0.0210*	-0.0161	-0.0278	-0.0384***	-0.0223	-0.0225	-0.0097
	(-1.8545)	(-1.2577)	(-1.3875)	(-2.6010)	(-1.4521)	(-1.3779)	(-0.5908)
ROA volatility	-0.1091	-0.1067	-0.1431	-0.1022	-0.4249**	-0.3656*	-0.2854
	(-0.7989)	(-0.7078)	(-0.8130)	(-0.5102)	(-2.0647)	(-1.6578)	(-1.3116)
industry median sales	-0.1296	-0.1157	-0.1729	-0.1652	-0.2803**	-0.1991*	-0.1090
growth volatility	(-0.9588)	(-1.0081)	(-1.5034)	(-1.4994)	(-2.5624)	(-1.7592)	(-0.8359)
asset tangibility	0.1508	0.1234	0.1230	-0.0059	0.1941**	0.0522	0.0867
	(1.3627)	(1.3371)	(1.3544)	(-0.0649)	(2.0111)	(0.5566)	(0.8749)
leverage	0.2437**	0.1823**	0.0040	-0.0629	-0.2185*	-0.0680	0.0195
	(2.2341)	(1.9818)	(0.0451)	(-0.5711)	(-1.7675)	(-0.6020)	(0.1722)
inverse Altman's Z-score	-0.0048*	-0.0027	-0.0039	0.0050	-0.0067	-0.0061*	-0.0115
	(-1.7948)	(-0.2747)	(-0.8815)	(0.9248)	(-0.3319)	(-1.8271)	(-0.5294)
Constant	0.8107***	0.8843***	0.9728***	1.0240***	1.0351***	1.0368***	0.9484***
	(7.6641)	(9.7871)	(10.4958)	(10.9938)	(10.8167)	(11.3749)	(9.7426)
Observations	409	578	542	563	570	578	580
R-squared	0.1369	0.1133	0.1460	0.1425	0.1221	0.1262	0.0863

Continued on next page.

Table C2 continued.

year	2008	2009	2010	2011	2012	2013
	(8)	(9)	(10)	(11)	(12)	(13)
high $PPS_{stocks+options}$	-0.0010	-0.0066	-0.0273	-0.0072	-0.0033	0.0348
	(-0.0315)	(-0.2016)	(-0.8935)	(-0.2613)	(-0.1200)	(0.7727)
dispersion of	-1.1728	-0.1673	-1.1279	1.6816	-4.2627**	0.8091
analyst forecasts	(-0.5787)	(-0.1265)	(-0.6564)	(1.2702)	(-2.2344)	(0.2896)
ln(total assets)	-0.0879***	-0.1057***	-0.1153***	-0.1249***	-0.1229***	-0.1273***
	(-9.5550)	(-13.0814)	(-15.0703)	(-18.2319)	(-17.0141)	(-10.6001)
ROA	0.1607	0.1209	0.3405**	0.3427***	0.1099	0.0176
	(1.0028)	(0.7678)	(2.4879)	(2.7301)	(0.7589)	(0.0668)
R&D intensity	-0.0019	-0.1492	-0.1617	-0.5482**	-0.5165**	-1.1419***
	(-0.0074)	(-0.6280)	(-0.7005)	(-2.2790)	(-2.3614)	(-4.1865)
market to book	-0.0478***	-0.0469**	-0.0382*	-0.0435***	-0.0411***	-0.0179
	(-3.2831)	(-2.2779)	(-1.9534)	(-2.7456)	(-3.0528)	(-0.8544)
ROA volatility	-0.2263	-0.3706*	-0.0889	0.2567	0.1508	-0.8421
	(-1.0945)	(-1.7918)	(-0.4116)	(1.4634)	(0.7797)	(-1.4803)
industry median sales	-0.1714	0.0048	0.0383	0.0347	0.0508	0.0777
growth volatility	(-1.3129)	(0.0365)	(0.3330)	(0.3140)	(0.4692)	(0.4323)
asset tangibility	0.0437	0.0081	-0.0128	-0.0054	0.0174	-0.0311
	(0.4358)	(0.0936)	(-0.1523)	(-0.0637)	(0.2286)	(-0.2000)
leverage	-0.0396	-0.0818	-0.2420**	-0.2435**	-0.1720**	-0.2708**
	(-0.3455)	(-1.0468)	(-2.4398)	(-2.3470)	(-2.0174)	(-2.0839)
inverse Altman's Z-score	-0.0133	0.0007***	0.0011***	0.0009	-0.0004	-0.0006***
	(-0.8551)	(4.6517)	(2.6537)	(0.2103)	(-0.2510)	(-5.8753)
Constant	1.1783***	1.3204***	1.3762***	1.4740***	1.5171***	1.6470***
	(13.3862)	(17.1576)	(18.0234)	(21.1152)	(20.8491)	(13.5620)
Observations	572	615	579	628	633	206
R-squared	0.1217	0.1756	0.2408	0.2889	0.2595	0.3799

Robust t-statistics in parentheses.

Table C3: Yearly Debt Structure Estimation - Long Version

year	2001	2002	2003	2004
	(1)	(2)	(3)	(4)
high $PPS_{stocks+options}$	-0.1289	0.3014*	0.0825	-0.0266
	(-0.4404)	(1.7480)	(0.4255)	(-0.1787)
dispersion of	9.2532	1.1091	1.9567	6.6154
analyst forecasts	(0.3970)	(0.2995)	(0.3846)	(0.2350)
ln(total assets)	-0.1019*	-0.1114**	-0.1070	-0.0010
	(-1.7028)	(-2.4485)	(-1.2201)	(-0.0086)
ln(internal funding deficit)	-0.1095	-0.1529*	-0.0476	-0.2080
	(-0.8176)	(-1.8532)	(-0.3456)	(-1.3659)
ln(total assets)*	0.0138	0.0173	0.0111	0.0335
ln(internal funding deficit)	(0.8105)	(1.5598)	(0.5641)	(1.4383)
ROA	0.5294	-0.1381	1.5619**	0.6487
	(0.4208)	(-0.3331)	(2.3192)	(0.6837)
S&P credit rating	-0.0970	-0.2807**	-0.2823	0.2431
	(-0.4452)	(-2.2537)	(-1.0043)	(1.1962)
R&D intensity	0.4751	-0.0779	1.2352	-0.4323
	(0.6190)	(-0.1394)	(1.0535)	(-0.4692)
market to book	-0.0049	0.0105	-0.1547**	-0.1335*
	(-0.1011)	(0.3192)	(-2.5095)	(-2.0031)
ROA volatility	-0.4234	-0.3274	0.8313	1.5912
	(-0.6005)	(-0.8101)	(0.5987)	(1.2366)
industry median sales	0.5532	-0.0440	-0.8022*	-0.2768
growth volatility	(1.0157)	(-0.1547)	(-1.9721)	(-0.6942)
asset tangibility	1.0719*	1.5188***	0.1219	0.1328
	(1.8257)	(2.8553)	(0.2685)	(0.1670)
firm age	-0.0039	-0.0016	0.0110	0.0088
	(-0.1490)	(-0.1282)	(0.8357)	(0.5437)
leverage	-1.1861	-0.2568	-0.1790	-0.4231
	(-1.5061)	(-0.8458)	(-0.5849)	(-1.1882)
interest coverage	-0.0006	0.0003	-0.0005	-0.0003
	(-0.5865)	(1.0364)	(-1.0191)	(-0.5760)
inverse Altman's Z-score	1.1273	-0.0414***	-0.1596*	-0.6488**
	(1.3444)	(-3.1503)	(-1.7932)	(-2.5062)
Constant	0.5143	0.9213**	1.5318***	0.6160
	(0.6995)	(2.1477)	(3.0529)	(1.0091)
Observations	36	51	52	47
R-squared	0.4609	0.5394	0.4793	0.4560

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Table C3 continued.

year	2005	2006	2007	2008
	(5)	(6)	(7)	(8)
high $PPS_{stocks+options}$	-0.1504	-0.3592**	-0.0773	0.0470
	(-0.7676)	(-2.1598)	(-0.5448)	(0.4000)
dispersion of	104.2532*	13.4323	18.7687	10.9199
analyst forecasts	(1.9946)	(0.6322)	(1.2728)	(0.7838)
ln(total assets)	-0.0733	-0.1806***	-0.1656***	-0.1941*
	(-0.8109)	(-4.4109)	(-3.2714)	(-1.9378)
ln(internal funding deficit)	-0.0712	0.1048	0.0153	-0.1424
	(-0.5257)	(0.9442)	(0.1429)	(-0.9166)
ln(total assets)*	0.0143	-0.0129	-0.0073	0.0123
ln(internal funding deficit)	(0.7240)	(-0.8677)	(-0.4633)	(0.5346)
ROA	0.4676	1.0481	0.8031*	-0.0020
	(0.5128)	(0.8511)	(1.7004)	(-0.0033)
S&P credit rating	0.1564	0.2551	0.9592	
	(0.7543)	(0.9908)	(1.0004)	
R&D intensity	-2.9488**	-1.1956	-0.9424	-1.8977
	(-2.3088)	(-0.8367)	(-1.1923)	(-1.6525)
market to book	0.0098	0.0038	-0.0748*	0.0162
	(0.1362)	(0.0475)	(-1.7184)	(0.1938)
ROA volatility	-0.6572	0.2105	1.0349	0.1390
	(-0.8713)	(0.1604)	(1.2946)	(0.1303)
industry median sales	-0.5219	-0.0919	0.1816	0.7804
growth volatility	(-1.3996)	(-0.2236)	(0.3403)	(1.0333)
asset tangibility	0.9345	0.7159	0.1370	0.5006*
	(1.1137)	(0.9918)	(0.2663)	(1.9142)
firm age	0.0271*	0.0422**	0.0090	-0.0178
	(1.8629)	(2.0444)	(0.6910)	(-1.5082)
leverage	-0.8412	-0.3585	-0.5384	-0.2015
	(-1.0389)	(-0.6466)	(-0.8741)	(-0.3664)
interest coverage	0.0003	0.0001	0.0001	-0.0000
	(0.4456)	(0.3033)	(0.6464)	(-0.1392)
inverse Altman's Z-score	-0.0027	-0.0549	-0.1618	-0.1990
	(-0.0512)	(-1.0601)	(-0.8125)	(-1.4547)
Constant	0.6693	0.7864*	0.5216	1.6886***
	(0.9540)	(1.9195)	(0.5302)	(3.3032)
Observations	49	44	56	53
R-squared	0.4861	0.6180	0.3686	0.4514

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Table C3 continued.

year	2009	2010	2011	2012
	(9)	(10)	(11)	(12)
high $PPS_{stocks+options}$	0.1300	0.0816	0.0974	-0.0780
	(1.0586)	(0.8416)	(0.9009)	(-0.6377)
dispersion of	-3.1280	14.3069**	10.8092	-2.0638
analyst forecasts	(-0.4809)	(2.5270)	(1.2373)	(-0.4563)
ln(total assets)	-0.1628*	-0.2031***	-0.2237***	-0.2248***
	(-1.9570)	(-2.8461)	(-3.6511)	(-3.6475)
ln(internal funding deficit)	0.0576	0.0996	0.0360	0.0814
	(0.4533)	(1.1138)	(0.3305)	(0.8247)
ln(total assets)*	-0.0076	-0.0158	-0.0044	-0.0117
ln(internal funding deficit)	(-0.4294)	(-1.2743)	(-0.2818)	(-0.7483)
ROA	-0.2162	-0.1880	1.0461*	0.7059
	(-0.2501)	(-0.3069)	(1.7319)	(1.1785)
S&P credit rating	0.1923	0.0474	0.3319	-0.3982**
	(0.4115)	(0.2159)	(1.0242)	(-2.4172)
R&D intensity	-1.3297	-0.9498	-1.0439	0.9184
	(-1.3374)	(-1.2597)	(-0.9128)	(1.4278)
market to book	-0.1862**	0.0191	0.0174	-0.0791
	(-2.2601)	(0.1943)	(0.2714)	(-1.1337)
ROA volatility	1.0736	-3.0065**	-3.3122***	-2.4497**
	(0.6186)	(-2.4360)	(-3.9794)	(-2.3133)
industry median sales	0.3062	-0.0375	0.0879	-0.7035
growth volatility	(0.6910)	(-0.0660)	(0.1483)	(-1.3592)
asset tangibility	-0.1729	0.2551	-0.1518	0.2007
	(-0.5369)	(0.9031)	(-0.3588)	(0.8157)
firm age	0.0245*	-0.0041	-0.0104	-0.0063
	(1.9372)	(-0.4387)	(-1.0515)	(-0.6681)
leverage	-0.0905	-0.8236	-0.8620	-1.3416***
	(-0.2682)	(-1.6490)	(-1.5214)	(-2.8785)
interest coverage	0.0003	-0.0001	-0.0003	-0.0001
	(1.5746)	(-0.3215)	(-0.9408)	(-0.4455)
inverse Altman's Z-score	0.1090	0.0005	0.1325	0.3304**
	(0.5402)	(0.0009)	(0.6692)	(2.4480)
Constant	1.2179**	2.0774***	1.9682***	2.8776***
	(2.0436)	(5.4718)	(4.0776)	(6.8209)
Observations	55	50	53	53
R-squared	0.4476	0.4992	0.4779	0.5644

Robust t-statistics in parentheses.

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