

Institutional Involvement in Syndicated Project Finance Loans

Master Thesis I:

The Effects of Non-Bank Lenders in Syndicated Project Finance Loans: *Pricing and Tenor*

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Master Thesis II:

The Factors Driving Institutional Involvement in Syndicated Project Finance Loans: *Loan-specific, Macro-Economic, Financial, Political, Regulatory, and Legal Considerations*

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DISCLAIMER

Both theses were written, submitted, and defended in accordance with the framework of the Double Degree Programme in Finance between Stockholm School of Economics (Home School) and Università Commerciale Luigi Bocconi (Host School). Both theses can be read independently. The former thesis was submitted as an independent piece of work in June 2019 to Università Commerciale Luigi Bocconi and was defended ibidem in July 2019.

The latter thesis was written in order to fulfill the additional requirements at Stockholm School of Economics and was submitted in July 2019.

MASTER THESIS I

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The Effects of Non-Bank Lenders in Syndicated Project Finance Loans: Pricing and Tenor

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Abstract

Global infrastructure spending is expected to increase sharply in the near- and medium-term future. The “classical” infrastructure investors, i.e. the public and banks, face their very own restrictions, however, and additional funding will be required to cover the expected shortfall. In this context, institutional investors are thought to assume a greater role. These investors are far from being a homogeneous group, though, but reflect a wide range of different investor types that distinguish themselves by investment strategies, risk-return frameworks, investment horizons and funding sources. Generally, it is, thus, to be expected that investments that involve any of such investors may deviate from investments that are shouldered in their entirety by banks. Focusing on the specific investment avenue of syndicated project finance loans, the author finds that two important loan determinants, the spread and the tenor at issuance, differ substantially for loans in which institutional lenders are involved compared to bank-only loans. Furthermore, it is shown that the effects are not unidirectional if a more granular measure of institutional lender involvement is employed: Pension funds, sovereign wealth funds, and life insurance companies, i.e. the “natural long-term investors” are associated with loan determinants that deviate substantially from those of other non-bank lenders such as asset managers, private equity firms, finance companies and different types of agencies. Finally, more detailed analyses reveal that loan determinants have been affected differently before the financial crisis and that geography appears to be relevant as well as loan determinants are found to be impacted differently by institutional involvement in North America and Europe.

Keywords: Syndicated Loans, Project Finance, Institutional Lender, Loan Spread, Loan Tenor

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1 INTRODUCTION

Private capital – or more precisely private capital from other sources than banks is expected to assume a larger role in the field of infrastructure financing going forward. A field, that is slowly and forcibly breaking with traditions. Today, in a post-crisis world it seems like gone are the “good old days” when public expenditure went hand-in-hand with debt capital provided by banks to build roads, put electric grids in place and provide the public with state-of-the-art hospitals. Due to elevated debt levels fueled by recurring deficits and disappointing results of publicly-funded projects in the past the hands of the public seem tied and post-crisis deleveraging in combination with tighter regulation under Basel III has a stranglehold on banks. We observe thus to some degree, the forced retreat of two major funding sources at a time when infrastructure investment needs are about to surge, driven amongst other things both by the increasing need for maintenance and replacement due to deferred expenditure in the Western hemisphere and the need for new development and expansion in the developing world.

Since it is universally expected (and certainly hoped for), that non-bank investors will, at least partially, step up to fill this void, the main concern of this thesis is the conceivable effects these investors may have on the instruments they choose to access the infrastructure space and in this study, in particular, the effects on different determinants of syndicated project loans, that is loan spreads and tenors. This analysis is motivated by the timely observations made in the preface to Gatti (2018), where the author highlights, inter alia, the emergence of non-bank lenders in project finance loan syndicates and the increased “inclusion of infrastructure in more traditional financial portfolios” [p. xiv].

While speaking of traditions, one should not forget, that non-bank investors have, in different capacities and to a varying extent, been part of infrastructure financing in the past, in the debt financing space foremost with regards to the private placements in the project bond space. Additionally, their experience reaches further, so have institutional investor long been shareholders of public infrastructure companies, have bought corporate bonds of these very companies or taken part in IPOs of privatized utilities (Inderst, 2013). So, their presence is far from being an utter novelty, however, the interest they attract these days is surely

intensifying and their importance is ever-growing. If past transactions carry any predictive value, then it might be more than interesting to understand what kind of impact non-bank investors have had before in order to prepare for the potential rise of their involvement.

In order to paint a coherent picture of the motivation underlying this study and which points need to be addressed before one can assess individual loan transactions, the author has decided to structure the introductory part of this thesis in the following way: In this introductory first section, the author will give a short overview of past and current infrastructure spending and expected future financing needs to provide an idea of the scale of the challenge ahead. In addition, he will discuss some of the attractive features that infrastructure investments may have to offer to investors. Furthermore, different investors are characterized with regards, amongst other things, to their motivation for becoming involved, challenges they're facing and their experience with infrastructure. In the second section, the author will then proceed to briefly introduce project finance as a method to access infrastructure finance and provide further detail on project debt in particular - which will naturally give rise to a very brief discussion of loan syndication. Additionally, this review section will provide a sense for different approaches to syndicate structure, since the inclusion of non-bank investors marks a noticeable change to traditional syndicate structures often composed purely by banks, before a presentation of previous research on loan spreads and other loan determinants concludes the review part of this study. Subsequently, the author will present his research questions. Thereafter, a thorough description of the data collection and sampling processes, the definition of relevant variables, and an explanation of the applied methodology follow. Eventually, the effects of non-bank lenders on loan determinants such as spread and maturity are subjected to empiric analysis, followed by the presentation and discussion of the results which conclude this thesis.

"Lack of money is the root of all evil." – George Bernard Shaw

1.1 THE INFRASTRUCTURE GAP AND INFRASTRUCTURE AS AN ASSET CLASS

While the above quote from the Nobel Prize Laureate and famed Irish playwright is certainly far from being a universal truth, there is undeniably some truth to it when regarded in the context of infrastructure and today's state of funding of such economic activities.

Infrastructure and its value are often described in almost poetic ways, portraying different public and private works as the lifelines of national economies, being “at the very heart of economic and social development” and as key determinants of (long-term) growth potential of an economy and possibly the answer of many of the most pressing issues of our time such as climate change, urbanization, population growth, aging populations, etc. (Ashley & Cashman, 2006; Crozet, 2007; Ehlers, 2014). Specifically, Citigroup (2016) associate a 1% increase in infrastructure investment with a 1.2% increase in GDP growth, effectively acting as a multiplier. Additionally, Weber, Alfen, and Staub-Bisang (2016) highlight the important role cross-border infrastructure plays in the economic integration of geographies. Given the importance, for a rather exhaustive list of studies putting a spotlight on the economic benefits of infrastructure, the author would like to refer to Thierie and de Moor (2016). For a detailed discussion of which and how global megatrends affect the infrastructure space, one may consult Triantis (2018, pp. 299–318). That being said, the economic layman would expect adequate expenditure to preserve a beneficial level of infrastructure quality or even continuous financial effort to expand and improve. However, the reality in a post-crisis world looks rather gloomy for various reasons.

Infrastructure has certainly not been forgotten and is clearly on the minds of many political, academic and economic leaders globally as a brief look at the recent global news landscape reveals. China’s “Belt and Road Initiative” originally announced in 2013 in two speeches by Chinese President Xi Jinping continues to be discussed today, Germany’s aging infrastructure remains the subject of heated political debates on national and local levels and US President Trump’s vow to boost infrastructure spending is still awaiting delivery. At the same time, global developments such as a push for “Green Energy”, calls for “Climate Neutrality” and the “Electrification” of the Automotive industry constantly bring the need for infrastructure investments to the front pages of news outlets across the globe. Evidently, there is a substantial need for infrastructure investments and meaningful amounts are spent on a continuous basis, but what does this imply in terms of concrete numbers? How much exactly are we expected to invest in the new development and expansion, maintenance, modernization and sometimes rehabilitation?

Since definitions of infrastructure investments around the globe are differing substantially and researchers, agencies and think-tanks seem to set different scopes, rely on different data

sources and methodologies, there is a wide array of figures and numbers circulating when it comes to actual spending on infrastructure and prospective investment needs in the future. In addition, there are stark contrasts of investment levels depending on geography and sector. For example, the European Investment Bank (2018) reports EU infrastructure investments at 1.7% of EU-wide GDP for 2017, down 25% from a high in 2009 when investments reached 2.2% of GDP. A year earlier, when EU-wide spending was 0.1% higher, the EIB (2017) reported the largest decline in countries with the lowest infrastructure quality – giving rise to substantial and palpable effects, such as a slowdown in the economic convergence process. But also, the United States, arguably the most important geographic area for infrastructure spending, has seen a notable decrease in infrastructure spending in the past. Data collected by the Hamilton Project (2015) from sources such as the Bureau of Economic Analysis and the Congressional Budget Office and focusing on transportation and water infrastructure show a peak in the late 1950s at roughly 3% of GDP. This is contrasted with more recent observations from McKinsey (2017) where the US was averaging at 2.3% of GDP between 2010-2015 and the American Society of Civil Engineers' (2017a) estimates of 2.5% in 2016.

Observable decline and stagnation are, however, not too revealing when regarded in isolation, thus in the following current investment levels shall be compared to some estimates of future spending required in order to keep up with growth expectations and investment needs. Again, the individual estimates should not be compared on a one-to-one basis; as is the case with estimates of current spending, scope, data sources, expectations and methodologies may vary substantially from report to report. To cite one example, Citigroup (2016), at the time, forecasted investment needs of \$58.6tr globally until 2030 in order to match the then official OECD growth forecast of 3.8%, resulting in annual investments of about \$3.5-4.0tr a year. McKinsey (2016) reported investment needs of about 3.8% of world GDP between 2016 and 2030 to support the expected global economic growth trajectory – this corresponds to \$3.3tr annually and aggregates to US\$49.1tr over the whole period. Compared to its estimates of investment levels at the current rate, McKinsey predicted an investment shortfall of about 11% or US\$350bn a year. Yet, only a year later in their follow-up study McKinsey (2017) increased the numbers substantially, now predicting a need of 4.1% of global GDP for the period between 2017 and 2035 equalling US\$3.7tn a year and an

aggregate amount of US\$69.4tn. In itself already a staggering number, this amount could be further pushed by US\$1tn annually if the United Nations' Sustainable Development Goals are to be met. At current levels, this would imply an aggregate shortfall of US\$5.5tn. But McKinsey isn't the only party predicting staggering amounts of investment required, the OECD (2017) expects investment needs of US\$6.3tn per year (2016-2030) and the Global Infrastructure Hub in cooperation with Oxford Economics (2018) sees investment needs climbing up to US\$94tn until 2040, not accounting for another US\$3.5tn for the UN Sustainable Development Goals – under their assumptions this would equal 3.5% of world GDP annually or roughly US\$3.7tn a year. According to their estimations, however, under current investment trends which they identify at 3.0% of global GDP, this would result in a shortfall of roughly US\$15tn by 2040. In order to bridge that gap, investment levels would have to rise to approx. 3.5% annually. In this context, it is also important to understand, that investment needs do not only vary drastically with regards to the researchers behind the estimates but also across geographies – i.e. in their model Asia alone will account for some 54 percent of infrastructure investment and the Americas being runner-up at 22 percent. This is no surprise, since different geographies may start from very different bases. In the Western world, as a joint report by J.P. Morgan Asset Management and Af2i Working Group (2015) points out, delayed spending on maintenance of aging infrastructure is the main driver, whereas developing economies will face substantial investment pressure with regard to new infrastructure in order to support their rapidly growing populations. Lastly, the American Society of Civil Engineers (2017a, 2017b) expects - for the US alone – investment needs in the amount of US\$5.2tn for the same time period and roughly US\$2tn in the immediate future from 2016 to 2025.

The numbers above, in spite of their differences, undoubtedly show that a lot of capital will be required going forward – borrowing the words of the World Bank Group (2015), investments will have to move from “billions to trillions”. So, while political goals and commitments often remain vague, e.g. boosting the economic competitiveness or assuring higher living standards, it may be worthwhile to regard infrastructure and large projects through the lens of a financial investor and thus consider infrastructure as an asset class – with its very own characteristics. What is it that may draw investors' capital to infrastructure?

Firstly, one may even backpedal briefly and ask the daring question whether most investors would even consider infrastructure a distinct asset class in its own right? Inderst (2010, p. 95) observes that “*infrastructure assets [...] have certain characteristics of bonds, equities, private equity, and real estate*”, the exact combination, however, differs from case to case. Furthermore, often infrastructure investments are recorded by the respective investors as a sub-type of other alternatives assets, such as real estate, inflation-linked investments or private equity, something the author will touch upon again in the next section. But if we sideline such doubt for the moment, we can try to develop an idea of what makes infrastructure stand out from other (firmly established) asset classes. Before the author does so, he would like to recall the basic concept of an asset class from an investor’s point of view, especially in a portfolio context, by referring to Sawant (2010, p. 29). In this regard, assets that are governed in a similar fashion by market environments, laws and regulations and generally show similar characteristics can be considered as a group of assets making up a distinct asset class. In a portfolio context, as modern portfolio theory in the tradition of Markowitz stipulates, their behavior and characteristics are translated into three variables that within a given asset class are expected to behave similarly: i) risk or volatility of returns, ii) return (distributions) and iii) correlation of returns (among themselves).

Before we delve into a deeper analysis of what may be the defining characteristics of infrastructure as an asset class, it may be worth mentioning that, like Bird, Liem, and Thorp (2014) note, empirical research in addressing this classification is still in its infancy. This notion of infrastructure being “under-researched” is shared by Inderst (2010). Even a common definition of infrastructure has proven to be elusive, as many approaches co-exist; varying definitions along economic and social dimensions are just as readily applied as the distinction between public and private works or classifications by maturity, location and/or development stage. Concerning the interplay of public and private actors, there’s also the notion of infrastructure projects being either fully, partially or not financially self-sustainable (Gatti, 2014). It is thus not surprising that in the preface to his book, Grigg (2010) acknowledges the arbitrary and at times confusing nature of infrastructure definitions. In general, talking about “the infrastructure” thus remains to be difficult without precise context (Weber et al., 2016). A notion that is further hammered home if one concerns oneself, for example, with the multitude of global infrastructure indices of listed equities. The frequently

used global benchmarks such as S&P's Global Infrastructure Index, the DJ Brookfield Global Infrastructure Index or the MSCI World Core Infrastructure Index vary substantially with regards to their composition, weighting-schemes and infrastructure definitions, even though they only reflect the public equity universe. For an in-depth side-by-side comparison please see Legg Mason Global Asset Management (2017). Variations are also observable regarding capital flows as Brodehser (2013) states that investments are mainly flowing into projects in the energy space and transportation respectively. Generally, the idea of ambiguity revolving around the term infrastructure was fittingly condensed in 1985 by then British Prime Minister Margaret Thatcher who famously explained: *"You and I come by road or rail, but economists travel on infrastructure."*

But there are some aspects that are almost universally agreed. While allocations and capital flows may differ and even suggest a focus on what is often referred to as "economic infrastructure", all kinds of infrastructure including "social infrastructure" in the form of schools, hospitals, prisons etc. serve some basic need of the population or represent "services essential to society" (Inderst, 2010). This general notion of "essentiality" gives rise to a broader, distinct risk-return profile based on certain economic and financial characteristics common for many infrastructure assets. Before highlighting the most distinguished and generally accepted risk-return factors, which may or may not apply to an individual asset, a brief introduction to the more individual characteristics of an infrastructure asset may be warranted. Weber et al. (2016, p. 15) identify three different characteristics: Country-Specific, (Cross-) Sector Specific and Project-Asset-Specifics. The author won't dig any deeper here, since this is not the core subject of this study, but suffice it to say that with regards to infrastructure the devil may be in the details despite a more general risk-return framework that applies to a great number of infrastructure assets; Weber et al. (2016) fill a full chapter or almost 150 pages on selected sector-specific considerations alone and Grigg (2010) spends substantial time on this topic as well [pp. 19-192].

Investors of all classes tend to follow a defined investment strategy including considerations regarding the asset at hand like the risk-return profile, "yield-vs.-IRR"-preferences, cash-flow profiles, investment horizon, inflation protection, investment stage, leverage, geographies, liquidity and diversification benefits (Weber et al., 2016, p. 43). Therefore, we will now

establish a number of traits that characterize infrastructure assets in general, before the author will discuss their potential fit to specific investor groups in the next section.

Firstly, different authors record that infrastructure assets are typically *long-term assets* with very long service lives (Gatti, 2014; Sawant, 2010; Walter, 2016; Weber et al., 2016) which, as Gatti notes, are only seldom cut short by technical obsolescence. Weber et al. (2016) mention potential service lives of well beyond 100 years and Rickards (2008) provides further detail. His ranking is led by tunnels and electricity transmission lines with average lives of about 60 years, followed by bridges and overpasses reaching on average 45 years; highways and roads average approx. 30 years. This non-exhaustive list already makes clear that the definition of long-term can vary substantially and Weber et al. (2016) point to the fact that service life, in terms of physical or technical life, cannot always be equated with useful economic life, as often investors are quite reliant on the amortization of their investment – so the economic life is often assumed to be rather short. Additionally, Walter (2016) raises the concern that long life is not really a unique characteristic of infrastructure, but rather shared with the well-established asset class of real estate including both residential and commercial assets. Next in line is the notion of the *provision of key public services* that serve broad public goals – an idea that is iterated by Gatti (2014), Walter (2016) and Weber et al. (2016) and includes everyday services such as water, energy, communication and etc. Closely aligned with this perception of infrastructure being key to economic growth and quality of life are a series of interrelated characteristics that most often naturally go hand in hand and promote each other. The series includes i) low elasticity of demand, ii) natural monopolies or quasi-monopolistic market contexts, iii) high entry barriers, iv) substantial regulation, v) high start-up costs and vi) economies of scale (Gatti, 2014; Sawant, 2010; Walter, 2016; Weber et al., 2016). With regards to the demand inelasticity Weber et al. highlight infrastructure's independence of industry cycles and economic performance which can be attributed to its predictability, stability, and adjustability which in return are the result of various provisions such as long-term contracts, inflation adjustments and/or the service or product fulfilling a basic need. (Quasi-)monopolistic conditions with high entry barriers in the infrastructure field are often the result of high front-up investments effectively deterring potential competitors and the lack of substitutes, e.g. in the case of a new airport or an electric grid. Once established, the

provision of an additional service/product unit is relatively cheap and infrastructure demonstrates increasing economies of scale (Gatti, 2014; Sawant, 2010; Weber et al., 2016). This cost efficiency in return calls for large-size infrastructure facilities and favors the provision from a single supplier (Walter, 2016). Close regulatory oversight is, therefore, a logical consequence, performs a corrective function (Weber et al., 2016) and limits the market power implied by the (quasi) monopolistic status (Gatti, 2014). Bird et al. (2014) and Ben Ammar and Eling (2015) consequently argue for the existence of a regulatory risk premium. The various characteristics just listed above enable infrastructure assets to generate substantial, stable and predictable cash-flows, turning infrastructure assets upon completion into something that asset managers would anecdotally refer to as “reliable cash cows”. The substantiality is the result of very low variable costs that have already been mentioned above and the fact that infrastructure also tends to profit from relative low capital expenditure requirements throughout its useful life once operations have started (Gatti, 2018, p. 153) and variations in working capital often being negligible (Gatti, 2018, p. 170). Both points are particularly valid when the infrastructure asset is being financed in a project finance setup. Low capital expenditures can be explained by the regularly limited growth options, so incurred capital expenditures are typically only maintenance-related. Negligible investments in working capital are often the result of a regulated business environment with stable supply and demand resulting in very little variation of accounts receivable and accounts payable and stable inventory levels. Given these conditions, an individual project’s Free Cash-Flow often can be proxied by EBITDA less cash taxes and therefore results in an attractive cash-conversion ratio. The stability and predictability of cash-flows are naturally the product of monopoly situations, demand in-elasticity, the lack of substitutes and regulation as Sawant (2010, p. 36) notes. The same author, therefore, states that infrastructure cash-flows resemble the cash-flows produced by fixed income securities rather than more volatile cash-flows from equity investments. Closely connected with the favorable characteristics of infrastructure cash-flows is the idea of infrastructure presenting a *natural hedge against inflation*, especially in connection with prolonged investment horizons. In fact, possible protection from inflation is one of the benefits most heavily advertised by the professional investment community when it comes to infrastructure investments (see for example UBS (2018) or J.P. Morgan Asset Management and Af2i

Working Group (2015)) and therefore warrants a closer inspection. On the face of it, this makes perfect sense, Gatti (2014) and Weber et al. (2016) explain the apparent self-protection against price escalation on the basis of revenues being tied to inflation rates via price-adjustment mechanisms, availability-based payments, and guaranteed yields. When subjected to empiric analysis, however, the picture appears to be less rosy and these findings have started to have a moderating effect on the investment community (Geysen, 2018, pp. 10–11). On the academic side, Bird et al. (2014) confirm some limited inflation-hedging abilities, albeit being mostly limited to the utility sector in their study, Wurstbauer and Schäfers (2015) indicate partial hedging ability limited to direct infrastructure investments in the short run and Sawant (2010, p. 65) finds generally weak correlations between CPI and equity infrastructure indices. Other academic authors reject the proposition altogether in their respective studies (Ben Ammar & Eling, 2015; Rödel & Rothballer, 2012). All authors agree that a potential inflation hedge is very much dependent on the infrastructure's specific characteristics including factors such as pricing power, economies of scale, regulatory environment and the way infrastructure is accessed (i.e. indirectly or directly via debt or equity) and for the time being it is advisable not to expect such qualities from the broad mass of infrastructure assets. Additionally, the empiric research mostly addresses listed equity investments – there is thus a chance that inflation hedging qualities are more pronounced for (private) debt investments and/or unlisted infrastructure. An obvious lack of data is, however, an obstacle to the provision of a definite answer. The next desirable feature of infrastructure is its *low correlation with other asset classes* and the general economic cycle and the resulting *diversification benefits* (Gatti, 2014). Peng and Newell (2007) report very low correlations with other asset classes (e.g. stocks, bonds, and direct property) and especially unlisted infrastructure shows strong diversification potential. Geysen (2018) in turn qualifies global infrastructure as an “effective diversifier” during the historic period of his analysis [p. 8]. Dechant and Finkenzeller (2012) find that particularly for low and medium-risk portfolios infrastructure can have an important diversification effect. Finally, different authors bring forward further features which shall not be discussed in more detail at this point in time; Gatti (2014) proposes low technological risk which relates to the provision of key services, others spotlight the illiquidity (risk premium) of infrastructure assets and the fact that valuations are therefore often appraisal-based instead of being

transaction-based, in particular in the unlisted infrastructure space (Bird et al., 2014; Sawant, 2010). Lastly, Sawant (2010) points out location specificity, investment irreversibility and relative little growth options as characteristics that potential investors should bear in mind. The length and granularity of the above enumeration alone suggest that, in reality, a specific infrastructure asset most likely will not reflect all of these desirable traits at a time, yet it should have become unmistakably clear that certain investors will definitely be drawn to these kinds of assets.

Thus, after having discussed the shortfall of current infrastructure investments, the palpable increase in expected spending and the potential allure of infrastructure as an asset class, the next section will drill down on which kind of investors could fund the bill, why some of them are constraint or unwilling to commit more capital and how the investor landscape is expected to change going forward. The potential is obviously enormous and some market commentators are tempted to speak of a “match-made-in-heaven” or the “perfect match”¹; bringing together capital-rich institutional investors in search of yield and diversification with an attractive asset class that is in dire need of more private capital.

„There is massive institutional interest in owning these assets.”

– Jim Barry (BlackRock)

“Historically, these types of assets were not available investments for us. This was mostly because the market was dominated by banks.”

– Klaus Weber (Swiss Re)

1.2 NON-BANK INVESTORS IN INFRASTRUCTURE

The above quotes, taken from a Euromoney article (Bowman, 2013), aptly describe how times in the infrastructure financing space have changed and are still changing to this very day since these statements haven’t lost any of their topicality. As shown in the previous section, there is a demand for infrastructure financing coming from the private sector and infrastructure assets are able to come up with some intriguing features. So, the task at hand is to match those assets with able and willing investors.

As a result, the author will quickly present the incumbents of old, that is the public sector and (commercial) banks and give a summary on the changed reality both groups are facing today,

¹ Such comments, including rather exuberant phrasing, have been made for example by Ottesen (2011) and more recently Walter and Lipshitz (2019).

before he will continue to shine a light on the “newcomers” that more and more push into this field of international finance. The author will spend substantial time on this topic since a detailed characterization of the different investor groups directly concerns the central question of this thesis – which kind of impact different non-bank investors may have on the loans they invest in. In this context, we will first have a closer look at the “natural” investors into long-dated assets, i.e. pension funds, insurance companies and sovereign wealth funds (SWFs). Subsequently, the author will discuss in shorter fashion other market players such as private equity and private debt firms, (specialized) asset managers and mutual funds, securitization vehicles (CLOs/CDOs), specialized lenders, (captive) finance companies and finally the growing group of agencies including export-credit agencies (ECAs), development banks and others. As we will see, these groups have different motivations to enter the infrastructure space, have made different experiences and accumulated varying levels of expertise and face various distinct obstacles. One further note, the author uses the terms “institutional”, “non-bank” and “alternative” interchangeably when contrasting banks (“commercial lenders”) with the players that have recently and increasingly have entered the lending market for infrastructure.

Starting with the status quo, the author will now give a brief introduction to the diminishing role played by public funds which once were the mainstay of infrastructure finance due to infrastructure’s “typical nature of [being] public goods and [generating] positive externalities” (Gatti, 2014, p. 6). The first important question to ask is: “Where are we coming from when we talk about funding levels”? Both advanced and emerging economies show the same trend with regards to both the development of real public capital stock and real public investment as percentages of GDP – there’s a clear declining trend for both measures in both groups of economies from a top-down perspective. Public investment in advanced (emerging) economies has declined from 5.2% (9.1%) of GDP in 1970 to 3.3% (7.4%) in 2014 (Citigroup, 2016). Unfortunately, the picture doesn’t look any better when, leaving issues of data availability aside, one repeats the analysis from a bottom-up perspective starting by sector or country. The same report of Citigroup (2016) reports a decline of infrastructure spend as a percentage of GDP for individual countries such as the US, Japan, and China and also the OECD countries as a whole and the Euro Area edge lower. Even if we keep in mind, that in absolute terms spending may have increased (since GDP figures have expanded

substantially), the overall picture certainly isn't cause for celebration and a turnaround is not to be expected any time soon as there is increased alert globally regarding the funding ability of the public sector (Bianchi & Drew, 2013). This is due to several reasons and without entering in too much detail, these reasons can be put into four non-exhaustive categories: i) tight public budgets and recurring deficits especially in a post-crisis reality driving ii) elevated public debt levels and iii) poor experiences with investments realized from public funds in the past (Gatti, 2014, p. 6). As a fourth point, one may add the realization that the private sector may often be better equipped to achieve efficient results. The last point is potentially the point where the public sector can still be the most active today, assuming a role as an "enabler" and "facilitator" at different stages of an investment, e.g. through various Public-Private Partnership Schemes (PPPs/3Ps), project support and above all, a stable and long-term political framework – a point the author will revisit shortly while portraying other investor groups. The OECD (2017, pp. 20–21) highlights, for example, the important role the government can assume during the initial stages of an infrastructure project in attracting subsequent financing through the use of risk mitigation techniques and incentives. Hellowell, Vecchi, and Caselli (2015) and Vecchi, Hellowell, Della Croce, and Gatti (2017) lengthily discuss different risk-mitigating tools to attract private capital including, inter alia, grants/subsidies, credit enhancement and availability-based payments, that have the potential to support revenues, increase the funding base and reduce the financial pressure on the investment projects. While these tools all allude to an active role of the public sector in a given project, the public should also make considerable efforts to provide a conclusive general investment/financing framework that goes beyond individual projects, but rather consists of different policies and (de-)regulations. The author will dive deeper on this topic when discussing other investor groups. In sum, in times of ongoing "fiscal consolidation" (Group of Thirty, 2013, p. 15) the public sector is expected to substitute its role as a financier of infrastructure projects with a supporting role concerned with leveling the playing field and ensuring the right parameters to mobilize deep-pocketed private investors.

For a long time - up until the *Global Financial Crisis (GFC)* really - banks have been recognized as the traditional providers of infrastructure financing, predominantly in the form of infrastructure loans (Bianchi & Drew, 2013; Financial Stability Board, 2018; Hallak & Wambeke, 2014; OECD, 2013b) where particularly Europe has been immensely reliant on

bank-funded debt. (AFME & ICMA, 2015; European Commission, 2013; Inderst, 2013). Headed predominantly by European and Asian Banks (Yescombe, 2013, pp. 64–65), commercial banks are responsible for almost 90% of the private project finance debt [p.62]. Walter (2016, p. 70) further highlights their “key role”, attributing them an approximate 80% share in the fragmented global infrastructure loan market. But the international regulatory response to the GFC has been painful for banks active in the infrastructure space and dramatically reset the rules of the game. The response, mostly associated with the Basel III accords and gradually implemented between 2013 and the end of 2018, has drastically increased capital and liquidity requirements for banks and rendered capital-intensive and illiquid assets far less attractive to them. The previous iteration of global banking regulation, Basel II, mostly concerned itself with capitalization, but the GFC painfully demonstrated that lack of liquidity can prove just as fatal during times of distress when, given the maturity mismatch of their assets and liabilities, even “adequately capitalized banks found themselves in dire straits because of liquidity concerns” (McNamara & Metrick, 2015, p. 2). Therefore, Basel III has set greater store by the provision of adequate liquidity, both in the short- and in the long-run. Adopting a two-pronged approach, the newly introduced Liquidity Coverage Ratio (LCR) requires banks to have sufficient “high quality liquid assets” (HQLA) in order to meet anticipated (net) outflows under a 30-day stress scenario, while the Net Stable Funding Ratio (NSFR) is concerned with banks’ long-term funding ability, implying that, roughly speaking, banks would have to match long-term assets with more expensive long-term liabilities and thus rely less on the cheaper, but more volatile inter-banking market in order to avoid a costly maturity mismatch (Yescombe, 2013, p. 484). In 2011, two years before the implementation of Basel III took off, Chan and Worth made several predictions, later supported by Ma (2016), concerning the impact of Basel III on infrastructure finance. Firstly, banks would mostly be affected by the NSFR due to which they would have to seek more expensive long-term funding to match those long-term infrastructure loans on the asset side of their balance sheets and these extra-costs would be passed on to borrowers, effectively increasing the price of infrastructure loans. Ma (2016) reports an increase of 60-110 basis points (bps) in funding costs compared to the Basel II regime and, what is more, the Financial Stability Board (2018) registered a palpable spike in loan spreads during the crisis. Walter (2016, p. 70) registered an increase of margins from roughly +50-100 bps pre-crisis to +250-

350 bps post-crisis². Since then, spreads have (to varying degrees) declined, but have never come back down to pre-crisis levels. This spike has unsurprisingly increased competition as suddenly institutional investors that have inherently higher return requirements are able to compete on a pricing basis. Secondly, banks could also reduce the tenor of their loans or reduce their overall long-term lending exposure in order to reduce the required capital, in turn effectively reducing the supply of long-term funding. Accordingly, Blanc-Brude, Chreng, Hasan, Wang, and Whittaker (2017) record in their study that duration of unlisted infrastructure debt has decreased markedly since the turn of the century and in the wake of the GFC now is on par with general corporate debt. Moreover, Hallak and Wambeke (2014) report a substantial decline in the average maturity of European PPP loans; average maturities fell from more than twenty years in the pre-crisis period of 2006-2009 to approx. ten years post-crisis (2012-2013). A result that is echoed by the Financial Stability Board (2018) which reports a decrease in maturity by around three years for infrastructure loans in general. Furthermore, they note that Basel III has mainly affect banks in terms of maturity, but not with regards to risk – the willingness to fund risky construction-related loan over a three- to five-year horizon is still given. This point is hammered home by anecdotal reports of market participants. The following quote, taken from an asset management executive in charge of sourcing infrastructure loans from banks in the secondary markets, neatly sums up the issue (Bowman, 2013): *“Banks don’t have to put up a huge amount of capital against these loans as the credit is generally good. However, they do have to put up a huge amount of capital because of the asset liability management (ALM) mismatch. The capital charge is significant when you are funding 25-year loans with 90-day money.”*

In general, these findings have benefited from the fact that under Basel III risk-weights for assets have been left untouched, however “Basel IV” has already gotten of the starting blocks and may heavily impact risk weights of, inter alia, specialized lending including project and infrastructure finance and lead to higher risk-weights despite specialized lending’s “low default profile” (Roland Berger, 2017, p. 9). For example, under the Internal Ratings-based (IRB) approach risk-weights of specialized lending could range from 70% for investment grade credit to 250% for high-risk credits and concerning unrated infrastructure loans the

² In a more general syndicated lending context, Thia (2019) accounts for a hike of roughly 100 bps from around 200 bps to 300 bps.

proposition has been made to differentiate between the construction phase (carrying a risk-weight of 150%) and the operating phase (100%), as compared to the standard approach under Basel III where unrated claims on corporate debt generally carry a risk-weight of 100% (Childs & Hawken, 2017; van Bragt & Lamaud, 2018). Different authors thus generally surmise additional reactions on the part of the banks including a further down-sizing of long-term and specialized lending activities, reduced availability of long-term finance, mounting (non-core) asset sales as a part of general portfolio-management and a renewed focus on a “originate-to-distribute” business models where assets are no longer intended to be held to maturity (Childs & Hawken, 2017; Inderst, 2013; Roland Berger, 2017). The last perception is shared by Chan and Worth (2011) and Gelencsér and Campbell (2014) who, already under Basel III, predict a higher appreciation of loan transferability, potentially without borrower consent, in order to preserve the possibility to convert long-term assets into liquidity. In sum, there’s a general expectation of another round of deleveraging in the banking sector and a more capital markets-oriented financing model for infrastructure assets once Basel IV will reach full implementation and the definite repercussions of Basel III start to show.

So far, we have observed the following reactions to the more stringent regulation (Financial Stability Board, 2018): i) on the liability side, increased funding costs due to changes in the funding composition have been translated into higher loan spreads in order to preserve profitability and ii) on the asset side, we have witnessed shortened tenors and iii) adjustments to loan volumes through portfolio management including the sale of existing loan portfolios (e.g. Banco Espirito Santo selling a portfolio to a Sequoia Infrastructure Debt Fund or Pension Danmark acquiring €270m of loan commitments from Bank of Ireland) and a shift to “originate-to-distribute” strategies. According to Brodehser (2013), changes to both the lending profile (i.e. the asset-side) and the refinancing profile (i.e. the liability-side) put project finance at a disadvantage since borrowers now have to deal with refinancing risk as the shortened loans no longer correspond to the investment horizon and, in addition, they face higher borrowing costs. Correspondingly, iv) a new type of loan structure, so-called semi- or mini-perms, have gained popularity³. These structures provide a strong incentive to

³ A fitting example is the construction of the N33 highway project in the Netherlands whose construction was initially financed by three commercial banks. However, the Dutch pension fund APG was already involved in the planning phase and pledged to refinance 70% of the long-term debt once the 3-year construction phase would be successfully completed. For further detail, please refer to Bennon, Monk, and Nowacki (2015).

refinance after some initial shorter period, which usually corresponds to the construction phase of a project, by means of margin step-ups or the use of cash-sweep mechanism (Dupas, Marty, & Voisin, 2011; Gelencsér & Campbell, 2014; Ma, 2016; McNamara & Metrick, 2015; Watson, Farley & Williams, 2012). As a consequence, they softly enforce shorter tenors, reflect the reduced appetite for long-term lending, while at the same time, the expected shorter tenor allows the banks to offer more competitive pricing.

Before the author proceeds to discuss some implications of these findings, it should be noted, however, that in general, not all geographies have reacted equally. As for example the United States, due to their previously discussed higher propensity to rely on capital markets instead of banks, have been comparatively less affected and even in Europe itself the effects have not been uniform. The European Commission (2013) and Inderst (2013) argue that to some degree this ongoing “bank disintermediation” could be a chance for Europe to move to a more capital market-oriented funding model and there’s also anecdotal evidence that banks may embrace such a development as one executive notes that “We need to convert the market from a bank-driven buy-and-hold to a bridge market with a healthy capital market presence” (Braithwaite, 2011) where banks, instead of earning a spread on the funded loans move to business model where they reap fees from the “origination and syndication to derivatives deals and advisory work”. Elsewhere in Asia, and especially in Japan, banks have found it easier to comply with the new regulations imposed by Basel III due to their relatively “stronger balance-sheets” (The Economist, 2014) and used this opportunity to expand their businesses overseas by means of offering attractive terms, e.g. in the form of longer maturities (Gelencsér & Campbell, 2014; Inderst, 2016).

Nonetheless, the financing landscape for infrastructure projects has changed substantially since the financial crisis. The Financial Stability Board (2018) for example registered an increase in the available alternatives to bank loans which have led to a decrease, in relative terms, in the use of the same. Generally, bank loans have begun to be substituted in two ways as Inderst (2016) explains. Firstly, there is an increasing trend towards securitization and capital markets solutions including the issuance of infrastructure/project bonds. Secondly, as an alternative in the direct lending space, institutional investors have increasingly entered the market through various co-investment models. While the first alternative certainly merits a closer look, the author will focus on the second alternative as it’s closely related to

the underlying question this study wants to answer, that is to which degree institutional, i.e. non-bank investors, affect different determinants of syndicated loans.

It's worth mentioning at this point that, despite the potential influx of new investors competing for loan shares, *"banks will [...] not disappear from the intermediation chain [...]"* (European Commission, 2013, p. 7) owing to their expertise and experience and will *"continue to be important players in channeling long-term investment"* [p. 3]. Dr. Frédéric Blanc-Brude at the EDHEC Risk Institute – Asia takes things even further stating that *"without project finance bankers there simply are no projects: banks play an essential role in structuring and mitigating credit risk [...]"*. In a market where commercial lenders continue to play an influential role and institutional lenders strive to make inroads, the name of the game is collaboration.

Mini-Perm structures, as mentioned above, are one rather recent example of how banks and institutional investors may collaborate going forward (Hallak & Wambeke, 2014) and may herald a greater focus on formal relationships between the two lender groups. According to Childs and Hawken (2017), commercial lenders would then become medium-term lenders and long-term facilitators that bridge infrastructure assets through construction before long-term institutional investors take over during refinancing often using the format of long-term bonds (Walter, 2016, p. 70). Consequently, there's a delay to the involvement of non-bank lenders which plays directly into their hands given their general preference to invest in potentially de-risked projects with "brownfield" qualities (Bianchi & Drew, 2013; OECD, 2015). Evidently, this caters to both the preferences of banks and non-bank lenders. Brodehser (2013, p. 129) refers to the "affinity" of banks for structuring and evaluating transactions given their skills and expertise, but makes the point that banks are not the "natural partner" [p. 128] for long-term loans. Institutional investors, in turn, have no "affinity" for structuring the transaction for lack of experience and a general distaste of construction risk but sympathize with long tenors. As neither party generally favors exposure to both aspects, mini-perm structures arise as a natural consequence, allowing both parties to complement one another. Generally, the mini-perm model, therefore, implies a temporal separation between the two lender groups with the end of the construction phase as a dividing line for splitting up the tenors of the transaction. This split is, however, by no means set in stone. Different institutional market participants raise the point neither phase

is “reserved” for either lender group – institutional investors, once they have acquired the necessary skill set, may very well fund the construction phase of a project (Maeder & Berger, 2013, p. 10). Park (2018, p. 393) notes that “direct lending, traditionally the province of banks, is an increasingly viable and profitable venture for institutional investors during the construction and operational phases of a project”.

With respect to the temporal separation of the between commercial and institutional lenders, one would do well to remember that institutional lenders have long been lending “indirectly” to infrastructure borrowers as they have been busy buying infrastructure loan portfolios from banks in the secondary markets (Dunning, 2013). The above-mentioned portfolio management transactions involving, inter alia, Bank of Ireland are a good example of such activity.

Meanwhile, other, contemporaneous, (direct lending) models are on the rise as presented in detail by Gatti (2018, pp. 224–231). He explains that all of the four approaches which will be presented shortly can be placed in the wider framework of “originate-to-distribute” models that allow commercial lenders to “re-sell” or “distribute” originated debt to other capital-market participants instead of holding these newly issued assets on their own balance sheets until maturity. Before continuing, however, the reader is remembered that these approaches are still in their infancy and despite their theoretic establishment hard data may still be scarce (Della Croce & Gatti, 2014, p. 131).

Nevertheless, two of the listed approaches, the partnership/co-investment model and the securitization model involve to varying extent direct collaboration between banks and institutional lenders, whereas the remaining two alternatives, the debt fund model and the direct origination of infrastructure loans by institutional investors, are not “directly linked to syndication processes” [p.226] and have the potential to bypass bank intermediation. However, as is often the case, the borders between these approaches tend to be blurred, as banks are often involved via their asset management arms (e.g. Macquarie’s infrastructure debt platform MIDIS, UBS AM’s Archmore Infrastructure Debt Platforms, and Natixis’ Infrastructure Platform launched in 2012) and initial success of selected co-investments may give rise to the establishment of a wider platform approach. Some authors consequently

regard this form of cooperation therefore as the “most logical from an evolutionary sense, [building] on how things have been done in the past” (Maeder & Berger, 2013, p. 14).

The first approach, the partnership/co-investment model, sees institutional investors teaming up with banks by means of participating in a fairly standard syndication process, converting the traditional “bank-to-bank syndicate” into a “banks-to-institutional-investors syndicate” (Gatti, 2018, p. 224). This approach also referred to as “joint ventures” (Maeder & Berger, 2013), is eventually be the one the author will turn his attention to during the empirical part of this study. Provided that regulation allows direct lending by institutional investors, this approach enables said investors to build a loan portfolio by capitalizing on the skills and experience of the arranging bank, while the bank itself is able to earn fees and profit from a less funding-intensive final take owing to the fact that they institutional partner holds the majority stake. An additional advantage from the institutional investors’ perspective is the chance to leverage the large origination teams already in place at their banking counterparts which in turn facilitate access to a constant stream of investment opportunities (Bowman, 2013). Since banks are not limited to a single institutional investor, over time substantial co-investment networks can arise. A case in point: the French bank Natixis as entered a series of cooperation agreements since the launch of its infrastructure platform in 2012, including European insurance partners such as Ageas, CNP Assurances, MACIF and Swiss Life (for a combined investment capacity of € €4.55bn) and has expanded to Asia taking investors such as KB Insurance, Samsung Life and Samsung Asset Management under its wings (Natixis CIB, 2019). Other examples in the French infrastructure loan space include the partnerships between Société Générale and AXA, Crédit Agricole and AXA and BNPP and CARDIF as reported by Della Croce and Gatti (2014).

The securitization model has met increased interest lately due to the increasing popularity of the “originate-to-distribute” model on the banking side and its ability to circumvent direct lending constraints (e.g. due to concentration risk) as institutional investors are generally allowed to invest in rated (asset-backed) securities. The securitization of infrastructure loans is starting from a rather low basis though due to its “guilt by association” in connection to the central role securitizations have played during the GFC (Forrester, 2010). An effective repackaging of infrastructure loans originated by banks may allow catering to the specific needs of institutional investors with regards to geographies, (sub-)sectors, ratings, risk-

return profiles, etc. (Forrester, 2010, p. 226; Gatti, 2018, p. 226) In this setup, however, institutional investors would only lend indirectly to the borrowers. In the case of legacy loans, this model also offers the opportunity for banks to refinance some of these rather illiquid assets (Grushkin & Bartfeld, 2013). From the viewpoint of the institutional investor, securitizations also offer a substantial diversification benefit. Taking a broader economic perspective, infrastructure CLOs/CDOs enable the efficient transfer of concentrated risks (credit, interest rate, market and in the case of infrastructure liquidity) to a wider audience of investors and could principally accelerate loan issuance, free up bank lending capacity and expand infrastructure credit as a whole (G20 Sustainable Finance Study Group, 2018).

Being a rather recent development, the debt fund model has the most appeal with less sophisticated institutional investors looking for a cost-effective alternative, i.e. those who generally lack the in-house capacity to make direct debt investments in infrastructure assets (Gatti, 2018, p. 226), are short of the necessary capital to fund large ticket sizes individually or have to circumvent direct lending restrictions as investing in a debt fund is perceived as lending to a portfolio. An additional factor benefiting the fund model is the fact that institutional investors have long been familiar with investing in different funds and may have built meaningful relationships with their investment managers. Added to this, investing in a fund has a positive diversification effect from a portfolio perspective, avoid concentration risk and may offer more stable returns with a single commitment (Ma, 2016). This simplicity, however, comes at a cost, since asset allocation is routinely defined at the outset of the deal and investment criteria are generally fixed, leaving little room for adjustments to individual investor needs. Furthermore, Hallak and Wambeke (2014) raise a few additional concerns. Often debt funds are set up by managers that have been previously active in the equity part of the infrastructure market but may lack the specific skill set required for debt investments including the structuring and origination of debt, the handling of creditor control rights and loan renegotiation. Additionally, fee structures have also been an issue in this context. As debt funds inherently offer a lower return vis-à-vis equity funds, the translation of equity-like fee structures has prevented the successful raise of sufficient capital in the past. In any case, at the center of the model is the general partner who pools commitments from several limited partners (i.e. the institutional investors) and then is solely responsible to invest the funds according to the predefined criteria. The role of the general partner, can, in theory, be filled

by different investor types. In practice, in the infrastructure debt space, the role is either assumed by a bank or an institutional investor itself, e.g. an independent asset manager or institutional investor with in-house capacities. With regards to banks, the author would like to refer to the previously discussed debt platforms offered by banks such as Natixis, Macquarie, and UBS, but also Barclays tried its hand in 2011 with the launch of its Barclays Senior Debt Infrastructure Fund I and BNP Paribas entered the fray in late 2017⁴. The motivation for establishing such funds has been discussed above. Independent asset managers that have assumed the role include BlackRock, Sequoia, SCOR, AMP Capital, AVIVA, Schroders⁵ or private debt units of selected private equity firms⁶. Lastly, some institutional investors that have built sufficient expertise and gathered experience themselves include insurers such as Allianz, AXA, MEAG and Generali⁷ who invest through their respective investment arms. Here, the latter two choices allow bypassing banks altogether. For insurers, the motivations are quite clear. Having spent substantial resources to build capacity internally or acquiring the necessary skillsets from outside (Bowman, 2013), they're willing and able to invest both own capital (Maeder & Berger, 2013) and accept external funds to increase scale and earn fees. Independent asset managers, on the other hand, are less driven by the desire to invest own capital, but given their independence from banking or other institutions, they're willing to offer their investment services to a broad audience of institutional investors and profit from increased demand for infrastructure investment solutions. A last interesting example is reported by Walter (2016, p. 73). He describes a high-level country-level approach adopted by the Reserve Bank of India in 2013 which established the rules for a system of Infrastructure debt funds. These funds are supposed to be funded by domestic and international insurance companies in order to finance Indian PPP projects.

⁴ For further details please refer to Barclays (2011); BNP Paribas AM (2018); IPE Real Assets (2019); Macquarie (2012); Natixis CIB (2019).

⁵ For further details please refer to AMP Capital (2017); Private Equity Wire (2018); SCOR Investment Partners (2017); Sharma (2018); Schroders (2017); Stutts (2019); Tasman-Jones (2018).

⁶ However, with regards to these private equity firms, their focus is still tilted towards the equity side as examples of such funds like KKR's \$7.4bn Global Infrastructure Investors III or Blackstone's envisaged \$40bn infrastructure fund clearly indicate (Blackstone (2017, 2019), KKR (2018)). An additional, more recent example is EQT's €9bn fund (EQT (2019)).

⁷ For further details please refer to Allianz Global Investors (2018); AXA (2013); Assicurazioni Generali SpA (2018); Bentley (2019).

Finally, the direct lending model is an approach that is reserved for institutional investors that have both the scale and capital to make large-scale debt investments and have amassed in-house the necessary skills as to structuring, credit analysis, etc. - again Allianz GI is a case in point and is joined by investors such as AXA, L&G and M&G Investments (Della Croce & Gatti, 2014; Maeder & Berger, 2013). This approach allows to sidestep any form of intermediation, reduces investment costs due to the avoidance of fees and leaves no room for conflicts-of-interests or any misalignment of incentives, but may clash with regulation concerning direct lending, as in some jurisdictions, e.g. Germany, a banking license may be required ((Brodehser, 2013, p. 131); (Hallak & Wambeke, 2014)).

Having established how potential forms of collaboration could look like or how institutional investors could completely bypass commercial lenders, it is now time to have a closer look at what these lenders could bring to the table and why they want to become more involved in infrastructure debt in the first place. From “real” banks the author will now move to a group of investors that together have been infamously dubbed as “shadow banks” due to their increased involvement in the lending and other regulated bank-like businesses. Standard & Poor’s (2013) delivers the following definition of the phenomenon: “*[Shadow banking is the] credit intermediation involving entities and activities outside the regular banking system.*” This form of intermediation involves a plethora of different participants such as pension funds, insurance companies, sovereign wealth funds along with export credit agencies, finance companies, sponsored intermediaries, asset managers, hedge funds, etc. The length of the list makes one thing painfully clear, non-bank lenders are far from representing a homogenous investor group. In fact, as we will learn shortly, the term “non-bank lenders” aggregates a very heterogeneous group of investors with regards to, inter alia, their strategy, size, investment beliefs, risk appetite, governance structures and regulation (Inderst, 2016; Kaminker, Kawanishi, Stewart, Caldecott, & Howarth, 2013; OECD, 2013b; Park, 2018). “Some investors will want tenor, others will want flow and others may want index-linked”, as Jim Barry, global head of BlackRock’s infrastructure business puts it (Bowman, 2013). McNamara and Metrick (2015) point out, however, one similarity, these entities are all not subject to regulations such as Basel II and thus face different standards. They regard the increase in debt fund activity and specialized units at insurance companies and non-bank lenders as a sign of a transfer of the infrastructure-related credit intermediation into the

realm of “shadow banking”. Some observers, including the Financial Stability Board (2011) and Park (2018), watch this development with some concern as they dread the migration of risks, particularly concerning liquidity, which is intended to be curtailed by the Basel III regulation, from the regulated to the shadow banking sector. Particularly they are concerned that shadow banks may raise short-term funds to invest in long-term assets. For some non-bank lenders, however, this perception appears to be ill-founded and falls short with regards to what the investors want to achieve by investing long-term. This brings the analysis to a special group of institutional investors which are in a way the “natural” investors in long-dated assets such as infrastructure and have been paid particular attention by the academia, market observers and the investment community – (life) insurance companies, pension funds and to some degree sovereign wealth funds (SWFs). Insurance Europe and Oliver Wyman (2013) raise the point that insurers and pension funds are by no means “un-regulated” entities, nor do they perform any maturity transformation which could expose them to significant liquidity risk. By contrast, they use long-term investments to naturally match their long-term liabilities (Liability-Driven Investment, short LDI) which leaves them, according to Hallak and Wambeke (2014), less liquidity-constraint and provides a natural “capital advantage” (Bob Dewing at JPMorgan Asset Management in (Bowman, 2013)) vis-à-vis banks. This view is shared by the Group of Thirty (2013) who argue that “long-term finance should be supplied by entities with committed long-term horizons” [p. 8] and observe that “[the risk of maturity mismatches] is substantially reduced when investors with the appropriate time horizons, risk appetite, and liquidity needs are matched with the right investment opportunities.” [p. 22]. Others even attribute a potentially market-stabilizing character to institutional investors (Insurance Europe & Oliver Wyman, 2013). Insurers, for example, receive a constant flow of premiums which constitute a source of liquidity even during market downturns and allows them to snap up undervalued assets, effectively acting counter-cyclically.

Generally, various reasons for their growing appetite for infrastructure have been identified of which the author will now provide a brief summary. In a post-crisis world yields of government bonds, a staple of long-term investment for above investors, have been compressed due to various rounds of accommodating monetary policy and therefore said investors have embarked on a simultaneous quest for yield and stable income. Here,

infrastructure debt offers an attractive yield-pickup⁸ (owing to additional risk premia of alternative and illiquid markets) at comparatively low risk levels, but also other alternative asset classes such as hedge funds, real estate, and private equity have registered a spike in interest (OECD, 2013b). In the specific case of infrastructure debt, Blanc-Brude, Chreng et al. (2017) show, on the basis of three different unlisted debt indices, superior performance and attractive yields-spreads of infrastructure as compared to a broad corporate debt reference. The OECD (2013b) further explains that return enhancing strategies are of particular importance against the backdrop of increasing interest rates in the long run and inflation which would put additional pressure on real returns. Insurance companies, in addition, may face additional pressure if guarantees on minimal return rates have been made. Additionally, institutional investors face substantial investment pressure due to the prevailing negative carry of cash.

Other widely cited motives include the desire for greater diversification and a reduced risk profile concerning inflation-protection, asset quality during downturns and asset-liability mismatches⁹. Combining enhanced returns and lower risk unsurprisingly improves the risk-adjusted returns from a portfolio perspective. In an unpublished thesis, Ugolotti Verdoni (2013) demonstrates how the inclusion of infrastructure advances the efficient frontier of an investment portfolio belonging to an insurance company active under the Solvency II regulation. The analysis, following Markowitz' portfolio theory, yields higher risk-adjusted returns for a given level of portfolio risk when different forms of infrastructure investments are added and further analysis further how infrastructure dominates other alternatives such as hedge funds and real estate. Related studies by other authors indicate similar results – adding infrastructure to an investment portfolio increases the return efficiency per unit of risk, as measured by the Sharpe ratio (Credit Suisse AM, 2010; Panayiotou & Medda, 2017). When it comes to the perception of comparatively low risk, two studies by two of the world's premier rating agencies are able to provide some more detail. Focusing on rated infrastructure debt, S&P Global Ratings (2018b) that the majority of the infrastructure sector

⁸ See for example, OECD (2013a); Blanc-Brude (2014); AFME and ICMA (2017); Arezki, Bolton, Peters, Samama, and Stiglitz (2016); European Commission (2013); Financial Stability Board (2018); Childs and Hawken (2017); Thierie and de Moor (2016); UBS (2017)

⁹ See for example, European Commission (2013); Inderst (2016); Thierie and de Moor (2016); OECD (2013b); Hallak and Wambeke (2014)

has received investment-grade ratings, that is more than 70% of issues have received a rating of AAA-BBB; only 60% of non-financial corporates fall into the same categories [p.8]. Debt issued to infrastructure corporates, on average, is better rated than debt issued via project finance. Moody's (2018) tends to rate infrastructure debt even more favorably – 92% of their infrastructure ratings are investment-grade, compared to 40% of non-financial corporates. Generally, infrastructure debt ratings have been less volatile than non-financial corporates, project finance ratings being slightly more volatile than corporates (S&P Global Ratings, 2018b). Moody's (2018) find that ratings for infrastructure debt are on average 61% less volatile than non-financial corporates. S&P Global Ratings' (2018b) cumulative default rates over a 10-year horizon also compare favorably, rated infrastructure's cumulative default rates is 2.82% compared to 11.42% for non-financial corporates, a difference of 8.6 percentage points [pp. 40-41]. Recoveries for rated infrastructure debt are also generally higher than non-financial corporates. In another study, S&P Global Ratings (2018a) has focused on unrated project finance debt. Here, the 10-year cumulative default rate stands at 6.3% for a sample of 7,064 unrated project loans and therefore stacks up favorably against rated project finance loans (6.87%) as reported in (S&P Global Ratings, 2018b). Marginal default rates tend to decline over time, becoming almost negligible by year ten, reflecting that most risk originates from the early years covering the construction period. This pattern is confirmed by Moody's (2017) who also find a slightly higher 10-year cumulative default rate of 6.7% for unrated project finance loans – according to their data this corresponds to the expected results for low investment-grade credits. Taken all together, the four studies attest favorable ratings due to lower default probabilities vis-à-vis non-financial corporate debt, lower ratings volatility and higher recoveries. In isolation, it's no surprise that institutional investors show some interest in infrastructure debt in order to de-risk and diversify parts of their portfolio.

We have already touched on infrastructure's ability to match the long-term liabilities of institutional investors which are driven by the characteristics of their beneficiaries and their respective needs (Hallak & Wambeke, 2014; Insurance Europe & Oliver Wyman, 2013; OECD, 2013a). Life insurance companies often provide products such as annuities and or other retirement products which are set to be paid out some time in the future – this required the continuous investment of the collected premiums. Pension funds, in turn, receive

contributions on an ongoing basis as individuals work throughout their lives which leads to a substantial disconnect when benefits are being distributed many years later. A disconnect that is further driven by today's aging societies, particularly in the Western hemisphere. The liabilities of SWFs may be less tangible and not all of them follow the same strategy or have the same purpose. Most relevant for our analysis are those SWFs which have the goal to preserve a country's often natural resource-driven wealth for future generations and are thus concerned with inter-generational wealth transfer. Stabilizing funds are usually more short-term oriented and therefore show less appetite to invest in long-term and illiquid assets. The (OECD, 2013a) further argues that long-term buy-and-hold strategies drive down portfolio turnover and thus reduce costs. Given the long investment horizons, these savings can make quite the difference as a reduction of annual charges by 1% over 40 could increase the final pension income substantially.

So far, the discussed motivations can be neatly summarized by the following quote by James Wilson (co-founder of Macquarie's MIDIS platform): "If you have long-dated liabilities and want to match them, the alternatives are long-dated sovereigns and corporates. Institutional investors can put part of their book in a less liquid form and get superior returns." The asset class is increasingly seen as a diversification play away from government and covered bonds in such a low interest rate environment." (Bowman, 2013). As a consequence, 46% of infrastructure debt investors now list infrastructure as a distinct allocation instead of an allocation to a broader alternatives bracket (Preqin, 2016).

Other reports (Ma, 2016; Probitas Partners, 2018) cite the stickiness of the "inflation-hedge narrative", even though, as discussed, the final empirical evidence has yet to be presented on a wider scale. Sure enough, many of their liabilities have "inflation-linked annuity-type" character (Inderst, 2016) as they're intended to preserve the purchasing power of their beneficiaries at some point in the future (Della Croce & Yermo, 2013). They also explain that often the national supply of other suitable debt alternatives, e.g. inflation-linked bonds with long maturities is not able to match investors demand. This generally explains why some institutional investors record infrastructure investments as a sub-set of "inflation-sensitive instruments" with regards to their asset allocation (Dyck & Virani, 2012).

Lastly, infrastructure investments are also a matter of regulation, opportunity, and political developments. Concerning regulatory issues, we have already discussed the effects of regulation targeting commercial lenders, i.e. Basel III and Basel IV. As we have seen, this has opened up opportunities for and increased competitiveness of institutional investors without support on their end. Still, institutional investors are affected and driven by their own regulatory standards. For example, a series of amendments to and the general application of Solvency II which regulates the European insurance sector, have raised the profile of certain infrastructure investment opportunities¹⁰. Infrastructure requires a lower capital charge (approx. 30% for project debt and 25% reduction for the debt of qualifying infrastructure corporates¹¹) and thus becomes an attractive alternative to credits with a similar rating, while unrated infrastructure debt is treated as a BBB-equivalent. On the broader political stage, past and concurrent privatization efforts have further contributed to an increase in investment opportunities (Della Croce, 2012).

It stands to reason, that there is a strong case for life insurers, pension funds and SWFs to lend to infrastructure projects. But how and to which degree is this reflected by actual asset allocations and given a certain allocation level, what can we expect in terms of volume from these investors? Analogous to the volumes of global infrastructure spending needs and actual expenditure that the author has reported in the previous section, estimates concerning Assets under Management (AuM) and allocations of institutional investors may vary starkly from report to report. Additionally, Bennon et al. (2015) indicate that the task of delivering exact estimates of the aggregate allocations to infrastructure is made difficult by the fact that institutional investors tend to classify infrastructure differently and often list them as a part of other asset classes, e.g. inflation-linked instruments, private equity and/or private debt. For example, TheCityUK (2014) reported that institutional investors including pension

¹⁰ See for example, Childs and Hawken (2017); European Commission (2017); AFME and ICMA (2017); Gatzert and Kosub (2017); Insurance Europe and Oliver Wyman (2013); van Bragt and Lamaud (2018)

¹¹ Definition by the European Commission (2017): “Infrastructure corporate” means an entity or corporate group which derives the substantial majority of its revenues from owning, financing, developing, or operating infrastructure assets in the EEA or OECD in the following lines of business: generation, transmission or distribution of electrical or thermal energy; distribution or transmission of natural or petroleum gas; provision of water or wastewater services; waste management or recycling services; transport networks or the operation of transport assets; social infrastructure (p. 11). They are entities that have matured into the operational phase beyond the construction phase. In some instances, an infrastructure corporate may undertake new projects (e.g. for expansion or modernisation) and in such cases it will still be recognised as an infrastructure corporate (p. 40).

funds, insurance companies, and mutual funds collectively managed approx. \$86.5tr, accounting for \$33.9tr, \$26.5tr and \$26.1tr respectively and a year later updated these volumes to \$97.2tr in total and a split of \$38.1tr, 29.1tr and \$30.0tr for the same investors (TheCityUK, 2015). In turn, the OECD (2014) reports \$92.6tr, being allotted to investment funds (\$34.9tr), insurance companies (\$26.1tr), pension funds (\$24.7tr), public pension reserve funds (\$5.1tr) and \$1.8tr from other investors in the OECD area. Three years later reported private pension assets have already jumped to \$28.4tr according to the same authors (OECD, 2018a) – amounting to 56% of OECD-area GDP. An alternative study by the Thinking Ahead Institute (2019), covering 22 pension markets globally, observes pensions assets worth approx. \$40tr. A commonality of all these reports is the substantial geographic differences and heavy concentration in the largest markets, for example, the top 7 markets account for 91% of the surveyed markets (Thinking Ahead Institute, 2019). As to SWFs, TheCityUK reports AuM of \$6.1tr in 2014 and \$7.1tr in 2015 and most recent estimates from Sovereign Wealth Fund Institute (2019) raise the volume to about \$8.1tr. Zooming in on unlisted infrastructure debt, Prequin (2018a) reports a substantial increase of fundraising activity over the last couple of years; coming from a low of 1 fund (\$0.2bn) in 2009, the years 2015-2017 witnessed the closing of 8, 12 and another 12 funds respectively, correspondingly amassing capital in the amount of \$6.2bn, \$4.9bn and \$6.9bn. In each given year this was equal to 13%, 7% and 11% of global unlisted infrastructure capital raised. For the year 2018, Prequin (2019) however reports a substantial drop to a global aggregate amount of \$2.2bn of new debt capital raised. With regards to funds-in-market, debt accounts for 15% of aggregate capital. This implies substantial headroom, given the fact that in infrastructure project debt is often 2-3x equity. Yong and Smith (2017) of Schrodgers come up with a similar interpretation.

Evidently, institutional investors manage substantial capital. But how much are they're theoretically willing to allocate and how do these allocation targets stack up against reality? Prequin (2019, p. 38) provides the following breakdown of institutional investors in infrastructure for 2018: Private & public pension funds 35%, insurance companies 10%, foundations 10%, endowments 8%, asset managers 6%, etc. But how do these figures translate into individual allocations? A survey by the OECD (2018b) covering institutional AuM of \$8.3tr report an increase in allocations to alternatives including infrastructure from

12.7% (2010) to 13.8% (2015). However, when looking at infrastructure in isolation, returned questionnaires indicate a meager allocation of 1.1% to infrastructure including both equity and debt. Again, however, these results are subject to substantial variations. Australia and Canada, two clear frontrunners of institutional investment in infrastructure, record average allocations to infrastructure of 5-6% and approx. 5% respectively – “thought-leaders” like OMERS (14.8%) stand out substantially from the rest (Della Croce & Inderst, 2013; OECD, 2016). As Della Croce and Yermo (2013) explain, asset allocation may be influenced by market trends, investment beliefs, regulation, cultural factors, governance structures, tax issues and ultimately domestically available assets since infrastructure investments suffer from an observable “home bias” (OECD, 2016)¹². Additionally, allocations also vary by investor type. Prequin (2019) details various median current and target allocations [p. 39]. While pension funds currently stand at a 2% allocation¹³ and generally target 4-5%, SWFs are more ambitious, targeting a median allocation of 7.5% compared to their current 4.9% allocation. Robinson (2018, p. 8) even reports a lofty 11% allocation for SWFs. Unsurprisingly, the number of wealth funds investing in infrastructure has increased in each of the last three years (Prequin, 2018b, p. 5). In contrast, insurance companies are rather modest, currently allocating 1.2% to infrastructure against a target of 3.0%. Generally, however, the same report shows that during the last 5 years there’s has been little change, both median current and target allocations have decreased slightly, from 2.4% (5.0%) in 2014 to 2.2% (4.9%) in 2018. Overall, these results certainly fall short of expectations given “the mutual” attraction. And there is certainly some headroom left. Coming from a single study, the results certainly have to be approached with some caution, but Dechant and Finkenzeller (2013) show - from a portfolio perspective - that “efficient” allocations to infrastructure could reach well beyond 20%.

However, there is some hope. 50% of surveyed investors want to increase their allocation in the long run and only 6% entertain the idea of a reduction, which is not surprising, given that 61% of the respondents state that their infrastructure investments have met expectations and even exceeded them in 23% of the cases. In the same study, Prequin (2019) consequently predicts that AuM will double by 2023 and reach \$1tr. This buoyancy is echoed by other

¹² Robinson (2018) reports, based on survey answers, that almost 70% of real asset investments are domestic.

¹³ A figure corroborated by Robinson (2018)

surveys and observations. Probitas Partners (2018) report continued strong appetite, as 91% of reached investors either plan to maintain or increase their investments. 90.3% of asset owners interviewed by Blanc-Brude, Whittaker, and Yim (2017) intend to increase their investment in infrastructure in the next 3-5 years. Robinson (2018) in a survey for OMFIF and BNY Melon reports that almost 70% of the answers indicate that institutional investors plan to (significantly) increase the level of infrastructure investments over the next 12-24 months, markedly outpacing all other surveyed asset classes [p.20].

But all optimism and all professions of improvement aside, the divergence between targets and results is evident. In relative terms we may only speak about a few percentage points, however, given the enormous potential represented by institutional investors, these shortcomings have substantial economic and financial consequences. That is why the attentive reader will wonder which hurdles could possibly prevent that institutional investors come together and without entering too deep into the details, here's a short list of possible "barriers to investment"¹⁴. S&P Global Ratings (2019) presents some concerns hot from the presses including growing worries about the slowdown of the global economy late in the credit cycle and mounting political risks due to growing populism and nationalism which could have a negative impact on contractual and regulatory stability and, ultimately, on country risk and sovereign credit quality.

More generally, academic research and market observers expose several points that may hamper institutional investment. Borrowing the classification approach by Inderst (2013, 2016) these points can be roughly put into three different categories: the supply side, the demand side, and market structure/intermediation.

Starting with the supply side, Inderst observes difficulties with regards to political risk, regulatory uncertainty, project pipeline deficiencies, and project size. Political risk and regulatory uncertainty often coincide and include aspects concerning the tax, legal and regulatory environment OECD (2016). Generally, investors are wary of sovereign risk (Bianchi & Drew, 2013), favour "robust rule of law" (Allen & Overy, 2009) which may effectively limit them to a few subsector in well-known infrastructure markets (in particular

¹⁴ A term borrowed from and coined on various occasions by several authors, including Della Croce, Yermo, and Stewart (2011); Gatti, Vecchi, and Casalini ; Inderst (2013).

US, UK, Canada, Europe and Australia) and thus leaving many opportunities on the table. Déau (2011), Della Croce et al. (2011), Inderst (2013) and Mareuse (2011) all voice the concern that modern regulations, accounting and reporting with their mark-to-market focus may - despite the advances made under some Solvency II amendments - favor short-term investments ("short-termism") and penalize long-term, illiquid assets such as infrastructure. Déau (2011) adds, that in several countries quantitative limitations and outright exclusion concerning asset allocation do exist, often complicating or prohibiting substantial investment in unlisted assets. As an example, Deau presents the Swedish pension fund regulation that caps illiquid investments (including infrastructure) at 5% of portfolio value. Della Croce et al. (2011) add that similar restrictions apply in countries such as Denmark, Finland, and the Netherlands further disincentivizing infrastructure investments. Institutional investors further lament the lack of suitable projects, poor public procurement processes and generally missing governmental support (Allen & Overy, 2009; Gatti et al.; Saha, Hong, Modi, & Zemlytska, 2018). A visible project-pipeline in the long-run, underpinned by a coherent and forward-looking political framework, is an important precondition for investors to start the time-consuming exercise of building up internal expertise or bring in costly external experience. It can be expected, that they would only be willing to do so if these efforts could be matched with a continuous, stable project pipeline that would justify such spending (Ehlers, 2014). Kaminker and Stewart (2012) further posit that long-term strategies should ideally cover 10-20 years and thus easily span several political terms. Additionally, they explain that coordination between different levels of authority and possible among several countries may be required because investors dislike obscurities and turf battles that go along with bureaucratic regionalism. Project size is the last point related to the supply side and here the problem has two faces: Projects that are either too small (Arezki et al., 2016; Hallak & Wambeke, 2014) or too large (Bianchi & Drew, 2013; Blanc-Brude, 2012; Della Croce, 2012; Dyck & Virani, 2012). Projects that are too small are often local and concern social infrastructure (e.g. schools; (Hallak & Wambeke, 2014)) and supposed to be funded under a PPP-scheme. In turn, Economic infrastructure, in particular, has the tendency to be too lumpy for small institutional investors to make direct investments due to concentration risk. In such a case infrastructure could hardly be seen as a means to diversify the portfolio in place, but would rather give rise to a highly specific exposure (Blanc-Brude, 2012) that is unique for

every investment opportunity. The same author explains, that large ticket size upfront would require an “active” management approach compared to the “passive” investment style institutional investors normally favor – holding a basket of infrastructure investments for diversification purposes may prove impossible to achieve individually in an efficient fashion, except for the largest and most skilled institutional investors (Dyck & Virani, 2012). This further explains the proliferation of debt funds that has been discussed earlier in this section. A possible remedy for both project size-related problems is “pooling” – of either smaller projects into larger SPVs (Arezki et al., 2016; Hallak & Wambeke, 2014) or pooling small-scale institutional investors together and foster their collaboration in different conceivable forms (Bachher & Monk, 2012; Gatti et al.; OECD, 2013a).

Next, the author will present some issues on the demand side, as introduced by Inderst; Inderst (2013, 2016), including investors’ capabilities (human capital and scale), investor preferences and experiences. Concerning investors’ capabilities, Hallak and Wambeke (2014) cite a prevailing lack of expertise when it comes to lending, credit and risk analysis and management of assets and given the fact that infrastructure assets are highly heterogeneous (i.e. sub-sector, development stage, ...) the task of building such is not made any easier (Inderst, 2016). Additionally, institutional investors would suddenly have to deal with risks that previously were of little relevance under a more passive approach and concern regulatory, technical, operating, political and social dimensions of a project (Kaminker & Stewart, 2012). This certainly explains why most institutional investors express substantial risk-aversion vis-à-vis direct investments and if at all, clearly favor so-called brownfield projects in mature markets that they deem sufficiently de-risked since the construction period has been finished and the asset is in operation, therefore establishing a proven track-record (Gatti et al.; Hallak & Wambeke, 2014; OECD, 2013b, 2016). Even in a delegated fund model, this risk-aversion is still present as investment mandates often limit investments to investment-grade projects or such that are at least rated (Hallak & Wambeke, 2014; Saha et al., 2018). Again, collaboration amongst institutional investors could improve the situation as different arguments presented by Bachher and Monk (2012) suggest. Sharing (local) knowledge, combining skill-sets, sharing deal pipelines and networks may enable institutional investors to achieve higher returns as they leverage local advantages, save costs

due to the elimination of redundancy, improve deal flow and achieve better diversification via co-investments¹⁵.

Lastly, again within the framework proposed above, the author addresses obstacles caused by market structure and intermediation. Inderst (2013) notes thin secondary markets that could prevent premature exit strategies if needed. A paucity of data and a lack of visibility are furthermore common to many complaints¹⁶. Because there are no “true” benchmarks¹⁷ for neither infrastructure equity nor debt investments, comparing investment performance can become a daunting task and the establishment of a risk-return framework that would facilitate portfolio allocations is inhibited. This deficiency, however, has gotten new attention and high-level data gathering projects have been initiated¹⁸¹⁹. A task that could prove time-consuming, nerve-wracking and costly because data is scattered across different, often proprietary, sources and presented in varying formats. Finally, given the prevalence of the delegated/indirect investment model, institutional investors have become more cautious recently because some flaws of this approach started to become ever-more evident. Relying on external management opens the door to conflicts of interest, asymmetric information, misaligned incentives, “short-termism” due to disincentives related to performance evaluation and exaggerated fees.²⁰ This has resulted in some disappointing experiences, in particular during the crisis, and lower-than-expected returns. Furthermore, a dearth of suitable investment vehicles has started to show. The available options are often not maturity-compatible with the underlying assets. This again, makes peer-to-peer

¹⁵ Another possible avenue is the pairing of institutional investors with non-financial project developers. A case in point is the joint venture between the five Dutch pension of PGGM and the Dutch construction company BAM PPP, that brings together the capital of an institutional investor and the expertise in building and managing projects of a seasoned project developer (Benyon et al. (2015); BAM PPP (2016); BAM PPP and PGGM (2011)).

¹⁶ Della Croce, Paula, Assab, and Weigl (2017); Della Croce (2012), OECD (2016, 2013b), Kaminker and Stewart (2012).

¹⁷ A recent survey by Probitas Partners (2018, p. 19) shows that many different benchmark approaches are used, with a majority favouring absolute return targets.

¹⁸ Della Croce et al. (2017): The collaborative „Infrastructure Data Initiative” has been launched to address the issue of establishing infrastructure as an asset class by means of data collection and improving the availability of infrastructure investment data with the aim of creating a centralized repository on historical long-term data. Furthermore, researchers including Frédéric Blanc-Brude are making substantial efforts to create truly representative infrastructure benchmarks. Refer for example to Blanc-Brude (2013); Blanc-Brude, Chreng et al. (2017); Blanc-Brude, Hasan, and Whittaker (2016).

¹⁹ Data collection efforts should be promoted on both national and international level in order to reduce information asymmetry, improve functioning of markets and facilitate monitoring OECD (2013a).

²⁰ Inderst (2013); Johnson (2011); Gatti et al. ; Saha et al. (2018); Bachher and Monk (2012); Della Croce and Yermo (2013).

collaboration among institutional investors or moving assets in-house more attractive. Eliminating the external intermediary could save costs related to fees and reduce information asymmetries together with conflicts of interest – provided that no new conflicts among the peer investors arise.

Finally, to cap off the review of “natural” long-term investors, the author would like the institutional investors to have the final words as to where they see the biggest challenges concerning infrastructure investments. A lack of suitable investment opportunities is the dominating concern according to (Robinson, 2018, p. 24), followed by worries about higher costs fuelled by increasing competition for few assets and equally-worrying perceptions of difficulties to access and regulatory/political risks. In another survey, it’s declining returns due to increased competition, the looming turn of the investment cycle and fees that cause investors headaches (Probitas Partners, 2018, p. 24).

So far, one thing has become painfully clear. Infrastructure faces constraints in all directions as the public is constrained by leverage, banks are constrained by regulations and the “natural” long-term investors (pension funds, life insurance companies, and sovereign wealth funds) are limited by their expertise and experience.

Thus, it’s only fitting to give a brief introduction to another group of lenders that is gaining importance in the infrastructure finance field as they could potentially provide some relief for the issues we have just discussed – of course, we are talking about international financial institutions and multilateral agencies²¹. This group consists of a wide range of different entities including multilateral organizations such as the World Bank Group (incl. the International Finance Corporation and the Multilateral Investment Guarantee Agency), regional development banks and development funds, such as the European Investment Bank, European Investment Fund or the Asian Development Bank, Development Agencies (e.g. DEG from Germany or FMO from the Netherlands) and different national Export Credit Agencies and Export-Import Banks. They all may have different mandates, be active in different jurisdictions and focus on specific projects, yet they typically share the same overriding goal to foster trade and investment by means of a diverse set of funding and guarantee tools.

²¹ Given the role and the importance of this group, they would certainly warrant an in-depth exploration. As the focus of the study is, however, the role played by the previously highlighted “natural” long-term investors group, the author will keep this part rather short.

Another common feature is their proximity to the government and the public sector as a whole. And this closeness is the leverage point where their importance arises from. Academia and market participants alike expect that this group could have a positive influence on issues such as project pipeline deficiencies, long-term infrastructure policies, the mobilization and pooling of funds and risk-reduction schemes (e.g. the alleviation of political risk, subordinated loans, guarantee schemes, etc.) (Broccolini, Lotti, Maffioli, Presbitero, & Stucchi, 2019; Gurara, Presbitero, & Sarmiento, 2018). In this context, different authors²² emphasize, especially in the case of development banks, their local knowledge which may be especially relevant in developing countries, their technical and financial expertise, and their political experience and intermediation ability, but have to acknowledge their limited capital base. As a result, Arezki et al. (2016) attribute them a “gatekeeping” role where they transform their business models into an originate-to-distribute model with a clear focus on structuring projects which can then be funded by other long-term investors with deep pockets. That is to say, all these entities must not necessary become long-term lenders themselves, although they can and will if need be (Regan, 2018), but “crowd-in” those who are generally able to assume this role but face some difficulties.

Further lender groups that show up in the empirical sample that will be discussed at a later point are private equity and private debt firms, mutual and hedge funds, specialized non-bank lenders and infrastructure investors²³, finance companies (e.g. the financial services arms of firms such as Siemens, General Electric, etc.), loan funds and structured finance vehicles (CLOs/CDOs) and leasing companies – all of which have their very own reasons to be present in the infrastructure finance space. For some it may be the prospect of earning attractive risk-adjusted returns, collecting fees in a booming market or accessing assets that show desirable qualities in order to pool them (e.g. for private debt firms, hedge and mutual funds and structured finance vehicles), while for others infrastructure represents their special line of business (e.g. for specialized lenders) and for some it offers the chance to

²² One may refer for example to Arezki et al. (2016), Della Croce et al. (2017), Ehlers (2014), European Commission (2013), OECD (2013a), Orr and Kennedy (2008), Myamoto and Chiofalo (2016), Regan (2018), Walter (2016, Ch. 16).

²³ The sample includes, inter alia, for example Indian Non-Banking Financial Companies (NBFCs) with a focus on infrastructure such as IDFC, Power Finance Corp, PTC India Financial Services, IL&FS or transportation finance companies like ITF Suisse AG.

support their core business in a sector where they already have substantial expertise (e.g. for finance companies whose parent is involved in the construction or operation of an asset).

Having established who the investors in place are, the author will now move on to a brief description of how these investors could choose to access infrastructure financially.

“Syndicated lending has left a clear mark on international markets since its inception. The first facilities of this type, in which financing was provided jointly by several banks, date from the nineteenth century. They were designed to meet the financial needs of major rail infrastructure projects for which funding requirements were of so great a magnitude that no single bank could, or would, take it on. It is immediately apparent that these were the first steps in what is now commonly and widely known as “project finance”, one of the most typical purposes of this type of facility.

– Estevan de Quesada and Renner (2017, p. 172)

2 LITERATURE REVIEW

2.1 SYNDICATED PROJECT FINANCE LOANS

Just as there are many different investors in and obstacles concerning infrastructure, there is, at least in theory, a multitude of different ways and vehicles to access this asset class. The rest of this section will, therefore, briefly focus on the following specific avenue: a) a *debt* investment, b) in a *specific project* (company), c) in the form of a (*syndicated*) *loan*, d) that is made *directly* to the project – in short, *syndicated project finance loans*. The author will keep this introduction very short as there’s a plethora of detailed literature the interested reader may consult for a detailed introduction to both project finance and syndicated lending. Instead, more time will be spent on the development of ideas revolving syndicate structure and the determination of loan terms in the subsequent sections – for now, project finance and syndicated loans are just access points to observe institutional involvement in the field of infrastructure finance.

As has been the case before with infrastructure, different attempts at delivering a definition for project finance have been made. Esty, Chavich, and Sesia (2014) define project finance as follows: “[...] involves the creation of a legally independent project company financed with nonrecourse debt (and equity from one or more corporate entities known as sponsoring firms) for the purpose of financing investment in a single-purpose capital asset, usually with a limited life.” In turn, Gatti (2018, p. 2) notes that project finance “is the structured financing of a specific economic entity – the SPV [...] created by the sponsor using equity or mezzanine debt and for which the lenders consider cash flows as being the primary source of loan reimbursement, whereas assets represent only collateral.”

These loans, given their often very substantial volume, are hardly ever funded by a single lender and normally are split between different lenders by means of a process that is called syndication. To share a loan entails some degree of collaboration among the lenders and the assignment of different roles within a syndicate. In the general case, we distinguish arrangers and participants. The arranger is typically responsible for the ex-ante screening of the borrower, the structuring of the loan transaction itself and the ex-post monitoring of the borrower. Different responsibilities may arise or some of the responsibilities may be delegated to other syndicate members. The participants are usually limited to the provision of funds. The many different forms a syndicate may assume, the various underlying motivations for joining such a group of lenders, and the possible issues of such cooperation will be presented in more detail in the upcoming section.

"[...] it seems relatively intuitive that loan syndicates are not formed randomly. Important considerations seem to motivate their structures, [...]"

– Champagne (2014, p. 151)

"We offer evidence that the size and composition of a lending syndicate are far from random outcomes [...]"

– Lee and Mullineaux (2004, p. 128)

2.2 SYNDICATE STRUCTURE

Let's start this section with a timely reminder courtesy of Esty (2001, p. 88). He states, that one should not forget that "observed [syndicate] structures do not always reflect intended structures [...]"²⁴. Lee and Mullineaux (2001) elaborate further that the final composition at transaction close is typically at the strict discretion of the lead arranger and driven by choices such as the number of invited lenders, initial loan shares, the timing of closing and the own desired share. However, as demand by participants for the relative shares is far from certain ex-ante, final outcomes may vary substantially from initial targets. Furthermore, Saavedra (2018) points out that the number of lenders and the respective loan shares held may change over time due to loan sales in the secondary market. Neither the originally targeted

²⁴ A simple example: The MLA may have invited 20 banks to make their bids during, expecting at least 15 competitive offers. It could be the case however, that only ten banks constitute the final syndicate, for lack of further competitive bids. Clearly, the intended structure in terms of syndicate size does not correspond to the actual outcome.

composition nor the potential future composition is observable, therefore, our focus is on observable syndicate structures at financial close.

When approaching syndicate structure, the one question that should come up first is: How do we define structure? Subsequently, we would ask ourselves: What does the given structure represent? Is it a reaction to potential issues among the lenders or is it related to the relationship to the borrower, do external factors such as legal, economic or regulatory environments play a part?

In the spirit of Champagne and Coggins (2012) who examine different measures of syndicate structure, the author will start with a quick introduction to the various concepts that have been used by the general literature to approach syndicate structure and their underlying drivers. He will then proceed to provide further detail on the introduced concepts and motivate their application by matching them to the underlying drivers. Naturally, it's imprudent to assume that the syndicate structure is motivated by a single driver alone. Neither exist different measures independently from another. More often than not we will, therefore, observe that a certain structure is a response to a combination of various drivers – syndicate structure is therefore multi-dimensional and different structural measures have bilateral relationships (Champagne & Coggins, 2012). When applicable, the author will comment on the specific relevance of certain concepts and drivers in a project finance context. The potential impacts and effects that certain structures may have on loan determinants (i.e. spreads, maturity, etc.) are then discussed in the last and separate section of this initial literature review.

The general literature has approached syndicated structure, inter alia, with the following concepts:

- *Debt ownership and concentration* (e.g. the relative size of loan shares held by individual syndicate members with a particular focus on the share retained by the lead arranger(s))
- *Syndicate size*²⁵ (i.e. the number of arrangers, participants and/or lenders in general)

²⁵ Differentiating between arrangers and participants in the context of syndicate size can be motivated by the fact that senior members in the syndicate may have different concerns and motivations than more junior members (Godlewski (2010a)).

- *Geographic distance or concentration and cultural dispersion of syndicate members* (i.e. the presence of foreign lenders, the nationality of the arranger, measures of cultural distance, etc.)
- *Quality*, that is the average of and differences in *expertise, experience and reputation*²⁶ (of syndicate members and in particular of the arranger(s)²⁷)
- *Institutional types* of lenders (i.e. pure bank syndicates, the inclusion and diversity of non-bank lenders and the rising role of certain lenders such as development banks, etc.)
- *Relationships* (both lender-lender and lender-borrower relationships along dimensions such as length and intensity)
- *Roles* (i.e. the assignment of special roles to individual members during syndication, club deals, and multi-stage syndications)
- *(Social) Networks* (incl. concepts like betweenness, closeness, and degree²⁸)

This observed variety of concepts can be understood as an attempt to describe syndicate structure as a way to react and respond to the following issues:

- *Motives and deal assessment of the lead arranger* (i.e. desired loan share, willingness to share fees, interpretation of market conditions, etc.)
- *Information asymmetries and agency problems*²⁹ (incl. moral hazard³⁰, adverse selection³¹, etc.)

²⁶ As syndicated lending is a business of repeated transactions, acquiring reputation is an important factor to be invited to subsequent deals.

²⁷ The prominent position of the lead arranger is highlighted in several studies, most notably in Champagne and Coggins (2012).

²⁸ For a detailed description of the concepts refer to Godlewski, Sanditov, and Burger-Helmchen (2012).

²⁹ Sufi 2007 explains that moral hazard and adverse selection differ in regards to where the information asymmetry is coming from. Under moral hazard, all syndicate members are unfamiliar with the borrower and must learn about it. In the adverse selection framework, the MLA has private information whereas the participating lenders are unfamiliar. Both forms of agency costs are hard to be measured empirically though and need to be proxied (Lee and Mullineaux (2001)).

³⁰ Moral hazard is an ex-post problem and occurs when the reduction of the loan share held by the lead arranger reduces its incentive to monitor the loan optimally, as it occurs all the associated costs but does only share a fraction of the benefit (Champagne and Coggins (2012); Kleimeier and Chaudhry (2015); Ivashina (2005)). From the arranger's perspective, the issue may be regarded as a "free riding" problem. Both perspectives would lead to sub-optimal monitoring.

³¹ Adverse selection is an ex-ante problem and the result of the superior information possessed by the lead arranger due to due diligence and/or prior relationships to the borrower. If this information is not accessible to fellow lenders, they might be apprehensive of being sold "lemons", that is the MLA will retain larger shares of high-quality loans but may try to shed lower-quality loans by allocating larger shares to syndicate

- *Relationships* (both among lenders & between lenders and borrowers)
- *Incentives*
- Differences in *skill* and *experience* (e.g. the need to pool information or form coherent syndicates)
- *Risk factors* (incl. project, country, legal, political and other risks)
- *Demand and supply of debt capital* (e.g. driven by the search-for-yield, regulatory constraints, funding costs, etc.)
- *Borrower characteristics and desires* (e.g. project and sponsor type, industry, credit risk, leverage, etc.)
- *Loan characteristics* (e.g. loan type, collateral, seniority, required tenor, volume, etc.)
- *Other factors* (e.g. market liquidity, the introduction of loan ratings, etc.)

The author will start the discussion with a focus on (relative) debt ownership and syndicate size. Both measures share one “natural” underlying driver – the size of the loan. For various reasons³², volume naturally affects both of these factors in a sense that it can be expected that larger loan volumes, all other things equal, require more lenders and lead to higher lender dispersion. It is really no surprise, that given its enormous scale, the lender syndicate for the Eurotunnel consisted of 50 banks that shared underwriting commitments and in turn syndicated the deal to more than 200 banks (Grant, 1997).

With reference to **debt ownership (or relative loan shares)**, Esty (2001) highlights the prominent role that the MLA plays in that matter as the final syndicate composition (i.e. the allocated loan shares) reflects its own profitability goals, risk considerations and the appreciation of the markets. Bosch and Steffen (2007) focus on debt ownership (in particular the loan share retained by the MLA) and the size of the syndicate³³. They relate their findings to information asymmetries³⁴ between the MLA and the syndicate participants which in turn

participants and retaining a lower share himself (Champagne and Coggins (2012); Kleimeier and Chaudhry (2015); Ivashina (2005)).

³² Including the availability of (individual) funds, risk considerations, the ease of transaction.

³³ The attentive reader surely takes note that size and concentration are closely related, as all other things equal, larger syndicates unavoidable reduce concentration (i.e. individual loan shares). However, the direct implications and drivers of both structural measures can vary from case to case.

³⁴ Champagne and Coggins (2012) make the due observation, that syndicated loans, as opposed to bilateral loans, not only suffer from information asymmetries between the lender and the borrower, but also from information asymmetries within the lender group itself. Conversely, syndication may, however, also help to alleviate certain agency conflicts.

depends on the opacity of the borrower. Their empirical work shows that MLA retains larger shares and form smaller syndicates if information asymmetries are higher, the syndicate is, therefore, more “concentrated”. Lee and Mullineaux (2004) and Sufi (2005, 2007) offer similar interpretations for borrowers that require sizeable screening and monitoring efforts. It is then no surprise, that in a case where quick syndication is key, a more concentrated syndicate around a few arrangers is better able to overcome informational frictions quickly (Godlewski, 2010b). Ball, Bushman, and Vasvari (2008) document that high-quality accounting information of the borrower is able to reduce information asymmetries between lead arranger and participants. As a result, the lead arranger is allowed to reduce the loan share it retains. S. Bae, Chong, and Kim (2014) go beyond domestic markets and focus on the international lending market. Interestingly enough, they present reverse results. In international markets and under informational asymmetries, riskier borrowers face more diversified syndicates, measured by relative arranger loan shares and number of arrangers relative to the total number of lenders. They attribute their findings to a risk diversification motive where both arrangers and participants have relevant but different information. Esty and Megginson (2001) and others³⁵ collectively highlight the positive signal of a larger retained arranger share with regards to loan quality (i.e. providing “certification”) and the incentive to provide thorough monitoring and Paligorova and Santos (2015) note increased credibility concerning potential renegotiations. Bosch and Steffen (2011) show that opaque firms (i.e. unlisted, not rated) borrow from smaller and thus more concentrated syndicates and Lee and Mullineaux (2001, 2004) come to similar conclusions, highlighting the importance of available information. Since syndicated loans are a field of repeated business, reputation can be expected to be important, particularly for arrangers. Gopalan, Nanda, and Yerramilli (2011) demonstrate a link between the poor performance of lead arranger’s borrowers and his retained loan share. They find that in many cases subsequent to large bankruptcies, lead arrangers tend to retain larger shares both to signal borrower quality in order to attract startled participants, but also to provide greater incentives for screening and monitoring of the borrower. As its reputation has suffered post-bankruptcy, the lead arranger uses this increased commitment in order to offset the reputational damage. Cai, Eidam, Saunders, and Steffen (2018) show that arrangers distribute larger loan shares if

³⁵ Refer for example to Jones, Lang, and Nigro (2005); McCahery and Schwienbacher (2010); Sufi (2007).

syndicates members are on a similar level with regards to lending expertise, implying a reduced need to signal the quality of a transaction by retaining a larger fraction of the loan – principally, agency conflicts and asymmetric information are of less importance for such “close” syndicates. In fact, Cai, Eidam, Saunders, and Steffen (2017) show that retained loan shares of lead arrangers are about 1-3% lower in close syndicates. In the same paper, the authors state that loan shares act as an incentive scheme to align other lenders if they’re awarded more prominent roles. Offering incentives via loan-shares works both ways as Lee and Mullineaux (2001) argue. Participant banks are incentivized to monitor the borrower when obtaining larger shares and thus alleviate the “free-riding” problem from the MLA’s perspective (Esty & Megginson, 2003), larger shares retained by the MLA, in contrast, motivate the arranger to carefully perform his duties. Esty (2001) reports anecdotal evidence that relationships are a driving force behind the invitation of certain lenders to the syndicate and the allocation of specific shares. Relationships form through repeated joint transactions where arrangers become participants and vice versa. This “reciprocity” affects the retained arranger share³⁶ (Cai, 2010). According to the author, reciprocity creates interdependence on each other’s monitoring effort throughout various transactions and therefore effectively reduces moral hazard. Relationship considerations are also at the heart of a recent study by Huang, Zhang, and Zhao (2018) who show that lender-sponsor relationships in a private equity context influence syndicate structure inasmuch as stronger relationships lead to the retention of smaller shares by the lead arranger and a more dispersed syndicate in general. Relationships with related third-parties (i.e. the sponsors) then have the potential to mitigate agency problems as they are a channel by which additional information about the borrower can be gathered. Borrower-relationships that go beyond lending (i.e. non-loan exposures) allow the reduction of retained loan shares by lead arrangers as they ensure continuous monitoring incentives (Neuhann & Saidi, 2016). Risk sharing is reduced by cultural differences³⁷ according to research by Giannetti and Yafeh (2012), that is participants hold smaller loan shares in loans arranged by culturally distant lead arrangers. They attribute their findings to higher contracting costs and higher

³⁶ Cai (2010) reports that on average lead arrangers hold 4.3% less of the loans subject to reciprocity. Reciprocity is measured in different ways, including breadth, depth and length [pp. 17-19].

³⁷ The authors demonstrate that one-standard-deviation increase in cultural distance between a participant and the lead lender augments the difference of their loan shares by 5%.

information asymmetries when syndicate members are culturally different. With regards to the deterrence function of syndicate structure, Esty and Megginson (2003), Godlewski and Weill (2008) and Qian and Strahan (2007) collectively find that higher ownership concentration (i.e. larger relative loan shares) is positively related to creditor rights and legal enforcement – lenders are willing to contribute relatively more of the whole loan if they feel sufficiently protected. Qian and Strahan (2007) explain this finding for loans in general as the use of ownership as a contracting tool that does not rely on laws or institutions. But it's not only creditor rights that are of importance. Bharath, Dahiya, and Hallak (2018) investigate the interaction between creditor and shareholder rights, the two opponents within a borrower's capital structure. They detect that in their sample which covers the US market, a reduction in shareholder rights implicates loan syndicates that are less concentrated – for example, monitoring efforts become less of a concern in the face of reduced risk originating from opportunistic shareholder behavior. Chaudhry and Kleimeier (2015) take a different approach and examine loan shares from a cultural viewpoint. They observe that foreign arrangers keep larger shares increasing in cultural distance³⁸ and interpret their results as another iteration of the moral hazard problem, where higher loan shares signal stronger commitment because distant foreign arrangers typically face higher costs to gather information and perform monitoring tasks.

In a project finance setup, political risk is of particular importance. Hence Esty and Megginson (2000) report a “syndicate smile”³⁹ and show that debt ownership is sensitive to a varying degree on political risk. As long-term PF loans are strongly impacted by the political and legal frameworks of the project country and are usually made to specific projects that require substantial monitoring, ownership concentration can be expected to be an important creditor-led governance and incentive tool. In a related paper, Esty and Megginson (2001) derive that creditor rights and legal enforcement, i.e. legal risk in general, influence debt ownership in PF loans. They find that higher legal risk, as measured by weaker creditor rights

³⁸ A number of proxies for culture and cultural distance is conceivable including Hofstede's cultural dimensions, geographic distance, shared borders, different languages and different legal origin (Kleimeier and Chaudhry (2015)).

³⁹ For arranging banks, individual average loan share declines initially for rising country risk, but later starts to increase for high-risk countries. Their aggregated share, however, forms a “frown” when graphed against country risk, implying larger, more dispersed syndicates for high-risk countries. Concentration is therefore clearly a non-linear function of political risk.

and poor legal enforcement, is associated with more dispersed ownership. The lead arranger is of particular importance⁴⁰ in PF transactions as noted by Contreras et al. (2018). Hence syndicate participants can be expected to pay particular attention to its retained share.

Syndicate Size, in the sense of the number of total lenders, arrangers and participants, clearly illustrates the hybrid nature of syndicated loans (Esty, 2001). Whereas small syndicates (i.e. no more than three lenders) come close to the academic model of private debt lending, very large syndicates proxy capital markets (i.e. a bond issuance) where many independent investors are involved. As the global financial crisis had implications in almost every field of the financial sector, it should not come as a surprise that it has also affected the number of lenders participating in a syndicated transaction. According to Thia (2019), the reaction was different in developed economies where the number of banks involved per deal increased from 2 to 3 banks, as compared to developing economies where a decline of roughly the same magnitude was noticed (i.e. a drop from 3.5 to 2.5 banks per deal). The crisis, therefore, reversed the picture. Before the crisis, there was a logical difference between these types of economies. Driven by risk diversification efforts, syndicates in developing economies tended to be larger than their counterparts in developed economies. After the crisis, according to Thia (2019), larger syndicates have formed in developing countries - a development he associates with a capital shock to banks in developed countries and the drop in developing economies could originate from the withdrawal of developed lenders from developing countries. From a similar higher-level perspective Godlewski (2010a) reports that banking environment is one of the main drivers concerning syndicate size, both when measured as the number of arrangers and the number of total lenders and consider characteristics such as financial development, regulation, banking cost structures and bank concentration in the market. Syndicate size also presents a basic tradeoff. While the risk for individual lenders decreases and the certainty of a successful syndication increases (Esty, 2001), opportunity costs in the form of foregone fees, less than desired loan shares, agency conflicts and coordination/administrative efforts increase – restructuring in the case of financial difficulties becomes particularly more cumbersome with more lenders involved

⁴⁰ “Given the high-leverage and non-recourse nature of project finance, the screening and monitoring efforts of the lead arrangers are critical - even more so than in standard syndicated lending” (Contreras, Bos, and Kleimeier (2018, p. 10)).

(Esty & Megginson, 2001, 2003). It is not a surprise when he reports that against backdrops of higher credit or sovereign risks smaller syndicates are preferred for the purpose of simplified and low-cost renegotiations⁴¹ and easier monitoring. Syndicates arranged by non-bank lenders are typically also smaller - a finding Grupp (2015) interprets as a remedy against higher information asymmetries when non-banks take the lead. Larger syndicates, however, are able to deter strategic default (Esty & Megginson, 2003), as it may severely impact the future availability of credit. Larger syndicates are also the result of reputable arranges and positively related to the available information about the borrower. As both points are able to reduce information asymmetries, it is no surprise that more lenders are willing to join the syndicate (Lee & Mullineaux, 2001). Sufi (2005) expresses a similar view, stating that lead arrangers seem to adjust ex-ante syndicate structure according to ex-post renegotiation prospects – “loading” the syndicate with additional participants for deterrence effects. He makes the remark though that, if restructuring is likely due to exogenous shocks, syndicates should be smaller to facilitate renegotiation, echoing findings of Esty and Megginson (2001, 2003) above. Esty (2001) also emphasizes the borrower’s perspective, as smaller syndicates may be preferential from confidentiality (ex-syndication) and administrative standpoints (post-syndication), e.g. in the case of financial difficulties. In contrast, borrowers may prefer larger syndicates to increase competitive forces so as to obtain better execution and pricing. Lee and Mullineaux (2001, 2004) also comment that larger syndicates may naturally arise if the lead bank (and the borrower) decide to control or limit the resale activity of loan shares. This perceived reduction of loan liquidity leads to the reduction of individual loan shares and thus to larger syndicates.

In the specific context of project finance, different factors are of special importance. Esty and Megginson (2003) state that low-cost restructuring is important since projects involve highly-specific assets that may not readily be redeployed – smaller syndicates, *ceteris paribus*, would be therefore preferential. Furthermore, Esty and Megginson (2001) extend the PF literature with their finding that larger syndicates have a positive relationship with legal risk, the higher legal risk, the larger the syndicate, implying a deterrence effect. There are some indications that this deterrence effect is less of a factor when there is a close

⁴¹ A case in point: When the Eurotunnel project started to run into problems it proved to be quite cumbersome to find common ground among +200 syndicate members (Grant (1997)).

collaboration with the public sector. In line with this, Tandja M., Power, and Soumaré (2017) describe that PF loans made to PPPs are more concentrated in the sense that there are fewer lenders and MLAs involved when compared to PF loans made to a broader range of projects⁴². Albeit they do not specifically examine project finance loans, the results of Fotak, Lee, and Megginson (2019) could still prove interesting in a PF context. The authors' research shows that Bilateral Investment Treaties (BITs) lead, amongst other things, to larger syndicates. They attribute this finding to the fact that BITs strengthen property rights and reduce the likelihood of government expropriations. Both legal and political risks are therefore mitigated, making it easier for the MLA to syndicate a larger share of the loan and attracting more potential lenders. All these factors eventually lead to the finding that PF syndicates are substantially larger⁴³ than syndicates for other loan types (Kleimeier & Megginson, 2000). Pinto and Alves (2016) confirm their observations in a more recent study of the European PF market.

Champagne and Coggins (2012) consider various factors as relevant for syndicate **quality**. These factors include, inter alia, intensity, duration, reputation, and experience which can be proxied by observations such as the number of shared deals, league tables, market shares, and the number of past transactions. Quality, in their eyes, is important as relationships foster trust and coherent expertise helps to alleviate coordination problems and lowers asymmetric information. In terms of **expertise and experience**, Cai et al. (2017, 2018) describe the preference of MLA to form “close” syndicates, indicating such syndicates where lending expertise among lenders is highly similar. “Distant” syndicates describe syndicates where this similarity is rather low. This result, according to the authors, is driven by improved screening and monitoring abilities for the syndicate as a whole, reducing the costs to produce information. Chaudhry and Kleimeier (2015) and Sufi (2007) agree that lead arranger reputation, in particular, is important to overcome agency problems. Esty (2001) arguments along the same lines, prominent MLAs facilitate syndication. In addition,

⁴² The authors compare their observations explicitly to the results presented in Corielli, Gatti, and Steffanoni (2010) and Gatti, Kleimeier, Megginson, and Steffanoni (2013).

⁴³ The authors show for their sample that on average 14.5 banks join PF syndicates as compared to 10.7 banks for all other loan types like general purpose loans, corporate control loans and others. In a more recent, Europe-focused study record that the general syndicate size has declined substantially, but PF syndicates are still larger than most other syndicates (on average 7.1 banks as compared to 6.5 in corporate control loans or 6.6 banks in general corporate purpose loans).

Godlewski (2010b) argues that, if the borrower calls for quick syndication, reputation and experience are key to put syndicates together in due time.

In the context of project finance, it is not surprising therefore that we observe the activity of both debt arms of private equity firms and captive finance companies (Estevan de Quesada, 2018), given the importance of skills and experience discussed above. Both types of non-bank lenders have been able to build expertise, the first one due to its involvement in the equity fraction of project finance and the latter due to the expertise and sector focus of its parent company. Gatti et al. (2013) focus on syndicated PF loans and show that the choice of a reputable⁴⁴ lead arranger is motivated by its proven ability to create economic value by arranging loans at lower spreads. They add that “certification” provided by prestigious arrangers is most valuable during financial crises when informational frictions surge. Contreras et al. (2018) contend that syndicates in PF act as “pools” of information which is motivated by the borrower’s lack of any history, lead arranger’s unfamiliarity with a certain sector, complex institutional environments and high project specificity. The syndicate structure, therefore, reflects the pooling of as much information “as possible and necessary” [p. 11] and the desire to bring lenders together that complement each other.

Roles⁴⁵ are of importance in syndicates, as they allow the distribution of responsibilities to different syndicate members, potentially catering to their respective strengths and offer the opportunity to earn additional fees and gain prestige. Cai et al. (2018) regard the awarding of different roles as being driven by relationship considerations among lenders and desire to secure a successful syndication where the assignment of different responsibilities according to individual specializations could increase the odds of success and reduce the management costs for the lenders (Cai et al., 2017). François and Missonier-Piera (2007) perceive the delegation of certain administrative task both as a way to drive down managing costs by leveraging specializations of co-agents and a means to reduce agency conflicts among lenders as co-agents can effectively also monitor the MLA on behalf of fellow syndicate participants.

⁴⁴ In order to proxy reputation, the authors fall back on two proxies: average lead arranger market share and a high prestige dummy (taking the value of 1 for all lead arrangers whose market share is in the top 25% quartile).

⁴⁵ Different roles in syndicates carry for example titles such as “administrative” agent handling interest and principal payments, “documentation” agent responsible for the selection of a law firm and loan documentation, etc. More fundamentally however, they separate mandated lead arrangers from sub-underwriters and mere participants and indicate a sense of various degrees of risk with regards to a successful syndication. Cai et al. (2017) provide a more comprehensive list of detailed roles [pp. 11-12].

Additionally, roles are also determined by the underlying syndication process itself. If the MLA opts for multi-stage syndication, it needs to invite sub-underwriters before general syndication can begin, effectively establishing another level of responsibility within the lender group. Alternatively, in a club deal, all involved lenders are on equal footing. That is at least from an arranging standpoint, individual roles when it comes to the management of the loan can still be assigned.

The **presence of foreign lenders** in any given syndicate can be motivated by various reasons. Haselmann and Wachtel (2011) report that risk appetite and business plans of foreign lenders are important as they have to overcome barriers of market entry and establish a presence in a foreign market. They find however differences between large and small countries. For larger countries, higher loan spreads to incentivize the spreading of risk via syndication are observed, whereas in smaller countries foreign banks are required to complete markets, i.e. substitute for lacking domestic capital. These incentives are duly received, as foreign lenders must overcome a “home bias” that is rooted in the lack of familiarity abroad and differences in legal and financial systems (Boyle & Stover, 2014) – a domestic collaborator with local knowledge is therefore of importance. Reversely, we can, therefore, expect some degree of “domestic clustering” in syndicated loans. The degree of foreign lender involvement, Bosch and Steffen (2011) find, is strongly rating-related, as foreign lenders (both banks and non-banks) are rather hesitant to fund unrated issuances. Champagne (2014) surmises that geographic concentration, in turn, facilitates the formation of syndicates as information flow and the building of relationships are facilitated by geographic proximity. Godlewski (2010b) adds to that idea noting that when faster syndication is required syndicates tend to be cohesive in a geographic sense, that is either arrangers tend to come from the borrower’s country or a large fraction of all syndicate members share the same geographic background. Champagne and Coggins (2012) state that *ceteris paribus* foreign lenders increase agency problems. Thomas and Wang (2004) see the participation of foreign lenders as an expression of regulatory arbitrage. They observe in a sample of 44 countries that lenders from strictly regulated countries are more likely to take part in syndications from less regulated countries, therefore circumventing domestic capital regulations in order to achieve a higher return on capital. In the process, foreign lenders typically rely on knowledgeable local lead arrangers. The importance of familiarity with local

borrowers is also emphasized by Sufi (2007) who records that geographic proximity is important for opaque borrowers. In such cases, syndicates are geographically closer to the borrower. The same is true for syndicates arranged by non-banks as these rather “inexperienced” arrangers seek to alleviate concerns about informational frictions (Grupp, 2015). As to cultural aspects, culturally heterogeneous syndicates are unlikely initially as they increase contracting costs and reduce risk sharing, but repeated transactions can reduce cultural differences over time (Giannetti & Yafeh, 2012).

Given that **PF** is a highly globalized field of finance, Dorobantu and Müllner (2017) investigate the geographic nature of project finance syndicates and connect it to various drivers. They show that whether syndicates are geographically clustered or dispersed depends on two macro risk factors: political and systemic risk. Political risk favors the establishment of more dispersed syndicates in terms of geography as it allows to increase what they call “external leverage” over the borrower and other related parties in the host country and disincentivizes opportunistic behavior. External leverage is increased as lenders from different countries contribute non-redundant, individual leverage. As this, however, complicates “internal” reorganization under adverse circumstances, geographic dispersion presents a classic tradeoff, since geographically closer syndicates are typically better equipped to handle such situations because lenders fall back on a common culture, similar frameworks, and intermediate communication. With regards to political risk, they also voice the power of the international lending markets to deter opportunistic behavior, an argument akin to those proposed with respect to syndicate size. Opportunistic behavior would burn bridges to many markets at a stroke. The second factor, systemic, influences lenders in two ways. Firstly, it creates informational frictions making geographically distant syndication more challenging and costly and secondly, it fosters opportunistic behavior by individual lenders if there are no shared set of norms or relational dependencies which are more likely for geographically concentrated syndicates. The two risk factors, therefore, work in opposite directions. As risks in international lending are to a large part both determined and intermediated by laws and their enforcement, the results of Esty (2004) don’t come as a surprise. Foreign banks are willing to assume a larger share in syndicated loans if they can trust local creditor rights and enforcement constitute an accommodating framework. Qian and Strahan (2007) validate this finding; strong creditor rights attract higher foreign loan shares. Surprisingly though, Esty

(2004) show that as to financial development, the case is different. Well-developed local financial systems seem to curb foreign involvement for various reasons as they generally facilitate the sourcing of funds in the home markets. Relying on local funds may have a few advantages for PF borrowers including reduced information asymmetries and the avoidance of currency risk. If this is the case, foreign lenders only seem to fill the gaps. On a related note and explicitly from a borrower's perspective, Houston, Itzkowitz, and Naranjo (2007) argue information costs and the variations in the institutional environment are primary drivers for an evident home bias. Geographic proximity enables the establishment of relationships that can ease these concerns. Relationships are therefore able to explain why borrowers with foreign sales and assets are more likely to have a lending relationship with a foreign bank (Houston, Itzkowitz, & Naranjo, 2017). As a matter of fact, the location of the borrower's foreign assets has a strong ability to predict the geographic origin of foreign lenders. The authors also agree that cultural ties (e.g. speaking the same language) influence foreign lender choice, as well.

Furthermore, Ahiabor and James (2019) make the case for domestic lead arrangers in project finance loans owing to their superior knowledge of local market conditions, stronger political leverage and monitoring abilities – all fostered due to their geographic proximity to the borrowing SPV. Yeh, Yao, and Chin (2019) also highlight the potential benefits of domestic co-leads in syndicated lending and particularly in Emerging Markets.

Unsurprisingly, **relationships** built on the basis of repeated joint transactions foster trust, align the level of information of all syndicate members and thus reduce informational frictions (Champagne & Coggins, 2012). But not all relationships are equal. Home bias, previous role allocation⁴⁶ and reputation all have some importance (Champagne & Kryzanowski, 2007). Again, it's no surprise, therefore, that different authors including Champagne and Kryzanowski (2007) record that current syndications are driven by past transactions in the sense that previous collaboration increases the chances to join the same syndicate again. In sum, relationships constitute a special case, as they arguably are both a structural measure of syndicates and a driving force behind them. Esty (2001) reveals that

⁴⁶ The authors differentiate the following role allocations: previous lead-participant with same role in current syndicate, previous lead-participant with reversed roles, lead-lead and participant-participant.

both lender-lender and lender-borrower relationships are of importance during syndicate formation and Sufi (2005, 2007) drives home this point remarking that for opaque borrowers arrangers may prefer to add lenders that are already “close” to the borrower and have established a relationship.

This highlights the fact that not only lender-lender relationships are relevant, but also previous lender-borrower relationships carry significant weight. For non-bank lenders in the PF field, this may imply some substantial effort to break into the relationship-driven “inner circle” of syndicated PF lending. Alternatively, we can see this as a chance for non-bank lenders as over time they may be able to build strong relationships with the incumbent banks in order to gain facilitated access to future loan syndications. Gatti et al. (2013) raise an important point that should be kept in mind when approaching syndicated PF loans. They argue that previous transactions with the borrower may not be a valid indicator of any informational advantage possessed by a prospective syndicate member, as relationships with the SPV per se are non-existent due to its specific creation for the purpose of a single project and having had relationships with the sponsors before has limited value against the backdrop of both legal and operational separation. Contreras et al. (2018) focus on lender-lender relationships in syndicated PF loans and argue that repeated transactions with the same collaborators are able to mitigate information asymmetries among lenders⁴⁷. However, when arrangers are more concerned with the information asymmetries vis-à-vis the borrower (i.e. the project SPV) and lack sector expertise themselves, they may decide to invite participants with whom they have no previous relationships to tap into their expertise and experience, even though such a move could increase information asymmetries among lenders themselves.

Institutional identity is a variation of syndicate structure that has gained in importance as of late and as noted before also has an effect on project finance. As discussed in detail in section two, the increasing number of institutional lenders in loan syndications can be traced back to various reasons. Estevan de Quesada (2018) enumerates the following reasons: i) the changing regulatory environment of banks yielding comparative advantages for institutional

⁴⁷ The authors also make the valid point, that relationship-driven mitigation of information asymmetries is particularly relevant in PF since traditional mitigation tools like collateral, ratings, etc. are of lesser use.

lenders, ii) the introduction of loan ratings after 1995 increasing borrower transparency, iii) a growing secondary market for syndicated loans that has increased liquidity and the ability to manage loan portfolios (also in and iv) specific sector knowledge⁴⁸ acquired by institutional lenders reducing information asymmetries and turning them into “informed” lenders. Grupp (2015) reaffirms points ii)-iv) and Paligorova and Santos (2015) add that the proliferation of loan securitizations further increased the manageability of loans for institutional investors. With regards to the institutional identity of some participants, Beyhaghi, Nguyen, and Wald (2019) examine non-bank lenders in the US market (particularly CLOs, closed-end funds, and mutual funds, but the list goes on) and consider this as a response to the changed regulatory environment after the GFC that limited credit from the banking side against a rising demand for credit post-crisis – non-bank lenders stepped up to fill that void. Bosch/Steffen (2011) show that the presence of non-bank lenders – or in their words “uninformed” capital – is largely driven by the availability of loan or borrower ratings, providing much-needed transparency with regard to the issuance. Neuhaan and Saidi (2016) support the concept of “uninformed” institutional capital in that they lack the monitoring expertise of commercial lenders. They, therefore, tend to take part in loan syndications where the lead arranger has relationships to the borrower that go beyond mere lending-exposure but includes ancillary services. In their eyes, this motivates the lead arranger to duly perform his monitoring tasks despite conceding a substantial fraction of the loan. Carey, Post, and Sharpe (1998) link the presence of certain institutional lender types (in their case with a focus on finance companies) to various degrees of specialization which in turn is often the result of regulatory differences between lenders and/or borrower-specific risk-profiles. Maskara and Mullineaux (2010) take a similar view, stating that differences in regulation and sources of funds are important factors, as they govern the risk-taking behavior of non-bank lenders and thus define the group of potential borrowers. For example, they may face fewer restrictions regarding credit risk as compared to commercial banks which allows them to invest in riskier loans. Furthermore, they typically face higher funding costs (as they cannot rely on insured deposits) and thus have to capture higher returns, to begin with. In this context, is logical that the authors find that non-bank lenders are favoring “tranching”

⁴⁸ The same author makes reference to captive finance companies that have a logical focus on the sector in which their parent operates. Additionally, private equity firms also gathered expertise on previous transactions, albeit being active on the complementary equity side of the capital structure.

deals⁴⁹ in which they are able to acquire a loan share in exactly the tranche that is representing their level of risk appetite. Nandy and Shao (2010) also find that institutional lenders gravitate towards riskier borrowers and riskier-loan purposes. They, therefore, surmise that institutional investors become “lenders of last resort”, extending loans to borrowers that would be cut off by banks. Lim, Minton, and Weisbach (2014) draw similar conclusions while examining a rich sample of leveraged syndicated loans. They posit that the invitation of non-bank participants by bank arrangers reflects the arrangers’ inability to bring together a pure bank syndicate, non-banks effectively act as fillers. Chernenko, Erel, and Prilmeier (2018) in turn present external factors such a poor bank capitalization and low banking concentrations in domestic markets as reasons why non-bank lenders come to the fore. Given the arguments above, specialized knowledge and changes to regulatory environments are potentially the main drivers behind the presence of non-bank lenders in project finance. Gatev and Strahan (2009) are able to relate the presence of non-bank lenders to credit, market and liquidity risk. They observe that commercial lenders have an advantage in the provision of liquidity (i.e. credit lines, guarantees, etc.) and the handling of the associated risk, thus syndicates that provide fully funded loans at origination (i.e. term loans) are more likely to include non-bank lenders who willing to bear the credit risk, but worse-equipped to shoulder liquidity risk⁵⁰. Bord and Santos (2012) connect this observation to a change in the business model of banks and the often observed move to an “originate-to-distribute” model, that by design funnels more loans to institutional lenders. Loan types, therefore, are able to influence syndicate composition. Harjoto, Mullineaux, and Yi (2006) distinguish between investment and commercial banks and the various forms of syndicates that can arise from the presence of these two lender groups. Their findings imply that syndication to other another lender type (i.e. mixed syndicates) reflects the desire to build relationships in order to grow market share both in syndicated lending and other financial services, for example, underwriting services. A study by Grupp (2015) focuses on syndicated loans where non-bank lenders assume the responsibility of being the lead arranger. The author demonstrates that a couple of factors have contributed to this evolution. Firstly,

⁴⁹ Berlin, Nini, and Yu (2016) and Nini (2017), in the case of leveraged loans, report that banks and non-banks co-exist and prevail in different tranches. The term loan tranche is typically dominated by institutional lenders, whereas banks (incl. the lead arranger of the whole syndicate) overwhelmingly hold the revolving tranche.

⁵⁰ See footnote 49 above.

relatively loose regulation for some institutional investors like private equity firms or hedge funds allows them to compete for loans where banks are constrained. Secondly, specialized expertise in some sector makes them competitive on a skill basis. Examples of such sectors are typically industrial and finance companies are able to compete due to the experience of their parent companies. Lastly, non-banks specifically target borrowers for which cross-selling offered by commercial banks is not a crucial aspect.

Hainz and Kleimeier (2012) shine a light on the special case of development banks joining PF syndicates. According to the authors they do so if the political risk is particularly high, as they can serve as a “political umbrella”, able to exert some influence on the host government. Broccolini et al. (2019) further attribute them signaling qualities and the provision of better information. On top of that, the authors show that lending from development banks can be thought of as a “door opener” since, given a development bank participates in syndicated lending, on average an additional 0.55 banks are going to join loan syndicates (for the same sector and country).

Finally, Godlewski et al. (2012) think of syndicates as **social networks**. They determine the French syndicated loan market to be a “small world” where they observe local density and lenders that are socially close. Short social distances allow the timely diffusion of information, while social concentration helps to build trust and encourage reciprocity. Two factors that are very important in a business such as syndicated lending where business relations repeat themselves. Contreras et al. (2018) reason that PF especially is a field of business where networks among lenders are relevant in order to form “informational” capital both on individual and on aggregated syndicate level. In contrast to the findings above, they highlight the benefits of reaching further into one’s network or even or to go beyond the network’s limits in order to access new knowledge – “small world” features may be less desirable in PF lending.

Regardless of how we eventually decide to approach syndicate structure, the examples presented in this section certainly hammer home the point that the composition of the loan syndicate could and most likely will influence a project finance deal and institutional investors, in particular, are going to have an impact. In keeping with the arguments presented in earlier sections, syndicate structure in a PF context is usually related to risk mitigation

considerations, legal and financial environments, regulatory change, loan/project characteristics, relationship considerations and the need to bring together lenders that are both able to collaborate trustfully and complement one another.

In the following final section of the initial review, the author expands on how the syndicate structure may be one of the (most important) determinants of loan features such as spreads, maturities, volume, covenants, etc.

“As a result, the determinants of credit spreads in private infrastructure debt are some of the main drivers of the cost of capital in privately financed infrastructure, and they also condition the affordability of such schemes for the public sector and end users.”

– Blanc-Brude and Yim (2019, p. 9)

“Do banks price risks and, if so, how accurately? [...] If project finance loans almost never default, why do PPP term loans cost 120bp?”

– Blanc-Brude and Strange (2007, p. 95)

“When banks grant loans to a project, they have two decision variables: the interest margin or the spread and the maturity of the loan. Although several studies analyzed the drivers of the spread, few studies in the literature look at the maturity of bank loans.”

– Thierie and de Moor (2018b, p. 2)

2.3 LOAN PRICING AND LOAN TENORS

In the previous chapter, we have both described the structure of loan syndicates and analyzed why different lenders come together in the way that we eventually observe. Now, in this last section of the review part of this study, we will have a closer look at the syndicated loans themselves, in particular the author will focus on two defining characteristics of an individual loan: its price (i.e. spread or margin) and its tenor (or time-to-maturity) at financial close. These two contractual terms, one price and one non-price, are of particular interest in many studies concerning syndicated loans and the author is going to show that institutional investors may have an impact on both measures. One may argue, that loan size may be another interesting non-price feature that deserves a closer look, but in the context of project finance, loan size is largely determined by the project size and chosen project leverage and therefore is subject to the discretion of the lenders only to a lesser degree. As

the author has no access to meaningful data with respect to project leverage, he treats loan size as an exogenous variable. In the following, our analysis of spreads and tenors is therefore threefold. Firstly, the author will provide an overview of loan pricing studies in general⁵¹ as, contingent on their focus, they still have the potential to provide meaningful insights into factors that could affect PF loans as well (e.g. institutional environments, legal frameworks, macro-economic factors, etc.). Secondly, with regards to studies that address the impact of syndicate structure on syndicated loans, we will drill down a bit further. Lastly, there will be a more thorough discussion of loan pricing and other loan determinants in a project finance context. In general, we will observe that empirical studies on loan pricing and other loan features vary substantially with regards to the employed variables which for their part depend on the research goal at hand. Some variables show up quite regularly while others are only used in a single instance. As to why such a review is helpful before the author proceeds to present his empirical analysis, Blanc-Brude and Strange (2007) provide an adequate summary: “[Lenders] may either seek compensation for risk through spreads and fees or use the non-price characteristics of loans to facilitate monitoring (e.g. shorter maturities) and limit losses (e.g. loan size, collaterals) when lending to risky borrowers.” [p. 96]. To have an understanding of what research has hitherto accomplished in that regard is therefore helpful to set up any further analysis.

Starting with *loan syndications in general*, Vu and Skully (2008) try to get to the bottom of the question of why banks syndicate loans in the first place and whether, if they chose to do so, loan pricing differs from sole-lender loans. They test two hypotheses, for both of which they find empirical indications. The “information-selling” hypothesis states that informed lead banks are willing to persuade uninformed participants of the quality of the loan. They do so by sharing information in order to overcome agency conflicts. As a result, participants require lower risk premia and the cost of borrowing is reduced. The alternative “risk-selling” hypothesis posits that lead banks are more willing to syndicate a larger fraction of riskier loans. Potential syndicate participants are then likely to demand higher risk premia. After controlling for various other loan characteristics, the authors show that with respect to loan spreads the information-selling seems to prevail as syndicated loans on average have lower

⁵¹ Note: There’s also a rich literature on the pricing of bonds. This is not the focus of this study, however. Still, the author may comment on such examples, especially in a project finance context.

spreads than loans offered by a single lender. However, for revolving credit facilities there are signs of the risk-selling motivation – lead banks may attempt to recover some of the costs associated with information-selling. In order to do so, they charge higher fees for this particular loan type.

Gottesman and Roberts (2004) investigate the relationship between corporate loan spreads and maturity and introduce two competing theories. The “trade-off” hypothesis understands higher spreads as compensation for longer maturities as lenders would prefer shorter maturities for better control of agency problems. This hypothesis competes with the “credit-quality” hypothesis which states that riskier borrowers are forced into short-term loans so that lenders can limit their exposure and if need be liquidate the loan at maturity, an outcome dreaded by riskier borrowers. Their empirical analysis strongly supports the trade-off hypothesis as longer loans tend to require higher spreads. Expected loan liquidity post-origination – here, defined as the ability of a loan to be sold in the secondary market, without the need for a discount – has been investigated by Gupta, Singh, and Zebedee (2008). Their results indicate that increased secondary liquidity yields benefits for loan originators which they (partially) pass on to borrowers via a reduction of loan spreads. After accounting for several other risk factors, syndicated loans clearly seem to price in expected liquidity. Wittenberg-Moermann (2009) also relies on a liquidity measure, but for different purposes as she investigates information asymmetries. More precisely, she uses bid-ask spreads of loans traded in the secondary market to proxy for borrower opaqueness. She then goes on to show that high bid-ask spreads (i.e. more opaque borrowers) lead to higher spreads in subsequent syndicated loan issues of the same borrower. Non-price terms are also affected as higher bid-ask spreads are likewise translated into shorter maturities. Focarelli, Pozzolo, and Casolaro (2008) et al. report lower interest rates for short-term loans and offer various explanations ranging from higher probabilities of default through high-risk firms choosing longer maturities to avoid refinancing risk to the reduction of potential agency conflicts since short-term loans allow for more frequent renegotiations. Maskara (2010) demonstrates the economic value of loan tranching from a borrower perspective (i.e. overall reduced borrowing costs). Tranching loans, she argues, allows borrowers to skim off the risk-appetite of different lender groups. Thus, after controlling for other risk characteristics, tranced

loans are found to have lower credit spreads than otherwise identical loans that have not been tranching.

Performance pricing (i.e. performance pricing covenants) also have an impact on syndicated loan spreads. Being a tool that adjusts post-issuance loan spreads according to the borrower's performance, such a framework can be expected to also have an effect ex-ante. Research shows that most of the performance pricing covenants are accounting-based, instead of being debt-rating based which would be an alternative. On average, accounting-based performance-pricing covenants lead to a reduction of loan spreads by roughly 52 bps (Panyagometh, Roberts, Gottesman, & Beyhaghi, 2013). The authors interpret this reduction as a sign of better control of information asymmetries and recontracting costs associated with the use of such covenants.

Altunbaş and Gadanecz (2003), while focusing on borrowers from developing economies, scrutinize various macro- and micro-economic variables and come up with results that are mostly in line with expectations. By way of example, loans extended to riskier borrowers (e.g. signaled by the pledge of collateral) are more expensive, loan size has a negative impact on pricing⁵² and generally favorable economic conditions (e.g. expected GDP growth) drive down the cost of loans. Gong, Jiang, and Wu (2018) stay within the realm of emerging economies but are preoccupied with the effects of foreign currency loans. They provide a couple of arguments for the fact that foreign currency denominated loans in many emerging economies are priced with a lower spread ("foreign currency effect"), even after controlling for various other risk factors and the endogenous choice of currency. The effect is most pronounced when syndicate members are able to lend in their domestic currency, emerging markets are less open from a capital standpoint and after the financial crisis. These observations, the authors infer, are driven by a combination of different factors such as ample liquidity and low funding costs in developed home markets of lenders, reduced exchange rate

⁵² This finding could have a series of alternative explanations: i) the ability of safe lenders to secure larger loans, ii) larger loans being made to larger, more transparent lenders with an alternative access to capital markets and iii) the ability of lenders to exploit economies of scale (Angbazo, Mei, and Saunders (1998); K.-H. Bae and Goyal (2006); Godlewski et al. (2012); Focarelli et al. (2008)). Alternatively, a positive relationship would be conceivable if the individual loan would increase borrower leverage substantially and/or have rating impact. Bouzguenda (2014) and Thia (2019) further note that larger loans could imply higher concentration for the lender in terms of single-name, sector and country risks and thus introduce priced risk via the lender channel. Thia (2019) also submits that larger loans tie up more of the lender's capital – in his work he shows a positive relationship between loan spreads and loan size.

risks for lenders, risk sharing motives (from local participants' point of view) and diversification benefits that are passed on (from foreign lenders' perspective). On a related note, Knyazeva and Knyazeva (2012) show that (physical) distance matters in the lending market. Loan spreads are significantly increasing in the geographic distance between lenders and borrower, all else equal. Information gathering and ex-post monitoring are hampered by larger geographic distance. But other, non-price loan terms are affected as well, as covenants and demands for collateral become more likely in geographic distance.

Carey and Nini (2007), having controlled for borrower, loan and lender characteristics, make the puzzling observations that there are significant differences between the loan spreads of loans issued in Europe and the United States. Loans in Europe, they find, are about 30 bps cheaper over the previous decade. They argue that both lenders and borrowers exhibit palpable home bias, but provide no definite explanation for the observed phenomenon. Houston et al. (2007) build upon this "pricing puzzle" and also find that European loans are priced about 40 bps cheaper than North American loans in their sample, under the caveat that these results primarily hold for borrowers that have no complete access to the international markets. Large North American firms with larger businesses overseas are able to tap into the "discounted" European lending markets, potentially due to reduced informational barriers. With regards to the underlying drivers of the pricing discrepancies, the authors surmise that larger competition in Europe (which per se is more reliant on funding provided by banks) may drive spreads down, while limited competition in the US enables banks to keep loan spreads at higher levels. Gurara et al. (2018) corroborate the loan differentials while investigating the influence of development banks. They show that loans issued in Euro enjoy a discount as compared to USD-denominated loans. Berg, Saunders, Steffen, and Streititz (2017) are able to replicate the findings of Carey and Nini (2007) above, both on economically and statistically. But, in addition, they show that there's a catch. First, they distinguish between term loans and credit lines. Certainly, they find, US borrowers pay higher loan spreads. However, they argue that spreads are only one side of the coin. Various fees embedded in loan contracts are the other side and in order to make an inference as to if there's really a pricing puzzle, they need to be taken into account. After doing so, the authors find that borrowing costs for credit lines are similar in both markets, US borrowers pay

substantially lower fees. The pricing gap for term loans is still persistent⁵³ but can be closed substantially by controlling for various measures including borrower's post-performance, profitability, etc. Furthermore, recent observations by Burietz, Oosterlinck, and Szafarz (2017) hint at geographic differences of accounting standards being one of the main drivers. They introduce region-specific credit ratings reflecting such deviations. After controlling for these ratings, the pricing gap between Europe and the US is rendered insignificant.

Thia (2019) delves into the seemingly contradictory paths that the risk-free rate and loan spreads have taken in the wake of the GFC. While "risk-free" rates (e.g. LIBOR and other interbank offered rates) have nosedived substantially and stayed at historically low levels, lending spreads have hiked noticeably and are still at substantially higher levels than before the crisis. The latter, rather casual observation is confirmed by his study as regression results show a clear impact of the crisis. In sum, borrowing costs are not as low as a simple look at interest rates may suggest. Loan tenors, in return, he finds, have not changed structurally seeing that they tend to be pro-cyclical. After a contraction during the crisis, they have reverted to average levels since then.

In a study related to the work of K.-H. Bae and Goyal (2009) which will be discussed further below, Qian and Strahan (2007) comment on the role of creditor protection as part of the legal framework in the borrower country. According to their results, longer maturities and lower interest rates are a direct consequence of better creditor protection – that is in countries with weaker creditor rights shorter tenors may substitute for loan spreads in order to control credit risk. Laeven and Majnoni (2003) further contribute to the literature spotlighting the relevance of judicial efficiency. Since judicial efficiency achieves to reduce uncertainty in bad states of the world and speeds up judicial decision making and bankruptcy procedures, lenders are inclined to offer lower spreads. Fotak et al. (2019) concern themselves with another particular feature of legal frameworks, so-called bilateral investment treaties (BITs) that are supposed to protect investors from political (in particular that of expropriation) and legal risks in the borrower country as they reinforce property rights. They demonstrate that BITs in place, used as a proxy for increased property rights, lead to a reduction of spreads and are especially impactful in countries with previous cases

⁵³ Note that for term loans the fee component is usually of lesser importance.

of expropriation. Analogously, they show that expropriations in the past substantially increase loan spreads by about 100 bps. Unsurprisingly, loan tenors are negatively affected by past expropriations, as well. But again, a BIT in place is able to - at least partially - offset this effect. Loan size and property rights also are positively related. Beyhaghi, Dai, Saunders, and Wald (2018) further contribute to the stream of literature that examines the role of legal frameworks in a lending context⁵⁴ and which usually focuses on the legal state of affairs in the borrower's country. Yet, they add a twist since they do focus on the laws applicable to the lenders. This is of importance since sometimes lenders secure "home-field advantage" by the implementation of so-called "choice of law" provisions. This is preferable, as (international) lenders are wary of local courts favoring local borrowers. Consequently, the authors show that stronger *lender* creditor rights are linked to lower spreads even after accounting for borrower country laws (which empirically still show a stronger effect) - an additional point in the used lenders' creditor rights index roughly yields a 4% decrease in spread. But not only the price of a loan is affected, stronger legal rights in the lenders' country favour larger and more long-term loans, as well. Naturally, the political parameters of both borrower and lender countries have the ability to impact loan terms. Kim (2018) inspects the influence of political uncertainty⁵⁵ induced by general elections in the lender country. In line with her initial expectations, she observes that electoral uncertainty increases borrowing costs as lenders pass-through the "uncertainty premium".

Cook, Schellhorn, and Spellman (2003) show that lenders are able to extract a premium for the certification they provide when they grant a loan. Thus, (especially opaque) borrowers are both willing to pay and in need for the certification provided by lenders with a high reputation where they proxy higher reputation by means of lender rating and lenders' total assets. As spreads of credit default swaps (CDS) over time have become the dominating alternative benchmark and proxy for single-name credit risk, it's no surprise that Norden and

⁵⁴ The seminal efforts of Djankov, McLiesh, and Shleifer (2007); Djankov, Hart, McLiesh, and Shleifer (2008); La Porta, Lopez-de-Silanes, and Shleifer (2008); La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997); La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1998) provide a thorough understanding of the characteristics and importance of legal frameworks whereas the, by way of example, the combined efforts of K.-H. Bae and Goyal (2009); Esty and Megginson (2001); Laeven and Majnoni (2003); Qian and Strahan (2007); Subramanian and Tung (2016) elaborate on the effects of these frameworks.

⁵⁵ Kim (2018) refers to political uncertainty as the uncertainty regarding potential policy changes at a future point in time. Electoral uncertainty is a specific source of such uncertainty. Clearly, the outcome of elections may have a severe impact on future policies.

Wagner (2008) observe that changes in CDS spreads have a strong impact on subsequent loan issues – 25% of subsequent changes to loan spreads can be traced back to their positive relationship with CDS spreads, the authors note. Naturally, however, the observation of this effect is limited for those entities which have traded CDSs. Bharath, Dahiya, Saunders, and Srinivasan (2011) add to the literature in terms of how previous and concurrent relationships are reflected in loan pricing and record a reduction of loan spreads by 10-17 bps if the loan is extended by a repeated lender. They further note that relationships become more relevant for opaque borrowers.

In the following, the author will focus on studies that establish a connection between syndicate structure (as defined by one of the many measures we have learned about in the previous section) and the determination of different loan characteristics.

Bosch (2007) targets the link between syndicate structure and loan spreads. Initially, he reports that informationally challenging borrowers face higher loan spreads. Thus, higher information transparency, achieved by credit ratings and being listed on a stock exchange, lowers loan spreads markedly. Transparency vis-à-vis potential lenders is further fostered by repeated transactions, relationship-building, therefore, drives costs further down, ceteris paribus. Finally, syndication takes its toll as information asymmetries among MLAs and participants require two additional premia. Uninformed participants require an “information risk” premium. This premium is, however, inversely related to the second premium what he christens “diversification risk” premium. Lead arrangers holding larger shares of the loan reduce agency problems (i.e. reduce the required information premium) but expose the MLA to higher concentration risk. This, in return, raises the diversification premium required by the MLA. S. Bae et al. (2014) use similar concepts. What Bosch (2007) calls information risk, they refer to as the “diversification hypothesis”. Bosch’s diversification risk is interchanged with the notion of “concentration”. As a result of their work, they further nourish the diversification hypothesis. They test two measures of syndicate structure: i) the proportional number of lead arrangers in the syndicate (“number concentration”) and ii) the relative loan share held by these very arrangers (“amount concentration”). After controlling for other risk factors, they find a significantly negative relationship between both of these concentration measures and the credit risk premium. Arguably, more dispersed syndicates, therefore, require higher margins as the risk becomes more diversified among a wider group of lenders

and in particular participants who in return require a higher premium to join the lending group. Ivashina (2009) and an earlier working paper (2005) further add to this stream of literature and provide additional insight into the forces leading to the equilibrium outcome. Firstly, she confirms the negative relationship between loan spreads and MLA share, in her sample, a 9% increase in the retained share reduces the required spread by approx. 29 bps. In her eyes, this is motivated by the reduction of asymmetric information. The share retained by the MLA is determined by a second factor, the diversification effect, which affects the MLA's pricing considerations in the light of his idiosyncratic credit-risk exposure. The pricing and determination of the structure of syndicated loans is, therefore, a bargaining process between MLAs and participants where two different effects work in opposite directions. An increase in MLA share reduces the spread demanded by participant banks to compensate for information asymmetries, but drive up the spread demanded by the MLA associated with its higher credit exposure. *"The equilibrium relationship between spread and lead bank share is determined by the point where the lead bank's required marginal premium (driven by credit risk) is equal to the participants' required marginal premium (driven by information asymmetry)."* (Ivashina, 2005, p. 7). Angbazo et al. (1998) report lower spreads for loans in which the lead lender retains a higher share and thus signals the observance of its monitoring duties. They find confirmation in the work Focarelli et al. (2008) who make the same observation. They call this certification on the part of the lead arranger. Larger loan shares incentivize both ex-ante screening and ex-post monitoring, therefore certify the efforts of the MLA and become a proxy for information asymmetries (Gadanecz, Kara, & Molyneux, 2012). In line with expectations, the certification effect is stronger in the case where asymmetric information between the borrowers and the lending group and among the lending group itself is the greatest. Gadanecz, Kara, and Molyneux (2010) confirm the findings (i.e. uninformed lenders require an information premium⁵⁶) and discern that credit ratings, as a means to reduce borrower opaqueness, have the ability to reduce this impact as they "level the playing field". Furthermore, they shine a light on the role of MLA reputation and show that reputation is only a factor for borrowers that are more transparent, to begin with. In a later study, the same authors explore the importance of repeated transactions by developing

⁵⁶ Again, this premium is two-fold: i) ex-ante premium for possessing inferior information and ii) ex-post premium concerning the monitoring efforts of the MLA.

various relationship measures. With the aid of repeated transactions and the building of relationships, participant lenders can evolve into informed lenders who are less dependent on the MLA – informational frictions and loan spreads are reduced in lockstep (Gadanecz et al., 2012). McCahery and Schwienbacher (2010) report that (high) reputation of the MLA is mostly relevant for borrowers without a credit rating, i.e. for those which are willing to pay a higher spread for the provided “certification”⁵⁷. Champagne and Coggins (2012) perceive this phenomenon differently. They find that the positive relationship between MLA reputation and spreads only persists for transparent borrowers. In the case of opaque borrowers, no such relationship is observable – as the benefits of having a high-quality MLA cancel out the price paid for the certification. Hence, borrowers profit from the provided certification. Ross (2010) does not content himself with reputable lenders but focuses on “dominant” lenders in the US market, namely the Big 3 that are JPMorgan Chase, Bank of America and Citi. He finds that the involvement of any of the Big 3 negatively and significantly affects loan spreads. He sees this as signs of a “win-win-win” situation. Borrowers profit from lower borrowing costs, the dominating banks are able to capture a larger fraction of the upfront fees and market share, and participant banks readily join the syndicate, foregoing both some basis points of spread and a fraction of the fees. They do so gladly, however, as they profit from the dominating banks’ superior screening and monitoring abilities. Godlewski et al. (2012) approach lender reputation from a network perspective. Reputable lenders are those who are more central in their syndicated lending network, where centrality implies the accumulation of social capital through repeated interactions. Social capital, in turn, nurtures experience and reputation which allow mitigating information frictions. Applying different measures of network centrality as proxies of reputation and experience, he shows that borrowers profit if syndicates are formed by lenders that are more central in the lending network as loans offered by such syndicates have lower spreads. Cai (2010) delves deeper into the relevance of reciprocity and shows that spreads decrease for loans that have reciprocity⁵⁸. Findings of Cai et al. (2018) imply that “close” syndicates formed by lenders with similar lending expertise have a negative effect on loan spreads for their

⁵⁷ The authors note that these findings differ from the public markets (i.e. bonds) where reputable underwriters still certify the quality of the issue, however, the signal is a reduced spread instead hinting at higher issue quality and lower risk.

⁵⁸ As a reminder, reciprocity was defined earlier as the reversal of the arranger-participant relationship between two lenders in subsequent loan syndications.

complete sample period. In earlier research, they highlight that this is particularly the case for opaque borrowers (Cai et al., 2017). Syndicate participants that are “close” to the MLA can effectively support him in different screening and monitoring tasks which are especially costly for borrowers with little available information. Some of these cost savings are then passed on to the borrower in the form of a reduced margin. However, after the crisis, close syndicates are to some extent able to lock in borrowers and extract higher spreads (“price collusion”). Champagne and Coggins (2012) confirm that coherent and higher-quality syndicates effectively reduce information asymmetries and negatively impact credit spreads. However, they also find that heterogeneous and less concentrated syndicates can have the same impact. The channel is different though, as the advantages are not rooted in the reduction of informational frictions but are attributed to diversification benefits.

In their work, K.-H. Bae and Goyal (2009) are primarily concerned with both creditor rights and the enforceability of said rights in the borrower country, but control for the impact of syndicate structure, too, and deliver further insights in that regard. Besides, they show that poor enforceability is related to smaller and shorter loans and higher loan spreads⁵⁹. Weaker creditor rights fail to have a statistically significant impact on loan size and maturity, but stronger creditor rights go along with lower spreads. The authors then show that larger syndicates and those with higher involvement of foreign banks have lower spreads. Thia (2019) confirms the diversification or deterrence effect as he, too, observes reduced spreads for an increase in the number of syndicate participants. On top of this, participation by agencies leads to longer maturities, lower spreads, and larger loans – highlighting the enabling nature of development banks and other agencies (K.-H. Bae & Goyal, 2009). Giannetti and Yafeh (2012) provide further insight into country-specific differences and concentrate on cultural aspects. They show that culturally distant MLAs show some effects on both price and non-price terms of syndicated loans. Loan spreads are increasing in cultural distance whereas loan size decreases and maturities are not affected. Additionally, culturally distant MLAs show a propensity for third-party guarantees. As possible

⁵⁹ Limiting both loan size and maturity can be seen as tools to restrict borrower flexibility and limit the riskiness of the assets. Smaller loan sizes reduce overall exposure while shorter tenors allow for the more frequent review of lending decisions (K.-H. Bae and Goyal (2009)). Unsurprisingly, earlier work, therefore, shows that long-term loans fetch higher loan spreads (as they exacerbate agency problems and reduce loan liquidity) and loan size has a statistically significant negative coefficient (K.-H. Bae and Goyal (2006)).

explanations, the authors cite both increased contracting costs and costly information production.

Nandy and Shao (2010) reflect on the reasons why institutional loans incur higher loan spreads than loans funded by banks alone. For this purpose, they present two competing theories. Their “selection effect hypothesis” accommodates the observation that institutional lenders - on their “search for yield” - fund loans to riskier borrowers, for riskier purposes, that are more likely to be secured and have stricter covenants, and therefore earn a higher yield. Maskara and Mullineaux (2010) lend additional support to this reasoning as they report that institutional lenders show a propensity for investing in riskier multi-facility loans because the heterogeneous group of non-bank lenders typically exhibits a higher appetite for risk⁶⁰. However, higher, deliberately sought out risk fails to fully explain the spread differential. Thus, the authors advance a second theory (“asymmetric information hypothesis”). As banks rebuff these loans, borrowers have to rely on lenders that are less informed and therefore must produce information which in itself is a costly process. As a result, after having controlled for the selection bias, higher loan spreads can be interpreted both as the compensation for costly information generation and the incentive to attract institutional lenders as “lenders of last resort”. As institutional investors become more experienced over time, this theory also (partially) succeeds in explaining why the spread differential has shown a decline over time⁶¹. Lim et al. (2014) study the impact of non-bank lenders, as well. They find, much in line with the authors above and after controlling for various risk factors, that loan tranches involving institutional lenders have higher spreads than otherwise identical bank-only loans. Their explanations for this phenomenon again follow along the lines of Nandy and Shao (2010). Institutional lenders are lenders of last resort and get involved when borrowers face either financial constraints or banks are less willing to fund them⁶². In order to attract non-bank lenders which regularly have

⁶⁰ Let’s recall for example, that they may be, on average, less regulated but also less informed, have higher return targets and fees to cover, focus on different sector and situations, have differing business models, have varying obligations and liability structures, and/or may face higher funding costs themselves.

⁶¹ An alternative explanation proposed by the authors is the increasing competition originating from ever more institutional investors pushing into the market.

⁶² This is in line with earlier research by Denis and Mihov (2003) who present evidence that, on balance, it is borrowers with the lowest credit that borrow from non-bank lenders. In their eyes, private institutional lenders, thus, close the financing gap at the bottom of the credit quality spectrum.

substantially higher return requirements and funding costs⁶³, a higher spread is required. They further expand on these findings and show that different non-bank lender types (i.e. hedge funds, private equity firms, insurance companies, etc.) have varying effects on loans spreads as non-bank lenders aren't a homogenous group in itself. Beyond that, they show that spreads increase in the relative amount funded by non-bank lenders. Commercial banks, on the other hand, may entice borrowers with a discounted spread if they see the potential to earn additional income from longer-term relationships and cross-selling. Beyhaghi et al. (2019) propose an alternative explanation for the apparent premium that non-bank lenders require. The premium is reflected by the fact that adding non-banks to the syndicate and increasing the relative share held by non-banks both lead to higher margins. Firstly, they agree that higher spreads may reflection of the "search-for-yield" of institutional lenders, as other authors have argued before. But then they also suggest that commercial banks generally hold more diversified loan portfolios so that they're mostly pricing the systematic risk contribution of a newly issued loan while non-bank lenders also have to account for idiosyncratic loan risk given their inferior diversification. On a side note, the authors also report that increasing the syndicate, both by adding commercial banks and non-banks, lengthens offered loan tenors. Ivashina and Sun (2011) have a closer look at what they refer to as institutional demand pressure. They are able to demonstrate that the influx of institutional funds may have a sizeable impact on loan spreads due to increasing demand. In order to do so, they proxy institutional demand via the time-on-the-market, that is the time required until successful syndication. They show that for loan tranches where institutional investors are involved, increasing institutional demand - as proxied by shorter syndication periods - impacts loan spreads negatively, after controlling for other risk factors⁶⁴. Carey et al. (1998) point out that syndicate participation by finance companies is associated with higher spreads because finance companies tend to "specialize", that is to lend to substantially riskier borrowers. Higher riskiness is, for example, reflected in a higher percentage of secured loans once finance companies are involved. Chernenko et al. (2018) who also

⁶³ Commercial banks have access to "low-cost" (insured) deposits and thus mainly intend to cover the risk-free rate plus credit-risk. Private equity firms and hedge funds on the other hand, not only try to satisfy lofty return requirements of their original investors but also must earn enough to warrant their sizeable management fees.

⁶⁴ Considering the findings of Ivashina and Sun (2011) and Lim et al. (2014) conjointly, the attentive reader may ask himself which effect institutional involvement may have in the long run. Higher spreads due to higher return requirements could be eventually eroded away if institutional demand pressure were to persist.

observe significantly higher spreads paid by borrowers from non-banks, address loan types as they argue that non-banks are far more likely to invest in junior or second lien tranches. Alternatively, like other authors before them, they reference higher institutional funding costs for non-banks. Grupp (2015) joins the ranks of studies finding meaningful spread differentials between non-bank syndicates and pure bank syndicates. They report a 38% spread increase meant to compensate non-bank borrowers for extending loans to more informationally challenging and riskier borrowers and increased within-syndicate information asymmetries if non-banks are taking the lead. Non-bank MLAs, thus, have severe effects, while the impact of non-bank participants joining bank-led syndicates is more moderated (+105 bps in the first case as compared to an additional markup of 24 bps in the latter case). Finally, Tesauro also succeeds in identifying a non-bank premium in the syndicated loan market. Including a rich set of covariates, he isolates a statistically significant premium of approx. 50 bps. His work, however, does not stop there. Acknowledging the heterogeneity of institutional lending groups, he decomposes his institutional investor dummy into several dummies representing various sub-investor classes including private debt, private equity, hedge funds, finance companies, investment funds, insurance companies, and other lenders. He then proceeds to demonstrate that these sub-classes require different, statistically significant risk premia. It doesn't come as a surprise that, given the varying institutional backgrounds⁶⁵, hedge funds are found to require the highest premium, followed by private debt and private equity investors. In a more banking-specific study, Harjoto et al. (2006) compare the pricing terms of syndicated loans extended by investment and commercial banks. While not delivering a definite answer as to the observed pricing differential, after controlling for the riskiness of the borrower and the loan itself, they surmise that differences in funding costs (e.g. commercial banks' advantageous to collect insured deposits) and varying degrees of relationships to the borrowers play an important role. More recently, development banks of many different forms play an important part in syndicated lending and their presence is an important aspect of syndicate structure. Therefore, they are studied in detail by Gurara et al. (2018). Based on arguments presented in more detail in the previous section (i.e. risk mitigation, structuring expertise, etc.), the authors find that the presence of development banks increases loan tenors, generally implies

⁶⁵ See footnote 60 above.

higher borrowing costs as they focus on high-risk projects unable to find complete funding in the private markets and reduces loan spreads for particularly risky projects. Furthermore, loan size seems not to be affected, calling into question the mobilization hypothesis alleged by many market observers. With particular regard to loan tenors, the results are economically meaningful as average tenors are increased by about two years – development banks certainly seem to be able to extend longer maturities than the private sector alone. In Broccolini et al. (2019) the authors also find a positive effect of development banks on loan tenors. Development bank syndicate participation in a specific country-sector combination increases loan tenors in both of the following two years with the cumulative effect averaging out at approx. 0.8 years.

Houston et al. (2017) address the effect of foreign lead arrangers. They find that borrowers with foreign assets are more likely to approach foreign lead lenders and the location of foreign assets is predictive of the foreign lead arranger's nationality. They surmise that foreign assets help to bring down geographic barriers and reduce informational frictions. In conjunction, this results in enhanced capital access and is one possible explanation for why foreign lead lenders have a negative effect on loan spreads, as the authors find.

Finally, there has been done substantial work on syndicated loans in a PF context.

Kleimeier and Megginson (2000) in an earlier and Pinto and Alves (2016) in a more recent Europe-centered study show that - contrary to popular belief and the no-recourse, no-history character of PF - PF loans spreads are fairly in line with the spreads of general syndicated loans and are lower than the spreads of corporate control (i.e. those for LBOs) and capital structure loans (i.e. those for recapitalizations or debt repayments) in the earlier study and lower than corporate control loans and general corporate purpose loans in the more recent one. The work of Ferreira Coelho (2016) shows similar results. PF, therefore, must possess other comparative advantages that explain this apparent contradiction. In a more general study, they also show that PF and non-PF loans are priced in segmented capital markets, that is their pricing is contingent on different factors and common factors affect them to varying degrees. For PF loans they report higher spreads for borrowers from industries with many tangible assets, reduced spreads for deals covered by third-party guarantees (Kleimeier & Megginson, 2002). The latter observation is corroborated by a recent study by Bouzguenda

(2014) who particularly highlights the spread-reducing effect of third-party guarantees in countries with higher levels of country risk. In addition to that, loan size seems to have no impact on their work. Finally, they show that spreads and fees are of complementary rather than supplementary nature⁶⁶ because coefficients on participation fees and commitment fees have a significantly positive relationship with loan spreads (Kleimeier & Megginson, 2002). Regarding loan size, Ferreira Coelho (2016) presents contradictory evidence – a 1% increase in loan size, all things equal, goes hand in hand with a spread reduction of about 11 bps. Bouzguenda (2014) intensifies the notion that riskier projects have to post collateral⁶⁷ as she detects a sizeable positive effect of reported collateral on PF loan spreads. In a recent study, Marques, Megginson, and Pinto (2017) compare the ex-ante credit spreads of structured (including project finance) and straight debt finance in Western European markets between January 2000 and December 2016 and find that they are impacted to varying degrees by common pricing factors. Most notably, straight debt places particular emphasis on the borrower's characteristics, whereas structured finance is more reliant on deal specifics and risk-management considerations. They test for a great number of different factors which will not further be explored here. The interested reader may refer to their work directly. Blanc-Brude and Yim (2019) compare the pricing of project finance loans with infrastructure corporate loans. As one would expect, there are some shared risk factors, yet their pricing may vary substantially. Firstly, they come to the realization that in the face of the paucity of observable data and the dependence on the underlying private infrastructure market, a large component of loan spreads can be explained by the spread of previous transactions (i.e. spreads are auto-correlated). Hence, a general, time-varying market trend is the largest driver of credit spreads reflecting the general state of the infrastructure credit market at a given point in time. Bharath et al. (2011) and Fotak et al. (2019) also employ variables that reflect time-varying trends in loan spreads. For Blanc-Brude and Yim (2019), the next main component of spreads is the credit risk component which is contingent on factors such as loan size (having a negative impact that signals lower credit risk) and industry classifications. Further priced risk factors are liquidity proxied by various measures and maturity. Refinancings should not drive spreads during normal times but are timing-dependent, that is

⁶⁶ Angbazo et al. (1998) observe similar behavior for highly-leveraged loan transactions.

⁶⁷ An early and general study regarding the role and signaling quality of collateral has been carried out by Berger and Udell (1990).

they may have an impact if debt falls due in times of market distress. In an early experiment covering the Australian PF space, Nguyen and Ross (2006) asked participants for their perception of the importance of five different project finance risk factors and to which degree the project credit risk premia would be affected by these. According to the respondents' answers changes in market risk would account for roughly one third (33%) of the change in risk premia, followed by operating risk (21%), sponsor risk (20%), regulatory/political risk (16%) and environmental risk (10%).

Esty (2004) observe a positive connection between PF loan spreads and the relative loan share held by foreign banks while the loan share increases in the participation of a bi-/multi-lateral agency. Generally, they link these findings to observations concerning the legal protection of lenders and suggest that foreign lenders need to be incentivized to enter countries which are initially perceived as less attractive from a legal standpoint. Ahiabor and James (2019) chose a different approach and center on the influence of domestic lead arrangers in emerging markets. They record a significant reduction of PF loan spreads owing to the certification provided by domestic lead arrangers who arguably possess superior market knowledge, are better able to mitigate political risk and are therefore better equipped to signal the quality of the loan package and perform ex-post monitoring duties, thus, overcoming informational frictions faced by syndicate participants. Their certification reduces loan spreads on average by 24 bps after controlling for other risk factors and potential selection biases. Yeh et al. (2019) make similar observations in another recent study. Ahiabor and James (2019) also report a significant negative relationship between agency involvement and loan spreads. These findings partially contradict⁶⁸ the results obtained by Gurara et al. (2018) who observe a positive relationship, at least in the case of development banks. Loans with development banks' interests on average are 66 bps more expensive than syndicated loans provided by commercial banks only. For PPP projects, however, and public sector borrowers in general development banks are associated with significantly lower borrowing costs. Cruz and Sarmiento (2018) make a similar observation regarding the involvement of the European Investment Bank in Portuguese highway PPPs.

⁶⁸ The evidenced differences highlight the fact that agencies can vary substantially in their nature despite their many commonalities. The goals and qualifications of development banks could, in theory, differ substantially from export-import banks and other agencies or even among different kinds of development banks.

Esty and Megginson (2000) carry out research at the interface between PF and syndicate structure and are able to demonstrate that loan pricing is a positive function of both syndicate size⁶⁹ and concentration, in line with theories of re-contracting and deterrence. The positive relationship of syndicate size is accordingly interpreted as the price for deterrence benefits while higher concentration is remunerated as it enables cost-savings in the renegotiation case and increases monitoring efforts. In addition, they show that higher country risk is related to higher lender compensation (incl. both spread and fees). A similar effect of country risk on loan spreads is also present in the study of Ferreira Coelho (2016).

Gatti et al. (2013) are more concerned with the role of the lead arranger in a PF context. Certification provided by more reputable arrangers (as measured by previous years' market shares), they show, results in lower spreads when compared to loans arranged by arrangers of lower reputation. Interestingly enough, they note that it's not the borrowing project that pays for this certification, but the participant banks who concede larger fractions of the up-front fees present in PF lending. A different aspect of project finance, albeit outside of the lending syndicate, is the role of financial advisors. Tandja M. et al. (2017) scrutinize the involvement of such parties and show that both the presence and the reputation of financial advisors influence the borrowing costs. Rooted in the fact that they derive a substantial part of their remuneration in the form of success fees, lenders are afraid that financial advisors try to sell excessively risky deals ("fear of risk hypothesis"). On top of this, the higher the reputation of a given financial advisor the stronger these concerns ("fear of advisor reputation hypothesis"). The authors present evidence of both hypotheses as the presence of financial advisors drives up loan spreads and even more so if the financial advisor is more prestigious.

Girardone and Snaith (2011), in turn, spotlight the impact of political risk with a focus on developing countries in particular. Complementary to Hainz and Kleimeier (2012), they use dis-aggregated measures of political risk and government quality (e.g. government stability, corruption, bureaucracy quality, etc.) and after controlling for macro-economic factors find that strong legal and institutional frameworks allow cheaper lending. Intriguingly enough,

⁶⁹ Ferreira Coelho (2016) also demonstrates that adding lenders to the syndicate reduces spreads at an approximate rate of 1.65 bps per lender.

they show that weaker and less stable governments in emerging economies further reduced loan spreads. They interpret this result as an indication that project risk is transferred to the host country. Bouzguenda (2014) focuses on an aggregated measure of country risk (including political components) and emphasizes its importance for both spreads and maturities. Higher levels of country risk result in higher spreads and shortened maturities. Currency risk is found to be insignificant. In the case of PF in Asia, Vaaler, James, and Aguilera (2008) acknowledge that “[legal] institutions matter” [p. 46] in the sense that according to their work legal systems tend to dominate other risk factors related to the economic state of a country or sponsor-related issues. Their work is mostly centered on PF leverage and they show that projects in common law countries with stronger creditor rights and faster judicial resolution processes usually achieve higher leverage (by approx. ten percentage points). Recent work of Tandja M. et al. (2017) provides further evidence for the negative spread impact of better institutional quality. Esty (2004) also confirms the importance of the legal framework for foreign lenders. Stronger protection of (foreign) lenders allows reducing the loan spread.

Moving on from political and legal frameworks, Thierie and de Moor (2018a) get to the bottom of the relevance of the (macro-)economic setting at the time of financial close and thus the timing of the syndication. After controlling for various other risk factors, they highlight the impact of different macro-economic measurables including economic growth, inflation, the central bank policy rate, the debt-to-GDP ratio and the return on equity of the banking sector in the project’s country. It follows a summary of their observations. Economic growth drives spreads, i.e. during boom periods loan margins are lowered across the board. Inflation also has a palpable negative impact on loan spreads. A one percentage point increase in the inflation rate yields a 25.6 bps reduction. Finally, higher levels of public debt seem to induce higher financing costs. In the eyes of the authors, this proposes conundrum. Infrastructure projects that are supposed to potentially last for decades are heavily influenced by short-term economic outlooks and prevailing economic conditions at the time of the syndication – projects that were financed during the GFC and thus faced higher loan margins *“will continue to [feel the impact] over the next 30 years, as the higher financing costs will persist throughout the operating period”* (Thierie & de Moor, 2018a, p. 22). Cruz and Sarmiento (2018) strike a similar chord noting that market conditions, particularly during the

GFC, had a substantial impact on PPP projects in Portugal, driving up their spreads. Furthermore, these observations find confirmation in the work of Moro Visconti (2010) who, in the case of Italian healthcare, dwells on the importance of borrowing conditions (“lending mood”) which may vary from lender to lender and the relevance of economic cycles. Additional research by the same author underscores the impact of monetary policies which are of course closely associated with the economic cycle (i.e. targeting a certain level of inflation) (Moro Visconti, 2016).

Pinto and Alves (2016) also cover the impact of the financial crisis and in line with what we would expect given what we have seen so far indicate that PF loan spreads in Europe have substantially increased in the aftermath of the GFC and the European sovereign debt crisis. Marques et al. (2017) further report a noticeable spike in PF loan spreads during the crisis supported by both univariate analysis and regressions on the credit spread. Their regressions use two different crisis dummies, one for the GFC and one for the European sovereign crisis. The first has a statistically significant coefficient of 157.9 bps for PF loans issued throughout the period (September 15, 2008, through April 23, 2010) and the latter one itches even higher, reaching 162,4 bps (for the period from April 24, 2010, to December 31, 2016). In line with expectations, PF loans also exhibit lower tranche sizes and shorter maturities during the crisis period. Blanc-Brude and Yim (2019) observe two “regime shifts” of market trends: up in 2008 and down after 2014.

Pinto and Alves (2016) provide further PF-related confirmation of the “segmented market theory” or “pricing puzzle” introduced by Carey and Nini (2007) for syndicated loans in general. In their study, the authors show that the pricing difference between PF loans in the US and Western Europe is statistically significant and totals approx. 85 bps. Evidence also suggests that the term structure of European PF loans is noticeably flatter than that of PF loans issued in the US (Ferreira Coelho, 2016). Blanc-Brude and Yim (2019) report similar observations but remark that the gap seems to vanish in the wake of the GFC.

As Craciun (2011) states, the tenors of PF are a special beast as they easily eclipse the tenors of corporate and other loans (often being two to three times longer dated). Ferreira Coelho (2016) offers a similar view. Longer tenors, as will see shortly may benefit lenders, but also sponsors certainly have an appetite for longer-dated funds as long-term borrowing has the

benefit of stretching repayments over a longer period, allowing for earlier and potentially higher dividends if the project stays on track. However, research in this direction has been scant compared to other aspects of PF lending. Gadanecz and Sorge (2008) examine the term structure of PF credit spreads which they find to be “hump-shaped”⁷⁰⁷¹. This reflects the decreasing nature of credit risk over time as both leverage decreases and uncertainty are resolved after the initial high-risk construction phase is successfully completed. Besides, they explain the importance of longer maturities as, all other things equal, longer maturities ease liquidity constraints in the earlier periods, effectively matching lower initial cash-flows with smaller repayments. Generally, longer tenors facilitate the matching of debt service and the revenue profile in PF deals (Sorge, 2004). In sum, the declining term structure, therefore, may reflect three different factors, these are declining leverage, the timing of cash flows and the resolution of uncertainty over time. Generally, these findings generally echo the results of Kleimeier and Megginson (2000) who show that not only are PF loans substantially longer than other loan types but also are subject to a negative relationship between maturity and spread while all other loan types show a distinctively positive relationship⁷². Bouzguenda (2014) confirms this negative relationship in a more recent study. On the face of it, Blanc-Brude and Strange (2007) admit that it looks like there is substance to the “hump-shaped” relationship, but digging deeper into their sample they argue that this may be misleading (at least for the case of PPP projects) and only valid for the cross-section. They find that after controlling for year and country effects, no specific term structure is implied. Thierie and de Moor (2018b) note the relative scarcity of work on loan maturities in relation to loan spreads. They analyze PF loan tenors against the background of four risk factors: project specifics, political risk in the project country, macro-economic conditions and the regulatory framework. Their most important, sample-based insights can be summarized as follows: Basel III as a proxy for regulatory risk has reduced average tenor length by 2.3 years, political risk has a negative relationship with tenors, tenors increase if agencies are present

⁷⁰ Marques et al. (2017) and Ferreira Coelho (2016) report robust indicators of the same shape in more recent studies.

⁷¹ Curiously enough, these findings in a way present an “impossible” state of affairs. Borrowers would naturally wish to borrow long-term at lower rates whereas lenders would have inherent preference for lending short-term at higher rates. Agency costs, however, would normally prevent such outcomes (Ferreira Coelho (2016)).

⁷² The authors come up with the relative simplistic explanation that an upward sloping term-structure in combination with the very long-term nature of PF loans would make long-term lending prohibitively expensive. Other than that, they provide no further insights.

highlighting once more their risk-mitigation abilities, PPP projects have substantially longer maturities given their sound political framework and green-field projects are offered rather short maturities. In a related study, the same authors find a statistically significant relation between loan spreads and maturity. This finding is mainly driven by PPPs though. Excluding such projects, the relationship is no longer significant.

Bonetti, Caselli, and Gatti (2010) deal with a specific risk transfer mechanism, off-taking agreements. In an ideal PF finance world, the risk that is credibly transferred has not to be borne by the project lenders and therefore should diminish loan spreads. Yet, the authors show that in the case of off-taking agreements a trade-off could be implied, as higher counterparty risk may substitute for market risk and thus impact financing costs. Increasing counterparty risk, *ceteris paribus*, has a positive impact on PF loan spreads.

Blanc-Brude and Strange (2007) limit their research to PPP projects. Neither the tranche size nor the size of the syndicate and the risk-free rate has significant effects but they show that instrument type is of strong importance and term loans, revolvers or mezzanine loans produce significant and largely varying effects. As expected, due to reduced uncertainty and risks, refinancings are typically priced at a spread lower than primary syndications. Dailami and Hauswald (2007) study credit-spreads of PF bonds and show that these are driven by un-managed risk factors while risks managed via the contractual network of a project have no effect. Contractual incompleteness that is not absorbed by hedging contracts, therefore, has to be borne by both equity and debt providers. In an older study, the same authors highlight the strong effect of inflation on foreign PF loans whose estimated coefficients are statistically significant in all of their model specifications (Dailami & Leipziger, 1998). The impact of inflation is also underscored by the work of Laeven and Majnoni (2003) in a broader lending context. Buscaino, Caselli, Corielli, and Gatti (2012) have a closer look at the factors driving the price of PF collateralized debt obligations (CDOs). They reveal that, just as in the case for corporate bonds, liquidity and (weighted-average) maturity are relevant factors driving spreads. More specifically, however, the quality of underlying project assets is of importance. Portfolios comprising a larger share of assets under construction or exposed to higher levels of market risks require higher primary market spreads.

This review shows us a couple of things. Firstly, a variety of work has been done addressing different pricing factors and focusing on different outcomes and measurables. Secondly, addressing non-bank lending in PF targets a veritable blind spot that has the potential to expand the existing literature. Thirdly, both general and PF syndication literature yield additional insights into which kind of variables may have to be included in our empiric model in order to make meaningful inferences. Evidently, measures of syndicate structure as just as important as project specifics and various indicators of legal, political, economic and country risk. Furthermore, it may prove to be rewarding to keep issues pertaining to the financial crisis and geographic segmentation in mind. In sum, the stage is set to proceed with the presentation of the author's research hypotheses and to start the empirical part of this thesis.

3 HYPOTHESES

As briefly commented in the previous section, non-bank involvement in project finance loan syndicates has been a relative blind spot in the literature so far. In connection with observations made in earlier sections of this thesis, this gives cause for a thorough empirical examination of the role played by insurance companies, pension funds, SWFs, asset managers, private debt funds and the many parties more that have become involved. Naturally, before the author plunges into a thorough empiric analysis, a formulation of some research hypotheses concerning the effects of loan spreads and tenors is in order.

The first hypothesis is motivated by the fact that different studies have demonstrated that without making any further distinctions with regards to their exact identity, non-bank lenders influence contractual terms and loan specifics. This gives rise to the first general hypothesis.

H_{0,1}: Syndicated PF Loans with non-bank lenders differ in terms of spreads and tenors from general syndicated PF loans.

The exact effect could go in different ways. As we have seen previously, non-bank lenders are relative newcomers to the market and definitely "light-weight" participants vis-à-vis bank lenders. The notion of "uninformed" may, therefore, be generally appropriate and we would expect informational frictions to exist both vis-a-vis the borrowing SPVs and "informed" banks in arranging and participating capacities. This perceived risk would then require higher spreads as a means of compensation or non-bank lenders would only be willing to

lend for shorter periods (i.e. shorter tenors) to limit their exposure. Alternatively, one could perceive that demand pressure from ever-increasing institutional market entry may lead to downward pressures on margins and the concession of longer tenors by institutional investors. While the author expects loan terms to differ, an exact prediction of the direction of the impact seems premature.

The second set of hypotheses touches on the observations made by other authors before. Institutional lenders come from a wide array of different investment backgrounds with different clientele and investment strategies. Given these differing backgrounds, we would expect varying effects. Hardly surprising, therefore, the second set of hypotheses goes as follows:

H_{0,2}: Loans with the involvement of “natural long-term investors” (pension funds, life insurance companies, and sovereign wealth funds) have lower loan spreads and extended loan tenors.

Given their theoretical desire to match long-dated liabilities, it's reasonable to expect longer maturities if any of these investors can be mobilized. With regards to loan spreads, the theoretical picture is less clear. On the one hand, these investors are still somewhat inferior when it comes to experience in the project finance space, a fact that could motive some sort of additional risk premium, i.e. higher spreads. Then again, some of these investors, as we learned before, have made substantial inroads in infrastructure investments and may have caught up with bank lenders to some degree from a skill-set perspective. Thus, an additional premium would be harder to justify. Beyond that, long-term institutional investors may actually have a funding-related advantage vis-à-vis banks for which long-term funding has become almost prohibitively expensive. As it's hard to determine which effect will dominate ex-ante, the author keeps this part of the hypothesis open and unbiased.

H_{0,3}: The involvement of “yield-seeking” investors such as, inter alia, private debt funds, private equity funds, asset managers, hedge funds, CDO/CLO, etc., is linked to higher loan spreads and shorter tenors.

These investors⁷³ are lacking the long-term liabilities that the previous investor group may desire to match. They are, however, mostly attracted to infrastructure owing to its return-enhancing potential, general diversification considerations, opportunities to earn substantial fee income and the relative attractiveness of infrastructure assets. As argued before, these investors have both higher funding costs driven by the return expectations of their original investors and want to pocket substantial fee income for themselves. In addition, given their relative inexperience, they may demand an additional risk premium if they were to contribute the needed funds or pro-actively single out riskier loan tranches that banks are hesitant to fund. In sum, it seems reasonable to expect them to have a positive impact on loan spreads. With regards to loan tenors, the author predicts a negative impact for various reasons. Again, for lack of long-term liabilities that need to be hedged, these investors may place greater store by liquidity and, therefore, shorter maturities. In addition, some of these investors may be influenced by the “duration” or lifecycle of their underlying funds – at the moment it is reasonable to expect that average holding periods for investments in these funds are substantially shorter than the loan tenors desired by project finance borrowers. Against this backdrop, the author expects shorter loan tenors for loans in which these lenders become involved.

H_{0,4}: The involvement of agencies (ECAs, (multi-/bi-lateral) development banks, Exim-banks, etc.) is associated with more favorable loan terms for PF borrowers, that is lower spreads and longer maturities.

Other authors have demonstrated the mitigating effects of these institutions both in general syndicated lending and in specific project finance contexts. In PF, they have the ability to mitigate certain risks (i.e. development banks in the context of political risk, in particular) and often-times possess the required technical expertise to contribute positively to various projects. Given this “enabling” nature, the author expects to be able to replicate previous

⁷³ Even this sub-aggregation still brings together an array of investors that may, to some extent, differ substantially with respect to the regulations applicable to them, governance limiting their investment approaches and required returns. Clearly, hedge funds are not comparable to private debt and other investors, per se. However, they share some common traits, inter alia, the mentioned lack of long-term liabilities. As a result, for this thesis, where there is a clear emphasis on the role played by the “long-term” investors given their potential and interest, the author deems it sufficient to contrast these two broader investor groups and distinguish them from other involved parties such as agencies, specialized lenders, etc.

findings, that is he expects to show longer maturities and reduced spreads for deals in which these institutions are involved.

In addition, arrangers arguably play a more important role than mere syndicate participants in the determination of the outcome of the syndication process. While their actions are scrutinized to a higher degree by participant lenders, they still benefit from the advantage to be able to influence the syndication process, at least to some degree, in their own interests. It might, therefore, be reasonable to assume that non-bank arrangers have a stronger impact compared to syndications in which non-banks only participate.

H_{0,5}: Syndications with non-bank arrangers show stronger deviations from bank-only syndicates compared to syndications in which non-banks only participate

The repercussions of the global financial crisis have been felt in many aspects of our lives and reverberated throughout the whole financial system. In its aftermath, a series of ever-tighter regulations have been enacted and/or are still waiting for their final implementation. Project finance was not able to emerge unscathed and Basel III has definitely taken its toll on the banking side of infrastructure finance. On the other hand, cash-rich non-bank lenders, in a low-yield environment fostered by central-bank-induced liquidity, have been drawn to the sector and are starting to gain a competitive edge. Consequently, the last hypothesis has to be considered in light of these developments.

H_{0,6}: The impact of non-bank lenders has been stronger post-crisis. This is expected to be the case for both the aggregated case and when differentiating among different sub-sets of institutional investors.

4 DATA & METHODOLOGY

4.1 DATA COLLECTION & SAMPLE

While most studies obtain loan data from either Dealogic's Loanware database or LPC's DealScan, for this study and for lack of access to the aforementioned sources, the author relies on tranche-level loan data from the ThomsonOne.com Investment Banking (ThomsonONE) database. Originally, he obtained a sample of 33,775 syndicated loans for the time-window from 1985 to the end of 2018 whose "Use of Proceeds" fall into the "Project Finance" category (as classified by the data vendor). After filtering for syndicated issues only, 18,129 loans

remain. Selecting only tranches for which initial all-in drawn pricing data is available, narrows the sample down to 8,577 loans. The sample is further reduced to 6,292 loans after selecting LIBOR as the desired benchmark. As only (financially) closed loans are permissible for the final sample, another 964 loans have to be removed from the sample, for a total count of 5,328 tranches. Subsequently, to allow for proper identification of the loan, the author checked whether a closing date is reported, otherwise, the loan tranche is removed. In doing so, he narrowed the sample further down to 5,174 tranches. As maturity is one of the loan characteristics of interest in this study, additional tranches had to be eliminated for which maturities could neither be observed directly nor be constructed manually from closing and maturity dates. This eliminated another 241 loan tranches, bringing the sample size to 4,933 loan tranches. Restricting the sample to loans for which lenders and loan amounts (in US dollar) are reported, eliminated another 5 loans for a count of 4,928 loans. As the author intends to employ a rich set of explanatory variables which will be discussed shortly in detail and for which often only limited time series and/or historical observations are available, all loans before 1997 and after 2017 have been removed for a total count of 3,811 loans. Stripping out all loans for which some of the desired variables are missing, reduces the sample to its final count of 3,558 fully-identified observations. The author has compared the properties of the reduced, high-information sample and the initially un-adjusted sample. Both are fairly in line and narrowing down the sample in the way described above does not entail the introduction of some selection bias in that sense. As our observations are at tranche-level we can also infer the number of loan packages. *The 3,558 loan tranches spread across 2,095 loan packages – approx. 1.7 tranches per loan package.*

A word of caution may be in order here with regard to the used database. As ThomsonONE only reports deals that have been *pro*-actively submitted to Thomson Reuters within ten business days from financial close, the sample at is probably far from being census data nor being a random sample of a larger population. The inferences made in the subsequent part of this thesis may, thus, be only applicable within the framework of this very sample and should be taken “with a pinch of salt” with regards to the general PF syndicated loan space.

ThomsonOne.com Investment Banking provides us with loan and some borrower specifics but for the remainder of the variables used in this study, the author had to fall back on a wide

range of other databases and sources. These will be referenced in more detail when the respective variables are introduced later on in this study.

4.2 VARIABLES

As this study focuses concurrently on two loan determinants, the author treats those two variables as dependent and being determined by a rich set of independent variables that account for project and loan specific features, borrower country characteristics, and legal/political/financial/economic frameworks. With regards to the sheer number of employed variables, project finance clearly stands out in the loan pricing literature as controlling for loan and borrower information is not enough given the inherent sensitivity of large-scale investment projects to other factors including syndicate structure, politics, law, and macro-economic developments.

The first dependent variable and our main object of interest is the *Initial All-in Drawn Spread (IAIDS)* in basis points provided by ThomsonONE. This measure of borrowing costs describes the price the borrower pays above the reference rate (here: LIBOR) for each dollar drawn. It is, therefore, an aggregation of the credit spread and any annual (or facility) fee that is paid on the drawn amount. While not reflecting the true (economic) cost of borrowing as it does not take into account a substantial number of potentially applicable fees⁷⁴ (Berg et al., 2016; Berg et al., 2017; Blanc-Brude & Strange, 2007) it is still a measure that has been used regularly in the loan pricing literature⁷⁵ and for reasons of comparability and its ability to capture at least some of the fee components the author chooses to follow this approach, as well. In this context, capturing at least some of the fees is preferable to the use of a credit margin alone since Blanc-Brude and Strange (2007) argue that credit spreads and fees are complementary and are both related to creditworthiness and performance of the borrower.

⁷⁴ Berg, Saunders, and Steffen (2016) and Berg et al. (2017) advocate the use of a more comprehensive measure which they call the Total-Cost-of-Borrowing (TCB) that also takes into account additional, potentially important loan pricing components such as up-front fees and “option-like” components such as commitment, utilization and cancellation fees. On top of this, IAIDS only accounts for fees paid on the drawn amount whereas the authors argue that some of the fee components apply to the undrawn amount and thus to another cost base. Blanc-Brude and Strange (2007) further argue that in the case of project finance multiple pricing structures can possibly exist at some point after closing due to the existence of step-up structures. Hence, the observed IAIDS may really only be a valid proxy of borrowing costs for the time around the financial close.

⁷⁵ Please, refer, for example, to S. Bae et al. (2014); Berg et al. (2017); Beyhaghi et al. (2018); Burietz et al. (2017); Carey and Nini (2007); Ferreira Coelho (2016); Fotak et al. (2019); Gong et al. (2018); Grupp (2015); Gurara et al. (2018); Houston et al. (2017); Ivashina and Sun (2011); Lim et al. (2014); Marques et al. (2017); Nandy and Shao (2010); Qian and Strahan (2007).

The second dependent variable is the original (final) loan *maturity* or *tenor* (*YRSFNLMAT*) at financial close, measured in years. Again, this variable is drawn from the loan sample obtained from ThomsonONE. In combination, *IAIDS* and *YRSFNLMAT* make up the term structure of loan spreads. As we will explore later, they may be determined simultaneously as they represent some kind of trade-off and are effective tools to price and manage risk.

In the following, the author will present a rich set of explanatory, independent variables that fall into different categories. Initially, the presentation will be restricted to variables used in the base case of the employed empirical models. Additional variables that will be used in alternative specifications and sensitivity tests will be introduced if and when they are employed for the first time. The base case variables fall into different categories and are related to the following issues: loan specifics and borrower, syndicate (structure), and economic, financial, legal and political frameworks. To keep this section condensed and to avoid undue repetition the author will not enter into details here with respect to the motivation behind the use of every single independent variable. He will, however, do so once the first empirical analysis has been run and benchmark his findings against results provided by the literature. For the moment, suffice it to say that all of the employed variables have been used on various occasions in different studies.

Let's start with the loan and borrower-specific variables which are mostly drawn directly from the loan sample gathered from ThomsonONE. These variables include *AMOUNT* (the principal amount of the loan tranche in US\$m), *CURRRISK* (a dummy indicating whether the project is subject to currency risk, i.e. the loan tranche is issued in a currency other than the one used in the borrower host country), *NR_TRANCHES* (the number of tranches in the loan package), *PERFPRICE* (a dummy variable indicating whether the loan tranche is subject to a performance pricing grid), *FUNDING* (a dummy variable indicating whether the tranche is fully funded at close, e.g. a term loan), *REFIN* (a dummy indicating whether the tranche is part of a refinancing), *PPP* (a dummy indicating whether the loan is issued in the course of a PPP project), *SUBORD* (a dummy indicating whether the loan tranche is subordinated), *LOANRATING* (based on reported loan ratings from S&P and Moody's and converted to a scale ranging from 1 to 5, following the methodology introduced by Corielli et al. (2010, p. 1302)), *COVENANT* (a dummy indicating whether any covenants are reported), *INSURED* (a dummy indicating whether any form of insurance is reported), *COLLATERAL* (a dummy indicating if

any collateral has been reported), *GUARANTEED* (a dummy indicating if any third-party guarantee has been secured, e.g. by a bank or a governmental body), *OVERSUBSCRIBED* (a dummy indicating whether the loan issue was reported as oversubscribed) and *TREND* (the average IAIDS of project finance loans issued in the 12-month period before the closing date of the respective transaction). As we will observe shortly in the descriptive statistics section, there seem to exist substantial pricing differentials between geographic regions in the sample data. Hence, the *TREND* variable has been averaged by geographic region to capture issuing market-specific trends as a global approach could yield distorted values. Finally, with regard to micro-economic variables, *REGULATED* codes loan tranches that are issued by utilities and its use has been inspired by the works of Bharath et al. (2011) and Fotak et al. (2019), while Barclay and Smith Jr. (1995) provided the original reasoning. Jointly the authors argue that higher regulatory scrutiny applied to these firms would imply lower agency costs for debt, potentially resulting in lower spreads and/or longer-term debt.

The next relevant set of independent variables is related to the observed syndicate structure. *LENDERCONCENTRATION*, for example, divides the number of arrangers by the number of lenders and implies a sense of the concentration of bargaining power within the syndicate and the distribution of managing tasks. *SYNDSIZE* is the syndicate size, measured as the number of lenders. *FOREIGNMAN* is a dummy variable that takes the value of one if any foreign lender is part of the syndicate or else zero. *NONBANK* is a dummy variable that indicates whether any of the lenders is a lender other than a bank (commercial or investment banks). *NONBANK2* and *NONBANK3* distinguish between the roles that institutional investors assume in the syndicate. *NONBANK2* captures tranches in which non-bank lenders act as arrangers whereas *NONBANK3* encodes tranches in which institutional lenders only participate. *SWFPENSUR*, *INVESTOTHER*, *CDOCLO*, *LENDOTHER*, *AGENCY* and *OTHER* provide further disaggregation with regards to non-bank lender identity and are specific dummy variables that account for the presence of natural long-term lenders (SWFs, pension funds and life insurance companies), other loan investors (private equity and debt, mutual funds, asset managers), CDOs/CLOs/specialized loan funds, other lenders (including finance companies, etc.), agencies (incl. ECAs and various development banks) and others (that cannot be classified, but aren't banks) respectively. *DOMESTICARR* takes the value of one if any of the arrangers is from the project host country.

In addition, the author uses a set of variables that try to capture the state of affairs in the fixed income markets at the time of financial close. Even though previous research has shown the level of interest rates does generally not impact the level of loan spreads, the author still includes the yield of 10Y-US\$-denominated government bonds (*US10Y*) to proxy the general interest rate environment at the time of the financial close. Additionally, the author includes two measures that capture the term structure of interest rates and the yield pick-up associated with different rating buckets. Therefore, *USSLOPE* is the term spread, i.e. the pick-up of yield by moving from a 1-year to a 10-year U.S. sovereign bond and *AAABBB* is the pick-up of yield by moving from US\$-denominated AAA-rated bonds to BBB-rated bonds. Certainly, these measures are centered on US\$-denominated markets which may imply that they are not the best controls for loans denominated in other currencies and issued in other countries. However, the sample at hand, in spite of its international quality, is heavily tilted towards the U.S., both in terms of currency and issued volumes. As the US equity and fixed-income markets are a fairly reliable bellwether for the state of the global financial markets. Hence, the taken approach still has its merits in terms of “ease of use” and explanatory power.

Next, the author employs a variable meant to control for the economic and financial situation and development in the project’s country. Here it would be tempting to employ a large set of variables, as the literature has made use of a substantial variety of different explanatory factors. However, as such an approach generally involves the risk of multicollinearity⁷⁶, in the base case the author restricts himself to the use of a single variable that aggregates different risk components including political, legal, financial and economic risks – sovereign ratings⁷⁷. *SOVRATING*, hence, follows the same approach as loan ratings (Corielli et al., 2010) and reflects historic and time-varying sovereign ratings from the three major rating agencies.

Additionally, *BASELIII* is methodologically guided by an approach proposed by Thierie and de Moor (2018b) and is a variable ranging from zero to one, increasing by one-seventh every year between 2013 and the end of 2018 to reflect the gradual phase-in of the Basel III

⁷⁶ Multicollinearity concerns in syndicated loan studies (with and without specific PF context) have, inter alia, been acknowledged by Champagne and Coggins (2012), Cruz and Sarmento (2018) and Hainz and Kleimeier (2012).

⁷⁷ In later specifications this aggregate measure will then be replaced with dis-aggregated measures that are able to capture political, legal, financial and economic risks individually.

framework. It is supposed to cover account for regulatory limitations and uncertainties revolving around the implementation of this new regulatory framework.

Finally, falling back on data provided by Moody's and S&P Global Ratings, three additional variables are employed to reflect the state-of-affairs in the infrastructure space. INFRARATESENTIMENT reflects the general rating sentiment for a given year, that is whether in any given year positive rating changes prevailed. The dummy, thus, takes the value of one if in a given year more upgrades were registered than downgrades. INFRADEFAULT, in turn, is the average annual default rate of infrastructure debt. In this context, a distinction is made between investment-grade and high-yield debt and the respective tranches are matched with the corresponding values based on their assigned loan ratings. Finally, INFRARECOVERY is the average annual recovery rate observed for a given year. When considered together, these three measures have the potential to shape investors' perceptions of the riskiness of infrastructure as a whole.

As mentioned before, these are only the variables the author will use in his base case model specifications. In alternative specifications and sensitivity tests, he will introduce additional variables, dummies and/or use dis-aggregated measures, e.g. in the case of the POLRISK variable.

4.3 UNIVARIATE ANALYSIS

The selected methodologies provide us with the necessary tools to answers the research questions at hand and determine whether the author is able to corroborate his hypotheses. In the first step, the author will, therefore, perform a univariate analysis. In this analysis, he will compare some of the loan features, most notably the loan spreads and the tenors of syndicated loan tranches, of bank-only loans and loans that involve non-banks.

As the author is fortunate enough to work with a general sample and sub-samples of satisfactory sizes, he can readily rely on an *unpaired two-sample t-test* to test for differences in the mean of the split sample which is in line with the approach taken by various studies in

the literature⁷⁸⁷⁹. Given the non-normal nature of the observed spreads and maturities, however, the author will also present the results of a non-parametric test for unpaired data as an alternative and therefore also show the results of the *Mann-Whitney U-test* (or *Wilcoxon rank-sum test*)⁸⁰. Both alternatives, in theory, should provide evidence as to if bank-only and mixed syndicates yield different outcomes from a univariate perspective and are often used contemporaneously in the literature.

As univariate tests, by design, are oblivious to fact that differences in the loan determinants could be explained by other factors than just the simple split into two different kinds of syndicates, the author performs a series of multivariate analyses in the following steps in order to determine whether these preliminary results obtained from the univariate analysis still hold after accounting for other factors simultaneously.

4.4 MULTIVARIATE ANALYSIS

In order to get to the bottom of the question if institutional lenders have a significant impact on the outcomes of syndicated PF loans after controlling for other potentially influencing factors, this study follows the literature and makes use of a simple OLS regressions framework where the two dependent variables (loan spread and loan tenor) are explained by linear combinations of a rich set of covariates. Unfortunately, the data does not lend itself to panel analysis as loan issuances are distributed rather un-evenly across time and countries. As we examine tranche-level data, one option would have been to cluster standard errors at the deal level to account for deal-level relatedness. However, as there are less than two tranches per deal on average, this would entail a vast number of rather “meaningless” clusters. Instead, the author uses standard errors that are clustered and robust at country level to account for correlations driven by un-observed, but common factors within a single country⁸¹. Time-varying year effects will be captured by the rich set of independent variables.

⁷⁸ Note: Owing to the central limit theorem the distribution of sampled location parameters (means, medians) asymptotically approach a normal distribution in increasing sample size.

⁷⁹ T-tests have been reported, inter alia, in works of Tesauro ,Bharath et al. (2011) Kleimeier and Megginson (2000), Cai (2010), Lim et al. (2014), Fotak et al. (2019), Panyagometh et al. (2013), S. Bae et al. (2014) and others.

⁸⁰ This kind of test has been reported, inter alia, in works of Tesauro , Bharath et al. (2011), Panyagometh et al. (2013), Marques et al. (2017), Tandja M. et al. (2017), S. Bae et al. (2014), and others.

⁸¹ Theoretical motivation for such an approach can be drawn from the segmentation hypothesis postulated by Carey and Nini (2007), Burietz et al. (2017) and others.

The first two general model specifications take the following forms in the base case.

- (I) $IAIDS = \alpha + \sum_i \beta_{1,i} \text{ loan and borrower variables} +$
 $\sum_i \beta_{2,i} \text{ institutional presence dummies} +$
 $\sum_i \beta_{3,i} \text{ other syndicate variables} + \sum_i \beta_{4,i} \text{ global financial variables} +$
 $\sum_i \beta_{5,i} \text{ country – specific variables} + \sum_i \beta_{6,i} \text{ infrastructure –}$
 $\text{related variables} + \text{various dummies} + \varepsilon$
- (II) $YRSFNLMAT = \alpha + \sum_i \beta_{1,i} \text{ loan and borrower variables} +$
 $\sum_i \beta_{2,i} \text{ institutional presence dummies} +$
 $\sum_i \beta_{3,i} \text{ other syndicate variables} + \sum_i \beta_{4,i} \text{ global financial variables} +$
 $\sum_i \beta_{5,i} \text{ country – specific variables} + \sum_i \beta_{6,i} \text{ infrastructure –}$
 $\text{related variables} + \text{various dummies} + \varepsilon$

In alternative cases, the models may differ as alternative variables may be employed and/or additional dummy variables introduced. One such alternative case, for example, is the concurrent use of different dummies of institutional presence instead of a single dummy that aggregates all different non-bank lender types.

In additional robustness tests and sensitivity analyses, the author will employ the same OLS framework but make adjustments to the used sample with regards to the time horizon and geographic focus to examine both the effects of the GFC and the often-cited geographic segmentation of loan markets. This is motivated by the fact that results which hold for the sample as a whole may not be applicable for certain time-frames and/or geographic locations and thus results could vary for certain sub-samples. For example, it's theoretically imaginable that non-bank lenders exercise a significant influence on loan spreads for the whole sample but only started to do so after the crisis. Alternatively, institutional investors may have a significant impact in the U.S. market (which dominates the sample) but are irrelevant in Europe, the second biggest market in the sample. The use and addition of alternative variables and control dummies and the dis-aggregation of some aggregated variables will further help to develop an understanding regarding the sensitivity of the obtained results with regard to the choice of control variables or whether some potentially important explanatory variables have been omitted in the base case.

5 ANALYSIS AND RESULTS

5.1 DESCRIPTIVE STATISTICS

In this section, the author would like to provide a descriptive overview of the sample at hand. As mentioned earlier, the unit of observation are loans at tranche-level of which we observe 3,558 in the final high-information sample. Table 1 provides a general overview of the most relevant loan specifics. The average tranche has a nominal amount of roughly US\$292m, but there's substantial variation as the mean value is clearly dominated by the standard deviation of approx. US\$607m. Loan tenors average out at 8.5 years (Standard deviation: 5.7 years) and the Initial All-In Drawn Spread (IAIDS) totals, on average, 201.33 basis points (Std. Dev.: 152.39 bps). The average loan rating is 1.1 implying that the larger portion of the loans is unrated. Roughly 60 percent of the tranches can be classified as funded tranches while around 28 percent of the tranches have a LIQUID dummy of value 1 and about 60 percent are classified as funded loans. There's a negligible number of PPP-related (2.6 percent) and subordinated (0.3 percent) tranches in the sample. Only 5.4 percent of the tranches have reported covenants and for 13.3 percent ThomsonONE reports collateral. Guarantees are implied in 12.9 percent of the cases and 3.2 percent mention any form of insurance. Lastly, 15.9 percent of the tranches have been oversubscribed.

Table 1: Descriptive Statistics - Loan Specifics

	N	Mean	St. Dev	min	Max
IAIDS	3,558	201.333	152.391	0	1400
YRSFNLMT	3,558	8.454	5.702	.038	34.277
AMOUNT	3,558	291.543	607.425	.094	15,324
LOANRATING	3,558	1.108	.489	1	5
FUNDING#	3,558	.599	-	0	1
LIQUID#	3,558	.281	-	0	1
REFIN#	3,558	.155	-	0	1
PPP#	3,558	.026	-	0	1
SUBORD#	3,558	.003	-	0	1
COVENANT#	3,558	.054	-	0	1
INSURED#	3,558	.032	-	0	1
REPORTCOLLATERAL#	3,558	.133	-	0	1
GUARANTEED#	3,558	.129	-	0	1
OVERSUBSCRIBED#	3,558	.159	-	0	1

#These variables are dummy variables. Their mean can, therefore, be interpreted as the percentage of loans for which the dummy takes on the value of 1.

With regard to syndicate structure (Table 2), we observe a mean syndicate size of 9.9 lenders with a standard deviation of 8.8 – the number of lenders ranges from 1 (bi-lateral deal) to a

maximum number of 100. 97.2 percent of the tranches involve at least one foreign lender and in roughly half of the cases, there is at least one domestic arranger involved.

Table 2: Descriptive Statistics - Syndicate Specifics

	N	Mean	St. Dev	min	Max
SYNDSIZE	3,558	9.929	8.76	1	100
FOREIGNMAN#	3,558	.972	-	0	1
DOMESTICARR#	3,558	.478	-	0	1
NONBANK#	3,558	.405	-	0	1
SWFPENSUR#	3,558	.031	-	0	1
INVESTOTHER#	3,558	.049	-	0	1
CDOCLO#	3,558	.016	-	0	1
LENDOTHER#	3,558	.122	-	0	1
AGENCY#	3,558	.259	-	0	1
OTHER#	3,558	.005	-	0	1
NONBANK2#	3,558	.179	-	0	1
NONBANK3#	3,558	.226	-	0	1

#These variables are dummy variables. Their mean can, therefore, be interpreted as the percentage of loans for which the dummy takes on the value of 1.

The aggregated measure NONBANK indicates that in about 40 percent of all cases at least one non-bank lender is part of the syndicate (1,440 tranches). In 637 (or 17.9 percent) of these, they assume arranger roles (NONBANK2) whereas in 805 (22.6 percent) tranches they only provide funding (NONBANK3). Having a closer look at the involvement of specific lender groups, the sample shows that pension funds, life insurance companies, and sovereign wealth funds are part of the syndicate for 3.1 percent of the tranches (112 tranches), topped by other investors (including asset manager, hedge funds, private debt, etc.) which are involved in 4.9 percent of the cases (173 tranches). CDO/CLOs are present in 56 tranches (1.6 percent), other lenders (e.g. finance companies) play a part in 434 tranches (12.2 percent). Various types of agencies are rather prevalent (25.9 percent of tranches or 921 tranches) and un-identified non-bank lenders appear in solely 17 tranches (0.5 percent). Tables 3,4 and 5 (see the Appendix) provide us with an idea of how tranches that involve non-bank lenders stack up against the average loan tranches (with an IAIDS of 201.33 bps, a tenor of 8.45 years and a notional amount of US\$291.543m). On average, NONBANK⁸² tranches are more expensive at

⁸² As a reminder, NONBANK accounts for all loan tranches for which non-bank lenders have at least a participating role but may also have an arranging role. NONBANK therefore aggregates NONBANK 2 and NONBANK3 where NONBANK2 codes all tranches for which non-bank lenders assume an arranging role (which usually also implies a funding role) and NONBANK3 identifies those tranches for which non-bank lenders really only provide funding. That is why, comparing NONBANK2 and NONBANK3 allows to develop an idea about the additional impact it may have when non-bank lenders assume the responsibilities of an arranger vis-à-vis the sole provision of funds.

221.8 bps, almost one year longer with a tenor of 9.4 years and also a bit larger totaling US\$319.8m. Entering into the details, SWFPENSUR loans are sizably larger (\$482.6m), run substantially longer (10.9 years) and are fairly in line with the average loan tranche with regards to pricing (at 202.4 bps). Increased tenors and ticket sizes could, without further analysis, be interpreted as preliminary signs of the ability of these lenders to invest substantial amounts for longer time periods. Loans including other investors, however, come at a steep premium (298.1 bps), a result only topped by CDOCLO tranches with 328.7 bps. In line with expectations, INVESTOTHER and CDOCLO tranches tend to be shorter (6.3 years and 5.6 years respectively), an initial reflection of shorter investment horizons. Size-wise both investor groups show signs of investing in larger deals (US\$314.3m for other investors and US\$464.3m for CDO/CLOs). AGENCY tranches imply larger amount (US\$373.2m), markedly longer tenors (10.4 years) and cheaper pricing compared to the average (187.2 bps). Without further analysis, this can be interpreted as early indications of the enabling and risk-reducing nature of this investor type in syndicated lending. A comparison of NONBANK2 and NONBANK3 loans implies that when non-bank lenders assume arranger roles, spreads increase slightly, loan tenors are extended to a larger degree and the ticket size is also higher. Furthermore, loans involving foreign managers are fairly in line with the average as they make up the bulk of loans, the case in which no foreign lender is involved is, therefore, more interesting. The absence of foreign lenders in 98 tranches indicates a substantial premium (395.6 bps), longer maturities (9.5 years) and substantially smaller tickets (US\$158.3m). Domestic arrangers, in turn, seem to be involved in larger loans (US\$353m) that are priced at a premium of 13.5 bps compared to the average. Table 6 (in the Appendix) details the number of tranches in which non-bank lenders have been present throughout the years. The high-level NONBANK variable indicates that, for the sample at hand, non-bank involvement has declined when measured in the number of tranches only. There have been notable peaks around the turn of the century and in the run-up to the financial crisis. Most pronounced has been the decline for lenders captured by the AGENCY dummy. Up until 2013, there had been only one year with less than 30 tranches, but for the last five years of sample data, there have been 17 tranches at most.

In terms of geography (see Table 7 in the Appendix⁸³), the largest portion of lending has been concentrated Europe and Central Asia (US\$367.8bn), North America (US\$304.4bn) and the Middle East (including North Africa) (US\$142.7bn) of total sample volume of US\$1.040tn. The geographic breakdown implies that there are palpable differences for all three selected loan determinants based on geography. As referenced in various studies (Berg et al. (2017) Burietz et al. (2017), Carey and Nini (2007) and others), we observe first indications of a pricing differential between Europe and North America and differences are also apparent for tranche size and tenor. Compared to the other two major geographic regions and the average sample values, European loans are larger (US\$359m) and offer more favorable terms for project borrowers – lower spreads (149.2 bps) and longer tenors (9.8 years).

US\$-denominated issues dominate the sample (N = 2,738) amounting to a total volume of US\$763.8bn. Runners-up are GBP- and EUR-denominated tranches with total volumes of US\$127.1bn and US\$79.1bn respectively. Again, we observe indications of segmented markets as spreads, tenors and loan amounts vary substantially. Again, tranches issued in European currencies are longer-running, have lower spreads and are generally larger (Table 9 in the Appendix).

Loan ratings which have been converted according to the methodology proposed by Corielli et al. (2010) provide another interesting perspective on our selected loan determinants. Unsurprisingly, Table 10 (see the Appendix) reveals a tendency of declining spreads and increasing tenors and loan amounts in increasing loan ratings. As the majority of tranches is unrated, however, the interpretation of the results for all tranches with a rating of 1 has to be taken with a pinch of salt.

Industry-wise, projects concerning transportation, communications and electric, gas and sanitary services (TCEGS) receive the bulk of financing in the sample – more than 50% of the total volume of all tranches fall upon tranches in this particular SIC-division (Table 11 in the Appendix). As industry dummies can be expected to aggregate several unobserved risk factors, it is no surprise that loan characteristics differ, on average, substantially across different industries. IAIDS range from a low of 112.3 bps for projects assigned to the wholesale trade SIC-division (WST) to a high of 275 bps and 265.8 bps for retail trade (RT)

⁸³ For more detailed, country-level data please refer to Table 8.

and agriculture, forestry, and fishing (AFF) respectively. Loan tenors reach as much as 14.3 years for construction sector-related projects and fall to 4.7 for projects related to retail trade.

The author is also able to corroborate the “hump-shaped” term structure observed by other authors (most notably in Blanc-Brude and Strange (2007) and Gadanecz and Sorge (2008)). Loan tenors tend to increase in maturity up to year 8 with a peak of approx. 250 bps. For maturities of more than eight years, we observe a declining spread pattern for increasing loan tenors (see Graphs 1 and 2 in the Appendix).

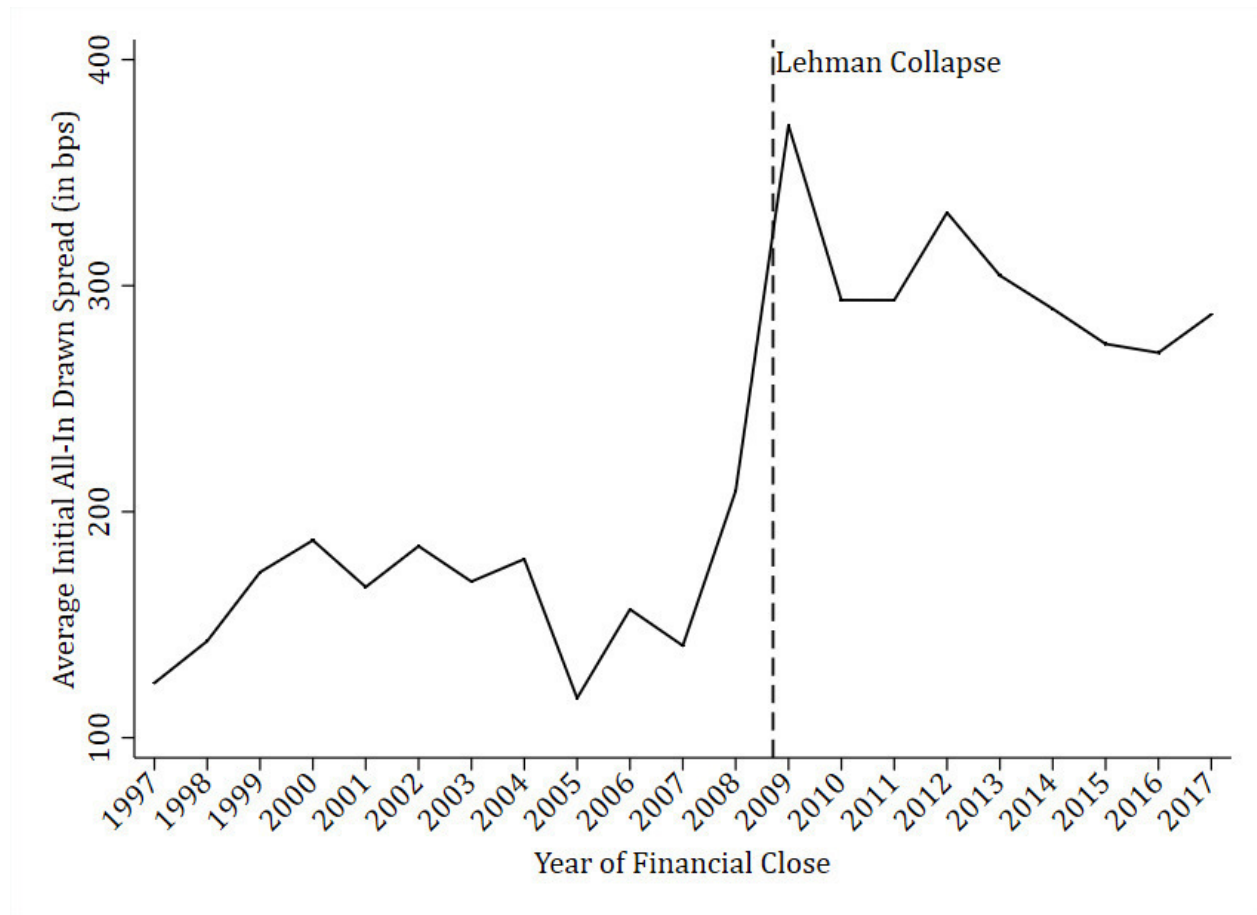
Times of crisis has been an important concern in the literature in the recent past. Hence, it’s also worthwhile to have a look at the sample form with these concerns in mind. Table 12 (see the Appendix) contrasts loan determinants of tranches issued during banking crises in the borrower country (dummy value of 1) and those of tranches that have been issued in “regular” times. Crisis dates have been determined based on the database of Laeven and Valencia (2012, 2018). As one would expect, in times of crisis charged spreads tend to be higher (an approx. 17 bps upswing compared to non-crisis spreads). Surprisingly though, tenors appear to be slightly longer. Thus, while lending duration is not restricted, lenders seem to limit their exposure by means of a reduction of loan volume. Tranche amounts appear to be reduced substantially (US\$190.9m during crises compared to US\$312.2m in regular times). In our sample, the majority of tranches (both in terms of numbers and issuance volume) have been issued non-crisis periods. Table 13 (in the Appendix) chooses the 15th September 2008 as the point in time that divides the full sample into a pre- and a post-GFC period. In a post-crisis world, spreads have reached elevated levels (up to 297.7 bps from a pre-crisis level of 162.6 bps) and loan tenors have declined (down roughly by 1 year compared to the pre-GFC period).

As these observations indicate substantial changes of times, the author has produced a series of graphs (Graphs 3 below, 4, 5, 6 and 7 in the Appendix) that reflect the development of selected loan determinants over time and their time-varying nature. Table 14 offers numeric details in this regard. Graph 3 illustrates the two “regime shifts” mentioned by Blanc-Brude and Yim (2019) – spreads shot up during the crisis and since then have only retracted partially after the immediate crisis. They reached a maximum of 370.91 bps, on average, in

2009 and for the last full sample year they have come down to 287.25 bps in 2017. A return to pre-crisis levels of below 200 bps seems a distant goal at the present time.

Loan tenors (Graph 4) show a long-term declining trend, that was temporarily reversed during the boom times in the immediate pre-crisis years starting in 2003. Tenors hit their maximum in-sample length in 2005 with an average tenor of 11.64 years. As of the end of 2017, they have fallen to an average maturity of 7.13 years – having been effectively almost halved. Graph 5 implies a steady decline in deal-making (except for the boom years pre-crisis) as both the number of deals and number of tranches on a yearly basis have fallen throughout the sample period and average yearly issuance volumes currently are well below heights around the turn of the century and the years prior to the GFC (Graph 6 in the Appendix). Such a declining trend is also evident for the average syndicate size. Whereas approx. 14 lenders made up a lending syndicate in 1997 the average number of lenders per tranche has been reduced by roughly 50% hovering around seven lenders per tranche (Graph 7 in the Appendix).

Graph 3: Initial All-In Drawn Spreads over Time (bps)



5.2 UNIVARIATE RESULTS

Tables 15 and 16 allow to further develop an understanding of how loan spreads and tenors may differ when different kind of non-bank lenders get involved. Building on initial observations from the descriptive statistics section we observe that NONBANK loans, that is loans where non-bank lenders have joined the syndicate, command higher spreads by approximately 34 basis points. This finding is corroborated by both t-values and Wilcoxon z-values which are significant at the 1%-level. As noted before, regarding loan spreads pension funds, life insurance companies and SWFs don't seem to be associated with an additional premium as spreads charged by syndicates with and without their presence are pretty much in line and show no signs of a significant deviation under both tests. Generally, results provided by both tests are in line with each other. In contrast to SWFPENSUR-coded syndicates, all other non-bank investors seem likely to look for an extra premium. As one would expect, hedge funds, private debt, asset managers and CLDO/CLOs appear to be

connected to the most demanding pricing terms with statistically significant premia in excess of 100 bps. Exceptions to the rule are AGENCY-coded lenders who according to the results have a reverse impact and lead to lower spreads (-19 bps). As the literature has surmised time and time again, these lenders may be capable of alleviating all sorts of concerns regarding the investment project and thus allow for more favorable lending terms. Table 15 also shines a first light on the question whether the effect of non-bank lenders may be more pronounced once they graduate to become arrangers of PF syndicated loans (as indicated by the *NONBANK2* dummy variable). Loan tranches for which at least one non-bank lender assumes an arranging role price more expensive than loans where institutional lenders are merely participants (*NONBANK3*)⁸⁴ – the spread differential increases from approx. 16.5 bps to approx. 36.5 bps, both results are statistically significant.

With regards to GFC and CRISIS dummies, the results replicate previous finding that financial (i.e. banking) crises lead to additional premia and thus higher borrowing costs. In the case of the GFC for which all loan tranches closed after 15th September 2008 have a GFC dummy of value 1, this implies a spread that is highly significant and more than 135 bps higher than before the GFC. Loans affected by the more specific CRISIS dummy (Laeven & Valencia, 2012, 2018) are, on average, around 17 bps more expensive.

Un-tabulated results also yield preliminary confirmation of the “segmentation hypothesis” as North American borrowers face significantly higher spreads than their European counterparts. While there are indications that the spread differential has decreased in the wake of the financial crisis, it remains both significant ex- and post-GFC.

With respect to loan tenors, Table 16 again indicates that non-bank lenders are associated with substantial deviations. Generally, NONBANK-coded syndicates grant tenors that are, on average, about 1.6 years longer than bank-only loans. This overall result is substantially linked to syndicates involving pension funds, life insurance companies, SWFs and different agencies. Furthermore, there are signs that when institutional lenders become arrangers of syndicated loans, loan tenors tend to increase further (e.g. compare tabulated results for NONBANK2 and NONBANK3). SWFPENSUR-tranches are almost 2.5 years longer and

⁸⁴ Reminder: *NONBANK* aggregates both loan tranches where non-bank lenders are only participants and those where non-bank lenders are participating (funding the loan) and assuming arranger roles.

agency-involvement is associated with loan tenors that are approx. more than 2.6 years longer (reported p-values are smaller than 1 percent). Given their more short-term oriented nature, INVESTOTHER and CDOCLO are significantly associated with shorter maturities (approx. -2.2 and -2.8 years respectively).

Table 15: Unpaired two-sample t-test and Wilcoxon rank sum test for loan spreads (in bps)

Full Sample Mean: <i>201.33 bps</i>	N (0)	N (1)	Mean (0)	Mean (1)	Diff.	t-value	Wilcoxon z-value
NONBANK	2,118	1,440	187.445	221.761	-34.316	-6.4***	-6.57***
NONBANK2	2,921	637	194.789	231.341	-36.552	-4.85***	-4.85***
NONBANK3	2,753	805	197.601	214.095	-16.494	-2.6***	-3.29***
SWFPENSUR	3,446	112	201.298	202.395	-1.097	-.1	-0.31
INVESTOTHER	3,385	173	196.388	298.081	-101.692	-8.95***	-10.13***
CDOCLO	3,502	56	199.297	328.705	-129.409	-11.75***	-8.21***
LENDOTHER	3,124	434	190.527	279.118	-88.591	-9.2***	-12.52***
AGENCY	2,637	921	206.278	187.177	19.101	3.25***	4.67***
OTHER	3,541	17	201.127	244.264	-43.138	-1.1	-1.15
GFC	2,537	1,021	162.564	297.668	-135.105	-25.2***	-29.46***
CRISIS	2,953	605	198.492	215.202	-16.71	-3.05***	-6.1***

*** denotes statistical significance at the 1%-level.

(0) implies tranches for which the respective dummy has taken on the value of 0, (1) implies tranches for which the respective dummy has taken on the value of 1 and thus the given lender type is present.

Given unequal variances in and the substantially different numbers of observations for the sub-groups, the t-tests have been performed using Welch's approximation.

Mirroring results presented above for loan spreads, loan tranches with institutional arrangers (NONBANK2) show stronger impacts compared to loan tranches where non-bank lenders only participate (NONBANK3). Both dummies are associated with statistically significantly longer tenors compared to their respective reference groups, the differential is, however, more pronounced for institutionally arranged loans (1.9 years vs 0.6 years).

In similar fashion to the loan spreads, financial crises also take their toll on loan tenors and negatively affect prospective borrowers. In the wake of the GFC, loan tenors have been significantly shortened, having been reduced by approximately 0.8 years across the board. This is not the case for the CRISIS dummy. Here, there's an indication that loan tenors actually increase slightly, however, the difference is not significant.

Table 16:
Unpaired two-sample t-test and Wilcoxon rank sum test for loan tenors (in years)

Full Sample Mean: 8.45 years	N (0)	N (1)	Mean (0)	Mean (1)	Diff.	t-value	Wilcoxon z-value
NONBANK	2,118	1,440	7.814	9.398	-1.584	-8.05***	-8.74***
NONBANK2	2,921	637	8.112	10.025	-1.913	-7.4***	-8.18***
NONBANK3	2,753	805	8.322	8.905	-.583	-2.5**	-2.82***
SWFPENSUR	3,446	112	8.376	10.875	-2.499	-3.7***	-3.72***
INVESTOTHER	3,385	173	8.563	6.33	2.233	7.45***	4.83***
CDOCLO	3,502	56	8.5	5.619	2.881	10.05***	3.67***
LENDOTHER	3,124	434	8.537	7.861	.676	2.95***	0.51
AGENCY	2,637	921	7.766	10.427	-2.661	-11.3***	-11.5***
OTHER	3,541	17	8.458	7.764	.694	0.65	0.19
GFC	2,537	1,021	8.684	7.886	.798	4.25***	1.49
CRISIS	2,953	605	8.405	8.696	-.291	-1.05	-0.5

*** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level.

(0) implies tranches for which the respective dummy has taken on the value of 0, (1) implies tranches for which the respective dummy has taken on the value of 1 and thus the given lender type is present.

Given unequal variances in and the substantially different numbers of observations for the sub-groups, the t-tests have been performed using Welch's approximation.

Tables 17 and 18 (see the Appendix) allow commencing a discussion about whether the GFC has changed the status quo. For loan spreads (Table 17) we observe results that are somewhat contrary to our expectations. It appears that the GFC has somewhat closed the gaps that may have existed before the crisis whereas, based on what we have discussed so far, one would have expected that pricing differences between loans involving only banks and those also involving institutional lenders may have become more pronounced in the aftermath of the GFC. For several of the syndicate structure dummies, there are indications that pricing differentials that were statistically significant ex-GFC, are no longer so post-GFC (see, for example, NONBANK, AGENCY, NONBANK2 and/or NONBANK3). Loans in which other investors are involved, however, still shows signs of significant deviations, as both before and after the GFC INVESTOTHER-coded loans seem to require higher spreads.

Table 18 paints a more promising picture for loan tenors. Some results are still not in line with expectations (i.e. statistically significant, longer loan tenors post-GFC). SWFPENSUR is one case in point. However, some results substantiate our expectations. For example, NONBANK3 indicates that loans involving non-bank lenders (but not non-bank arrangers) profit from statistically significant longer tenors, whereas longer tenors before the GFC failed to be significant. AGENCY-coded loans also have longer maturities post-crisis. Other results

reflect that specific sub-groups of non-bank lenders produce statistically significant differences in loan tenors both before and after the crisis (e.g. agencies and other investors).

In sum, the results for the whole sample period implicate that there might be some substance to the research hypotheses of this study as non-bank and bank-only loans seem to differ significantly. However, further analysis indicates that these general observations may be driven by tranches that have been issued before the financial crisis and that the financial crisis has eliminated (to varying degrees) the differences and their significance. Therefore, it will be interesting to see whether these preliminary findings will be corroborated by the results of the following multivariate analysis which allows accounting for the interaction of many factors that may drive the dynamics of syndicated PF loan tranches concurrently.

5.3 MULTIVARIATE RESULTS

In the previous section, univariate analysis has indicated that there is a reason to believe that syndicated PF loans with non-bank involvement are structurally different from other loans with regards to loan spreads and tenors. In this section, we will now observe whether these findings still hold when we control for many different variables concurrently. Table 19 shows the coefficients of the OLS regression model described in the methodology section. In parentheses, the reader will find country-clustered and robust standard errors. Column (1) shows results for the base case while columns (2) – (4) employ additional dummy variables to test for industry, geographic and year effects. The signs of the coefficients are mostly in line with expectations. Given the large number of used covariates and to keep the analysis somewhat short and expedient, the author will focus on the most significant results and the variables at the heart of our interest, that are predominantly variables concerned with syndicate structure and the series of dummies indicating lender identities.

TABLE 19: OLS Regression Analysis: Panel A – Loan Spreads (in bps)

	(1)	(2)	(3)	(4)
<i>NONBANK</i>	27.666*** (7.648)	29.672*** (7.513)	29.162*** (7.341)	28.232*** (7.317)
<i>YRSFNLMT</i>	-1.304* (0.752)	-1.271* (0.761)	-1.101* (0.615)	-1.268* (0.699)
<i>TREND</i>	0.617*** (0.054)	0.610*** (0.054)	0.574*** (0.065)	0.545*** (0.074)
<i>AMOUNT</i>	-0.008 (0.006)	-0.008 (0.006)	-0.008 (0.006)	-0.008 (0.005)
<i>LENDERCONCENTRATION</i>	4.286 (15.524)	5.350 (15.648)	7.823 (16.174)	2.145 (17.809)

SYNDSIZE	-1.585*** (0.447)	-1.586*** (0.414)	-1.579*** (0.513)	-1.795*** (0.442)
FOREIGNMAN	-139.590 (110.200)	-143.622 (110.176)	-133.277 (107.714)	-143.673 (107.272)
DOMESTICARR	7.270 (9.786)	7.670 (8.988)	6.872 (9.951)	9.435 (10.055)
OVERSUBSCRIBED	7.069 (11.629)	9.089 (11.456)	6.997 (11.011)	9.062 (12.677)
NR_TRANCHES	0.292 (2.430)	-0.117 (2.472)	0.504 (2.426)	0.517 (2.096)
CURRRISK	-36.244*** (11.886)	-37.045*** (11.304)	-24.902 (19.685)	-36.721*** (11.028)
PERFPRICE	-2.240 (8.848)	-3.581 (8.428)	0.152 (10.337)	0.374 (9.329)
FUNDING	18.829** (9.010)	19.990** (8.938)	18.445** (8.835)	20.164** (8.316)
REFIN	9.877 (8.850)	10.221 (9.122)	10.597 (8.683)	10.232 (9.198)
PPP	-41.220*** (13.161)	-36.629*** (13.131)	-42.710*** (13.848)	-28.779** (13.273)
SUBORD	131.847** (65.543)	131.898** (66.394)	134.611** (64.387)	128.234* (66.080)
LOANRATING	5.988 (8.628)	5.614 (8.248)	5.545 (8.925)	11.057 (7.206)
COVENANT	37.687*** (8.892)	40.112*** (8.585)	37.484*** (8.780)	32.244*** (8.443)
INSURED	-10.954 (15.206)	-11.123 (15.589)	-11.612 (15.765)	-15.959 (16.149)
REPORTCOLLATERAL	34.924*** (11.061)	35.821*** (11.727)	33.025*** (11.240)	38.080*** (10.723)
GUARANTEED	-19.134** (7.479)	-21.148*** (7.284)	-17.002** (6.992)	-18.771** (7.485)
INFRARATESENTIMENT	6.657 (5.719)	2.414 (5.258)	7.366 (5.741)	14.868*** (5.523)
INFRADEFAULT	-3.697*** (1.380)	-3.567*** (1.337)	-3.512*** (1.328)	3.475 (3.764)
INFRARECOVERY	-60.259** (25.563)	-66.643*** (25.101)	-59.640** (25.623)	
US10Y	-1.387 (3.989)	1.201 (4.359)	-2.618 (4.106)	2.242 (10.874)
USSLOPE	6.626 (4.831)	5.550 (4.723)	7.462* (4.425)	4.582 (9.848)
AAABBB	25.954*** (8.638)	26.312*** (8.542)	24.497*** (8.886)	5.840 (9.566)
BASELIII	21.038 (22.046)	23.594 (21.989)	15.780 (21.312)	
SOVRATING	-29.806*** (6.298)	-30.005*** (6.101)	-30.879*** (7.773)	-31.907*** (6.381)
REGULATED	-22.423*** (7.621)		-23.044*** (7.693)	-21.945*** (8.079)
CONSTANT	377.853*** (120.509)	378.466*** (121.540)	357.541*** (113.607)	339.218*** (109.328)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.397	0.397	0.402	0.412
Industry dummies	NO	YES	NO	NO
Geographic dummies	NO	NO	YES	NO

Year dummies	NO	NO	NO	YES
The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where LAIDS is the dependent variable (loan spread in bps). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.				

The NONBANK dummy is both economically and statistically (at the 1%-level) significant in all specifications. Non-bank involvement is associated with higher loan spreads (around 30 bps in all cases). Given an average tranche amount of \$292m, this is equivalent to additional interest expenses of approx. \$875,000 annually. In this analysis of loan spreads, tranche amount and maturity as treated as pre-determined. While amount generally shows no significant effect, loan tenors (YRSFNLMAT) are implied to have a negative relationship with loan spreads which is significant at the 10%-level – a one-year increase of maturity goes in hand with a spread reduction of roughly one basis point. This is contrary to the findings of Thierie and de Moor (2018a) but in line with results presented by other authors before (Bouzguenda, 2014; Gadanecz & Sorge, 2008; Kleimeier & Megginson, 2000) who cite the decreasing risk profile over time and the gradual resolution of uncertainty. As argued before, syndicated PF loans are not priced continuously, so it's natural to assume that during syndication banks may refer to a pricing grid of recently priced transactions. TREND reflects this effect as it captures the average spread of transactions closed in the same geographic region the year before the financial close of a given tranche. As surmised, there is a positive, significant relationship. LENDERCONCENTRATION enters with the expected sign as one would presume that more concentrated syndicates may be able to extract higher rents but the results are not significant. In line with arguments proposed by Bouzguenda (2014), Kleimeier and Megginson (2000) and Thierie and de Moor (2018a) larger syndicates are associated with lower spreads as they offer a chance to tap into larger pools of information and enable risk sharing. Currency risk has a negative impact on loan spreads and is highly significant – it seems that borrowers are rewarded if they chose to borrow in hard currencies and that only the most creditworthy projects with currency risk will be funded (Bouzguenda, 2014; Corielli et al., 2010; Gatti et al., 2013; Kleimeier & Megginson, 2000). Funded loans involve significantly higher spreads of around 20 bps. Unsurprisingly, on the back of public support, PPP-associated loan tranches are priced consistently cheaper. Furthermore, given their heightened risk profile subordinated loans require an additional premium, of approx.

130 basis points in all specifications. As covenants and collateral are usually associated with riskier borrowers it is no surprise then that both dummies are statistically significant and enter with positive signs (see for example Bouzguenda (2014) and Kleimeier and Megginson (2000) for the use of collateral). Both covenants and collateral, if reported, increase spreads by more than 30 bps in all specifications. Guarantees work the other way around and significantly moderate loan spreads as they effectively reduce the risk of the primary lenders. The sign of INFRADEFAULT is surprising as higher default rates seem come alongside lower spreads, but the effect is insignificant once year dummies are employed to capture time-varying fixed effects. INFRARECOVERY enters with the expected sign and is highly significant. An environment with higher recovery rates seems to be associated with markedly lower spreads, potentially allaying some concerns of would-be investors. However, once year-dummies are included the variable is omitted for reasons of collinearity. Finally, AAABBB which can be seen as a proxy of default spreads has the expected positive sign and is significant while the mere level of interest rates (US10Y) has no such impact. In line with the literature, higher sovereign ratings seem to reduce concerns about the prospects of the project country and lead to significantly lower spreads in all our modifications. Finally, regulated industries appear to be perceived as less risky and thus projects in such industries seem to profit from a significantly lower spread (see negative and significant coefficients for REGULATED). Tables 20 and 21 in the Appendix show the results for the same set of model specifications, but employ disaggregated dummies instead of NONBANK. The coefficients of the other control variables remain largely the same. Table 20 shows us the varying impact of non-bank arrangers and non-bank participants. As purported, the results indicate that the effect on non-bank arrangers is more pronounced (NONBANK2) as compared to non-bank participants (NONBANK3). This can be read as a sign that non-bank arrangers may be able to drive loan terms in their interests to a higher degree. Both dummies are highly significant in all specifications. Table 21 further decomposes NONBANK and presents the coefficient of individual institutional lender groups. It has been argued before that these lenders come from diverse institutional backgrounds shaping their investment behavior and may, therefore, have different return requirements. This is reflected by the results as they vary starkly. Unsurprisingly, INVESTOTHER (reflecting private equity and debt investors, asset managers, mutual funds and others) and CDOCLO show large and highly significant

coefficients, a potential indicator for their “search for yield”. While AGENCY and SWFPENSUR are not significant, we can still observe that from a spread perspective they cannot be interpreted as driving them as the magnitude of their coefficients is low.

Let’s shift our attention to loan tenors. As has been the case before with loan spreads, Table 22 details the coefficients of different OLS regression models. NONBANK is highly significant across all four specifications and is associated with loan tenors that are almost one year longer. The significant and negative coefficients for FOREIGNMAN indicate that the involvement of foreign lenders goes hand-in-hand with shorter maturities. One may argue that this can be interpreted as a sign of them limiting their exposure in an environment where foreign lenders supposedly are less experienced and may be exposed to asymmetric information. Dividing a loan package into several tranches offers the opportunity to cater to different lender preferences, i.e. adjusting loan terms such as maturity. In this sense, it seems natural that a larger number of tranches (NR_TRANCHES) is associated with longer maturities as in the number of tranches the chances increase to match long-term investment demand from the lenders’ side (see Maskara (2010) for reference). PERFPRICE, PPP and INSURED all have the expected positive sign and are associated with significantly longer tenors.

As a performance pricing grid guarantees the adjustment of spreads ex-ante in case that things should not go as expected it also mitigates the need for swift renegotiations and thus may be able to enable longer tenors.

Insured projects also are less risky and the value of insurance may actually increase for longer projects. As seen before for spreads, reported collateral and covenants may identify riskier projects and loan tenors appear to be shortened accordingly. Both measures may proxy for some country-effects as their coefficients change substantially once country-dummies are included in the analysis (column (3)).

TABLE 22: OLS Regression Analysis: Panel A – Loan Tenor (in Years)

	(1)	(2)	(3)	(4)
NONBANK	0.986*** (0.214)	0.928*** (0.221)	0.968*** (0.193)	0.923*** (0.209)
LENDERCONCENTRATION	0.955** (0.434)	0.960** (0.452)	0.723* (0.366)	0.953** (0.443)
SYNDSIZE	0.005 (0.026)	0.011 (0.022)	-0.015 (0.024)	0.005 (0.026)

FOREIGNMAN	-2.505** (1.097)	-2.197** (0.993)	-1.782* (1.046)	-2.230** (1.044)
DOMESTICARR	0.155 (0.497)	0.045 (0.397)	0.009 (0.549)	0.189 (0.473)
OVERSUBSCRIBED	-0.173 (0.501)	-0.198 (0.494)	-0.524 (0.462)	-0.137 (0.482)
NR_TRANCHES	0.504*** (0.080)	0.523*** (0.080)	0.467*** (0.096)	0.501*** (0.073)
AMOUNT	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
CURRRISK	-0.069 (1.029)	0.191 (0.823)	-2.565*** (0.815)	-0.158 (0.962)
PERFPRICE	3.517*** (0.689)	3.471*** (0.624)	2.779*** (0.658)	3.404*** (0.675)
FUNDING	1.609*** (0.312)	1.493*** (0.277)	1.449*** (0.278)	1.427*** (0.355)
REFIN	-1.676*** (0.351)	-1.589*** (0.310)	-1.650*** (0.386)	-1.711*** (0.351)
PPP	6.616*** (1.320)	5.393*** (1.080)	5.492*** (1.124)	6.094*** (1.325)
SUBORD	2.784** (1.256)	2.788** (1.315)	1.456 (1.217)	2.338** (1.159)
LOANRATING	-0.036 (0.174)	0.040 (0.153)	0.132 (0.155)	-0.097 (0.199)
COVENANT	-2.854*** (0.559)	-2.751*** (0.401)	-1.512*** (0.380)	-2.671*** (0.620)
INSURED	1.662*** (0.506)	1.572*** (0.529)	1.916*** (0.495)	1.682*** (0.479)
REPORTCOLLATERAL	-1.274*** (0.357)	-1.249*** (0.341)	-0.884** (0.352)	-1.327*** (0.379)
GUARANTEED	-0.043 (0.352)	0.169 (0.338)	0.017 (0.362)	-0.121 (0.345)
INFRARATESENTIMENT	-0.196 (0.354)	0.038 (0.333)	-0.173 (0.296)	-0.336 (0.366)
INFRADEFAULT	-0.017 (0.054)	-0.039 (0.050)	-0.039 (0.055)	-0.343*** (0.125)
INFRARECOVERY	-1.436 (0.886)	-1.155 (0.849)	-0.903 (0.742)	
US10Y	0.214 (0.182)	0.082 (0.179)	0.048 (0.118)	-0.075 (0.209)
USSLOPE	-0.127 (0.121)	-0.024 (0.123)	-0.054 (0.123)	0.419 (0.317)
BASELIII	-1.631 (1.298)	-1.424 (1.240)	-0.326 (0.751)	
SOVRATING	0.331** (0.135)	0.305** (0.135)	0.418** (0.165)	0.294** (0.125)
REGULATED	0.794 (0.596)		1.016* (0.532)	0.774 (0.566)
CONSTANT	6.092*** (2.234)	4.516** (2.064)	7.561*** (1.647)	7.203*** (2.073)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.225	0.251	0.282	0.241
Industry dummies	NO	YES	NO	NO
Geographic dummies	NO	NO	YES	NO
Year dummies	NO	NO	NO	YES

The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where

YRSFNLMAT is the dependent variable (loan tenor in years). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Oddly enough, tranches with REFIN-dummies appear to be shorter on average (by more than 1.5 years). As refinancings supposedly happened after the initial, high-risk construction period has been completed, the author would have expected a positive sign instead. The sign and magnitude of FUNDING coefficients are in line with expectations, however. Funded loans are longer on average by approx. one and a half years. Again, higher sovereign ratings or read differently, lower sovereign risk interacts positively with loan tenors as loans in lower-risk countries are longer on average, where one rating increase lengthens tenors by roughly four months.

As before, there are indications that non-bank arrangers may have a stronger influence on loan tenors, as can be seen from Table 23 in the Appendix. NONBANK2 is associated with loan tenors that are on average at least 1.2 years longer in all specifications (p-values are smaller than 0.01), whereas the effect of NONBANK3 is less pronounced. Institutional lenders are associated with loan tenors that are 0.6 to 0.8 years longer than average in the models presented. Longer tenors seem to be strongly driven by the presence of SWFPENSUR- and AGENCY-coded lenders as their significant and positive coefficients indicate (see Table 24 in the Appendix). For SWFPENSUR this can be interpreted as the effect of the “natural” long-term investors which seek long-term exposures to match their long-term liabilities and lock in an illiquidity premium. As for AGENCY, one may surmise that longer tenors can be interpreted as an indication of their enabling nature and their readiness to provide funds for the long-run. CDOCLO (even if not significant) and INVESTOTHER clearly represent the other side of the investment horizon spectrum. Their preference for rather short-term investments and relative liquidity is clearly represented by the negative sign. Asset managers, private equity firms, hedge funds, and others accompany loans that are on average two years shorter in the base case scenario.

Both the univariate and the multivariate analysis have shown clear indications so far, that loan tranches with non-bank lender involvement have structurally different loan features, at least as long as we consider loan spreads and tenors. In the following, it will first be tested

whether the results still hold if alternative explanatory variables are used and how sensitive the findings are to such an exchange. Furthermore, the author examines the impact of the GFC by splitting the sample into pre- and post-crisis subsamples. Alternatively, geographic segmentation is implemented as loan tranches issued in Europe and North America will be contrasted.

For the sake of brevity, the author only reports some stylized facts with respect to these additional analyses. The interested reader will find a thorough discussion in the Appendix. In short, the sensitivity analysis corroborates the results presented above from the simple OLS regression framework. Splitting the full sample into an ex- and post-GFC sub-sample respectively indicates time-varying differences where surprisingly enough, the results indicate that the involvement of non-bank lenders is associated with stronger effects before the crisis. Generally, however, the results are significant in both sub-periods. Getting to the bottom of the geographic segmentation theory discussed earlier, the results indicate that loan terms react differently to the chosen variables based on their geographic origin. The same is true for the impact of institutional lenders as the author finds that they're associated with different effects depending on whether loans are issued in Europe or North America.

6 CONCLUSIONS AND CONSOLIDATION WITH HYPOTHESES

When taken together all these observations should enable the author to test his original hypotheses. $H_{0,1}$ stated that tranches with non-bank lenders involved would deviate substantially from other syndicated PF loans with respect to loan spreads and tenors. Univariate and multivariate analyses have subsequently shown that this is generally the case and holds true for many alternative specifications and across time and geographies. $H_{0,2}$ then went on to claim that “natural long-term investors” (coded with SWFPENSUR) would go alongside lower loan spreads and longer maturities. Support for this claim is mixed. While SWFPENSUR is associated with longer loan tenors for the whole sample, the results are only significant in the pre-crisis era as a decomposition into two sub-periods indicates. Furthermore, there is no such relationship evident in the European and North American tranches of the sample. For loan spreads the hypothesis doesn't find confirmation in any of the specifications and sub-samples. Indeed, the coefficients of the base case and alternative specifications are negative for the full sample, however, the results are not statistically

significant at any reasonable level. The third hypothesis ($H_{0,3}$) is that “yield-seeking” investors (coded with INVESTOTHER and CDOCLO) would be associated with higher loan spreads and shorter maturities. For the loan sample at large, this is certainly the case for loan spreads, while on a geographic basis only North American loans show the expected result and are significant. With regards to the role of the GFC, the effects have been economically and statistically significant for both sub-periods. Concerning loan tenors, the full sample and GFC-related results are in line with the hypothesis – “yield-seeking” investors are associated with shortened loan tenors. In terms of geography, however, again only the North American case carries coefficients that are both negative and statistically significant. Next, AGENCY-coded lenders are, in line with $H_{0,4}$, associated with longer loan tenors for the full sample and these findings are corroborated for both sub-periods and both tested geographies. As to loan spreads, the hypothesis cannot be confirmed. Loan spreads are hardly changed by the presence of agencies in all the presented tests. While agencies appear to facilitate long-term lending their return expectations seem to be in line with the general market, carefully avoiding any form of “crowding-out” other investors on financial terms which is often part of their mandates. $H_{0,5}$ is concerned with differences between non-bank arrangers and non-bank participants. The author can, at least partially, confirm the expectations. For the full sample, the results are significant and loan tranches (jointly) arranged by an institutional lender have longer maturities and higher loan spreads compared to loan tranches in which non-bank lenders have only participated. This also mostly holds true across time, as only for tenors the picture has changed post-crisis. Here, non-bank participants are associated with a stronger, positive effect on loan maturities. As to geography and spreads, in Europe, the effect of non-bank arrangers is more pronounced than those of participants, while in North America non-bank participants have a higher positive impact by a very slight margin. This pattern for geographies repeats itself maturity-wise. Finally, the author has speculated for various reasons that the differences driven by non-bank lenders may be more pronounced post-crisis (please refer to $H_{0,6}$). He has surmised that this would be the case for both aggregated (NONBANK) and decomposed (SWFPENSUR, INVESTOTHER, etc.) measures. Except for a few exceptions (e.g. AGENCY-, NONBANK- and NONBANK3-tranches for maturities and INVESTOTHER-tranches for loan spreads), however, the empirical analyses fail to

corroborate this idea for any of the significant findings. Actually, the effects of non-bank involvement appear to have been stronger in the pre-crisis era.

In sum, this thesis, however, achieves to show that tranches in which institutional lenders are present differ both economically and statistically from other syndicated project finance loans with regard to two prominent loan determinants - loan spreads and loan tenors.

7 LIMITATIONS, FURTHER RESEARCH, AND OUTLOOK

If the past is in any form an indicator of the future, the results of this thesis might offer a few interesting insights as to what expect from the predicted surge of institutional lender involvement in the project finance lending space. However, whether such an increase will really translate into longer loan tenors and higher spreads is contingent on many different factors. It is perfectly conceivable that ever-increasing competition for high-quality projects may actually drive down spreads despite the increased presence of institutional lenders while regulatory pressures and “improvements for the worse” could also take their toll on non-bank debt investors’ ability to provide long-term funds. And how will institutional investors react if interest and sovereign yields were to increase again? Would they still fancy the investment into experience and know-how to access this challenging asset class? Will politics shape more investor-friendly infrastructure frameworks? There are many questions to be answered in this regard.

Furthermore, this is just the bigger picture. Even with just the presented analysis in mind, a few questions may come up. The sample at hand registers a steady decline of institutional involvement over time whilst anecdotal evidence and infrastructure publications suggest the reverse. Are institutional investors less likely to report their deals in time⁸⁵ especially if they assume more senior roles or if they do so may they only report to a single data vendor? In this context, a repeated analysis based on another loan sample e.g. drawn from LPC DealScan or Dealogic’s LoanWare could shed some additional light on this issue and eliminate potential concerns about any form of sample bias.

In addition, the attentive reader may have surely noted that the analysis at hand, for lack of data, does only consider a few pieces of project-related data. Obviously, more detailed

⁸⁵ For institutional investors, for example, league table and ranking considerations may be less important.

information about project-specific risks and how they are mitigated, contracts, expected construction and project duration (i.e. asset life), government support, sponsor identity and reputation, and project specifics such as leverage and the precise nature and industry⁸⁶ of the project would offer strong additional explanatory power and some significant results we have just observed may prove to be no longer significant after controlling for such supplementary factors.

Finally, it would be helpful to gain an understanding of what micro- and macro-factors actually encourage institutional involvement in syndicated PF lending. Do project specifics outweigh country-specific considerations such as political and legal frameworks and the development of local capital markets or are tranche specifics emphasized by prospective non-bank lenders? There is a lot left to be examined in this context and, thus, the author will focus on this question in his second thesis in accordance with the Double Degree in Finance administered by Università Commerciale Luigi Bocconi and the Stockholm School of Economics.

⁸⁶ After all, both toll road and an airport projects would constitute projects in the transportation space. However, such a macro-classification hardly does the respective project dynamics and specifics any justice.

APPENDIX

A.1 SENSITIVITY ANALYSIS AND ROBUSTNESS TESTS

Table 25 represents the regression results for the base case and three alternative specifications. Column (2) has TREND replaced by MSCIAWCI (the level of the MSCI All Country World Index) and the MOVE (Merrill Lynch Option Volatility Estimate Index). Together, they are supposed to proxy for the state of financial markets at the time of financial close where MOVE can be seen as a measure of fixed-income volatility which surprisingly enters with a negative sign. Column (3) presents a model specification in which SOVRATING has been decomposed into a series of alternative variables⁸⁷ supposed to proxy for the country-specific macro-environment (GDPGRWTH, INFLATION, and CRISIS), financial development/sophistication (GDPCAP and IMFINDEV) and a broad index of political risk (PRSPOLRISK)⁸⁸. Finally, in column (4) PRSPOLRISK is further decomposed into different partial aspects of the aggregated index and additional legal dummies accounting for the origin of the legal code (British, French, German or Scandinavian) are added. As one may have guessed, PRSLAW and PRSINVEST which proxy for the rule of law and the investment climate in a given country prove to be significant and higher levels for the respective variable go hand-in-hand with lower loan spreads. These alternative set-ups, however, have only a small impact on our primary variable of interest. NONBANK remains highly significant throughout all additional tests only slightly increases in magnitude (mostly driven by the substitution of the TREND variable).

Table 25: Sensitivity Analysis: Panel A – Loan Spreads (in bps)

	(1)	(2)	(3)	(4)
NONBANK	27.666*** (7.648)	29.883*** (8.724)	31.255*** (8.454)	30.197*** (8.326)
YRSFNLMT	-1.304* (0.752)	-1.940*** (0.687)	-2.215*** (0.673)	-1.598*** (0.589)
TREND	0.617*** (0.054)			
AMOUNT	-0.008 (0.006)	-0.008 (0.006)	-0.004 (0.006)	-0.006 (0.006)
LENDERCONCENTRATION	4.286 (15.524)	1.581 (18.015)	5.126 (16.205)	5.049 (16.180)
SYNDSIZE	-1.585*** (0.447)	-1.772*** (0.416)	-1.885*** (0.382)	-1.822*** (0.471)

⁸⁷ For detailed descriptions of the variables please refer to Table 31 in the Appendix.

⁸⁸ Please note that PRSPOLRISK is constructed in a way that higher index levels indicate less risk, the coefficient, even though not significant, thus takes on the expected sign.

FOREIGNMAN	-139.590 (110.200)	-161.542 (130.647)	-156.837 (121.515)	-150.512 (117.493)
DOMESTICARR	7.270 (9.786)	1.749 (11.397)	3.840 (10.108)	12.006 (9.121)
OVERSUBSCRIBED	7.069 (11.629)	5.417 (15.623)	8.658 (13.676)	5.180 (14.413)
NR_TRANCHES	0.292 (2.430)	-0.963 (2.193)	-1.038 (2.005)	0.680 (2.217)
CURRRISK	-36.244*** (11.886)	-58.625*** (15.584)	-70.118*** (25.259)	-59.223** (25.921)
PERFPRICE	-2.240 (8.848)	-9.800 (9.228)	-7.951 (9.271)	-6.589 (8.954)
FUNDING	18.829** (9.010)	18.855* (9.612)	17.962* (9.930)	18.830** (9.265)
REFIN	9.877 (8.850)	8.940 (9.514)	12.373 (9.194)	9.800 (8.721)
PPP	-41.220*** (13.161)	-50.802*** (15.781)	-51.251*** (16.030)	-58.014*** (14.738)
SUBORD	131.847** (65.543)	136.530** (60.456)	141.360** (57.313)	144.227** (57.229)
LOANRATING	5.988 (8.628)	6.708 (7.016)	6.648 (6.596)	6.791 (7.221)
COVENANT	37.687*** (8.892)	50.913*** (10.079)	61.642*** (8.780)	55.063*** (8.628)
INSURED	-10.954 (15.206)	-12.032 (16.758)	-7.848 (16.802)	-6.817 (17.175)
REPORTCOLLATERAL	34.924*** (11.061)	46.133*** (11.194)	45.603*** (11.331)	42.613*** (11.061)
GUARANTEED	-19.134** (7.479)	-21.786*** (7.760)	-24.228*** (7.865)	-16.970** (7.576)
INFRARATESENTIMENT	6.657 (5.719)	6.298 (5.468)	7.582 (6.179)	3.090 (5.746)
INFRADEFAULT	-3.697*** (1.380)	-6.622*** (1.526)	-6.028*** (1.565)	-4.423*** (1.342)
INFRARECOVERY	-60.259** (25.563)	-92.479*** (33.596)	-74.190*** (25.224)	-61.893** (25.562)
US10Y	-1.387 (3.989)	-3.792 (5.838)	-3.268 (5.746)	-6.448 (5.219)
USSLOPE	6.626 (4.831)	26.011*** (4.163)	25.653*** (3.893)	26.146*** (3.889)
AAABBB	25.954*** (8.638)	58.643*** (17.084)	57.213*** (15.751)	51.633*** (15.005)
BASELIII	21.038 (22.046)	31.936 (32.731)	37.366 (27.986)	6.092 (30.233)
SOVRATING	-29.806*** (6.298)	-38.242*** (7.365)		-13.213 (9.749)
REGULATED	-22.423*** (7.621)	-19.888*** (7.426)		-18.004** (8.540)
MSCIACWI		0.104 (0.076)	0.134* (0.074)	0.175** (0.087)
MOVE		-0.943*** (0.208)	-0.954*** (0.191)	-0.891*** (0.202)
GDPCAP				0.000 (0.000)
GDPGRWTH			-0.001* (0.000)	-1.186 (1.361)

INFLATION			-2.189 (2.189)	0.383 (0.317)
IMFFINDEV			0.421 (0.335)	-126.105** (62.878)
CRISIS			-108.509** (43.948)	-2.214 (10.645)
PRSPOLRISK			-6.233 (8.353)	
PRSGOVSTAB			-1.667*** (0.622)	4.680 (3.571)
PRSDMOACC				20.762*** (5.073)
PRSBUREAUQ				-8.661 (13.631)
PRSLAW				-11.452* (5.986)
PRSinVEST				-12.628*** (3.854)
PRSCORRUPT				4.686 (6.816)
CONSTANT	377.853*** (120.509)	613.969*** (127.660)	640.988*** (132.582)	561.511*** (121.682)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.397	0.326	0.327	0.362
Legal Dummies	NO	NO	NO	YES

The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where LAIDS is the dependent variable (loan spread in bps). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. Column (1) reports the coefficients of the base case, column (2) presents the coefficients for the alternative case in which the TREND variable has been replaced by MOVE and MSCIAW, column (3) introduces a series of variables replacing SOVRATING. Finally, column (4) disaggregates the PRSPOLRISK variable and employs a series of legal dummies. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Table 26 shows the impact of the same adjustments on loan maturities (YRSFNLMT). Again, NONBANK experiences very limited variation and remains highly significant. Notably, GDPGRWTH and PRSLAW appear to be associated with a significant change to tenors. Higher GDP growth rates and levels of rule of law seem to encourage long-term lending.

Table 26: Sensitivity Analysis: Panel A – Loan Tenors (in Years)

	(1)	(2)	(3)	(4)
NONBANK	0.986*** (0.214)	0.947*** (0.205)	0.951*** (0.208)	0.879*** (0.201)
LENDERCONCENTION	0.955** (0.434)	0.976** (0.471)	0.957** (0.452)	0.976** (0.452)
SYNDSIZE	0.005 (0.026)	0.004 (0.025)	-0.002 (0.024)	-0.010 (0.023)
FOREIGNMAN	-2.505** (1.097)	-2.386** (1.082)	-2.317** (1.102)	-2.276* (1.175)
DOMESTICARR	0.155	0.271	0.137	0.077

	(0.497)	(0.547)	(0.528)	(0.534)
OVERSUBSCRIBED	-0.173	-0.195	-0.174	-0.069
	(0.501)	(0.482)	(0.486)	(0.493)
NR_TRANCHES	0.504***	0.509***	0.476***	0.485***
	(0.080)	(0.081)	(0.084)	(0.083)
AMOUNT	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
CURRRISK	-0.069	-0.661	-0.741	-0.908
	(1.029)	(0.851)	(0.827)	(0.765)
PERFPRICE	3.517***	3.397***	3.276***	3.194***
	(0.689)	(0.729)	(0.709)	(0.725)
FUNDING	1.609***	1.580***	1.555***	1.547***
	(0.312)	(0.302)	(0.305)	(0.308)
REFIN	-1.676***	-1.689***	-1.627***	-1.691***
	(0.351)	(0.335)	(0.335)	(0.336)
PPP	6.616***	6.633***	6.825***	6.829***
	(1.320)	(1.363)	(1.242)	(1.222)
SUBORD	2.784**	2.958**	2.711**	2.665**
	(1.256)	(1.291)	(1.243)	(1.298)
LOANRATING	-0.036	-0.016	0.011	0.012
	(0.174)	(0.174)	(0.168)	(0.167)
COVENANT	-2.854***	-2.886***	-2.738***	-2.633***
	(0.559)	(0.538)	(0.501)	(0.537)
INSURED	1.662***	1.590***	1.492***	1.296**
	(0.506)	(0.510)	(0.504)	(0.538)
REPORTCOLLATERAL	-1.274***	-1.233***	-1.215***	-1.205***
	(0.357)	(0.361)	(0.354)	(0.364)
GUARANTEED	-0.043	-0.065	-0.180	-0.127
	(0.352)	(0.380)	(0.390)	(0.379)
INFRARATESENTIMENT	-0.196	-0.241	-0.224	-0.217
	(0.354)	(0.330)	(0.331)	(0.333)
INFRADEFAULT	-0.017	-0.025	-0.023	-0.011
	(0.054)	(0.054)	(0.051)	(0.052)
INFRARECOVERY	-1.436	-1.596	-1.622	-1.369
	(0.886)	(1.037)	(1.045)	(0.963)
US10Y	0.214	0.145	0.249	0.153
	(0.182)	(0.160)	(0.150)	(0.156)
USSLOPE	-0.127	-0.098	-0.066	-0.054
	(0.121)	(0.129)	(0.137)	(0.142)
BASELIII	-1.631	-1.709	-1.478	-1.302
	(1.298)	(1.159)	(1.058)	(1.075)
REGULATED	0.794	0.819	0.849	0.843
	(0.596)	(0.607)	(0.588)	(0.582)
SOVRATING	0.331**			
	(0.135)			
PRSPOLRISK		0.040*		
		(0.021)		
GDPCAP		0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
GDPGRWTH		0.107***	0.102***	0.129***
		(0.036)	(0.036)	(0.035)
INFLATION		-0.004	-0.007	-0.009
		(0.008)	(0.005)	(0.007)
IMFFINDEV		-1.567	-1.315	-1.802
		(1.021)	(1.313)	(1.429)
CRISIS		0.015	0.010	0.120

		(0.516)	(0.517)	(0.506)
PRSGOVSTAB			-0.213	-0.238*
			(0.131)	(0.121)
PRSDMOACC			-0.184	-0.296*
			(0.169)	(0.154)
PRSBUREAUQ			-0.575	-0.382
			(0.481)	(0.428)
PRSLAW			0.579***	0.784***
			(0.213)	(0.217)
PRSINVEST			0.189*	0.142
			(0.113)	(0.112)
PRSCORRUPT			0.249	0.300
			(0.225)	(0.226)
CONSTANT	6.092***	5.575**	7.604***	6.503***
	(2.234)	(2.228)	(2.003)	(2.013)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.225	0.229	0.237	0.246
Legal Dummies	NO	NO	NO	YES

The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where IAIDS is the dependent variable (loan spread in bps). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. Column (1) reports the coefficients of the base case, column (2) presents the coefficients for the alternative case in which the TREND variable has been replaced by MOVE and MSCIW, column (3) introduces a series of variables replacing SOVRATING. Finally, column (4) disaggregates the PRSPOLRISK variable and employs a series of legal dummies. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Table 27 at the end of this section shows the results of the base case regressions if the original sample is split into a pre- and post-crisis subsample, respectively. As the critical date the 15th September 2008, the day of the Lehman Brothers collapse, has been chosen. As a first observation, the variability of loan spreads appears to be better explained by the chosen variables in a post-crisis context (all R-squared are higher for the respective post-crisis cases). Most interesting are obviously those cases for which the coefficients remain significant in all instances or show different behavior and importance in the different subsamples. TREND, SYNDSize, REPORTCOLLATERAL, SOVRATING, and REGULATED are examples of the former situation. CURRRISK, on the other hand, is only significant pre-crisis and its coefficient is at least halved in all cases post-crisis. For PPP projects we observe a reversal of the sign which could potentially be explained by factors such as the sovereign debt crisis that may have cast some doubt on the value of public support for infrastructure projects in a post-GFC world. Loan ratings become significant only in a post-GFC world and interestingly enough higher ratings seem to be accompanied by higher spreads. INSURED is weakly significant after the crisis, but the magnitude of its coefficient is substantial. For

guarantees we can make a similar observation, apparently, lenders set greater store by guarantees in a post-crisis context. NONBANK remains highly significant in both time periods, however against the author's initial hypothesis the effect of institutional lenders appears to be muted post-crisis as the coefficient has been reduced by roughly seven basis points. Similar conclusions can be drawn from the NONBANK2 and NONBANK3 dummies. Non-bank arrangers seem to command higher spreads both before and after the crisis, but as with NONBANK, the effect is reduced. The same applies to NOBANK3, but on a lower level. Finally, the results for the individual institutional lender groups are a mixed bag. SWFPENSUR, as before, is not significant but the change in sign could be interpreted as a thin indication of our initial presumptions that long-term institutional investors may enjoy some benefit post-crisis. INVESTOTHER shows an even higher and significant coefficient post-crisis potentially signaling some substance to the allegation of a “search-for-yield”. CDOCLO's magnitude is decreased post-crisis but the results should be read carefully given the low occurrence of such investors after the crisis. The coefficient for LENDOTHER loses its significance post-crisis and is substantially lower than before.

A similar analysis can be performed for loan tenors (see Table 28 at the end of this section). Notably, while, as noted above, the explanatory power of the chosen variables seemed to differ across time for loan spreads, R-squared is pretty stable across all cases for loan tenors. NR_TRANCHES, FUNDING, and PPP are associated with significantly longer tenors irrespective of the time-window, while the same holds REFIN and REPORTCOLLATERAL, only with a flipped sign. FOREIGNMAN can be linked to substantially shorter maturities pre-crisis ($p\text{-value} < 0.05$), while oversubscribed deals appear to be longer-term post-crisis – demand pressure could, thus, lead to concessions on the lenders' part with respect to maturities. A similar trend is present for subordinated loans. Recovery rates for infrastructure projects have had a significant negative relationship with tenors before the crisis, but this seems to be no longer the case post-GFC. Interestingly, both the level of the sovereign US 10-year yield and the slope of the sovereign yield curve appear to have a significant relationship with loan tenors post-crisis. A steeper slope which may be interpreted as a sign of higher expected future interest rates significantly shortens loan tenors while higher interest rates at the time of issuance appear to have a prolonging effect. The BASELIII index is significant in the post-crisis case and in line with expectations the

gradual implementation of BASELIII seems to be accompanied by shorter tenors ($p\text{-value} < 0.01$) – regulation seems to take its toll on the ability of lenders to provide long-term funding to infrastructure projects. Finally, as to the non-bank lender groups, NONBANK has significant and positive coefficient both before and after the crisis while the magnitude is higher post-GFC. NONBANK2 and NONBANK3 send mixed signals as for NONBANK2 the coefficient and its significance are reduced post-crisis. On the other hand, NONBANK3 only becomes significant after the crisis and is linked to loan tenors that are more than two years longer on average. A more granular analysis indicates that AGENCY loans are significantly longer in both sub-samples while, in line with previous observations, INVESTOTHER is related to significantly shorter maturities. SWFPENSUR again has the expected sign but loses its significance after the crisis and registers a drop concerning its magnitude.

Finally, it may be interesting to see whether syndicate structure and lender identity produces similar results across geographies. To this end, Table 29 (see the end of this section) juxtaposes regression results for Europe (EUCA) and North America (NORAM). The choice of these two geographic areas is motivated by the volume of issued loans (combined the two areas account for almost 65% of all loan issuance in the sample and roughly two-thirds of all tranches issued) and previous research that has highlighted substantial differences in the loan determinants of loans issued in these two areas (see for example Burietz et al. (2017) and Carey and Nini (2007)). Generally, referring to the reported R-squared, it appears to be the case that the given set of variables is better suited to explain the variability of loan spreads in North America. It can be seen that LENDERCONCENTRATION is associated with significantly higher spreads in both geographies. Foreign lenders enter with positive signs in both cases but are only slightly significant in the European case. There's a difference in the sign of the domestic arranger dummy. The coefficients are significant in all cases, still, in Europe domestic arrangers appear to have a negative impact on loan spreads while for North America the opposite is the case. NONBANK has significant and positive coefficients in both cases, but the impact is more than double in size for the NORAM-coded loans. The same holds for the decomposed NONBANK2 and NONBANK3 dummies. Regardless of whether non-bank lenders act as arrangers or solely participate, their involvement is tied to higher loan spreads. Again, the effect appears to be substantially more pronounced in the United States and Canada. Private equity firms, asset managers and other investors have a strong positive

relationship with North American loan spreads but are not significant in Europe whereas CDOCL0 have significant and positive effects in both geographic areas. The relationship between loan spreads and agencies is not significant for North American loans while there is a weakly significant and positive relationship with European loan spreads. Other lenders seem to have a more pronounced impact in North America. The positive coefficients of SWFPENSUR fail to be significant in both cases.

Curiously enough, while the given set of variables seems to be better able to explain loan spreads in North America, the reverse seems to hold true for loan tenors as the R-squared for loan tenors of European loan tranches is substantially higher than their North American counterparts (see Table 30 at the end of this section). Foreign lenders have a relation to longer tenors in North America while in Europe their impact is not significant and has a negative sign. Domestic arrangers are significant in both geographies, but again their effects are differing. In Europe, they appear to be linked to longer tenors while in North America there is an association with shorter tenors. This time around non-bank lenders appear to have a higher impact in Europe. The coefficients for NONBANK are positive and highly significant in both jurisdictions but the effect is stronger in Europe. The same can be said for the NONBANK2 dummy. As before non-bank arrangers in Europe are associated with longer loan tenors vis-à-vis their North American counterparts. When it comes to participants only, however, they are not significant in Europe but still produce positive and significant results in North America. The SWFPENSUR dummies, as compared to the full sample are no longer significant, but at least for Europe, the coefficients have the expected sign. Conversely, INVESTOTHER is only significant in the North American sub-sample in which it enters with the expected negative sign. Agencies are linked to longer maturities in both sub-samples and on average extend loan tenors by more than 1.5 years. CDOCL0 appears to have a very strong positive link to loan tenors in Europe. This observation should be handled with care though given the very limited occurrence of CDOCL0-coded loan tranches in Europe.

Table 27: Robustness Tests: Loan Spreads (in bps) before and after the GFC

	(1)		(2)		(3)	
	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis
YRSFNLMAT	-1.328* (0.772)	-1.638* (0.868)	-1.361* (0.738)	-1.508* (0.889)	-0.965 (0.772)	-0.963 (0.919)
TREND	0.566*** (0.084)	0.512*** (0.072)	0.567*** (0.083)	0.517*** (0.072)	0.554*** (0.080)	0.504*** (0.072)

AMOUNT	-0.007 (0.007)	-0.005 (0.007)	-0.007 (0.007)	-0.005 (0.007)	-0.005 (0.006)	-0.007 (0.007)
LENDERCONCENTRATION	-1.723 (14.328)	4.576 (26.031)	-4.293 (19.265)	-5.028 (29.230)	4.447 (14.443)	4.798 (27.250)
SYNDSIZE	-1.576*** (0.492)	-3.575** (1.496)	-1.580*** (0.508)	-3.766** (1.451)	-1.545*** (0.476)	-3.438** (1.514)
FOREIGNMAN	-130.322 (103.630)	-177.152 (144.945)	-129.749 (101.753)	-176.451 (143.874)	-128.139 (93.660)	-198.770 (155.093)
DOMESTICARR	0.293 (9.218)	32.570*** (11.398)	-0.180 (9.387)	31.684*** (11.462)	0.890 (8.024)	33.941*** (11.824)
OVERSUBSCRIBED	4.347 (11.149)	50.077** (23.467)	4.386 (11.281)	50.801** (23.310)	5.609 (11.557)	51.644** (22.162)
NR_TRANCHES	2.130 (2.143)	-3.583 (6.235)	2.163 (2.145)	-3.870 (6.117)	2.570 (2.253)	-3.348 (6.494)
CURRRISK	-41.329*** (11.610)	-20.127 (21.823)	-41.840*** (11.866)	-20.908 (21.900)	-32.567*** (10.234)	-13.273 (21.614)
PERFPRICE	2.536 (10.083)	-4.554 (14.229)	2.386 (10.093)	-3.799 (14.234)	4.956 (9.304)	-7.730 (14.956)
FUNDING	13.826 (8.413)	28.240*** (5.452)	13.932* (8.362)	27.918*** (5.422)	8.569 (7.479)	25.942*** (5.657)
REFIN	7.549 (9.256)	21.804 (16.248)	7.785 (9.094)	22.013 (16.600)	6.980 (9.824)	21.006 (17.719)
PPP	-48.131*** (15.616)	52.053* (28.999)	-47.505*** (15.376)	45.666 (31.250)	-40.068** (15.233)	58.997* (30.896)
SUBORD	187.46*** (57.688)	15.455 (111.076)	186.08*** (58.761)	17.169 (109.392)	193.05*** (57.349)	6.080 (114.330)
LOANRATING	-2.780 (4.518)	45.286*** (7.911)	-2.606 (4.322)	46.284*** (7.911)	-3.109 (4.824)	44.162*** (8.946)
COVENANT	14.582 (10.312)	54.109*** (11.957)	14.121 (10.853)	52.543*** (11.587)	-10.637 (11.768)	55.677*** (11.232)
INSURED	-15.596 (13.035)	-101.123* (58.143)	-14.772 (12.945)	-105.036* (59.586)	-18.715 (13.472)	-104.657* (60.946)
REPORTCOLLATERAL	38.032*** (10.192)	55.463** (21.877)	37.810*** (10.344)	56.927** (22.145)	31.662*** (9.598)	55.163** (21.564)
GUARANTEED	-8.889 (7.667)	-83.505*** (22.962)	-8.851 (7.649)	-84.999*** (23.256)	-10.301 (7.060)	-83.831*** (22.584)
INFRARATESENTIMENT	9.700 (6.181)	10.011 (9.740)	9.905 (6.219)	10.377 (9.524)	6.770 (5.975)	7.470 (11.173)
INFRADEFAULT	-2.854 (2.220)	9.056* (4.807)	-2.800 (2.165)	8.800* (4.920)	-2.186 (2.111)	9.193* (4.962)
INFRARECOVERY	-83.985* (50.324)	-12.107 (33.836)	-81.919* (47.873)	-10.457 (33.087)	-84.170* (49.543)	-10.823 (35.584)
US10Y	5.656 (5.380)	0.482 (22.685)	5.463 (5.504)	-0.231 (22.308)	3.472 (5.268)	-2.309 (21.659)
USSLOPE	5.361 (5.822)	11.042 (22.486)	5.350 (5.865)	11.318 (22.202)	4.991 (5.706)	13.419 (21.662)
AAABBB	22.819* (13.530)	20.946** (7.899)	22.727* (13.468)	21.057*** (7.882)	18.914 (12.994)	20.751** (7.984)
BASELIII		3.291 (38.950)		2.929 (38.466)		12.251 (42.097)
SOVRATING	-28.851*** (6.742)	-42.450*** (9.873)	-28.708*** (6.710)	-41.956*** (9.890)	-28.661*** (6.603)	-42.429*** (10.135)
REGULATED	-20.829** (8.337)	-23.678*** (8.202)	-20.983** (8.255)	-23.113*** (8.148)	-22.636*** (7.377)	-23.457*** (8.788)
NONBANK	32.987*** (11.507)	25.518*** (7.479)				

<i>NONBANK2</i>			37.435**	34.021***		
			(18.730)	(11.133)		
<i>NONBANK3</i>			29.899**	14.567*		
			(12.365)	(7.785)		
<i>SWFPENSUR</i>					3.631	-18.498
					(14.176)	(22.221)
<i>INVESTOTHER</i>					65.052***	73.036***
					(17.234)	(16.554)
<i>CDOCLO</i>					73.952***	20.270**
					(14.365)	(8.386)
<i>LENDOTHER</i>					75.667***	10.465
					(28.395)	(9.668)
<i>AGENCY</i>					-0.536	7.060
					(8.000)	(14.174)
<i>OTHER</i>					-0.080	-148.332
					(21.753)	(97.034)
CONSTANT	367.33***	400.621**	367.11***	404.077**	377.37***	422.019**
	(131.148)	(162.308)	(129.975)	(161.818)	(122.493)	(173.132)
Obs.	2,537	1,021	2,537	1,021	2,537	1,021
R-squared	0.278	0.389	0.278	0.390	0.305	0.400

The columns under (1) – (3) show the coefficients of an ordinary least squares regression analysis, where LAIDS is the dependent variable (loan spread in bps). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. Columns under (1) report the coefficients of the base case in which institutional involvement is recorded by the NONBANK dummy. Columns under (2) repeat the same analysis, but with a dis-aggregated NONBANK measure. Columns under (3) further dis-aggregate and show the coefficients of individual, institutional lender groups. The explanatory variables are the same as in the base case. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Table 28: Robustness Tests: Loan Tenors (in Years) before and after the GFC

	(1)		(2)		(3)	
	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis	Pre-Crisis	Post-Crisis
LENDERCONCENTRATION	0.610	1.360	0.110	1.964**	0.478	0.850
	(0.443)	(0.916)	(0.434)	(0.875)	(0.472)	(0.854)
SYNDSIZE	0.004	-0.017	0.002	-0.005	-0.005	-0.038
	(0.027)	(0.057)	(0.027)	(0.055)	(0.028)	(0.056)
FOREIGNMAN	-2.579**	-0.336	-2.434**	-0.325	-2.515**	-0.219
	(1.073)	(1.115)	(0.987)	(1.127)	(1.194)	(1.106)
DOMESTICARR	0.611	-0.980**	0.512	-0.919**	0.596	-0.511
	(0.526)	(0.395)	(0.544)	(0.389)	(0.491)	(0.377)
OVERSUBSCRIBED	-0.512	1.883***	-0.497	1.815***	-0.504	1.770***
	(0.477)	(0.534)	(0.470)	(0.527)	(0.438)	(0.497)
AMOUNT	-0.001*	0.000	-0.001*	0.000	-0.001**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
NR_TRANCHES	0.525***	0.299**	0.524***	0.317**	0.535***	0.266
	(0.067)	(0.148)	(0.064)	(0.142)	(0.066)	(0.168)
CURRRISK	-0.447	0.063	-0.558	0.119	-0.625	-0.483
	(1.107)	(0.700)	(1.104)	(0.700)	(1.084)	(0.631)
PERFPRICE	3.945***	-0.066	3.889***	-0.108	3.905***	0.413
	(0.676)	(0.865)	(0.684)	(0.814)	(0.672)	(0.811)
FUNDING	1.324***	1.764***	1.334***	1.770***	1.419***	1.550***
	(0.387)	(0.336)	(0.385)	(0.339)	(0.378)	(0.263)
REFIN	-1.757***	-1.346***	-1.696***	-1.347***	-1.616***	-1.365***
	(0.407)	(0.316)	(0.409)	(0.299)	(0.378)	(0.265)

PPP	5.622*** (1.315)	8.409*** (3.053)	5.703*** (1.366)	8.756*** (2.993)	5.270*** (1.265)	7.210** (3.038)
SUBORD	1.065 (1.401)	4.424*** (1.513)	0.790 (1.418)	4.275*** (1.377)	0.906 (1.346)	4.660*** (1.666)
LOANRATING	-0.035 (0.233)	-0.573 (0.353)	-0.002 (0.234)	-0.633* (0.330)	-0.010 (0.220)	-0.292 (0.278)
COVENANT	-3.782*** (0.698)	-0.391 (0.318)	-3.858*** (0.733)	-0.287 (0.327)	-3.441*** (0.754)	-0.907** (0.432)
INSURED	1.887*** (0.549)	3.400* (1.740)	2.024*** (0.568)	3.644** (1.622)	2.020*** (0.564)	3.123 (2.027)
REPORTCOLLATERAL	-1.175*** (0.416)	-1.574*** (0.563)	-1.209*** (0.428)	-1.657*** (0.519)	-1.161*** (0.409)	-1.506** (0.626)
GUARANTEED	-0.191 (0.426)	0.625 (0.702)	-0.190 (0.427)	0.703 (0.706)	-0.184 (0.452)	0.556 (0.672)
INFRARATESENTIMENT	-0.173 (0.360)	-0.804** (0.365)	-0.147 (0.372)	-0.822** (0.362)	-0.137 (0.364)	-0.588* (0.343)
INFRADEFAULT	-0.060 (0.068)	-0.345* (0.200)	-0.049 (0.069)	-0.328 (0.213)	-0.080 (0.073)	-0.460** (0.193)
INFRARECOVERY	-4.702*** (1.724)	-1.375 (0.862)	-4.295** (1.697)	-1.472* (0.842)	-5.014*** (1.782)	-0.873 (0.858)
US10Y	-0.213 (0.211)	1.993*** (0.733)	-0.236 (0.211)	2.038*** (0.680)	-0.176 (0.213)	1.780** (0.787)
USSLOPE	-0.126 (0.150)	-2.130*** (0.574)	-0.132 (0.151)	-2.149*** (0.531)	-0.089 (0.163)	-1.852*** (0.618)
BASELIII		-3.288** (1.319)		-3.235** (1.311)		-3.049*** (1.075)
SOVRATING	0.336** (0.157)	0.044 (0.250)	0.354** (0.158)	0.019 (0.248)	0.344** (0.149)	0.099 (0.262)
REGULATED	1.069* (0.623)	0.438 (0.497)	1.052* (0.615)	0.396 (0.481)	1.025 (0.638)	0.468 (0.526)
<i>NONBANK</i>	<i>1.011*** (0.221)</i>	<i>1.543*** (0.423)</i>				
<i>NONBANK2</i>			<i>1.967*** (0.306)</i>	<i>0.991* (0.512)</i>		
<i>NONBANK3</i>			<i>0.448 (0.286)</i>	<i>2.217*** (0.429)</i>		
<i>SWFPENSUR</i>					<i>2.147** (1.021)</i>	<i>1.615 (1.694)</i>
<i>INVESTOTHER</i>					<i>-1.766** (0.808)</i>	<i>-1.482* (0.821)</i>
<i>CDOCLO</i>					<i>-0.405 (0.943)</i>	<i>-1.434*** (0.335)</i>
<i>LENDOTHER</i>					<i>0.210 (0.610)</i>	<i>0.137 (0.445)</i>
<i>AGENCY</i>					<i>1.520*** (0.228)</i>	<i>2.887*** (0.536)</i>
<i>OTHER</i>					<i>1.708 (1.535)</i>	<i>-2.799** (1.127)</i>
CONSTANT	11.330*** (2.34)	7.474*** (2.407)	11.187*** (2.247)	7.009*** (2.464)	11.396*** (2.181)	7.326*** (2.331)
Obs.	2,537	1,021	2,537	1,021	2,537	1,021
R-squared	0.253	0.263	0.258	0.270	0.265	0.299

The columns under (1) – (3) show the coefficients of an ordinary least squares regression analysis, where YRSFNLMAT is the dependent variable (loan tenor in years). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. Columns under (1) report the coefficients of the base case in which institutional involvement is recorded by the NONBANK dummy. Columns under (2) repeat the same

analysis, but with a dis-aggregated NONBANK measure. Columns under (3) further dis-aggregate and show the coefficients of individual, institutional lender groups. The explanatory variables are the same as in the base case. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

**Table 29: Robustness Tests -
“The Pricing Puzzle”: Loan Spreads (in bps) in Europe and North America**

	(1)		(2)		(3)	
	EUCA	NORAM	EUCA	NORAM	EUCA	NORAM
YRSFNLMAT	-0.764** (0.387)	-2.837*** (0.787)	-0.794** (0.388)	-2.840*** (0.786)	-0.794** (0.390)	-2.191*** (0.781)
TREND	0.543*** (0.097)	0.078 (0.119)	0.538*** (0.097)	0.077 (0.119)	0.551*** (0.097)	0.094 (0.115)
AMOUNT	-0.006 (0.004)	-0.024*** (0.007)	-0.006 (0.004)	-0.024*** (0.007)	-0.006* (0.004)	-0.023*** (0.006)
LENDERCONCENTRATION	30.408** (13.520)	24.440* (13.694)	27.521* (14.839)	24.816* (14.001)	30.248** (13.721)	25.757** (12.825)
SYNDSIZE	-0.222 (0.357)	-2.248*** (0.833)	-0.219 (0.357)	-2.248*** (0.833)	-0.166 (0.367)	-2.552*** (0.625)
FOREIGNMAN	24.928* (13.260)	21.622 (24.738)	24.851* (13.311)	21.689 (24.748)	25.469* (13.488)	23.238 (24.721)
DOMESTICARR	-16.271** (6.455)	23.155*** (6.504)	-16.136** (6.488)	23.250*** (6.599)	-16.007** (6.574)	18.868*** (6.387)
OVERSUBSCRIBED	-13.774** (6.465)	10.689 (9.650)	-14.089** (6.510)	10.613 (9.679)	-14.628** (6.525)	16.682* (9.904)
NR_TRANCHES	2.218 (1.613)	-0.559 (2.584)	2.234 (1.615)	-0.538 (2.609)	2.511 (1.605)	-1.316 (2.525)
CURRRISK	-8.560 (7.059)	25.643 (29.634)	-8.758 (7.092)	25.411 (30.007)	-8.450 (7.134)	40.918 (30.482)
PERFPRICE	-1.438 (6.396)	-20.071** (9.562)	-1.563 (6.441)	-20.103** (9.577)	-1.615 (6.404)	-14.790 (9.167)
FUNDING	2.474 (6.035)	50.823*** (6.442)	2.582 (6.012)	50.807*** (6.454)	2.869 (6.043)	44.948*** (6.279)
REFIN	2.209 (7.321)	20.842** (9.881)	2.189 (7.331)	20.811** (9.863)	2.748 (7.324)	22.111** (9.546)
PPP	-27.480** (11.006)	-21.516 (22.826)	-27.664** (11.025)	-21.605 (22.748)	-26.571** (11.509)	-4.697 (21.928)
SUBORD	155.98*** (58.050)	508.21*** (15.186)	154.30*** (58.133)	508.03*** (15.322)	155.47*** (58.032)	494.59*** (14.556)
LOANRATING	-1.878 (5.636)	20.192*** (5.522)	-1.796 (5.677)	20.153*** (5.536)	-1.334 (5.737)	16.987*** (5.441)
COVENANT	78.201** (33.420)	61.319*** (12.682)	78.007** (34.011)	61.418*** (12.687)	81.004** (34.581)	51.510*** (12.514)
INSURED	5.165 (27.137)	-45.188 (44.782)	6.047 (27.103)	-44.966 (45.243)	6.847 (27.182)	-50.230 (42.249)
REPORTCOLLATERAL	20.099 (12.785)	38.472*** (11.403)	19.974 (12.772)	38.380*** (11.367)	19.954 (12.911)	35.783*** (11.094)
GUARANTEED	-22.109* (11.372)	-20.975 (13.230)	-21.971* (11.347)	-20.995 (13.238)	-23.842** (11.594)	-28.985** (12.599)
INFRARATESENTIMENT	19.37*** (6.900)	-10.162 (7.111)	19.413*** (6.905)	-10.200 (7.097)	19.047*** (6.974)	-15.219** (7.026)
INFRADEFAULT	0.706 (1.704)	-1.740 (2.170)	0.675 (1.706)	-1.743 (2.173)	0.765 (1.735)	-3.049 (2.129)
INFRARECOVERY	12.138	35.964	11.959	35.970	12.735	48.370

	(41.473)	(31.102)	(41.506)	(31.124)	(41.963)	(31.181)
US10Y	2.537	-0.212	2.373	-0.158	2.755	0.384
	(4.987)	(5.620)	(4.974)	(5.681)	(5.018)	(5.576)
USSLOPE	-2.179	12.514**	-1.890	12.510**	-1.995	12.904***
	(5.179)	(4.950)	(5.259)	(4.947)	(5.188)	(4.815)
AAABBB	32.633***	-2.759	32.448***	-2.762	32.900***	1.208
	(7.469)	(9.742)	(7.435)	(9.752)	(7.511)	(9.146)
BASELIII	79.624*	-183.97***	78.466*	-184.06***	82.255*	-166.31***
	(46.190)	(47.948)	(46.493)	(47.878)	(46.298)	(45.769)
REGULATED	-25.97***	-46.634***	-26.556***	-46.719***	-26.514***	-42.011***
	(6.205)	(7.801)	(6.273)	(7.863)	(6.226)	(7.680)
PRSPOLRISK	-0.925**	3.231	-0.894**	3.235	-0.879**	1.916
	(0.437)	(2.206)	(0.437)	(2.205)	(0.429)	(2.130)
GDPGRWTH	-0.971	3.505	-0.939	3.512	-0.878	2.820
	(1.882)	(2.849)	(1.878)	(2.855)	(1.896)	(2.766)
GDPCAP	-0.000	0.009***	-0.000	0.009***	-0.000	0.009***
	(0.000)	(0.002)	(0.000)	(0.002)	(0.000)	(0.002)
INFLATION	0.231	-19.020***	0.230	-19.073***	0.240	-17.499***
	(0.295)	(5.025)	(0.294)	(4.999)	(0.294)	(4.958)
IMFFINDEV	-83.61***	-851.69***	-83.305***	-852.85***	-85.550***	-896.73***
	(26.073)	(327.523)	(26.016)	(326.652)	(26.303)	(325.006)
CRISIS	-4.226	-12.454	-4.140	-12.450	-4.204	-27.473*
	(11.200)	(14.850)	(11.215)	(14.861)	(11.298)	(14.941)
NONBANK	16.405**	39.887***				
	(6.844)	(6.695)				
NONBANK2			22.376*	39.209***		
			(12.097)	(9.037)		
NONBANK3			13.560*	40.424***		
			(7.181)	(7.748)		
SWFPENSUR					32.877	17.063
					(26.206)	(12.014)
INVESTOTHER					3.383	86.220***
					(13.958)	(10.791)
CDOCLO					98.831***	51.697***
					(14.801)	(13.021)
LENDOTHER					-0.020	15.112**
					(12.410)	(6.889)
AGENCY					12.884*	-0.628
					(7.503)	(11.325)
OTHER						-2.316
						(28.328)
CONSTANT	138.75**	257.593	139.39***	257.559	131.419**	383.946
	(53.866)	(285.243)	(53.673)	(285.611)	(53.772)	(274.877)
Obs.	1,025	1,093	1,025	1,093	1,025	1,093
R-squared	0.298	0.398	0.298	0.398	0.298	0.432

The columns under (1) – (3) show the coefficients of an ordinary least squares regression analysis, where IAIDS is the dependent variable (loan spread in bps). In parentheses, below the coefficients, Huber-White robust standard errors are reported. Columns under (1) report the coefficients of the base case in which institutional involvement is recorded by the NONBANK dummy. Columns under (2) repeat the same analysis, but with a dis-aggregated NONBANK measure. Columns under (3) further dis-aggregate and show the coefficients of individual, institutional lender groups. The explanatory variables differ from the base case in the regard that SOVRATING has been replaced by a set of alternative variables – SOVRATING was factually a constant for NORAM since it has never experienced any change throughout the sample period. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Table 30:
Robustness Tests: “The Pricing Puzzle”: Loan Tenors (in Years) in Europe and North America

	(1)		(2)		(3)	
	EUCA	NORAM	EUCA	NORAM	EUCA	NORAM
LENDERCONCENTRATION	0.083 (0.782)	1.300** (0.617)	-0.599 (0.804)	1.392** (0.645)	0.032 (0.770)	1.123* (0.620)
SYNDSIZE	-0.055** (0.023)	0.017 (0.023)	-0.054** (0.023)	0.017 (0.023)	-0.056** (0.023)	0.006 (0.025)
FOREIGNMAN	-1.961 (2.104)	1.000** (0.498)	-1.982 (2.162)	1.017** (0.497)	-2.037 (2.101)	1.161** (0.544)
DOMESTICARR	1.521*** (0.440)	-1.237*** (0.306)	1.541*** (0.441)	-1.213*** (0.304)	1.451*** (0.435)	-1.032*** (0.302)
OVERSUBSCRIBED	-1.416*** (0.457)	1.316** (0.628)	-1.479*** (0.455)	1.297** (0.629)	-1.419*** (0.466)	1.309** (0.633)
NR_TRANCHES	0.539*** (0.101)	0.121 (0.107)	0.543*** (0.100)	0.125 (0.107)	0.558*** (0.102)	0.128 (0.107)
AMOUNT	-0.001*** (0.000)	-0.000 (0.000)	-0.001*** (0.000)	-0.000 (0.000)	-0.001*** (0.000)	-0.000* (0.000)
CURRRISK	-2.265*** (0.431)	-0.502 (1.106)	-2.300*** (0.430)	-0.566 (1.103)	-2.269*** (0.429)	-0.752 (1.089)
PERFPRICE	4.272*** (0.519)	0.666* (0.350)	4.217*** (0.517)	0.658* (0.351)	4.281*** (0.512)	0.741** (0.351)
FUNDING	1.095*** (0.390)	1.832*** (0.249)	1.121*** (0.391)	1.826*** (0.249)	1.167*** (0.390)	1.867*** (0.251)
REFIN	-1.559*** (0.480)	-0.881*** (0.221)	-1.555*** (0.474)	-0.888*** (0.220)	-1.394*** (0.475)	-0.933*** (0.227)
PPP	6.013*** (1.276)	12.089*** (3.840)	5.938*** (1.279)	12.062*** (3.894)	5.832*** (1.277)	12.137*** (3.633)
SUBORD	-0.231 (3.051)	4.481*** (0.522)	-0.590 (2.919)	4.433*** (0.529)	-0.207 (3.030)	4.520*** (0.518)
LOANRATING	0.135 (0.394)	-0.149 (0.157)	0.147 (0.387)	-0.158 (0.158)	0.170 (0.393)	-0.104 (0.161)
COVENANT	0.093 (1.920)	-1.681*** (0.317)	0.062 (1.874)	-1.655*** (0.324)	0.292 (1.869)	-1.634*** (0.316)
INSURED	1.301 (0.984)	3.154** (1.535)	1.493 (0.966)	3.207** (1.554)	1.503 (1.020)	3.038* (1.573)
REPORTCOLLATERAL	-0.755 (0.758)	-0.446* (0.264)	-0.782 (0.742)	-0.469* (0.266)	-1.017 (0.772)	-0.498* (0.266)
GUARANTEED	0.290 (0.585)	-0.312 (0.441)	0.317 (0.584)	-0.316 (0.443)	0.080 (0.595)	-0.144 (0.440)
INFRARATESENTIMENT	-0.767* (0.427)	-0.371 (0.284)	-0.754* (0.428)	-0.380 (0.284)	-0.768* (0.429)	-0.275 (0.281)
INFRADEFAULT	0.065 (0.113)	-0.158* (0.083)	0.055 (0.114)	-0.159* (0.083)	0.093 (0.114)	-0.151* (0.083)
INFRARECOVERY	-7.346*** (1.913)	2.345* (1.240)	-7.342*** (1.936)	2.343* (1.240)	-7.480*** (1.908)	2.154* (1.237)
US10Y	0.767*** (0.265)	0.019 (0.198)	0.750*** (0.266)	0.033 (0.200)	0.792*** (0.263)	0.001 (0.198)
USSLOPE	-0.264 (0.293)	0.103 (0.195)	-0.211 (0.292)	0.101 (0.195)	-0.238 (0.295)	0.126 (0.193)
BASELIII	4.135* (2.301)	-1.588 (1.546)	3.813 (2.380)	-1.590 (1.545)	4.172* (2.327)	-1.646 (1.537)
REGULATED	0.684* (0.413)	0.131 (0.287)	0.541 (0.417)	0.109 (0.290)	0.711* (0.413)	0.100 (0.288)

PRSPOLRISK	0.029** (0.015)	-0.045 (0.068)	0.036** (0.015)	-0.044 (0.069)	0.034** (0.015)	-0.032 (0.068)
GDPCAP	-0.000* (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
GDPGRWTH	0.050 (0.065)	0.232** (0.094)	0.058 (0.064)	0.232** (0.094)	0.053 (0.065)	0.259*** (0.095)
INFLATION	-0.002 (0.013)	-0.236 (0.220)	-0.003 (0.013)	-0.247 (0.220)	0.003 (0.013)	-0.251 (0.218)
IMFFINDEV	2.242 (1.387)	-22.187* (11.638)	2.273 (1.388)	-22.461* (11.637)	2.007 (1.395)	-21.290* (11.556)
CRISIS	2.856*** (0.711)	-0.987** (0.483)	2.860*** (0.708)	-0.985** (0.484)	2.677*** (0.722)	-0.707 (0.477)
NONBANK	1.325*** (0.474)	0.792*** (0.248)				
NONBANK2			2.691*** (0.760)	0.624** (0.303)		
NONBANK3			0.654 (0.545)	0.925*** (0.297)		
SWFPENSUR					4.033 (2.722)	-0.468 (0.531)
INVESTOTHER					-1.993 (1.331)	-0.612** (0.263)
CDOCLO					5.583*** (0.823)	0.013 (0.368)
LENDOTHER					0.450 (0.902)	0.595*** (0.226)
AGENCY					1.648*** (0.506)	1.524*** (0.542)
OTHER						1.787 (1.603)
CONSTANT	7.922** (3.090)	22.833** (10.589)	7.741** (3.135)	22.879** (10.589)	7.422** (3.087)	21.055** (10.547)
Obs.	1,025	1,093	1,025	1,093	1,025	1,093
R-squared	0.333	0.191	0.338	0.192	0.340	0.198

The columns under (1) – (3) show the coefficients of an ordinary least squares regression analysis, where YRSFNLMAT is the dependent variable (loan tenor in years). In parentheses, below the coefficients, Huber-White robust standard errors are reported. Columns under (1) report the coefficients of the base case in which institutional involvement is recorded by the NONBANK dummy. Columns under (2) repeat the same analysis, but with a dis-aggregated NONBANK measure. Columns under (3) further dis-aggregate and show the coefficients of individual, institutional lender groups. The explanatory variables differ from the base case in the regard that SOVRATING has been replaced by a set of alternative variables – SOVRATING was factually a constant for NORAM since it has never experienced any change throughout the sample period. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

A.2 ADDITIONAL TABLES

Table 3: IAIDS by Syndicate Type (bps)

	N	Mean	Std. Dev.	Min	Max
<i>NONBANK (1)</i>	1,440	221.8	168.9	1.5	1,400
<i>NONBANK (0)</i>	2,118	187.4	138.4	0	1,225
<i>SWFPENSUR (1)</i>	112	202.4	141.3	1.5	700
<i>SWFPENSUR (0)</i>	3,446	201.3	152.8	0	1,400
<i>INVESTOTHER (1)</i>	173	298.1	145.4	35	1,060
<i>INVESTOTHER (0)</i>	3,385	196.4	151.1	0	1,400
<i>CDOCLO (1)</i>	56	328.7	80.3	137.5	500
<i>CDOCLO (0)</i>	3,502	199.3	152.4	0	1,400
<i>LENDOTHER (1)</i>	434	279.1	193.8	8	1,400
<i>LENDOTHER (0)</i>	3,124	190.5	142.4	0	1,300
<i>AGENCY (1)</i>	921	187.2	152.5	1.5	1,300
<i>AGENCY (0)</i>	2,637	206.3	152.1	0	1,400
<i>OTHER (1)</i>	17	244.3	162.8	30	500
<i>OTHER (0)</i>	3,541	201.1	152.3	0	1,400
<i>NONBANK2 (1)</i>	637	231.3	177.8	1.5	1,300
<i>NONBANK2 (0)</i>	2,921	194.8	145.5	0	1,400
<i>NONBANK3 (1)</i>	805	214.1	161.1	5	1,400
<i>NONBANK3 (0)</i>	2,753	197.6	149.6	0	1,300
<i>FOREIGNMAN (1)</i>	3,460	195.8	133.6	0	1,100
<i>FOREIGNMAN (0)</i>	98	395.6	418.9	1.7	1,400
<i>DOMESTICARR (1)</i>	1,702	214.8	170.9	1.5	1,400
<i>DOMESTICARR (0)</i>	1,856	189	132	0	1,060
TOTAL	3,558	201.3	152.4	0	1,400

(1) indicates syndicates in which the given non-bank lender type is present, (0) indicates cases in which these lender types are not involved. NONBANK aggregates SWFPENSUR, INVESTOTHER, CDOCLO, LENDOTHER, AGENCY and OTHER. FOREIGNMAN (1) indicates the presence of foreign lenders and DOMESTICARR (1) indicates that at least one of the arranging lenders is from the borrower's country.

Table 4: YRSFNLMT by Syndicate Type (in Years)

	N	Mean	Std. Dev.	Min	Max
<i>NONBANK (1)</i>	1,440	9.4	5.9	.3	34.3
<i>NONBANK (0)</i>	2,118	7.8	5.4	0	31.5
<i>SWFPENSUR (1)</i>	112	10.9	7.1	1	31.9
<i>SWFPENSUR (0)</i>	3,446	8.4	5.6	0	34.3
<i>INVESTOTHER (1)</i>	173	6.3	3.7	.3	22.6
<i>INVESTOTHER (0)</i>	3,385	8.6	5.8	0	34.3
<i>CDOCLO (1)</i>	56	5.6	2	.5	11
<i>CDOCLO (0)</i>	3,502	8.5	5.7	0	34.3
<i>LENDOTHER (1)</i>	434	7.9	4.3	.4	27.5
<i>LENDOTHER (0)</i>	3,124	8.5	5.9	0	34.3
<i>AGENCY (1)</i>	921	10.4	6.4	.5	34.3
<i>AGENCY (0)</i>	2,637	7.8	5.3	0	31.9
<i>OTHER (1)</i>	17	7.8	4.4	2	16.9
<i>OTHER (0)</i>	3,541	8.5	5.7	0	34.3
<i>NONBANK2 (1)</i>	637	10	6	.5	34.3
<i>NONBANK2 (0)</i>	2,921	8.1	5.6	0	31.9
<i>NONBANK3 (1)</i>	805	8.9	5.8	.3	31.9
<i>NONBANK3 (0)</i>	2,753	8.3	5.7	0	34.3
<i>FOREIGNMAN (1)</i>	3,460	8.4	5.7	0	34.3

FOREIGNMAN (0)	98	9.5	6.5	.3	29
DOMESTICARR (1)	1,702	8.8	6.3	.3	34.3
DOMESTICARR (0)	1,856	8.1	5.1	0	30
TOTAL	3,558	8.5	5.7	0	34.3

(1) indicates syndicates in which the given non-bank lender type is present, (0) indicates cases in which these lender types are not involved. NONBANK aggregates SWFPENSUR, INVESTOTHER, CDOCLO, LENDOTHER, AGENCY and OTHER. FOREIGNMAN (1) indicates the presence of foreign lenders and DOMESTICARR (1) indicates that at least one of the arranging lenders is from the borrower's country.

Table 5: AMOUNT by Syndicate Type (in US\$m)

	N	Mean	Std. Dev.	Min	Max
NONBANK (1)	1,440	319.8	590.5	.4	8,400
NONBANK (0)	2,118	272.3	618	.1	15,324
SWFPENSUR (1)	112	482.6	809	3.1	5,819
SWFPENSUR (0)	3,446	285.3	598.9	.1	15,324
INVESTOTHER (1)	173	314.3	627.9	6.8	5,819
INVESTOTHER (0)	3,385	290.4	606.4	.1	15,324
CDOCLO (1)	56	464.3	1,171.4	25	8,400
CDOCLO (0)	3,502	288.8	594	.1	15,324
LENDOTHER (1)	434	226.6	377.2	.4	3,975
LENDOTHER (0)	3,124	300.6	632.3	.1	15,324
AGENCY (1)	921	368	675.8	1.3	8,400
AGENCY (0)	2,637	264.8	579.4	.1	15,324
OTHER (1)	17	329.3	312.5	12.2	875
OTHER (0)	3,541	291.4	608.5	.1	15,324
NONBANK2 (1)	637	346.6	665	.4	8,400
NONBANK2 (0)	2,921	279.5	593.6	.1	15,324
NONBANK3 (1)	805	298.1	522.9	1.1	5,819
NONBANK3 (0)	2,753	289.6	630.1	.1	15,324
FOREIGNMAN (1)	3,460	295.3	614.4	.1	15,324
FOREIGNMAN (0)	98	158.3	228.6	4.3	1,250
DOMESTICARR (1)	1,702	353	723.8	.1	15,324
DOMESTICARR (0)	1,856	235.2	469.6	.1	7,000
TOTAL	3,558	291.5	607.4	.1	15,324

(1) indicates syndicates in which the given non-bank lender type is present, (0) indicates cases in which these lender types are not involved. NONBANK aggregates SWFPENSUR, INVESTOTHER, CDOCLO, LENDOTHER, AGENCY and OTHER. FOREIGNMAN (1) indicates the presence of foreign lenders and DOMESTICARR (1) indicates that at least one of the arranging lenders is from the borrower's country.

Table 6: Number of Tranches in which Non-Bank Lenders have been involved by year

	All Tranches	NON BANK	SWF PENSUR	INVESTO THER	CDO CLO	LEND OTHER	AGENCY	OTHER
1997	305	114	2	8	3	39	82	0
1998	248	54	4	10	2	6	39	0
1999	284	95	5	21	15	14	66	2
2000	362	126	10	19	9	36	85	1
2001	206	64	12	7	5	19	42	2
2002	126	42	6	0	0	4	35	1
2003	119	55	4	6	1	0	47	0
2004	136	57	5	5	2	4	46	1
2005	94	47	11	8	3	5	39	1
2006	213	84	3	0	0	15	64	4
2007	229	112	6	9	0	16	96	1

2008	278	128	11	20	2	37	81	1
2009	102	45	3	9	0	12	30	0
2010	121	53	6	13	0	25	15	1
2011	146	80	5	10	0	49	34	0
2012	95	55	4	7	0	10	44	0
2013	122	62	4	11	2	42	21	1
2014	98	38	3	1	2	24	17	1
2015	107	48	4	5	4	24	16	0
2016	90	47	2	4	1	29	13	0
2017	77	34	2	0	5	24	9	0

Table 7: Breakdown by Geographic Region[#]

	N	IAIDS	YRSFNLMT	AMOUNT	Volume
East Asia and Pacific (<i>EASTPAC</i>)	553	161.9	8.7	194.89	107.772
Europe and Central Asia (<i>EUCA</i>)	1,025	149.2	9.8	358.85	367.823
Latin America and the Caribbean (<i>LATCAR</i>)	344	250.7	7.5	205.27	70.614
Middle East and North Africa (<i>MENA</i>)	320	113.7	11.7	445.95	142.704
North America (<i>NORAM</i>)	1,093	254.9	6.5	278.47	304.372
Sub-Saharan Africa (<i>SUBSA</i>)	107	286.5	7	217.62	23.285
South Asia (<i>SOUTHASIA</i>)	116	362.3	8.7	178.8	20.741
TOTAL	3,558	201.3	8.5	291.54	1,040

[#]Geographic breakdown according to the classification for country and lending groups set out by the World Bank Group (see: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>).

IAIDS, YRSFNLMT and AMOUNT reflect average values and are reported as follows: IAIDS in bps, YRSFNLMT in years and AMOUNT in US\$m. Volume is the total issuance volume by geographic region and is reported in US\$bn.

Table 8: Breakdown by Country (N = 100)

Country	N	IAIDS	YRSFNLMT	AMOUNT	Volume
Algeria	1	125	5	50	0.50
Angola	3	258.33	4.5	396.67	1.190
Argentina	32	286.37	6.14	114.65	3.669
Australia	54	180.7	7.65	549.48	27.474
Austria	5	87.7	8.01	191.71	0.959
Azerbaijan	12	128.75	10.42	151.94	1.823
Bahamas	4	212.5	5.44	141.75	0.567
Bahrain	14	189.43	10.42	356.39	4.989
Bangladesh	6	283.33	10.26	69.48	0.417
Belgium	19	130.26	9.67	262.36	4.985
Bolivia	1	400	8.01	50	0.050
Brazil	82	285.23	6.56	323.28	25.539
Bulgaria	7	200	16.59	138.19	0.967
Cameroon	3	550	5.37	89.49	0.268
Canada	78	212.87	7.74	322.38	25.146
Chile	42	175.31	8.94	209.7	8.807
China	103	106.66	8.4	134.74	13.879
Colombia	25	308.3	5.77	118.19	2.955
Costa Rica	3	300	12.42	155.33	0.466
Croatia	8	135.63	3.66	54.62	0.437

Cyprus	2	175	3.95	219	0.438
Denmark	8	202.81	6	187.82	1.503
Ecuador	2	112.5	17.01	900	0.900
Egypt	52	127.97	9.39	179.71	9.345
El Salvador	3	483.33	7.34	58.33	0.175
Estonia	4	170	5.5	30.98	0.124
Finland	4	109.38	5	526.5	2.106
France	31	113.52	7.71	434.1	13.457
Gabon	1	800	7	100.44	0.100
Germany	37	149.95	8.36	481.75	17.825
Ghana	13	354.62	7.34	610.73	7.940
Greece	29	124.96	8.15	128.55	3.728
Guatemala	9	412.22	6.34	69.44	0.625
Guinea	3	273.33	5	90	0.270
Guyana	1	350	4	80	0.080
Hungary	14	83.21	13.82	188.58	2.640
Iceland	9	203.33	8.37	58.88	0.530
India	103	374.77	8.88	191.49	19.723
Indonesia	62	296.34	6.52	175.01	10.501
Iran	2	117.5	7.63	401.05	0.802
Ireland-Rep	25	109.7	10.7	94.46	1.889
Israel	5	87.5	16.51	281.4	1.407
Italy	60	119.21	11.2	281.64	16.899
Jamaica	6	315.38	7.19	38.5	0.231
Japan	10	99	11.16	389.41	3.894
Jordan	9	160.56	11.05	76.39	0.688
Kazakhstan	9	311.11	6.25	195.89	1.763
Kenya	8	495	8.09	48.71	0.390
Kuwait	13	68.27	9.48	506.65	6.587
Liberia	1	115	10.01	42.14	0.042
Libya	1	200	6	50	0.050
Lithuania	1	55	.74	75	0.075
Luxembourg	5	350	5	270	0.270
Madagascar	7	127.86	17.01	300	2.100
Malaysia	48	108.83	9.15	97.21	4.666
Mali	3	205	5.17	57.17	0.171
Malta	1	325	5	350	0.350
Mexico	83	202.53	8.13	210.75	17.492
Mongolia	2	302.5	12.01	1170	2.340
Morocco	9	145.56	10.45	164.56	1.481
Mozambique	1	190	10.01	759.73	0.760
Namibia	2	290	6	70.5	0.141
Netherlands	36	143.99	10.95	268.6	9.670
New Zealand	3	205	5.17	266.49	0.799
Nicaragua	1	510	5	15	0.015
Nigeria	20	320.75	4.98	242.5	4.850
Norway	39	160.51	6.4	403.28	15.325
Oman	40	109.38	13.46	280.18	11.207
Pakistan	3	181.67	3.59	90.69	0.272
Panama	30	214.52	9.62	103.55	3.003
Papua N Guinea	3	186.67	4	116.33	0.349
Peru	20	256	8.08	252.96	5.059
Philippines	52	187.25	8.45	172.39	8.964
Poland	31	134.68	7.29	109.39	3.391
Portugal	14	128.75	14.22	304.33	4.261
Qatar	42	81.9	14.78	633.09	26.590

Rep of Congo	2	375	2.96	205	0.410
Russian Fed	43	324.53	4.37	472.31	20.309
Saudi Arabia	60	105.35	12.2	747.48	44.849
Singapore	62	126.88	8.05	191.58	11.495
Slovak Rep	18	150.28	5.28	127.98	2.304
Slovenia	4	82.5	7.5	36.83	0.147
South Africa	29	201.34	7.28	122.19	3.543
South Korea	120	163.15	9.48	115.11	13.813
Spain	45	91.51	11.39	217.39	9.783
Sri Lanka	4	294.45	4.25	82.25	0.329
Sweden	23	135.43	6.32	495.04	11.386
Switzerland	13	132.69	7.2	546.06	7.099
Tanzania	3	148.33	7.67	159	0.477
Thailand	22	119.77	10.81	224.54	4.940
Trinidad & Tobago	5	232.5	6	196	0.980
Tunisia	4	91.25	11.06	45.75	0.183
Turkey	63	189.16	8.65	163.73	10.151
Ukraine	1	210	5	50	0.050
United Kingdom	417	142.79	11.51	483.29	201.531
United States	1,086	258.09	6.43	275.1	279.226
Utd Arab Em	65	111.8	10.97	482.22	31.344
Vietnam	20	207.63	12.63	232.88	4.658
Yemen	2	165	14.89	1391	2.782
Zambia	8	275	4.33	78.97	0.631

IAIDS, YRSFNLMAT and AMOUNT reflect average values and are reported as follows: IAIDS in bps, YRSFNLMAT in years and AMOUNT in US\$m. Volume is the total issuance volume by country and is reported in US\$bn.

Table 9: Breakdown by Currency

	N	IAIDS	YRSFNLMAT	AMOUNT	Volume
USD	2,738	213.1	7.6	279	763.802
GBP	347	138.1	12.8	366.4	127.132
EUR	181	134.2	11.1	437.3	79.146
CAD	47	203	8.2	274.5	12.900
AUD	16	176.3	6.5	251.5	4.024
JPY	15	125.3	10.4	193.9	2.909
TOTAL	3,558	201.3	8.5	291.5	1,037.310

IAIDS, YRSFNLMAT and AMOUNT reflect average values and are reported as follows: IAIDS in bps, YRSFNLMAT in years and AMOUNT in US\$m. Volume is the total issuance volume by geographic region and is reported in US\$bn.

Table 10: Breakdown by Loan Rating[#]

	N	IAIDS	YRSFNLMAT	AMOUNT	Volume
5	8	46.5	11.8	817.9	6.543
4	47	135.5	9	616.9	28.996
3	65	278.3	6.1	378.7	24.615

2	81	382.1	6.1	354.2	28.693
1 / Unrated	3,357	196.8	8.5	282.5	948.463
TOTAL	3,558	201.3	8.5	291.5	1,037.310

IAIDS, YRSFNLMAT and AMOUNT reflect average values and are reported as follows: IAIDS in bps, YRSFNLMAT in years and AMOUNT in US\$m. Volume is the total issuance volume by geographic region and is reported in US\$bn.

#Ratings have been converted according to the methodology introduced in Corielli et al. (2010).

Table 11: Breakdown by Industry

	N	IAIDS	YRSFNLMAT	AMOUNT	Volume
AFF	6	265.8	8.3	122.5	0.735
CONSTRUCT	115	175.8	14.3	365.6	42.043
FIRE	217	199.1	7.4	297.4	64.535
MANUFACT	366	185	8.2	305.1	111.667
MINING	442	237.9	6.7	447.2	197.642
PA	62	124.7	11.8	133.9	8.301
RT	5	275	4.7	277.5	1.388
SERV	112	169.8	11	142.7	15.985
TCEGS	2,223	202.1	8.5	265.5	590.124
WST	10	112.3	5.5	489	4.890
REGULATED#	1,881	199.6	8.9	231.8	436.069
TOTAL	3,558	201.3	8.5	291.5	1,037.310

#REGULATED is a dummy variable and used as an instrument for maturity in the 2SLS analysis of this thesis. In line with the approach presented by Bharath et al. (2011) and Fotak et al. (2019) regulated industries encompass utilities and transportation projects whose revenues are regularly subject to tight regulation. IAIDS, YRSFNLMAT and AMOUNT reflect average values and are reported as follows: IAIDS in bps, YRSFNLMAT in years and AMOUNT in US\$m. Volume is the total issuance volume by geographic region and is reported in US\$bn.

Table 12: Loan Determinants in Times of Crisis#

	N	IAIDS	YRSFNLMAT	AMOUNT	Volume
In Crisis	605	215.2	8.7	190.9	115.479
Not in Crisis	2,953	198.5	8.4	312.2	921.832
TOTAL	3,558	201.3	8.5	291.5	1,037.310

#The dummy variable CRISIS used to identify countries suffering from a domestic banking crisis has been modeled based on the databases by Laeven and Valencia (2012, 2018). IAIDS, YRSFNLMAT and AMOUNT reflect average values and are reported as follows: IAIDS in bps, YRSFNLMAT in years and AMOUNT in US\$m. Volume is the total issuance volume by geographic region and is reported in US\$bn.

Table 13: Loan Determinants pre- and post-GFC#

	N	IAIDS	YRSFNLMAT	AMOUNT	Volume
Post-GFC (1)	1,116	294.7	7.7	300.5	335.327
Pre-GFC (0)	2,537	162.6	8.7	291.4	739.277
TOTAL	3,653	202.9	8.4	294.2	1,074.605

#In line with approaches taken previously in the literature, closing dates before September 15th 2008 – the date Lehman Brothers filed for Chapter 11 bankruptcy protection – are regarded to be pre-GFC, closing dates on and after this day are considered to be post-GFC for the purposes of this study. IAIDS, YRSFNLMAT and AMOUNT reflect average values and are reported as follows: IAIDS in bps,

YRSFNLMAT in years and AMOUNT in US\$m. Volume is the total issuance volume by geographic region and is reported in US\$bn.

Table 14: Development of Selected Loan Determinants over Time

Year	IAIDS	YRSFNLMAT	AMOUNT
1997	124.2	8.57	270.54
1998	142.74	8.03	220.47
1999	173.23	8.1	336.71
2000	187.35	7.7	350.33
2001	166.68	7.12	319.32
2002	184.78	7.41	192.03
2003	169.09	9.8	233.4
2004	179.05	9.14	219.1
2005	117.51	11.64	332.03
2006	156.8	9.48	316.68
2007	140.74	10.31	295.75
2008	209.18	10.02	282.24
2009	370.91	9.1	229.66
2010	293.61	7.26	150.96
2011	293.57	8.3	215
2012	332.35	8.36	317.45
2013	304.5	6.93	279.03
2014	289.77	6.63	521.13
2015	274.22	7.73	369.42
2016	270.33	7.04	321.75
2017	287.25	7.13	369.29

The columns for IAIDS, YRSFNLMAT and AMOUNT reflect average values for each given year, the column for NONBANK shows the percentage of deals with non-bank involvement for each given year.

Table 17: Unpaired two-sample t-test and Wilcoxon rank sum test for loan spreads (in bps)
Pre- and Post-Crisis

Full Sample Mean: 201.33 bps	N (0)	N (1)	Mean (0)	Mean (1)	Diff.	t-value	Wilcoxon z-value
NONBANK pre-GFC	1,581	956	151.71	180.51	-28.79	-4.8***	-2.97***
NONBANK post-GFC	537	484	292.64	303.25	-10.6	-1.15	-1.46
NONBANK2 pre-GFC	2,169	368	158.79	184.81	-26.02	-2.45***	1.10
NONBANK2 post-GFC	752	269	298.63	294.99	3.63	.4	-.84
NONBANK3 pre-GFC	1,947	590	157.93	177.84	-19.91	-3.1***	-4.39***
NONBANK3 post-GFC	806	215	293.43	313.57	-20.15	-1.5	-.88
SWFPENSUR pre-GFC	2,458	79	162.49	164.96	-2.47	-.15	.38
SWFPENSUR post-GFC	988	33	297.86	292.01	5.84	.35	-.58
INVESTOTHER	2,427	110	158.16	259.75	-101.6	-7.2***	-8.55***

<i>pre-GFC</i> INVESTOTHER	958	63	293.24	365	-71.76	-4.5***	-5.43***
post-GFC							
<i>CDO</i> <i>CLO</i> <i>pre-GFC</i>	2,495	42	159.77	328.75	-168.98	-13.05***	-8.70***
CDO							
post-GFC	1,007	14	297.24	328.57	-31.33	-1.45	-1.71*
<i>LENDOTHER</i> <i>pre-GFC</i>	2,345	192	154.07	266.26	-112.19	-6.65***	-8.59***
LENDOTHER							
post-GFC	779	242	300.26	289.32	10.94	.95	1.61
<i>AGENCY</i> <i>pre-GFC</i>	1,831	706	166.2	153.14	13.06	2.2**	3.38***
AGENCY							
post-GFC	806	215	297.32	298.96	-1.63	-.15	.49
<i>OTHER</i> <i>pre-GFC</i>	2,524	13	162.37	200.19	-37.82	-.95	-.94
OTHER							
post-GFC	1,017	4	297.32	387.5	-90.18	-1.15	-1.45

*** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level, * denotes statistical significance at the 10%-level.

(0) implies tranches for which the respective dummy has taken on the value of 0, (1) implies tranches for which the respective dummy has taken on the value of 1.

Given unequal variances in and the substantially different numbers of observations for the sub-groups, the t-tests have been performed using Welch's approximation.

**Table 18: Unpaired two-sample t-test and Wilcoxon rank sum test for loan tenors (in years);
Pre- and Post-Crisis**

Full Sample Mean: 8.39 years	N (0)	N (1)	Mean (0)	Mean (1)	Diff.	t-value	Wilcoxon z-value
<i>NONBANK</i> <i>pre-GFC</i>	1,581	956	8.09	9.67	-1.58	-6.3***	-6.7***
NONBANK post-GFC	537	484	7.01	8.86	-1.85	-6.4***	-6.2***
<i>NONBANK2</i> <i>pre-GFC</i>	2,169	368	8.32	10.84	-2.52	-7.15***	-7.84***
NONBANK2 post-GFC	752	269	7.52	8.91	-1.4	-3.85***	-3.58***
<i>NONBANK3</i> <i>pre-GFC</i>	1,947	590	8.6	8.95	-.34	-1.2	-1.22
NONBANK3 post-GFC	806	215	7.64	8.79	-1.15	-3.25***	-3.73***
<i>SWFPENSUR</i> <i>pre-GFC</i>	2,458	79	8.59	11.63	-3.05	-3.55***	-3.42***
SWFPENSUR post-GFC	988	33	7.85	9.05	-1.21	-1.3	-2.06**
<i>INVESTOTHER</i> <i>pre-GFC</i>	2,427	110	8.79	6.42	2.37	5.6***	3.9***
INVESTOTHER	958	63	8	6.18	1.82	5.05***	2.98***

post-GFC CDOCL0	2,495	42	8.74	5.42	3.32	9.1***	3.51***
pre-GFC CDOCL0	1,007	14	7.91	6.22	1.68	5.65***	1.04
post-GFC LENDOTHER	2,345	192	8.72	8.29	.42	1.05	0.57
pre-GFC LENDOTHER	779	242	8	7.52	.48	1.75*	-0.85
post-GFC AGENCY	1,831	706	8.08	10.26	-2.18	-7.8***	-8.43***
pre-GFC AGENCY	806	215	7.06	10.99	-3.93	-8.9***	-7.76***
post-GFC OTHER	2,524	13	8.68	9.08	-.39	-.35	0.89
pre-GFC OTHER	1,017	4	7.9	3.5	4.4	8.45***	2.68***
post-GFC							

*** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level

(0) implies tranches for which the respective dummy has taken on the value of 0, (1) implies tranches for which the respective dummy has taken on the value of 1.

Given unequal variances in and the substantially different numbers of observations for the sub-groups, the t-tests have been performed using Welch's approximation.

Table 20: OLS Regression Analysis: Panel B – Loan Spreads (in bps)

	(1)	(2)	(3)	(4)
NONBANK2	32.996** (12.843)	34.788*** (13.158)	35.790*** (12.365)	30.703** (12.757)
NONBANK3	23.282*** (8.200)	25.434*** (8.217)	23.904*** (7.980)	25.955*** (7.785)
YRSFNLMAT	-1.326* (0.743)	-1.294* (0.749)	-1.122* (0.612)	-1.280* (0.688)
TREND	0.619*** (0.054)	0.611*** (0.055)	0.574*** (0.065)	0.546*** (0.076)
AMOUNT	-0.008 (0.006)	-0.008 (0.006)	-0.008 (0.006)	-0.008 (0.005)
LENDERCONCENTRATION	0.694 (19.590)	1.945 (19.821)	3.585 (20.085)	0.332 (21.820)
SYNDSIZE	-1.599*** (0.463)	-1.597*** (0.429)	-1.596*** (0.529)	-1.798*** (0.453)
FOREIGNMAN	-139.151 (109.059)	-143.282 (109.088)	-132.868 (106.602)	-143.439 (106.334)
DOMESTICARR	6.649 (10.040)	7.059 (9.290)	6.173 (10.206)	9.119 (10.379)
OVERSUBSCRIBED	7.171 (11.799)	9.207 (11.637)	7.109 (11.173)	9.088 (12.790)
NR_TRANCHES	0.252 (2.448)	-0.159 (2.487)	0.459 (2.445)	0.499 (2.109)
CURRRISK	-36.832*** (12.200)	-37.547*** (11.642)	-25.220 (19.902)	-36.992*** (11.336)
PERFPRICE	-2.299 (8.775)	-3.610 (8.362)	0.067 (10.270)	0.328 (9.275)
FUNDING	18.944** (8.983)	20.093** (8.924)	18.627** (8.781)	20.212** (8.296)
REFIN	10.108	10.451	10.889	10.326

	(8.679)	(8.935)	(8.477)	(9.051)
PPP	-40.719***	-36.163***	-42.200***	-28.645**
	(13.075)	(13.148)	(13.751)	(13.233)
SUBORD	130.858**	130.986*	133.472**	127.756*
	(65.466)	(66.418)	(64.198)	(66.129)
LOANRATING	6.314	5.951	5.937	11.173
	(8.462)	(8.065)	(8.764)	(7.133)
COVENANT	36.960***	39.477***	36.658***	31.972***
	(9.395)	(9.108)	(9.030)	(8.841)
INSURED	-10.100	-10.350	-10.530	-15.476
	(14.876)	(15.253)	(15.535)	(15.843)
REPORTCOLLATERAL	35.065***	35.979***	33.227***	38.103***
	(11.124)	(11.777)	(11.318)	(10.734)
GUARANTEED	-19.242**	-21.228***	-17.042**	-18.808**
	(7.449)	(7.263)	(7.019)	(7.450)
INFRARATESENTIMENT	6.927	2.679	7.660	14.963***
	(5.778)	(5.325)	(5.803)	(5.525)
INFRADefault	-3.636***	-3.513***	-3.437***	3.396
	(1.356)	(1.314)	(1.309)	(3.804)
INFRARECOVERY	-58.876**	-65.322***	-57.975**	
	(24.856)	(24.355)	(24.894)	
US10Y	-1.567	1.019	-2.861	2.205
	(3.980)	(4.343)	(4.094)	(10.904)
USSLOPE	6.592	5.522	7.453*	4.548
	(4.866)	(4.758)	(4.467)	(9.933)
AAABBB	25.871***	26.220***	24.333***	5.913
	(8.594)	(8.482)	(8.799)	(9.572)
BASELIII	20.665	23.144	15.147	
	(22.165)	(22.054)	(21.438)	
SOVRATING	-29.666***	-29.862***	-30.668***	-31.811***
	(6.262)	(6.061)	(7.735)	(6.358)
REGULATED	-22.495***		-23.072***	-22.018***
	(7.520)		(7.619)	(8.015)
CONSTANT	378.739***	379.061***	359.545***	339.638***
	(120.750)	(121.698)	(114.132)	(109.700)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.397	0.397	0.403	0.412
Industry dummies	NO	YES	NO	NO
Geographic dummies	NO	NO	YES	NO
Year dummies	NO	NO	NO	YES

The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where IAIDS is the dependent variable (loan spread in bps). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Table 21: OLS Regression Analysis: Panel C – Loan Spreads (in bps)

	(1)	(2)	(3)	(4)
<i>SWFPENSUR</i>	-8.853	-10.091	-1.953	-5.599
	(15.873)	(15.478)	(16.229)	(15.119)
<i>INVESTOTHER</i>	66.383***	68.633***	67.371***	65.000***
	(14.462)	(15.039)	(15.113)	(14.909)
<i>CDOCLO</i>	58.770***	62.986***	56.713***	61.592***
	(8.263)	(7.190)	(6.686)	(9.074)

LENDOTHER	36.740*	36.635*	35.387	35.959
	(21.126)	(20.379)	(22.020)	(22.269)
AGENCY	-0.481	1.325	1.262	0.635
	(6.860)	(6.708)	(6.592)	(7.077)
OTHER	-25.209	-27.972	-19.595	-21.382
	(28.415)	(28.137)	(26.513)	(27.028)
YRSFNLMAT	-0.757	-0.732	-0.695	-0.745
	(0.807)	(0.803)	(0.654)	(0.752)
TREND	0.609***	0.602***	0.571***	0.543***
	(0.052)	(0.052)	(0.064)	(0.075)
AMOUNT	-0.007	-0.007	-0.007	-0.007
	(0.006)	(0.006)	(0.006)	(0.005)
LENDERCONCENTRATION	9.150	10.024	12.300	6.428
	(16.856)	(16.951)	(17.600)	(18.426)
SYNDSIZE	-1.443***	-1.444***	-1.479***	-1.653***
	(0.438)	(0.404)	(0.503)	(0.434)
FOREIGNMAN	-144.995	-149.078	-137.445	-147.883
	(107.491)	(107.381)	(105.996)	(104.335)
DOMESTICARR	7.078	7.494	6.794	8.699
	(9.245)	(8.468)	(9.256)	(9.306)
OVERSUBSCRIBED	7.586	9.835	6.958	9.526
	(12.196)	(12.061)	(11.279)	(12.998)
NR_TRANCHES	0.388	-0.001	0.671	0.549
	(2.638)	(2.671)	(2.542)	(2.217)
CURRRISK	-27.293**	-28.503***	-21.134	-28.516***
	(10.446)	(10.133)	(19.337)	(9.674)
PERFPRICE	-2.328	-3.772	-0.457	0.446
	(8.638)	(8.278)	(9.972)	(8.962)
FUNDING	16.471**	17.656**	15.900**	17.354**
	(8.193)	(8.034)	(7.924)	(7.387)
REFIN	7.856	8.073	8.574	8.350
	(9.045)	(9.312)	(8.992)	(9.449)
PPP	-31.217**	-26.927**	-33.880**	-20.704
	(12.678)	(12.930)	(13.154)	(13.265)
SUBORD	133.291**	133.328*	134.035**	129.582*
	(66.970)	(67.575)	(65.883)	(67.172)
LOANRATING	6.180	5.653	5.939	10.636
	(8.582)	(8.204)	(8.828)	(7.119)
COVENANT	26.458***	28.376***	28.131***	20.737**
	(9.028)	(8.526)	(8.599)	(8.700)
INSURED	-12.973	-12.666	-12.217	-17.286
	(16.034)	(16.390)	(16.580)	(17.050)
REPORTCOLLATERAL	32.607***	33.437***	31.036***	35.515***
	(10.729)	(11.270)	(10.803)	(10.379)
GUARANTEED	-19.426***	-21.636***	-17.347***	-19.102***
	(7.198)	(6.979)	(6.553)	(7.140)
INFRARATESENTIMENT	5.167	0.826	5.655	11.993**
	(5.962)	(5.371)	(6.087)	(6.024)
INFRADEFAULT	-3.137**	-3.042**	-3.047**	3.123
	(1.386)	(1.325)	(1.329)	(3.947)
INFRARECOVERY	-59.816**	-66.486***	-58.347**	
	(24.941)	(24.658)	(25.036)	
US10Y	-1.930	0.745	-3.141	3.148
	(3.788)	(4.207)	(3.942)	(10.080)
USSLOPE	5.794	4.680	6.736	3.224
	(4.687)	(4.567)	(4.321)	(9.351)

AAABBB	25.771*** (9.084)	26.211*** (9.039)	24.160** (9.394)	8.088 (9.413)
BASELIII	18.436 (19.733)	21.880 (20.137)	16.538 (19.471)	
SOVRATING	-29.881*** (6.251)	-30.068*** (6.100)	-30.157*** (7.691)	-31.895*** (6.307)
REGULATED	-23.760*** (6.925)		-23.888*** (7.091)	-23.240*** (7.242)
CONSTANT	380.593*** (113.893)	383.847*** (114.284)	364.778*** (108.942)	332.935*** (105.491)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.408	0.408	0.412	0.422
Industry dummies	NO	YES	NO	NO
Geographic dummies	NO	NO	YES	NO
Year dummies	NO	NO	NO	YES

The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where IAIDS is the dependent variable (loan spread in bps). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to the Table 31 in the Appendix.

Table 23: OLS Regression Analysis: Panel B – Loan Tenor (in Years)

	(1)	(2)	(3)	(4)
<i>NONBANK2</i>	1.398*** (0.357)	1.397*** (0.340)	1.243*** (0.329)	1.341*** (0.349)
<i>NONBANK3</i>	0.688*** (0.238)	0.804*** (0.234)	0.780*** (0.225)	0.617*** (0.235)
LENDERCONCENTRATION	0.695 (0.452)	0.748* (0.415)	0.558 (0.393)	0.688 (0.476)
SYNDSIZE	0.004 (0.026)	0.014 (0.022)	-0.016 (0.024)	0.004 (0.026)
FOREIGNMAN	-2.468** (1.048)	-2.087** (0.940)	-1.762* (1.012)	-2.191** (0.997)
DOMESTICARR	0.107 (0.489)	-0.068 (0.402)	-0.020 (0.543)	0.138 (0.463)
OVERSUBSCRIBED	-0.163 (0.501)	0.047 (0.467)	-0.518 (0.461)	-0.131 (0.484)
NR_TRANCHES	0.500*** (0.081)	0.496*** (0.077)	0.464*** (0.095)	0.494*** (0.073)
AMOUNT	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
CURRRISK	-0.116 (1.044)	0.108 (0.850)	-2.575*** (0.815)	-0.207 (0.977)
PERFPRICE	3.506*** (0.687)	3.368*** (0.628)	2.774*** (0.656)	3.388*** (0.672)
FUNDING	1.614*** (0.313)	1.492*** (0.291)	1.455*** (0.277)	1.430*** (0.357)
REFIN	-1.655*** (0.344)	-1.389*** (0.265)	-1.636*** (0.379)	-1.692*** (0.344)
PPP	6.635*** (1.333)	5.260*** (1.122)	5.503*** (1.129)	6.098*** (1.342)
SUBORD	2.712** (1.296)	2.864** (1.196)	1.415 (1.249)	2.272* (1.208)
LOANRATING	-0.012	0.023	0.147	-0.078

	(0.171)	(0.145)	(0.154)	(0.197)
COVENANT	-2.903***	-2.498***	-1.545***	-2.712***
	(0.568)	(0.396)	(0.374)	(0.628)
INSURED	1.718***	1.662***	1.955***	1.742***
	(0.519)	(0.489)	(0.504)	(0.495)
REPORTCOLLATERAL	-1.259***	-1.089***	-0.876**	-1.317***
	(0.363)	(0.338)	(0.356)	(0.387)
GUARANTEED	-0.052	0.079	0.015	-0.129
	(0.353)	(0.326)	(0.361)	(0.347)
INFRARATESENTIMENT	-0.178	-0.023	-0.162	-0.326
	(0.360)	(0.328)	(0.299)	(0.371)
INFRADEFAULT	-0.013	-0.028	-0.036	-0.355***
	(0.055)	(0.054)	(0.056)	(0.119)
INFRARECOVERY	-1.342	-1.314	-0.841	
	(0.889)	(0.849)	(0.739)	
US10Y	0.202	0.195	0.041	-0.079
	(0.183)	(0.155)	(0.119)	(0.207)
USSLOPE	-0.130	-0.109	-0.056	0.412
	(0.124)	(0.136)	(0.124)	(0.321)
BASELIII	-1.639	-1.368	-0.337	
	(1.276)	(1.243)	(0.749)	
SOVRATING	0.339**	0.243*	0.426***	0.302**
	(0.135)	(0.133)	(0.162)	(0.124)
REGULATED	0.791	2.779***	1.015*	0.770
	(0.595)	(0.508)	(0.532)	(0.566)
CONSTANT	6.160***	4.297**	7.608***	7.297***
	(2.207)	(2.030)	(1.639)	(2.067)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.227	0.269	0.283	0.242
Industry dummies	NO	YES	NO	NO
Geographic dummies	NO	NO	YES	NO
Year dummies	NO	NO	NO	YES

The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where YRSFNLMAT is the dependent variable (loan tenor in years). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Table 24: OLS Regression Analysis: Panel C – Loan Tenor (in Years)

	(1)	(2)	(3)	(4)
<i>SWFPENSUR</i>	2.093** (1.036)	1.975* (1.020)	1.752* (0.903)	2.043** (0.959)
<i>INVESTOTHER</i>	-2.056** (0.788)	-1.985*** (0.731)	-1.659** (0.718)	-2.111*** (0.776)
<i>CDOCLO</i>	-0.424 (0.468)	-0.655 (0.458)	0.031 (0.297)	-0.511 (0.435)
<i>LENDOTHER</i>	-0.304 (0.368)	-0.179 (0.343)	0.191 (0.330)	-0.211 (0.330)
<i>AGENCY</i>	1.921*** (0.249)	1.846*** (0.265)	1.513*** (0.229)	1.803*** (0.250)
<i>OTHER</i>	0.205 (1.093)	0.568 (0.986)	0.957 (1.010)	0.371 (1.101)
<i>LENDERCONCENTRATION</i>	0.672 (0.421)	0.697 (0.453)	0.540 (0.359)	0.684 (0.428)

SYNDSIZE	-0.006 (0.027)	-0.001 (0.023)	-0.022 (0.024)	-0.007 (0.028)
FOREIGNMAN	-2.361* (1.283)	-2.059* (1.155)	-1.701 (1.180)	-2.102* (1.215)
DOMESTICARR	0.239 (0.440)	0.124 (0.346)	0.076 (0.497)	0.297 (0.415)
OVERSUBSCRIBED	-0.197 (0.457)	-0.226 (0.457)	-0.515 (0.434)	-0.154 (0.434)
NR_TRANCHES	0.498*** (0.077)	0.515*** (0.078)	0.470*** (0.090)	0.501*** (0.072)
AMOUNT	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
CURRRISK	-0.445 (0.980)	-0.160 (0.781)	-2.571*** (0.779)	-0.472 (0.920)
PERFPRICE	3.500*** (0.653)	3.468*** (0.595)	2.843*** (0.640)	3.399*** (0.654)
FUNDING	1.642*** (0.293)	1.525*** (0.259)	1.491*** (0.262)	1.485*** (0.339)
REFIN	-1.571*** (0.305)	-1.483*** (0.285)	-1.573*** (0.337)	-1.606*** (0.304)
PPP	5.960*** (1.242)	4.815*** (1.027)	5.127*** (1.095)	5.542*** (1.269)
SUBORD	2.564** (1.266)	2.581* (1.330)	1.419 (1.246)	2.161* (1.195)
LOANRATING	-0.016 (0.171)	0.064 (0.147)	0.137 (0.149)	-0.035 (0.189)
COVENANT	-2.583*** (0.529)	-2.465*** (0.395)	-1.476*** (0.410)	-2.402*** (0.594)
INSURED	1.868*** (0.542)	1.750*** (0.560)	2.034*** (0.514)	1.846*** (0.517)
REPORTCOLLATERAL	-1.217*** (0.354)	-1.196*** (0.348)	-0.901** (0.352)	-1.273*** (0.380)
GUARANTEED	-0.054 (0.370)	0.165 (0.349)	0.008 (0.374)	-0.131 (0.361)
INFRARATESENTIMENT	-0.145 (0.343)	0.084 (0.311)	-0.129 (0.288)	-0.231 (0.348)
INFRADEFAULT	-0.054 (0.054)	-0.072 (0.051)	-0.062 (0.056)	-0.325** (0.132)
INFRARECOVERY	-1.451 (0.930)	-1.166 (0.882)	-0.979 (0.781)	
US10Y	0.196 (0.179)	0.070 (0.166)	0.042 (0.120)	-0.060 (0.222)
USSLOPE	-0.065 (0.126)	0.033 (0.127)	-0.016 (0.127)	0.425 (0.327)
BASELIII	-1.337 (1.085)	-1.171 (1.046)	-0.322 (0.707)	
SOVRATING	0.330** (0.128)	0.308** (0.126)	0.392** (0.157)	0.292** (0.118)
REGULATED	0.816 (0.603)		0.990* (0.540)	0.789 (0.574)
CONSTANT	6.352*** (2.188)	4.477** (2.067)	7.445*** (1.669)	7.178*** (1.944)
Obs.	3,558	3,558	3,558	3,558
R-squared	0.247	0.271	0.293	0.261
Industry dummies	NO	YES	NO	NO
Geographic dummies	NO	NO	YES	NO

Year dummies	NO	NO	NO	YES
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The columns (1) – (4) show the coefficients of an ordinary least squares regression analysis, where YRSFNLMAT is the dependent variable (loan tenor in years). In parentheses, below the coefficients, country-clustered and robust standard errors are reported. “YES” and “NO” indicate the inclusion of the respective dummy variables. *** denotes statistical significance at the 1%-level, ** denotes statistical significance at the 5%-level and * denotes statistical significance at the 10%-level. For a detailed definition of the variables please refer to Table 31 in the Appendix.

Table 31: Variables

The table below provides an overview of the used variables, a more concise description of the very same and the specifications in which they are used.

Variable	Description	Use	Source
Dependent Variables			
IAIDS	Initial All-In Drawn Spread above LIBOR (in basis points); a combined measure of a credit spread above the reference rate and annual (facility) fees applicable on the drawn amount.	Base Case and additional specifications	ThomsonONE Investment Banking
YRSFNLMAT	Original loan tenor (in years)	Base Case and additional specifications	ThomsonONE Investment Banking
Independent Variables			
Loan Tranche-specific Variables			
AMOUNT	The principal amount of the loan tranche (in US\$m)	Base Case and additional specifications	ThomsonONE Investment Banking
COVENANT	Dummy variable taking the value of 1 if at least one covenant has been reported for the tranche, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
CURRRISK	Dummy variable taking the value of 1 if tranche is issued in a currency different from the project country's one, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
FUNDING	Dummy variable taking the value of 1 if loan tranche is categorized as any of the following: <i>Term Loan, Construction Loan, Delayed Draw Term Loan, Secured Loan, Secured Notes, Senior Debt Facility, Term Notes, etc.</i> , else 0	Base Case and additional specifications	ThomsonONE Investment Banking
GUARANTEED	Dummy variable taking the value of 1 if any form of guarantee has been reported for the tranche, else 0	Base Case and additional specifications	ThomsonONE Investment Banking

INSURED	Dummy variable taking the value of 1 if any form of insurance has been reported for the tranche, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
LOANRATING	Higher of either loan rating reported (by either Moody's or S&P); converted into numeric values according to the methodology proposed in Corielli et al. (2010)	Base Case and additional specifications	ThomsonONE Investment Banking
NR_TRANCHES	Number of reported tranches included in the loan package	Base Case and additional specifications	ThomsonONE Investment Banking
OVERSUBSCRIBED	Dummy variable taking the value of 1 if tranche has been flagged as "oversubscribed", else 0	Base Case and additional specifications	ThomsonONE Investment Banking
PERFPRICE	Dummy variable taking the value of 1 if tranche is subject to a performance pricing grid, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
PPP	Dummy variable taking the value of 1 if the use of proceeds has been additionally coded with "Public-Private Partnership"	Base Case and additional specifications	ThomsonONE Investment Banking
REGULATED	Following the methodology employed in Bharath et al. (2011) and Fotak et al. (2019) and based on the work of Barclay and Smith Jr. (1995), dummy variable taking the value of 1 if the borrower is a utility, else 0	Base Case and additional specifications	ThomsonONE Investment Banking / assigned manually
REFIN	Dummy variable taking the value of 1 if tranche is associated with refinancing, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
REPORTCOLLATERAL	Dummy variable taking the value of 1 if any form of collateral has been reported for the tranche, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
SUBORD	Dummy variable taking the value of 1 if the tranche has been flagged as subordinated, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
Lender-specific Variables			
AGENCY	Dummy variable taking the value of 1 if any of the lenders qualifies as any of the following: <i>Export</i>	Additional specifications	ThomsonONE Investment Banking / coded manually

	<i>Credit Agency, Export-Import Bank, (Multilateral) Development Bank or Development Finance Company and Development Funds, etc.; else 0</i>		
CDOCLO	Dummy variable taking the value of 1 if any of the lenders qualifies as any of the following: <i>CDO, CLO, Prime Rate Fund, Loan Fund</i> ; else 0	Additional specifications	ThomsonONE Investment Banking / coded manually
INVESTOTHER	Dummy variable taking the value of 1 if any of the lenders qualifies as any of the following: <i>Private Equity and Private Debt Funds, Hedge Funds, Asset Management Firms, Investment Firms, Mutual Funds, etc.</i> ; else 0	Additional specifications	ThomsonONE Investment Banking / coded manually
LENDOTHER	Dummy variable taking the value of 1 if any of the lenders qualifies as any of the following: <i>Specialized Lender, (Captive) Finance Company, Leasing Company, Corporate, Vendor- or Trade Finance</i> ; else 0	Additional specifications	ThomsonONE Investment Banking / coded manually
NONBANK	Dummy variable taking the value of 1 if any of the arrangers <u>or</u> participants is a <i>non-bank (institutional)</i> lender, else 0	Base Case and additional specifications	ThomsonONE Investment Banking / coded manually
NONBANK2	Dummy variable taking the value of 1 if a non-bank lender assumes an arranger role, else 0	Additional specifications	ThomsonONE Investment Banking / coded manually
NONBANK3	Dummy variable taking the value of 1 if a non-bank lender participates in the syndicate but does not assume an arranger role, else 0	Additional specifications	ThomsonONE Investment Banking / coded manually
OTHER	Dummy variable taking the value of 1 if a lender can neither be classified as a bank nor as any other non-bank lender type, else 0	Additional specifications	ThomsonONE Investment Banking / coded manually
SWFPENSUR	Dummy variable taking the value of 1 if any of the lenders qualifies as any of	Additional specifications	ThomsonONE Investment Banking / coded manually

	the following: Sovereign Wealth Fund (SWF), pension fund and (life) insurance company, else 0		
Syndicate-specific Variables			
DOMESTICARR	Dummy variable taking the value of 1 if any domestic arranger is involved, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
FOREIGNMAN	Dummy variable taking the value of 1 if any foreign lender is part of the syndicate, else 0	Base Case and additional specifications	ThomsonONE Investment Banking
LENDERCONCENTRATION	Variable taking values between 0 and 1; the number of arrangers divided by the number of lenders	Base Case and additional specifications	ThomsonONE Investment Banking
SYNDSIZE	Number of lenders in the syndicate	Base Case and additional specifications	ThomsonONE Investment Banking
Infrastructure-related Variables			
INFRADEFAULT	Time-varying, the annual default rate of infrastructure debt as reported by S&P (in percent)	Base Case and additional specifications	Standard&Poor's
INFRARATESENTIMENT	Dummy variable taking the value of 1 and reflecting positive rating sentiment if in a given year the positive rating changes of infrastructure debt outnumbered the negative rating changes as reported by S&P	Base Case and additional specifications	Standard&Poor's
INFRARECOVERY	Time-varying, annual infrastructure debt recovery rates as reported by S&P (in percent)	Base Case and additional specifications	Moody's
Macro-Economic & Financial Variables			
AAABBB	Default spread measured as yield pickup (in percent) between US\$-denominated AAA-rated and BBB-rated bonds (based on the ICE BofAML US Corporate AAA and BBB Indices) at the time of the loan issuance	Base Case and additional specifications	Federal Reserve Bank of St. Louis
BASELIII	Index variable ranging from 0 to 1 tracking the Implementation of Basel III (2013-2019) and increasing by 1/7 annually	Base Case and additional specifications	Manually created following the approach taken by Thierie and de Moor (2018b)

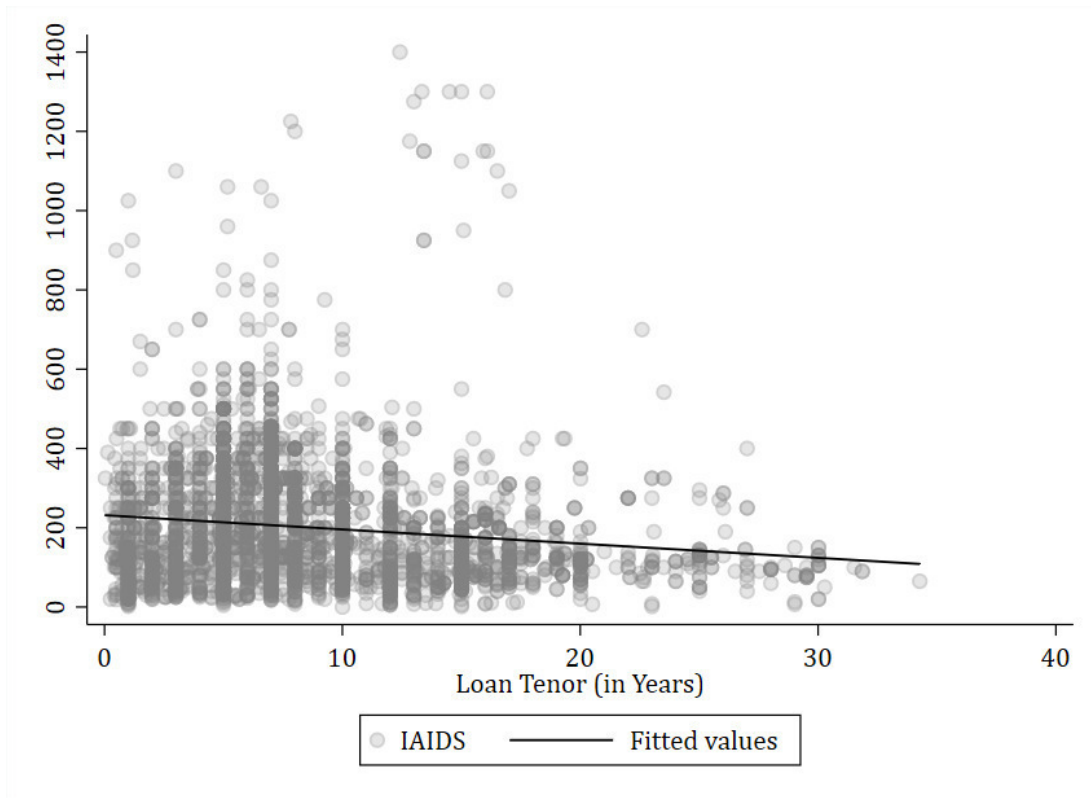
MOVE	Merrill Option Volatility Estimate Index; used as a proxy for Fixed-Income volatility	Sensitivity analysis	Bloomberg / Merrill Lynch
MSCIACWI	Level of the MSCI All World Index	Sensitivity analysis	
US10Y	The yield of the US\$-denominated 10-year Government Bonds (in percent) at the time of the loan issuance	Base Case and additional specifications	Federal Reserve Bank of St. Louis
USSLOPE	Computed as the difference between the 10-year and 1-year yields of US\$-denominated government bonds (in percent) at the time of the loan issuance	Base Case and additional specifications	Federal Reserve Bank of St. Louis
Country-Specific Variables			
CRISIS	Dummy variable taking the value of 1 if project country is affected by the banking crisis at the time of loan issuance, else 0	Sensitivity analysis and robustness tests	Database developed by and used in Laeven and Valencia (2012, 2018)
GDPGRWTH	GDP growth (in percent) in the year of the financial close	Sensitivity analysis and robustness tests	IMF
GDPCAP	GDP per capita in international dollars (under Purchasing-Power Parity)	Sensitivity analysis and robustness tests	IMF
INFLATION	The percentage change of the project countries CPI (in percent)	Sensitivity analysis and robustness tests	IMF
IMFFINDEV	Time-varying level of the IMF Financial Development Index which ranks countries based on depth, access and efficiency of both their financial markets and financial institutions; ranging from 0 to 1 (highest)	Sensitivity analysis and robustness tests	IMF / Svirydzenka (2016)
PRSBUREAUQ	Sub-index of the aggregate Political Risk Index ranging from 0 to 4 (highest quality) and measuring Bureaucracy Quality	Sensitivity analysis and robustness tests	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSCORRUPT	Sub-index of the aggregate Political Risk Index ranging from 0 to 6 (least corrupt) and measuring a country's corruption level	Sensitivity analysis and robustness tests	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk

PRSDemoACC	Sub-index of the aggregate Political Risk Index ranging from 0 to 6 (most democratic) and measuring a country's level of democratic accountability	Sensitivity analysis and robustness tests	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSGOVSTAB	Sub-index of the aggregate Political Risk Index ranging from 0 to 12 (most stable) and measuring a country's government stability	Sensitivity analysis and robustness tests	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSINVEST	Sub-index of the aggregate Political Risk Index ranging from 0 to 12 (best profile) and evaluating a country's investment profile (e.g. contract viability, profit repatriation, ...)	Sensitivity analysis and robustness tests	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSLAW	Sub-index of the aggregate Political Risk Index ranging from 0 to 6 (highest level of order) and measuring a country's level of law and order	Sensitivity analysis and robustness tests	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSPOLRISK	Political Risk Index ranging from 0 to 100 (least political risk) and aggregating 12 different sub-indices	Sensitivity analysis and robustness tests	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
SOVRATING	Time-varying sovereign ratings converted into numeric values according to the methodology proposed by Corielli et al. (2010)	Base Case and additional specifications	Fitch's, Moody's and Standard&Poor's
Other control variables			
Geographic dummies	Dummy variables taking the value of 1 if project country is assigned to one of the following regions: <i>East Asia-Pacific, Europe-Central Asia, Latin America and the Caribbean, Middle East-North Africa, North America, Sub-Saharan Africa or South Asia</i> , else 0	Additional specifications	ThomsonONE Investment Banking / World Bank Country and Lending Groups
GFC	Dummy variable taking the value of 1 if the date of financial close is on or after the 15 th September 2008 (Lehman Brothers collapse), else 0	Robustness Test	-

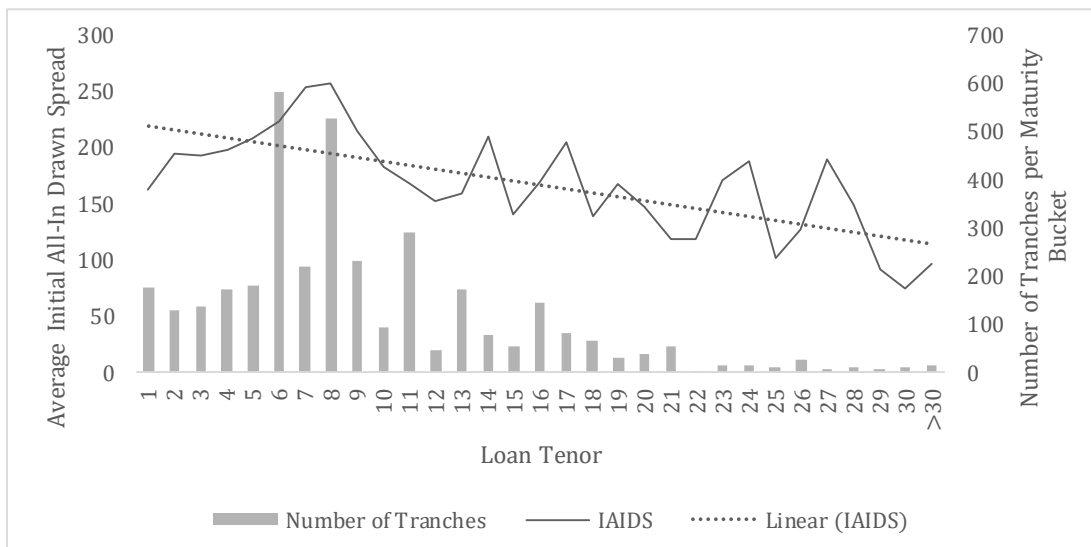
Industry dummies	Dummy variables taking the value of 1 if borrowing project can be assigned to one of the ten SIC-Code Divisions, else 0	Additional specifications	ThomsonONE Investment Banking / United States Department of Labor, SIC Division Structure
Legal dummies	Dummy variables taking the value of 1 if project country legal code's origin is either British, French, German or Scandinavian, else 0	Sensitivity analysis	Taken from the authors' data set of La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999)
Year dummies	Dummy variables taking the value of 1 based on the year of financial close, else 0	Additional specifications	ThomsonONE Investment Banking

A.3 ADDITIONAL GRAPHS

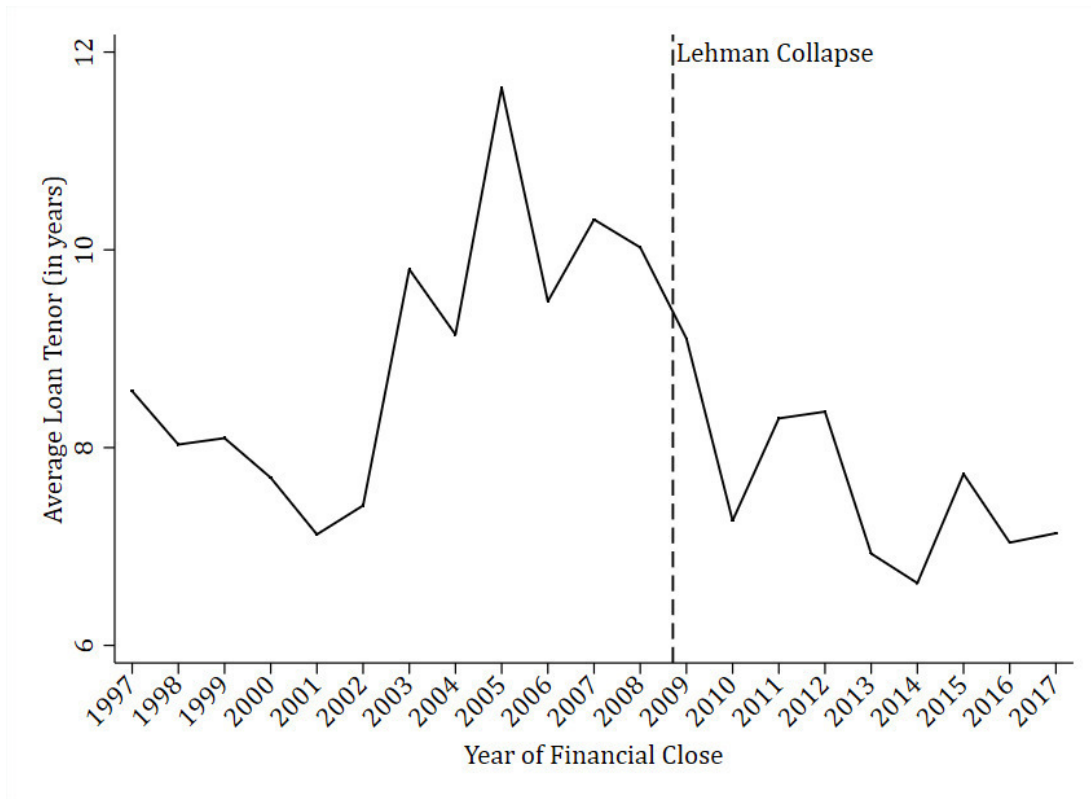
Graph 1: The Term Structure of IAIDS (I)



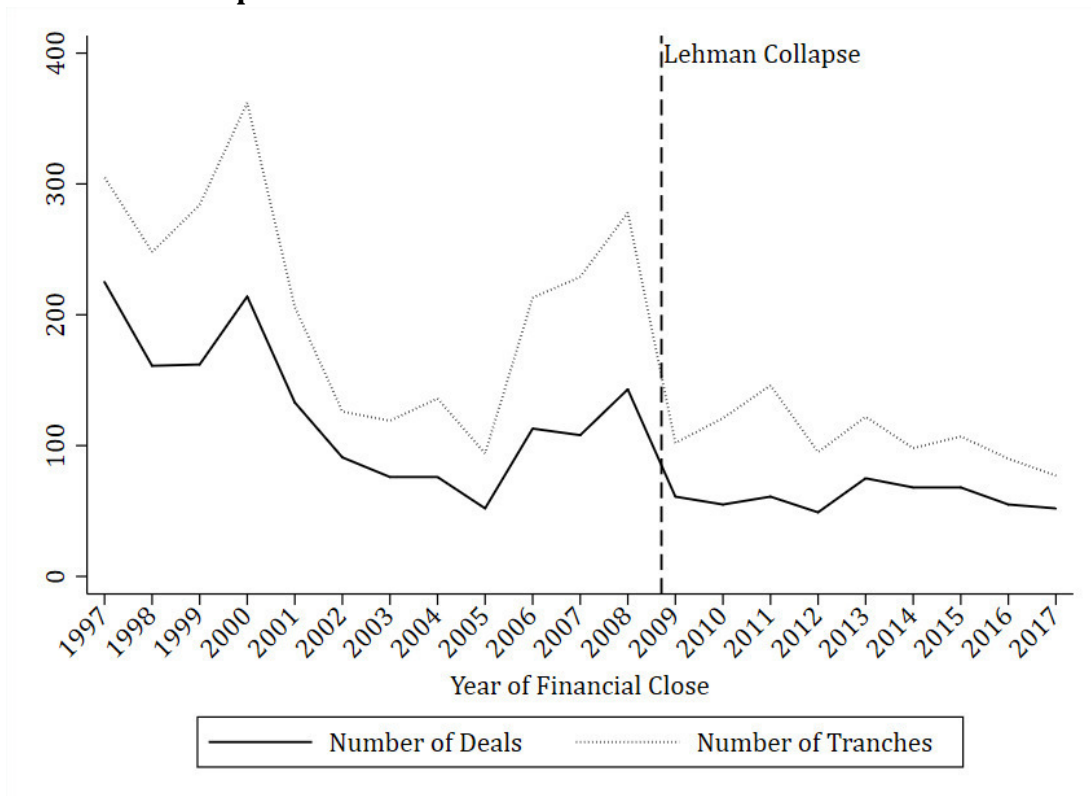
Graph 2: The Term Structure of IAIDS (II)



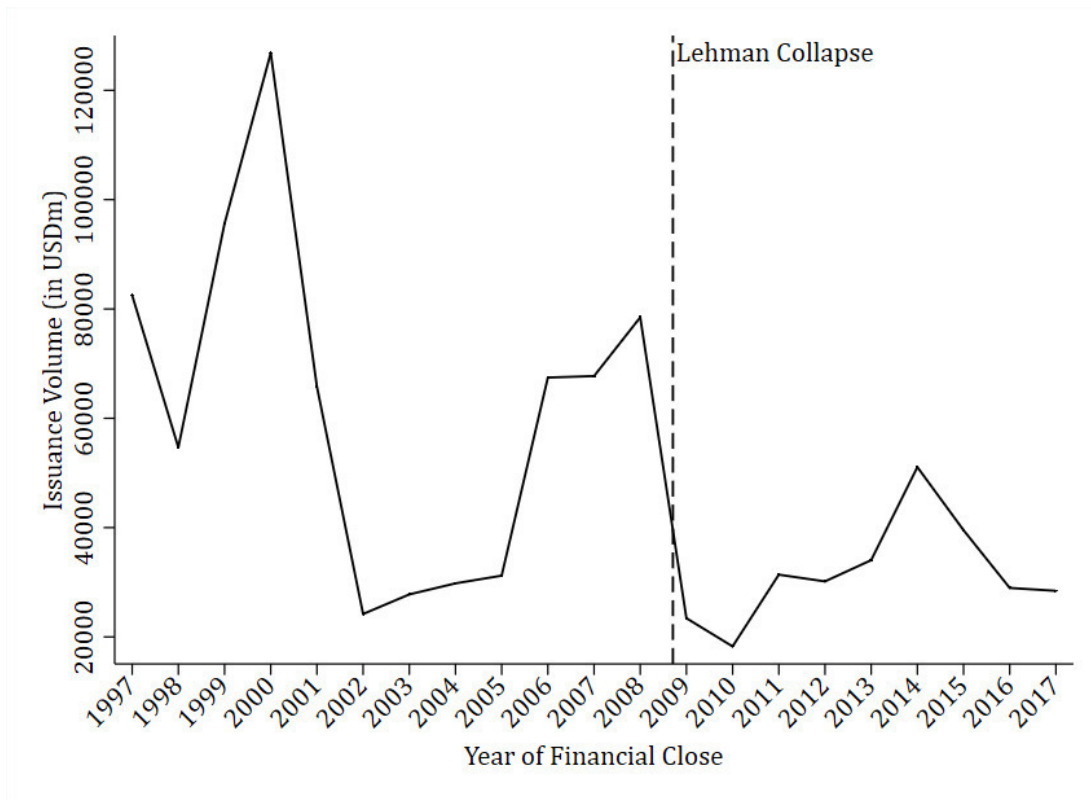
Graph 4: Average Loan Tenors (in years) over Time



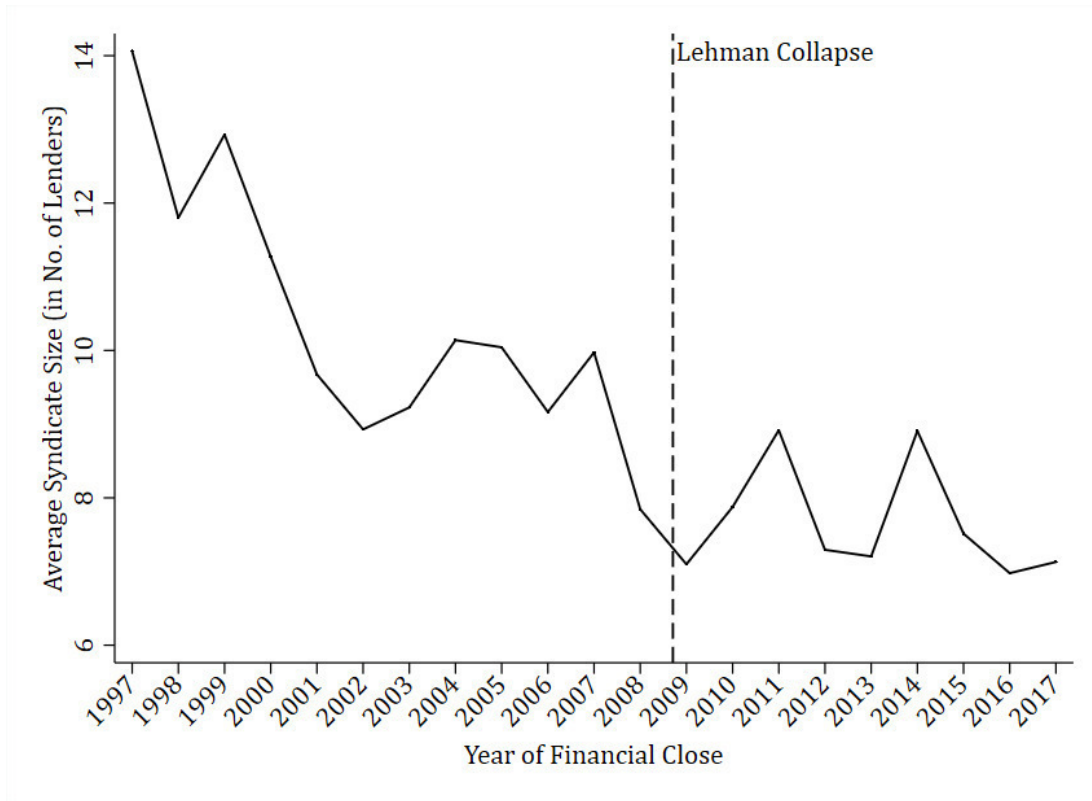
Graph 5: Number of Deals and Tranches over Time



Graph 6: Annual Issuance Volume (in US\$m) over Time



Graph 7: Average Syndicate Size (# of Lenders) over Time



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End of Master Thesis I

MASTER THESIS II

The Factors Driving Institutional Involvement in Syndicated Project Finance Loans:

Loan-specific, Macro-Economic, Financial, Political,
Regulatory, and Legal Considerations

July 2019

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Abstract

Infrastructure investment requirements are expected to surge in the coming years and while the traditional main funding sources of such long-term investments, i.e. the public and (commercial) banks are facing severe constraints, substantial hope is set on institutional investors to bridge the “infrastructure gap”. However, the attraction of these private investors to these often complex, long-term and large-scale projects is not an easy task and many conditions have to be right in order to encourage this heterogeneous group of investors to bankroll domestic projects. By focusing on the specific investment channel of syndicated project finance loans, the author provides evidence of which factors appear to be the most influential. As it turns out, tranche-specific considerations such as loan-level risk mitigation are the main drivers for institutional involvement. In addition, the findings reflect a clear preference of institutional lenders for funded loan tranches. Furthermore, positive sector- and country-experiences prove to be beneficial. Results for external factors (i.e. macro-economic, political, legal, etc.) are mixed, however, lower levels of political risk appear to be beneficial. For the specific case of emerging economies, the development of the domestic financial markets is also relevant and there's an institutional preference for refinancings.

Keywords: Syndicated Loans, Project Finance, Institutional Lender, Investment Conditions, Political Risk, Legal Risk, Regulatory Risk

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“Global investors are increasingly viewing infrastructure assets as an important element of their investment strategy and are actively assessing opportunities in both developed and emerging markets.”

– in *Global Infrastructure Investment Index: Move from Risk to Reward* (2012) by EC Harris

1 INTRODUCTION

Infrastructure is certainly on the minds of politicians and investors around the globe. But it's also ordinary people who are confronted with the need for infrastructure investments every day. Crumbling school buildings, pothole-riddled roads, and airports working beyond maximum capacity are the symptoms that people in the Western Hemisphere are all too familiar with and point toward the drastic *under*-investment of the past and the urgent need for expansion and modernization in the present. For example, EU infrastructure investments have been at 1.7% of EU-wide GDP for 2017, down 25% from a high in 2009 when investments reached 2.2% of GDP (European Investment Bank [EIB], 2018). In the US spending has been declining continuously since a peak at around 3% of GDP in the 1950s (The Hamilton Project, 2015). On the other hand, developing economies start from a lower base and often infrastructure projects have to be planned and financed from scratch (China's *Belt-and-Road Initiative* is probably the most visible example to date). Missing motorways, railway links, and sanitation are urgent matters across many geographies globally. At the same time, issues such as clean energy, ever-increasing urbanization, the internet-of-things, and the electrification of the automotive industry are on top of the agenda everywhere and investments into the required underlying infrastructure appear to be inevitable. Unfortunately, in many jurisdictions, there's a perfect storm approaching from a financing perspective. Excessive public debt levels have led to tightened public budgets and governments are increasingly and desperately looking to the financial sector in order to come up with the necessary funds. However, the private sector faces limitations on its own. Banks, traditionally a bulwark of private finance in the infrastructure space, have to deal with ever-tightening regulations (e.g. the liquidity requirements phased in under Basel III) that increasingly render infrastructure investments unattractive and difficult. Additionally, many banks are still reeling from the repercussions of the crisis. Against this gloomy backdrop, it is no surprise that increasingly institutional investors, predominantly pension funds, life

insurance companies, and sovereign wealth funds, have come to the center of attention as they reach record-breaking levels of assets that require to be invested. And fortunately enough, the attraction often is mutual – *at least on paper*¹. Alas, these investors are picky at times and their investment process may be tedious for various reasons².

For a more in-depth discussion of issues concerning infrastructure investment in general and the perceived infrastructure investment gap, the constraints faced by the public sector and commercial banks and the attraction of private investors to infrastructure, the author would invite the interested reader to refer to the review part of his first thesis in order to keep the discussion here at a reasonable length.

Thus, for many countries, it is of the utmost importance to get the framework right and foster an environment in which these investors feel comfortable to make these often complex, large-scale and long-term investments that infrastructure projects regularly represent. Such an environment is composed of many interdependent factors which will be discussed shortly in detail since “*creating an attractive environment for investment is never easy. It often seems that there is a plethora of opportunities, but very few reach a fruitful conclusion. However, it is not all doom and gloom; you just need to know where to look.*” (in Nabarro LLP and Opinium Research (2016, p. 5)).

This thesis tries to help foster a better understanding of which factors benefit private (institutional) infrastructure investments globally. As we’re going to explore shortly, a lot of work has been done with regards to investment flows in general and with respect to infrastructure, Public-Private Partnerships (PPP) have received more and more attention as of late. Usually, the authors, however, have had a rather narrow focus both with respect to specific industrial sectors, geographies, and time-horizons, e.g. focusing on the attraction of PPP investments in the energy sector in emerging Latin America at the turn of the century. Consequently, the contribution of this thesis threefold. Firstly, the author focuses on the specific investment channel of project finance debt in the form of syndicated loans which are a mainstay of infrastructure funding around the world. Secondly, the author covers a

¹ Reasons such as liability matching, potential inflation hedging, diversification opportunities, and an attractive yield-pickup are just a few examples of why infrastructure investments could be a welcome addition to institutional investment portfolios around the globe.

² For a discussion of barriers to institutional investment one may, for example, consult with Della Croce (2011).

relatively long-time span that captures both the boom years before the financial crisis of the early 2000s and the challenging aftermath of the same. Finally and thirdly, the author bases his work on a global sample that includes transactions from both developed and developing economies. In sum, this set-up should allow for capturing the conditions that institutional investors deem the most accommodating for their investments.

In order to deliver an answer to the question of which factors are considered to be the most important, this thesis is structured as follows: i) in the initial review part the author will present the relevant literature, different surveys that have elicited the most relevant investor deliberations and some practitioner-oriented indices that have tried to classify the infrastructure investment attractiveness of different countries. ii) based on this theoretic groundwork the author will develop and present his research hypotheses, followed by an introduction to the sample and the various variables employed. iii) the empirical part of the study will start with a description of the sample in detail and present the empirical model. Thereafter, the empirical results and some sensitivity/robustness tests will be reported. iv) Finally, a discussion of the results and their implications will conclude this thesis.

“‘Project finance’ is not the same thing as ‘financing projects’, because projects may be financed in many different ways.” - Yescombe (2013, p. 1)

2 LITERATURE REVIEW & BACKGROUND

2.1 PROJECT FINANCE

Just as there are many different investors in and obstacles concerning infrastructure, there is, at least in theory, a multitude of different ways and vehicles to access this asset class³. A first classification is normally made based on whether the investor is interested in an equity, hybrid or debt (fixed income) investment. Next, investors have to decide whether they would like to invest in a specific project or fund an infrastructure corporate (and thus provide funds indirectly through the corporation's balance sheet). The choice of a suitable instrument is then normally closely related to the question if one would like to invest in a public (“listed” or “capital markets”) or private (“unlisted” or “OTC”) instrument – and for the debt side the

³ See Graph 1 below and Table 1 in the Annex.

question boils further down to whether the investors favor a bond or a loan investment. Finally, another detail is the decision to invest directly to have a direct exposure or to pursue an indirect strategy via a contribution to a pooled and intermediated investment vehicle, such as different types of infrastructure funds. Obviously, delving deeper into these different approaches would be a tiresome endeavor and would not serve the specific purpose of this study. Hence the author will focus on one specific channel for investment going forward.

The rest of this chapter will, therefore, focus on the following specific avenue: a) a *debt* investment, b) in a *specific project* (company), c) in the form of a (*syndicated*) *loan*, d) that is made *directly* to the project – in short, *syndicated project finance loans*. Hence the focus of this section is on a financing technique known as “project finance” before the author will move further down the line in the next section where he will give some more details regarding syndicated loans. Esty (2004b) compares project finance to a “*strategic research site*” [p. 214] for the reason that “*standalone project companies [...] provide a relatively clear window into the process by which managers make important financing and structuring decisions*” in order to increase project value. As project finance represents a very specific investment channel whose particularities will be of importance in the later discussion of the empirical results, the better part of this section will deal with a description of the project finance process in order to understand why and how these results could deviate from findings of the broader academic literature.

Project finance (PF) is by no means a modern invention and can be traced back, in some “primitive form”, as far as Medieval England⁴, before developing its modern form in the 1970s when big projects in the natural resource and energy space were realized using this financing technique. Since then PF has been applied to the funding of all kinds of economic infrastructure and more recently has extended its reach to social infrastructure as well. But what exactly does the label “project finance” imply? As it is the case with infrastructure in general, different attempts at delivering a definition have been made. Esty et al. (2014) define project finance as follows: “[...] involves the creation of a legally independent project company financed with nonrecourse debt (and equity from one or more corporate entities known as

⁴ For some historic context the author recommends to refer to Esty, Chavich, and Sesia (2014) and Kensinger and Martin (1988).

sponsoring firms) for the purpose of financing investment in a single-purpose capital asset, usually with a limited life.”

Graph 1: Available Financing Vehicles for Institutional Infrastructure Investment

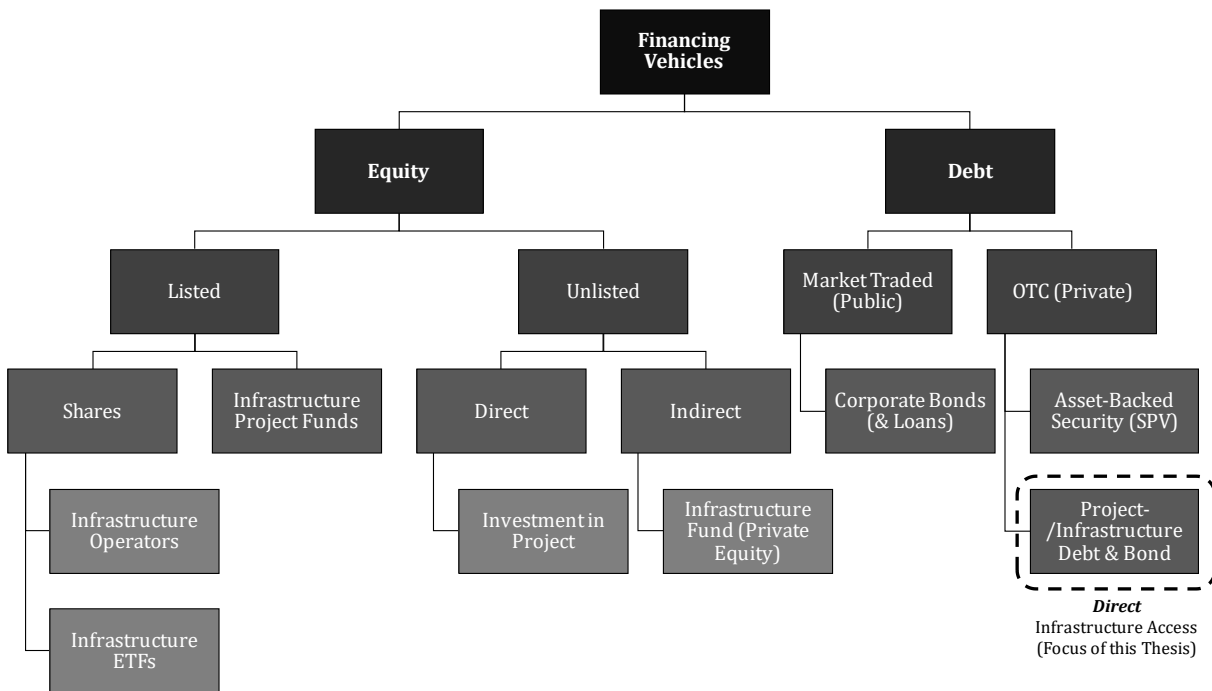


Illustration by the author based on Della Croce (2012)

In turn, Gatti (2018, p. 2) notes that project finance “is the structured financing of a specific economic entity – the SPV [...] created by the sponsor using equity or mezzanine debt and for which the lenders consider cash flows as being the primary source of loan reimbursement, whereas assets represent only collateral.” As said before, additional authors have at times given different definitions, but except for minor changes to the wording, they all seem to agree on a few key points that are neatly summarised by Gatti (2018, p. 2). Firstly, the borrower is a project company completely independent, both financially and legally, from its sponsoring entities⁵. Dorobantu and Müllner (2017) consequently state that aspects other

⁵ Sponsors typically fall into one of the four following categories: 1) industrial sponsors, who see some link between the project and their core business, 2) public sponsors trying to support social welfare, 3) contractors involved in the construction and operation of the project and 4) purely financial investors. The last group usually aggregates investors such as infrastructure, pension and sovereign wealth funds and insurance companies Gatti (2018, pp. 4–25) The attentive reader may notice that this could potentially lead to a situation where institutional investors both contribute debt and equity to a project.

than sponsors' creditworthiness determine the use of PF. Secondly, lenders have only limited (or sometimes no) recourse to the sponsors after completion of the project. Furthermore, project risks are allocated to the counterparties best able to bear them and cash-flows generated by the undertaking must be sufficient to cover both operating costs and debt service – only residuals can then be distributed to the sponsors involved. Fifth, collateral has an important role to ensure that payments are made to the project lenders.

Generally speaking, project finance has been historically interpreted in three different ways. Firstly, PF can be seen as an organizational tool bundling a potentially large number of (nonfinancial) contractual obligations in an otherwise empty shell (a “nexus of contracts” or “contractual finance”)⁶. Alternatively, PF represents a risk-management tool⁷ not only from the sponsors' perspective as separate incorporation and non-/limited-recourse basis reduce, inter alia, contamination risk but also from the perspective of the parties involved as risks are transparently allocated between lenders, sponsors, and other third-parties and incentives can be efficiently set. Lastly, PF is a highly levered funding technique, often reaching leverage levels of up to 90%⁸⁹¹⁰ - hence project finance can be interpreted as mostly a debt product. Increasing leverage, however, should not only be misconstrued as a simple effort to max out cheaper debt financing, but rather be interpreted as a way to structure ownership and control in the project in favor of experienced lenders (Brealey, Cooper, & Habib, 1996). Subramanian and Tung (2016) perceive a similar connotation. They explain

⁶ Labels coined respectively by Dailami and Hauswald (2007) and by Esty (2003) and Corielli, Gatti, and Steffanoni (2010).

⁷ According to Gatti (2018, pp. 28–29) risk management includes four key steps: i) Risk identification, ii) Risk analysis, iii) Risk Transfer and allocation of risks to actors best able to bear them, iv) Management and pricing of residual risk. Being a key topic in project finance, the same authors spends substantial time on the risk identification and allocation processes (p.63-103). Examples of risk allocation are presented later when project risks as explored in more detail.

⁸ As reported by Blanc-Brude, Hasan, and Ismail (2014) who on average observe 75% regardless of business and credit cycles (1994-2012). In addition, Esty et al. (2014) report average debt-to-capital ratios of approx. 74-75% (2009-2013) with one third of projects surpassing 80%. Tandja M., Power, and Soumaré (2017) report mean (median) values of 86.89% (90%) for PPP projects. In an earlier sample period Kleimeier and Megginson (2002) reported lower levels (67% loan-to-project value).

⁹ Such elevated levels of leverage are somewhat surprising because the project itself has no operating history, the projects are highly specific, the debt is granted on limited (non-) recourse basis and there's typically no previous lender-borrower relationship. PF lenders therefore share much of the project's business risk (Kleimeier and Megginson (2000)).

¹⁰ Given such elevated leverage levels, lenders effectively “own” the most part of the project. This entails substantial control rights and responsibility and PF basically becomes a sophisticated corporate governance tool for projects that are deemed to have little asset risk (Blanc-Brude and Strange (2007)).

that in many cases PF can be interpreted as a private response to inefficient or weak legal protection of outside investors, PF thus becomes an organizational and contractual substitute for such laws. Hainz and Kleimeier (2006, 2012) supplement this idea with political risk. Unsurprisingly, therefore, Kleimeier and Megginson (2000) find that PF is most commonly used for long-term capital-intensive projects with relatively transparent cash-flows in riskier-than-average countries. Such projects, as Brealey et al. (1996) argue, are more concerned with downside risk (i.e. the loss of value) which tends to be better managed by lenders, as compared to upside risk (i.e. non-realization of upside) that would call for higher equity contributions in order to incentivize sponsors.

Project finance, in general, is too wide a subject to give an exhaustive overview of the many advantages and challenges it entails without losing track of the essential part of this thesis which will eventually deal with loan determinants such as risk spreads and loan tenors. Consequently, in order to streamline this thesis, the author will focus on PF aspects that are directly linked to these issues. The most important aspects are the special role that lenders play in PF, project risks¹¹ and the different debt tranches. For this reason, the author will leapfrog issues such as the optimal choice between corporate and PF debt, the role of sponsors and potential conflicts-of-interest, the cash-flow waterfall, and so forth.

Let's start with the special role of lenders in PF. As mentioned before, at leverage levels of up to 90% it is reasonable to see PF lenders as the de-facto owners of the project and this tacit ownership entails both increased risk and responsibility. This notion is supported by the fact that lending in a PF context typically involves substantial "step-in rights" and a detailed security package¹² – if things should go south lenders have no problems to make the transition from de-facto ownership to becoming the de-jure owners. Blanc-Brude and Strange (2007) make the case that lenders are in fact "the architects of the project's contractual structure". This structure eventually allocates rights and responsibilities and in

¹¹ These risks will turn up again later, reflected in different variables of the author's empiric model.

¹² The security package is required for "defensive" purposes and owns its importance to the specificity of project assets which typically makes it paramount to continue with the project even if the sponsors run into problems. The package therefore ensures that all assets must become collateral, lenders are able to assume control and the project can be continued. Therefore, it typically includes i) a mortgage on fixed assets and special privileges on moveable assets, ii) a pledge on the SPV shares, iii) assignment of future SPV credits to the lenders, and iv) a pledge on the SPV current accounts. In addition, there are direct agreements. For details please refer to Gatti (2018, pp. 376–386)

this connection risks, as well. The risk management process is consequently a fundamental task for the lenders as eventually only residual, that is unmanaged risk should determine the pricing of the PF loan, i.e. the credit spread above the risk-free rate (Blanc-Brude & Strange, 2007; Bonetti, Caselli, & Gatti, 2010). This margin plus any relevant fees are then the rewards for all the managing efforts incurred and risks assumed directly by the lenders. But the responsibilities of the lenders don't stop with the issuance of the loans, further intensive monitoring, and continuous dialogue are required for most of the project's life and in particular if the project should not go as planned. This all involves the liaison with many different partners, the coordination of different parties and the management of a large number of individual contracts which cover the whole range of financial, legal, political, operational and other aspects. With relatively inexperienced institutional lenders in mind, it may take substantial time until they acquire the required expertise¹³ regarding infrastructure - and here's exactly why.

Having covered the importance of risk management, we will now proceed to the risks that need to be addressed. The literature generally puts individual risks into three macro-categories: i) risks arising during the pre-completion (or construction) phase, ii) risks that become relevant during the post-completion (or operating) phase and iii) those risks that exist during both phases. Occasionally, a fourth category may be identified covering a special set of risks that may arise at the end of the operating phase, i.e. risks that would be entailed by rehabilitation and removal efforts¹⁴. Clearly, the risk profile of a project may substantially change throughout its lifecycle and risk often drops noticeably once the construction phase has been successfully completed. Gatti (2018, pp. 63–103) provides a detailed overview of the different individual risk and how they can be managed. During the construction phase activity planning, technology and construction are identified as the primary risks which are often managed through specific contracts (e.g. turnkey (EPC) contracts). Post-completion sponsors and lenders typically have to deal with risks concerning the supply of raw material, operations, and market risk, that is risk concerning the sale of services or products. Just as before, tailor-made contractual agreements can efficiently address the risk, examples are

¹³ A recent research memorandum by Contreras, Bos, and Kleimeier (2018) underlines the need of what they call "informational capital" and describes how this shapes the syndication behavior of PF lenders.

¹⁴ Note, however, that this risk is typically borne by the sponsors alone as in a regular case the debt provided by PF lenders has been fully amortized some time before the end of the project's life.

Put-or-pay agreements addressing supply risk and O&M agreements taking care of the operational risk. Risks that prevail during both phases are usually hedged via insurance contracts or derivatives/market instruments and include. A non-exhaustive list would probably include risks concerning interest rates, exchange rates, inflation, politics and regulations, environmental issues and counterparties (“credit risk”). Again, the author will provide further detail regarding any specific risk in the empirical part of this thesis if warranted. In general, we observe that there are three basic strategies to eliminate or reduce the repercussions of a given risk. First, risk can be allocated to the counterparty best able to deal with it. This generally constitutes the preferred option. Secondly, one may rely on available market instruments (i.e. derivatives) or offload risks on to specialized counterparties in return for the payment of an insurance premium. Note, however, that both of these approaches to a certain degree represent a trade-off; the specific project risk is replaced by counter-party risk (Bonetti et al., 2010). Finally, some un-allocable risk is simply retained and has a volume- and pricing-effect. A lower level of risk would allow to reduce the cost of debt and increase the leverage (i.e. the debt-to-equity ratio). In sum, the project sponsors would be able to boost their return-on-investment (Gatti, 2018, p. 103).

Just as different risks are addressed in different ways, a syndicated project finance loan facility is usually not one singular lump-sum payment but may be rather split into different tranches which in turn could be drawn upon at different points in time and are subject to differing provisions. Projects typically include a funded base facility (term loan), a VAT-facility to fund accruing VAT during construction, a pro-rata stand-by facility to provide for potential cost-overruns and a (revolving) working-capital facility to provide liquidity during operations. Contingent on the size and specifics of a project, a wide range of additional, tailor-made tranches are conceivable including grant facilities, bridge facilities, letters-of-credit, etc. As institutional investors represent deep pools of capital that are supposed to be put to work it can be assumed that they prefer a setting in which the timing, amount and horizon of the loan are known ex-ante. That is why, it is to be expected that institutional lenders will

show a preference for the funded¹⁵ tranches of a PF facility, i.e. the base facility and, will consequently leave the provision of liquidity to commercial lenders.

To close this section, the author would like to present the current state of the global project loans market and provide some detail on how project finance loans are distinct from other project and infrastructure related debt. Based on the *Refinitiv Project Finance International (PFI)* annual league tables¹⁶ the global market for project finance loans on limited- or non-recourse basis was up 23% compared to the previous year and reached a record high of \$282.6bn accumulated in 871 deals. While project bond activity was down 29% to \$45bn, this still lifted the commercial project finance market to a record-setting \$327.6bn (+11.6%) (Project Finance International, 2019, p. 46). The editors take this as evidence that the long-forecasted end of banking supremacy in PF loans has to wait at least another year, a development that has been helped by the move towards shorter tenors. The editors, however, acknowledge that bonds may still win out if sponsors prefer very long tenors. Lender-wise the market is dominated by Asian and European banks, the top 10 of which account for 33% of volume (on initial mandated lead arranger basis), yet in general, the market is still rather dispersed [p. 51]. Geographically, the U.S. accounted for roughly one-fifth of the volume, followed by Australia with 11.3% and the UK (7.9%) [p.54]. On a sector basis, Power (mainly driven by renewables) dominated with a take of 48.7% (approx. \$138bn), Oil & Gas (19.1%) and Transportation (17.9%) came in second and third respectively while PPP accounted for a respectable \$13.2bn (4.7%) [p. 54].

Obviously, the PF loan market is flourishing, but how does PF debt stack up against infrastructure debt that is issued by infrastructure corporates. To get to the bottom of this question with respect to financial performance, Blanc-Brude, Chreng, Hasan, Wang, and Whittaker (2017) have constructed three indices for a time-window spanning 2000 through 2016 and covering 14 European countries [p. 37]. The first index is reflecting broad market infrastructure debt which in turn is composed of two sub-indices reflecting project debt and infrastructure corporate debt individually. Project debt delivers higher risk-adjusted

¹⁵ Note that such an approach is not too different from the investment in a (project) bond, a field in which institutional lenders have long been active and meaningful expertise.

¹⁶ According to their editors these project finance related league tables provide the most accurate and comprehensive data across the globe in any given year (Project Finance International (PFI) (2019).

returns (as measured by the Sharpe ratio) vis-à-vis infrastructure corporate debt and a broad corporate debt market reference across all examined time-horizons [p. 43]. Here, project debt benefits from lower return volatility that is 70-100 bps below the volatility of infrastructure corporate debt. Based on cumulative performance for the given reference period alone, infrastructure corporate debt prevails though. But this result can easily be explained, because infrastructure corporate debt has profited from higher returns early on in the sample period which have been compounded correspondingly [pp. 47; 49]. Yield-to-Maturity (YTM) or the Internal-Rate-of-Return (IRR) of a fixed-income instrument is another tool to evaluate performance that has been used by the same authors. Generally, the YTM of all indices show a long-term declining trend since the beginning of the sample period, except for a “bump” upwards during the GFC. Towards the end of the sample period, however, the paths of project debt and general corporate debt are deviating, with yields of project finance showing a slight (potentially regulation-driven) upward trend, whereas general corporate debt is headed ever lower.

With respect to credit risk (i.e. default and recovery rates), the two rating powerhouses Standard & Poor's (S&P) and Moody's have provided in-depth researches lately that both underscore the generally favorable features of infrastructure debt vis-à-vis non-financial corporate debt and drill down on the more subtle differences between (un)rated project and infrastructure corporate debt. Moody's (2017) report a **10-year average cumulative default rate** of 6.7% for un-rated project finance bank loans which corresponds to their 10-year average cumulative default rate of low-investment grade credits. PPP projects compare even more favorably with a respective rate of 5.2%. S&P Global Ratings (2018a) present results in the same ballpark. In their sample, unrated PF loans stand at 6.3%, core infrastructure sectors including power, transport, social and oil & gas at 5.85% and PPP projects rate are best-in-class at 5.6%. For Moody's, rated infrastructure (an aggregate of both corporate infrastructure and project finance) fares even better, coming out at 3.4% (Moody's, 2016), substantially outperforming non-financial corporate issues. S&P Global Ratings (2018b) fortunately provide a split for corporate infrastructure debt and project finance debt. Rated project finance average cumulative default rates for a 10-year horizon stand at 6.87%, markedly beaten by rated corporate infrastructure debt at 2.12%. Together, they stand at 2.82% and therefore 8.6% lower than rated non-financial corporate debt at

11.42%. Following a similar trend, **average annual default rates** of rated project finance debt are slightly higher than that of corporate infrastructure (0.50% vs. 0.35% since 1981). For unrated loans the percentages are slightly higher, yielding 1.5% for all infrastructure projects and 0.7% for PPP projects (S&P Global Ratings, 2018a). Jobst (2018) acknowledges the favorable performance of infrastructure debt over long time horizons, both in developing and developed countries and emphasizes the non-linear relationship between maturity and credit risk. Cumulative default rates appear to follow a “hump-shaped” term structure¹⁷ whereas corporate credits usually exhibit a straight-line relationship between credit risk and maturity. This visual observation can be linked to the behavior of **marginal default rates** over time. Moody's (2017) observes marginal annual default rates for unrated PF debt that decrease substantially over time, from high speculative-grade default rates to those more similar of single-A ratings after approx. seven years. S&P Global Ratings (2018a) corroborate these findings for unrated PF loans. Generally, these observations suggest that default risk declines substantially once the higher risk construction phase is completed and the asset establishes an operating history. Jobst (2018) further notes that over time the project deleverages and often profits from a stable revenue base and Gadanecz and Sorge (2008) and Sorge (2004) conclude that longer maturities ease liquidity constraints in the early periods as they allow to stretch debt repayments over a longer time interval, effectively reducing credit risk. Overall, the declining nature of marginal default rates is in stark contrast to the behavior of marginal default rates of corporate credits which are generally rather stable across time (Gadanecz & Sorge, 2008; Jobst, 2018). As to **recovery rates**, unrated project finance loans have an average recovery of 79.5%, the most likely ultimate recovery is however 100%, implying 0% economic loss (and in line with senior secured corporate bank loans) (Moody's, 2017). Again, PPP projects slightly outperform, recovering on average 85.5%. S&P Global Ratings' (2018a) sample of unrated PF loans deviates slightly with recovery rates at 84% nominally and at 77% on a discounted basis. For rated debt Moody's (2016) record average recoveries of approx. 74% (senior secured). Interestingly enough, data of S&P Global Ratings (2018b) shows a considerable difference between rated corporate infrastructure recovery rates and those of rated project finance (77% compared to 59%). Moreover, they give an

¹⁷ This is a result that mimics the findings of Gadanecz and Sorge (2008) who observe a “hump-shaped” term structure for project finance spreads. Their findings will be discussed in a later section.

account of sizeable variations, nearly as many projects recover at par or greater as projects recover less than 20% - a result of high market risk and technological issues of certain projects. Nonetheless, when compared to broader corporate credit, infrastructure debt recoveries show relative strength. *Generally, when all four studies are taken together, infrastructure performs substantially better than non-financial corporate debt, rated issues come out on top of unrated debt and infrastructure corporate debt outperforms project finance debt.*

Combining our observations of returns and credit risk in the context of infrastructure debt, two things stand out. Firstly, with regards to broader corporate debt issuances, infrastructure debt performs better both regarding return performance and credit risk. Secondly, the results are less telling when we differentiate between project and infrastructure corporate debt. While some findings imply that project debt is superior on a performance basis, other findings imply that project debt underperforms in terms of credit risk.

In this section, the author has introduced project finance loans as one way how investors can access infrastructure investments. In addition, he has provided an overview of definitions, peculiarities, and risk that arise during such an investment. Finally, we have had a look at the PF loan market and how such loans may differ from other kinds of debt.

Infrastructure projects are capital intensive undertakings that in almost all of the cases are way too “chunky” for any individual investor, whether it be for reasons of concentration-limits, fund size, capital available or else. That is why, in the case of PF loans, investors typically come together to form a so-called “syndicate” that collectively lends to the project at hand. Spreading the investment amount is only one of many reasons to join a syndicate and the syndication process itself may give rise to different issues. As a result, the author will familiarize the reader with this process in the next section.

“Syndicated lending has left a clear mark on international markets since its inception. The first facilities of this type, in which financing was provided jointly by several banks, date from the nineteenth century. They were designed to meet the financial needs of major rail infrastructure projects for which funding requirements were of so great a magnitude that no single bank could, or would, take it on. It is immediately apparent that these were the first steps in what is now commonly and widely known as “project finance”, one of the most typical purposes of this type of facility.

– Estevan de Quesada and Renner (2017, p. 172)

2.2 SYNDICATED LENDING

In the previous section, the author has introduced project finance loans as one way to provide capital to an infrastructure project. These loans, given their often very substantial volume, are hardly ever funded by a single lender and normally are split between different lenders by means of a process that is called syndication. As the citation above demonstrates, both concepts have been closely linked historically. To share a loan entails some degree of collaboration among the lenders and the assignment of different roles within a syndicate. In the general case, we distinguish arrangers and participants. The arranger is typically responsible for the ex-ante screening of the borrower, the structuring of the loan transaction itself and the ex-post monitoring of the borrower. Different responsibilities may arise or some of the responsibilities may be delegated to other syndicate members. The participants are usually limited to the provision of funds. This distinction in turn, on a case-by-case basis, may give rise to certain issues and conflicts-of-interest. To get to the bottom of what syndication means for project lending, this section will touch on three different topics. For starters, motivations and the underlying logic for forming a syndicate will be covered. Second, the formal syndication process will be quickly reviewed highlighting the different roles of lenders involved. Then the author will try to present some issues that may arise in the course of the syndication process – issues that can be potentially resolved by falling back on differing notions of syndicate structure¹⁸.

¹⁸ For a detailed discussion of syndicate structure please refer to the author’s thesis submitted to Università Commerciale Luigi Bocconi.

The motivations for forming a syndicate (arranger perspective) and joining a syndicate (participant perspective) are manifold and by no means limited to loans alone, as the general syndication literature has dealt with many different contexts and markets¹⁹ including private equity, venture capital, as well as bond and equity underwritings. However, as we will learn to understand shortly, the collaborative lending to an isolated project SPV can have its very own implications.

Without having the special project finance case in mind, one possible way to interpret a syndicated loan is to see it as a hybrid of “public” (capital markets) and “private” (bank) debt (Dennis & Mullineaux, 2000). Boot and Thakor (2000) regard them as the intersection of “relationship” and “transaction” loans. The notion of relationship originates from the arranger’s screening and continuous monitoring efforts, i.e. information production in general, which over time establishes a relationship between the two parties. In the general syndication context, often a relationship between the arranger (or Mandated Lead Arranger (MLA)) and borrower has been established at some point before the actual loan, as we will see, however, this is not regularly the case for PF loans. The “transactional” interpretation stems from the fact that a syndicated loan, even if only arranged by a single arranger, is then syndicated (or distributed) to numerous participants, coming closer to a capital-markets set-up, where a large number of investors is typically involved, e.g. in the issuance of a bond. Participants therefore usually have no direct relationship with the borrower but are “at an arm’s length”. To them, however, the relationship with the MLA is of high importance, as Cai (2010) notes, reciprocity²⁰ in syndicated lending both limits potential conflicts-of-interests and allows to access a continuous flow of transactions²¹. Given our heightened interest in non-bank lenders being active in PF loan syndications, it’s worth mentioning that Beyhaghi, Nguyen, and Wald (2019) state that lending “at an arm’s length” makes screening and

¹⁹ For further details regarding please refer to the following studies. For private equity Tykvová and Schertler (2007); Meuleman, Wright, Manigart, and Lockett (2009); Legrand and Pomet (2011); Brettel, Breuer, and Friedrich (2008), for venture capital Brander, Amit, and Antweiler (2002); Bubna (2002); Bygrave (1987); Casamatta and Haritchabalet (2003); Clercq and Dimov (2004); Ferrary (2010); Hopp and Rieder (2011); Lerner (1994); Manigart et al. (2006); Manigart et al. (2002); Wright and Lockett (2003), for equity investments Bernoussi, Dereeper, and Schwenbacher (2013); Corwin and Schultz (2003), and for bonds Song (2004)

²⁰ The term reciprocity describes repeated collaborations between arrangers and participants in the same and reversed roles.

²¹ Access to a viable pipeline of projects has been, as seen before, one of the major impediments for institutional investors in infrastructure funding.

monitoring cheaper for them when they act as participants, as individual information production would be quite expensive for them. Therefore, they typically prefer a “passive” investment approach where these tasks are left to banks that have the required skill set. On a side note, although they yield a somewhat similar result with regards to the final placement of a loan, loan syndications and (secondary) loan sales via “participations” or “assignments” differ inasmuch as in loan syndication participants are involved from the onset of the loan and are directly linked to the borrower (Gorton & Pennacchi, 1995; Simons, 1993). Gadanecz (2004) refines the concept, implying that syndicated loans constitute a primary market where the sharing of risk and the joint provision of funding are the main goals whereas loan sales constitute a secondary market where the complete transfer of risk and liquidity provision are key. Both forms of intermediation exist in parallel, though, and allow lenders to finetune their lending portfolios and provide liquidity to an asset class that has been deemed non-marketable historically. Especially for investors that lack the critical size to be active in the primary market, loan sales are an attractive avenue to gain sector- or country-exposure (Gadanecz, 2004).

As we approach the motivations and advantages of syndicated loans, it is important to remember that all three parties that we have identified so far may differ as to what is driving them. We will, therefore, analyze syndicated loans through the lenses of arrangers, participants, and borrowers respectively and, if possible, also highlight some commonalities. The author starts with the arrangers. First of all, arrangers want to be remunerated for the efforts they incur during the structuring and monitoring process, so syndicated loans offer an opportunity to generate additional fee income²² (Altunbaş & Kara, 2011; Esty, 2001; Godlewski & Weill, 2008; Thomas & Wang, 2004). Gadanecz (2004, p. 80) provides a non-exhaustive list of possible fees including, amongst other things, arrangement fees, underwriting fees, participation fees, facility fees, etcetera. Generally, syndication allows banks with substantial origination and structuring experience to leverage their comparative advantage without having to fund the transactions themselves (Bosch & Steffen, 2007; Esty, 2001; Jones, Lang, & Nigro, 2005). Alternatively, syndication offers a way to circumvent some

²² This offers an opportunity for the arranger to improve return on capital as fees are paid based on the total amount of the loan. The arranger, however, distributes some fraction of this amount and only funds the remainder.

liquidity²³ constraints (Altunbaş & Kara, 2011; Dennis & Mullineaux, 2000; Maskara & Mullineaux, 2010; Simons, 1993). This is closely related to the circumvention of regulatory constraints concerning capital²⁴ as argued by the same authors. Syndicating the loan is an effective risk management tool that prevents concentration²⁵ risk and allows to spread credit risk among several lenders (Chowdhry, 1991; Estevan de Quesada & Renner, 2017; Gadaneč, 2004; Godlewski & Weill, 2008). Estevan de Quesada (2018) and Esty (2001) underscore the fact that, despite being negotiated under a single loan agreement, each lender has its own individual responsibility towards the borrower and other lenders cannot be held liable for these obligations – which is the very reason why syndicated loans were initially perceived²⁶. Finally, arrangers may decide to syndicate to pool information, especially if the borrower is rather opaque (Contreras et al., 2018). For the participants, passively providing funds, the case is different. For them participating in a syndicated loan offers the chance for cost-effective portfolio diversification into geographies outside of their home market and into sectors where the participants have no screening, origination or monitoring capabilities (Altunbaş & Kara, 2011; Dennis & Mullineaux, 2000; Gadaneč, 2004; Godlewski & Weill, 2008; Simons, 1993; Thomas & Wang, 2004). Estevan de Quesada and Renner (2017) find that this represents a chance to provide direct funding for non-bank lenders in particular. The same author [p. 165] provides a neat summary of the case for syndicated loans: *“Syndicated loans are an indispensable instrument of corporate finance [...]. The business logic for syndicated loans is compelling. [Arrangers and participants] split the risk of a large credit, which they would not be able to bear alone, and at the same time they can pool their resources for administering and executing the loan [...]”*. The generation of fees is of less importance for participants as their focus is on the accumulation of interest-bearing assets and diversification of interest income (Esty, 2001) at limited costs. Cost-effectiveness, in this context, is achieved by leveraging screening and monitoring skills of the arranger and that are paid for by the borrower; engaging in the same activities would be far more costly for the individual participant (Dennis & Mullineaux, 2000; Gadaneč, 2004). Estevan de Quesada and

²³ These considerations are especially relevant in the context of large-scale, illiquid infrastructure projects.

²⁴ See no. 20 above.

²⁵ Concentration can be seen from various perspectives, i.e. single-name, industry, sector, geography, etc. (Thomas and Wang (2004); Thia (2019)).

²⁶ This provision protects individual lenders from having to fund a portion larger than their comfort levels and is particularly relevant in loan syndications where the final takes differ substantially.

Renner (2017) further note that syndicated lending reduces redundancy of certain activities that would be incurred in a series of bilateral loans. Additionally, participants can profit from the established relationship between borrower and arranger²⁷ (Bosch & Steffen, 2007). Fortunately for both lender groups, there is also some additional common ground. Cai (2010) shows that both sides can profit from “reciprocity” as syndicated loans typically involve the same lenders, but in alternating roles. Therefore, syndication grants access to a continuous pipeline of investment opportunities. Against this backdrop, repeated transactions foster the transfer of know-how and present a learning opportunity for both parties. Seasoned investors may be able to source fresh ideas from newcomers which in return profit from their experience (Contreras et al., 2018; Tykvová, 2007). Contreras et al. (2018), however, raise an important point with regards to project finance. Funding a project that is not yet in existence precludes the existence of any ex-ante relationship with the prospective borrower. Furthermore, even existing relationships to the project sponsors may have limited meaning due to the highly specific nature of individual projects. In such a case “informational” capital, as the authors describe it, becomes particularly relevant as it enables the screening, monitoring and negotiation of contract terms based on the sector- and country-specific experience acquired in previous projects²⁸. Ideally, lenders would, therefore, form syndicates that bring together complementary “informational” capital and are led by “informed” arrangers. Gatti, Kleimeier, Megginson, and Steffanoni (2013) also highlight the lack of past history for and independence from sponsors of any given project. In their eyes, reputable and experienced arrangers can overcome these obstacles, however. Coming together as a larger group of lenders has also the additional advantage of deterring strategic default and other opportunistic behavior on the side of the borrower as the retaliation would be more severe and access to financing in the future would certainly be inhibited²⁹ (Chowdhry, 1991; Esty & Megginson, 2003). As Chowdhry (1991, p. 126) puts it: *“After a small number of defaults, the borrower would exhaust all sources of credit in the international market”*. Finally, syndicated

²⁷ Note, that this argument may be less valid in a PF context due to the lack of history and the high specificity of any individual project.

²⁸ This very notion motivates the inclusion of some variables in the empirical model that reflect successful debt offerings involving institutional lenders.

²⁹ This point could prove particularly valid in the context of large-scale infrastructure projects in countries with weaker legal and political conditions.

loans, alongside the introduction of loan ratings³⁰ in the 1990s, have fostered a liquid secondary market which benefits the dynamic portfolio management of all lenders involved (Altunbaş & Kara, 2011; Altunbaş, Kara, & Marques-Ibanez, 2010) and certainly has generated higher interest from non-bank entities. But not only lenders stand to profit because borrowers are able to take advantage as well. Negotiations with a limited number of counterparties (in case of several arrangers) are generally easier to handle and can be better tailored to specific needs (Estevan de Quesada, 2018; Focarelli, Pozzolo, & Casolaro, 2008; Paligorova & Santos, 2016). Godlewski (2010) and Godlewski and Weill (2008) further report sped-up executions. In addition, syndicated loans prove to be cheaper vis-à-vis public bonds or bilateral loans for various reasons. On the one hand, as compared to public bonds there are no disclosure and marketing costs are incurred (Gadanecz, 2004; Godlewski, Sanditov, & Burger-Helmchen, 2012; Godlewski & Weill, 2008). On the other hand, syndicated loans are more liquid than bilateral loans and consequently require a lower or no illiquidity premium (Thomas & Wang, 2004). In addition, syndicated loans are typically not provided lump-sum but are split into various tranches according to different risk characteristics and project needs³¹. As Maskara (2010) argues that this allows to directly address lenders with different levels of risk aversion instead of conceding a “one-size-fits-all” spread that has to accommodate different return requirements. On a similar note, Beyhaghi et al. (2019) establish that a syndicated loan introduces a sense of heterogeneity to a single transaction. Not only are different tranches issued under a single umbrella facility, but there’s also a heterogeneous group of investors with differing motivations and requirements. Breaking away from lender and borrower roles, we observe that in a broader economic framework syndicated loans foster credit expansion for the general economy as loans can be originated that would be neither issued on bilateral basis nor capital markets in the form of a bond.

Taken as a whole, it should have become clear why syndicated loans are an interesting way for institutional investors to access PF. Leveraging the capacities of experienced originators and being able to contribute capital directly are certainly alluring factors. Eventually, a

³⁰ Sufi (2009) reports in detail how loan ratings have both been driven by and increased institutional willingness to participate in direct loans.

³¹ Recall that syndicated PF loans typically involve several tranches including base facilities, VAT-facilities, working capital revolvers and contingency lines.

syndicate can take on many different forms. Therefore, after a short formal description of the syndication process itself, the author will proceed to discuss some different ways of how the literature has approached syndicate structures and their implications³².

Esty (2001) provides a detailed account of how syndicates come together in a PF context. Here's a short summary of the process that usually follows a strict order of events. After an initial bidding process, the would-be borrower mandates a lead arranger (MLA), typically based on its experience in the sector, track-record and the competitiveness of its bid. Key responsibilities of the MLA include credit analysis, negotiation of relevant contract terms with the borrower, underwriting the issue and marketing the deal to potential participants. Contacting prospective participants starts the actual syndication phase which can take several forms depending on various factors such as the soundness of the project, the state of financial markets, etc. The MLA may choose to directly enter general syndication, that is allocating individual loan shares based on bids by the would-be participants – something generally called “single-stage syndication”. Alternatively, if there are some concerns regarding the willingness of other lenders to join the syndicate – be it for project-specific or other reasons -, the MLA may seek support from a limited group of other lenders, that would be willing to share the underwriting commitment (two-stage syndication)³³. Esty (2001) fittingly remarks that this can be seen as adding a “wholesale” phase, before the “retail” phase of syndication starts. During syndication, the MLA, therefore, has the delicate tasks to find a common denominator for both borrower and participants. The MLA has to financially structure (design and negotiate) a deal that is viable for the borrower and acceptable for the market (distribution). Since general syndication may move back-and-forth this can be a time-consuming process. However, in times of higher market uncertainty and crisis, lenders have acquired a taste for faster execution. Gatti (2018, pp. 222–223) thus presents an alternative, faster solution in the form of so-called “club deals”. In such a case, a limited number of banks jointly negotiates with the borrower and fully commits to funding the project – general syndication is avoided altogether. Regardless of how the syndication eventually converges,

³² This is an important point to discuss, as the increased participation of non-bank lenders in syndicates can surely be interpreted as a change to the general structure of loan syndicates.

³³ Naturally, this would require the MLA to share some of the fees that compensate the arranging efforts, thus making the deal less profitable. In sum, the decision for a two-stage syndication presents a risk-return trade-off.

the MLA is usually responsible for the continued monitoring of the borrower throughout the life of the loan.

To cap off this section content-wise, the author would like to highlight some advantages of syndicated lending from a project finance and infrastructure perspective and for institutional lenders in particular – some of which immediately suggest themselves. Most notably, syndicated lending offers the advantage to distribute intrinsic project risk among a group of lenders. This risk-sharing motive is ever-present and also applies to concentration risk which is highly relevant in a PF context – as infrastructure projects have a tendency to be rather lumpy. Smaller loan portions furthermore improve liquidity and being able to sell individual allocations in a secondary market could prove beneficial for both banks and non-banks with respect to portfolio-management considerations. Additionally, syndicated loans enable banks to “circumvent” regulatory obstacles (e.g. liquidity constraints”) and with a subtle tweak to their business models they can focus on the generation of fees. “Originate-to-distribute” models which work especially well in the syndicated loan field offer the opportunity to leverage their unique skill-sets with regards to origination and monitoring. At the same time, their final take becomes less funding-intensive. With the highly heterogeneous and specific nature of infrastructure projects in mind, syndicated lending fosters information pooling and allows to bring together complementary expertise. In this regard, banks may have dominated the project finance market for a long time, institutional investors, however, have built up their own unique experience in the infrastructure space via bond and equity investments. In some occasions, they could certainly bring additional information into the deal and it may prove worthwhile for banks to reach out to them. Institutional investors, in return, stand to gain from improved diversification opportunities, access to a continuous deal pipeline, the opportunity to learn by participation in a minor role and to gain exposure to geographies and sectors which they could enter independently for lack of origination expertise. There is also the fact that project finance loans are typically available in different tranches. As we have learned, project finance deals are structured deals where different loan tranches must be provided in order to match specific funding requirements. Institutional investors have a natural interest in the provision of long-term funds right from the start whereas banks gladly focus on the provision of liquidity. It’s evident then, that PF requirements and the tranching of syndicated loans complement each other beautifully.

Lastly, infrastructure projects are capital intensive and long-term and become highly-attractive once the risky construction phase is completed. So, lenders are to some degree dependent on, amongst other things, the goodwill of host governments and the quality of legal frameworks. In the absence of the latter, syndicated lending becomes an effective tool to deter opportunistic behavior by third parties – a tool that both banks and non-banks have learned to appreciate.

Having established syndicated project finance loans as a way to access infrastructure finance, the focus of this initial review part will now shift to the prevailing conditions in the project host country and the factors that may or may not facilitate institutional lending to domestic infrastructure projects.

“The much more powerful way to deliver sustained infrastructure investment is to get the regulatory framework right; and then for governments to avoid the temptation to make frequent short-term changes to the regulatory framework [...] that undermines confidence on the part of investors.” – Stanley (2011)

“The environment for institutional infrastructure investment is rarely perfect, even in advanced countries.” – Inderst and Stewart (2014)

2.3 INVESTMENT FRAMEWORKS FROM AN ACADEMIC PERSPECTIVE

In the two previous sections, syndicated project finance loans have been introduced as the method of choice for this study in order to access infrastructure investments. Therefore, after having established how investors may choose to invest, the important question that is left unanswered thus far is why certain countries and geographies receive more private investment than others. In this and the subsequent sections, the author intends to provide an overview of how the literature has addressed and tried to assess the attractiveness of different countries and geographies for private infrastructure investment, which factors practitioners deem the most important and finally, what the results of previous attempts at classifying the attractiveness of individual countries reveal.

Generally, the literature on attracting private infrastructure investment has circled around a couple of main factors that both individually and in conjunction have shown some potential

to explain variations in cross-country comparisons of private sector infrastructure investment. Usually, these factors can be either ascribed to the national economy as a whole, fall into the realm of political and other institutions, thus, indirectly holding governments accountable or are dependent on the investors themselves, i.e. concerning their own skill-sets, experiences and, potentially, investment mandates. The identifiable factors can be roughly grouped as follows³⁴:

- ***The economic and financial framework***
 - *The micro-economic environment and deal specifics*
 - *The macro-economic and business environment*
 - *The financial environment*
- ***The institutional framework***
 - *The political environment and public governance*
 - *The regulatory environment*
 - *The legal environment*
- ***The investor background***
 - *The investor experience and skills*
 - *The investment mandate and strategy*
 - *The investor regulatory framework*

These factors have been dealt with to varying degrees of detail and both on a granular and an aggregated basis. However, this list is far from being exhaustive as occasionally other additional factors such as social factors³⁵ and culture, sustainability, existing endowment with infrastructure, tax issues, and innovation have been highlighted, as well. Moreover, most research does not refer to (private) infrastructure per se but rather focuses either on foreign direct investment as a whole or on specific infrastructure investment channels – quite often and increasingly after the financial crisis of 2008, Public-Private Partnerships (PPPs) have

³⁴ This categorization approach is in line with Inderst and Stewart (2014) who identify i) the nature, size and regulation of the institutional investor base, ii) the state of the financial system, iii) infrastructure policies and regulation, iv) private sector engagement, and v) the economic and political macro-environment as the most important attributes of an enabling background environment [p. 37].

³⁵ See, for example, Basílio (2011).

gained heightened attention. Finally, the reader should be advised as with these concepts the borders are often rather fluid and combined measures may be used in empirical set-ups³⁶.

Unsurprisingly, the **economic and financial framework** is of great importance for an investment decision. Determinants such as economic growth, sustainability and inflation, economic wealth levels, economic openness, solvency and sovereign ratings³⁷, foreign exchange rates, and depth of local financial markets determine both the attractiveness of a target market and the ease of access to it.

The importance of the *macro-economic and business environment* has been touched upon in many different studies. Often, however, the results are treated as a “by-product” as the original focus of these studies has been a different one³⁸. Araya et al. (2013) register positive effects of economic openness, growth and lower inflation rates while they focus on the effects on country risk on private participation in investments. Banerjee, Oetzel, and Ranganathan (2006), while investigating the importance of institutions, also find that macro-economic variables have a positive influence on private infrastructure investment – especially high economic growth and higher GDP-per-capita levels³⁹ are found to be significant. Basílio (2011) and Moszoro, Araya, Ruiz-Núñez, and Schwartz (2015) come to the same conclusions for PPP investments in emerging markets’ infrastructure and Hammami, Ruhashyankiko, and Yehoue (2006) corroborate the results for PPPs in general. Soecipto, Verhoest, Petersen, and Scherrer (2015) find a positive relationship between PPP support and “economic well-being”. Work by Jadhav (2012) indicates that, in the case of foreign direct investment (FDI) in BRICS-economies, economic factors are of greater importance than institutional or political factors. Kirkpatrick, Parker, and Zhang (2004) corroborate the findings of the general literature and attest a positive impact of macro-economic stability on foreign direct investment in

³⁶ In concrete examples, Araya, Schwartz, and Andres (2013) and Schwartz, Hahn, and Bannon (2004) work with Euromoney’s Country Risk Ratings which combine political risk factors with both financial and economic measures that carry different weights for the determination of the final index.

³⁷ Note that sovereign ratings typically reflect and aggregate a number of macro-economic factors including growth, inflation, government debt, per capital income levels. In addition, these measures may also cover some political and institutional considerations and, therefore, may not be completely distinct.

³⁸ As a case in point, Busse and Hefeker (2007) focus on political risk and institutions and their effect on FDI but nonetheless include various macro-economic variables such as GNI-per capita, trade-to-GDP and inflation.

³⁹ The authors interpret higher GDP-per-capita levels as a reflection of higher purchasing power or ability-to-pay (Jensen and Blanc-Brude (2005)) and thus as a sign for greater demand for the investment project. Banerjee et al. (2006) use the same measure as a proxy for market size.

infrastructure in developing countries. Harris and Pratap (2009) further report that macro-economic crises (measured as a depreciation of the exchange rate) are strongly driving the cancelation of private sector infrastructure investment and Makovšek (2018) acknowledges an increased risk sensitivity of investors in the aftermath of economic crises. Furthermore, in its Self-Assessment Form for PPP Readiness United Nations ESCAP (2005) advises countries seeking private investment in infrastructure to investigate factors such as GDP growth, ease of doing business, a stable exchange rate, and the level of business confidence and the World Bank Group (2016) advises to use a similar set of variables to self-determine a country's readiness for PPP. Finally, Blackrock (2015) further emphasizes the need of investors for economic certainty in order to be willing to commit to large-scale, longer-term investment projects.

Micro-economic and deal related factors are primarily concerned with investment risks that derive directly from the investment project itself. Deal size, sector-specific considerations (i.e. technological, environmental and other risks), currency mismatches, the involvement of development banks and other agencies⁴⁰, the loan purpose and type, specific contractual agreements, and the provision of risk mitigants (e.g. guarantees, collateral, covenants, and/or insurance) – just to name a few - are all factors that need to be considered. In the case of syndicated lending, syndicate structure may be an additional factor and would involve topics such as the presence of foreign lenders or domestic arrangers, the size of the syndicate, the experience and reputation of syndicate members and so forth⁴¹. The effect of these factors on country-specific investment flows, however, has hardly received any attention in the literature. As such, these factors at most have been reduced to control variables every now and then, even though Harris and Pratap (2009) acknowledge their importance as they state that these factors influence the decision of private investors to cancel infrastructure investments.

The financial environment has many different aspects and must not necessarily be confined to the country where the investment project is located⁴². Usually, relevant aspects revolve

⁴⁰ See ,for example, Gatti (2015).

⁴¹ For an in-depth discussion of syndicate structure-related literature please refer to the review section in the Master's Thesis the author has submitted previously to Università Commerciale Luigi Bocconi in Milano.

⁴² Altunbaş and Gadanecz (2003), for instance, justify the inclusion of the 3-year US-Treasury Yield in their empirical models by stating that said yield may represent a (risk-free) alternative for prospective lenders.

around topics such as the access to finance, extended credit to the economy, the development of both the national banking and capital markets, the amount and quality of pension and insurance assets, the level of interest rates, and/or the development of benchmarks such as, for example, JPMorgan's Emerging Market Sovereign Bond Index. Ba, Gasmi, and Um (2010) examine private investment in the power sector and their results strongly imply the importance of the development of the financial sector of the host country. Furthermore, they show that highly-developed capital markets that open the door for both equity and bond financings in local currency are a stronger attracting factor than the relative strength of the local banking sector as it reduces the reliance of hard-currency financing from abroad. Sheppard, Klaudy, and Kumar (2006) share this view citing the sub-par development of local financial markets as a major inhibition for African countries to attract private project finance and long-term debt funding in particular. Low sovereign creditworthiness and shallow local financial markets restrict access to both local-currency and hard-currency long-term funding. Mengistu (2013) and Moszoro et al. (2015) show that access to finance (in the sense of commercial bank credit) is an important factor for private participation in infrastructure. Esty (2004a) finds that strong financial systems reduce the likelihood of foreign lenders being involved in the financing of a local project – effectively reducing them to “go-to” financiers in case that local markets lack the necessary depth. Kinda (2010) further argues that stronger local financial markets reduce information asymmetries between foreign investors and local projects thus stimulating foreign market entry. It comes as no surprise then that Economist Intelligence Unit (2019b) considers the financing environment as an important building block of their *Infrascope* methodology⁴³ and Euromoney's Country Risk Rating that has been employed, for example, by Schwartz et al. (2004) considers access to various forms of financing, too. The World Bank Group (2016) also recognizes the importance of access to finance both from banks and capital markets and in local foreign currency. In addition, support and the provision of credit enhancement by development banks, development finance institutions, and export credit agencies (ECAs) is identified as an integral part of the financial architecture in the host country – an idea shared by Blackrock (2015).

⁴³ The *Infrascope* reports published by The Economist Intelligence Unit are geographically-focused reports that try to measure the ability of countries to enable PPPs in infrastructure.

The **institutional framework** establishes the rules of the game, provides guidance and, in the best-case scenario, credibly enforces the adherence to said rules, consequently reducing uncertainty and ensuring stability and a level playing field that would attract investors. However, institutions are a multi-faceted concept and it may be next-to-impossible to capture all of its characteristics reliably. Thus, the characteristics presented in the following can only represent a snippet of all conceivable combinations. Moreover, laws, policies, and regulations are not always perfectly separable. Thus, a lot of these concepts have been used interchangeably in the literature or have been aggregated into broader indices covering all of these aspects at once. However, it is fair to assume that politics in many cases is the bedrock on which grounds legal rules are established, which in turn are taken up again by regulation (i.e. supervision and enforcement). Given the enormous dimension that infrastructure investments often take, their long-investment periods, and their rather high political importance (i.e. the provision of an essential good) it is no surprise that political risks are on top of the agenda of every infrastructure investor.

The *political environment* and *public governance* encompass a wide range of factors including political (in)stability and conflict, the quality of government (i.e. its susceptibility to corruption), political transparency, the quality of bureaucracy and political effectiveness, expropriation and nationalisation, the type of political regimes (incl. political rights and civil liberties), etc. All of these factors affect the given investment project from without and are both used in aggregated (e.g. the Political Risk Index of the PRS Group) and dis-aggregated forms.

Biau and Pfister (2014) argue, for example, that an enabling policy framework for investment must tackle issues such as investment, trade, tax and competition policies and promote and facilitate investment. For instance, a sound investment policy framework may enable foreign investors to access domestic investments. Araya et al. (2013) show that countries afflicted by conflict and thus showing high levels of country risk require six to seven years until they're able to attract significant levels of private infrastructure investments. In their support, Schwartz et al. (2004) report that political risk (as a substantial weight of an aggregated country risk indicator) has a negative impact on infrastructure provision in post-conflict countries. In addition, they provide evidence that lower levels of country risk increase the probability of private investment. Banerjee et al. (2006) make the somewhat startling

observation that even though corruption potentially increases uncertainty and the cost of investment, higher levels of corruption are accompanied by higher private investment levels. As to political stability, there are no surprises as the authors find that higher stability is related positively to private investment levels. Basilio (2011) reveals that higher transparency with regards to political elections and the work of the government fosters PPP investments in emerging markets. Along the same lines, Pérez-D'Oleo, Castro, Herraiz, and Carpintero (2015) argue that political accountability is paramount for PPP in the transportation sector. Interestingly enough, both Basilio (2011) and Banerjee et al. (2006) claim that higher civil liberties discourage private investment. Their findings potentially reflect that increasing civil rights usually require to obtain more approvals which in turn could drive up transaction costs and lengthen the investment process. Busse and Hefeker (2007) focus on FDI in general and show that inter alia, government stability, democratic accountability and the absence of internal or external conflicts are positive determinants of FDI flows. Hammami et al. (2006) also report that politically stable countries are more likely to be attractive for PPP investments and EIU (2019b) also considers the explicit expression of political will and support as an important factor for an accommodating PPP environment. Moszoro et al. (2014, 2015) corroborate these findings and again highlight the importance of both political stability and the political effectiveness for private investment. Witold J. Henisz (2002) and Witold J. Henisz and Zelner (1999) consider the likelihood of a political regime change that could affect not only political stability but also policy stability and thus the credibility of long-term political commitments. They, therefore, construct an index of political constraints in order to gauge the ease with which existent policies could be changed in the future. Then, they go on to show that higher levels of political constraints, i.e. higher credibility of policy commitments, nurture infrastructure investment. A result that also holds for a later study focusing on the telecommunications sector (Witold J. Henisz & Zelner, 2001). Mengistu (2013) offers similar insights and articulates the importance of political stability for PPP as a regime or policy change could drastically alter the attitude towards PPP projects which are inherently long-term and, thus, sensible to changes. Stavasage (2002) uses the index developed by Henisz and Zelner above and shows that a system of checks and balances (i.e. effective constraints) leads to an increase in average private investment.

The *regulation*-specific literature is thinner and regulatory issues have often been analyzed side-by-side with the general politic conditions. Most often, the presence and quality of a regulatory entity have been at the center of the attention. Ba et al. (2010), for instance, in their empirical work concerning private investments in the energy sector, have included both an indicator of regulatory quality and the existence of a separated regulatory authority. Their findings indicate that the existence of such an entity increases private investment volume substantially and better governance has a positive impact, as well. Kirkpatrick et al. (2004) follow a similar approach. When they speak of regulatory quality and how it affects infrastructure FDI in developing countries they consider the “government effectiveness⁴⁴” indicator by Kaufmann, Kraay, and Mastruzzi (2009, 2011) and a self-constructed dummy for the establishment of an independent regulatory body in the sectors under supervision. Again, the results indicate that private investors respond favorably to both factors. Moszoro et al. (2014), in turn, show that improving regulatory quality by one standard deviation increases private infrastructure investment by 3.2% for their data while every contractual dispute reaching legal courts reduces the same prospects by 4%. Focusing on evidence from Latin America, Pargal (2003) provides more details about the importance of regulatory structure – that is a combination of aspects such as independence, competence, and the mandate of the regulatory authority and the transparency with which the regulatory process is handled. She concludes that a credible and independent regulator is of high importance for the commitment of private investors in Latin America. Banerjee et al. (2006) emphasize the role of potential regulatory interventions and supervision of existing rights as they both play their part in the support of the market. Biau and Pfister (2014) make an additional case for a strong regulatory framework and especially its predictability in order to accommodate the long-term character of infrastructure projects, United Nations ESCAP (2005) considers a sound regulatory framework as an important step towards PPP readiness and the EIU (2019b) considers regulations as one of the main components of its *Infrascopes* methodology. Makovšek (2018) singles out some important aspects of regulation throughout the lifecycle of infrastructure projects: documentation and review requirements, the procurement and permitting process including potential cancellations thereof, the costs of such a process, and

⁴⁴ The creators describe the indicator as a measure that captures phenomena such as, inter alia, civil servants being competent and politically-independent, credible government decisions and efficient bureaucracy.

changes to regulation that could potentially target a sector as a whole or a single project on discretionary basis.

The *legal* environment is of central importance to infrastructure investment and especially to project finance⁴⁵ since the allocation of project risk via contracts is predicated on the belief that these contracts will be upheld or, if need be, can be enforced. Therefore, property and creditor rights, the enforcement of contracts and general rule-of-law are vital to the attraction of private investors. In this context, rights and their enforcement need to be considered in combination – strong rights may suffer when they cannot be credibly enforced whereas the enforcement of weaker rights is not sufficient either. This interplay is thoroughly discussed by Biau and Pfister (2014) and Banerjee et al. (2006) report that a standard deviation rise in their rule-of-law measure increases a country's expected private investment by 31% if other factors are being held constant. Basilio (2011) employs different measures to proxy for the legal environment (including an index of creditor rights, contract enforcement days and a country's legal origin)⁴⁶. The importance of strong creditor rights is further developed by Esty (2004a) whose work implies that stronger creditor rights and effective enforcement help to raise long-term capital from foreign lenders. Gatti (2015) further introduces the importance of the legal tradition (i.e. common or civil law) and states that civil law effectively protects borrowers whereas the common law tradition benefits the lenders/investors (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1998)⁴⁷. Unsurprisingly, Hammami et al. (2006) find that higher levels of rule-of-law are indicative of higher PPP investment levels and Jensen and Blanc-Brude (2005) declare the importance of the rule-of-law and strong property rights for private investment in the water sector. Moszoro et al. (2014) are able to quantify this effect, in their sample the improvement of a rule-of-law indicator by one standard deviation has the potential to raise private investment by 4.3%. At this point, it's important to remember that the legal framework is not an isolated factor but

⁴⁵ Esty (2004a) state that since project finance is essentially “contract finance” and a project company can be seen as a “contractual bundle” (Basilio 2011) the legal protection of these contracts is particularly valuable for this specific investment avenue.

⁴⁶ For important groundwork on these topics, please, refer to the collected work of La Porta, Lopez-de-Silanes, and Shleifer (2008) and La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998, 1999), Djankov, Hart, McLiesh, and Shleifer (2008), and Djankov, McLiesh, and Shleifer (2007).

⁴⁷ As the authors explain, civil-law relies on legal scholars to formalize rules which are then converted in to statutes and comprehensive codes whereas the common law tradition is based of precedents set by judicial decisions taken by judges resolving specific legal cases.

also affects other aspects of the infrastructure investment environment. As La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) and La Porta et al. (2008) show, legal origin and tradition shape legal institutions, laws and their enforcement – factors which turn go on to have a substantial impact on financial markets and other aspects of the investment environment. It is, therefore, advisable to keep in mind that the “structural and contractual certainty” (Blackrock, 2015) that the legal environment provides to would-be investors is only one way of how the legal environment affects private investment behavior and that other, indirect effects are a fact.

Finally, the *investor* background needs to be concerned. Whether a certain private investor is interested in investing in a certain country and project is not necessarily driven by external factors alone (“pull factors”). Considerations on investor-level such as the investment mandate and strategy, the available skill-set and experiences made, and regulation that addresses the investors themselves instead of the infrastructure project in the host country are certainly relevant factors in an investment decision (“push factors”). For a detailed discussion of such issues please refer to the respective review section in the author’s first thesis submitted at Università Commerciale Luigi Bocconi.

In sum, we have seen which points the literature has identified as the defining factors for the attraction of private investment to infrastructure projects. But this is only one side of the medal. In the next section, therefore, the author will give the investors themselves a chance to speak and invites the reader to familiarize himself with the practitioners’ views.

“When you consider what the other interesting markets are with great potential and the right risk profile, there are not that many.” – Infrastructure Investor and Asset Manager⁴⁸

2.4 PRACTITIONERS’ VIEW AND INFRASTRUCTURE INVESTORS SURVEYS

In order to understand what favors private, a particularly institutional involvement in infrastructure and project finance transactions it might be help- and insightful to elicit answers directly from the prospective investors themselves. Several attempts at this have been made in the past and in the following the author will provide an overview of different

⁴⁸ See IPA Perpetual Australian Infrastructure Investment Report 2015.

institutional investor-targeting surveys in order to provide a better understanding of which factors enable institutional investors best to access infrastructure. As we will see and as is implied by the opening quote above, there is no “do-it-all” jurisdiction that caters to all investor requirements to perfection, but still, some countries and industries may attract more or less private capital for infrastructure development for differing reasons.

Back in March 2009, the global law firm Allen & Overy conducted a worldwide survey among its clients in order to gauge their attitude towards infrastructure projects around the globe. In total, the survey further cemented the fact that institutional investors tend to favor well-established infrastructure markets – with the US (by 55%), the UK (by 45%) and Germany (by 31%) being named as the most interesting jurisdictions at the time. Drilling deeper as to why these countries came out on top, the respondents set greatest store, inter alia, by factors such as *“robust rule of law”*, *“attractiveness of the regulatory environment”*, *“track record of other infrastructure projects being closed”*, *“the availability of international finance”* and *“positive public support”*. As the biggest dealbreakers, on the other hand, they identified *“lack of long-term senior debt providers”* and *“lack of coordinated government support”* while a change in law and regulations was identified as the single biggest risk to infrastructure investments.

Probitas Partners has started surveying institutional investors back in 2007 and throughout the years (i.e. 2007, 2009, 2012, 2013, 2014, 2015, 2016, 2017, and 2018)⁴⁹ its surveys have continued to deliver investor perceptions with regard to infrastructure investments. Three things have stayed constant throughout time: i) institutional investors express substantial interest in infrastructure (i.e. wanting to increase allocations year after year or at least keep them constant), ii) they’re most likely to opt to invest globally with a clear preference for developed markets like North America, Western Europe and Australia which often constitute their respective home markets and finally, iii) Energy and Power (incl. Renewables), Water and Waste Management, and Transportation are the industrial sectors of choice. Interest in infrastructure investments in emerging markets has been volatile and generally lacked impetus – institutional investors *“are less interested in the sector due to political, economic, or*

⁴⁹ The author only refers to reports that are publicly available at Probitas Partners website.

currency risk".⁵⁰ Still, if they express interest this is usually due to potential diversification benefits and general long-term growth potential. The surveys also pay special attention to investors who are not invested in infrastructure. Their top motivations for remaining on the sidelines to date have been mixed and have changed over time. Most notably, those investors find that "the return profile is unattractive" (2009, 2014, 2015, 2016 and 2017) and infrastructure "is not within [their] investment mandate" (2012), state that "[they] do not believe that the market is currently developed enough to warrant a specific allocation" (2013) and think that "the average duration is too long for [their] needs" (2018). Interestingly enough, some of these issues are – if one dares say – "homemade". Asked about what "*keeps them up at night*" one answer has been consistently given throughout the years and reigned among the top responses: "*Too much new money coming into the sector affecting future returns*". Infrastructure, in the eyes of many institutional investors, is falling victim to its own success. Other widely voiced concerns are that "*the market feels like [...] near the top of the cycle*", "*the lack of experienced fund managers in the sector*", increasing political risk globally and "*standard fee levels [...] eating away at returns*". Some of these factors the author may not be able to reflect in the empirical part of this study, but some key takeaways from Probitas Partners efforts should be that certain jurisdictions and sectors experience higher interest than others, the general investment climate is a concern and political and economic risks are surely to be considered.

An analysis by Robinson (2018) for OMFIF takes the same line. Institutional investors face increasing challenges when investing in real assets due to the lack of suitable projects, higher costs, challenging access and regulatory and political risks (including political instability, restrictions of foreign investment, etc.).

Stirling Infrastructure Partners Ltd⁵¹ has also released a series of institutional infrastructure surveys (covering the years 2013, 2014, 2015, 2016, and 2017) that to some degree mirrors the results presented by Probitas Partners. Again, the general intention is the same: On average institutional investors tend to raise their allocations to infrastructure investments –

⁵⁰ Throughout the years institutional infrastructure investors have expressed this as the main reason not to invest and this perception has increased lately. The following percentages represent their approval rate of the above statement: 31% (2011), 45% (2012), 45% (2013), 58% (2014), 32% (2015), 60% (2016), 64% (2017) and 54% (2018).

⁵¹ Again, the author refers to the surveys publicly available at Stirling Infrastructure Ltd's website.

with a clear preference for infrastructure equity or a combination of debt and equity, preferences for stand-alone debt investments are rather an exception. As seen before, the home markets of the would-be investors receive the most attention, that is (Western) Europe, North America, and Australia are favored by institutional investors. In brief, emerging markets are getting the cold shoulder. With regards to industrial sectors, again Renewables, Transportation (Airports, Rail and Toll Roads) and Water are consistently the main targets. When questioned on the main reasons why they would not invest in infrastructure the *“lack of internal resource to undertake due diligence”*, concerns regarding the risk/return framework and fund size, and the illiquidity of the asset class as a whole have been cited the most. In addition, when asked in 2016 whether infrastructure as a whole has become too expensive, 52.8% of the polled investors answered with “Yes” – effective echoing findings of the Probitas Partners surveys.

Two surveys by Deloitte (2013, 2016) confirm the findings concerning geographic and sectoral preferences and offer additional insight into which risks concern infrastructure investors the most. While business and operating risks certainly play some part (2013), external risks (including macro-economic, political and regulatory risks) are on top of the agenda (2013 and 2016). According to the surveys, regulatory risk has spiked recently and investors expect this trend to continue. Concrete examples of such issues are the lowering of solar feed-in tariffs in Spain and retroactive changes in the Italian solar-feed in tariffs (2019, p. 16).

Further surveys (2015, 2017a, 2017b, and 2019) by the law firm Bryan Cave Leighton Paisner (BCLP, formerly known as Berwin Leighton Paisner) with a particular focus on the European infrastructure markets corroborate what we have read so far and further emphasize some well-known threats to private infrastructure investment including arguments such as a deficient deal pipeline, political risk and interference, regulatory concerns and lofty valuations – unsurprisingly, in times of Brexit and trade tensions, political risks have gained center stage.

Marsh & McLennan Global Infrastructure Practice (2012) reports that political risk is considered an important issue and highlight the importance of revenue and operating risk during economic downturns.

In addition, the Global Infrastructure Investor Association (2018) which has the goal to promote private investment in infrastructure has identified several best practices. Countries that successfully attract private infrastructure investments offer enforceable contractual frameworks, boast specialist PPP authorities, provide certainty about the long-term political direction and business environment and allow for transparent and objective decision making [p. 16].

Infrastructure investor responses collected by Preqin (2018, 2019) also capture the sustained interest in developed markets and the desire to increase allocations even further. Again, elevated asset valuations and the fear of being at the peak of the cycle are quoted as the main challenges ahead (2019). Furthermore, institutional investors are concerned with rising interest rates, the global political arena, regulation, and financial market volatility.

Interviewing 34 mostly chief executive officers and chief investment officers, the World Bank Group (2018) solicited their perceptions on the global investment environment including infrastructure. They voiced three major concerns as to why a “gap between the desire and the ability to invest” exists. High transactions costs, uncertainty and additional risks in combination with a lacking pipeline of bankable projects is a serious hindrance. In addition, regulatory constraints further aggravate the situation. Furthermore, the interviewed investors highlight the additional difficulties for investments in emerging markets where higher business risk, political concerns and lack of institutional support present further obstacles. Entering more into detail, regulatory and political uncertainty and poor legal and institutional frameworks take their toll with corruption, regime changes, foreign exchange and currency risks and breach of contracts emerging as the most pressing issues.

In 2002, Lamech and Saeed of the World Bank Group polled private investors in Power infrastructure in developing countries and asked them which conditions they would deem important for investment. The responses yielded no surprises. *“Legal protection of investors”*, *guarantees*, *“government efficiency”*, *“judicial independence”* and *“investment grade debt ratings”* unsurprisingly were among the most important conditions.

Amenc, Blanc-Brude, Gupta, and Yim (2019) shine additional light on the perceived importance of two macro-risks, namely interest-rate risk, and foreign-exchange risk. Rising interest rates (predominantly in the US) and the looming normalization of monetary policies,

in general, will negatively impact infrastructure markets according to 46.7% of respondents in advanced economies and 54.3% of respondents in emerging markets. Furthermore, currency mismatches, typically created when a project is financed in hard currency but revenues are collected in domestic currency, are considered a major investment barrier by 45.5% of the respondents.

Osei-Kyei and Chan (2017) took a closer look at how developing countries could attract private investments to PPPs in developing countries according to international experts. The authors presented the experts with 16 different factors [p.97] including factors such as, inter alia, an *“available and mature financial market”*, *“favourable existing economic policies and legal frameworks”*, *“political stability”*, *“stable macro-economic indicators”*, *“investors’ knowledge of host country environment”*, and etc. Eventually, five factors came out on top (in descending order) [p. 101 ff.]: i) *“political support and acceptability for PPPs”*, ii) *“government positive attitude towards private sector investments”*, iii) *“political stability”*, iv) *“favourable existing legal framework and policy”*, and v) a *“well-organized and committed contracting authority”*.

The World Investment and Political Risk Reports for the years 2009, 2010, 2011, 2012, and 2013 published by the MIGA (MIGA) - a part of the World Bank Group – include political risk surveys conducted by the Economist Intelligence Unit (EIU) and collects the answers of executives from multinational enterprises that invest globally in developing countries. Over the years, these reports have presented detailed insights into which factors concern international investors the most when investing in such countries. Atop of a list of relevant factors, we find the “usual suspects”. The perceived greatest constraints to investments and therefore infrastructure in emerging markets are (with varying importance year-over-year) macro-economic instability, political risk, access to financing, corruption and weak government institutions and increasing government intervention. With regards to political risk, the surveys dig even deeper and provide more detail as to which exact manifestation is the most relevant. Again, there is no room for surprises: Adverse regulatory changes, breach of contract, transfer and convertibility restrictions, expropriation/nationalization, and civil disturbance are consistently placed among the most worrisome factors.

Finally, having a look at one of the most favored investment jurisdictions for infrastructure investments, the Australian Infrastructure Investment Reports⁵² (for 2015, 2016, 2017, and 2018) might help to understand which factors (international) institutional investors cherish the most when deciding to invest in such an established target market as Australia. Good experiences seem to be key, as, throughout the years, investors have continuously attributed great importance to an established track record and strong knowledge of market participants and partners. Unsurprisingly, economic and political stability, investment certainty, the ease of doing business and the availability of funding also play a substantial role. But challenges remain. Even though Australia compares favorably on a global scale, investors are far from being complacent. Political and sovereign risks are on the agenda, competition for assets is ever increasing, taking its toll on value perceptions, and is being compounded by a perceived lack of opportunities and an opaque project pipeline.

In the eyes of the author, despite the multitude of arguments and factors presented, two things have become clear. First, in order to explain the attraction of private capital to infrastructure investments across the globe, many different factors have to be taken into account and this will be reflected later on by the choice of the explaining variables used in the empirical model of this thesis. Second, the academic literature and the practitioner audience show substantial overlap in what they respectively deem most relevant in order to get the conditions for private infrastructure investment right.

*“The [...] Global Infrastructure Investment Index (GIII) shows which markets are most attractive to both public and private investors, **and the analysis highlights why this is the case**, revealing where core opportunities lie. It also explores the issues affecting each region and the conclusions support investors, contractors and project sponsors alike in ensuring that the investment gap is bridged successfully.” - Rob Mooren⁵³*

2.5 PRIVATE INFRASTRUCTURE INVESTMENT ATTRACTIVENESS INDICES

In the previous two sections, we have developed both a notion of the economic, political, and regulatory conditions the academic literature deems indispensable to attract private

⁵² The reports have been put together by Infrastructure Partnerships Australia and Perpetual .

⁵³ Rob Mooren is the global director of Arcadis’ infrastructure practice and has been cited in Arcadis (2016).

investment in infrastructure and the factors institutional investors factually set the greatest store by.

In this concluding section of the review part of this thesis, the author will offer a brief overview on several indices that have been developed which try to rank and classify the ability and readiness of countries to accommodate private infrastructure investment. These attempts have not always focused on the same geographic areas and some of them have been more focused on PPPs in particular. However, when taken together, they can offer some insight into which countries are deemed the most attractive and, more importantly, why they may be favored by investors. Furthermore, the analysis of these indices has helped the author to determine the final set of variables to be employed in the analytical part of this study.

Already in 2009, the World Economic Forum (WEF) benchmarked the attractiveness of Latin American countries for private infrastructure investments. The *“Infrastructure Private Investment Attractiveness Index”* (IPIAI) is composed of eight pillars for a total of 62 variables that can be grouped into two sub-indices: i) the general investment environment⁵⁴ and ii) infrastructure investment specific factors⁵⁵ (Mia, Estrada, & Geiger, 2009, p. 7). Going into more detail would go beyond the purpose of this exercise here, however, the author will come back on certain factors when determining some of the used variables of the empirical model used later in this thesis. Back then, Chile dominated the index, achieving the highest score not only for the overall index but also for both sub-indices. The same finding holds for most of the individual sub-pillars. In the overall index, Chile is followed by Brazil and Colombia both of which show substantial deviation in their performance across sub-indices and sub-pillars. As all eight dimensions receive the same weight in the index, however, little inference can be made as to which factors are most important.

Verhoest, Petersen, Scherrer, and Soeipto (2014) assess the PPP readiness of 15 European Countries. Their *“PPP Governmental Support”*-index focuses on whether i) policies in place benefit or inhibit PPP development, ii) specific PPP laws and regulation have been enacted,

⁵⁴ This includes i) the macro environment, ii) the legal framework (rule of law), iii) political risks, and iv) the ease of access to information. All these factors are then decomposed further.

⁵⁵ This includes i) financial markets, ii) the track record of private infrastructure investments, iii) government and society's willingness to pay, and iv) the government's readiness for private investment. All these factors are then decomposed further.

and iii) dedicated PPP institutions exist. All of these three aspects are equally weighted. The authors find that the UK and the Netherlands are best prepared to embrace PPP projects. Countries like Estonia, Serbia, and Slovenia are found at the bottom of the ranking, indicating a lack of PPP-dedicated policies.

The *Nabarro Infrastructure Index* (2013) tries to capture and classify the potential of 20 countries from around the globe to attract private infrastructure investment. Nine key indicators are considered: i) Credit rating, ii) credit outlook, iii) currency volatility, iv) Environmental performance, v) ecological sustainability of the national infrastructure, vi) innovation, vii) tax regime, viii) ease of doing business, and ix) private sector participation. The overall index can be decomposed into 5 subindices, aggregating points i)-iii) into the Composite Credit and Stability Sub-index and iv)-vi) into the composite Sustainability and Innovation Sub-index. Unfortunately, the exact weighting-scheme has not been disclosed. In line with expectations the first five positions are taken by Western European countries, the US and Australia – obviously being endowed with the most favorable investment environment and echoing expressions voiced by institutional investors in the previous section. In 2016, Nabarro LLP and Opinium Research expanded their index to include 25 countries. The index itself has been subject to some change, now being composed of six sub-indices: i) Credit and stability, ii) sustainability and innovation, iii) tax environment, iv) national stability, v) ease of doing business and vi) private participation rate. The UK still reigned supreme, now followed by the newly-added Canada, the US, and Australia – one may feel inclined to say, “the usual suspects”. Since then, (due to the combination of several law firms including Nabarro) the *CMS Infrastructure Index* (2017) - which spotlights 40 jurisdictions and is built upon six key components which in turn are further decomposed – has been introduced. The index is based on a weighting scheme that attributes the highest weight to the economic status (30%), followed by political stability (22.5%) and private participation (20%)⁵⁶. While still being relevant, sustainability and innovation (12.5%), the ease of doing business (10%) and the tax environment (5%) are deemed less important for the overall outcome. This index, to some degree, reflects the status quo. The Netherlands,

⁵⁶ Economic status aggregates the factors annual trade (% of GDP) (5%), credit rating (20%) and interest rates (5%), whereas political stability is made up of governance and stability (10%), regulatory stability (7.5%) and rule of law (5%). Private participation captures private investment (10%), gross fixed capital formation (5%) and government support (5%).

Canada, Germany, the UK, and Australia make up the top 5. The only two non-Western countries in the Top 10 are Singapore (No. 6) and the United Arab Emirates (No. 10).

Another attempt at ranking countries with regard to their allure to private infrastructure investors has been made by the consultancy firm EC Harris (now Arcadis). Today, their *Global Infrastructure Investment Index* has gone through three iterations in 2012, 2014, and 2016, respectively. Originally, 40 countries (now 41) have been compared based on 24 (26 in 2014) individual criteria making up 5 larger building blocks that are i) the quality of existing infrastructure, ii) the economic environment, iii) the ease of doing business, iv) the political and social environment, and finally v) the financial environment. Despite being focused on the long-term (+5 years) attractiveness of these countries the latest iteration has added some additional focus on short-term investment barriers reflected by issues such as the strength of the currency, the dependence on commodity exports and political stability. The rankings according to the index deviate from the results presented above inasmuch as they're less dominated by the Western hemisphere. For three times in a row, Singapore and Qatar have topped the index and, in addition, UAE and Malaysia consistently rank near the top. With regards to the Western World, Canada, Sweden, Norway, the US, and the UK are among the highest rated countries. This goes to show, that despite the fact that all indices we have highlighted so far center on more or less the same variables, results can still deviate. In this context, the devil may be in the details, as weighting schemes, the use of more or less granular indicator and the reliance on different data sources that try to cover the same aspects may cause the deviations.

This review wouldn't be complete without having a look at the *Infrascope* indices for PPP readiness produced by the EIU (2009, 2010, 2011, 2012a, 2012b, 2014a, 2014b, 2015, 2017, 2018, and 2019a). Each of these indices has been published with a focus on a single or a few geographic areas⁵⁷. The index methodology has undergone various changes⁵⁸ and the latest iteration focuses on factor such as the national legal and regulatory framework, the institutional quality, the maturity of the PPP sector (receiving the highest individual weight in the index's weighting scheme), the economic and business environment and the financial

⁵⁷ To date, the indices cover 67 countries and subnational governmental entities.

⁵⁸ Comparisons between older and more recent results should, therefore, be compared with caution.

facilities available to bankroll infrastructure investments. In Latin America, Chile has come out on top in each of the five iterations to date but has consistently reached a score of below 80-100 which would define a mature PPP market according to the methodology whereas scores of 60 to 79.9 qualify a PPP market as developed. Serial runner-ups, in varying order, include Brazil, Peru, Mexico, and Colombia. The bulk of Latin American countries, however, still qualify as “emerging” in terms of Infrascopes. In Africa (in 2015), South Africa clearly dominated the country as the only country to be classified as developed in the sense of PPPs. Morocco, Kenya, and Egypt followed by a wide margin and the Democratic Republic of the Congo coming in dead last with a score of 20.6 (nascent market). The Asia-Pacific region (incl. the UK) has been analyzed twice already (in 2011 and 2014, respectively). In line with expectations, Australia and the UK are representing mature PPP markets and lead both rankings. The Republic of Korea, Japan and India follow as developed PPP markets. In 2018, Infrascopes focused on the Asian region alone and found that Thailand and the Philippines now lead the peer group qualifying as mature markets and Indonesia and India following rather closely behind. Lastly, the exact results for Eastern Europe, Central Asia, and the Southern and Eastern Mediterranean are hard to compare across time (2012 and 2017) as the geographic coverage deviates substantially. Still, there is a tendency for declining results the further one moves to the East on the map.

Finally, albeit the underlying idea deviates from the indices presented above, the author considers it worthwhile to have a brief look at the *Cambridge Associates LLC Infrastructure Index*⁵⁹ as it captures the performance of private (equity) investments in infrastructure. As information on the performance of private infrastructure investments is scarce and public equity infrastructure indices (e.g. provided by S&P, Brookfield, and others) may not reflect such investments adequately, the index provided by Cambridge Associates LLC offers one of the best chances to gain an understanding for the performance of such investments over a long time horizon, especially when the results are presented by geographic split. When we regard the performance since the inception of the first funds captured by the index through the end of 2018, a clear winner emerges. Over a 15.75-year period, the 29 funds raised in the

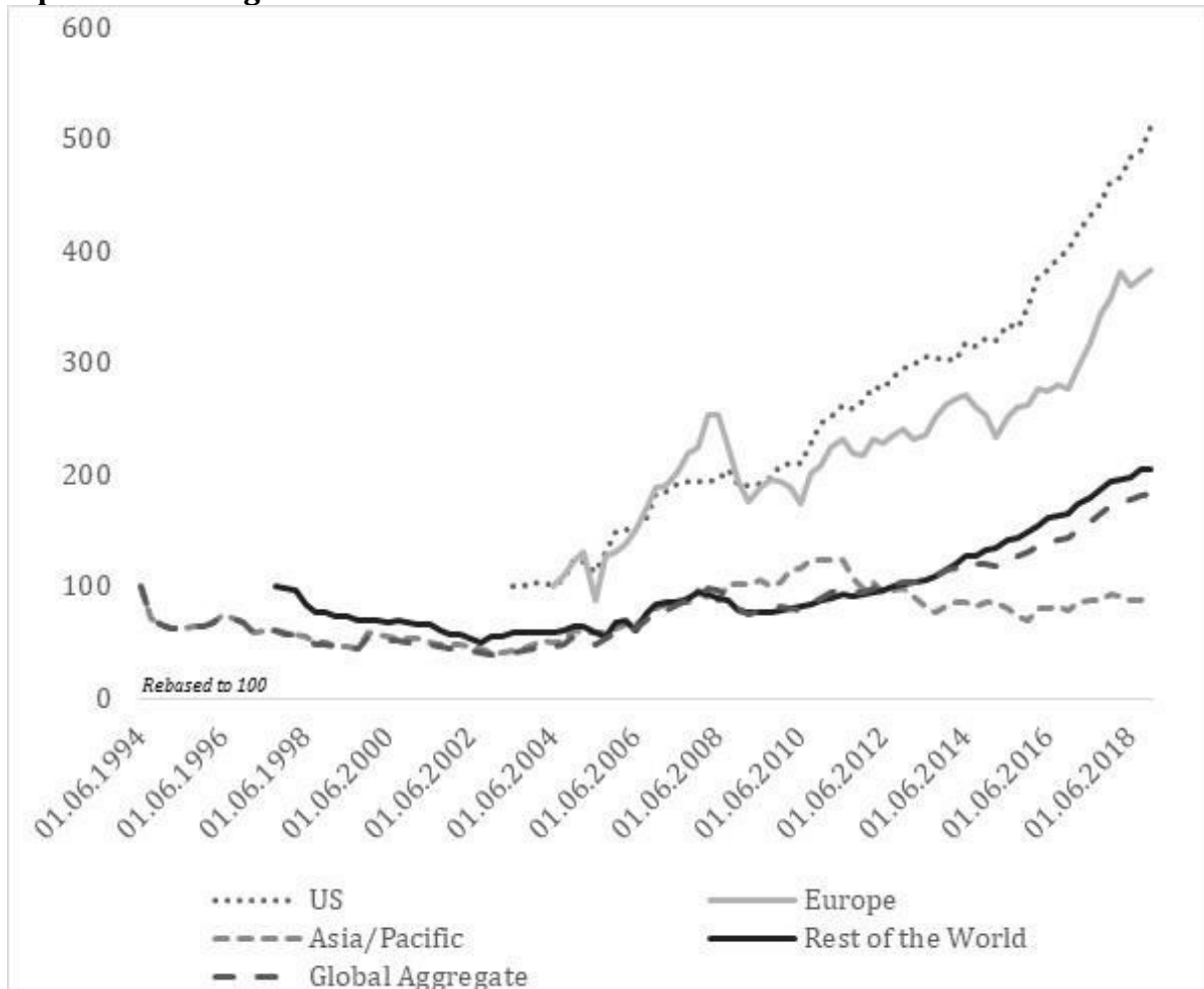
⁵⁹ The Cambridge Associates LLC Infrastructure Index (that has been used for this thesis) is based on data compiled from 110 infrastructure funds, including fully liquidated partnerships, formed between 1993 and 2018. Private indices are pooled horizon internal rate of return (IRR) calculations, net of fees, expenses, and carried interest (methodology as disclosed in Cambridge Associates LLC (2017)).

United States have returned an IRR of 10.1%, followed by the rest of the world bringing in 9% across 37 funds and a 21.5-year period. Europe and the Asia-Pacific region have fared worse, returning 6.74% (31 funds in 14.75 years) and a meager 1.64% p.a. (13 funds over a 24.75-year timespan), respectively. Globally aggregated the IRR stands at 7.62% since inception. A look at the respective indices (*rebased to 100*; see Graph 2 below) reveals that performance has not always been resilient. Asia/Pacific, for instance, has not recovered its inception value by the end of 2018. The US sub-index reveals the negative effects of the financial crisis of 2008. But overall, the sub-indices paint a rosy picture of the development over the last two decades.

What should be the key message of this exercise of comparing different indices intent on measuring domestic attractiveness for private infrastructure investment? Firstly, it shows that results may differ according to the indicators chosen and data sources consulted. Secondly, a wide range of possible indicators exist and the review of these indices, alongside the academic literature and investor surveys presented in the previous two sections, will help the author to motivate his choice of variables later on for the empirical part of this study. Furthermore, attracting private infrastructure investment is contingent on the successful interplay of various factors – being a strong and dynamic economy may not suffice in isolation as long as the legal and political framework deter investment. By the same token, policies and legal rules could ever be so accommodating – if the economic foundations are shaky, all efforts to attract private investment in infrastructure may prove to be futile. Finally, it should have become apparent that there are substantial differences not only between geographies but even among countries belonging to the same broad geographic areas. On a similar note, the results presented above are reflective of the investment preferences voiced by practitioners in the previous section. Advanced and in particular Western economies receive the greater part of private infrastructure investment not only because they represent the home markets of many large-scale institutional investors but also because they are comparatively attractive to them. In sum, the interested reader is more than welcome to proceed with a deep dive into the indices on display as, if one takes one's time, they offer a very detailed and granular view on the topic.

This concludes the initial review part of this thesis. Being equipped with the theoretical knowhow the author will now go on to present his research questions and introduce his dataset.

Graph 2: Cambridge Associates LLC Infrastructure Index



All index data has been retrieved from Thomson Reuters Eikon on July 5, 2019.

3 HYPOTHESES

Building on what has been presented in the previous sections, many of the hypotheses formulated below immediately suggest themselves. By taking into account arguments put forward by other researchers and listening to the considerations voiced by practitioners, it's possible to work out a set of conditions that, in theory at least, appear to be the most relevant for institutional infrastructure lending. In these premises, the hypotheses about to be introduced by the author below are far from being new and exclusive to this thesis. It is, however, their introduction in the context of syndicated project finance loans that is new. In addition, the simultaneous use of both project-specific and external factors adds to the literature, as well.

Project finance intends to allocate risks as efficiently as possible via a dense and complex web of contractual agreements. In theory, it is therefore conceivable that outside factors such as politics, law and order and regulation are deemed less relevant as long as contracts are in place which limit or eliminate the most of the exposure for the lenders. As a consequence, this thesis also has the chance to shine a light on the questions whether internal (project-specific) factors or external factors dominate the institutional lending decision. As will be discussed in the final section of this thesis, this thesis suffers from a lack of deal-specific variables that go beyond information about the specific debt tranche – detailed information on contracts, sponsor identity, financial leverage, construction periods, or a specific project description have not been available to the author. This constitutes a problem since, without a doubt, such factors may heavily influence the institutional investment decision. Thus, when the author speaks of project-specific information this will allude to tranche-level information. Despite its flaws, this approach still has the potential to deliver some insight into the relevant factors that facilitate private investments.

As the author has argued in his previous thesis, institutional investors are, on average, relatively inexperienced investors in the field of infrastructure vis-à-vis banks. In addition, they often lack the depth of skills that their banking counterparts possess. Therefore, it is reasonable to assume that on the *micro-economic/deal level* non-bank investors set greater store by various kinds of risk mitigants. Examples of such mitigants include the following: reported covenants and/or collateral, performance pricing agreements, reported insurance

and/or third-party guarantees, (higher) loan ratings, seniority, the avoidance of currency risk, and the involvement of an agency (i.e. development banks, export-credit agencies, etc.) and/or a domestic arranger. These mitigants have the potential to reduce information asymmetry and increase the chance that non-bank investors may be able to lend on equal footing. Likewise, with every successful closing that involves an institutional lender, non-bank lenders become more familiar with the respective sector and country and are able to accumulate experience capital themselves while successful closing may also attract other first-time non-bank lenders. So far the literature has largely avoided tackling these issues specifically and with the exception of Gatti (2015) who, for example, makes the case for the presence of development banks, this field has been left untreated. The first two suggested hypotheses, therefore, are:

H_{0,1}: The presence of risk mitigants and outright avoidance of certain risks on deal level increase the chances of non-bank involvement in syndicated project finance lending.

H_{0,2}: Successful experiences with infrastructure investments increase the likelihood of further non-bank infrastructure lending.

A sound (macro-)economic environment can find representation in many forms (i.e. high and sustainable GDP growth, low inflation, sustainable levels of public debt and a higher level of GDP-per-capita, just to name a few) and the literature is ripe with examples in which various researchers have ascertained its importance for private infrastructure investments. The demonstrated importance of macro-economic factors for the amount of FDI in BRICS-economies (Jadhav, 2012), the positive influences of economic openness and growth on private investments (Araya et al., 2013) and the increasing number of infrastructure investments in developing countries due to macro-economic stability (Kirkpatrick et al., 2004) are all fitting examples. Generally, macro-economic factors have been seen as indicators for the ability of a country to pay for its infrastructure, as proxies for the potential market size, and so forth. The third hypothesis, thus, reads as follows:

H_{0,3}: Private institutional lending to infrastructure projects is more likely in countries with a strong and stable macro-economic backdrop.

Closely linked to the economic environment is usually the financial complement. Well-functioning and deep financial markets have the ability to provide the necessary funding for real economic growth and “financial openness” is a prerequisite for foreign investment as many studies have shown in the past. Examples include the work of Ba et al. (2010) who highlight the importance of the development of the project host country’s financial sector with a focus on private investments in the power sector and the combined findings of Mengistu (2013) and Moszoro et al. (2015) who emphasize the importance of access to (local-currency) financing. In the spirit of their work, the next hypothesis is:

H_{0,4}: Countries with a strong and sophisticated financial environment find it easier to attract institutional infrastructure lending.

Moving on from economic and financial considerations, the author would like to highlight the importance of the political environment. As we have seen before, political stability (e.g. described by Busse and Hefeker (2007) and Hammami et al. (2006)) and transparency (Basilio, 2011), and the quality and effectiveness of its organizational representations (Moszoro et al., 2014) are important drivers for a conducive investment environment by reducing uncertainty, especially with regards to longer time horizons. Consequently:

H_{0,5}: Country-specific political risks are negatively related to non-bank lending to infrastructure.

Intimately related to the political context is the regulatory framework that, inter alia, touches on points such as the formulation of specific rules and the effectiveness of their respective application (e.g. Pargal (2003) in the case of Latin America and Moszoro et al. (2014)), the existence of an independent regulator (refer, for example, to Ba et al. (2010) and Kirkpatrick et al. (2004)), and the provision of guidance and supervision of respective market participants. As a result, the author suggests:

H_{0,6}: Higher levels of regulatory variables are associated with higher levels of non-bank infrastructure investments.

The legal bedrock is of utmost importance in the context of project finance due to the great importance attributed to its contractual web that is meant to allocate risks and rewards. The quality of laws and the rule-of-law in general (Banerjee et al., 2006; Hammami et al., 2006), the strength of investor rights (as discussed, e.g. in Esty (2004a) and Esty and Megginson

(2003)), and the eventual enforcement thereof (e.g. in Basilio (2011)) are all points that need to be considered on the domestic level and may be particularly scrutinized in the context of emerging economies. In line with these deliberations, the last hypothesis is:

H_{0,7}: Lower levels of legal risks should translate into an increased likelihood of non-bank project finance lending.

Equipped with these research questions, the author will now proceed with a brief explication of the sampling process and an introduction to the relevant variables.

4 DATA & METHODOLOGY

4.1 SAMPLING PROCESS & VARIABLES

The author initially obtained a set of syndicated project finance loans⁶⁰ from *ThomsonOne* that covers the time period from 1985 through the end of 2018 and comprises 5,174 individual loan tranches. This data set yields all the micro-economic variables that will be presented shortly. For macro-economic, financial, political, regulatory and legal variables the author has tapped a wide range of data sources including rating agencies, research firms (e.g. Political Risk Services (PRS), data vendors (e.g. Bloomberg and Thomson Reuters EIKON), datasets constructed by other researchers, agencies (i.e. the IMF, the World Bank Group, the FED, etc.) and NGOs (e.g. Fraser Institute, Transparency International, etc.). The specific data sources are provided in detail in Table 2 in the Appendix which explains the employed variables in more detail and below during the introduction of these very variables⁶¹. Working with many different data sources naturally places some constraints as to the availability of data, in particular for longer time-frames. Unsurprisingly, therefore, the final high-information data sample has been reduced to 3,342 syndicated project finance tranches that are distributed across 1,957 deals (1.71 tranches per deal) and now covers the time period from 1997 through the end of 2018. With regards to geography, the final sample contains projects from 81 jurisdictions from all around the globe.

⁶⁰ The relevant tranches have been identified by the data fields “Use of Proceeds: Project Finance” and “Syndicated Loan: Y”.

⁶¹ Tables 3 and 4 (also in the Appendix) detail the use of the respective variables in all the specifications of the empirical model.

The single *dependent* variable of interest is a dummy variable (*INSTITUTIONAL*) that codifies the presence of a non-bank lender in the syndicate offering a loan tranche to the project. These institutional lenders include pension funds, life insurance companies, sovereign wealth funds, asset managers, loan funds, CDOs/CLOs, private equity and debt funds, hedge funds, etc. The dummy variable, thus, has a value of 1 if any of these lenders is present, and 0 otherwise.

Based on the findings of the previous sections, the author has chosen to make use of explanatory variables that fall into seven different categories plus some additional dummies. These *independent* variables are grouped as follows: i) micro-economic/deal-specific variables, ii) infrastructure-related variables, iii) macro-economic variables, iv) financial variables, v) political variables, vi) regulatory variables, and vii) legal variables. In addition, dummies for years, geographies, and sectors are used. In the following, the variables for the base case specifications will be introduced. Additional variables used in alternative specifications will be highlighted at the time of their first appearance.

Micro-economic variables include the tranche amount (*AMOUNT*) as a proxy for the size of the project and thus the potential scale of the investment. *FUNDING* indicates that the loan is fully funded at issuance which is assumed to be preferable for non-bank investors as they seek to deploy their funds right from the start and are usually not specialized in the provision of liquidity via revolvers or similarly delayed tranches. *LOANRATING* reflects loan ratings assigned by either S&P or Moody's (the ratings are converted to a 0-to-5 rating scale based on the methodology introduced by Corielli et al. (2010) and also applied in the author's previous thesis).

RISKMITIGATION is an index variable constructed by the author based on the presence of risk-mitigation factors and the avoidance of certain risks and is based on the idea that non-bank lenders are relatively uninformed and inexperienced and, therefore, would prefer to be exposed to lower risk in general. In theory, the index ranges from -3 to 8 and aggregates a series of individual variables/dummies⁶². *DOMESTICARR* indicates the presence of a

⁶² The index is increased by 1 for the presence of any of the following risk mitigants: presence of an agency, presence of a domestic arranger, reported collateral, reported insurance, reported guarantees, reported performance pricing mechanisms, the existence of covenants, and the loan being offered during a refinancing.

domestic arranger that would reduce information asymmetries, *AGENCY* indicates the presence of either a development bank, export credit agency or similar agencies which all may be able to mitigate risk by various means. *REFIN* indicates that the loan tranche is offered during a refinancing transaction and initial risks (i.e. construction, technological, etc.) may have been eliminated already. *PERFPRICE* indicates that a performance pricing grid has been reported which allows the ex-post adjustment of some pricing terms and thus the alignment of risk and pricing in case things took a turn for the worse. *COVENANT* reflects that at least one covenant has been reported, again with the aim to limit risks for lenders. *INSURED* reveals the existence of any form of insurance and *REPORTCOLLATERAL* indicates that some form of collateral has been reported while *GUARANTEED* identifies the presence of either a bank or another third-party as a guarantor. Risks that could be consciously avoided by investors are currency risk (*CURRRISK*) (i.e. the tranche is offered in another currency than the project revenues), prepayment risk (*PREPAY*) which is disliked by investors looking to invest their capital for some period and finally *SUBORD* indicates that the loan is subordinated and thus will be treated disadvantageously in case of financial troubles.

The next variables are employed to reflect the environment for infrastructure investments at the time of loan issuance. *INFRADEFAULT* and *INFRASENTIMENT* are variables obtained from S&P Global Ratings (2018a, 2018b) and Moody's (2016, 2017, 2018) and reflect how infrastructure has performed during the year preceding financial close. One would expect that higher levels of infrastructure defaults may discourage non-bank lenders whereas positive sentiment (i.e. more infrastructure loans have received an upgrade than a downgrade) would potentially make such investments more likely. *SECTORCLOSING* and *CNTRYCLOSING* are proxies for non-bank infrastructure experience and successful closings of infrastructure loans in which non-bank lenders have been involved prior to the issuance of the loan at hand. *SECTORCLOSING* is, therefore, an index that increases with every loan tranche that includes non-bank lenders in a respective sector while *CNTRYCLOSING* follows the same idea for a given country. Higher levels of experience and success stories are expected to shorten the odds for further non-bank lending.

The index is reduced by 1 for the presence of any of the following risks: currency risk, (premature) repayment and investment in a sub-ordinationed/junior tranche.

Macro-economic variables include *JAHANWANG* that is the Jahan-Wang Capital Account Openness Index (Jahan & Wang, 2017) for which higher levels should be accompanied by a higher propensity to attract private capital. *SOVRATING* is the sovereign rating of the project country at the time of loan issuance (obtained from either S&P, Moody's or Fitch Ratings) and is converted according to the same methodology as *LOANRATING* above. Here, *SOVRATING* is used as an aggregate proxy of the macro-economic outlook of a given country. In later specifications, *SOVRATING* is replaced by *GDPGRWTH* (GDP growth), *INFLATION* (annual inflation rate) and *REER* (a Real Effective Exchange Rate Index developed by Darvas; Darvas (2012a, 2012b) which measures the development of the real value of a country's currency against the basket of the trading partners (and proxies, inter alia, for national competitiveness and trade flows).

From a financial perspective, the US-10Y yield (*US10Y*) is used to reflect a proxy for an alternative, riskless investment and higher yields would be expected to reduce the likelihood of non-bank lending to infrastructure projects. In addition, *MOVE* (Merrill Option Volatility Estimate) is used to indicate some level of volatility and risk perceptions for debt investments. Again, higher levels are supposed to affect non-bank infrastructure lending negatively. *IMFFINDEV* is the IMF's Financial Development Index (Svirydzenka, 2016) which aggregates *IMFFININDEV* (Financial Institutions Development Index) and *IMFFINMKTDEV* (Financial Markets Development Index) and ranges from 0 to 1 (highest development). By construction, the index rates a country's financial development based on the depth of, the efficiency of and the access to the national financial market and the author presumes that highly-developed markets are better equipped to attract non-bank lending.

In the base case, a single political aggregate variable is employed. *PRSPOLRISK* is the Political Risk Index developed by The PRS Group (2012). The index ranges from 0 to 100 (least political risk) and aggregates 12 different components including, inter alia, government stability, corruption, democratic accountability, investment profile, etc. As such, the index has been readily used in many empirical studies (e.g. Banerjee et al. (2006), Busse and Hefeker (2007), and Jensen and Blanc-Brude (2005)). As infrastructure projects are particularly sensitive to the political environment, it is fair to assume that lower political risk could be beneficial to private lending decisions. In additional specifications, this index is replaced by

six relevant sub-indices⁶³ to paint a more refined picture of the political environment in the project country. These sub-indices then cover different aspects, i.e. politics, regulation, and legal aspects.

With regards to regulation, initially, a single variable *BASELIII* is used that follows the reasoning of Thierie and de Moor (2018). It mirrors the step-wise adoption of the Basel III accords that took place over the 7-year period from January 2013 through the end of 2018. Therefore, the index variable increases by one-seventh every year from 2013 onwards and reaches 1 by the end of 2018.

As additional dummies, the author uses years, geographic areas (as defined by the World Bank Country and Lending Groups) and ten different sectors (based on the SIC-code divisions proposed by the United States Department of Labor).

Equipped with this wide array of different variables the author feels prepared to investigate which factors are the most likely to affect the presence of non-bank lenders in project finance loans. It now remains to be seen whether project-specific variables or those variables describing the environment of the projects are more relevant.

4.2 METHODOLOGY

The author approaches the research questions in two different ways. In a first, uni-variate step he compares the mean/median values of selected explanatory variables for transactions with and without non-bank involvement by means of t- and Whitney-Mann u-tests⁶⁴. This approach could provide preliminary insights as to which variables - when considered in isolation - could be of importance in the decision-making process of institutional investors. As such an approach does not take into account the concurrent effects of the different variables the author will further augment this approach. In a second step, a probit regression model is employed that takes the following form:

$$Pr(Y = 1 | X) = Pr(\tilde{Y} > 0) = Pr(X'\beta + \varepsilon > 0) = \Phi(X'\beta)$$

⁶³ These are *PRSGOVSTAB*, *PRSDMOACC*, *PRSCORRUPT*, *PRSINVEST*, *PRSBUREAUQ*, and *PRSLAW*.

⁶⁴ For a more detailed discussion of these univariate tests please refer to the methodology section of the author's first thesis.

Here, the dependent variable Y is a binary value taking either the value 1 (if a non-bank lender is involved in the syndicate financing the project finance loan) or the value 0 (if no non-bank lender is involved) – thus, only two outcomes are possible. X is a vector of (independent) regressors which are expected to influence the outcome and fall into different macro-categories (incl. micro- and macro-economic factors, political, legal, regulatory factors) and also include a number of control variables and dummies. Pr stands for probability and Φ is the standard normal cumulative distribution function (CDF). For the estimation of the parameters β maximum likelihood estimation (MLE) is used. Given this framework model, the author tries to identify which factors affect the probability of non-bank lending to infrastructure projects.

5 ANALYSIS & RESULTS

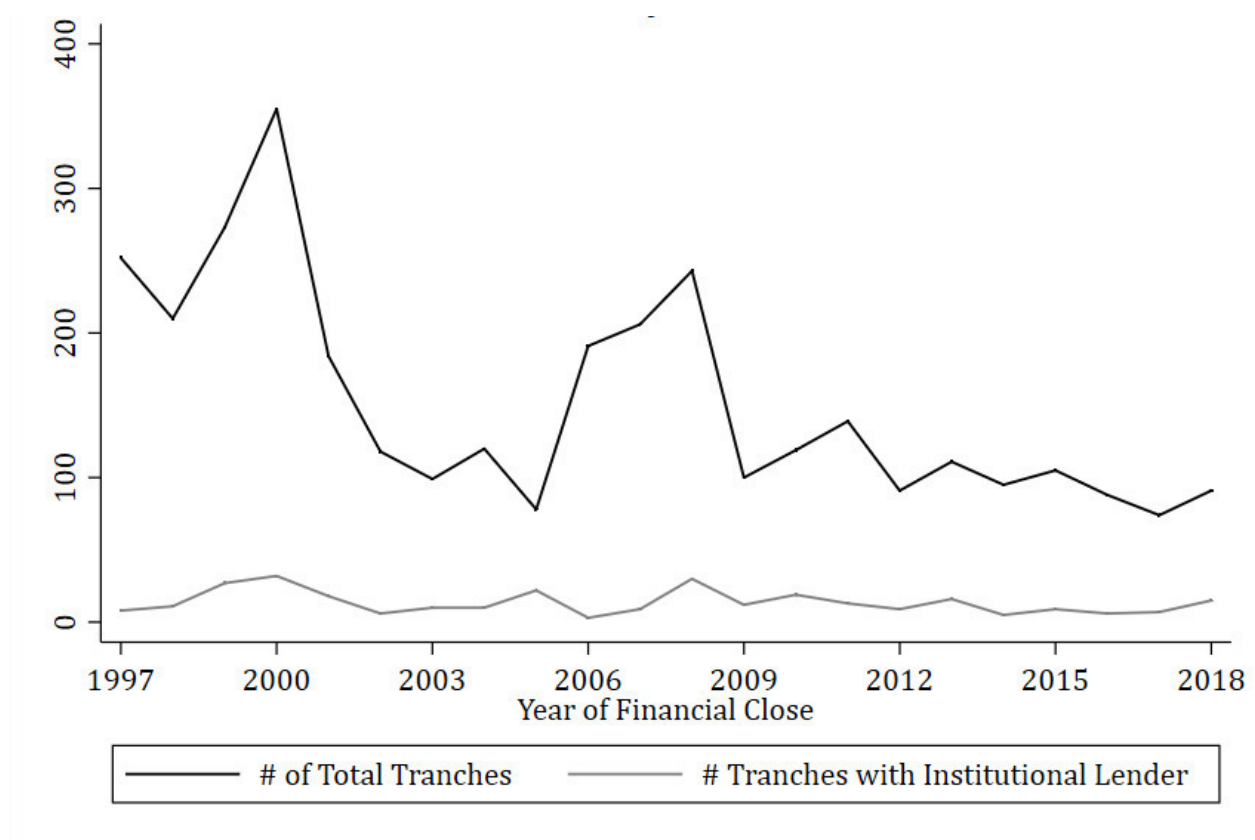
5.1 DESCRIPTIVE STATISTICS

As mentioned before, the final high-information sample consists of 3,342 individual loan tranches of which 297 tranches feature non-bank involvement, that is 8.89% of all tranches in the sample. Over time (see Graph 3 below) two marked peaks of market activity stand out both in terms of total issuance and issuance involving non-bank lenders. These peaks coincide with the boom years right around the turn of the century and the run-up to the global financial crisis. Relative institutional involvement hit notable levels in 2005 and 2010 when 28.21% and 15.97% of all issued tranches involved non-bank lenders, respectively. However, this result was largely driven by a decline of issuance in general, not by a spike in institutional lending per se. In general, a declining trend since the inception of the sample can be observed for total issuance.

Geographically, the larger share of project finance syndications has occurred in advanced economies⁶⁵ (2,246 tranches or 67.2% of all issuances; refer to Table 5 below). In 219 of these tranches (9.75%) non-bank lenders have been involved. This reflects a clear institutional in-sample preference for advanced economies as more than 73% of all tranches involving

⁶⁵ For the division of countries into advanced and emerging/developing economies the author has oriented himself by the classification provided by the IMF which can be found (as of October 2018) at: <https://www.imf.org/external/pubs/ft/weo/2018/02/weodata/groups.htm>.

Graph 3: Yearly Issuance and Institutional Involvement, 1997-2018



institutional lenders have been issued there. This observation is, therefore, in line with the voiced preferences for infrastructure investments in advanced economies we have come across in the survey section of this thesis. North America and Europe (incl. Central Asia) are clearly the main recipients of project finance loans in the sample and in combination account for almost 70% of all non-bank involvement. Drilling down further on the national level (see Table 6 in the Appendix for details), the United States emerge on top both with regards to total issuance (1,086 tranches) and issuance involving institutional lenders (166 tranches or 55.9% of such tranches). Other important targets for non-bank project finance lending in the sample are the United Arabian Emirates (20 tranches), South Korea (17 tranches) and the United Kingdom (16 tranches). In general, of the 81 jurisdictions represented in the sample, 33 have had at least one loan issuance with institutional involvement. Notable cases of countries which have seen substantial issuance but for which no institutional involvement has been reported include India (103 tranches), Italy (60 tranches), Spain (45 tranches), Russia (43 branches), and Chile (42 tranches).

Table 5: Institutional Involvement by Geography

Geography	# of Total Tranches	# of Tranches with Institutional Involvement	Relative Institutional Involvement*	Institutional Preference**
Advanced Economies	2,246	219	9.75%	73.74%
Emerging Economies	1,096	78	7.12%	26.26%
East Asia and Pacific	410	28	6.83%	9.43%
Europe and Central Asia	1,011	39	3.86%	13.13%
Latin America and Caribbean	339	17	5.01%	5.72%
Middle East and North Africa	205	34	16.59%	11.45%
North America	1,164	171	14.69%	57.58%
Sub-Saharan Africa	97	6	6.19%	2.02%
South Asia	116	2	1.72%	0.67%

* is the ratio of “# of Tranches with Institutional Involvement” and “# of Total Tranches”; ** is the ratio of “# of Tranches with Institutional Involvement” and the “sum of all institutional tranches”

From an industry perspective (refer to Table 7 below), the SIC-Division “*Transportation, Communications, Electric, Gas, and Sanitary Services*” surely dominates the sample pocketing roughly 64% of all issuance and almost three-quarters of all issuance involving institutional lenders. Thus, already at this stage, the sample at hand seems to confirm the sectorial preference voiced by a majority of investors in the previous review section concerning investor surveys. Next in line are industries classified as “Manufacturing”, “Mining”, “Finance, Insurance, and Real Estate”. “Agriculture, Forestry, and Fishing”, “Public Administration”, “Retail Trade”, and “Wholesale Trade” are definitively underrepresented both in term of total issuance and non-bank involvement.

Next, let’s have a look at some of the relevant variables later employed in the empirical analysis. Table 8 provides the summary statistics of some selected variables and Table 9 offers a closer look at some deal-specific issues, i.e. the RISKMITIGATION variable has been decomposed. Loan ratings, on average, are at the lower end of the scale driven by the fact that the larger part of the tranches in the sample have not received any rating and, thus, received a value of 1. The RISKMITIGATION index is above 0 on average, showing that for most tranches at least some risk mitigation has been reported. The average results of all the other variables are tilted towards the upper end of their respective scales which is not surprising as we have seen above the sample is heavily dominated by advanced economies which tend

Table 7: Institutional Involvement by Industrial Sector

Sector (SIC Division) [†]	# of Total Tranches	# of Tranches with Institutional Involvement	Relative Institutional Involvement*	Institutional Preference**
Agriculture, Forestry, and Fishing	6	1	16.67%	0.34%
Construction	105	10	9.52%	3.37%
Finance, Insurance, and Real Estate	200	14	7.00%	4.71%
Manufacturing	286	22	7.69%	7.41%
Mining	420	17	4.05%	5.72%
Public Administration	58	2	3.45%	0.67%
Retail Trade	5	1	20.00%	0.34%
Services	118	11	9.32%	3.70%
Transportation, Communications, Electric, Gas, and Sanitary Services	2,135	217	10.16%	73.06%
Wholesale Trade	9	2	22.22%	0.67%
TOTAL	3,342	297	8.89%	
[†] industries have been identified according to the SIC-Division methodology proposed by the United States Department of Labor. * is the ratio of “# of Tranches with Institutional Involvement” and “# of Total Tranches”; ** is the ratio of “# of Tranches with Institutional Involvement” and the “sum of all institutional tranches”				

to rate higher. Almost 60% of the tranches in the sample are funded at issuance (i.e. term loans) and almost a fifth of the tranches are issued during refinancings. Untabulated calculations indicate that both features are slightly more prevalent when we consider loans involving non-bank lenders in isolation: of the 297 non-bank tranches 196 are funded tranches (66%) and 63 are issued during refinancings (21.2%). Among the disaggregated risk mitigation measures the presence of a domestic arranger or an agency are reported most often⁶⁶. Performance pricing provisions are reported for every fifth tranche while guarantees and collaterals are reported both in at least 10% of the cases. Currency risk is the most prevalent whereas prepayment risk or investments in subordinated tranches are rather rare.

To cap off this section, let’s have a preliminary look at how tranches with and without non-bank involvement compare for a few selected variables (see Tables 10 and 11 below).

⁶⁶ Again, as with refinancings and funded loans, domestic arrangers and agencies are more prevalent among loans involving institutional lenders. 59.9% of these loans have at least one domestic arranger and 33% have agency support.

Table 8: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
LOANRATING	1.12	.51	1	5
RISKMITIGATION	.9	1.13	-1	5
JAHANWANG	.71	.28	0	1
SOVRATING	4.34	1.07	1	5
IMFFINDEV	.67	.24	.04	.99
PRSPOLRISK	77.98	10.38	0	95.25

Table 9: Summary Statistics - Disaggregated RISKMITIGATION

Variable	Count	Relative Occurrence (%)
FUNDING	1,975	59.1
DOMESTICARR	1,631	48.8
AGENCY	798	23.88
REFIN	536	16.04
COVENANT	193	5.77
PERFPRICE	646	19.33
INSURED	78	2.33
GUARANTEED	388	11.61
REPORTCOLLATERAL	442	13.23
CURRRISK	1,589	47.55
PREPAY	112	3.35
SUBORD	9	0.27

Non-bank involvement goes hand in hand with substantially higher levels of risk mitigation. The other variables show similar results; however, the differences are certainly less pronounced. For tranches with institutional lenders, there is substantial variation with regards to the values the individual explanatory variables take. For instance, the self-constructed, project-level risk mitigation index (RISKMITIGATION) ranges from -1 (e.g. Bangladesh in 2014 or Canada in 1998) to +5 (a project in the United States in 2000). PRSPOLRISK reaches an in-sample peak of 90.29 for a project in the UK (2001) and falls to as low as 45.13 for an Algerian project of the same year. In 2006, projects in the UK were subject to the highest levels of IMFFINDEV at 0.895 whereas the Republic of Congo scored an abysmal 0.054 in 2002. The same year the Republic of Congo didn't fare much better with regards to the Jahan-Wang-Index, effectively being more or less closed for foreign capital account investments with a score of 0. Germany scored the sample-wide record with a score of 1 in 1999.

Table 10: Selected Variables by Institutional Involvement

Presence	RISK MITIGATION	LOAN RATING	SOV RATING	JAHAN WANG	IMF FINDEV	PRS POLRISK
No	.84	1.12	4.33	.71	.67	77.83
Yes	1.46	1.18	4.47	.75	.71	79.54

Having a look at disaggregated measures of political risk and the development of national financial markets, again we observe a tendency of tranches involving non-bank lenders to score slightly higher, except for government stability (PRSGOVSTAB) and corruption (PRSCORRUPT).

Table 11: Selected Disaggregated Variables by Institutional Involvement

Presence	IMF FININ DEV	IMF FIN MK DEV	PRS GOV STAB	PRS DEMO ACC	PRS CORRU PT	PRS INVEST	PRS BUR EAUQ	PRS LAW
No	.67	.65	8.88	5.2	3.68	10.14	3.35	4.72
Yes	.71	.7	8.87	5.3	3.65	10.76	3.52	4.87

Now that we have familiarized ourselves with the sample at hand, it's time to dive into a first empirical analysis.

5.2 UNIVARIATE RESULTS

In the previous section, we have familiarized ourselves with the sample at large. Now, it is time to have a closer look at some of the factors that potentially influence the decision of institutional investors to lend to a project company. For starters, we consider these factors in isolation and disregard concurrent effects for the moment. Table 13 at the end of this section tabulates the pairwise correlation coefficients for a range of selected variables. Naturally, we are most interested in the correlations between the independent variable of choice (INSTITUTIONAL) that identifies those tranches that involve non-bank lenders and the selected explanatory variables. A few results stand out. RISKMITIGATION is positively (and significantly) correlated with the presence of non-bank lenders and positive experiences with non-bank involvement (as proxied by successful sector and geographic closings involving this kind of lender) also show significant positive correlation coefficients.

The correlation coefficient with the US-10-year yield shows the expected sign as one would expect that higher government yields may render complex infrastructure investments relatively less attractive. Finally, better developed financial markets (IMFFINDEV) and lower levels of political risk (as measured by higher values of the PRSPOLRISK variable) are positively associated with non-bank lending to infrastructure projects. On a side note, the results are also indicative of a problem frequently encountered when working with a wide range of macro-economic, political and financial variables. These variables are often aggregated and branch into different aspects. A case in point, it's fair to assume that SOVRATING, while being focused on the economic prospects of a given country, also touches on political issues and thus is not perfectly precise with regards to what it is supposed to measure. Furthermore, many of the concepts we have come across so far are expectedly connected. Stronger political frameworks beget sophisticated financial markets which in turn profit from reliable legal conditions. In sum, it is, thus, not surprising that variables such as JAHANWANG, SOVRATING, PRSPOLRISK, and IMFFINDEV are substantially and positively correlated.

Table 12 shows the results of the two univariate tests the author has introduced in the methodology section. Based on the comparison of 3,045 bank-only tranches with 297 tranches that involve institutional lenders, the results show that for some selected variables the average values in the sub-samples differ substantially in statistical terms. Potentially, without taking into consideration concurrent effects, the results imply that these variables take on structurally different values for non-bank tranches as both tests identify the differences to be statistically significant. In isolation, therefore, we are confronted with preliminary statistical evidence that micro-economic (LOANRATING and RISKMITIGATION), infrastructure-related (CNTRYCLOSING and SECTORCLOSING), macro-economic (SOVRATING and to a lesser extent JAHANWANG), financial (IMFFINDEV) and political (PRSPOLRISK) factors are associated with the presence of institutional lenders. Having established statistical significance, the question arises whether these observations also have economic significance. With regards to risk-mitigating measures this is certainly the case, as institutional tranches, on average, score a value above 1, implying that at least one form of risk-mitigation has been reported and certain risks have been consciously avoided. Furthermore, for the experience proxies (CNTRYCLOSING and SECTORCLOSING) the

economic difference is also palpable. A difference of more than 12, respectively 19 successful closings is quite meaningful in a sample that counts no more than 297 institutional tranches in total. All other findings, while still being statistically significant, are less telling in economic terms. For example, for a 0.06 rating increase for LOANRATING or 0.15 for SOVRATING it is rather hard to quantify those changes economically. The economic meaning is also rather difficult to decipher for PRSPOLRISK. Moving from 77.83 to 79.54 in the sample basically equals a move from Belgium of the year 2015 to Spain of the year 2007 – the interpretation of which is not necessarily straightforward as, on the face of it the economic layman would most certainly deem both EU countries somewhat comparable in economic, political and various other terms. Similar comparisons could be made for JAHANWANG (move from Australia to Norway both in 2015) and IMFFINDEV (Austria in 2004 to France in 2001) but again the practical economic implications would rather hard to grasp. Given the fact that the issuance captured by the sample is largely dominated by the Western Hemisphere, however, it would have been overconfident in the first place to assume that these differences would potentially reflect a move from advanced to developing economies. At this point of the analysis, the author is cautiously optimistic that these univariate findings are an important first step in order to accommodate his hypotheses but acknowledges that in terms of economic interpretation the results are still rather vague.

In the next section, we will see whether these preliminary findings, suggesting that some variables differ substantially in statistical terms, hold after having controlled for the fact that these factors may influence the outcomes of the analysis concurrently.

Table 12: Univariate Analysis for Selected Variables

	Un-paired two-sided t-test				Wilcoxon Ranksum Test
	Bank-only	Institutional	Difference	t_value	z-value
LOANRATING	1.12	1.18	-.06	-1.85***	-3.69***
RISKMITIGATION	.84	1.46	-.61	-9.7***	-8.91***
CNTRYCLOSING	21.92	34.63	-12.71	-5.5***	-9.26***
SECTORCLOSING	62.77	81.79	-19.02	-4.5***	-5.54***
JAHANWANG	.7	.75	-.04	-3.25***	1.33
SOVRATING	4.33	4.47	-.15	-2.5**	-2.11**
IMFFINDEV	.67	.71	-.05	-3.2***	-3.71***
PRSPOLRISK	77.83	79.54	-1.72	-3.3***	-1.82*

The results above reflect the comparison of 3,045 tranches that are financed by banks only compared to 297 tranches with non-bank involvement.

Table 13: Pairwise Correlation Coefficients

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
INSTITUTIONAL	1.00															
AMOUNT	0.04	1.00														
FUNDING	0.04	0.02	1.00													
LOANRATING	0.03	0.09*	0.01	1.00												
RISKMITIGATION	0.15*	0.12*	-0.06*	0.08*	1.00											
INFRADEFAULT	0.01	-0.03	0.14*	-0.06*	0.09*	1.00										
INFRASENTIMENT	0.03	0.03	0.06*	0.02	0.04	-0.21*	1.00									
SECTORCLOSING	0.08*	-0.06*	0.11*	0.03	0.10*	0.16*	0.09*	1.00								
CNTRYCLOSING	0.10*	0.01	0.00	0.13*	0.18*	0.11*	0.13*	0.57*	1.00							
JAHANWANG	0.04	0.09*	-0.15*	0.06*	0.27*	-0.03	0.00	0.15*	0.24*	1.00						
SOVRATING	0.04	0.09*	-0.14*	0.07*	0.31*	-0.02	0.01	0.21*	0.37*	0.58*	1.00					
MOVE	0.01	-0.07*	-0.03	-0.02	-0.03	-0.10*	0.04	-0.18*	-0.27*	-0.01	-0.07*	1.00				
US10Y	-0.05*	0.00	-0.20*	-0.02	-0.11*	-0.29*	-0.20*	-0.64*	-0.61*	-0.12*	-0.22*	0.15*	1.00			
IMFFINDEV	0.06*	0.09*	-0.11*	0.10*	0.35*	0.04	0.04	0.28*	0.50*	0.61*	0.83*	-0.07*	-0.28*	1.00		
PRSPOLRISK	0.05*	0.10*	-0.18*	0.09*	0.26*	-0.05*	-0.03	0.08*	0.27*	0.63*	0.77*	-0.06*	-0.03	0.75*	1.00	
BASELIII	0.03	0.06*	0.08*	0.12*	0.02	0.02	0.21*	0.43*	0.61*	0.11*	0.18*	-0.43*	-0.52*	0.23*	0.13*	1.00

* indicates significance at the 1%-level.

5.3 MULTIVARIATE RESULTS

In this section, we will consider the explanatory variables whose relevance has been established in the previous sections. Table 14 shows the results of the Probit regression model with the binomial *INSTITUTIONAL* variable as the dependent variable. Column (1) details the results of the base case, column (2) has RISKMITIGATION decomposed, column (III) decomposes SOVRATING and IMFFINDEV into alternative and more detailed measures of the macro-economic and financial environment at the time of the financial close and the right-most column (IV) disaggregates the PRSPOLRISK variable into various sub-indices of PRS Group's political risk index.

Table 14: Probit Regression Results, Base Case and Additional Specifications

	(I)	(II)	(III)	(IV)
AMOUNT	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)
FUNDING	0.217* (0.123)	0.216* (0.128)	0.222* (0.121)	0.201 (0.133)
LOANRATING	0.018 (0.063)	0.017 (0.065)	0.012 (0.061)	0.004 (0.067)
RISKMITIGATION	0.261*** (0.040)		0.263*** (0.038)	0.245*** (0.043)
INFRADEFAULT	-0.013 (0.030)	-0.003 (0.029)	-0.006 (0.030)	-0.030 (0.031)
INFRASENTIMENT	0.048 (0.103)	0.066 (0.106)	0.052 (0.100)	0.044 (0.094)
SECTORCLOSING	0.001** (0.001)	0.001** (0.001)	0.002** (0.001)	0.001** (0.001)
CNTRYCLOSING	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)	0.004 (0.002)
JAHANWANG	-0.001 (0.336)	0.045 (0.361)	-0.131 (0.337)	0.049 (0.355)
SOVRATING	-0.078 (0.141)	-0.080 (0.153)		-0.163 (0.116)
US10Y	0.023 (0.070)	-0.002 (0.058)	0.030 (0.060)	0.012 (0.065)
MOVE	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)
IMFFINDEV	-0.718 (0.923)	-1.247 (0.818)		-0.478 (0.916)
PRSPOLRISK	0.017* (0.010)	0.015 (0.010)	0.014 (0.010)	
BASELIII	-0.403 (0.405)	-0.451 (0.475)	-0.470 (0.441)	-0.141 (0.353)
DOMESTICARR		0.185 (0.165)		
AGENCY		0.447*** (0.101)		
REFIN		0.155 (0.129)		

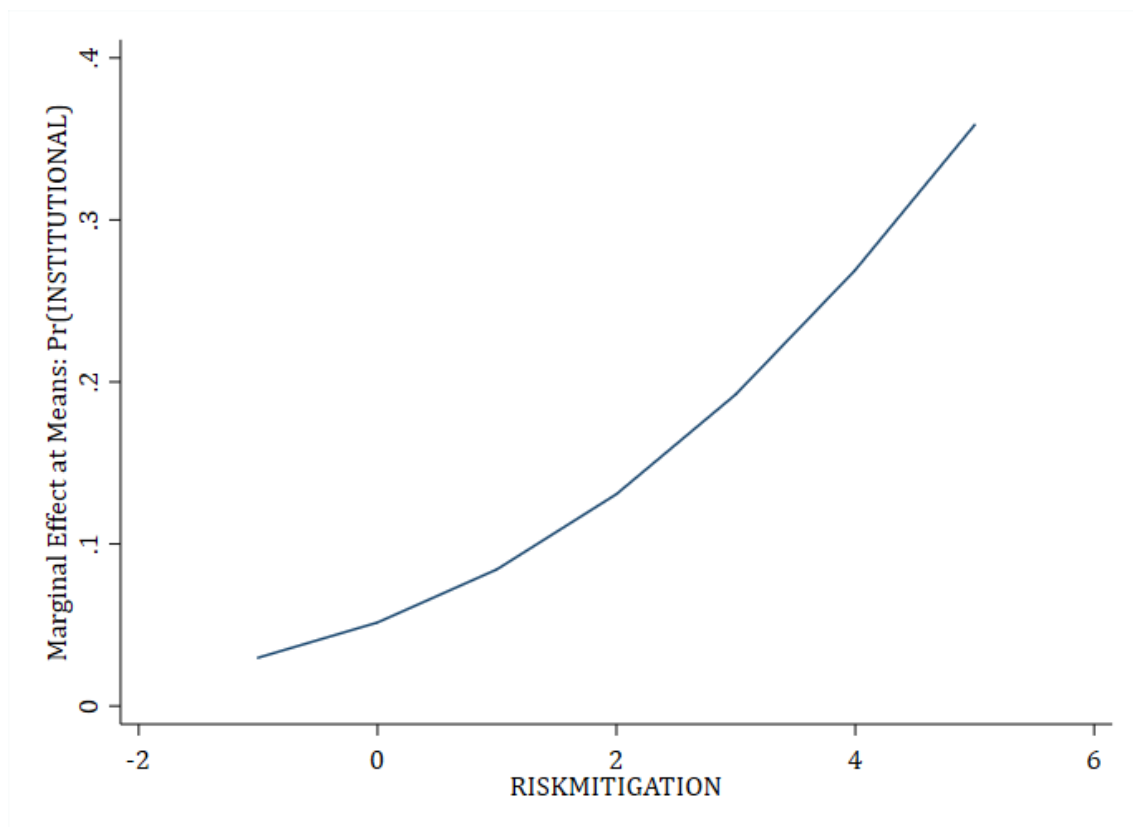
COVENANT	0.150			
	(0.128)			
PERFPRICE	0.089			
	(0.182)			
INSURED	-0.268			
	(0.425)			
GUARANTEED	0.121			
	(0.196)			
REPORTCOLLATERAL	0.180			
	(0.111)			
CURRRISK	-0.554***			
	(0.189)			
PREPAY	0.768***			
	(0.194)			
GDPGRWTH		-1.352		
		(1.944)		
REER		0.004		
		(0.003)		
INFLATION		0.816		
		(0.776)		
IMFFININDEV		0.142		
		(0.899)		
IMFFINMKTDEV		-0.813		
		(0.742)		
PRSGOVSTAB			0.048	
			(0.044)	
PRSDMOACC			-0.009	
			(0.089)	
PRSCORRUPT			-0.216**	
			(0.102)	
PRSINVEST			0.100*	
			(0.058)	
PRSBUREAUQ			0.267	
			(0.221)	
PRSLAW			0.053	
			(0.107)	
Constant	-2.895***	-2.052***	-3.330***	-2.869**
	(0.846)	(0.752)	(0.866)	(1.115)
Obs.	3,342	3,342	3,342	3,342
Standard errors are in parenthesis				
*** p<0.01, ** p<0.05, * p<0.1				
(I) Base Case Specification; (II) Decomposition of RISKMITIGATION; (III) Decomposition of Sovereign Rating and Financial Development; (IV) Dis-aggregation of PRSPOLRISK				

On deal-level, two findings stand out. FUNDING and RISKMITIGATION are both positively associated with the probability of institutional involvement in the loan tranche. In the base case, if one had two otherwise-average loan tranches (i.e. all other explanatory variables are held constant at their mean values), the likelihood of involving an institutional lender would be 2.98% higher for a funded loan (i.e. FUNDING assuming a value of 1). As RISKMITIGATION is a continuous variable, the marginal effects of a unit increase at various levels of

RISKMITIGATION (while all other variables are kept at their average values) are best reflected in Graph 4 below. Interestingly enough, institutional investors seem to set rather little store by loan ratings.

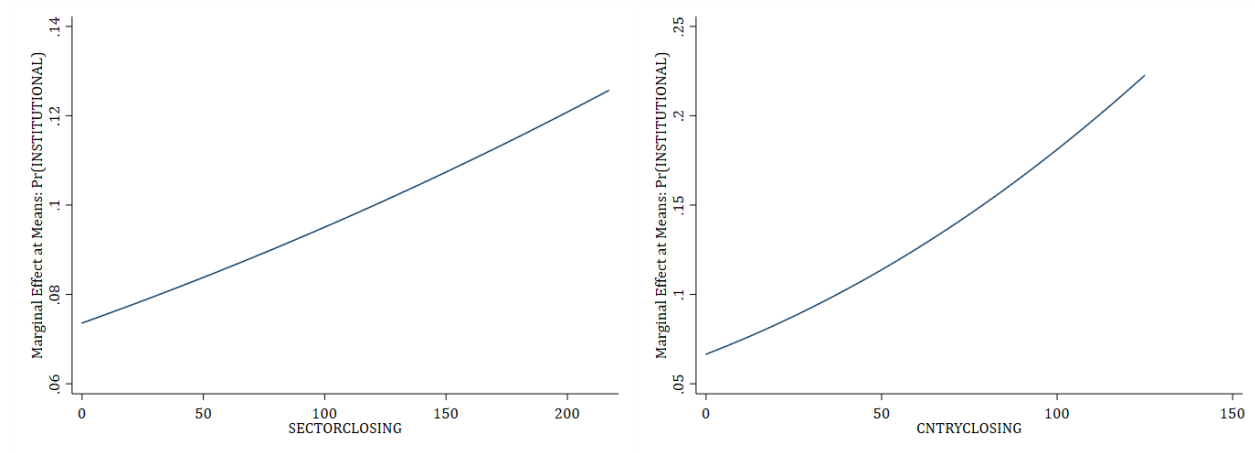
When RISKMITIGATION is decomposed (column (II)) into different binomial variables, three of them and their respective coefficients catch the eye. The presence of an agency, currency risk and the option to repay early are highly significant. Performing the same exercise as above for FUNDING, the probability of an otherwise-average loan to include an institutional lender increases by 7.1% if an agency is involved whereas currency risk reduces said probability by 7.4% (or conversely, the avoidance of currency risk increases the probability by the same amount). The effects of PREPAYMENT are unexpected since originally the author postulated that prepayment options would not be desirable for institutional investors due to the implied re-investment risk. However, the results indicate that the availability of a prepayment option increases the probability of institutional involvement by considerable 16.4%. All other coefficients of the dis-aggregated variables show the expected sign but fail to be significant.

Graph 4: Marginal Effects at Means (MEM) of RISKMITIGATION, Base Case



Considering the infrastructure-related environment, it becomes obvious that (positive) sector- and country-experiences are of importance as the almost universally positive and significant coefficients of `SECTORCLOSING` and `COUNTRYCLOSING` across all four specifications indicate. For the marginal effects of a one-unit increase of both these variables in the base case please refer to graphs 5 and 6 below. `CNTRYCLOSING` only loses its significance in the fourth specification where alternative, country-specific political measures are employed which will be discussed shortly. The performance of the infrastructure sector as a whole, as proxied by `INFRADEFAULT` and `INFRASENTIMENT`, is not found to be significant in any of the alternative scenarios.

Graphs 5 and 6: Marginal Effects at Means of `SECTORCLOSING` & `COUNTRYCLOSING`, Base Case



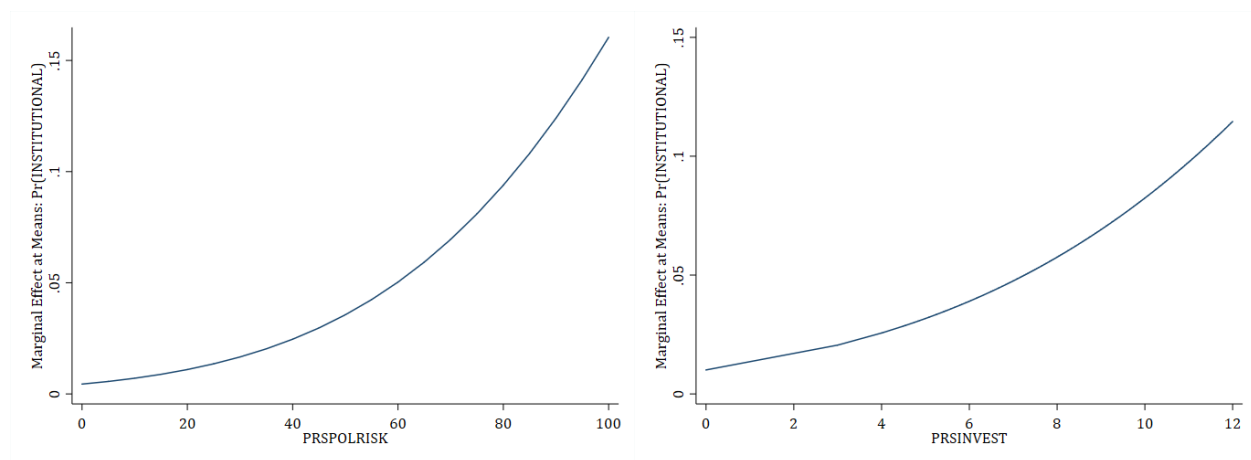
With regards to the macro-economic background, the employed variables `JAHANWANG` and `SOVRATING` are not found to be significant. The sign of the coefficient of `SOVRATING`, however, arouses some interest as it is implied that higher ratings are associated with reduced non-bank involvement. The decomposition of `SOVRATING` (column (III)), into GDP-growth (`GDPGRWTH`), an index reflecting the development of the real exchange rate (`REER`) and the inflation rate (`INFLATION`) does not alter the picture, again the coefficients are not found to be significant. Interestingly though, `GDPGRWTH` carries a negative sign and inflation positive one - a finding the author would not have expected ex-ante.

The financial environment at the time of the financial closing is proxied by the US10-year yield, a measure of fixed-income volatility (`MOVE`) and the development of the respective national financial markets (`IMFFINDEV`). Again, in terms of significance, these variables do

not produce any mentionable results in any of the specifications. Neither does the decomposition of IMFFINDEV into the development levels of domestic financial institutions and domestic capital markets (column (III)).

Political risk (as measured in aggregated form by PRSPOLRISK) produces significant results (albeit only at the 10%-level) in the base case. Here, lower levels of political risk (indicated by higher index levels) are associated with an increased probability of non-bank involvement. The marginal effects are reflected in graph 7 below. Column (IV) shows the Probit results for a dis-aggregation of this index. PRSINVEST, a sub-index that measures the investment environment in a given country (i.e. factors such as contract viability, profit repatriation, etc.), has a positive impact on the probability of non-bank lending (see graph 8 below for the marginal effects at means). This finding is quite in line with expectations. The (negative) coefficient for PRSCORRUPT is more eyebrow-raising, though, as the likelihood of institutional lending seems to decline in higher levels of corruption control (see Graph 9 in the Appendix for marginal effects). Nonetheless, as seen previously in the review section, the author is not the first one to make such a startling observation. Banerjee et al. (2006) report a similar finding.

Graphs 7 and 8: Marginal Effects at Means of PRSPOLRISK & PRSINVEST, Base Case and Political Risk Disaggregation



Finally, regulatory concerns (i.e. BASELIII and, in addition, PRSBUREAUQ) and specific legal considerations (PRSLAW) appear not to be significant for the presence of non-bank lenders.

Table 15 presents the results of the base case scenario under the inclusion of several dummy variables that proxy for geographic, industry and year effects. The main findings from above

remain largely valid after controlling for these dummies although some results deviate. On deal-level, FUNDING and RISKMITIGATION remain highly significant for all four cases. With regards to the importance of infrastructure-related experience and successful closings (SECTORCLOSING and CNTRYCLOSING), we observe some effects induced by the dummy variables. When controlling for geographic fixed effects⁶⁷, CNTRYCLOSING is no longer significant⁶⁸. Equivalently, the inclusion of industry dummies⁶⁹ eliminates the significance of SECTORCLOSING (column (II)), whereas the use of year dummies (column (III)) has no effect on neither of these two variables. To no surprise, in column (IV) the joint use of all three dummy sets eliminates the significance of both SECTORCLOSING and CNTRYCLOSING but also indicates the positive impact of INFRASENTIMENT⁷⁰. PRSPOLRISK proves to be sensitive to the use of both geographic and year dummies. This does, however, not come as a complete surprise as political risk is, in the final consequence, highly susceptible to time-varying geographic developments – sectorial dummies, as a result, seem to have a lesser impact on the political risk as PRSPOLRISK remains significant in column (II).

The main results of this section are the following. Firstly, for the loan-sample at hand, tranche-level considerations are clearly of the highest concern as results for RISKMITIGATION and FUNDING indicate throughout all specifications. More specifically, in the case of risk-mitigating precautions, the inclusion of agencies in the syndicate appears to be of high relevance, currency risk is a risk that should be avoided to further institutional involvement and, prepayment provisions have a positive impact. In line with expectations, positive experiences with infrastructure investments on the country- and industry-level are also of importance. Of all the external factors that comprise macro-economic, financial, political, regulatory and legal considerations, aggregate political risk appears to be the most relevant factor and upon drilling deeper the (political) investment environment and corruption appear to be important considerations. Contrary to the broader literature on the factors that tranche-specific considerations outweigh. Given what we have learned in the previous review section concerning project finance these conflicting findings can be, at least

⁶⁷ The geographic dummies are based on the World Bank Lending Groups.

⁶⁸ Untabulated results indicate that dummies for North America and the Middle East & North Africa are highly significant.

⁶⁹ The ten industry dummies are based on the United States Department of Labor's SIC Division Structure.

⁷⁰ The marginal effect of this dummy, however, is negligible.

Table 15: Probit Regression Results, Base Case incl. Dummies

	(1)	(2)	(3)	(4)
AMOUNT	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
FUNDING	0.251** (0.118)	0.203* (0.122)	0.241** (0.120)	0.256** (0.104)
LOANRATING	0.009 (0.067)	0.016 (0.064)	0.049 (0.063)	0.036 (0.070)
RISKMITIGATION	0.243*** (0.037)	0.259*** (0.042)	0.258*** (0.040)	0.245*** (0.044)
INFRADEFAULT	-0.014 (0.032)	-0.008 (0.028)	0.124 (0.131)	0.075 (0.142)
INFRASENTIMENT	0.026 (0.110)	0.112 (0.100)	0.073 (0.090)	0.177** (0.085)
SECTORCLOSING	0.002** (0.001)	-0.000 (0.001)	0.001** (0.001)	-0.000 (0.002)
CNTRYCLOSING	-0.001 (0.003)	0.007*** (0.002)	0.007** (0.003)	-0.001 (0.003)
JAHANWANG	-0.186 (0.295)	-0.015 (0.332)	0.005 (0.319)	-0.222 (0.249)
SOVRATING	-0.135 (0.130)	-0.101 (0.137)	-0.062 (0.141)	-0.179 (0.115)
US10Y	-0.011 (0.052)	-0.014 (0.067)	0.020 (0.085)	0.054 (0.076)
MOVE	0.002 (0.002)	0.002 (0.002)	-0.001 (0.002)	-0.001 (0.002)
IMFFINDEV	-0.502 (1.014)	-0.719 (0.911)	-0.798 (0.896)	-0.490 (0.864)
PRSPOLRISK	0.013 (0.009)	0.017* (0.010)	0.016 (0.010)	0.013 (0.010)
BASELIII	-0.105 (0.374)	-0.393 (0.365)	3.413 (2.677)	3.251 (2.517)
Constant	-2.995*** (0.847)	-1.843* (0.949)	-5.874*** (1.854)	-4.479* (2.364)
Obs.	3,342	3,342	3,342	3,342
Geographic dummies	YES	NO	NO	YES
Industry dummies	NO	YES	NO	YES
Year dummies	NO	NO	YES	YES

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

to some extent, reconciled. Project finance has the goal to credibly allocate risks (which are reflected by external factors) and as long as this is achieved, lenders may not be too concerned of with outside factors as they are mitigated under an effective contractual

framework. Naturally, investors are then poised to predominantly look at project- and tranche-specific issues first, before considering the broader investment conditions.

To further test these findings, the next section will report the results of some robustness tests and sensitivity analysis.

5.4 SENSITIVITY ANALYSIS & ROBUSTNESS TESTS

The previous section has shown that tranche-specific factors appear to be more relevant for institutional lending and external factors are more of an afterthought. To rule out that these findings are not just caused by the choice of an inappropriate and specific set of variables to proxy the external investment conditions, Table 16 shows the results of some alternative specifications that replace some of these variables. The author pays particular attention to the choice of political, regulatory and legal variables. In addition, JAHANWANG is replaced by CHINNITO, an alternative measure of a country's economic openness⁷¹.

Table 16: Probit Regression Results, Sensitivities

	(I)	(II)	(III)
AMOUNT	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
FUNDING	0.201 (0.133)	0.226** (0.114)	0.226* (0.126)
LOANRATING	0.004 (0.067)	0.032 (0.063)	0.002 (0.064)
RISKMITIGATION	0.245*** (0.043)	0.260*** (0.036)	0.229*** (0.042)
INFRADEFAULT	-0.030 (0.031)	0.000 (0.033)	-0.017 (0.035)
INFRASENTIMENT	0.044 (0.094)	0.057 (0.097)	0.003 (0.092)
SECTORCLOSING	0.001** (0.001)	0.001** (0.001)	0.002*** (0.001)
CNTRYCLOSING	0.004 (0.002)	0.006** (0.002)	-0.002 (0.003)
JAHANWANG	0.049 (0.355)		
SOVRATING	-0.163 (0.116)	-0.134 (0.139)	-0.070 (0.139)
US10Y	0.012 (0.065)	0.027 (0.070)	0.007 (0.054)
MOVE	0.001 (0.002)	0.003 (0.002)	0.001 (0.002)
IMFFINDEV	-0.478	-0.573	-0.097

⁷¹ For exact definitions of this and all other alternative variables, please refer to table 2 in the Appendix.

	(0.916)	(0.943)	(1.248)
PRSGOVSTAB	0.048		
	(0.044)		
PRSDMOACC	-0.009		
	(0.089)		
PRSCORRUPT	-0.216**		
	(0.102)		
PRSINVEST	0.100*		
	(0.058)		
PRSBUREAUQ	0.267		
	(0.221)		
PRSLAW	0.053		
	(0.107)		
BASELIII	-0.141	-0.359	-0.186
	(0.353)	(0.381)	(0.387)
CHINNITO		-0.117	-0.098
		(0.333)	(0.483)
WGINOVIOL		0.266	
		(0.177)	
WGIVA		-0.112	
		(0.168)	
WGICORR		-0.255	
		(0.287)	
WGIGOVEFF		-0.197	
		(0.364)	
WGIREGQ		0.344	
		(0.319)	
WGIROL		0.330	
		(0.301)	
DURABLE			0.004*
			(0.002)
POLITY			-0.033*
			(0.018)
CORRUPT1			-0.014**
			(0.006)
FRASERSM			-0.004
			(0.102)
POLCONV			0.284
			(0.473)
FRASERREG			0.142
			(0.111)
FRASERLEGAL			0.055
			(0.107)
Constant	-2.869**	-1.662**	-2.478**
	(1.115)	(0.762)	(1.109)
Obs.	3,342	3,342	3,342

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

(I) Base Case Specification with dis-aggregated PRSPOLRISK; (II) Alternative measures of political, regulatory and legal risk obtained from the WGI database and alternative measure for capital account openness (CHINNITO); (III) Alternative measures of political, regulatory and legal risk obtained from the Fraser Institute, Transparency International, the Center for Systematic Peace, and the work of Henisz and Zelner and alternative measure for capital account openness (CHINNITO)

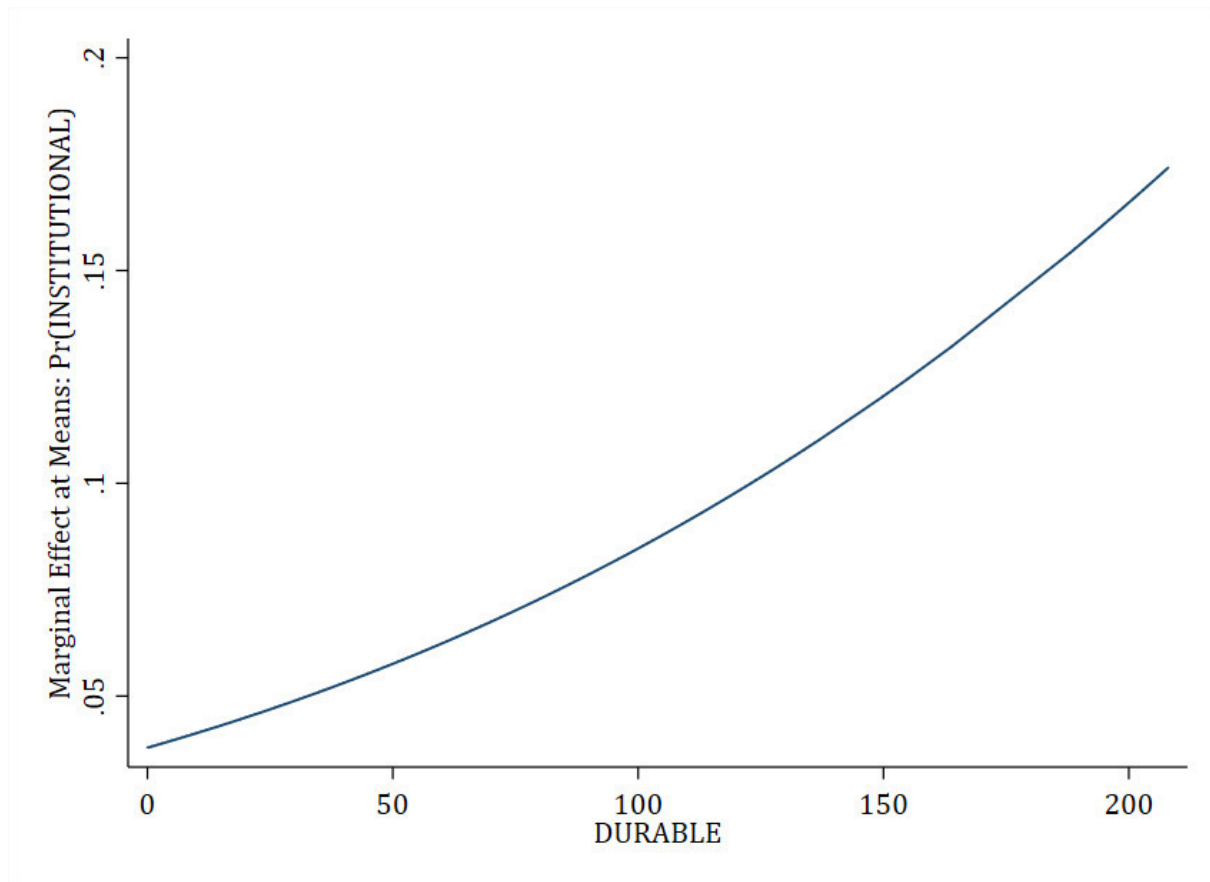
Column (I) shows the Probit coefficients for the base case (with dis-aggregated political risk). Column (II) employs alternative variables based on the World Governance Indicators (WGI) based on Kaufmann et al. (2011). None of these alternative variables produces a significant result, while, as in the base case, the relevant tranche- and infrastructure related variables remain significant. Column (III) uses three measures from the Fraser Institute: i) FRASERSM to proxy for some aspects of the investment environment, ii) FRASERREG to account for the regulatory environment, and iii) FRASERLEGAL to capture some legal conditions. Moreover, CORRUPT1 is Transparency International's Corruption Perceptions Index, POLITY grades a country as either being autocratic or democratic (in various increments), and POLCONV and DURABLE are measures of the feasibility of policy change and political stability, in general. The measures obtained from the Fraser Institute share the same fate as variables obtained from the WGI database in the sense that they are not significant. The latter three variables, however, produce some significant results. DURABLE enters with the expected sign and higher levels of the variable predict a higher probability of non-bank involvement (see graph 10). As has been the case of corruption before, to the author's surprise, better control of corruption (as expressed by higher levels of CORRUPT1) has a negative impact on the likelihood of institutional lending. In line with this surprise, higher levels of democracy (higher POLITY levels) are also considered to be non-beneficial. The (negative) marginal effects on average tranches of both variables are captured by graphs 11 and 12 below.

Finally, as the literature has dealt extensively with the prospects of private infrastructure investments in emerging economies, Table 17 in the Appendix shows the results of a focused analysis of these very markets. A few results of this additional analysis should be highlighted.

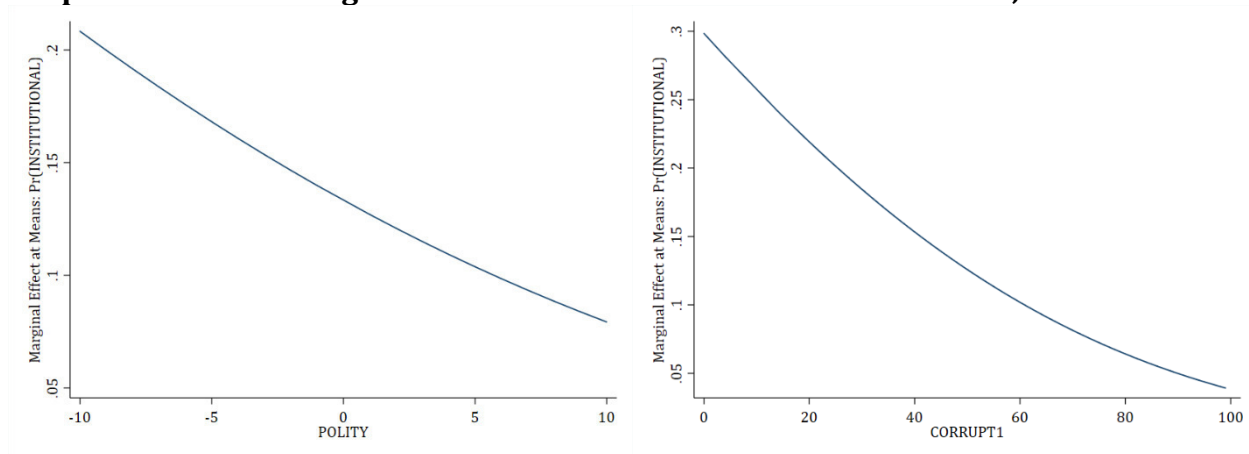
In emerging economies⁷² and for the 1,096 loan tranches under consideration, AMOUNT happens to be of some significance although the marginal effects are small. In general, institutional lenders are associated with larger projects and are more likely to stay away from small-scale endeavors. In the context of emerging markets, loan ratings gain importance and better ratings are associated with an increased likelihood of institutional lending to projects (see graph 13 in the Appendix). RISKMITIGATION, as has been the case for the whole sample,

⁷² Emerging economies have been identified based on the World Economic Outlook groupings by the IMF (as of April 2019).

Graph 10: Marginal Effects at Means of DURABLE, Sensitivities



Graphs 11 and 12: Marginal Effects at Means of POLITY & CORRUPT1, Sensitivities



remains significant throughout all specifications but FUNDING is no longer significant. While SECTORCLOSING equally no longer remains significant, successful closings of infrastructure loans with institutional involvement are highly relevant (see the marginal effects in graph 14 in the Appendix). With regards to column (II), domestic arrangers are not deemed exceedingly important but the presence of an agency produces a palpable effect. For an

average loan tranche in emerging markets, the presence of an agency increases the adjusted predicted probability of non-bank involvement by 5.26%. Refinancings which usually take place after the selected project has been substantially derisked also appear to gather additional interest by institutional lenders as average REFIN-coded tranches are 5% more likely to involve these kinds of lenders.

Macro-economic factors show no obvious effects. As to the financial environment, the coefficients of financial development (IMFFINDEV) enter with a negative and significant sign and the decomposition reveals this to be the result of the opposing effects of the development of financial institutions (IMFFININDEV; positive effect) and the development of financial markets (IMFFINMKTDEV; negative effect). Thus, while better developed financial institutions seem to be able to foster non-bank involvement in lending, more developed financial markets appear to have a negative impact. As we are specifically looking at project finance loans this could imply that more developed financial markets could present an attractive alternative for institutional investors who then might opt, for example, for a project bond rather than a loan. Interestingly enough, the political, regulatory, and legal context is not significant for project finance lending in these jurisdictions. A sole exception is, again, the (positive) impact of higher corruption in column (VI) as the coefficient of the corruption index constructed by Transparency International enters with a negative and significant sign.

In sum, these additional findings magnify the results reported in the previous section and further highlight the prevalence of tranche- and project-specific considerations vis-à-vis external factors for which significant impact could only be established in a few selected cases and, as has been the case with corruption, sometimes with unexpected implications.

6 DISCUSSION: CONCLUSIONS, LIMITATIONS, AND FURTHER RESEARCH

Syndicated project finance loans are just one of many different channels by which institutional investors can access the infrastructure finance space. In some of the previous sections, we've had a closer look as to which variables may impact the presence of institutional investors in loan syndicates globally. How do these findings tie in with the hypotheses developed earlier in this thesis?

We have seen with regard to $H_{0,1}$ that both *tranche*-level risks and steps to mitigate them (RISKMITIGATION) are relevant throughout all specifications of the empirical model. On a disaggregated basis, the results highlight the importance of different agencies which, given their local and technical expertise, have the ability to crowd in institutional investors. In addition, the avoidance of currency risk is considered beneficial and to the author's surprise prepayment options also show some positive effects. Furthermore, funded loans are sincerely preferred by institutional investors (in the global sample). For emerging markets, the effects of loan ratings and loan size (i.e. project size) are significant and positive whereas globally both factors are not significant. The same holds for the *REFIN* variable, indicating that in emerging economies non-bank lenders have a preference to invest in projects that have already been de-risked to some degree.

In addition, the results at hand mostly validated $H_{0,2}$ – successful experiences with infrastructure investments both on the country- and industry-level have a beneficial impact on the likelihood of further institutional involvement. For emerging markets, in particular, local closings are highly relevant whereas the effect of industry experiences is toned down.

With regards to $H_{0,1}$ and $H_{0,2}$ the empiric analysis has validated the author's hypotheses that project- and tranche-level considerations are of major importance for institutional presence in project finance loan syndicates.

The circumstances are different, however, when we address the importance of the *macro*-economic framework ($H_{0,3}$) as the author fails to produce significant results both for the global sample and the emerging markets sub-sample.

The *financial* conditions ($H_{0,4}$) at the time of financial close are insignificant in the global sample but for emerging markets, the development of the local financial system plays a role. The author finds that the development of local financial institutions in emerging markets appears to be beneficial to institutional investments. More developed capital markets, though, have a negative impact on syndicated lending coming from institutional investors as they potentially offer an attractive alternative to private debt.

The results for the importance of *political* factors ($H_{0,5}$) are mixed. Aggregated political risk (PRSPOLRISK) is shown to be significant in some iterations but the results are not consistent

for all alterations. When the political risk is disaggregated, it is shown that, paradoxically, corruption (measured by different variables) appears to have a positive effect on institutional presence and the political investment environment is also relevant. In line with expectations, there are also some cautious indications that political stability proves to be a boon to institutional lending.

Final, much to the author's surprise the $H_{0,6}$ and $H_{0,7}$ find no confirmation at all. *Regulatory* and *legal* factors consistently fail to produce significant results across all specifications.

The above discussion highlights how this thesis has been able to extend the literature with regards to the specific investment channel of syndicated project finance loans. Given these results, it's safe to say that, for the given sample, *micro*-economic considerations dominate and the decision of institutional lenders to join the syndicate seems to be predominantly driven by project- and tranche-specific deliberations. Outside factors largely appear to play a supporting role at best. This is a finding which appears not to be immediately reconcilable with a large number of studies which established the importance of factors such as domestic macro-economic prospects, financial development, the political framework and the state of the legal system. But are the results truly surprising? Given the importance that project finance places on the effective allocation of risks and responsibilities by means of a dense web of contractual obligations it may not come as the biggest surprise that, if this allocation is credible enough, project-specific factors are predominant and external factors are reduced to a minor role. Still, as indicated by some findings, in some specific set-ups (e.g. emerging markets) and dependent on which factors can be controlled for in addition (e.g. in the case of political risk in some specifications) the consideration of some external factors (e.g. the financial development or political risk) certainly has some merit.

And here lies one of the biggest limitations of this thesis. As contractual data is proprietary there has been no chance to include detailed data in this analysis. Obviously, the precise nature of the contracts⁷³, government support and guarantees⁷⁴, sponsors' identities and

⁷³ It is fair to assume that contracts such as turnkey EPC contracts, O&M contracts, Supply- and Offtake Agreements are of high importance as they can limit or outright eliminate risks concerning construction, technology, demand, pricing, etc.

⁷⁴ The guarantees included in the analysis concern the guarantee of the debt tranches. Revenue guarantees and other operations-oriented third-party guarantees have not been covered, though.

their respective experience, leverage levels, etc. are information that could be of the utmost importance to all respective lenders and rather inexperienced institutional lenders in particular. Case in point: *It is, for example, conceivable that by means of some form of an offtake agreement the demand/price risk is effectively eliminated. In such a scenario it is then not unlikely that the domestic macro-economic prospects (i.e. inflation rates, GDP-growth, etc.) play a somewhat limited role.*

Furthermore, it cannot be ruled out that the sample at hand suffers to some degree from some sort of *sample bias* which is induced for two reasons. Firstly, tranche-level data has been sourced from ThomsonOne Investment Banking which is a database not used by the broader academic literature. As only tranches are included that have been reported pro-actively and on time, the database is likely to be far from giving a complete picture of the project finance loan market. When sourcing data from alternative sources (e.g. LPC DealScan or Dealogic's LoanWare) the results could, therefore, deviate. Secondly, in order to obtain a high-information sample complete with many external variables gathered from a variety of other data sources, a substantial number of observations had to be dropped for different reasons⁷⁵. In sum, the given sample presents a "*filtered*" view on syndicated project finance lending at large.

This is exactly where future research could pick up. By repeating the analysis for a different loan sample, the author's results could be corroborated or called into question. Furthermore, if a researcher was fortunate enough to gather a sample that would include substantial and detailed *project-level* information, the analysis could be drastically enriched. Furthermore, the empirical set-up could be further refined as to whether long-term oriented investors (i.e. pension funds and insurance companies) and short-term oriented investors (e.g. private equity and debt funds, asset managers, hedge funds, etc.) are affected differently by the framework conditions. Similarly, an attempt could be made at deciphering the conditions which encourage institutional lenders not only to act as participants but to assume the additional responsibilities of arrangers.

⁷⁵ Tranches before 1997 have had to be dropped since, in many instances, no time-series for many of the explanatory variables have not been available. Beyond that, some countries have been excluded altogether as many variables have not been available in the first place.

Finally, institutional interest in infrastructure projects and infrastructure lending, in particular, may stand on shaky ground. Will institutional lenders still “go the extra mile” and invest in in-house capacities to access this complex field of financing if interest rates were to increase on a larger scale globally? From the author’s perspective, there is a reason to believe that despite all the assurances of institutional interest, some of them would readily return to the “easy” world of fixed-income investing in government bonds if they happened to offer attractive yields again. In addition, regulatory considerations on the investor’s side always have the potential *to improve conditions for the worse*. In a future attempt to reduce risk (as has been tried, for example, with the implementation of Solvency II), it is not completely drawn from thin air that complex investments, a category that most infrastructure projects certainly belong to, may suffer collateral damage going forward.

APPENDIX

A.1: ADDITIONAL TABLES

Table 1: Taxonomy of Instruments and Vehicles for Infrastructure Finance

Taxonomy of Instruments and Vehicles for Infrastructure Finance				
Modes		Finance Instruments		Market Vehicles
Asset Category	General Instrument	Project-Specific	Entity-Specific / Corporate Balance Sheet	Capital Pool
Fixed Income	Bonds	Project Bonds, Green Bonds & Others	Senior Corporate Debt Securities	Bond Indices, Bond Funds, & ETFs
		Municipal/Sub-Sovereign/Agency Bonds	Subordinated Bonds	
		Structured Finance (Securitized Assets/Cash-Flows)		
	Loans	Direct/Co-Investment & Lending to Infrastructure Projects: Syndicated Project Loans	Direct/Co-Investment & Lending to Infrastructure Corporates	Debt Funds (GPs)
			Syndicated Loans & Covered Bonds	Loan Indices & Loan Funds
Mixed	Hybrid	Subordinated Loans & Bonds & Mezzanine Finance	Subordinated Bonds, Convertible Bonds, & Preferred Stock	Mezzanine Debt Funds (GPs) & Hybrid Debt Funds
Equity	Listed	YieldCos	Listed Infrastructure & Utilities Stocks, Closed-End Funds, REITs, Infrastructure Investment Trusts (IITs), & Master Limited Partnerships (MLPs)	Listed Infrastructure Equity Funds, Indices, Trusts, & ETFs
	Unlisted	Direct/Co-Investment in Infrastructure Equity & PPP	Direct/Co-Investment in Infrastructure Corporate Equity	Unlisted Infrastructure Funds

Illustration by the author based on OECD (2015a), OECD (2015b), and Jobst (2018).

Table 2: Definitions of Employed Variables

Variable	Description	Use	Source
Independent Variable			
INSTITUTIONAL	Dummy variable taking the value of 1 if any of the lenders participating in the syndicate qualifies as: <i>Sovereign Wealth Fund (SWF), pension fund and (life) insurance company, asset manager, investment firm, private debt or equity fund, mutual fund, loan fund, CDO/CLO, and/or hedge fund, etc.</i> ; else 0	Base Case and Alternative Specifications	Loan Sample (ThomsonONE Investment Banking)
Explanatory Variables			
a) Micro-Economic / Deal-Specific Variables			
AGENCY	Dummy variable taking the value of 1 if any of the lenders qualifies as any of the following: <i>Export Credit Agency, Export-Import Bank, (Multilateral) Development Bank or Development Finance Company and Development Funds, etc.</i> ; else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
AMOUNT	The principal amount of the loan tranche (in US\$m)	Base Case and Alternative Specifications	Loan Sample (ThomsonONE Investment Banking)
COVENANT	Dummy variable taking the value of 1 if at least one covenant has been reported for the tranche, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
CURRRISK	Dummy variable taking the value of 1 if tranche is issued in a currency different from the project country's one, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)

DOMESTICARR	Dummy variable taking the value of 1 if any domestic arranger is involved, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
FUNDING	Dummy variable taking the value of 1 if loan tranche is categorized as any of the following: <i>Term Loan, Construction Loan, Delayed Draw Term Loan, Secured Loan, Secured Notes, Senior Debt Facility, Term Notes, etc.</i> , else 0	Base Case and Alternative Specifications	Loan Sample (ThomsonONE Investment Banking)
GUARANTEED	Dummy variable taking the value of 1 if any form of guarantee has been reported for the tranche, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
INSURED	Dummy variable taking the value of 1 if any form of insurance has been reported for the tranche, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
LOANRATING	Higher of either loan rating reported (by either Moody's or S&P); converted into numeric values according to the methodology proposed in Corielli et al. (2010)	Base Case and Alternative Specifications	Loan Sample (ThomsonONE Investment Banking)
PERFPRICE	Dummy variable taking the value of 1 if tranche is subject to a performance pricing grid, else 0	Base Case (disaggregated)	ThomsonONE Investment Banking
PREPAY	Dummy variable taking the value of 1 if tranche is subject to prepayment risk, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
REFIN	Dummy variable taking the value of 1 if tranche is associated with refinancing, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
REPORTCOLLATERAL	Dummy variable taking the value of 1 if any form of	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)

	collateral has been reported for the tranche, else 0		
RISKMITIGATION	Manually constructed index variable ranging from -3 to 8 (lowest risk). The index increases by 1 for each of the following risk-mitigating factors if having been reported: <i>AGENCY</i> , <i>COVENANT</i> , <i>DOMESTICARR</i> , <i>GUARANTEED</i> , <i>INSURED</i> , <i>PERFPRICE</i> , <i>REFIN</i> , and <i>REPORTCOLLATERAL</i> . The index decreases by 1 for each of the following risks if incurred: <i>CURRRISK</i> , <i>PREPAY</i> , and <i>SUBORD</i> .	Base Case and Alternative Specifications Case	Loan Sample (ThomsonONE Investment Banking)
SUBORD	Dummy variable taking the value of 1 if the tranche has been flagged as subordinated, else 0	Base Case (disaggregated)	Loan Sample (ThomsonONE Investment Banking)
b) Infrastructure-related Variables			
INFRADEFAULT	Time-varying, annual default rate of infrastructure debt as reported by S&P (in percent) in the year prior to financial close	Base Case and Alternative Specifications	Moody's
INFRASENTIMENT	Dummy variable taking the value of 1 and reflecting positive rating sentiment if in a given year the positive rating changes of infrastructure debt outnumbered the negative rating changes as reported by S&P	Base Case and Alternative Specifications	Standard & Poor's
CNTRYCLOSING	Manually constructed index variable that increases by 1 for each successful closing in	Base Case and Alternative Specifications	Loan Sample (ThomsonONE Investment Banking)

	a given country of a tranche involving a non-bank lender (INSTITUTIONAL)		
SECTORCLOSING	Manually constructed index variable that increases by 1 for each successful closing in a given SIC-division of a tranche involving a non-bank lender (INSTITUTIONAL)	Base Case	Loan Sample (ThomsonONE Investment Banking)
c) Macro-Economic Variables			
CHINNITO	Time-varying Chinn-Ito-Index measuring country degree of capital account openness ranging from 0 to 1 (most open)	Alternative Specifications	Chinn and Ito (2006, 2008) http://web.pdx.edu/~ito/Chinn-Ito_website.htm
GDPGRWTH	GDP growth (in percent) in the year of the financial close	Base Case (disaggregated)	IMF
INFLATION	The percentage change of the project countries CPI (in percent)	Base Case (disaggregated)	IMF
JAHANWANG	Jahan-Wang Capital Account Openness Index ranging from 0 to 1 (most open)	Base Case and Alternative Specifications	https://www.imf.org/external/datamapper/datasets/CL/1 www.imf.org/external/datamapper/LB_data.xlsx Jahan and Wang (2017)
REER	Project Country's <i>Real Effective Exchange Rate</i> (REER) in terms of an index (normalized at 100). An increase in the index indicates appreciation of the home currency against the basket of currencies of trading partners.	Base Case (disaggregated)	Darvas (2012a, 2012b) http://bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/
SOVRATING	Time-varying sovereign ratings converted into numeric values according to the methodology proposed by Corielli et al. (2010)	Base Case and Alternative Specifications	Fitch's, Moody's and Standard&Poor's

d) Financial Variables			
IMFFINDEV	Time-varying level of the IMF Financial Development Index which ranks countries based on depth, access and efficiency of both their financial markets and financial institutions; ranging from 0 to 1 (highest)	Base Case and Alternative Specifications	IMF / Svirydzenka (2016) http://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B
IMFFININDEV	IMF Financial Institutions Development Sub-Index; ranging from 0 to 1 (highest)	Base Case (disaggregated)	IMF / Svirydzenka (2016) http://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B
IMFFINMKTDEV	IMF Financial Markets Development Sub-Index; ranging from 0 to 1 (highest)	Base Case (disaggregated)	IMF / Svirydzenka (2016) http://data.imf.org/?sk=F8032E80-B36C-43B1-AC26-493C5B1CD33B
MOVE	Merrill Option Volatility Estimate Index; used as a proxy for Fixed-Income volatility	Base Case and Alternative Specifications	Bloomberg / Merill Lynch
US10Y	The yield of the US\$-denominated 10-year Government Bonds (in percent) at the time of the loan issuance; used as a proxy for a risk-less alternative investment	Base Case and Alternative Specifications	Federal Reserve Bank of St. Louis
e) Political Variables			
CORRUPT1	Transparency International's <i>Corruption Perception Index</i> ranging from 0 to 100 (lowest level of perceived corruption)	Alternative Specifications	https://www.transparency.org/research/cpi/overview Time Series from https://qog.pol.gu.se/data/datadownloads (Quality of Government Institute) [Most recent data manually updated]
DURABLE	<i>Regime Durability</i> as measured as the number of years since the most recent regime change (defined by a three-point change in the POLITY score over a period of three years or less)	Alternative Specifications	Center for Systemic Peace http://www.systemicpeace.org/inscrdata.html

FRASERSM	Fraser Institute - Economic Freedom of the World <i>Sound Money</i> Indicator ranging from 0 to 10 (most sound). Used as a proxy for the political investment environment	Alternative Specifications	Fraser Institute – Economic Freedom in the World https://www.fraserinstitute.org/economic-freedom/dataset?geozone=world&page=dataset&min-year=2&max-year=0&filter=0
POLCONV	Political Constraint Index estimating the feasibility and ease of policy change ranging from 0 to 1 where higher values imply more constraints	Alternative Specifications	W. J. Henisz; Witold J. Henisz (2000; 2002) https://mgmt.wharton.upenn.edu/faculty/heniszpolcon/polcondataset/
POLITY	A measure of <i>Political Regime</i> comparing Institutionalized Democracy and Autocracy features ranging from -10 (full Autocracy) to +10 (fully Institutionalized Democracy)	Alternative Specifications	Center for Systemic Peace http://www.systemicpeace.org/inscrdata.html
PRSCORRUPT	Sub-index of the aggregate <i>Political Risk</i> Index ranging from 0 to 6 (least corrupt) and measuring a country's corruption level	Base Case (disaggregated)	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSDemoACC	Sub-index of the aggregate Political Risk Index ranging from 0 to 6 (most democratic) and measuring a country's level of <i>democratic accountability</i>	Base Case (disaggregated)	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSGOVSTAB	Sub-index of the aggregate Political Risk Index ranging from 0 to 12 (most stable) and measuring a country's <i>government stability</i>	Base Case (disaggregated)	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
PRSINVEST	Sub-index of the aggregate Political Risk Index ranging from 0 to 12 (best profile) and evaluating a country's <i>investment profile</i> (e.g.	Base Case (disaggregated)	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk

	contract viability, profit repatriation, etc.)		
PRSPOLRISK	<i>Political Risk</i> Index ranging from 0 to 100 (least political risk) and aggregating 12 different sub-indices	Base Case (disaggregated)	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
WGICORR	World Governance Indicators (WGI) <i>Control of Corruption</i> Index ranging from -2.5 to +2.5 (best control)	Alternative Specifications	Kaufmann et al. (2011) http://info.worldbank.org/governance/wgi/index.aspx#home
WGIGOVEFF	World Governance Indicators (WGI) <i>Government Effectiveness</i> Index ranging from -2.5 to +2.5 (most efficient)	Alternative Specifications	Kaufmann et al. (2011) http://info.worldbank.org/governance/wgi/index.aspx#home
WGINOVIOL	World Governance Indicators (WGI) <i>Political Stability & Absence of Violence/Terrorism</i> Index ranging from -2.5 to +2.5 (strongest)	Alternative Specifications	Kaufmann et al. (2011) http://info.worldbank.org/governance/wgi/index.aspx#home
WGIVA	World Governance Indicators (WGI) <i>Voice & Accountability</i> Index ranging from -2.5 to +2.5 (strongest)	Alternative Specifications	Kaufmann et al. (2011) http://info.worldbank.org/governance/wgi/index.aspx#home
f) Regulatory Variables			
BASELIII	Index variable ranging from 0 to 1 tracking the Implementation of Basel III (2013-2019) and increasing by 1/7 annually	Base Case and Alternative Specifications	Manually created following the approach taken by Thierie and de Moor (2018)
FRASERREG	Fraser Institute - Economic Freedom of the World <i>Regulation</i> Indicator ranging from 0 to 10 (best). Used as a proxy for the regulatory environment concerning credit, labor markets, and business	Alternative Specifications	Fraser Institute – Economic Freedom in the World https://www.fraserinstitute.org/economic-freedom/dataset?geozone=world&page=dataset&min-year=2&max-year=0&filter=0

<i>PRSBUREAUQ</i>	Sub-index of the aggregate Political Risk Index ranging from 0 to 4 (highest quality) and measuring <i>Bureaucracy Quality</i>	Base Case (disaggregated)	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
<i>WGIREGQ</i>	World Governance Indicators (WGI) <i>Regulatory Quality</i> Index ranging from -2.5 to +2.5 (highest quality)	Alternative Specifications	Kaufmann et al. (2011) http://info.worldbank.org/governance/wgi/index.aspx#home
g) Legal Variables			
<i>FRASERLEGAL</i>	Fraser Institute - Economic Freedom of the World <i>Legal System and Property Rights</i> Indicator ranging from 0 to 10 (best). Aggregates various facets of the legal system including judicial independence, strength of rights and their enforcement.	Alternative Specifications	Fraser Institute – Economic Freedom in the World https://www.fraserinstitute.org/economic-freedom/dataset?geozone=world&page=dataset&min-year=2&max-year=0&filter=0
<i>PRSLAW</i>	Sub-index of the aggregate Political Risk Index ranging from 0 to 6 (highest level of order) and measuring a country's <i>level of law and order</i>	Base Case (disaggregated)	International Country Risk Guide (ICRG) by Political Risk Services (PRS) / 3B Researcher Dataset for Political Risk
<i>WGIROL</i>	World Governance Indicators (WGI) <i>Rule of Law</i> Index ranging from -2.5 to +2.5 (highest level). Aggregates various facets of the legal system including judicial independence, strength of rights and their enforcement.	Alternative Specifications	Kaufmann et al. (2011) http://info.worldbank.org/governance/wgi/index.aspx#home
h) Dummies			
Geographic Dummies	Dummy variables taking the value of 1 if project country is assigned to one of the following regions: <i>East Asia-Pacific, Europe-Central Asia,</i>	Alternative Specifications	ThomsonONE Investment Banking /

	<i>Latin America and the Caribbean, Middle East-North Africa, North America, Sub-Saharan Africa or South Asia, else 0</i>		World Bank Country and Lending Groups
Industry Dummies	Dummy variables taking the value of 1 if borrowing project can be assigned to one of the ten SIC-Code Divisions, else 0	Alternative Specifications	ThomsonONE Investment Banking / United States Department of Labor, SIC Division Structure
Year Dummies	Dummy variables taking the value of 1 based on the year of financial close, else 0	Alternative Specifications	ThomsonONE Investment Banking

**Table 3: Overview of Employed Variables
in Different Specifications of the Probit Regression Model**

Base Case	Micro Risk <i>disaggregated</i>	Macro & Financial Risk <i>disaggregated</i>	Political Risk <i>disaggregated</i>	Base Case / Dummies included
Independent Variable				
INSTITUTIONAL	INSTITUTIONAL	INSTITUTIONAL	INSTITUTIONAL	INSTITUTIONAL
Explanatory Variables				
a) Micro-Economic / Deal-Specific Variables				
AMOUNT	AMOUNT	AMOUNT	AMOUNT	AMOUNT
FUNDING	FUNDING	FUNDING	FUNDING	FUNDING
LOANRATING	LOANRATING	LOANRATING	LOANRATING	LOANRATING
RISKMITIGATION*		RISKMITIGATION*	RISKMITIGATION*	RISKMITIGATION*
	DOMESTICARR			
	AGENCY			
	REFIN			
	COVENANT			
	PERFPRICE			
	INSURED			
	GUARANTEED			
	REPORT- COLLATERAL			
	CURRRISK			
	PREPAY			
	SUBORD			
b) Infrastructure-related Variables				
INFRADEFAULT	INFRADEFAULT	INFRADEFAULT	INFRADEFAULT	INFRADEFAULT
INFRASENTIMENT	INFRASENTIMENT	INFRASENTIMENT	INFRASENTIMENT	INFRASENTIMENT
SECTORCLOSING	SECTORCLOSING	SECTORCLOSING	SECTORCLOSING	SECTORCLOSING
CNTRYCLOSING	CNTRYCLOSING	CNTRYCLOSING	CNTRYCLOSING	CNTRYCLOSING
c) Macro-Economic Variables				
JAHANWANG	JAHANWANG	JAHANWANG	JAHANWANG	JAHANWANG
SOVRATING*	SOVRATING*		SOVRATING*	SOVRATING*
		GDPGRWTH		
		REER		
		INFLATION		
d) Financial Variables				
MOVE	MOVE	MOVE	MOVE	MOVE
US10Y	US10Y	US10Y	US10Y	US10Y
IMFINDEV*	IMFINDEV*		IMFINDEV*	IMFINDEV*
		IMFFININDEV		
		IMFFINMKTDEV		
e) Political Variables				
PRSPOLRISK*	PRSPOLRISK*	PRSPOLRISK*		PRSPOLRISK*
			PRSGOVSTAB	
			PRSDMOACC	
			PRSCORRUPT	
			PRSINVEST	
f) Regulatory Variables				
BASELIII	BASELIII	BASELIII	BASELIII	BASELIII
			PRSBUREAUQ	
g) Legal Variables				
			PRSLAW	

h) Dummies				
				YEAR
				GEOGRAPHY
				SECTOR
* Indicates that the respective variable has been decomposed in the alternative specification of the base case and, therefore, has been replaced by several additional variables.				

**Table 4: Overview of Employed Variables
in the Alternative Specifications of the Probit Regression Model (Sensitivities)**

Base Case	Alternative I	Alternative II
Independent Variable		
INSTITUTIONAL	INSTITUTIONAL	INSTITUTIONAL
Explanatory Variables		
a) Micro-Economic / Deal-Specific Variables		
AMOUNT	AMOUNT	AMOUNT
FUNDING	FUNDING	FUNDING
LOANRATING	LOANRATING	LOANRATING
RISKMITIGATION	RISKMITIGATION	RISKMITIGATION
b) Infrastructure-related Variables		
INFRADEFAULT	INFRADEFAULT	INFRADEFAULT
INFRASENTIMENT	INFRASENTIMENT	INFRASENTIMENT
SECTORCLOSING	SECTORCLOSING	SECTORCLOSING
CNTRYCLOSING	CNTRYCLOSING	CNTRYCLOSING
c) Macro-Economic Variables		
JAHANWANG*	CHINNITO	CHINNITO*
SOVRATING	SOVRATING	SOVRATING
d) Financial Variables		
MOVE	MOVE	MOVE
US10Y	US10Y	US10Y
IMFINDEV	IMFINDEV	IMFINDEV
e) Political Variables		
PRSGOVSTAB*	WGINOVIOL	DURABLE
PRSDMOACC*	WGIVA	POLITY
PRSCORRUPT*	WGICORR	CORRUPT1
PRSinVEST*	WGIGOVEFF	FRASERSM
		POLCONV
f) Regulatory Variables		
BASELIII	BASELIII	BASELIII
PRSBUREAUQ*	WGIREGQ	FRASERREG
g) Legal Variables		
PRSLAW*	WGIROL	FRASERLEGAL
* Indicates that the respective variable has been replaced in the alternative specification.		

Table 6: Descriptive Statistics by Country

Country	# of Total Tranches	# of Non- Bank Tranches	RISK- MITI- GATION	LOAN- RATING	SOV- RATING	JANG- WAHAN	IMF- FINDEV	PRS- POL- RISK
Algeria	1	1	0	1	1	0	.14	45.13
Angola	1	0	-1	1	2	.09	.15	56.96
Argentina	32	4	.22	1.34	2	.71	.33	73.12
Australia	54	2	1.09	1.06	5	.67	.82	84.43
Austria	5	0	2	1	5	.89	.66	87.47
Azerbaijan	12	0	-.42	1	1	.55	.14	64.13
Bangladesh	6	2	0	1	1.33	.07	.17	52.6
Belgium	19	0	.42	1.16	5	.95	.57	80.05
Bolivia	1	0	0	1	1	.91	.11	65.5
Brazil	82	7	-.17	1	2.54	.37	.48	65.91
Bulgaria	7	7	-.14	1	4	.64	.32	71.04
Canada	78	5	.88	1.01	5	.92	.83	86.4
Chile	42	0	-.31	1.07	4.38	.5	.44	77.13
Colombia	25	0	.36	1	3.48	.1	.28	52.88
Costa Rica	3	2	.33	1	2	.64	.21	75.14
Croatia	8	0	-.5	1.38	4	.12	.25	44.21
Denmark	8	4	1	1	5	.87	.66	82.39
Ecuador	2	1	-1	2.5	2	.68	.17	55.73
Egypt	52	5	.62	1	3.54	.69	.31	63.42
El Salvador	3	0	.33	1.67	3	.98	.16	70.54
Finland	4	0	-.75	1	5	.84	.62	93.52
France	31	0	.94	1	5	.92	.76	77.71
Germany	37	1	1.41	1.08	5	.95	.77	86.04
Ghana	13	1	-.31	1	1.77	.61	.12	65.82
Greece	29	0	.17	1.03	3.79	.94	.56	77.35
Guatemala	9	1	.33	1	1	.91	.16	65.36
Hungary	14	0	.86	1	4	.6	.49	81.71
India	103	0	.81	1	3.47	.02	.42	61.68
Indonesia	37	3	.51	1.05	2.38	.23	.32	56
Iran	2	0	.5	1	1	0	.27	63.13
Ireland-Rep	25	4	.44	1	5	.87	.75	87.72
Israel	5	0	-.2	1.8	4	.74	.48	59.64
Italy	60	0	1.42	1	5	.96	.73	79.78
Jamaica	6	0	.33	1	2	0	.24	71.24
Japan	10	1	.7	1	5	.93	.77	83.67
Jordan	9	0	-.22	1	2	.86	.48	71.78
Kazakhstan	4	0	.5	1	4	.18	.38	74.53
Kenya	8	0	.25	1	1.63	.68	.15	53.77
Kuwait	13	3	1.46	1	4	.71	.45	74.63
Lithuania	1	0	1	1	4	.59	.19	0
Madagascar	7	0	1	1	2	0	.1	62.38
Malaysia	48	1	.02	1.21	4.02	.26	.61	75.34
Mali	3	0	-.67	1	1.33	.11	.1	63.11
Mexico	83	1	.11	1.16	3.42	.4	.34	69.07
Mongolia	2	0	1.5	1	2	.73	.38	67.92
Morocco	9	1	.78	1	1.89	.23	.24	69.23
Mozambique	1	0	1	1	2	0	.12	69.5
Namibia	2	0	0	1	3	.3	.4	76.75
Netherlands	36	2	1.36	1.06	5	.98	.79	88.63
New Zealand	3	0	.33	1	5	.85	.59	87.33
Nicaragua	1	0	1	1	1	.95	.11	58.83
Nigeria	20	0	.65	1	1.6	.74	.23	43.33

Norway	39	0	.23	1.1	5	.88	.64	87.61
Oman	40	4	1.55	1.15	4	.84	.38	76.13
Pakistan	3	0	0	1	2	.28	.29	50.13
Panama	30	1	.83	1	3.33	1	.32	72.51
Peru	20	0	.2	1	3.25	1	.27	62.09
Philippines	52	3	.63	1.12	2.85	.27	.37	66.96
Poland	31	0	.03	1	4	.11	.36	82.33
Portugal	14	0	1.14	1	5	.89	.65	89.03
Rep of Congo	2	1	-.5	1	1	0	.04	51.33
Russian Fed	43	0	-.12	1.19	2.81	.34	.36	62.72
Saudi Arabia	5	0	1.4	1	4.8	.42	.46	68.84
Singapore	62	1	.61	1	5	.84	.72	85.34
Slovak Rep	18	0	0	1	3.5	.32	.25	80.77
Slovenia	4	0	-.25	1	4	.43	.45	39.92
South Africa	29	4	.17	1	3.76	.35	.5	67.49
South Korea	120	17	.98	1	4.24	.54	.76	77
Spain	45	0	1.27	1.09	4.98	.77	.83	78.62
Sri Lanka	4	0	-.5	1	1.5	.02	.26	54.04
Sweden	23	0	.17	1	5	.83	.73	88.84
Switzerland	13	0	.15	1	5	.91	.95	87.2
Tanzania	3	0	1.33	1	1	.02	.1	63.19
Thailand	22	0	.68	1	4	.36	.51	68.05
Tunisia	4	0	-.25	1	4	.09	.22	73.17
Turkey	63	5	.63	1.02	2	.51	.39	57.03
Ukraine	1	0	0	1	2	.2	.27	67.67
United Kingdom	417	16	1.24	1.13	5	.95	.84	85.6
United States	1086	166	1.31	1.24	5	.82	.86	83.32
Utd Arab Em	65	20	.71	1	4.54	.75	.4	77.38
Zambia	8	0	.75	1	1	1	.09	65.47

Table 17: Probit Regression Results for Emerging Markets, Base Case and Alternative Specifications

	(I)	(II)	(III)	(IV)	(V)	(VI)
AMOUNT	0.000*	0.000*	0.000**	0.000**	0.000**	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FUNDING	0.003	-0.012	-0.011	-0.012	0.068	0.003
	(0.163)	(0.168)	(0.154)	(0.169)	(0.164)	(0.172)
LOANRATING	0.267**	0.234*	0.241*	0.291**	0.306**	0.308**
	(0.133)	(0.123)	(0.130)	(0.145)	(0.124)	(0.147)
RISKMITIGATION	0.202**		0.290***	0.186**	0.232***	0.182**
	(0.083)		(0.078)	(0.081)	(0.070)	(0.081)
INFRADEFAULT	-0.047	-0.039	-0.027	-0.058	-0.034	-0.035
	(0.039)	(0.038)	(0.040)	(0.038)	(0.041)	(0.039)
INFRASENTIMENT	-0.116	-0.123	-0.103	-0.132	-0.158	-0.129
	(0.267)	(0.259)	(0.251)	(0.214)	(0.246)	(0.250)
SECTORCLOSING	0.001	0.000	0.001	0.000	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
CNTRYCLOSING	0.131***	0.136***	0.184***	0.124***	0.156***	0.173***
	(0.031)	(0.031)	(0.040)	(0.043)	(0.041)	(0.041)
JANGWAHAN	0.238	0.046	-0.057	0.268		
	(0.287)	(0.306)	(0.311)	(0.327)		
SOVRATING	-0.033	-0.031		-0.084	-0.036	0.039
	(0.127)	(0.127)		(0.127)	(0.173)	(0.160)

US10Y	-0.109 (0.162)	-0.098 (0.148)	0.006 (0.129)	-0.091 (0.165)	-0.098 (0.167)	-0.066 (0.163)
EMYIELD	0.001* (0.000)	0.001* (0.000)	0.000 (0.001)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
MOVE	-0.001 (0.004)	-0.001 (0.004)	0.001 (0.004)	-0.001 (0.004)	0.000 (0.004)	-0.001 (0.004)
IMFFINDEV	-2.561** (1.190)	-2.365** (1.133)		-2.016 (1.369)	-2.826* (1.550)	-2.023 (1.746)
PRSPOLRISK	0.011 (0.013)	0.008 (0.013)	-0.000 (0.012)			
BASELIII	-2.530 (1.920)	-1.980 (1.743)	-3.084 (2.052)	-2.318 (1.679)	-2.504 (1.806)	-2.899 (1.960)
DOMESTICARR		-0.034 (0.299)				
AGENCY		0.537*** (0.188)				
REFIN		0.454** (0.204)				
COVENANT		1.019 (0.637)				
PERFPRICE		0.311 (0.317)				
INSURED		-0.257 (0.333)				
GUARANTEED		-0.063 (0.205)				
REPORTCOLLATERAL		-0.210 (0.308)				
CURRRISK		-0.437 (0.362)				
PREPAY						
GDPGRWTH			-3.791 (2.683)			
REER			0.003 (0.003)			
INFLATION			2.095** (0.845)			
IMFFININDEV			2.475** (1.251)			
IMFFINMKTDEV			-4.019*** (1.083)			
PRSGOVSTAB				-0.058 (0.085)		
PRSDMOACC				-0.050 (0.111)		
PRSCORRUPT				-0.119 (0.131)		
PRSinVEST				0.063 (0.086)		
PRSBUREAUQ				0.107 (0.263)		
PRSLAW				0.002 (0.122)		
CHINNITO					-0.448 (0.493)	-0.216 (0.532)

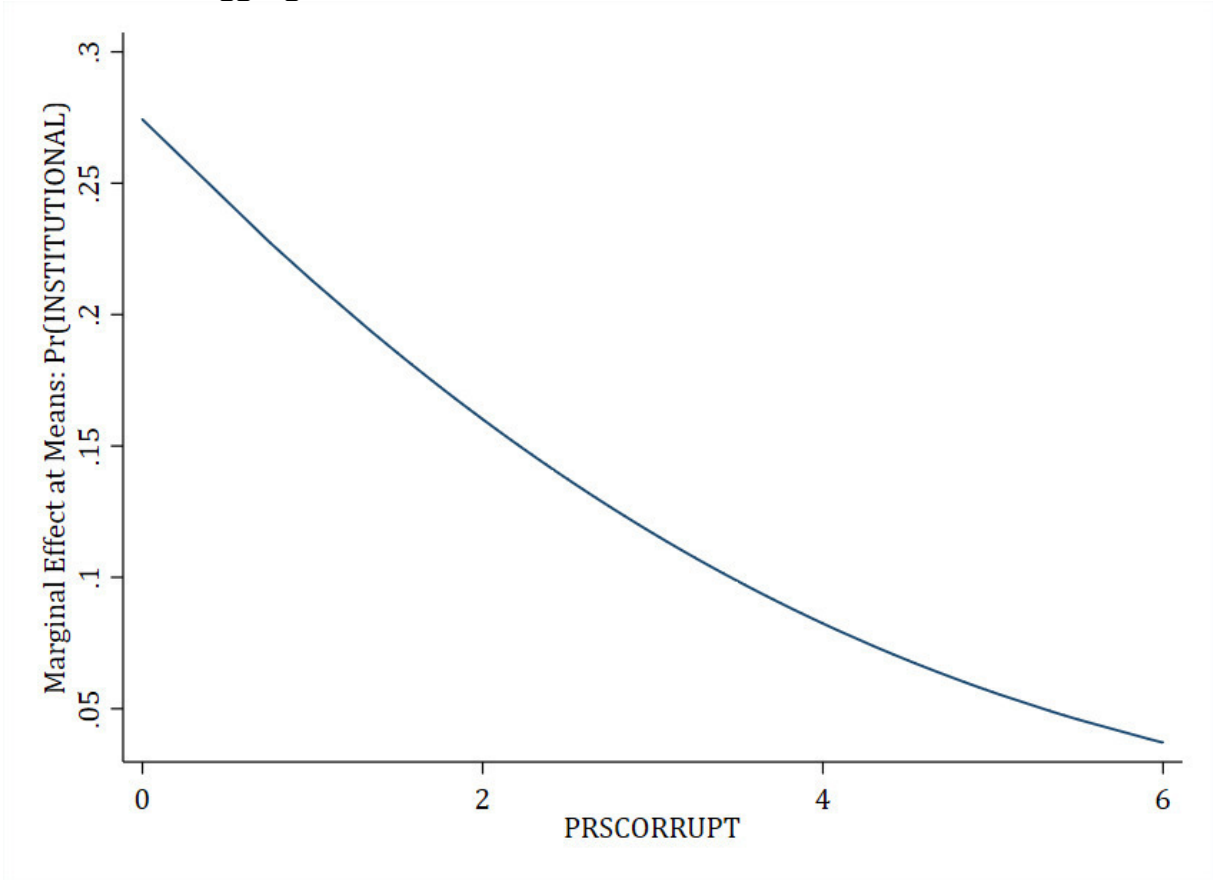
WGINOVIOL					0.413	
					(0.263)	
WGIVA					0.039	
					(0.177)	
WGICORR					-0.222	
					(0.635)	
WGIGOVEFF					-0.562	
					(0.470)	
WGIREGQ					0.444	
					(0.528)	
WGIROL					0.248	
					(0.401)	
DURABLE						-0.001
						(0.010)
POLITY						-0.019
						(0.021)
CORRUPT1						-0.016**
						(0.007)
FRASERSM						-0.055
						(0.086)
POLCONV						0.429
						(0.786)
FRASERREG						0.189
						(0.116)
FRASERLEGAL						-0.084
						(0.131)
Constant	-2.054*	-1.845	-2.950***	-1.201	-1.047	-1.716
	(1.112)	(1.252)	(1.076)	(1.373)	(1.263)	(1.398)
Obs.	1,096	1,096	1,096	1,096	1,096	1,096

Standard errors are in parenthesis

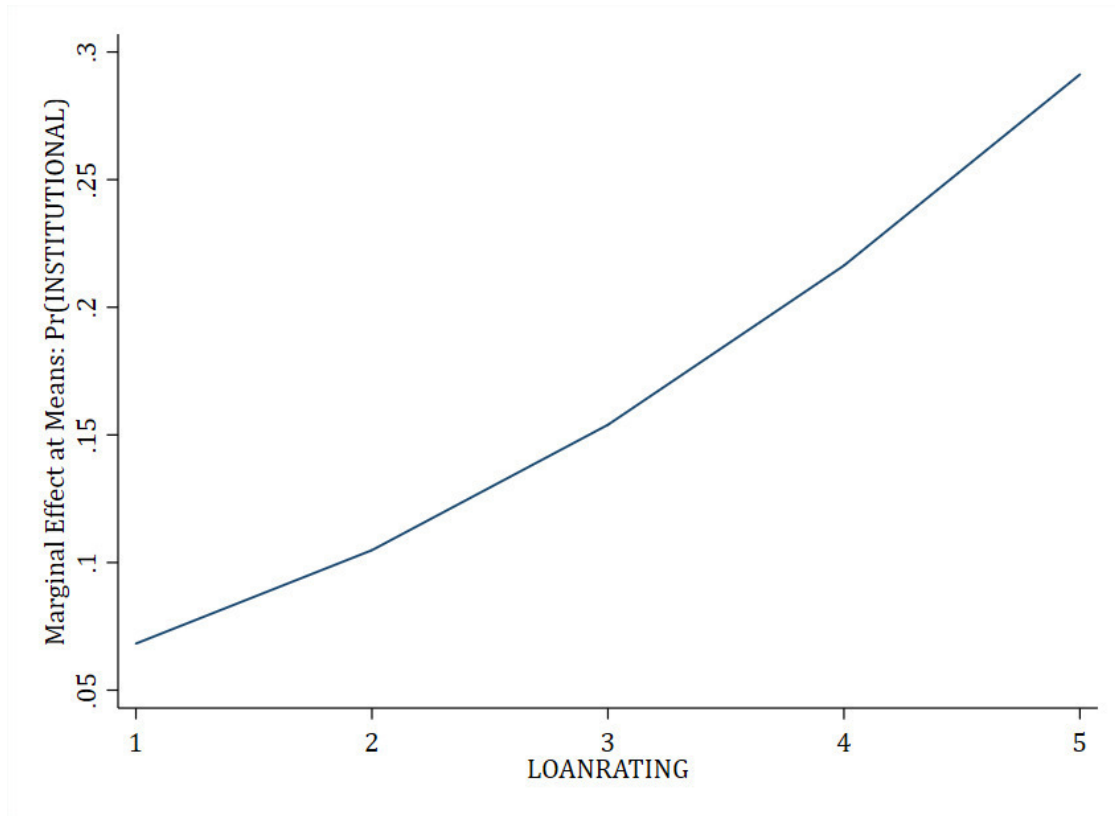
*** p<0.01, ** p<0.05, * p<0.1

A.2 ADDITIONAL GRAPHS

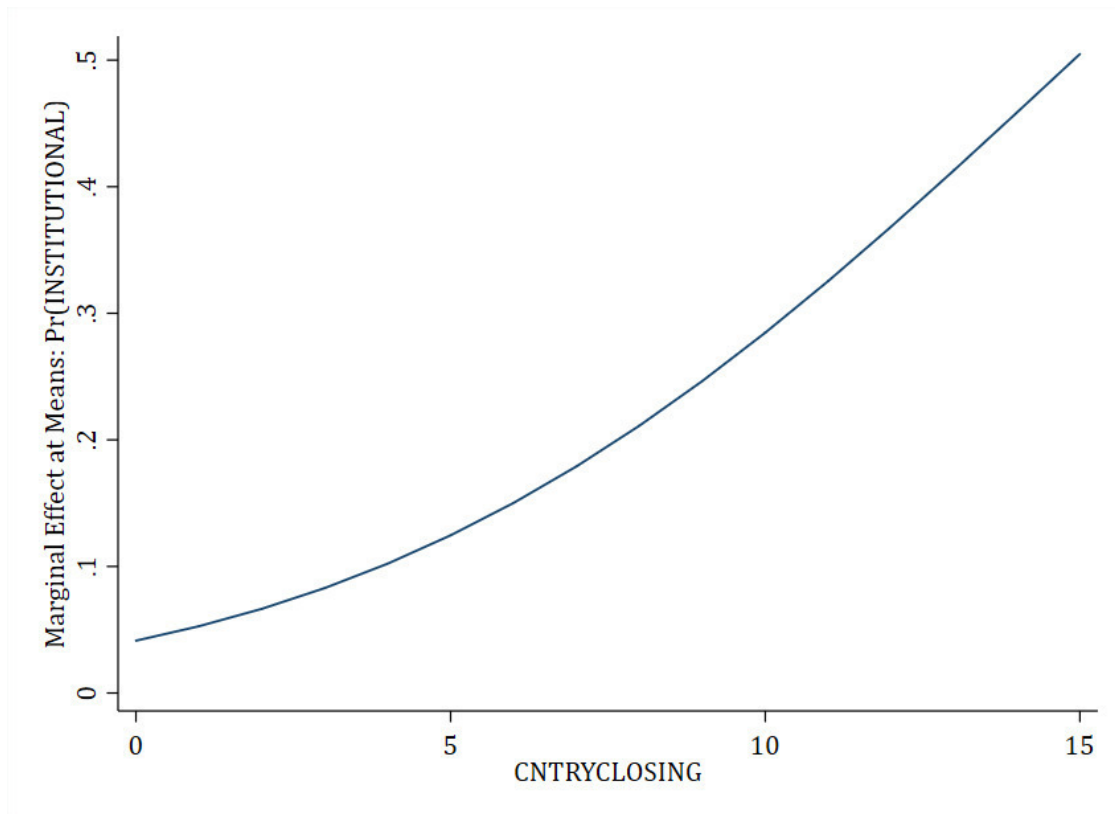
Graph 9: Marginal Effects at Means of PRSCORRUPT,
Base Case Disaggregated Political Risk



Graph 13: Marginal Effects at Means of LOANRATING, Emerging Markets



Graph 14: Marginal Effects at Means of CNTRYCLOSING, Emerging Markets



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End of Master Thesis II