Essays on Structures of Financial Systems and Their Impact on the Financing of Small and Medium-Sized Enterprises

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Dedicated to my Mother

And my Father and to my lovely Wife

'What counts in life is not the mere fact that we have lived.

It is what difference we have made to the lives of others

that will determine the significance of the life we lead.'

(Nelson Mandela)

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List of Abbreviations

2SLS	two-stage least squares
ATE	average treatment effect
CI	conditional independence
DB	Doing Business
DFI	development finance institution
ES	Enterprise Surveys
FDSD	Financial Development and Structure Dataset
GDP	gross domestic product
GFDD	Global Financial Development Database
IFC	International Finance Corporation
IMF	International Monetary Fund
IPWRA	inverse probability weighted regression adjustment
IV	instrumental variable
LMIC	low- and middle-income country
LPM	linear probability model
LTF	long-term finance
MFI	microfinance institution
MFS	Monetary and Financial Statistics
NGO	non-governmental organization
pc	per capita
PE	private equity
SE	standard error
SME	small and medium-sized enterprise
STF	short-term finance
USD	US dollar
VAR	vector autoregression
VC	venture capital
WDI	World Development Indicators
WGI	Worldwide Governance Indicators

Chapter 1

Introduction to the Essays

Putting human well-being into the center, Sen (1999) describes development as the enhancement of freedom and of free agency of people so that individuals are empowered to choose, pursue and achieve their goals in life. To this end, major sources of unfreedom need to be removed – for instance, poor economic opportunities and poverty (Sen, 1999).[1] Small and medium-sized enterprises (SMEs) play a key role in low- and middle-income countries (LMICs) to remove such sources of unfreedom by providing livelihoods and economic opportunities: Over 95 percent of firms worldwide are SMEs (Ciani et al., 2020) and they account for at least 50 percent (Ayyagari et al., 2014) and up to 78 percent (Haider et al., 2019) of *formal* employment in LMICs depending on definitions.[2] This still underestimates the importance of SMEs as they provide livelihoods for many more semi-formal and informal workers. Hence, SMEs are often described as the backbone of the economy and essential element of the private sector. Also the United Nations highlight the important role of private sector development to achieve sustainable development as enshrined in the 17 Sustainable Development Goals by acknowledging in the 2030 Agenda that '[p]rivate business activity, investment and innovation are major drivers of productivity, inclusive economic growth and job creation' (United Nations General Assembly, 2015). These contributions of SMEs and the broader private sector can serve as means to expand people's freedom and free agency and thus foster development as aspired by Sen (1999).

[1] The four other sources of unfreedom, that Sen (1999) lists, are tyranny, systematic social deprivation, neglect of public facilities and intolerance/ overactivity of repressive states.

[2] As outlined in Section 1.1, SME definitions vary across countries and institutions. Haider et al. (2019), for instance, include (formal) micro enterprises in their figures (and thus use the term MSMEs: micro, small and medium-sized enterprises).

This dissertation focuses on promoting SME development by addressing a central constraint of SMEs, namely access finance. Even though availability of external finance matters for the operation and development of firms of all sizes, smaller firms are more likely to be excluded from external finance (e.g. Beck, Demirgüç-Kunt, & Maksimovic, 2005; Beck et al., 2008). Specifically, the dissertation examines how structures of financial systems affect the financing situation of SMEs. On the one hand, it is analyzed how different financial intermediaries and markets within the financial system interact in the fulfillment of their main function to mobilize funds and resources that are channeled into investments and the financing of economic activities. This comprises both interactions between the microfinance sector and the conventional banking sector as well as interactions between capital markets and the banking sector. On the other hand, this dissertation focuses on a different structural dimension of the financial system by investigating the effect of maturity structures in credit markets on the development of firms. In the remaining part of the introduction, I unpack in more detail the importance of SMEs for inclusive development (Section 1.1), before discussing the role of finance in SME promotion (Section 1.2). In Section 1.3, I summarize the three essays and outline their contribution to the scientific literature.

1.1. The Importance of SME Promotion for Inclusive Development

SMEs, as core element of the private sector, drive inclusive economic development, employment creation and access to economic opportunities and livelihoods as argued, for instance, in the 2030 Agenda (United Nations General Assembly, 2015). Providing income-earning jobs is not an end in itself, but a means to enhance people's capability sets, i.e. their freedoms to choose, pursue and achieve their goals in life (Sen, 1999). Private sector development and productivity growth make jobs more broadly available and increase average income levels, which has the potential to directly alleviate (income) poverty and to give rise to positive second-round effects on other development goals such as food security, health and education. However, to realize such development impacts, growth policies need to be designed in a pro-poor manner. Existing national realities, in particular inequalities (with regard to physical and human capital, social capital and other dimension), affect the extent to which poorer segments in society share in aggregate growth and the extent to which average income

growth improves living standards of households in the poorer quintiles (with subsequent effects on inequality) (Ravallion, 2001). In the following, the channels through which SMEs are hypothesized to contribute to development outcomes are critically discussed based on evidence in the extant literature. This encompasses, most importantly, SMEs' role in employment, job creation and economic growth, but also less-researched debates around complementary contributions with regard to innovation, inclusiveness as well as diversification and resilience.

In order to reflect upon the importance of SMEs (also vis-à-vis the rest of the private sector), there is need for a definition of SMEs and large firms. Definitions of micro, small, medium-sized and large firms differ across countries and sometimes even across institutions or industries within the same country. Most common are thresholds with regard to the number of employees, but also with regard to assets, sales/turnover, investments or combinations thereof. Having no universal definition of SMEs is reflective of the diverse national economic contexts, in which these firms operate (what is considered as a small/large firm differs substantially between, for instance, the Indian economy with 1.42 billion people and Botswana with a population of 2.6 million). In this dissertation, I adopt the SME definition of the underlying dataset, the World Bank Enterprise Surveys: Irrespective of country-specific definitions, firms are categorized as small if they have less than 20 employees, as medium-sized with less than 100 employees and as large with 100 or more employees.[3] It is noteworthy that there is also a lower threshold in the SME definition of the World Bank: Only formal firms with five or more employees are included in the Enterprise Surveys. Informal firms are often equalized with micro enterprises (Beck, 2013) and disregarded in analyses. The reason is that, firstly, their contributions to development and growth are negligible (despite the considerable share of economic activity in LMICs through informal and micro enterprises, see e.g. La Porta and Shleifer (2008)); and secondly, because their behavior differs significantly from the SME segment: They often become entrepreneurs out of necessity, i.e. to meet their livelihood needs during times when jobs in the formal labor market are lacking. This leads to observations of countercyclical net firm creation rates (e.g. Liedholm, 2002), i.e. the closure of micro enterprises during economic growth periods when more formal sector jobs become available, and the re-emergence of micro enterprises during periods of economic decline. Such firm behavior is in stark contrast to opportunity-based or transformational entrepreneurs in the SME segment and among larger firms that seek to grow and develop their businesses. Accordingly, owners of micro enterprises

[3] Note that Chapter 4 slightly deviates for methodological reasons from this definition in the main analysis, but uses the 100-employee threshold in the robustness check.

generally exhibit different characteristics from owners and managers of large enterprises and rather resemble wage earners (e.g. de Mel et al., 2008). Yet also for small, medium-sized and large firms, the delineation according to size similarly extends to substantial differences with regard to organizational structures, behavior, strategy and other dimensions (Beck, 2013).

In LMICs, it is mostly SMEs that form the private sector as the vast majority of firms falls into the category of small and medium-sized enterprises and as these firms account for the majority of formal employment. Less than five percent of enterprises are large, while the remaining (more than) 95 percent belong to the SME segment (Ciani et al., 2020). The figure by Ayyagari et al. (2014), that SMEs employ at least 50 percent of the formal workforce in LMICs, rather constitutes a lower-bound estimate since the authors exclude the numerous enterprises with less than five employees and already count firms with 100 and more workers as large (even though in many countries in their sample, the national definitions would categorize more firms as SMEs – for example, firms with less than 250 employees). Using country-specific SME definitions and including (formal) micro enterprises, Haider et al. (2019) find SMEs to be responsible for 78 percent of formal jobs in LMICs (for a sample of 36 countries). Yet this still underestimates the role of the SME segment with regard to employment due to the informal economic activities, especially in lower-income countries, that provide livelihoods for a substantial share of the society.

Even though SMEs significantly contribute to job creation, the evidence is mixed whether they actually generate more new employment opportunities than large firms. Smaller firms are often described as more labor-intensive and thus expected to have larger effects on employment growth. According to survey evidence, SMEs are responsible for most of the newly created formal jobs in LMICs and this holds even when controlling for firm age and defining the SME segment narrowly (i.e. as formal firms with 5-99 employees) (e.g. Ayyagari et al., 2014). One weakness of this approach, however, is the inability to estimate robust net effects. Such cross-country surveys do not allow to consider the negative employment effects of firms that exited the market (survivor bias), which is relevant since smaller and younger firms have significantly lower survival rates (Klapper & Richmond, 2011). A second methodological flaw is known as composition effect and arises when, for instance, a large firm experiences negative growth such that it slides back into the SME category and its jobs are counted as newly created positions by SMEs. When using panel data to control for these biases, mixed results emerge. While some scholars still find SMEs' contributions to job creation to be larger (Neumark et al., 2011), others find them to be comparable to those of large firms (Haltiwanger et al., 2013; Page & Söderbom,

2015). Haltiwanger et al. (2013) emphasize the role of firm age, since young and dynamic firms – that tend to start as small firms – are key for employment growth.[4] Evidence from Tunisia indicates that in settings with more static firm environments, establishment of new micro enterprises is an important driver of employment growth, whereas – post-entry – large firms account for higher shares in job creation than SMEs (Rijkers et al., 2014). To sum up, SMEs significantly contribute to job creation, but there is no clear evidence (yet) for or against the notion that SMEs contribute more to net job creation than large firms.

Another central promise of SME promotion alongside employment and job creation is the boost to economic dynamism and growth. Cross-country regression analyses show a strong positive association between the share of SMEs in the manufacturing sector and GDP per capita growth (Beck, Demirgüç-Kunt, & Levine, 2005). Despite careful modelling, the authors cannot claim causality for this relationship. Indeed, having a large SME segment is not desirable per se. While it might be a sign for a dynamic and competitive firm landscape with many new enterprises entering the market (and replacing other SMEs that have grown and become large firms), it could also be an indication for wrong incentives to stay small or for inefficiencies that prevent firm growth (Beck, Demirgüç-Kunt, & Maksimovic, 2005). In line with this argument of inefficiencies and constrained firm growth, scholars have shown that financial development unlocks the growth potential of firms as financing constraints are removed (see e.g. Levine (2005) for an overview of the literature on finance and growth). It is argued that this effect mainly runs through SMEs (e.g. Beck, 2013) as SMEs, especially in LMICs, disproportionally benefit from the increased access to finance such that industries with larger SME shares experience disproportional growth (Beck, Demirgüç-Kunt, & Maksimovic, 2005; Beck et al., 2008). This will be discussed in more detail in Section 1.2 when focusing on the role of finance in SME promotion.

In addition, SMEs may make relevant contributions that are complementary to those of large firms – most importantly, with regard to innovation, inclusiveness as well as diversification and resilience. Although these complementary contributions are mostly not covered well by research, they play a prominent role in institutions in the field of development cooperation to motivate and implement interventions promoting SMEs (e.g. OECD, 2017). Concerning

[4] While the main finding by Haltiwanger et al. (2013) is that the inverse relationship between net job creation and firm size disappears when controlling for age, some of their specifications suggest that the relationship reverses (meaning that large firms play a more important role for job creation). Yet their preferred specification still finds a (very) weak, inverse relationship.

innovation and productivity, smaller enterprises are on average significantly less productive than large firms (Ciani et al., 2020; Page & Söderbom, 2015) as the latter exploit economies of scale and their capacities to advance productivity growth through investments in technology, machinery, human capital and through outsourcing, exports and other activities. The increased productivity at larger firms comes with wage premiums as well as non-pecuniary benefits like health insurance (Ciani et al., 2020). However, some transformational small enterprises may facilitate economy-wide productivity leaps either by 'work[ing] outside of dominant paradigms' and developing a commercial, private sector use-case for (existing) technologies or by adapting existing innovations through minor changes to national and local contexts (OECD, 2017) – with other enterprises copying and spreading the successful model of these pioneers (Hausmann & Rodrik, 2003). Global value chains and international cooperation foster such knowledge spillover.

With regard to inclusiveness, SMEs move to diverse geographic areas – including markets beyond economically strong urban centers, i.e. (smaller) markets that cannot draw large firms. This provides those areas with both relevant goods and services as well as economic opportunities such as employment, skills acquisition and upward mobility (OECD, 2017). In addition, SMEs contribute to more inclusive social and economic outcomes, as they make the mentioned economic opportunities more accessible to women, the youth, migrants and other disadvantaged or marginalized groups (OECD, 2017).

Lastly, a vibrant SME segment may foster the diversification and resilience of national economies. This refers both to crisis preparedness (resilience) as SMEs move into industries beyond established economic sectors, which enhances diversification, decreases vulnerability to commodity price fluctuations (especially in LMICs dependent on single sectors) and extends the availability and variety of (essential) goods and services. But it also refers to crises and post-crises situations as smaller and younger firms are agile, move fast and are thus quick to adapt to shocks and new macroeconomic realities (OECD, 2017), and as SMEs even create jobs in countries and periods that suffer from a net job loss (Ayyagari et al., 2014).

While these complementary contributions of SMEs to development are supported by descriptive and correlational evidence as well as theoretical arguments, it is ultimately an empirical question whether statistically and economically significant effects materialize. (And in spite of these favorable theoretical and descriptive arguments, the evidence may not univocally underscore the theorized prominence of SMEs in those contributions as seen, for

instance, in the case of job creation.) Yet also proponents of a stronger focus on the promotion of larger firms, acknowledge that '[e]conomic and social progress requires a diverse ecosystem of firms of different sizes playing complementary roles' (Ciani et al., 2020). In any case, the existing literature suggests that SMEs play a very dominant role in the private sector and its positive effects on inclusive development, with unmatched contributions to formal employment and livelihoods as well as to economic growth (the latter especially *if* financial constraints are removed as briefly mentioned above and detailed in the following).

1.2. The Role of Finance in SME Promotion

The private sector requires a suitable business environment to develop and to unfold its contributions to inclusive development. This comprises, amongst other things, macroeconomic and political stability, a good legal framework with institutions that guarantee contract enforcement and well-defined property rights, appropriate physical infrastructure as well as competitive product, labor and capital markets. While there might be deficiencies in several of those dimensions in various LMICs, finance is consistently found to be one of the most severe obstacles for the private sector (e.g. Ayyagari et al., 2008). Accordingly, enterprise managers rank access to finance as their biggest obstacle in the Enterprise Surveys – especially in LMICs and among owners and managers of SMEs (see e.g. Ayyagari et al., 2017). Credit constraints and credit rationing lead to an inefficient allocation of resources within the economy, which thwarts innovation, productivity growth and economic growth at the aggregate level (e.g. Bartelsman et al., 2013; Hsieh & Klenow, 2009).

Financial development has been shown to foster firm and aggregate growth as well as innovation, productivity and employment growth – with SMEs playing a central role. There is an extensive literature on the relationship between financial development, i.e. improved access to finance, and growth. Early work explored this link on the macro level using, for instance, the ratio of private credit to GDP and GDP growth (e.g. King & Levine, 1993; Rajan & Zingales, 1998). Also the work by Beck, Demirgüç-Kunt and Levine (2005) introduced in the previous section falls into this category, but fails to establish causality. However, subsequent studies exploited micro-level data to strengthen the identification strategy and remove doubts about the causal relationship. Comprehensive overviews of this literature on the finance-growth-nexus are provided by Levine (2005) and Popov (2018). In addition, financial development – through its impact on firms – also drives innovation and productivity growth (e.g. Amore et al., 2013;

Benfratello et al., 2008; Cornaggia et al., 2015) as well as employment growth (e.g. Ayyagari et al., 2021; Beck et al., 2010; Pagano & Pica, 2012).

Most importantly, it is argued that these effects largely run through SMEs and thus induce inclusive, pro-poor growth with ensuing effects on poverty reduction (Beck, 2013). First, because the binding constraint of finance disproportionally affects SMEs, such that SMEs disproportionally benefit from financial development leading to disproportional growth in sectors dominated by SMEs (Beck, Demirgüç-Kunt, & Maksimovic, 2005; Beck et al., 2008). Second, because the channels through which finance affects growth (or respectively productivity or employment growth) run – to a varying degree – through stimulating the emergence and/or growth of SMEs. Beck (2013) delineates the three main channels as follows: financial development (i) sparks entrepreneurship and establishment of new firms as well as firm dynamism and innovation (e.g. Aghion et al., 2007; Ayyagari et al., 2011); (ii) enables firms to realize growth and investment opportunities and thus larger equilibrium sizes (e.g. Beck et al., 2006), and (iii) allows adoption of more productive assets and more efficient organizational forms (e.g. Demirgüç-Kunt et al., 2006).

However, many SMEs are partially or fully constrained with regard to finance. As indicated above, especially SMEs in LMICs rank access to finance as their biggest obstacle according to the Enterprise Surveys (see e.g. Ayyagari et al., 2017); and ample evidence from cross-country, country-level and microeconomic studies of observational and (quasi-)experimental nature documents that smaller and younger firms are more severely affected by constrained access to finance (e.g. Ayyagari et al., 2007; Ayyagari et al., 2017; Banerjee & Duflo, 2014; Beck & Cull, 2014; Beck, Demirgüç-Kunt, & Maksimovic, 2005; de Mel et al., 2008; Dong & Men, 2014; Quartey et al., 2017; Zia, 2008). For instance, (quasi-)experimental studies, which allow for causal interpretations, find clear-cut evidence for credit constraints among SMEs (e.g. Banerjee & Duflo, 2014; Zia, 2008). In line with economic theory, that predicts high marginal product of capital due to the (relative) scarcity of this input factor, they find very high returns to capital. For the average firm in the Indian sample, for example, the return to capital is estimated to amount to 89 percent (Banerjee & Duflo, 2014). Experimental evidence from Sri Lanka, where grants were randomly distributed to micro-entrepreneurs, underlines that also in this firm-size category the return to capital is as high as 55 to 63 percent (de Mel et al., 2008).

Given the constrained access to external finance, the most common financing source for SMEs is, by far, internal and informal finance such as personal funds, funds from family and friends

or retained profits (Disse & Sommer, 2020). Yet having to rely on internal funds that need to be build up through retained profits because of lacking external financing options thwarts productivity-enhancing investments and growth. With regard to external finance, SMEs in LMICs mostly depend on bank financing through loans, overdrafts and secured credits, while other sources such as trade credit, factoring, leasing and especially market-based financing such as equity (e.g. private equity, venture capital, business angels) or bonds only play a minor role (Disse & Sommer, 2020). According to the International Finance Corporation (IFC), the institution within the World Bank Group responsible for private sector development, between 44 percent (Khanna et al., 2017) and 55-68 percent (Ardic Alper et al., 2013) of *formal* SMEs (excluding micro enterprises) in LMICs are financially constrained – either fully or partially. Removing their financial constraints is estimated to require additional external finance in the rage between USD 0.9-1.1 trillion (Ardic Alper et al., 2013) and USD 4.5 trillion (Khanna et al., 2017), which corresponds to 26-32 percent or respectively 127 percent of outstanding SME loans.[5] There are considerable regional differences, with the largest financing needs (relative to outstanding SME loans) in the Middle East and North Africa, Latin America and the Caribbean, and in sub-Saharan Africa.

The financing bottleneck is caused by institutional and market failures. As dissected in the seminal work by Stiglitz and Weiss (1981), moral hazard and adverse selection lead to market distortions and credit rationing such that viable projects and firms do not receive finance. The review on SME finance by Ayyagari et al. (2017) documents additional market and institutional failures as well as related challenges that hamper the financing of smaller and younger firms: Weak legal institutions affect contract enforcement and thus the issuance of financial contracts and products. The opaqueness of smaller firms – due to a lack of credit histories, records at credit bureaus and registries, and audited financial statements – leads to asymmetric

[5] The IFC estimates quantify the difference between the de facto outstanding SME loans and the market-clearing equilibrium in a scenario without institutional and market failures (i.e. under full competition, full information, costless and complete contracts as well as rational expectations). Both the lower- and upper-bound estimates have weaknesses. The lower-bound estimate by Ardic Alper et al. (2013) is imprecise due to data quality and coverage: For all countries with missing data, inference based on other countries in the region had to be used. For the upper-bound estimate by Khanna et al. (2017), main weakness is the methodological approach of using 'potential demand' rather than the latent actual credit demand: Employing benchmarks from high-income countries, it is implicitly assumed that institutional, regulatory and macroeconomic environments in LMICs improve. This inflates the estimates, as such a fictional, more conducive investment climate drives SMEs' credit demand ('potential demand') well beyond the latent actual demand under the current less favorable conditions.

information (for both potential lenders and investors) and thus to problems of adverse selection and moral hazard. Fixed transaction costs with regard to credit assessment, processing and monitoring render smaller loans less profitable and thus less attractive. The lack of collateral or institutional shortcomings that prevent the collateralization of existing assets (e.g. inability to provide ownership certificates, lack of moveable asset registries) make collateral requirements unattainable. Lastly, the limited competition in the financial system, which may be affected by inadequate regulation, curtails the availability of external finance with disproportional effects for SMEs. In addition to these supply-side challenges, SMEs do not apply for external finance because of high costs (high interest rates due to transaction costs and perceived risk), internal constraints (limited managerial capabilities and financial knowledge, pessimistic attitudes about the prospects of success) or inexistent or inadequate bankruptcy and insolvency laws (fear of personal liability and over-indebtedness) (e.g. Disse & Sommer, 2020); or SMEs cannot acquire external finance due to crowding out by the public sector (e.g. Disse & Sommer, 2020).[6]

The occurrence of institutional and market failures justifies interventions to address SMEs' financing constraints. Moreover, with adequate financing, SMEs can contribute even more to job creation, growth and thus inclusive development. Hence, policymakers and development agents have SME promotion, in particular SME finance, high on their agenda. Broadly defined, SME finance aims at levelling the playing field such that all firms irrespective of their size can equally access finance. This also encompasses interventions addressing the wider legal and institutional framework not just financial markets and financial institutions (e.g. legal and regulatory reforms, partial credit guarantees, tax policies, launch of credit bureaus and registries or moveable asset registries) (Beck, 2013).

1.3. Summary and Contribution of the Three Essays

As outlined in the previous sections, addressing financing constraints is pivotal for promoting SMEs and the wider private sector in the pursuit of economic growth and inclusive

[6] Note that especially the exemplary explanations in the brackets mainly reflect challenges with respect to debt financing. Yet the core points mostly apply to acquiring market-based finance: (i) *high costs* for raising small amounts (due to costs that are more or less fixed, e.g. fees, meeting pre-listing and reporting requirements); (ii) *internal constraints*, namely inadequate level of institutionalization to meet reporting and corporate governance requirements; (iii) *crowding out*; and one could add that some SMEs object the dilution of ownership associated with equity finance.

development. Importantly, structures of financial systems affect firms' access to finance, especially with regard to SMEs. The structure of a financial system refers to the mixture and interrelations of financial instruments, markets and intermediaries in an economy (Demirgüç-Kunt & Levine, 2001). While endowment as well as property rights (creditor or minority rights respectively) are the most important factors for explaining different financial structures across countries,[7] structures of financial systems are heavily influenced by path-dependencies, idiosyncratic drivers as well as specific regulations and laws (Claessens, 2017). Yet the mixture of financial intermediaries and financial instruments in an economy has implications for SMEs' access to finance (e.g. Berger & Udell, 2006). Financial intermediaries differ in their ability to cater to smaller and more opaque firms as some instruments are better suited than others to target SMEs (see, for example, the literature on relationship and transaction lending (Berger & Udell, 2006) or discussions on the feasibility of market-based financing for SMEs (World Bank, 2020)). Moreover, market structures also matter for the financing situation of SMEs: More competitive credit markets, for instance, mitigate SMEs' financing constraints (e.g. Carbó-Valverde et al., 2009; Ryan et al., 2014).

In the three essays of this dissertation, I examine specific elements of financial structures to investigate how they affect the financing situation and the development of SMEs. The first and the third essay look at the mixture and interrelations of different financial intermediaries and markets. In the first essay, the focus is on the relation between microfinance and the conventional banking sector, while I investigate the interactions between capital markets and the banking sector in the third essay. Main interest of the second essay lies in a different structural dimension of financial markets: I explore the role of maturity structures in finance for firms' development prospects.

The main contributions of this dissertation evolve around deepening our understanding of the interrelations between different financial intermediaries and markets, and the subsequent effects on SMEs' access to finance. I make conceptual contributions by outlining several mechanisms through which microfinance adversely affects the SME financing activities in the conventional

[7] Claessens (2017) details that the national economy and its growth model affect financial structures: National economies that rely on capital-intensive sectors for economic development rather use bank financing due to the security of tangible investments; economies relying on intangibles for growth rather use market-based financing. In terms of property rights, it depends whether creditor or minority rights are better developed and enforced; yet Claessens (2017) claims that capital markets are more sensitive to the quality of property rights and additionally depend on good corporate governance as well as accounting and rating agencies.

banking sector and thus adversely affects the graduation of small enterprises from microfinance to conventional bank loans. I present first evidence of the ensuing negative implications on credit availability for smaller firms, which allows understanding and assessing microfinance more fully, including the tensions with SME financing. Through the evidence and discussions around the role of suitable infrastructure and reporting requirements to share credit information, this dissertation also provides policymakers with options to better integrate different elements of the financial system and to harness a strong microfinance sector for successful firm graduation and functioning SME finance. Focusing on capital markets, I show that their role in providing direct access to external finance for SMEs is negligible, but that they make statistically and economically significant indirect contributions through their effects on the lending activities of banks and thus on loan availability for SMEs. This constitutes the first empirical evidence for these indirect contributions that have been highlighted by theoretical academic work and deliberations of practitioners. Furthermore, this is additional evidence in support of the complementarity and co-evolution of capital markets and banks, a notion that has been consolidated in the literature by the influential theoretical work of Song and Thakor (2010). I provide first empirical evidence for one of their central model predictions, i.e. that capital market development increases bank lending, in particular to smaller and riskier firms. Lastly, I explore how the maturity structure in the financing landscape affects firm behavior with regard to strategic decisions and investments, which has consequences for growth prospects as well as the quantity and quality of employment creation. This dissertation constitutes the first empirical evidence that longer-term finance is associated with better job quality. The longer planning horizon mitigates rollover risks (that emerge when firms do not match the maturities of their assets and liabilities) and thus allows firms to pursue long-term growth strategies – amongst other things, investments in a stable and skilled workforce leading to improvements in job quality. Furthermore, I add first cross-country evidence from LMICs to the strand of literature on the importance of long-term finance for investments. This dissertation also contributes to the literature on the role of long-term finance for SME growth: I complement the existing discussions on trade-offs at the extensive margin with insights on the effects at the intensive margin, which allows for a more comprehensive understanding of the effects of long-term finance on SME development and growth.

1.3.1. Summary of the First Essay: 'Unintended Consequences of Microfinance: Effects on Credit Access for Small- and Medium-Sized Enterprises'

The first essay (Chapter 2) assesses the extent to which microfinance affects (smaller) SMEs' access to finance. In doing so, it sheds light on unintended consequences of microfinance, namely that it hampers small firms' access to credits (of sufficient size) and thus their growth from micro enterprises into small or even medium-sized firms. Microfinance has undergone significant change from an NGO-led sector in the 1980s to a diverse set of legal entities that have increasingly offered financial services for higher value segments of the market. Upscaling microfinance institutions provide larger average loan sizes and may thus compete with downscaling banks. This aggravates what I refer to as 'graduation problem': Firstly, successful small firms outgrow microfinance and – due to their needs of larger loan sizes – must graduate into the conventional banking sector. Secondly, however, several barriers hamper firm graduation – most importantly lacking credit histories and limited readiness of banks to lend to small and opaque firms. In many LMICs, lending activities by microfinance institutions are not recorded in credit bureaus and registries such that smaller firms cannot build a credit history that would significantly increase their likelihood to acquire credits from conventional banks after outgrowing microfinance. Conventional banks already face several challenges in financing SMEs and may be further discouraged from downscaling and developing suitable lending instruments for smaller and opaque firms because of upscaling microfinance institutions that narrow down these market segments. Consequently, a strong microfinance sector may impede access to finance (of sufficient size) for smaller SMEs.

Using a within-estimator, I exploit intra-country variation in the depth of the microfinance sector to identify its effect on firms' credit access. An instrumental variable approach is employed to strengthen the estimation strategy and to account for potential reverse causality issues. Based on the sample of 51 countries with firm-level data from 2002 to 2015, a larger and more active microfinance sector is found to significantly lower the probability that small firms have access to credit. The adverse effect is more profound for small firms with 10-19 employees, i.e. for the firms in my sample that need to move from microfinance to conventional banks to acquire finance of sufficient size. However, I do not find any evidence that the negative effect is stronger in countries where for-profit microfinance institutions dominate the microfinance loan portfolio. In regions where lending activities by microfinance institutions are recorded in credit bureaus and registries, the sign of the effect becomes positive. This implies that a good infrastructure to share credit information along with appropriate reporting

requirements does not only mitigate the adverse effect of microfinance, but even harnesses a strong microfinance sector for successful graduation and financing of (smaller) firms. In conclusion, policymakers need to increase credit bureau coverage and introduce respective reporting requirements for microfinance institutions of a certain size or legal status in order to reconcile a strong microfinance sector with functioning SME financing, to strengthen compatibility and interrelations between the microfinance sector and the conventional banking sector, and thus to increase the efficiency in the financial system.

1.3.2. Summary of the Second Essay: 'The Impact of Long-Term Finance on Job Quality, Investments and Firm Performance: Cross-Country Evidence'

The second essay (Chapter 3) analyzes the effects of long-term finance on job quality, investments and firm performance. Long-term finance is particularly important for economic growth as it allows investments in projects that require capital commitments over a longer period of time and that substantially contribute to productivity growth. Different thresholds, namely 1, 2, 3, 4 and 5 years, are used to differentiate between short-term and long-term finance and to gauge the effect of having finance with longer maturities. Firms tend to match the maturities of their assets and liabilities in order to avoid rollover risks, which occurs when long-term projects are financed through short-term loans. After all, rollover risks may lead to the premature liquidation of profitable projects if creditors reject rolling over credits or only offer unaffordable financing terms. Hence, in the face of rollover risks, firms may forgo productive projects and technologies with payoffs in the more distant future if they cannot acquire financing with adequate maturities. This may not only affect the growth and productivity prospects on the firm and aggregate level, but may also undermine a broader shift towards better quality jobs. Many long-term investments such as R&D, fixed assets or technology adoption necessitate complementary investments in labor such as training or human capital accumulation. In order to fully reap the returns to these investments, firms have incentives to reduce staff turnover and to create longer employment relationships. Consequently, job security and the share of permanent jobs increases along with wages as this increases opportunity costs of switching jobs. In short, the quality of jobs is expected to rise.

I use inverse probability weighted regression adjustment in my sample of over 17,000 observations from 73 countries. It is an estimation strategy that identifies treatment effects in observational data by balancing between treated and untreated observations through

reweighting and thus achieving a quasi-random distribution. Since this balancing is done based on observable characteristics, I use two different approaches to account for potential endogeneity issues caused by unobservable variables. In the first approach, I define treatment as having long-term finance such that firms in the control group only have short-term finance. Theoretical and descriptive arguments are presented to mitigate concerns that unobserved characteristics affect demand for long-term finance and capabilities to acquire such loans. Nevertheless, a second approach is adopted to control for this potential source of endogeneity by only considering firms with long-term finance: These firms are most likely also similar with regard to unobservable characteristics (e.g. firms' strategy and quality) as all of them have demanded and acquired long-term finance. The control group comprises firms with long-term finance that matures in less than two years, and the treatment group firms with long-term finance of longer remaining maturities ($\geq$ 2 years). Several robustness checks are performed. Most importantly, I present additional evidence for the importance of rollover risks for firms, on which my identification strategy relies. The findings indicate that long-term finance is associated with significant increases in the likelihood that firms offer formal training, in the share of employees benefiting from such training, in the share of permanent employees as well as in average wages. In addition, it raises both the likelihood of investments in fixed assets, product innovation and process innovation as well as firm performance captured by sales and employment growth. Especially for the job quality indicators, effect sizes become larger with longer loan durations. I conclude that long-term finance is important for moving towards better jobs as it provides suitable planning horizons for firms to invest in a stable and skilled workforce and to realize productivity growth and superior long-term growth trajectories. Yet policymakers need to consider, firstly, that creating an adequate environment to increase the supply of long-term finance may require a lengthy reform process and, secondly, that not all firms need long-term finance and that such finance is more likely to go to larger and more transparent firms – potentially at the expense of SMEs' access to finance.

1.3.3. Summary of the Third Essay: 'The Role of Capital Markets for Small and Medium-Sized Enterprise (SME) Finance'

The third essay (Chapter 4) examines to what extent capital market development indirectly alleviates SMEs' financing constraints by improving their access to loans. Point of departure is the stylized fact that SMEs' direct access to external finance through capital markets is

negligible; this includes equity instruments such as publicly traded equity, private equity and venture capital as well as market-based debt instruments such as bonds. (Contributions by other, newer instruments such as equity crowdfunding or receivables and lending platforms are still miniscule.) However, capital market development can have positive indirect effects on SMEs' financing situations due to spillovers on banks' lending activities and thus loan availability for SMEs. With their influential theoretical model, Song and Thakor (2010) have consolidated the view that capital markets and the banking sector are complementary and co-evolve. Several financial instruments exploit the respective comparative advantages of banks (monitoring, screening and other information-related activities) and of markets (cost-efficient liquidity through access to a broad and diverse base of investors) to create benefit flows from markets to banks and vice versa, which results in their complementarity and co-evolution. For example, capital markets supply banks with relatively cheap equity finance, which allows banks (through bank equity capital) to improve their funding structure and thus to expand their lending activities – most importantly, to previously unserved riskier firms as banks can meet higher capital requirements. Securitization, in turn, constitutes an example for benefit flows from banks to markets: Banks overcome information frictions, provide loans and subsequently sell them off to investors in the market, which enhances capital market activity and size. At the same time, securitization equips banks with another financing source for their lending activities and thus enables banks to further increase their loan issuance and thus credit availability in the economy. Consequently, one of the central predictions by Song and Thakor (2010) is that capital market development raises bank lending, in particular, towards smaller and riskier firms.

I employ a cross-industry cross-country adaptation of the seminal model by Rajan and Zingales (1998), that has been used widely in economics to address endogeneity issues. Identification relies on intra-country variation resulting from differences in the external financial dependence across sectors due to sector-specific differences with respect to technologies and capital intensities. Hence, this approach allows identifying whether small firms in sectors that are more dependent on external finance are relatively less financially constrained (with regard to credit access) in countries with better developed capital markets. As part of the robustness checks, an instrumental variable approach additionally addresses concerns that effects from credit markets are wrongly assigned to capital market development. In my sample of almost 69,000 firm-level observations from 50 countries, I find evidence that capital market development indirectly improves the financing situation of smaller firms through enhanced credit access. The effect is significant and the findings indicate that it runs – in line with the theoretical model by Song and

Thakor (2010) – through banks' increased usage of capital markets and subsequent increases in their lending activities. In conclusion, there is evidence for positive spillovers from capital market development on SME finance as long as regulatory authorities allow for interactions between lending institutions and capital markets (while still safeguarding the soundness and stability of the banks and the overall financial system). Furthermore, these spillovers materialize even if capital market developments are limited to the main market instead of SME-specific segments (e.g. SME stock exchanges) or instruments more suitable to SMEs (e.g. private equity and venture capital). Nevertheless, policymakers need to carefully assess country-specific contexts since more direct means to foster SME finance such as improving SMEs' access to bank loans should have priority over efforts to advance capital market development if well-functioning capital markets (and subsequent spillovers on SME finance) are only feasible in the longer term after lengthy and strenuous institutional and structural reforms.

Chapter 2

Unintended Consequences of Microfinance: Effects on Credit Access for Small and Medium-Sized Enterprises

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Abstract

While competition in the financial system generally mitigates small- and medium-sized enterprises' (SMEs) financing constraints, this paper theorizes that competition by microfinance institutions (MFIs) has adverse effects through aggravating the 'graduation problem': Small firms outgrowing microfinance struggle to find financing as conventional financial institutions abstain from downscaling and developing suitable lending instruments for smaller firms if these market segments are narrowed down by upscaling MFIs. Using data from 51 countries between 2002 and 2015, microfinance is found to significantly lower SMEs' access to credit. Credit bureaus can reverse this effect indicating that credit information infrastructure can reconcile a strong microfinance sector with functioning SME finance.

2.1. Introduction

Most of the firms in low- and middle-income countries (LMICs) belong to the segment of small and medium-sized enterprises (SMEs). SMEs play a crucial role for national economies as they account for at least 50 percent of the formal workforce and significantly contribute to job creation (Ayyagari et al., 2014) as well as to economic growth, poverty reduction and reduced income inequality (Beck, Demirgüç-Kunt, & Maksimovic, 2005). Yet the development and growth of many SMEs is restrained by institutional and market failures – most importantly by lack of access to finance, which disproportionately affects smaller and younger firms (Beck et al., 2008).

The main source of external finance for SMEs is institutional credit, i.e. loans from (formal) financial institutions. While competition in the formal banking system is generally found to mitigate financing constraints of SMEs (Carbó-Valverde et al., 2009; Ryan et al., 2014), increasing competition with the microfinance sector may negatively affect SMEs' access to institutional credit. In their critique of microfinance, Bateman and Chang (2012) make the theoretical argument that funds are diverted from SMEs to micro enterprises, which do not contribute much to aggregate economic development. Strong and upscaling microfinance institutions (MFIs) amplify what I refer to as the 'graduation problem'. Successful small firms need to graduate to the conventional financial system, as MFI loans are commonly too small to fully meet the financing demands even of small SMEs. However, several obstacles hamper this graduation: In most LMICs, lending activities of MFIs are not recorded in credit bureaus such that MFI borrowers cannot build up a credit history. Moreover, conventional financial institutions already face many challenges in financing SMEs,[8] and may be further discouraged from downscaling and developing suitable lending instruments for smaller and more opaque firms if these market segments are narrowed down by upscaling MFIs. Hence, a strong microfinance sector may help to provide credit for poorer households and micro enterprises, but – as an unintended consequence – impede the access to external finance (of sufficient size) for (smaller) SMEs.

[8] In their comprehensive overview of the empirical evidence, Ayyagari et al. (2017) identify four central challenges: (i) transaction costs rendering smaller loans more expensive per dollar lent; (ii) opaqueness of smaller firms leading to asymmetric information and problems of adverse selection and moral hazard; (iii) lack of collateral; (iv) weak legal institutions.

In order to investigate the extent to which microfinance affects (smaller) SMEs' access to institutional credit, this study uses more than 56,000 firm-level observations from 51 countries – almost exclusively from LMICs. Building on the approach of Love and Martínez Pería (2015), I compute a within-estimator and find a larger and more active microfinance sector to significantly lower the probability that SMEs have access to institutional credit. The findings are robust to various alternative specifications including an instrumental variable (IV) approach accounting for potential reverse causality issues (through interrelations between the conventional financial system and the microfinance sector). The effect is more profound for small firms with 10-19 employees and thereafter decreases with increasing firm size. Furthermore, it is shown that in regions where MFI loans are recorded at credit bureaus, the credit information infrastructure can reverse the negative effect and instead harness MFIs to improve SMEs' access to loans. This suggests that adequate credit information infrastructure and reporting requirements may not only allow for functioning SME finance alongside a strong microfinance sector, but may even improve efficiency of the financial system as firms graduate more smoothly from microfinance to (larger) loans at conventional financial institutions.

This paper contributes to various strands of the existing literature. One is the literature on competition between microfinance and commercial banks. Cozarenco (2015) shows that in Europe mainly emerging countries such as Romania and Serbia experience competition between microfinance and conventional banks, partly because regulations restrict microfinance in several high-income countries. Cross-country regression analyses by Cull et al. (2014) and Vanroose and D'Espallier (2013), who look primarily into LMICs, find that a better developed formal banking sector negatively affects loan sizes and profitability of MFIs. These findings suggest that MFIs are pushed to lower market segments by competition from downscaling banks. However, this is not necessarily the case: Country-specific evidence shows that MFIs in Madagascar react to the presence of commercial banks by increasing the average loan size and softening collateral requirements in order to be more attractive for potential clients from the (lower) SME segment (Baraton & Leon, 2021). This indicates that MFIs engage in competition with conventional financial institutions and that it is ultimately an empirical question who can prevail in these market segments.

The described strand of literature only investigates the impact of competition between microfinance and the conventional financial system from an MFI perspective. To the best of my knowledge, this paper is the first to analyze how competition with microfinance affects conventional financial institutions and their financing activities with regard to SMEs, which in

turn influences firms' access to institutional credit. Accordingly, this paper helps to assess microfinance more fully and to also bring forth hidden, unintended consequences of heavy investments into this sector. After all, MFIs use external funding from commercial banks to expand activities (e.g. Hermes et al., 2011; Isern & Porteous, 2005), and priority sector policies that target micro enterprises potentially intensify such trends. This study constitutes the first empirical investigation of Bateman and Chang's (2012) argument that microfinance diverts funds away from SMEs to informal micro-entrepreneurs, which do not contribute much to aggregate economic growth, employment and productivity gains.

My work also makes a theoretical contribution by conceptualizing three mechanisms as to how microfinance may affect SME financing activities by conventional financial institutions and may thus contribute to the graduation problem. The first mechanism is based on empirical evidence for competition between conventional financial institutions and MFIs (Baraton & Leon, 2021; Cull et al., 2014; Vanroose & D'Espallier, 2013). In line with the findings from Madagascar by Baraton and Leon (2021), it is argued that MFIs are able to engage in direct competition with downscaling banks. The second mechanism applies the theory of blockaded or deterred entry from industrial organization (Tirole, 1988, chap. 8): Conventional financial institutions may not find it profitable to pay the market entry costs, i.e. invest in new business strategies, new lending instruments and staff training, such that they are capable of serving smaller and more opaque firms, if these market segments are already narrowed down or occupied by MFIs. The last mechanism builds on literature on the outreach and growth of microfinance that records the usage of external funding from commercial banks in MFIs' expansion (e.g. Hermes et al., 2011; Isern & Porteous, 2005). Hence, Bateman and Chang (2012) argue that banks reduce their SME lending, as it is often perceived as costly and risky, and instead invest these funds in MFIs, so that finance is diverted from SMEs to microfinance.

Finally, this paper is related to the strand of literature on the importance of credit registries and credit bureaus for SMEs' access to finance. Empirical studies covering 24 countries in Eastern Europe and Central Asia (Brown et al., 2009) and 51 countries from all world regions and income levels (Love & Mylenko, 2003) show that the infrastructure for sharing credit information improves access to loans for SMEs and that smaller and more opaque firms benefit more. Using micro data from Rwanda, Agarwal et al. (2021) find credit information infrastructure to facilitate small firms' graduation from microfinance to conventional financial institutions. The significance of my study is to provide first cross-country evidence for this effect. Since credit bureaus can mitigate and even reverse the negative effects of a strong

microfinance sector on banks' SME financing activities, these findings help to reconcile upscaling MFIs with functioning SME finance and can thus inform policy- and decision-makers in LMICs with a strong microfinance sector.

The rest of the paper is structured as follows. Section 2.2 examines the respective market segments of MFIs and conventional financial institutions through a literature review and descriptive analysis. Building on that, Section 2.3 develops a conceptual framework and hypotheses. Section 2.4 introduces the data, before Section 2.5 presents the regression model. Section 2.6 depicts the results along with robustness checks and Section 2.7 summarizes and concludes.

2.2. Financial Landscape

Higher degrees of competition in the banking sector improve SMEs' access to finance according to empirical evidence (Carbó-Valverde et al., 2009; Love & Martínez Pería, 2015; Mercieca et al., 2009; Ryan et al., 2014). Canales and Nanda (2012) find competition to be even more important for smaller banks, as they tend to offer more attractive terms to SMEs in competitive environments while cherry picking and restricting credit in case of market power.[9] One important consequence of competition is that banks have started to downscale and distribute smaller loans. Baraton and Leon (2021) note that these developments are under-researched, even though they began as early as the 1990s in Latin America and have spread to other regions (Ferrari & Jaffrin, 2006). Competition in the banking sector along with government pressure and profitability considerations are identified as primary reasons for banks to move down into new market segments (Isern & Porteous, 2005; Subhanij, 2016).

Microfinance, on the other hand, has experienced an upscaling to higher-value segments of the market. The evolution of microfinance from a donor-financed and NGO-led sector in the 1980s to a diverse landscape of legal entities with a wide range of financial services is well

[9] The discussions around the effects of competition are related to the literature on transaction and relationship lending. The seminal paper of Petersen and Rajan (1995) finds fiercer competition to negatively affect lending when banks rely on relationship lending. Yet more recent theoretical and empirical contributions call for a more nuanced view indicating that local interbank competition actually intensifies relationship-based lending (e.g. Boot & Thakor, 2000; Degryse & Ongena, 2007). Hence, I assume that competition generally fosters SME lending even if (smaller) banks may employ relationship lending.

documented in the academic literature and often controversially discussed under the term 'mission drift' (Mersland & Strøm, 2010). Even sceptics of a general mission drift in microfinance, however, acknowledge that individual MFIs do sacrifice some breadth of outreach (number of clients, share of female borrowers) and do increase average loan sizes in pursuit of higher profits (Cull et al., 2007; Mersland & Strøm, 2010). Upscaling and a rise in average loan sizes is closely related to institutional transformation of NGOs into financial entities (D'Espallier et al., 2017) – in a few cases even into full commercial banks (e.g. Prodem in Bolivia, Bhandhan in India and Microcred in Madagascar; see Baraton & Leon, 2021). These developments along with advancements in lending patterns, loan terms and expansion to new customers and market segments are spurred by competition in the microfinance sector (Baquero et al., 2018; De Quidt et al., 2018). Baraton and Leon (2021) further argue that the commercialization of microfinance has also led several MFIs, which did not change their legal status, to react to the needs of higher-value segments such as small firms by expanding loan sizes and maturities.

Consistent with these developments of simultaneously downscaling banks and upscaling MFIs, I find support for competition between these financial institutions over certain market segments. Analogous to analyses in microfinance, where average loan size is commonly used as a proxy for different income levels of customers (e.g. Cull et al., 2018), I use average loan sizes to examine whether MFIs and conventional financial institutions serve similar customer segments.[10]

Figure 2.1 visualizes the results when the average loan size by MFIs to SMEs is set in relation to the average size of institutional credit given to firms of different size. Data are available for 30 of the 51 countries in my sample so that the descriptive analysis serves as an approximation. The box plot suggests that MFIs and banks could potentially compete over firms with less than 10 employees, where the size of MFI loans amounts to more than 10 percent of institutional credit in roughly two thirds of the countries, and to more than 30 percent in more than a quarter of the countries. MFI loans are too small to be of interest for firms with 20 or more employees (firm-size categories 3-5), where even upper whiskers hardly reach 10 percent. The picture seems less clear for firms with 10-19 employees (second firm-size category). Yet the fact that only about a third of the countries surpasses the 10-percent threshold and only five countries the 30-percent threshold indicates that already for firms with 10-19 employees, MFI loans are

[10] The analysis is not driven by extreme values since winsorizing leads to identical results.

too small in most countries. In short, MFIs and conventional financial institutions could compete over loans to firms with less than 10 employees, while only in very few countries MFIs offer loan sizes that are large enough to attract firms with 10 or more employees.[11]

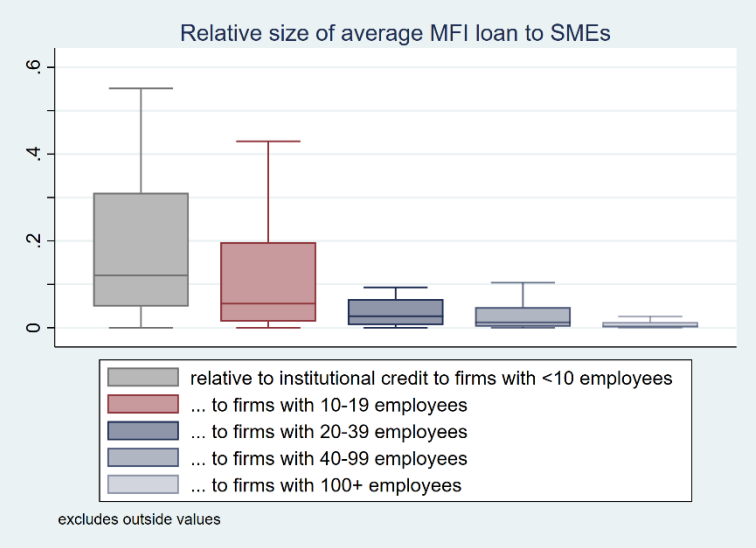

Figure 2.1: Average Size of MFI Loans to SMEs Relative to Average Institutional Credit by Firm-Size Categories on the Country Level

Note: Author's analysis based on data from MIX Market and Enterprise Surveys.

2.3. Conceptual Framework and Hypotheses

The findings from the descriptive analysis exhibit the first part of what I refer to as the 'graduation problem': There is a necessity for successful firms to graduate from microfinance to the conventional financial system. In most countries, MFI loan sizes are too small to fully meet the financing needs of firms with more than 10 employees.

The second part of the graduation problem is that there are several barriers that impede graduation from microfinance to conventional finance, two of which are highlighted here. The first barrier concerns poor reporting by MFIs to the national system for sharing credit information. Data from World Bank's Doing Business show that in less than 30 percent of LMICs, MFIs reported to credit registries or credit bureaus in the late 2000s (Bustelo, 2009).

[11] Mainly the three outliers (Ecuador, Madagascar and Poland), that are not shown in the box plot for reasons of readability, exhibit average MFI loans to SMEs that could be economically relevant beyond the smallest firm-size category.

Reporting slightly improved until 2015 (Chavez Sanchez et al., 2016): 60 percent of countries in Europe and Central Asia included MFIs into their credit reporting systems, 35 percent in the Middle East and North Africa, 34 percent in Latin America and the Caribbean, 32 percent in East Asia and the Pacific, and 25 percent in sub-Saharan Africa and South Asia each. Yet this means that in most countries, MFI loans are still not recorded in publicly available systems, in particular in regions with poorer countries, less developed financial systems and stronger microfinance. Hence, firms may have a credit history with their (former) MFI, but cannot exploit this financial footprint to receive loans from conventional financial institutions.

The second barrier arises because – even in countries where MFIs report to the credit information systems – the conventional financial system may not necessarily be ready to provide follow-up finance for small firms trying to graduate from microfinance. After all, it requires suitable lending instruments to serve such firms that may still lack audited financial statements, collateral and other characteristics central to standard procedures of traditional credit assessment. Conventional financial institutions may abstain from developing lending instruments for smaller firms if – in addition to the general challenges and perceived risk associated with SME loans – the profitability is compromised by competition from upscaling MFIs as is elaborated in the following.

At least three potential mechanisms can be identified how competition by MFIs may undermine firms' access to loans in the conventional financial system and thus amplify the graduation problem. The first is direct competition with MFIs. As described above, MFIs in many LMICs experienced favorable conditions for growth and commercialization and moved up the market to also serve better-off households and small firms through increased average loan sizes and maturities (e.g. Baraton & Leon, 2021; Cull et al., 2007; D'Espallier et al., 2017; Mersland & Strøm, 2010). MFIs could develop a strong position and benefit as incumbents from extensive business experience in lending to these market segments, fine-tuned lending instruments and informational advantages from existing lending relationships. The findings from Madagascar (Baraton & Leon, 2021) may be interpreted as suggestive evidence that MFIs are able to stand their ground and potentially even curb the market share of downscaling banks in these market segments.

A second, indirect effect might be at work simultaneously in line with standard economic theory of industrial organization about barriers to market entry. Potential market entrants face sunk costs when entering the market. Market entry is unprofitable if these sunk costs are too high

(blockaded entry) or high enough so that incumbents can engage in (costly) strategic behavior to make market entry unprofitable (deterred entry) (Tirole, 1988, chap. 8). In the context of downscaling banks, entry costs are mainly comprised of development of new business strategies, new lending instruments, and staff training in order to be capable of serving smaller and more opaque firms. With a dominant microfinance sector, conventional financial institutions may not find it profitable to invest in such new strategies and instruments and as a result, they may abstain from entering these market segments (blockaded or deterred entry).

The third mechanism is concerned with diversion of funds from the conventional financial sector to microfinance. Insights from several countries confirm that MFIs use external funding from commercial banks to expand activities (e.g. Hermes et al., 2011; Isern & Porteous, 2005). National policies and schemes that channel funds into priority sectors often target micro and small enterprises as well and thus potentially aggravate the diversion of resources from conventional finance towards microfinance usage. One example for a relatively strict regulative requirement is in India where banks have to lend at least 40 percent of their portfolio to the priority sector, which includes micro and small enterprises (Banerjee & Duflo, 2014). In their critique of microfinance, Bateman and Chang (2012) argue that banks may consider investments in microfinance more profitable than providing SME loans. Hence, banks may use their limited funds to refinance MFIs rather than increasing their SME loan portfolio even though SMEs have a significantly higher potential to contribute to economic growth and development.

Combining the first part of the graduation problem (i.e. necessity of successful small firms to move from microfinance to conventional finance for sufficient loan sizes) with the three mechanisms outlining how competition by MFIs hampers SME finance by conventional financial institutions, leads to my main hypothesis. It states that the (positive) direct effect of MFIs on institutional credit by supplying microloans is outweighed by the (negative) indirect effect of amplifying the graduation problem.

Hypothesis 1: *A strong microfinance sector aggravates the constraints for SMEs to access institutional credit.*

Smaller firms are likely to be more affected. Firms in the process of graduating from microfinance to the conventional financial system are the ones least likely to meet the usual prerequisites for a bank loan, i.e. to possess a credit history, audited financial statements, fixed assets as collateral, and the like.

Hypothesis 2: *Smaller firms are more affected by the effects of the competition from the microfinance sector on SMEs' access to institutional credit.*

In line with the literature on commercialization of microfinance, the effects from competition between banks and MFIs should be more severe for countries where the microfinance loan portfolio is dominated by for-profit MFIs (Cull et al., 2014). The reason being that profit-driven MFIs are more likely to offer larger loan sizes (D'Espallier et al., 2017) and thus to engage in competition with the formal banking system.

Hypothesis 3: *Effects of the competition with the microfinance sector are more profound in countries where for-profit MFIs dominate the microfinance loan portfolio.*

Credit information sharing schemes, on the other hand, should reduce the effects of a strong microfinance sector on banks' SME lending activities. The reason is that they lessen information asymmetries by making data from firms' former lending relationships available to other financial institutions where these firms may apply for follow-up finance. Country-level evidence from Rwanda indicates that this also facilitates the graduation from microfinance to conventional loans (Agarwal et al., 2021).

Hypothesis 4: *Credit bureaus mitigate the effects of MFI competition on SMEs' access to institutional credit.*

2.4. Data

The dataset was constructed by combining firm-, MFI- and country-level data from different databases of the World Bank, the two most important being the Enterprise Surveys (ES) for firm-level data and the MIX Market for microfinance data.[12] The ES is a nationally representative firm-level dataset with repeated cross-sections. Formally registered firms with five or more employees are interviewed using a standardized questionnaire that allows for cross-country comparison. The sampled firms primarily belong to the manufacturing and services sectors – firms from agriculture or finance are excluded. MIX Market constitutes the

[12] Except for the ES data, all datasets are openly available. Since ES data must not be transferred to a third party, data will only be shared on request and with permission of the Enterprise Analysis Unit.

most comprehensive dataset on MFIs and is commonly used in studies on microfinance (Cull et al., 2014, 2018; Mersland & Strøm, 2010; Vanroose & D'Espallier, 2013).

Since this study builds on the ES dataset, their definition of SMEs is adopted. I subdivide the category 'small firms' into very small (<10 employees) and small firms (10-19) and the category 'medium-sized' firms into smaller medium-sized (20-39) and larger medium-sized firms (40-99) to allow for a more nuanced analysis across SMEs. In particular, this categorization enables an assessment of the graduation problem, as it comprises a sufficient number of firms in the relevant market segments (see Table 2.1): Almost 14,500 very small firms over which MFIs and banks may compete (see Section 2.2), almost 12,000 small firms facing the hypothesized graduation problem and roughly 10,000 smaller medium-sized and almost 9,000 larger medium-sized firms that should have grown beyond the graduation problem. On top of that, the sample is split relatively evenly across the five firm-size groups allowing for good estimates in every group. Three key variables in Table 2.1 underline that the firm-size groups behave as expected: access to loans, firm age and audited financial statements increase continuously towards the group of large firms.

Table 2.1: Distribution of Firms across the Five Firm-Size Groups as well as Mean and Standard Deviation (in Brackets) of Some Key Variables by Firm-Size Categories

	N	Access to finance	Firm size (employees)	Firm age (years)	Financial statements
Very small firms (1-9 employees)	14,498	0.238 (0.426)	6.307 (1.688)	14.409 (10.915)	0.253 (0.435)
Small firms (10-19 employees)	11,969	0.343 (0.475)	13.640 (2.798)	16.307 (12.329)	0.343 (0.475)
Smaller medium-sized firms (20-39 employees)	10,212	0.435 (0.496)	27.158 (5.509)	18.348 (13.824)	0.426 (0.495)
Larger medium-sized firms (40-99 employees)	8,717	0.532 (0.499)	61.293 (16.950)	21.154 (16.071)	0.532 (0.499)
Large firms (100 employees or more)	10,724	0.621 (0.485)	447.969 (919.292)	26.852 (21.028)	0.715 (0.451)
Total	56,120	0.415 (0.493)	104.603 (435.551)	18.956 (15.561)	0.436 (0.496)

Notes: Author's analysis based on data from Enterprise Surveys.

Several observations had to be removed prior to the analysis, either due to missing data (country-year cases only appearing in ES or MIX Market; countries with only one time period – i.e. lacking within-country variation) or in order to exclude spurious variation from the

analysis. For a very small set of countries, one or several leading MFIs stopped reporting such that the data show a sharp decline in MFIs' gross loan portfolio on the national level that cannot be substantiated by struggles of the respective MFIs or the national microfinance sector.[13] It was also confirmed that increases in the national MFI gross loan portfolio were not driven by MFIs starting to report to MIX Market during the study period.[14]

The resulting sample comprises 56,120 firm-level observations from 51 countries between 2002 and 2015 (for details see Table A2.1 in the Appendix). It is fairly balanced between low-, lower-middle income and upper-middle income countries, but includes only two high-income countries. Table 2.2 reports the summary statistics. About 42 percent of firms have access to a loan or line of credit. The median firm size is 21 employees, which together with the 75th percentile of 65 employees indicates that most firms in the sample belong to the SME segment. The relative size of microfinance (gross loan portfolio of MFIs relative to private credit) ranges from 0.002 percent to almost 30 percent with an average (median) of 4.8 percent (2.9). Hence, the relative importance of microfinance varies widely across countries: In a few countries, it seems not to play any role, while in many countries it accounts for a noteworthy share of overall private credit (especially when considering that both the number of loans and loan sizes tend to be much smaller in microfinance).

2.5. Regression Model

To answer the central question as to what extent microfinance affects the access of SMEs to institutional credit, a within estimator is employed. The chosen linear probability model (LPM)[15] builds on the approach of Love and Martínez Pería (2015) who study the effect of competition in the banking sector on firms' access to finance. Their regression equation is nested in my own and augmented by the *relative size of microfinance*, by additional controls

[13] For details on the removal criteria and the seven excluded country-year cases, see the Appendix: Figure A2.1 shows that decisions were straightforward and free from borderline cases.

[14] For details, see the Appendix. The only country for which the decision was not completely clear-cut is Burundi. It was confirmed that all results carry through when excluding Burundi (e.g. baseline effect is -0.476, p=0.002).

[15] The LPM is preferred over logit/probit-specifications since the latter are prone to the incidental variable problem when using an exhaustive set of fixed effects. I present a logit model as robustness check, though.

Table 2.2: Summary Statistics

Variable	Obs.	Mean	SD	Min	p25	p50	p75	Max
Firm-level variables								
Access to finance	56,120	0.415	0.493	0	0	0	1	1
Loans for working capital/ fixed assets	51,781	0.401	0.490	0	0	0	1	1
Financially unconstrained	36,876	0.549	0.498	0	0	1	1	1
Firm size (employees)	56,120	104.603	435.551	1	9	21	65	20,500
Firm age	56,120	18.956	15.561	1	9	15	23	311
Manufacturing	56,120	0.600	0.490	0	0	1	1	1
Exporter	56,120	0.248	0.432	0	0	0	0	1
Foreign-owned	56,120	0.081	0.273	0	0	0	0	1
Government-owned	56,120	0.005	0.072	0	0	0	0	1
Fin. statements	56,120	0.436	0.496	0	0	0	1	1
Country-level variables								
Relative size of microfinance	55,968	0.048	0.060	0.00002	0.003	0.029	0.064	0.293
Lerner index	53,477	0.290	0.113	-0.018	0.230	0.274	0.329	1.072
Priv. credit per GDP	56,120	0.387	0.247	0.039	0.198	0.336	0.503	1.119
Legal rights index	56,120	5.802	2.448	0	4	6	8	10
Bank branches	56,120	14.301	15.514	0.505	4.531	8.598	17.791	92.045
Credit bureau coverage	56,120	0.244	0.302	0	0	0.069	0.404	1
GDP per capita	56,120	4,570.234	3,882.296	223.404	1,300.841	3,077.315	6,584.981	14,475.150
Inflation	56,120	0.062	0.049	-0.013	0.028	0.054	0.081	0.306
For-profit portfolio	55,968	0.637	0.350	0	0.376	0.768	0.941	1

Note: Author's analysis based on the data sources listed in the text.

for *firm characteristics* and the *lending environment*, as well as by time dummies (see Table 2.3 for details):

$$\text{access}_{i,c,t} = \beta\ (\text{relative size of microfinance})_{c,t-2} + \delta_1\ (\text{firm characteristics})_{i,c,t} + \delta_2\ (\text{lending env.})_{c,t-1} + \delta_3\ (\text{macroeconomic env.})_{c,t-1} + \gamma_c + \gamma_t + \varepsilon_{i,c,t}$$

The dependent variable *access* is captured by a dummy variable that is one if firm *i* in country *c* at time *t* has a line of credit or a loan from a financial institution (institutional credit) and zero otherwise. I deliberately include MFI loans in my outcome variable since it does not matter whether lending occurs from an MFI or a conventional financial institution as long as firms have access to affordable and sufficient finance.[16]

The main interest lies in β as it measures the effect of microfinance on SMEs' access to finance. The key explanatory variable, *relative size of microfinance*, is measured by the national gross loan portfolio of MFIs relative to private credit. Private credit to GDP is the standard variable for the size and activity of the formal financial sector (Beck et al., 2000) and the national gross loan portfolio of all MFIs (relative to GDP) is the equivalent for the microfinance sector. Setting these two variables in relation provides a measure of the size and activity of microfinance relative to the size and activity of the conventional financial sector. The variation in this variable largely stems from developments in the microfinance sector (within-country correlation between changes in the relative size of microfinance and the size of (changes in) MFI loans per GDP amount to r=0.36 (r=0.64) compared to r = -0.03 (r = -0.28) for private credit per GDP).[17] I use within-country variation over time to estimate the effect. To isolate the effect from other

[16] Even though the source of finance does matter, for instance, with regard to loan conditions and access to follow-up finance, I do not differentiate between conventional and MFI loans for two main reasons. First due to theoretical concerns, as neglecting the direct effect of MFIs (provision of microloans and thus increasing access to finance) would overestimate the hypothesized (negative) effect resulting from an aggravation of the graduation problem. Second for pragmatic reasons, as in the ES data loan sources are coded as 'private commercial banks', 'state-owned banks or government agency', 'non-bank financial institutions' and 'other'. In the wake of commercialization of microfinance, MFIs have adopted different legal status – including full banking licenses – such that the ES categories do not allow for a clear-cut differentiation between MFI and conventional loans.

[17] As a robustness check, I follow the approach chosen in the literature on the role of structures of financial systems for economic growth (e.g. Levine & Zervos, 1998), and plug in *MFI loans per GDP* and *private credit per GDP* as separate explanatory variables. Results (unreported) are very similar: the effect of microfinance is negative and significant; a one-standard-deviation lowers the likelihood of having access to finance by 2.4 percentage (compared to 2.6 in my preferred specification).

Table 2.3: Description of Variables and Data Sources

Variable	Description and data source
Access	Dummy variable equal to one if firm has institutional credit, i.e. a line of credit or loan from a financial institution; from World Bank Enterprise Surveys (ES)
Loans for working capital/ fixed assets	Dummy variable equal to one if firm used loans to finance working capital and/or fixed assets in the last fiscal year; from ES
Financially unconstrained	Dummy variable equal to zero if firm's loan application was rejected or if the firm was discouraged from applying for credit (adverse loan conditions, complexity, expected rejection, etc.) and one if firm has access to credit; from ES
Rel. size of microfinance[+]	National gross loan portfolio of MFIs relative to private credit; private credit per GDP from World Bank's World Development Indicators (WDI); MFIs' gross loans is extracted from MIX Market (First, the gross loan variable is interpolated on the MFI-level to correct for the few missing values when MFIs did not report the gross loan portfolio in a particular year.[a] Second, the gross loan portfolio is summed over all reporting MFIs for the respective country and year to arrive at the country-year-level figures.[b])
[For-profit portfolio[+]]	Share of MFI loan portfolio (at country-year level) managed by MFIs without non-profit status; from MIX Market
Firm characteristics	
Firm size (employees)	Number of full-time employees (temporary, full-time employees are converted into permanent, full-time equivalents using the average length of such employment); from ES
Firm age	Age of firm (in years); from ES
Manufacturing	Dummy variable equal to one if firm is in the manufacturing sector;[c] from ES
Exporters	Dummy variable equal to one if at least 10 percent of firm's output are exported (directly or indirectly); from ES
Foreign-owned	Dummy variable equal to one if firm is owned to 50 percent or more by foreign organizations; from ES
Government-owned	Dummy variable equal to one if firm is owned to 50 percent or more by the government; from ES
Audited financial statements[+]	Dummy variable equal to one if firm's financial statements are checked and certified by an external auditor; from ES
Lending environment	
Lerner index	Lerner index as competition measure in the banking sector (higher values corresponding to lower competition); from World Bank's Global Financial Development Database
Private credit per GDP[+]	Domestic credit to the private sector as percent of the GDP; from WDI
[Bank branches[+]]	Number of commercial bank branches per 100,000 adults;[d] from WDI
[Legal rights index[+]]	Strength of legal rights index: higher scores indicating better protection of borrowers' and lenders' rights (methodology from 2005-14 with a score from 0 to 10);[d] from World Bank's Doing Business Indicators
[Credit bureau coverage]	Number of individuals and firms included in credit bureaus as share of the adult population;[d] from World Bank's Doing Business Indicators
Macroeconomic environment	
Inflation	Annual growth rate of the consumer price index; from WDI
GDP per capita	Gross domestic product per capita (in constant US dollars); from WDI

[+] These variables have not been part of the regression equation in Love and Martínez Pería (2015), which underlies my model.

[.] Variables in squared brackets are only included in the robustness checks or interaction analyses.

[a] Since this only happened for very few MFIs, interpolation hardly differs from the uncorrected gross loan variable.

[b] Note that for Indonesia 2015 values were imputed for the national gross loan portfolio of MFIs since (i) Indonesia is an interesting country with a strong microfinance sector and almost 2,500 observations in the ES dataset and (ii) there is a clear trend over time until 2014 that facilitates imputation for 2015. Details of the conservative imputation procedure are outlined in the Appendix. Note that results hardly change when dropping Indonesia (main effect is -0.426 with a standard error of 0.151 and p=0.006).

[c] The manufacturing dummy was constructed from the ISIC codes. To reduce missings, additional information was used from the strata variable and from a meta-variable (indicating the use of the manufacturing questionnaire).

[d] Some values had to be imputed for credit bureau coverage (4% of observations), strengths of legal rights index (4%) and commercial bank branches (8%) in order to not lose observations. In most cases, very weak assumptions were required: For instance, if credit bureau coverage was zero in 2008, it is most likely to be zero for previous years as well. Only for some exceptions, I employed linear extrapolation and cautiously verified its aptness. These variables were nevertheless not used in the baseline regression. Details of the imputation are presented in the Appendix.

confounding variables, the model controls for the influence that *firm characteristics*, the *lending environment* and the *macroeconomic environment* may have on access to finance (included variables along with their descriptions and sources are presented in Table 2.3). Unobservable differences between countries and time periods are controlled for by including country fixed effects γ_c and time dummies γ_t.[18] As in the underlying model by Love and Martínez Pería (2015), standard errors are clustered at the country-year level. In the robustness check, I cluster standard errors at the country level to account for potential bias in standard errors through serial correlation (Bertrand et al., 2004).

I assume that the measure for the relative size of the microfinance sector and the other country-level variables are exogenous from the dependent variable. Following Love and Martínez Pería (2015), I lag the country-level variables in order to lessen potential reverse-causality problems. In my analysis, however, the issue is aggravated by the fact the firms' access to finance is probably related to the size and activity of the conventional financial system, which may, in turn, affect (or have affected) the size of the microfinance sector. Hence, I undertake an additional effort to address the reverse-causality issue through an IVs approach as a robustness check: The potentially endogenous variable *relative size of microfinance* is instrumented by its first, second and third order lags.

Compared to the other country-level variables, the key explanatory variable, *relative size of microfinance*, is lagged once more since banks' (potential) entry into lower market segments most likely requires some lead time. The strategic decision to downscale is based on the market situation, which is influenced by the size and strength of the microfinance sector;[19] and since data on MFI lending only appears annually, it can only be based on the market situation of the previous period (t-1). If conventional financial institutions decide to downscale, they need to adapt their business strategy and develop suitable lending instruments for serving smaller and

[18] The included time dummies capture the periods before, during and after the financial crisis 2007/08 (i.e. cover the years 2002-2006, 2007-2010 and 2011-2015).

[19] Competition in the banking sector incentivizes banks to downscale (see Section 2.2). However, the downscaling decision ultimately hinges on profitability considerations influenced by the situation in these market segments; for instance, whether upscaling MFIs narrow down or contest these segments. Hence, I see the relative size of microfinance as key to banks' downscaling decision (and lag it twice for the reasons given above). Whereas I see variables of the lending environment (e.g. for competition: Lerner index or private credit per GDP) primarily as controls for confounding factors for firms' access to institutional credit (and thus only lag them once like the other country-level controls).

more opaque firms – as discussed in the conceptual framework (Section 2.3). Because of this lead time, downscaling banks probably only enter lower market segments in the subsequent period (t+1). For these reasons, I prefer two lags for the key explanatory variable, but present results for a single lag as a robustness check (correlation of r = 0.96 between the first and second lag).

2.6. Results

2.6.1. Relative Size of the Microfinance Sector and Firms' Access to Institutional Credit

The baseline regression, presented in the first column of Table 2.4, supports the first hypothesis: The effect of the relative size of microfinance on firms' access to institutional credit is negative and significant at the one-percent level. Columns 2-9 report robustness checks for my baseline regression and arrive at similar effect sizes and significance levels. Results are robust when using only one lag for the key explanatory variable (Column 2), when clustering standard errors at the country level (Column 3) to account for the potential influence of serial correlation (Bertrand et al., 2004), when including additional controls for the lending environment (Column 4), or when excluding firms that do not make use of loans as they self-report not to need additional capital (Column 5). I further show that results are robust when using a logit model (Column 6) or when giving each country the same weight (Column 7). The robustness checks also comprise alternative measures for financial access as dependent variable. Column 8 employs a dummy being one if a firm used loans to finance working capital and/or fixed assets in the last fiscal year. Building on Popov and Udell (2012), firms are financially constrained if their loan application was rejected or if they are discouraged from borrowing by adverse loan conditions, complex procedures, expected rejection, etc.; to allow for simple comparison, I recode this dummy in Column 9 as being one if firms are unconstrained. Similar results materialize in these robustness checks.

The estimated effect β of the relative size of the microfinance sector amounts to -0.429. This implies that a change of the relative size of microfinance by one standard deviation (0.060) decreases the probability of access to institutional credit by about 2.6 percentage points. Alternatively, when moving from the country with the smallest relative size of microfinance in

Table 2.4: Baseline Regression Results and Robustness Checks

	Access to finance							Alternative measures for access to finance		Access to finance
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Baseline	Single lag	SE clustered at country level	Additional controls	Excluding firms with-out capital needs	Logit (marginal effects)	Same weight for all countries	Loans for working capital/ fixed assets	Financially un-constrained	IV
Rel. size microfinance	-0.429***	-0.319**	-0.429**	-0.363**	-0.368**	-0.353***	-0.338***	-0.454**	-0.314*	-0.423***
	(0.151)	(0.143)	(0.210)	(0.165)	(0.160)	(0.133)	(0.123)	(0.190)	(0.189)	(0.137)
Log firm size	0.0658***	0.0659***	0.0658***	0.0656***	0.0683***	0.0623***	0.0677***	0.0569***	0.0705***	0.0673***
	(0.00436)	(0.00443)	(0.00517)	(0.00438)	(0.00471)	(0.00414)	(0.00412)	(0.00438)	(0.00474)	(0.00457)
Log firm age	0.00883*	0.00926**	0.00883*	0.00929**	0.00820*	0.00902**	0.00901*	0.00723	0.00564	0.00592
	(0.00452)	(0.00457)	(0.00523)	(0.00452)	(0.00471)	(0.00449)	(0.00471)	(0.00438)	(0.00496)	(0.00511)
Manufacturing	0.00348	0.00363	0.00348	0.00263	-0.0133*	0.00347	0.00292	0.00255	-0.0293***	0.00115
	(0.00617)	(0.00623)	(0.00642)	(0.00619)	(0.00729)	(0.00601)	(0.00658)	(0.00583)	(0.00757)	(0.00708)
Exporter	0.0506***	0.0500***	0.0506***	0.0510***	0.0402***	0.0433***	0.0492***	0.0679***	0.0446***	0.0491***
	(0.00765)	(0.00773)	(0.00896)	(0.00772)	(0.00710)	(0.00714)	(0.00808)	(0.0111)	(0.00659)	(0.00909)
Foreign-owned	-0.129***	-0.127***	-0.129***	-0.128***	-0.0533***	-0.126***	-0.127***	-0.145***	-0.0221**	-0.127***
	(0.0135)	(0.0135)	(0.0166)	(0.0135)	(0.0101)	(0.0125)	(0.0132)	(0.0144)	(0.0100)	(0.0150)
Government-owned	-0.146***	-0.148***	-0.146***	-0.145***	-0.118***	-0.150***	-0.158***	-0.0784	-0.123***	-0.144***
	(0.0301)	(0.0313)	(0.0357)	(0.0301)	(0.0345)	(0.0293)	(0.0322)	(0.0485)	(0.0371)	(0.0310)
Fin. statements	0.0796***	0.0802***	0.0796***	0.0794***	0.0860***	0.0781***	0.0861***	0.0817***	0.0916***	0.0762***
	(0.00933)	(0.00944)	(0.0114)	(0.00927)	(0.0117)	(0.00967)	(0.00967)	(0.00818)	(0.0128)	(0.00905)
Lerner index	-0.181	-0.173	-0.181	-0.266*	-0.239	-0.153	-0.0810	0.00482	-0.154	-0.0677
	(0.145)	(0.145)	(0.204)	(0.146)	(0.171)	(0.117)	(0.114)	(0.0817)	(0.133)	(0.0727)

Priv. credit per GDP	0.154 (0.156)	0.173 (0.155)	0.154 (0.217)	0.226 (0.156)	0.162 (0.156)	0.183 (0.150)	0.194 (0.143)	-0.139 (0.130)	0.143 (0.126)	-0.0438 (0.131)
Log GDP per capita	0.118 (0.116)	0.119 (0.116)	0.118 (0.161)	0.0600 (0.126)	0.262** (0.126)	0.109 (0.126)	0.0149 (0.109)	-0.0640 (0.104)	-0.0281 (0.118)	0.167*** (0.0625)
Inflation	0.236 (0.182)	0.221 (0.186)	0.236 (0.257)	0.216 (0.176)	0.0206 (0.159)	0.174 (0.187)	0.173 (0.165)	0.512** (0.205)	0.0267 (0.174)	0.354** (0.145)
Legal rights index				0.0149** (0.00715)						
Bank branches				0.00101 (0.00192)						
Credit bureau coverage				-0.0565 (0.0390)						
Observations	56,120	55,374	56,120	56,120	41,603	56,120	56,120	51,197	36,876	44,139
R^2	0.216	0.214	0.216	0.217	0.284	0.179	0.202	0.167	0.305	0.209
Countries	51	50	51	51	51	51	51	50	51	41

Regressions employ country fixed effects, time dummies and robust standard errors clustered at the country-year level. Data sources are described in Table 2.3. The dependent variable *Access to finance* is a dummy variable capturing whether the firm has a loan or line of credit. The two alternative measures for access to finance indicate whether the firm has *loans for working capital/fixed assets* or whether the firm is *financially unconstrained*. *Relative size of microfinance* equals the national gross loan portfolio of MFIs relative to private credit. *Log firm size* is the logarithm of the firm size (number of employees). *Log firm age* is the logarithm of the firm's age (in years). *Manufacturing* is a dummy variable capturing whether the firm belongs to the manufacturing sector. *Exporter* is a dummy variable measuring whether the firm exports at least 10% of its output. The ownership dummies (*...-owned*) identifies the owner, whereas the base category is private domestic ownership. *Financial statements* is a dummy variable indicating whether the firm has an audited financial statement. The *Lerner index* measures bank competition (higher values corresponding to lower competition). *Private credit per GDP* captures depth of the conventional financial system. *Log GDP per capita* is the logarithm of the gross domestic product per capita (in constant dollars). *Inflation* measures the annual growth rate of the consumer price index. The strength of *legal rights index* measures the protection of borrowers' and lenders' rights. *Bank branches* is the number of commercial bank branches per 100,000 adults. *Credit bureau coverage* measures the proportion of the adult population listed in credit bureau databases. For robustness checks, Column (2) uses just one lag for the key explanatory variable, (3) robust standard errors clustered at the country level, (4) additional controls, (5) exclusion of firms not making use of loans as they have sufficient capital, (6) a logit model (average marginal effects are reported for comparison), (7) same weights for every country, (8) *loans for working capital/fixed assets* as dependent variable, (9) *financially unconstrained* as dependent variable, and (10) an IV approach instrumenting the *relative size of microfinance* by its first, second and third order lags.

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

the sample to that with the largest, the respective probability falls by 12.6 percentage points. The effect may be small for an average country in the sample where 41.5 percent of firms have access to finance from banks, but is more important in the context of low-income countries where only 24.5 percent of firms enjoy such a privilege.

The control variables included in the baseline regression and the robustness checks mostly exhibit the expected signs. Larger and older firms as well as firms with audited financial statements have significantly better access to finance. The effect of the manufacturing dummy is positive, but very small and insignificant. In line with Love and Martínez Pería (2015), firms with private domestic ownership are found to have significantly better access to loans. A more competitive and deeper conventional financial system, captured by the Lerner index and private credit per GDP, also mitigates firms' financing constraints (yet both are (mostly) insignificant). With regard to the macroeconomic environment, firms in wealthier countries (higher GDP per capita) are better off, but the effect is only significant in some robustness checks. Surprisingly there is also a positive sign for inflation suggesting that inflation rates above the long-term national average are supposed to improve firms' access to finance. A model with within and between effects puts this into perspective (unreported): The between effect of inflation is negative indicating that higher average levels of inflation are harmful for firms' access to finance.

The analysis so far assumed that the relative size of the microfinance sector is exogenous from firms' access to institutional credit. However, firms' access to finance is mainly influenced by the size and activity of the conventional financial system, which may, in turn, affect the (relative) size of microfinance. Hence, reverse causality may enter the picture. To account for that, the potentially endogenous variable is instrumented by its first, second and third order lags. As can be seen in Column 10 of Table 2.4, this IV approach arrives at a similar effect size (-0.423) and significance level (p=0.002) in support of the main finding of this study.

2.6.2. Heterogeneous Effects by Firm Size

Table 2.5 presents the findings with regard to the second hypothesis concerning firm size. The interaction between the key explanatory variable and firm size has the expected positive sign such that the negative effect of microfinance on firms' access to institutional credit decreases with increasing firm size. However, the effect is insignificant (Column 1; p=0.355).

Table 2.5: Regressions Including the Interaction of Relative Size of Microfinance with Log-Transformed Firm Size and Firm-Size Categories

	Access to finance	
	(1)	(2)
Rel. size microfinance	-0.574**	-0.262
	(0.221)	(0.184)
Rel. size microfinance X log firm size	0.0476	
	(0.0513)	
Log firm size	0.0637***	
	(0.00561)	
Rel. size microfinance X (<10 empl.)		-0.146
		(0.184)
Rel. size microfinance X (10-19 empl.)		-0.332**
		(0.148)
Rel. size microfinance X (20-39 empl.)		-0.138
		(0.121)
Rel. size microfinance X (100+ empl.)		-0.116
		(0.136)
Dummy (<10 employees)		-0.179***
		(0.0197)
Dummy (10-19 employees)		-0.108***
		(0.0143)
Dummy (20-39 employees)		-0.0536***
		(0.0106)
Dummy (100+ employees)		0.0602***
		(0.00996)
Log firm age	0.00884*	0.0112**
	(0.00451)	(0.00436)
Manufacturing	0.00322	0.00203
	(0.00618)	(0.00609)
Exporter	0.0507***	0.0582***
	(0.00763)	(0.00738)
Foreign-owned	-0.129***	-0.121***
	(0.0134)	(0.0130)
Government-owned	-0.147***	-0.133***
	(0.0300)	(0.0295)

Fin. statements	0.0796***	0.0831***
	(0.00933)	(0.00913)
Lerner index	-0.181	-0.177
	(0.145)	(0.148)
Priv. credit per GDP	0.155	0.160
	(0.156)	(0.157)
Log GDP per capita	0.119	0.0979
	(0.116)	(0.118)
Inflation	0.237	0.230
	(0.182)	(0.181)
Observations	56,120	56,120
R^2	0.217	0.216
Countries	51	51

Regressions employ country fixed effects, time dummies and robust standard errors clustered at the country-year level. Data sources are described in Table 2.3. The dependent variable *Access to finance* is a dummy variable capturing whether the firm has a loan or line of credit. *Relative size of microfinance* equals the national gross loan portfolio of MFIs relative to private credit. *Log firm size* is the logarithm of the firm size (number of employees); five firm-size categories are used alternatively as a factorial variable in Column 2. *Log firm age* is the logarithm of the firm's age (in years). *Manufacturing* is a dummy variable capturing whether the firm belongs to the manufacturing sector. *Exporter* is a dummy variable measuring whether the firm exports at least 10% of its output. The ownership dummies (*…-owned*) identifies the owner, whereas the base category is private domestic ownership. *Financial statements* is a dummy variable indicating whether the firm has an audited financial statement. The *Lerner index* measures bank competition (higher values corresponding to lower competition). *Private credit per GDP* captures depth of the conventional financial system. *Log GDP per capita* is the logarithm of the gross domestic product per capita (in constant dollars). *Inflation* measures the annual growth rate of the consumer price index.

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

One reason for the insignificance could be that the model wrongly imposes a linear structure on the interaction. Significant results materialize for firms with 10-19 employees (Column 2; p=0.028) when allowing for a nonlinear relationship. The nonlinearity is introduced by interacting the key explanatory variable with a factorial variable for the five firm-size categories (using larger medium-sized firms with 40-99 employees as base category)[20]. The left panel in Figure 2.2 visualizes the resulting average marginal effects for the different firm-size groups along with the 90-, 95- and 99-percent confidence intervals. The effect is most negative (-0.594) for firms with 10-19 employees and thereafter steadily increases (i.e. becomes smaller) before taking a small surprising drop for large firms. Hence, there is partial support for Hypothesis 2. The findings are robust to alternative specifications (single lag for key explanatory, standard errors clustered at country level, additional country-level controls, or exclusion of firms not

[20] Larger medium-sized firms are chosen as base category since these largest SMEs have grown beyond the graduation problem and thus provide the most valid comparison group for the other SME categories. Effects on large firms might not be completely comparable for reasons outlined at the end of this subsection.

making use of loans as they self-report not to need additional capital; see Table A2.2 and Figure A2.7 in the Appendix).

Figure 2.2: Average Marginal Effects of the Relative Size of the Microfinance Sector by Firm-Size Categories (Left Panel); Share of Firms with Institutional Credit by Firm Size (Right Panel)

Note: Author's analysis based on the data sources discussed in the text.

Since the dependent variable, access to finance, captures institutional credit and does not differentiate between loans originating in the microfinance or the conventional financial sector, these findings may be interpreted as follows. Very small firms with less than 10 employees still have access to loans of appropriate size in the microfinance sector (see Section 2.2) and thus stand to benefit from microfinance more. Small firms with 10-19 employees, however, that might try to graduate from MFIs to larger follow-up loans in the conventional financial system, may find it hard to access such finance because of the negative effect of competition by MFIs on banks' SME lending; also, they do not get appropriate loan sizes from MFIs and thus stand to be more negatively affected by microfinance.

This interpretation is further buttressed by the fact that the share of SMEs with institutional credit steadily increases in my sample with increasing firm size as depicted in the right panel of Figure 2.2. The jump between firms with less than 10 employees and firms with 10-14 employees demonstrates that very small firms with less than 10 employees are significantly more constrained with regard to institutional credit. Hence, if it were not for the described graduation problem from microfinance to the conventional financial sector, I would expect firms with less than 10 employees to face the worst impact. However, in line with the graduation problem, I find small firms with 10-19 employees that need to move from microfinance to larger loans in the conventional financial system to be most negatively affected by the relative size of the microfinance sector.

As can be seen in the left panel, the negative effect of microfinance becomes less severe when moving to smaller medium-sized firms (-0.401) and larger medium-sized firms (-0.262) as these are probably less opaque and more likely to meet the usual prerequisites for a bank loan such as a credit history, audited financial statements and fixed assets as collateral (and thus being less affected by the graduation problem). A one-standard-deviation change in the relative size of microfinance (or moving from the country with the smallest relative size of microfinance to the largest) lowers the probability of small firms' access to institutional credit by about 3.6 (17.4) percentage points, which is more than twice the effect size of larger medium-sized firms.

Large firms not exhibiting the least negative average marginal effect can be rationalized by the fact that larger firms are less dependent on loans. They can generally choose from a more diverse set of financing options that include, amongst others, capital markets and equity finance (e.g. Demirgüç-Kunt et al., 2020). Stylized facts from my sample support this view: Over 70 percent of large firms without a loan explain non-application for credit by 'no need for a loan', while this share continuously diminishes to 45 percent for very small firms. Only 20 percent of large firms without a loan perceive finance as a major or very severe obstacle, while this number rises continuously to 37 percent for very small firms. Since this may distort (marginal) effects for large firms and SMEs are of main interest in this study, I do not present and discuss figures for large firms in the rest of the paper.

2.6.3. Heterogeneous Effects by Profit Orientation in Microfinance and Credit Bureau Coverage

I expect the effect size to differ according to the degree of profit orientation in the national microfinance sector and according to the credit information infrastructure as hypothesized in Hypotheses 3 and 4. Table 2.6 reports the respective results. Profit orientation is captured by the share of the national MFI portfolio held by for-profit MFIs in the respective country-year. Contrary to the theoretical arguments, the interaction effect with the key explanatory variable is positive, but highly insignificant (Column 1; p=0.798). Similar results emerge in the robustness check (see Table A2.3 in the Appendix). Thus, I do not find support for Hypothesis 3. Potentially, the direct effect of supplying institutional credit weighs stronger for for-profit MFIs (than the indirect effect of aggravating the graduation problem) as they provide loans of larger sizes and longer maturities that are more comparable to conventional loans.

Credit bureau coverage mitigates the negative effects of a strong microfinance sector as depicted in Table 2.6. While the interaction effect with the key explanatory variable exhibits the right sign, it is not significant either (Column 2; p=0.646). This is not too surprising given that in many LMICs one central weakness of credit bureaus is the non-recording of MFI loans. In those countries, MFI borrowers cannot build up credit histories that can be used when applying for loans at conventional financial institutions. To assess the potential of credit bureaus in mitigating the graduation problem, one has to focus on countries with 'inclusive' credit bureaus that do record MFI lending activities. Since such data on credit bureaus is not (openly) available on the country level, I employ subsample regressions at the regional level differentiating between regions where most countries record MFI loans in credit bureaus and regions where most countries do not. In regions where only a minor fraction of countries has such inclusive credit bureaus (25-35%),[21] the interaction is neither positive nor significant (Column 4). Only for the region where most countries (60%) capture MFI loans in their credit information sharing system (i.e. Europe & Central Asia), credit bureaus mitigate the negative effect of microfinance on firms' access to institutional credit (Column 3). The findings are robust to alternative specifications (single lag for key explanatory, standard errors clustered at country level, additional country-level controls, or exclusion of firms not making use of loans as they self-report not to need additional capital; see Table A2.4 in the Appendix).

Table 2.6: Regressions Including the Interaction of Relative Size of Microfinance with Profit Orientation in Microfinance and Credit Bureau Coverage

	Access to finance			
	(1)	(2)	(3) Regions where MFI reporting to credit bureaus is widespread	(4) Regions where MFI reporting to credit bureaus is uncommon
Rel. size of microfinance	-0.488**	-0.463***	-0.833***	-0.342***
	(0.216)	(0.125)	(0.303)	(0.127)
Rel. size micro-finance X for-profit portfolio	0.0983			
	(0.383)			
Rel. size micro-finance X credit bureau coverage		0.421	2.367***	-1.832
		(0.914)	(0.595)	(1.885)

[21] These five regions are East Asia & Pacific, Latin America & Caribbean, Middle East & North Africa, South Asia, and sub-Saharan Africa.

Credit bureau coverage		-0.0700 (0.0812)	-0.178*** (0.0638)	0.199 (0.187)
Log firm size	0.0658*** (0.00435)	0.0656*** (0.00437)	0.0664*** (0.00746)	0.0654*** (0.00515)
Log firm age	0.00883* (0.00452)	0.00896** (0.00452)	-0.00111 (0.00771)	0.00999* (0.00526)
Manufacturing	0.00349 (0.00618)	0.00329 (0.00618)	0.000811 (0.00882)	0.00450 (0.00776)
Exporter	0.0505*** (0.00764)	0.0506*** (0.00766)	0.0591*** (0.0156)	0.0473*** (0.00846)
Foreign-owned	-0.128*** (0.0135)	-0.128*** (0.0135)	-0.135*** (0.0238)	-0.126*** (0.0160)
Government-owned	-0.146*** (0.0301)	-0.145*** (0.0301)	-0.223*** (0.0471)	-0.110*** (0.0335)
Fin. statements	0.0796*** (0.00934)	0.0793*** (0.00933)	0.0661*** (0.0164)	0.0820*** (0.0103)
Lerner index	-0.181 (0.147)	-0.180 (0.154)	-0.456* (0.254)	-0.0726 (0.145)
Priv. credit per GDP	0.159 (0.163)	0.193 (0.143)	0.0267 (0.105)	0.354 (0.297)
Log GDP per capita	0.118 (0.117)	0.101 (0.129)	0.0533 (0.144)	0.00172 (0.159)
Inflation	0.228 (0.186)	0.247 (0.186)	0.175 (0.343)	0.551* (0.284)
Observations	56,120	56,120	14,887	41,233
R^2	0.216	0.217	0.134	0.248
Countries	51	51	16	35

Regressions employ country fixed effects, time dummies and robust standard errors clustered at the country-year level. Data sources are described in Table 2.3. The dependent variable *Access to finance* is a dummy variable capturing whether the firm has a loan or line of credit. *Relative size of microfinance* equals the national gross loan portfolio of MFIs relative to private credit. *For-profit portfolio* captures the share of the national MFI portfolio held by profit-oriented MFIs. *Credit bureau coverage* measures the proportion of the adult population listed in credit bureau databases. *Log firm size* is the logarithm of the firm size (number of employees). *Log firm age* is the logarithm of the firm's age (in years). *Manufacturing* is a dummy variable capturing whether the firm belongs to the manufacturing sector. *Exporter* is a dummy variable measuring whether the firm exports at least 10% of its output. The ownership dummies (*…-owned*) identifies the owner, whereas the base category is private domestic ownership. *Financial statements* is a dummy variable indicating whether the firm has an audited financial statement. The *Lerner index* measures bank competition (higher values corresponding to lower competition). *Private credit per GDP* captures depth of the conventional financial system. *Log GDP per capita* is the logarithm of the gross domestic product per capita (in constant dollars). *Inflation* measures the annual growth rate of the consumer price index. The last two columns are subsample regressions for regions where most countries record MFI lending activities in credit bureaus (Europe and Central Asia; Column 3) and for regions where most countries do not (all other regions; Column 4).

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The positive effect of credit bureaus in the subsample analysis is both statistically significant and economically relevant. In a country with low credit bureau coverage (0%, i.e. one standard deviation (30.2 percentage points) below the average of 24.4%), a one-standard-deviation change in the relative size of microfinance lowers the probability of access to institutional credit by 5.0 percentage points, while in a country with high credit bureau coverage (54.6%) the effect becomes positive. This means that such an environment of good credit information infrastructure can reverse the negative effect of microfinance and instead increase the probability of firms having access to institutional credit by 2.8 percentage points (if MFI lending is recorded at credit bureaus). Differentiating the effect further by the five firm-size categories shows that except for very small firms, all other firms significantly benefit from increased credit bureau coverage (and effect sizes are relatively similar across these firm-size categories as shown in Table A2.5 in the Appendix). This also means that the group of firms with 10-19 employees, which is most vulnerable to the negative effect of microfinance, is helped during the graduation process to the conventional financial system by credit information infrastructure. The findings are in line with evidence from Rwanda (Agarwal et al., 2021) and support Hypothesis 4.

2.7. Conclusion

Theoretical and empirical work details the upscaling in the microfinance industry, which in combination with downscaling banks has resulted in competition between MFIs and the conventional financial system. Existing empirical evidence shows that MFIs adapt their behavior in response to the strength and activity of the conventional financial sector. Using firm-, MFI- and country-level data almost exclusively from LMICs, I am the first to present insights how this competition also affects the SME financing activities in the conventional financial sector. This is important since upscaling MFIs may discourage conventional banks from moving down the market and developing suitable lending instruments for smaller firms. As an unintended consequence of microfinance, firms' access to institutional credit (of sufficient size) may thus be worsened: Small firms may fail to graduate from microfinance and fail to get follow-up finance in the conventional financial system when they need loans of larger sizes in order to continue their growth and development.

The findings indicate that the relative size of the microfinance sector significantly affects firms' access to finance. A stronger and more active microfinance sector aggravates the financing

constraints of SMEs. These results are robust to a range of different specifications, including an IV approach in response to potential reverse causality concerns. Effects differ by characteristics of the firms and the credit information infrastructure. Small firms with 10-19 employees are most severely affected and thereafter the negative effect becomes smaller with increasing firm size. Credit bureaus mitigate the negative effect of microfinance in regions where MFI lending is recorded in the respective facilities for sharing credit information. For these regions, good credit bureau coverage even turns the effect positive, which indicates that good credit information infrastructure can actually harness microfinance to improve SMEs' access to institutional credit and thus facilitate graduation from microfinance to the conventional financial system.

This paper reveals certain tensions between microfinance and SMEs' access to external finance – especially for small firms. In order to mitigate these unintended consequences of microfinance, decision-makers have to consider means that ensure the sector's compatibility with the conventional financial system. Graduation from microfinance to follow-up loans in the formal financial sector can be facilitated, for instance, by improving credit bureau coverage and by requiring MFIs of a certain size or legal status to report to credit bureaus. Yet more research is needed to better understand the interrelations between microfinance and the conventional financial system. This requires both in-depth country case studies and cross-country analyses with longer time dimensions and/or panel structure that allow for advanced estimation strategies.

A.2 Appendix

The Appendix presents more detailed information on avoiding spurious variation (A2.1), imputation of national gross loan portfolio of MFIs for Indonesia 2015 (A2.2), imputation of control variables in the robustness check (A2.3), country-year cases included in the analysis (A2.4), robustness checks for Hypothesis 2 (A2.5) and for Hypotheses 3 and 4 (A2.6), and on subsample regressions by firm-size categories for the credit bureau analysis (A2.7). The order is determined by the appearance of the respective topic in the main article.

A2.1 Avoiding Spurious Variation from Discontinued or New Reporting of MFIs to MIX Market

A2.1.1 Exclusion of Country-Year Cases Based on Discontinued Reporting to MIX Market

The rationale for excluding some country-year cases is not to introduce spurious variation into the analysis. This could happen in cases where the MIX Market data suggests a sharp decline in the national gross loan portfolio of MFIs that is not based on real developments on the ground, but goes back to one (or several) leading MFI(s) no longer reporting to MIX. The challenge is to differentiate such a situation from a decline of microfinance based on individual MFIs struggling or on an industry-wide crisis. To do so, country-year cases with discontinued reporting were identified by checking three different areas: First, one (or several) MFIs stopped reporting so that the gross loan portfolio of MFIs on the national level dropped by at least 50 percent. Second, the sharp decline was not foreshadowed by negative developments in the performance of the respective MFI(s) or the national microfinance sector as a whole. Third, the decline occurred at a relevant point in time for the national microfinance industry, i.e. when the national gross loan portfolio of MFIs amounted to at least one third of its maximum value.

The country-year cases that I excluded based on this procedure are Russia 2012, Sudan 2014, Thailand 2016, Uruguay 2006, 2010, and 2017. The following visualizations of the evolution of the national microfinance gross loan portfolio (Figure A2.1) underline that the decisions are very straightforward and free from borderline cases (the vertical lines show the last year before the leading MFI(s) stopped reporting).

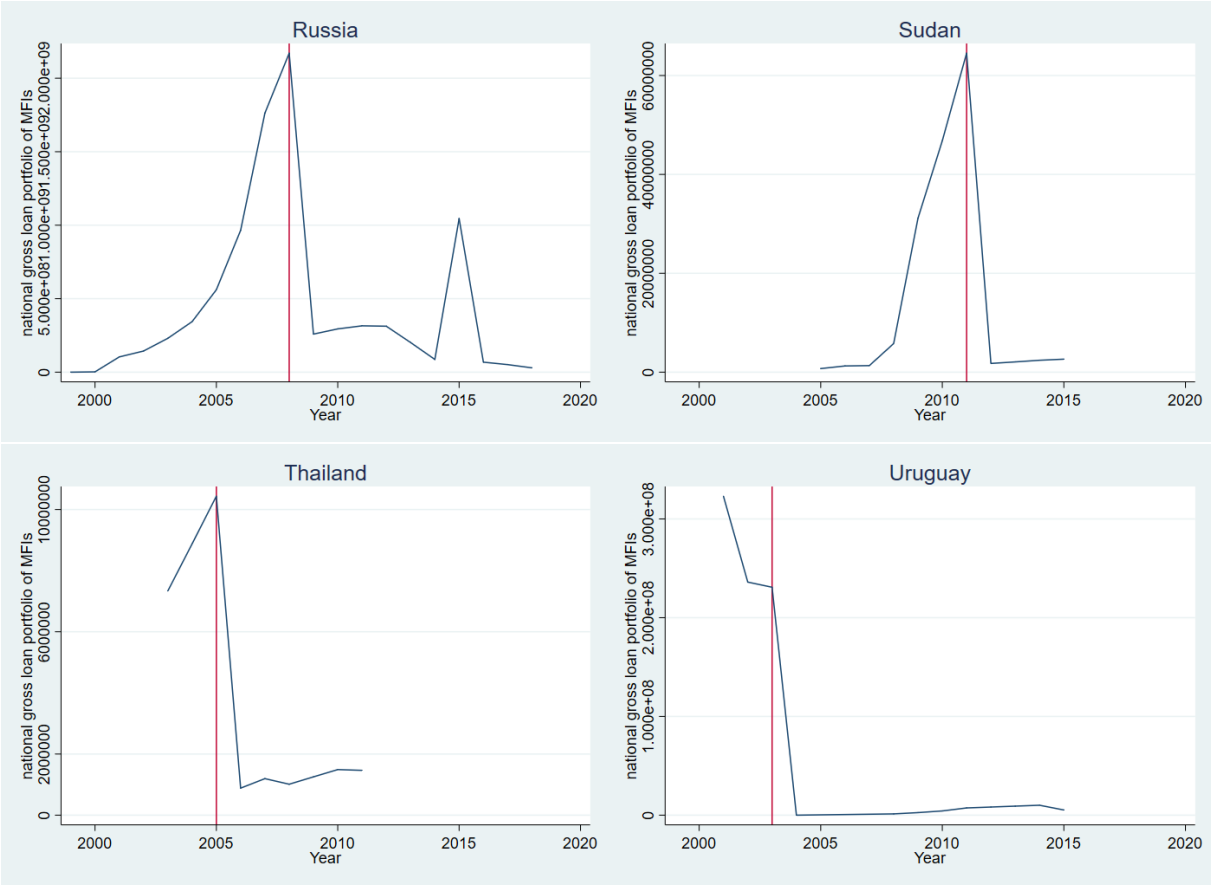

Figure A2.1: National Gross Loan Portfolio of MFIs for Countries with Discontinued Reporting by Leading MFI(s)

Note: Author's analysis based on MIX Market data.

A2.1.2 Checking for Potential Problems from Newly Reporting MFIs

Analogous criteria were applied to identify country-year cases in which the increase in the national gross loan portfolio of MFIs is caused by one or several MFIs that started reporting to MIX Market.

First, one (or several) MFIs started reporting so that the gross loan portfolio of MFIs on the national level increased by at least 50 percent. Second, the growth trends of newly reporting MFIs indicate that the national gross loan portfolio should have been significantly higher in the previous country-year case for which there is Enterprise Surveys (ES) data. Third, the increase occurred at a relevant point in time for the national microfinance industry, i.e. when the national gross loan portfolio of MFIs amounted to at least one third of its maximum value.

The only country, where the decision based on these criteria is not completely clear-cut, is Burundi. For this country, criteria one and three are met. Yet extrapolation of the loan portfolios of MFIs that started reporting in the period between the ES rounds (2006 and 2014), results only in a slightly higher value for the national gross loan portfolio of MFIs in 2006 as depicted in Figure A2.2. Hence, Burundi is unlikely to introduce spurious variation into the analysis and thus it has not been excluded. It was confirmed that all results carry through when excluding Burundi from the analysis. In fact, effect sizes and significant levels are very similar. For the baseline regression, for instance, the effect amounts to -0.476 (p=0.002) when excluding Burundi (compared to -0.429 and p=0.005 in the main analysis with Burundi).

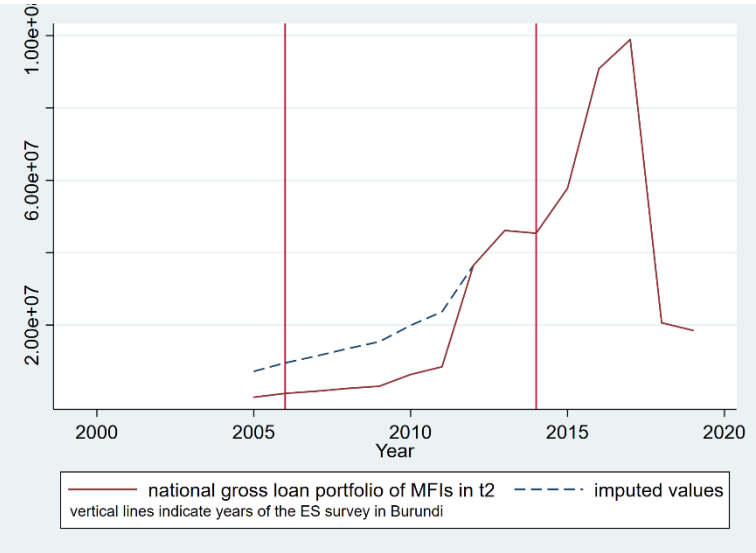

Figure A2.2: National Gross Loan Portfolio of MFIs for Burundi

Note: The red line are the values from MIX Market and the dashed blue line are imputed values; author's analysis based on MIX Market data.

A2.2 Imputation for the National Gross Loan Portfolio of MFIs in the Case of Indonesia 2015

The only country-year case for which I imputed missing values is Indonesia 2015. The reason being that Indonesia is an interesting country with a strong microfinance sector that should be included in the analysis. Otherwise, 2,464 firm-level observations would have been lost. As can be seen in Figure A2.3, the MIX Market data for Indonesia from 2001 to 2014 shows a clear

growth trend before leading MFIs discontinue reporting and the national gross loan portfolio of MFIs drops significantly. Hence, I can use the existing information to make a one-period extrapolation for 2015. Since growth in the microfinance industry slowed down before 2014, the extrapolation assumed that the increase in the industry from 2014 to 2015 amounts to only half of the increase in the period before. The imputed value is shown in Figure A2.3. Note that the results in the analysis do not change when dropping Indonesia from the regression: The main effect would then amount to -0.426 with a standard error of 0.151 and a p-value of 0.006.

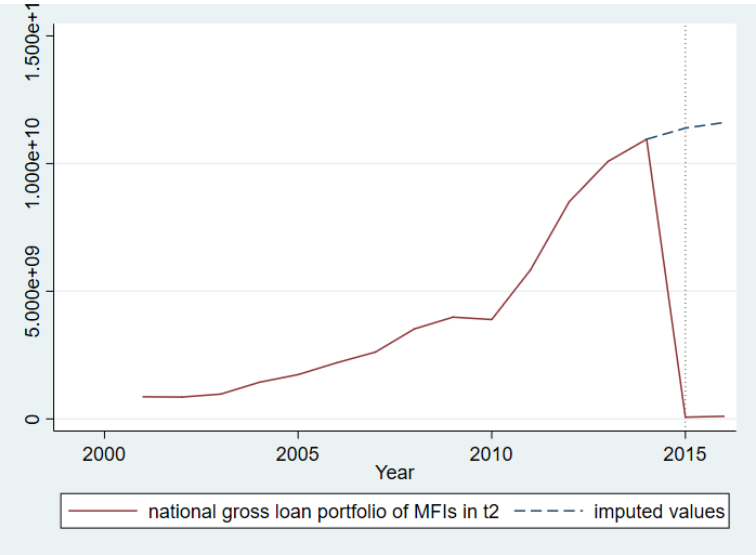

Figure A2.3: Imputation of the Missing Value for National Gross Loan Portfolio of MFIs for Indonesia 2015

Note: Author's analysis based on MIX Market data.

A2.3 Imputation for the Control Variables of the Lending environment in the Robustness Check

Credit bureau coverage, commercial bank branches per 100,000 adults and the strength of legal rights index are three variables from the lending environment that are included as additional controls in the robustness checks. In order to not lose any observations, some values were imputed. The details are laid out in the following.

In case of credit bureau coverage, about 4 percent of the observations had to be imputed. For the majority of these observations (i.e. the first survey round of Benin, Honduras and Mali), the

last measured value(s) indicated that there is zero coverage by credit bureaus. Since there are no plausible reasons to assume that the situation was better in the past, I adopted this value for the previous years as well. This left me with the first survey rounds of Brazil and Pakistan for which the last known values were non-zero and linear extrapolation was employed to derive the imputed values. For Pakistan, the linear extrapolation resulted in negative values such that zeros were imputed for the previous years. As can be seen in Figure A2.4, the linear approximation otherwise works relatively well (vertical lines indicate years for which there is ES data, i.e. years that are included in my analysis).

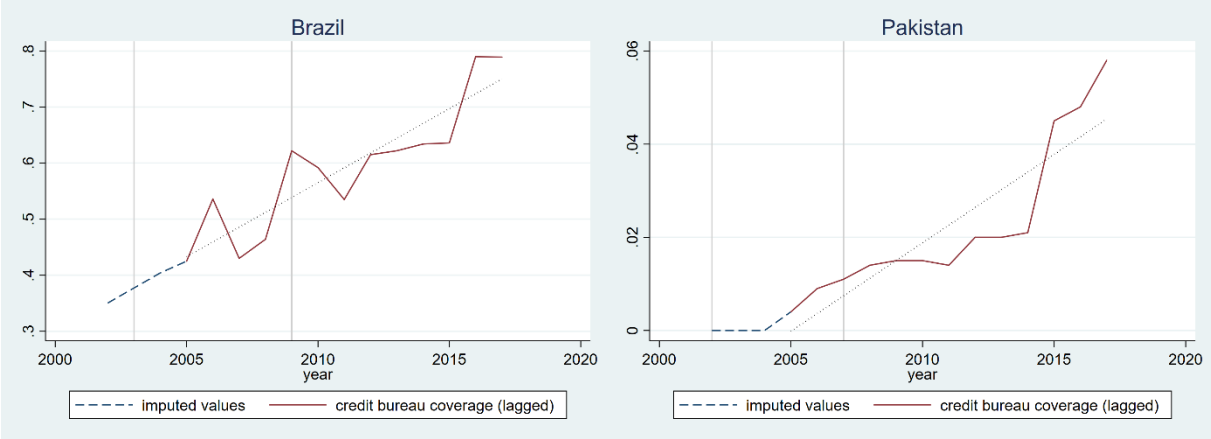

Figure A2.4: Imputation of Missing Values for Credit Bureau Coverage
Note: Author's analysis based on Doing Business Indicators.

The variable commercial bank branches per 100,000 adults has missing values for about 8 percent of the observations. Analogous to credit bureau coverage, I used linear extrapolation for the countries where the spread of bank branches followed a linear or quasi-linear trend. This worked well for most of the countries (i.e. Benin, Brazil, Colombia, Mali and Pakistan) as visualized in Figure A2.5. For El Salvador, Honduras and Panama, however, there is no clear linear trend so that I simply used the last known value for the previous years as well.

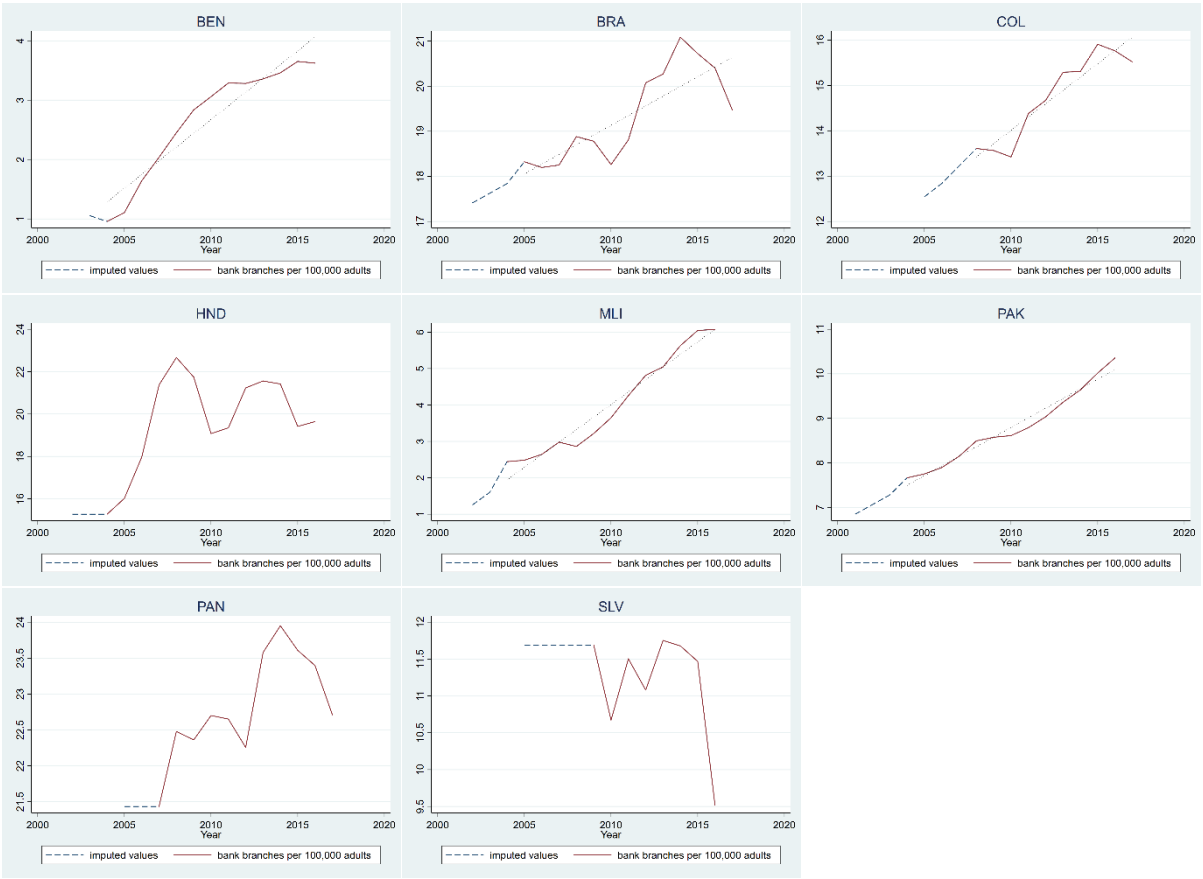

Figure A2.5: Imputation of Missing Values for Commercial Bank Branches per 100,000 Adults

Note: Author's analysis based on WDI.

The missing values in the strengths of legal rights index amount to about 4 percent of the observations. In contrast to the imputation strategy of the previous two variables, I simply used the last known value for the previous years. As underlined by the graphs in Figure A2.6, this seems favorable as the strength of legal rights index exhibits limited to no variation over the years. I imputed values for the years before 2005 for Benin, Brazil, Honduras, Mali and Pakistan (vertical lines indicate years for which there is ES data, i.e. years that are included in my analysis).

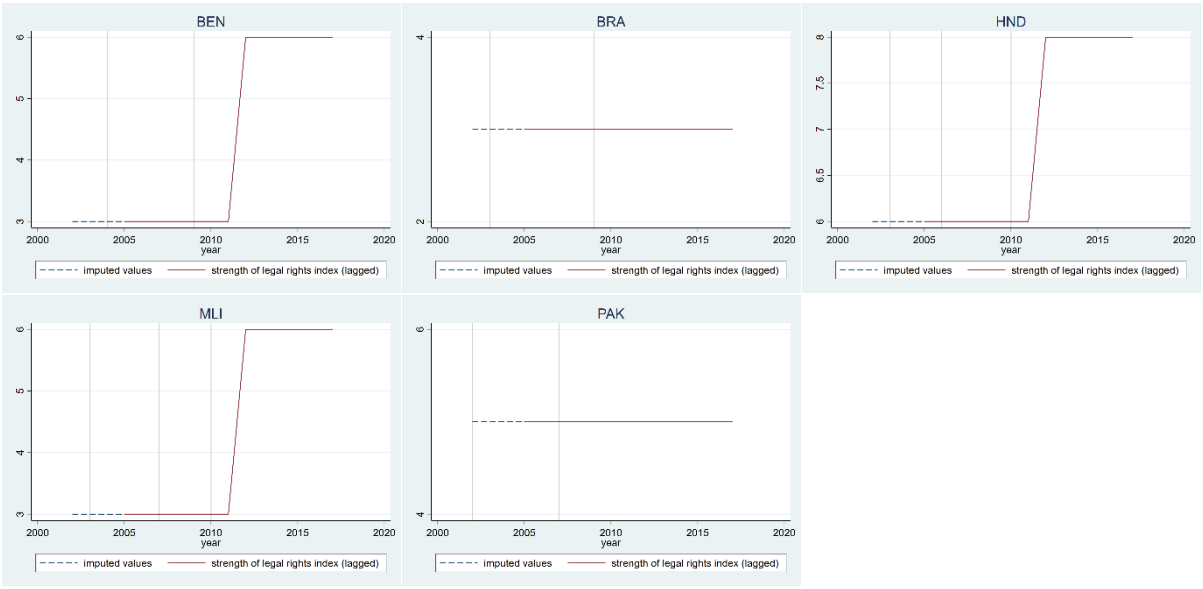

Figure A2.6: Imputation of Missing Values for the Strength of Legal Rights Index

Note: Author's analysis based on Doing Business Indicators.

A2.4 Detailed Overview of the Country-Year Cases Included in the Analysis

The sample used in the analysis includes 56,120 firm-level observations from 51 countries for the period of 2002 to 2015. The number of observations per country varies significantly from over 3,500 observations in Nigeria to less than 200 in Niger. Most countries were surveyed at two different points in time, but four countries have observations for three different years (Albania, Bulgaria, Honduras and Mali). Table A2.1 provides an overview how the observations are distributed by country and year.

Table A2.1: Distribution of Observations by Country and Year

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2013	2014	2015	Total
Afghanistan							496					354		850
Albania						262		152			281			695
Angola					422				216					638
Argentina					1,033				1,029					2,062
Armenia								361			346			707
Azerbaijan								345			379			724
Bangladesh										221	1,408			1,629
Benin			175					138						313
Bolivia					595				347					942
Bosnia and Herzegovina								330			347			677
Brazil		1,629						1,175						2,804
Bulgaria						1,001		266			286			1,553
Burkina Faso					85			335						420
Burundi					267							156		423
Cameroon					166			350						516
Chile					979				1,014					1,993
Colombia					993				941					1,934
Croatia						594		152						746
Ecuador					643				364					1,007
El Salvador					682				340					1,022
Georgia							336				357			693
Ghana						491					691			1,182
Guatemala					506				566					1,072
Honduras		450			416				321					1,187
Indonesia								1,283					1,180	2,463

Kazakhstan								521			551			1,072
Kenya						656					661			1,317
Madagascar								439			353			792
Malawi				150				146						296
Mali		129				489			275					893
Moldova								344			329			673
Montenegro								101			111			212
Morocco						229					350			579
Nepal								482			474			956
Niger				55				126						181
Nigeria						1,887						1,631		3,518
North Macedonia								355			351			706
Pakistan	17					1,240								1,257
Panama					571				327					898
Paraguay					591				351					942
Peru					626				989					1,615
Poland								375			473			848
Romania								423			520			943
Rwanda					210					219				429
Senegal						505						516		1,021
Serbia								363			350			713
Tanzania					409						562			971
Turkey							1,080				1,175			2,255
Ukraine							782				888			1,670
Vietnam								1,029					953	1,982
Zambia						478					651			1,129
Total	17	2,208	175	205	9,194	7,832	2,694	9,591	7,080	440	11,894	2,657	2,133	56,120

A2.5 Robustness Check for Heterogeneous Effects by Firm Size

The findings with regard to Hypothesis 2 (firm size) are robust to using a single lag for the key explanatory variable, to clustering standard errors at the country level, to including additional country-level control variables, or to excluding firms that do not make use of finance as they self-report not to need additional capital. The results of the respective robustness checks for regressions and analyses presented in Figure 2.2 and Table 2.5 of the main article are presented in Figure A2.7 and Table A2.2.

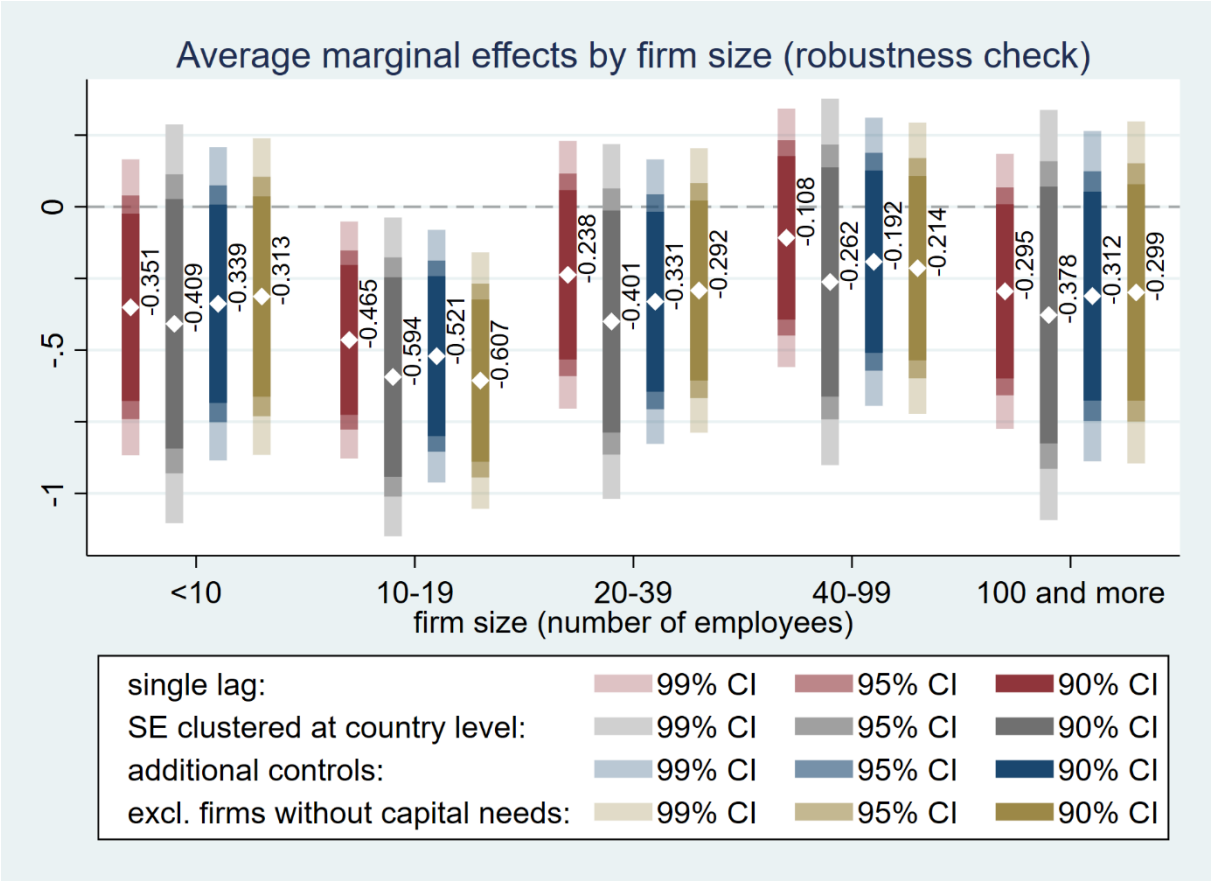

Figure A2.7: Robustness Check for Average Marginal Effects of the Relative Size of the Microfinance Sector by Firm-Size Categories

Note: The robustness check employs (i) a single lag for the key explanatory variable, (ii) robust standard errors clustered at the country level, (iii) additional country-level controls and (iv) excludes firms without capital needs.

Table A2.2: Robustness Checks for Regressions Including the Interaction of Relative Size of Microfinance with Log-Transformed Firm Size and Firm-Size Categories

	Access to finance							
	Single lag		SE clustered at country level		Additional controls		Excl. firms without capital needs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rel. size microfinance	-0.480**	-0.108	-0.574*	-0.262	-0.507**	-0.192	-0.537**	-0.214
	(0.224)	(0.172)	(0.293)	(0.239)	(0.227)	(0.192)	(0.261)	(0.194)
Rel. size microfinance X log firm size	0.0512		0.0476		0.0468		0.0545	
	(0.0508)		(0.0629)		(0.0517)		(0.0649)	
Log firm size	0.0637***		0.0637***		0.0636***		0.0660***	
	(0.00573)		(0.00672)		(0.00564)		(0.00639)	
Rel. size microfinance X (<10 empl.)		-0.243		-0.146		-0.147		-0.0989
		(0.192)		(0.212)		(0.184)		(0.204)
Rel. size microfinance X (10-19 empl.)		-0.356**		-0.332*		-0.329**		-0.392**
		(0.160)		(0.174)		(0.147)		(0.158)
Rel. size microfinance X (20-39 empl.)		-0.129		-0.138		-0.139		-0.0780
		(0.119)		(0.119)		(0.121)		(0.154)
Rel. size microfinance X (100+ empl.)		-0.187		-0.116		-0.120		-0.0848
		(0.126)		(0.164)		(0.138)		(0.138)
Dummy (<10 employees)		-0.174***		-0.179***		-0.179***		-0.194***
		(0.0197)		(0.0249)		(0.0198)		(0.0215)
Dummy (10-19 employees)		-0.106***		-0.108***		-0.108***		-0.109***
		(0.0144)		(0.0175)		(0.0143)		(0.0153)
Dummy (20-39 employees)		-0.0536***		-0.0536***		-0.0535***		-0.0554***
		(0.0107)		(0.0123)		(0.0106)		(0.0121)
Dummy (100+ employees)		0.0646***		0.0602***		0.0601***		0.0623***
		(0.00973)		(0.0118)		(0.01000)		(0.0103)
Log firm age	0.00922**	0.0115**	0.00884*	0.0112**	0.00931**	0.0116***	0.00824*	0.0110**
	(0.00456)	(0.00441)	(0.00522)	(0.00495)	(0.00451)	(0.00435)	(0.00471)	(0.00472)
Manufacturing	0.00337	0.00236	0.00322	0.00203	0.00238	0.00116	-0.0136*	-0.0162**
	(0.00625)	(0.00615)	(0.00647)	(0.00610)	(0.00620)	(0.00614)	(0.00722)	(0.00716)

Exporter	0.0501***	0.0577***	0.0507***	0.0582***	0.0512***	0.0586***	0.0404***	0.0478***
	(0.00772)	(0.00745)	(0.00894)	(0.00866)	(0.00771)	(0.00745)	(0.00708)	(0.00716)
Foreign-owned	-0.127***	-0.119***	-0.129***	-0.121***	-0.128***	-0.120***	-0.0534***	-0.0449***
	(0.0135)	(0.0130)	(0.0165)	(0.0158)	(0.0134)	(0.0130)	(0.0101)	(0.0102)
Government-owned	-0.148***	-0.134***	-0.147***	-0.133***	-0.145***	-0.132***	-0.119***	-0.104***
	(0.0311)	(0.0306)	(0.0354)	(0.0345)	(0.0300)	(0.0295)	(0.0342)	(0.0329)
Fin. statements	0.0802***	0.0838***	0.0796***	0.0831***	0.0793***	0.0830***	0.0859***	0.0892***
	(0.00943)	(0.00923)	(0.0114)	(0.0111)	(0.00927)	(0.00907)	(0.0117)	(0.0117)
Lerner index	-0.172	-0.168	-0.181	-0.177	-0.265*	-0.262*	-0.238	-0.234
	(0.145)	(0.147)	(0.204)	(0.208)	(0.146)	(0.149)	(0.171)	(0.176)
Priv. credit per GDP	0.173	0.178	0.155	0.160	0.227	0.234	0.163	0.168
	(0.155)	(0.155)	(0.217)	(0.218)	(0.156)	(0.156)	(0.157)	(0.157)
Log GDP per capita	0.119	0.0995	0.119	0.0979	0.0604	0.0397	0.262**	0.236*
	(0.115)	(0.118)	(0.161)	(0.164)	(0.126)	(0.128)	(0.126)	(0.128)
Inflation	0.221	0.217	0.237	0.230	0.217	0.211	0.0238	0.0149
	(0.187)	(0.186)	(0.258)	(0.256)	(0.176)	(0.175)	(0.159)	(0.160)
Legal rights index					0.0147**	0.0155**		
					(0.00716)	(0.00709)		
Bank branches					0.00104	0.000898		
					(0.00192)	(0.00192)		
Credit bureau coverage					-0.0576	-0.0552		
					(0.0391)	(0.0391)		
Observations	55,374	55,374	56,120	56,120	56,120	56,120	41,603	41,603
R^2	0.214	0.213	0.217	0.216	0.217	0.216	0.284	0.284
Countries	50	50	51	51	51	51	51	51

Regressions employ country fixed effects, time dummies and robust standard errors clustered at the country-year level. Data sources are described in Table 2.3. The dependent variable *Access to finance* is a dummy variable capturing whether the firm has a loan or line of credit. *Relative size of microfinance* equals the national gross loan portfolio of MFIs relative to private credit. *Log firm size* is the logarithm of the firm size (number of employees); five firm-size categories are used alternatively as a factorial variable in Columns 2, 4, 6 and 8. *Log firm age* is the logarithm of the firm's age (in years). *Manufacturing* is a dummy variable capturing whether the firm belongs to the manufacturing sector. *Exporter* is a dummy variable measuring whether the firm exports at least 10% of its output. The ownership dummies (*…-owned*) identifies the owner, whereas the base category is private domestic ownership. *Financial statements* is a dummy variable indicating whether the firm has an audited financial statement. The *Lerner index* measures bank competition (higher values corresponding to lower competition). *Private credit per GDP* captures depth of the conventional financial system. *Log GDP per capita* is the logarithm of the gross domestic product per capita (in constant dollars). *Inflation* measures the annual growth rate of the consumer price index. The strength of *legal rights index* measures the protection of borrowers' and lenders' rights. *Bank branches* is the number of commercial bank branches per 100,000 adults. *Credit bureau coverage* measures the proportion of the adult population listed in credit bureau databases.

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A2.6 Robustness Check for Heterogeneous Effects by Profit Orientation in Microfinance and Credit Bureau Coverage

The findings with regard to Hypothesis 3 (MFI for-profit portfolio) and Hypothesis 4 (credit bureau coverage) are robust to using a single lag for the key explanatory variable, to clustering standard errors at the country level, to including additional country-level control variables, or to excluding firms that do not make use of finance as they self-report not to need additional capital. The results for rerunning the respective regression for Hypothesis 3 are presented in Table A2.3 and those for Hypothesis 4 in Table A2.4.

Table A2.3: Robustness Checks for Regression Including the Interaction of Relative Size of Microfinance with Profit Orientation in Microfinance

	Access to finance			
	(1)	(2)	(3)	(4)
	Single lag	SE clustered at country level	Additional controls	Excluding firms without capital needs
Rel. size of microfinance	-0.520*	-0.488*	-0.307	-0.452*
	(0.313)	(0.284)	(0.215)	(0.245)
Rel. size microfinance X for-profit portfolio	0.291	0.0983	-0.0925	0.145
	(0.436)	(0.516)	(0.367)	(0.432)
Log firm size	0.0660***	0.0658***	0.0655***	0.0683***
	(0.00443)	(0.00517)	(0.00438)	(0.00470)
Log firm age	0.00925**	0.00883*	0.00930**	0.00821*
	(0.00457)	(0.00523)	(0.00452)	(0.00471)
Manufacturing	0.00375	0.00349	0.00260	-0.0132*
	(0.00626)	(0.00644)	(0.00621)	(0.00729)
Exporter	0.0500***	0.0505***	0.0510***	0.0402***
	(0.00773)	(0.00894)	(0.00771)	(0.00709)
Foreign-owned	-0.127***	-0.128***	-0.128***	-0.0532***
	(0.0135)	(0.0166)	(0.0135)	(0.0101)
Government-owned	-0.147***	-0.146***	-0.145***	-0.118***
	(0.0312)	(0.0356)	(0.0302)	(0.0344)
Fin. statements	0.0802***	0.0796***	0.0794***	0.0859***
	(0.00943)	(0.0114)	(0.00929)	(0.0116)
Lerner index	-0.170	-0.181	-0.267*	-0.238
	(0.146)	(0.205)	(0.148)	(0.173)

Priv. credit per GDP	0.177	0.159	0.224	0.169
	(0.155)	(0.226)	(0.160)	(0.163)
Log GDP per capita	0.120	0.118	0.0599	0.262**
	(0.115)	(0.162)	(0.126)	(0.126)
Inflation	0.207	0.228	0.224	0.00584
	(0.188)	(0.263)	(0.179)	(0.160)
Legal rights index			0.0151**	
			(0.00690)	
Bank branches			0.000985	
			(0.00191)	
Credit bureau coverage			-0.0583	
			(0.0402)	
Observations	55,374	56,120	56,120	41,603
R^2	0.214	0.216	0.217	0.284
Countries	50	51	51	51

Regressions employ country fixed effects, time dummies and robust standard errors clustered at the country-year level. Data sources are described in Table 2.3. The dependent variable *Access to finance* is a dummy variable capturing whether the firm has a loan or line of credit. *Relative size of microfinance* equals the national gross loan portfolio of MFIs relative to private credit. *For-profit portfolio* captures the share of the national MFI portfolio held by profit-oriented MFIs. *Log firm size* is the logarithm of the firm size (number of employees). *Log firm age* is the logarithm of the firm's age (in years). *Manufacturing* is a dummy variable capturing whether the firm belongs to the manufacturing sector. *Exporter* is a dummy variable measuring whether the firm exports at least 10% of its output. The ownership dummies (*…-owned*) identifies the owner, whereas the base category is private domestic ownership. *Financial statements* is a dummy variable indicating whether the firm has an audited financial statement. The *Lerner index* measures bank competition (higher values corresponding to lower competition). *Private credit per GDP* captures depth of the conventional financial system. *Log GDP per capita* is the logarithm of the gross domestic product per capita (in constant dollars). *Inflation* measures the annual growth rate of the consumer price index. The strength of *legal rights index* measures the protection of borrowers' and lenders' rights. *Bank branches* is the number of commercial bank branches per 100,000 adults. *Credit bureau coverage* measures the proportion of the adult population listed in credit bureau databases.

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2.4: Robustness Checks for Regressions Including the Interaction of Relative Size of Microfinance with Credit Bureau Coverage

	Access to finance											
	Single lag			SE clustered at country level			Additional controls			Excluding firms without capital needs		
	(1) Whole sample	(2) Regions where MFI reporting to credit bureaus is widespread	(3) Regions where MFI reporting to credit bureaus is uncommon	(4) Whole sample	(5) Regions where MFI reporting to credit bureaus is widespread	(6) Regions where MFI reporting to credit bureaus is uncommon	(7) Whole sample	(8) Regions where MFI reporting to credit bureaus is widespread	(9) Regions where MFI reporting to credit bureaus is uncommon	(10) Whole sample	(11) Regions where MFI reporting to credit bureaus is widespread	(12) Regions where MFI reporting to credit bureaus is uncommon
Rel. size microfinance	-0.338***	-0.185	-0.251	-0.463**	-0.833*	-0.342*	-0.379***	-0.534	-0.249*	-0.348***	-0.651	-0.311*
	(0.119)	(0.347)	(0.155)	(0.173)	(0.437)	(0.172)	(0.138)	(0.376)	(0.133)	(0.129)	(0.425)	(0.163)
Rel. size micro-finance X credit bureau coverage	0.221	3.343***	-1.404	0.421	2.367***	-1.832	0.168	2.413***	-2.070	-0.0961	1.458*	-1.069
	(1.080)	(0.538)	(1.694)	(1.275)	(0.770)	(2.613)	(0.899)	(0.574)	(1.954)	(1.128)	(0.780)	(2.195)
Credit bureau coverage	-0.0529	-0.259***	0.150	-0.0700	-0.178**	0.199	-0.0660	-0.165***	0.224	-0.0876	-0.141*	0.0282
	(0.104)	(0.0584)	(0.168)	(0.113)	(0.0817)	(0.259)	(0.0797)	(0.0533)	(0.186)	(0.108)	(0.0746)	(0.274)
Log firm size	0.0659***	0.0671***	0.0654***	0.0656***	0.0664***	0.0654***	0.0655***	0.0664***	0.0654***	0.0682***	0.0673***	0.0685***
	(0.00444)	(0.00788)	(0.00516)	(0.00519)	(0.00924)	(0.00601)	(0.00439)	(0.00747)	(0.00515)	(0.00469)	(0.00840)	(0.00549)
Log firm age	0.00937**	0.000383	0.00997*	0.00896*	-0.00111	0.00999	0.00928**	-0.00126	0.0101*	0.00856*	-0.0138	0.0127**
	(0.00457)	(0.00822)	(0.00530)	(0.00523)	(0.00918)	(0.00597)	(0.00451)	(0.00764)	(0.00522)	(0.00467)	(0.00816)	(0.00526)
Manufacturing	0.00355	0.00142	0.00462	0.00329	0.000811	0.00450	0.00263	0.00120	0.00367	-0.0135*	-0.0289***	-0.00843
	(0.00624)	(0.00931)	(0.00773)	(0.00645)	(0.00937)	(0.00810)	(0.00618)	(0.00875)	(0.00772)	(0.00723)	(0.00985)	(0.00887)
Exporter	0.0501***	0.0582***	0.0472***	0.0506***	0.0591***	0.0473***	0.0510***	0.0589***	0.0478***	0.0402***	0.0593***	0.0336***
	(0.00777)	(0.0164)	(0.00848)	(0.00899)	(0.0181)	(0.00984)	(0.00772)	(0.0157)	(0.00834)	(0.00713)	(0.0135)	(0.00829)
Foreign-owned	-0.126***	-0.127***	-0.126***	-0.128***	-0.135***	-0.126***	-0.128***	-0.136***	-0.126***	-0.0527***	-0.0522**	-0.0545***
	(0.0135)	(0.0238)	(0.0161)	(0.0166)	(0.0281)	(0.0200)	(0.0135)	(0.0238)	(0.0159)	(0.0102)	(0.0228)	(0.0115)
Government-owned	-0.147***	-0.240***	-0.109***	-0.145***	-0.223***	-0.110***	-0.145***	-0.224***	-0.110***	-0.116***	-0.224***	-0.0609
	(0.0312)	(0.0491)	(0.0337)	(0.0356)	(0.0518)	(0.0394)	(0.0302)	(0.0471)	(0.0337)	(0.0343)	(0.0462)	(0.0420)
Fin. statements	0.0799***	0.0671***	0.0820***	0.0793***	0.0661***	0.0820***	0.0794***	0.0662***	0.0823***	0.0852***	0.0499**	0.0972***
	(0.00941)	(0.0168)	(0.0102)	(0.0114)	(0.0192)	(0.0126)	(0.00931)	(0.0164)	(0.0107)	(0.0118)	(0.0185)	(0.0138)
Lerner index	-0.172	-0.0325	-0.0623	-0.180	-0.456	-0.0726	-0.263	-0.254	-0.156	-0.246	-0.169	-0.222
	(0.153)	(0.247)	(0.149)	(0.216)	(0.367)	(0.203)	(0.158)	(0.268)	(0.203)	(0.181)	(0.151)	(0.183)

Priv. credit per GDP	0.200 (0.141)	0.171* (0.0918)	0.393 (0.297)	0.193 (0.198)	0.0267 (0.151)	0.354 (0.413)	0.231 (0.154)	0.110 (0.106)	0.385 (0.322)	0.211 (0.142)	-0.0541 (0.151)	0.415 (0.287)
Log GDP per capita	0.106 (0.132)	-0.140 (0.159)	0.0232 (0.168)	0.101 (0.180)	0.0533 (0.204)	0.00172 (0.220)	0.0574 (0.133)	-0.0437 (0.181)	-0.0264 (0.160)	0.250* (0.146)	0.170 (0.184)	0.115 (0.187)
Inflation	0.223 (0.190)	-0.167 (0.349)	0.576* (0.290)	0.247 (0.262)	0.175 (0.498)	0.551 (0.399)	0.221 (0.181)	0.0580 (0.368)	0.485 (0.295)	0.0208 (0.167)	0.159 (0.333)	0.0940 (0.255)
Legal rights index							0.0146** (0.00706)	0.0144 (0.0147)	0.0154** (0.00686)			
Bank branches							0.000984 (0.00191)	-0.00281** (0.00117)	0.000123 (0.00387)			
Observations	55,374	14,141	41,233	56,120	14,887	41,233	56,120	14,887	41,233	41,603	10,251	31,352
R^2	0.214	0.123	0.248	0.217	0.134	0.248	0.217	0.134	0.249	0.285	0.149	0.316
Countries	50	15	35	51	16	35	51	16	35	51	16	35

Regressions employ country fixed effects, time dummies and robust standard errors clustered at the country-year level. Data sources are described in Table 2.3. The dependent variable *Access to finance* is a dummy variable capturing whether the firm has a loan or line of credit. *Relative size of microfinance* equals the national gross loan portfolio of MFIs relative to private credit. *Credit bureau coverage* measures the proportion of the adult population listed in credit bureau databases. *Log firm size* is the logarithm of the firm size (number of employees). *Log firm age* is the logarithm of the firm's age (in years). *Manufacturing* is a dummy variable capturing whether the firm belongs to the manufacturing sector. *Exporter* is a dummy variable measuring whether the firm exports at least 10% of its output. The ownership dummies (*…-owned*) identifies the owner, whereas the base category is private domestic ownership. *Financial statements* is a dummy variable indicating whether the firm has an audited financial statement. The *Lerner index* measures bank competition (higher values corresponding to lower competition). *Private credit per GDP* captures depth of the conventional financial system. *Log GDP per capita* is the logarithm of the gross domestic product per capita (in constant dollars). *Inflation* measures the annual growth rate of the consumer price index. The strength of *legal rights index* measures the protection of borrowers' and lenders' rights. *Bank branches* is the number of commercial bank branches per 100,000 adults. The last two columns in each approach are subsample regressions for regions where most countries record MFI lending activities in credit bureaus (Europe and Central Asia; Columns 2, 5, 8 and 11) and for regions where most countries do not (all other regions; Columns 3, 6, 9 and 12).

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

A2.7 Subsample Regressions by Firm-Size Categories for the Credit Bureau Analysis

For firms from Europe and Central Asia, the region where most countries record MFI loans at credit bureaus, I analyze the mitigating effect of credit bureau coverage for the different firm-size categories through subsample regressions. Hence, Table A2.5 re-runs the regression from Column 3 of Table 2.6 in the main article for the subsample of very small firms (Column 1), small firms (Column 2), smaller medium-sized firms (Column 3), larger medium-sized firms (Column 4) and large firms (Column 5). The main effect of relative size of microfinance behaves as depicted in Table 2.5 in the main article: The effect is most profound for small firms and thereafter becomes less severe with increasing firm size. The interaction effect with credit bureau coverage is positive and significant for all firm sizes except for very small firms. It is further relatively similar in terms of effect size across all firms except for very small firms. Consequently, except for firms with less than 10 employees, all firms benefit significantly from good credit bureau coverage.

Table A2.5: Subsample Regressions for Firms from Europe and Central Asia Including the Interaction of Relative Size of Microfinance with Credit Bureau Coverage

	Access to finance				
	(1)	(2)	(3)	(4)	(5)
	Very small firms	Small firms	Smaller medium-sized firms	Larger medium-sized firms	Large firms
Rel. size of microfinance	-1.065***	-1.457***	-1.099*	-0.547	-0.226
	(0.329)	(0.411)	(0.591)	(0.465)	(0.480)
Rel. size microfinance X credit bureau coverage	-0.868*	3.544***	3.894***	4.180***	3.186***
	(0.494)	(0.963)	(0.767)	(0.987)	(0.805)
Credit bureau coverage	0.0239	-0.311***	-0.302***	-0.287**	-0.153*
	(0.0363)	(0.112)	(0.0988)	(0.106)	(0.0814)
Log firm size	0.0974***	0.0441	0.0970**	0.0230	0.0435***
	(0.0176)	(0.0515)	(0.0420)	(0.0352)	(0.0138)
Log firm age	-0.0100	0.00349	0.0239*	-0.00527	-0.00285
	(0.0141)	(0.0181)	(0.0134)	(0.0147)	(0.0132)
Manufacturing	0.000140	-0.0209	0.0180	-0.0217	0.00549
	(0.0151)	(0.0201)	(0.0191)	(0.0260)	(0.0167)
Exporter	0.0608**	0.0653*	0.00877	0.0764***	0.0821**
	(0.0228)	(0.0358)	(0.0338)	(0.0227)	(0.0302)
Foreign-owned	-0.124***	-0.118***	-0.192***	-0.117**	-0.131***
	(0.0339)	(0.0397)	(0.0422)	(0.0445)	(0.0422)
Government-owned	-0.0231	-0.123	-0.398***	-0.139	-0.213***
	(0.214)	(0.158)	(0.0657)	(0.103)	(0.0692)

Fin. statements	0.0738***	0.0777***	0.0236	0.0556**	0.102***
	(0.0244)	(0.0225)	(0.0207)	(0.0216)	(0.0253)
Lerner index	-0.444	-0.751*	-0.759	0.0663	-0.768*
	(0.348)	(0.395)	(0.468)	(0.251)	(0.441)
Priv. credit per GDP	-0.214*	-0.0356	0.00763	0.274*	-0.103
	(0.125)	(0.170)	(0.160)	(0.150)	(0.131)
Log GDP per capita	0.268	0.201	-0.176	0.150	0.0198
	(0.204)	(0.211)	(0.244)	(0.185)	(0.201)
Inflation	-0.317	-0.0846	0.860	-0.612	1.499***
	(0.425)	(0.560)	(0.663)	(0.457)	(0.514)
Observations	3,762	3,203	2,715	2,423	2,784
R^2	0.076	0.130	0.136	0.098	0.099
Countries	16	16	16	16	16

Subsample regressions employ country fixed effects, time dummies and robust standard errors clustered at the country-year level. Data sources are described in Table 2.3. The dependent variable *Access to finance* is a dummy variable capturing whether the firm has a loan or line of credit. *Relative size of microfinance* equals the national gross loan portfolio of MFIs relative to private credit. *Credit bureau coverage* measures the proportion of the adult population listed in credit bureau databases. *Log firm size* is the logarithm of the firm size (number of employees). *Log firm age* is the logarithm of the firm's age (in years). *Manufacturing* is a dummy variable capturing whether the firm belongs to the manufacturing sector. *Exporter* is a dummy variable measuring whether the firm exports at least 10% of its output. The ownership dummies (…-*owned*) identifies the owner, whereas the base category is private domestic ownership. *Financial statements* is a dummy variable indicating whether the firm has an audited financial statement. The *Lerner index* measures bank competition (higher values corresponding to lower competition). *Private credit per GDP* captures depth of the conventional financial system. *Log GDP per capita* is the logarithm of the gross domestic product per capita (in constant dollars). *Inflation* measures the annual growth rate of the consumer price index. Column (1) comprises very small firms (<10 employees), (2) small firms (10-19 empl.), (3) smaller medium-sized firms (20-39 empl.), (4) larger medium-sized firms (40-99 empl.) and (5) large firms (100+ employees).

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Chapter 3

The Impact of Long-Term Finance on Job Quality, Investments and Firm Performance: Cross-Country Evidence

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Abstract

Despite its importance for development, long-term finance is particularly scarce in countries with lower income levels. This not only results in unrealized growth and employment creation, but may also undermine a broader shift towards better jobs. After all, many long-term investments comprise investments in labor that have the potential to contribute to improvements in job quality. This paper uses more than 17,000 firm-level observations from 73 mostly low- and middle-income countries to provide first empirical evidence of the extent to which long-term finance affects the quality of jobs. Additionally, it looks into effects on investments and firm performance. The findings, based on inverse probability weighted regression adjustment, indicate that long-term finance increases the likelihood of formal training by 4.4 to 4.8 percentage points, raises average wage by 4.1 percentage points and the share of permanent employees by 1.3 percentage points. Effects are also significant for investments in fixed assets and process innovation as well as for employment and sales growth. The fact that the positive effects on job quality increase with loan maturities underlines the importance of longer-term finance for better jobs. Despite several robustness checks, it cannot be ruled out completely that unobservable variables affect the estimation of effect sizes.

3.1. Introduction

Long-term finance (LTF) is crucial for development both on the micro level, for firms and households, and on the macro level, for national economies. Loans with longer maturities, equity and other forms of LTF are typically used to realize projects that require capital commitment over a longer period of time and contribute substantially to productivity growth. Consequently, LTF increases economic growth both at the level of the firm (e.g. Caprio & Demirgüç-Kunt, 1998) and at the national level (e.g. Aghion et al., 2005). In addition, it decreases aggregate volatility, as long-term investments tend to be counter-cyclical (e.g. Aghion et al., 2005; Gutierrez et al., 2018).

Despite its importance for economic development, LTF is particularly scarce in low- and middle-income countries (LMICs), with the proportion of LTF increasing with national income levels (Demirgüç-Kunt et al., 2020; Fan et al., 2012).[22] The limited availability of LTF has gained attention among researchers and policy-makers in the development field (e.g. Chen et al., 2019; Demirgüç-Kunt et al., 2020; G20, 2013; World Bank, 2015). It is also felt by firms, since constrained access to long-term loans impedes their operation and growth (Ayyagari et al., 2008; Gutierrez et al., 2018). This not only results in situations of unrealized growth and missed opportunities for employment creation, but may also undermine a broader shift towards better job quality. After all, many long-term investments also comprise investments in labor through training, human capital accumulation and similar activities that positively affect skill development, wages and stability of employment relations. The availability of good jobs, in turn, has been argued to contribute to more cohesive societies (Wietzke, 2014; World Bank, 2012). Understanding the significance of longer-term finance is particularly important against the background of current growth in digital finance and fintechs, since digital lending tends to be more short-term (e.g. Beaumont et al., 2021) and may thus increase short-termism in credit markets (e.g. United Nations Secretary-General's Task Force on Digital Financing of the Sustainable Development Goals, 2020).

The study analyzes to what extent LTF affects job quality, investments and firm performance. LTF is defined here as bank loans with longer maturities. Even though the focus on bank loans ignores equity and other potential sources of LTF, it can be expected to account for the vast majority of long-term (external) finance. In LMICs, in particular, non-bank sources for LTF are

[22] Respective descriptive statistics for countries in my sample are provided in Figure A3.1 in the Appendix.

the exception (Martínez Pería & Schmukler, 2017) such that firms, irrespective of their size, mostly rely on banks to access LTF (Gutierrez et al., 2018). Different thresholds (namely 1, 2, 3, 4 and 5 years) for the initial loan duration are used to distinguish and compare firms with short-term and with long-term loans. A second approach differentiates across firms with LTF based on the loans' remaining time to maturity. This allows exploring the role of loan maturities in empowering firms to pursue long-term growth strategies such as productivity-enhancing investments in technology, capital and in labor and its subsequent effects on the outcome variables of interest.

Along this line, the more than 17,000 firm-level observations from 73 mostly low- and middle-income countries are divided into a group with LTF and a control group with short-term finance (STF) in the first approach; or into a group with LTF of longer remaining maturity and a control group with shortly maturing LTF in the second approach. In both cases, inverse probability weighted regression adjustment (IPWRA) is employed, since this estimation strategy identifies treatment effects in observational data. Reweighting based on the propensity scores achieves similarity and balance of (observable) covariates across treatment and control group. Despite theoretical arguments and descriptive statistics suggesting that treatment and control groups may not differ too much with regard to observable and unobservable characteristics, it cannot be ruled out completely that unobservables affect the estimation. The findings indicate that LTF is significantly and positively associated with job quality. It increases the likelihood that firms offer formal training by 4.4 to 4.8 percentage points – depending on the chosen specification. The share of trained production workers increases by 15 to 17 percent and the share of trained non-production workers by 13 percent. Average wages relative to GDP per capita are found to rise by 4.1 percentage points. The share of permanent employees is 1.3 percentage points higher for firms with LTF. The fact that the positive effects increase with loan durations and loan maturities underlines the importance of longer-term finance for moving towards better jobs. Moreover, LTF is significantly and positively associated with investments. Firms with LTF are, again depending on the specification, 5 to 14 percentage points more likely to invest in fixed assets and 5.3 to 6.2 percentage points more likely to invest in process innovation, while effects on investments in product innovation are modest and only marginally significant. Firm performance tends to rise as well: The positive effects are substantial, which is reflected by a 0.95 to 1.53 percentage points higher employment growth rate and a 1.14 to 1.80 higher sales growth rate, but these effects are only significant for some maturity thresholds.

This paper contributes to at least two strands of literature. First, my work adds to the nascent literature on the role of finance with regard to job quality, since it is the first study to empirically investigate the effect of loan maturities on job quality. There is a more established sub-strand on capital markets that shows via theoretical models (e.g. Amable et al., 2005) and empirical evidence (e.g. Black et al., 2007; Darcillon, 2015) that equity finance negatively affects employment conditions such as job tenure, pay and training, since shareholder maximization tends to target at short-term performance of the financed firms. However, this literature on equity finance stems from and mainly applies to high-income countries. Looking beyond equity – i.e. into financing sources that are more relevant in LMIC contexts – most studies are concerned with the quantity of jobs created through access to finance (e.g. Ayyagari et al., 2021). One notable exception is the work by Blanas et al. (2019) which uses firm-level data from 19 countries in sub-Saharan Africa to show that foreign-owned firms tend to offer better-quality jobs. In particular, they find that foreign direct investment is associated with higher shares of permanent jobs, reduced likelihood of unpaid work, more training and higher wages. My analysis employs almost the same outcome variables, but differentiates finance along the maturity dimension instead of its origin. The significance of my study is to provide the first empirical evidence of how loan maturities affect the quality of jobs.

Second, this paper adds further evidence to the literature on the effect of LTF on investment by providing the first cross-country evidence from LMICs. Exploiting the financial crisis of 2007/08 as an exogenous shock to credit supply, several scholars found LTF to causally increase firms' investments and to decrease investment volatility in the US (Almeida et al., 2012; Duchin et al., 2010) and Belgium (Vermoesen et al., 2013). Using the same setting, Duval et al. (2020) confirm these findings in a cross-country analysis based on firm-level data from 15 high-income countries. So far, studies have been limited to high-income contexts, while for LMICs only correlational evidence for individual countries such as Ecuador (Jaramillo & Schiantarelli, 2002) or China (Li et al., 2009) exists. This study adds cross-country evidence from LMICs for the effect of LTF on investments.

Lastly, this paper contributes to the closely related literature on LTF and growth through additional cross-country evidence and new insights on the effects on SMEs. Within-country evidence points towards a positive relationship between LTF and firms' productivity and growth, which is attenuated or even reversed in the case of high shares of subsidized credit (Jaramillo & Schiantarelli, 2002; Schiantarelli & Sembenelli, 1997; Schiantarelli & Srivastava, 1997). No effect emerges for Chinese firms (Li et al., 2009), which may also be related to the

adverse impact of subsidized credit. Cross-country studies find a positive relationship between LTF and growth based on country-level data (Tasic & Valev, 2008) and firm-level data (Demirgüç-Kunt & Maksimovic, 1998). In addition, long-term debt is found to reduce growth volatility (Demirgüç-Kunt et al., 2017). When focusing on SMEs, Léon (2020) finds no evidence that higher levels of LTF at the national level increase firm growth. He argues that LTF increases lending towards larger transparent firms (intensive margin), at the expense of unserved SMEs (extensive margin). The relevance of my paper is to complement his work by analyzing the effects on SMEs with LTF (and in the main analysis, on firms with LTF in general). Léon (2020) used the share of LTF in the national private credit portfolio as a measure for availability of long-term loans in a particular country. My paper, however, identifies SMEs (or firms in general) that actually have a long-term loan and analyses whether they perform differently from SMEs (or firms) that rely on STF (or shortly maturing LTF) alone. This complements the findings of Léon (2020) on potential trade-offs at the extensive margin with insights on the effects at the intensive margin in order to more fully understand the effects of LTF on SME development and growth

The rest of the paper is structured as follows. First, the conceptual framework (Section 3.2) introduces how LTF affects the performance of firms and job quality from a theoretical perspective. The following section describes the dataset (Section 3.3). The method section (Section 3.4) outlines the estimation strategy, before the subsequent section presents the results and robustness checks (Section 3.5). The last section (Section 3.6) concludes.

3.2. Conceptual Framework

The most important reason for firms to rely on LTF is the realization of long-term investments. Theory suggests that maturity matching of assets and liabilities is optimal (Hart and Moore 1995) and survey evidence from the US, indeed, emphasizes that this is the most relevant factor for firms when deciding between short-term and long-term debt (Graham & Harvey, 2001). Firms' tendency to match maturities is confirmed by cross-country evidence from both high-income countries (Rajan & Zingales, 1995) and LMICs (Booth et al., 2001). Thus, STF is primarily used for working capital like payroll, inventory, and seasonal imbalances and LTF for investments with returns in the more distant future, for example, R&D, technology adoption, fixed assets or human capital.

Reliance on short-term debt for longer-term projects exposes firms to rollover risk – having to refinance in bad times when creditors may refuse to roll over credits or refinancing terms are detrimental to the borrower (Diamond, 1993; Diamond, 1991) and may lead to excessive liquidation of projects by the lender (Diamond, 1991). Rollover risk discourages profitable long-term investments with potentially adverse effects on firms' growth potential.[23] Firms forgo investments in more productive projects and technologies for the sake of investments with more immediate payoffs (Almeida et al., 2012; Caprio & Demirgüç-Kunt, 1998; Milbradt & Oehmke, 2015). This is formalized by the theoretical model of Milbradt and Oehmke (2015), which builds on the assumptions that financing terms and investment decisions are interlinked and that financing frictions increase with maturity. They show that, in equilibrium, investments are inefficiently short-term and that economic growth is lowered and shocks are amplified.

Despite this literature on maturity matching and rollover risk, the effect of LTF on the performance of firms is ambiguous from a theoretical perspective. A certain strand of literature argues that long-term loans also trigger suboptimal actions, whereas STF creates strong pressure for efficiency, profitability and (short-term) performance. STF is described as a tool for lenders to discipline borrowers and minimize agency problems. The threat of liquidation curbs suboptimal investments and activities (Rajan, 1992) and credit rollovers inflict frequent renegotiations, pressuring borrowers towards efficiency and towards actions in the interest of the lenders (Calomiris & Kahn, 1991; Diamond & Rajan, 2001; Jeanne, 2009; Jensen, 1986). This results in short-term profit maximization and positive (short-term) performance.[24]

The view that LTF benefits the performance of firms stresses the importance of maturity matching and rollover risk in decisions on productivity-enhancing, longer-term investments. LTF is preferred for investments with returns in the more distant future, such as R&D, technology adoption, fixed assets, equipment, human capital and similar investments, which are central to firms' productivity and growth prospects (e.g. Almeida et al., 2012; Caprio &

[23] Note that some economists argue that firms with good growth potentials should prefer to borrow short-term despite the rollover risk: First, because otherwise they benefit less from their investment since they have to share returns with their long-term lenders for a longer time (Myers, 1977); second, because in the context of asymmetric information the positive news allows for better financing terms when rolling over credits (Diamond, 1991). Yet this especially applies to high performers, while average firms are more likely to match maturities in the face of rollover risk – as described in the text.

[24] This may compromise firms' long-term performance and growth prospects as elaborated in the following paragraphs.

Demirgüç-Kunt, 1998). Following this line of argumentation – since it takes into account the previously introduced evidence on maturity matching and rollover risk – LTF can be expected to positively affect my outcome variables for investments (fixed assets, process innovation, product innovation) and firm performance (employment and sales growth). However, LTF also has the potential to improve job quality. While investments in highly profitable long-term projects generally include investments in physical capital such as fixed assets and equipment, it often comprises complementing investments in labor as well (with subsequent positive effects on firm performance). New equipment, technology adoption and R&D, for instance, require staff training and accumulation of human capital (e.g. Caselli & Coleman, 2001) (this hypothesis of complementing investments is explicitly tested in the result section, i.e. Section 3.5). As a positive side effect of investment in labor, the quality of jobs can be expected to rise, reflected, for instance, in skill development through training, higher wages and more stable employment relations. Investments in training and human capital, as necessary complements to capital investments, incentivize firms to reduce staff turnover in order to fully reap the returns on the investment and to reduce skill drain (e.g. Crook et al., 2011). This should increase the share of permanent jobs within a firm and potentially even raises wages as a means of increasing the opportunity costs of switching jobs (which further increases employment stability) (e.g. Bloom & Michel, 2002).

3.3. Data

The data stem from World Bank's Enterprise Surveys (ES), with additional control variables from the World Development Indicators (WDI), Worldwide Governance Indicators (WGI) and the Financial Development and Structure Database. My key explanatory variable is based on the variable from the ES dataset capturing the initial loan duration. In the analysis, different thresholds for the loan duration (1, 2, 3, 4 and 5 years) are used to distinguish between STF and LTF. The 1-year threshold that defines loans with maturities of up to 1 year as STF and those above as LTF is in line with the commonly used categorization in balance sheets, reports and datasets (e.g. Gutierrez et al., 2018; Léon, 2018). Even though the other thresholds deviate from the commonly used classification, they allow for a better understanding of the role of loan maturities as they allow to explore whether longer loan durations are associated with larger effects. The distribution of loan durations in my sample is illustrated by the empirical cumulative distribution function in Figure 3.1.

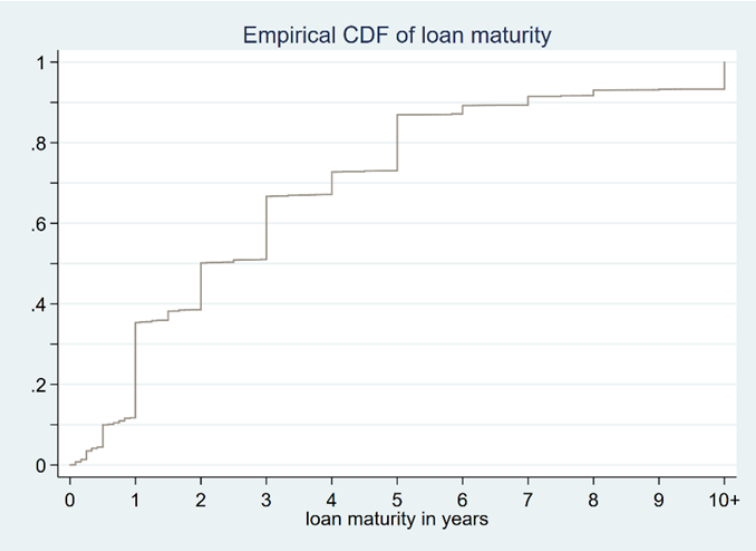

Figure 3.1: Empirical Cumulative Distribution Function of Loan Maturity
Note: Author based on data from Enterprise Surveys.

Data on loan maturity are only available from 2002 to 2009. Even though the variable was discontinued from 2010 onwards, its quality seems very promising: First, it does not exhibit more missing values than other numerical variables capturing loan characteristics. Second, it is not taken at its face value, but merely used to create a dummy for LTF, and this dummy aligns quite well with other country-level data on loan maturities (see Appendix for details).

The outcome variables also stem from the ES dataset and can be organized into the broader categories of job quality, investments and firm performance – with summary statistics provided in Table 3.1. It is challenging to adequately measure decent work and working conditions, but this paper follows Blanas et al. (2019) and approximates job quality by indicators for training, average wage and the share of permanent employees. A higher share of permanent jobs takes away the insecurity and pressures associated with temporary employment. Training contributes to skill development and reveals the firms' willingness to foster the development of their employees. It is measured by a dummy indicating whether the firm offered formal training in the last fiscal year as well as by one variable for the share of production workers and one for the share of non-production workers that received such training in the last fiscal year.[25] Lastly,

[25] If an observation had non-missing values for the dummy but missings for the shares of trained (non-)production workers, these observations were completed by either simple imputation (training=0 logically requires both shares to be zero as well) or multiple imputation (for training=1) using the mice package in R (Van Buuren & Groothuis-Oudshoorn, 2011). Details of the multiple imputation procedure can be found in the Appendix. The analysis also presents results based on listwise deletion.

better pay is associated with better jobs. The average wage is computed from the total labor costs divided by the number of employees. In order to make it comparable across countries, it is set in relation to the national GDP per capita.

Investments include, first, investments in machinery, vehicles, equipment, land or buildings, which are captured by a dummy for whether the firm purchased fixed assets. Second, they include investments in innovation measured by a dummy for whether new and/or significantly improved products were introduced over the last three fiscal years and a dummy for the respective equivalent for production processes.

Less immediate outcomes are the performance of firms as reflected in employment and sales growth. The growth rates are derived as annual averages from employment and sales figures in the last fiscal year and three fiscal years ago following Léon (2020): Sales were deflated with the GDP deflator from the WDI dataset and both growth rates were computed in a manner to avoid the regression-to-the-mean effect.[26]

Firm-level characteristics are also from the ES database and correspond to the controls commonly used in the literature on firms' access to finance (e.g. Beck et al., 2008; Love & Martínez Pería, 2015): size and age of firms as well as dummy variables for the manufacturing sector, exporters, foreign- and government-owned firms and firms with audited financial statements.[27] Summary statistics are presented in Table 3.1 (disaggregation by treatment and control group in Table A3.1 in the Appendix).

[26] The regression-to-the-mean effect is avoided by dividing not by the initial value, but by the average of the initial and last value.

[27] Subsidiary (dummy whether firm is part of a larger firm) or experience of the manager (as proxy for manager quality) are not included as control variables, since they have many missing values (e.g. almost 40% for experience of manager). It has been confirmed that all findings are robust to including these firm-level control variables.
I cannot control for other relevant loan characteristics on the firm level. The ES dataset only captures data on collateral and loan size; while the former is not relevant in my analysis, the latter may be, but the amount of missing values does not allow inclusion of the loan-size variable (outliers raise doubts about the quality of this variable anyways). Issues could arise if the loan size was correlated with loan maturity such that loan size instead of maturity drove the results. However, as shown in Figure A3.4 in the Appendix, size and maturity of loans are not correlated in my sample such that this should not be in issue.

Table 3.1: Summary Statistics

Variable	N	Mean	SD	Min	p50	Max
Outcome variables						
Training	14,554	0.548	0.498	0	1	1
Share of production workers trained	14,569	0.282	0.334	0	0.081	1
Share of non-production workers trained	14,554	0.201	0.267	0	0.04	1
Average wage	9,628	1.093	0.826	0.047	0.889	3.929
Share of permanent employees	17,057	0.881	0.210	0	1	1
Fixed asset investments	13,438	0.706	0.456	0	1	1
Product innovation	13,691	0.504	0.500	0	1	1
Process innovation	13,192	0.490	0.500	0	0	1
Employment growth	14,797	4.997	12.242	-32.099	2.899	47.619
Sales growth	11,328	1.884	16.887	-55.552	0.473	61.364
Firm characteristics						
Loan maturity >1 year	17,057	0.646	0.478	0	1	1
Loan maturity >2 years	17,057	0.498	0.500	0	0	1
Loan maturity >3 years	17,057	0.333	0.471	0	0	1
Loan maturity >4 years	17,057	0.273	0.445	0	0	1
Loan maturity >5 years	17,057	0.131	0.337	0	0	1
Firm size (employees)	17,057	188.459	1059.911	1	38	67,600
Age	17,057	20.314	18.183	1	14	201
Manufacturing	17,057	0.673	0.469	0	1	1
Exporter	17,057	0.289	0.453	0	0	1
Foreign-owned	17,057	0.092	0.289	0	0	1
Government-owned	17,057	0.039	0.193	0	0	1
Audited financial statement[+]	17,057	0.561	0.496	0	1	1
Country-level variables						
GDP per capita	17,057	8,452.11	9,847.14	225.62	5,693.27	52,276.2
Inflation	17,057	7.734	5.634	-7.594	6.498	24.193
Private credit per GDP[+]	17,057	44.314	32.816	4.179	32.633	143.365
Bank concentration[+]	17,057	64.607	14.459	24.740	64.942	100.000
Bank overhead costs[+]	17,057	4.251	3.176	0.883	3.789	25.081
Net interest margin[+]	17,057	5.183	2.324	0.911	4.526	13.782
Rule of law[+]	17,057	2.431	0.764	1.272	2.175	4.164
GDP growth[+]	17,057	5.616	2.773	-3.979	5.445	18.333

[+] Only included in the propensity score model.

Note: Author based on data from Enterprise Surveys.

The choice of country-level controls is informed by the same literature and comprises inflation and GDP per capita. For the first step in the estimation (propensity score model of having a loan with a loan duration above the chosen threshold, see method section, i.e. Section 3.4), additional variables are included: private credit relative to GDP, measures for competition in the banking sector (bank concentration, bank overhead costs, net interest margin) and for

quality of contract enforcement, property rights and the courts (rule of law) as well as GDP growth. Details on the definition and sources for all the variables are provided in Table A3.2 in the Appendix.

Some observations had to be removed prior to the analysis: first, observations with missing values for country-level controls or firm-level variables; second, the most extreme values for employment and sales growth as well as for average wage: The 1 percent at the lower and upper end were excluded, as routinely done in literature (for average wage a 10%-threshold was chosen since the variable exhibited considerably more suspiciously low/high values). Lastly, countries with too few remaining observations (<20) and countries with only controls or only treated were removed before the estimation. The final sample comprises 17,057 firms from 73 countries for the period of 2002 to 2009 (number of observations differs depending on outcome variable and specification). The sample is slightly tilted towards lower-middle-income countries (44% of observations) and upper-middle-income countries (33%), with fewer observations for low-income (13%) and high-income countries (10%). (For details on the distribution across country-year couples, see Table A3.3 in the Appendix.)

3.4. Method

In order to identify causal effects of LTF and loan maturities on job quality, investments and growth performance of firms, one needs to control for confounding characteristics of the firm and the country-specific economic and institutional context. Accurate estimation would ideally build on random assignment of LTF to firms in order to ensure balanced characteristics between treated firms (d_i=1, i.e. with LTF) and untreated firms (d_i=0, i.e. with shortly maturing finance). The chosen inverse probability weighted regression adjustment (IPWRA) model identifies treatment effects in observational data by reweighting based on the propensity scores (Imbens & Wooldridge, 2009). More weight is given to observations that were unlikely to receive treatment (or respectively likely to receive treatment), but ended up in the treatment group (or respectively in the control group). As a consequence, balancing between treated and untreated observations and some quasi-random distribution of treatment and control is achieved.

Since IPWRA only balances according to observable variables, two analytical approaches have been chosen that minimize issues introduced through unobservables. After all, unobservable

characteristics may affect both the likelihood of receiving treatment and the level of the outcome variables, which would introduce endogeneity problems. This means that for unbiased estimation, unobservable variables need to be correlated with the observables such that the balancing properties extend to the unobservables as well (or unobservables need to be balanced already). By definition, the conditions of unobservable variables cannot be tested. However, there are theoretical and descriptive arguments indicating that treatment and control may not differ too much with regard to unobservables in the two approaches.

3.4.1. First Approach: Comparing Firms with STF and Firms with LTF

The first approach compares firms with STF (control) to firms with LTF (treatment). One commonly discussed unobserved confounder in the context of (long-term) finance and firm performance is the quality of firms' management (World Bank, 2015). The theoretical literature suggests that the quality of the firm – which includes the unobservable quality of the management – does not necessarily allow for conclusions on the respective loan maturities. Of course, firms need to surpass a certain quality threshold to access external finance and the threshold is probably higher for long-term loans. Yet the pool of applicants for STF and LTF might not be too different according to economic theory. The decision whether to borrow short- or long-term depends on the firms' needs arising from maturity matching and rollover risk (e.g. Graham & Harvey, 2001). The quality of the management could be related to the demand for LTF, since better managers may see and create more long-term investment opportunities and would thus – if they should opt to match maturities – demand more LTF. However, it is further argued that firms with good growth potential – which is probably associated with good-quality management – are best-suited to short-term borrowing. The reason for this is that high-growth firms will benefit less from their investment if they have to share returns with their lenders for a longer time (Myers, 1977); firms with good growth potential will also benefit from short-term loans in the context of asymmetric information even for long-term investments, as positive news on their growth will lead to better financing terms when rolling over credits (Diamond, 1991).

Taken together, the theoretical arguments support the notion that firms applying for LTF are not necessarily of much better (observed and unobserved) quality than firms applying for STF. Hence, even though financial institutions probably cherry-pick good-quality firms for long-

term loans, there are also high-quality firms among the applicants for STF that will subsequently receive loans with short maturities.

This notion is underscored by descriptive statistics in Table A3.1 in the Appendix. Panel B compares firms with STF to firms with LTF (using different thresholds to define LTF). Firms with STF and LTF are not that different (even for quality of the management and the firm). When using a measure that is not influenced by the sample size, the standardized mean difference (Austin, 2011), only audited financial statements is found to be significantly different, while the other variables do generally not surpass the value of 0.1 commonly used in literature for significant differences (one exception each for the 1-year and 5-year threshold). Furthermore, it is noteworthy that minor differences in 'experience of manager' and 'certification by an internationally-recognized quality standard' – which may be seen as proxies for quality of the management and firm – are in favor of firms with STF.

In line with the theoretical arguments, however, stark differences emerge when comparing firms with loans to the group of firms without loans, as depicted in Panel A of Table A3.1: except for foreign-owned, all differences are highly significant. The descriptive statistics suggest that the endogeneity problem is much stronger when estimating the effect of finance (i.e. comparing firms with and without loans as, for example, in Ayyagari et al. (2021)) than for estimation of the effect of LTF (i.e. comparing firms with LTF to those with STF, as done here).

3.4.2. Second Approach: Comparing Firms with Shortly Maturing LTF and Firms with LTF

The second approach compares firms with long-term loans that mature in less than 2 years (i.e. shortly maturing LTF; control) to firms with LTF that has longer remaining maturities (≥2 years; treatment).[28] This approach addresses potential concerns that – despite previous theoretical and descriptive arguments – certain unobserved variables (e.g. strategy or quality of a firm) may affect demand for STF and LTF. In such a scenario, only certain types of firms – for instance, firms with quality management that identifies and creates long-term investment opportunities – would seek LTF such that systematic differences between firms with STF and

[28] The threshold choice is partly informed by results from the first approach: Effect sizes for job quality variables become larger and economically relevant at the 2-year threshold, which suggests that this is a meaningful and relevant threshold. The robustness check includes also other thresholds (1 and 3 years).

LTF would remain. This would give rise to two different problems: First, effects may be driven by the demand side (only certain types of firms seeking LTF) instead of the hypothesized supply-side constraints with regard to LTF that affect firm behavior due to maturity matching and rollover risk. Second, if these systematic differences additionally affect the outcome variables (job quality, investments, firm performance), unobservables would cause endogeneity issues and biased estimates. Hence, in this second line of analysis, I follow the approach of Almeida et al. (2012) and compare firms with long-term loans of different remaining maturities.[29] The underlying idea is that these firms revealed both demand for LTF as well as the ability to acquire LTF and may thus exhibit close similarities also with regard to unobservable characteristics (including firm strategy and quality that affect demand for LTF as well as ability to acquire LTF). This ensures that even in a scenario where certain unobserved variables (e.g. strategy or quality of a firm) affect demand for STF and LTF, the findings of this second approach are not driven by endogeneity issues or demand-side factors.

3.4.3. Estimation Strategy

In both approaches, propensity scores $\hat{p}_{ict} = \Pr(d_{ict} = 1 \mid X_{it}, Z_{c,t-1}, \gamma_c, \gamma_t)$ for firm i in country c and year t are estimated based on the following propensity score model with probit specification:

$$d_{ict} = \gamma_c + \gamma_t + \beta_1 X_{it} + \beta_2 Z_{c,t-1} + \upsilon_{ict} \qquad (3.1)$$

The dummy variable d_{ict} captures treatment and equals one for firms with a loan of a maturity above the chosen threshold of 1, 2, 3, 4 or 5 years. The vector X_{it} comprises firm characteristics and the vector $Z_{c,t-1}$ country characteristics. Country fixed effects (γ_c) and time fixed effects (γ_t) control for unobservable differences between countries and years respectively, which includes institutional quality, economic shocks and similar confounders on the country- or year-level.[30]

[29] One potential concern may be that firms with shortly maturing LTF are at different points in the business/investment cycle; i.e. they invest no longer and show lower investments since the uptake of the loan is longer in the past. However, similar results materialize when controlling for the time since the uptake of the loan.

[30] It has been confirmed that results are robust to using country-year fixed effects instead of country and time (i.e. year) fixed effects.

The propensity scores $\hat{p}_{ict}$ are used to compute weights according to $w_i = d_i/p_i + (1-d_i)/(1-p_i)$. The formula implies that observations are weighted by their inverse probability. The weights are employed in the conditional mean model:

$$y_{ict} = \gamma_c + \gamma_t + \beta_1 U_{it} + \beta_2 V_{c,t-1} + \varepsilon_{ict} \qquad (3.2)$$

The outcome variable y_{ict} captures job quality (training, average wage, share of permanent jobs), investments (fixed assets, product innovation, process innovation) or firm performance (employment or sales growth). In case of a binary outcome variable, the probit specification has been used. The vectors of firm characteristics and country-level controls differ slightly from the ones in the propensity score model. An overview of the respective included variables is provided in Table 3.1 in Section 3.3,[27] details on definitions and data sources in Table A3.2 in the Appendix. Analogous to the propensity score model, country-level controls are lagged and country and time fixed effects (γ_c, γ_t) are inserted. The conditional mean model is estimated separately for the treatment and the control group using the estimated propensity scores $\widehat{w}_i = d_i/\hat{p}_i + (1-d_i)/(1-\hat{p}_i)$. The average treatment effect (ATE) is then computed as the average difference between the predicted outcomes of the treatment and the control group.

One compelling feature of the IPWRA estimates is that they are doubly robust (Wooldridge, 2007). This means that misspecification of either the propensity score model or the conditional mean model still results in consistent estimates. Consistent estimation further depends on the conditional independence (CI) and the overlap assumption. CI assumes treatment to be independent of potential outcomes $y(1)_{ict}$ and $y(0)_{ict}$ after controlling for observables: $(y(1)_{ict}, y(0)_{ict}) \perp d_i \mid X_{it}, Z_{c,t-1}, \gamma_c, \gamma_t$. Imbens and Wooldridge (2009) emphasize that this strong assumption is quite controversial, even though it underlies every multiple regression approach. Tables A3.4 and A3.6 in the Appendix show that the CI is valid for observables, as covariates are balanced between the treatment and control group after weighting. The second assumption is known as overlap assumption: $0 < \Pr(d_i = 1 \mid X_i = x) < 1$, for all x. It constitutes that every observation must have a positive probability of receiving any of the two treatments d_i=1 and d_i=0. Figures A3.5 and A3.7 show that this assumption holds.

3.4.4. Differentiation of Stock Variables, Flow Variables and Growth Rates

In order to avoid underestimation in the first approach, the analysis must differentiate between flow variables, stock variables and growth rates. For stock variables such as the share of

permanent employees or average wage, it should not matter in which period after the loan approval we measure the (potential) impact of LTF – i.e. the remaining time until LTF matures should not matter. The variables should stay at the new level for at least two reasons. First, because of the theoretical arguments discussed in the conceptual framework that LTF allows firms to invest in a stable and skilled workforce and that firms can only fully benefit from the human capital investments when binding their employees long-term. This implies offering permanent positions and increasing the incentives to stay by paying higher wages. Second, from a more practical perspective, it might be argued that these impacts are only meaningful if they endure over time.

The situation is different for flow variables such as the training and investment variables. Instead of measuring, for instance, the number or share of production workers who were ever trained (stock variable), the ES capture which share was trained in the last fiscal year (flow variable). While it can be expected that LTF is used to increase the human capital stock, the firms' need to match assets and liabilities in the face of rollover risk makes such longer-term investments more likely to take place when there is still more remaining time before the loan matures. Hence, the full effects of LTF on these outcome variables are only observable when finance matures in the more distant future and effects are attenuated continuously the closer we get to the maturity date, i.e. the sooner the loan matures. Hence, the remaining time until maturity is considered as well for flow variables: Only firms with an initial loan duration of more than 1 year (or respectively 2, 3, 4 or 5 years) and a remaining maturity of 1 year (or respectively 2, 3, 4 or 5 years) or more are included in the treatment group.[31]

For employment and sales growth, the analysis should additionally be restricted to the subsample of firms that have taken out their loan in the last fiscal year or the year before (or if we expect a lagged effect, then last fiscal year ago or 1-2 years before; both are included in the analysis). This ensures that the computation of the growth rates is based on changes between periods before and after the uptake of LTF. (Recall that growth rates are based on employment/sales figures of the last fiscal year (t-1) and three fiscal years ago (t-3).)

[31] This implies that firms with an initial loan duration of more than 1 year (or respectively 2, 3, 4 or 5 years) and a remaining maturity of less than 1 year (or respectively 2, 3, 4 or 5 years) are removed from the analysis. (For stock variables, these observations would have been in the treatment group.)

3.5. Results

3.5.1. First Approach: Comparing Firms with STF and Firms with LTF

As outlined in the previous section, IPWRA addresses non-random treatment allocation by balancing the covariates. Using propensity scores for weighting moves standardized differences of the means closer to zero and variance ratios closer to one. Balancing has been achieved as almost none of the reweighted covariates deviates more than 0.1 from these targeted values (see Table A3.4 in the Appendix). In support of the overlap assumption, we have positive values for the propensity scores of both treated and controls over the whole range of realized values (see Figure A3.5 in the Appendix).

Baseline Results for Job Quality

In the following, the baseline ATEs[32] for the job quality variables are presented.[33] LTF positively affects all of the indicators, but not all of the effects are statistically significant. The likelihood that firms offer formal training increases with increasing maturities as shown in Figure 3.2 where the ATEs are plotted against the different maturity thresholds for LTF (confidence intervals in grey). This means that firms with LTF, that subsequently enjoy more financial security for a longer planning horizon, are more willing to invest in human capital to build a trained and skilled workforce. The effects are statistically significant for the 3-year (p=0.005), 4-year (p=0.003) and 5-year threshold (p=0.028). Given that about 55 percent of firms offer formal training in the control group, increasing the likelihood of training provision by 4.8 percent (for 4- and 5-year threshold) is also substantial and thus economically significant.

[32] Recall that this paper only looks at firms with a bank loan, i.e. it computes ATEs for the (sub-)population of firms with a loan (and not for the entire population of firms).

[33] Results from the propensity score model are presented exemplarily for the sample underlying the analysis of the outcome variable share of permanent employees in Table A3.5 in the Appendix.

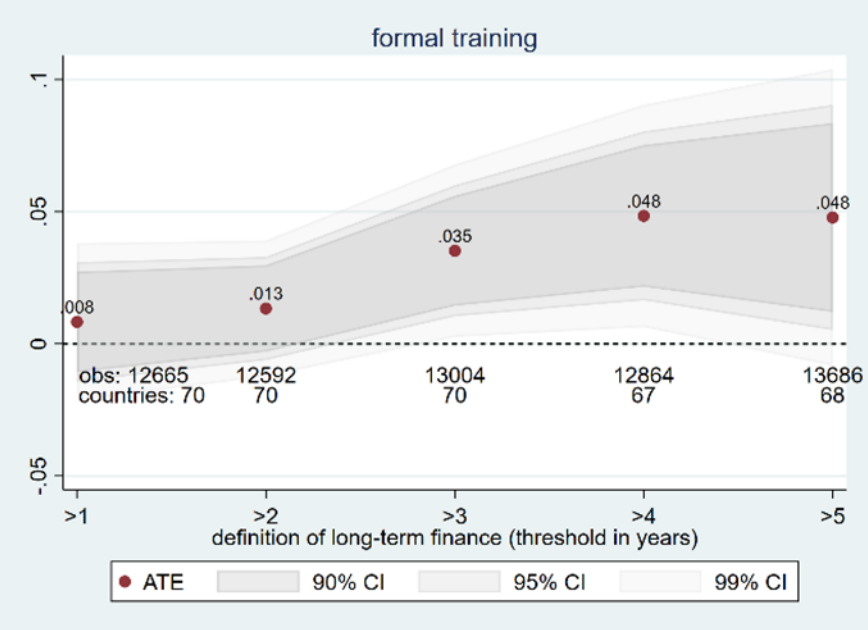

Figure 3.2: ATEs of the Training Variable (First Approach: LTF vs STF)
Note: The graph shows ATEs for different maturity thresholds of LTF.

Moreover, I find evidence for the mechanism of complementing investments described in the theoretical framework; i.e. that investments in new equipment, machines and technology adoption, for instance, require staff training and human capital accumulation and thus lead to complementing investments in labor, in particular formal training. For the subsample of firms that invested in fixed assets – or respectively in process innovation or product innovation –, effect sizes of the training variable are ((mostly) statistically significant and) much larger than for the subsample of firms that did not undertake such investments as depicted in Figure A3.6 in the Appendix (for the latter subsample effect sizes are often zero or close to zero).[34]

In accordance with the baseline findings on training, the share of production workers (top row) and the share of non-production workers (bottom row) that receive such formal training rises

[34] Despite the small sample size (and resulting imprecise estimation and large confidence intervals), differences between the subsamples are even statistically significant for certain maturity thresholds for investments in fixed assets and process innovation. Differences are statistically insignificant for product innovation (which is not too surprising given that the baseline effects of product innovation are, in contrast to the other two investment variables, relatively small and thus economically insignificant – see Figure 3.6). Also in line with the baseline findings of product innovation (significant effects for 1- and 2-year maturity threshold, but not for higher maturity thresholds), differences between the subsamples are substantial for these smaller maturity thresholds and vanish for larger thresholds.
Note that this subsample analysis cannot be repeated for the second approach (LTF vs shortly maturing LTF) due to insufficient observations (smaller sample in the second approach).

correspondingly with longer loan maturities as depicted in Figure 3.3. Effects are statistically and economically significant: For the 5-year threshold, for instance, an additional 4.2 percent (2.6%) of production workers (non-production workers) benefit from training offers over the average 28 percent (20%) that are trained in firms with STF. This corresponds to a relative increase of about 15 or 13 percent respectively. Effect sizes are similar (even slightly higher) when using listwise deletion instead of multiple imputation (right graph; note: not enough observations for non-production workers).

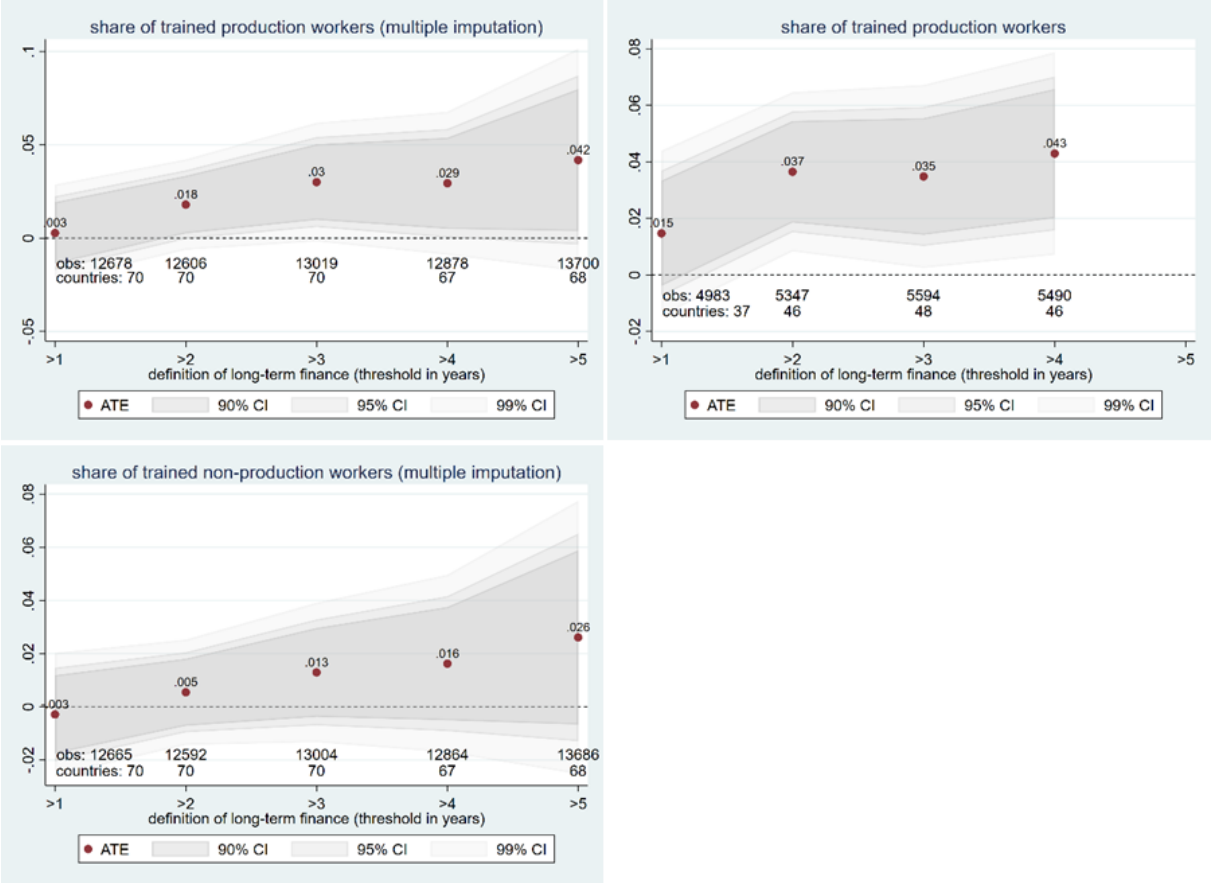

Figure 3.3: ATEs of Trained Share of Production Workers (Top Row) and Non-Production Workers (Bottom Row) (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

In line with the theoretical arguments, average wages are found to rise with increasing loan maturities (Figure 3.4). The average wage relative to national GDP per capita amounts to 1.08 for firms with STF. Wages in firms with LTF are, on average, up to 4.1 percentage points (4-year threshold) higher, which is marginally significant (p=0.095). Effect sizes and significance are marginally higher when looking only at recent borrowers (firms that received their loan in the last fiscal year or 1-2 years before; right graph); but most importantly, the similar effect

sizes suggest that LTF increases average wages not just shortly after the approval of a long-term loan, but permanently.

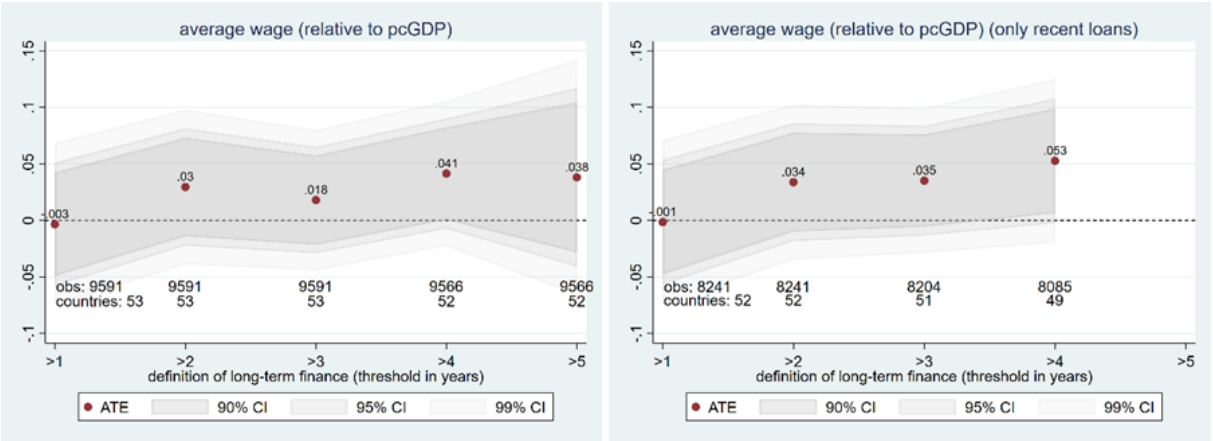

Figure 3.4: ATEs of Average Wage (First Approach: LTF vs STF)
Note: The graphs show ATEs for different maturity thresholds of LTF.

LTF is found to reduce the use of temporary jobs and to increase permanent jobs within firms, with significant effects for the 1-year (p=0.063) and 2-year threshold (p=0.019) as depicted in the left graph of Figure 3.5. In firms with STF, about 88 percent of employees enjoy a permanent contract. The ATE states that LTF raises the share of permanent employees by 0.9 percentage points for the 1-, 2- and 3-year threshold. Surprisingly, the ATE decreases when further increasing the maturity threshold.

The effects on permanent and temporary employment can be better understood when looking at the subsample of recent borrowers (right graph), for which the share of permanent jobs increases with rising maturity thresholds (e.g. 1.3 percentage points higher for 4-year threshold). Differences between ATEs for the whole sample and the subsample especially materialize for longer loan maturities, i.e. when firms that had received their loans in the more distant past are more prevalent. Taking into account that LTF is associated with higher growth of permanent jobs over all loan maturities (as presented shortly in Figure 3.7), this suggests the following: LTF creates more permanent jobs, such that the share of permanent jobs increases; however, some years after the injection of LTF, firms still create additional permanent jobs, but create relatively more temporary jobs such that the positive effect on the share of permanent employees is attenuated for higher maturity thresholds. The subsample of recent borrowers does not suffer from this attenuation and thus shows a clear positive trend over loan maturity thresholds.

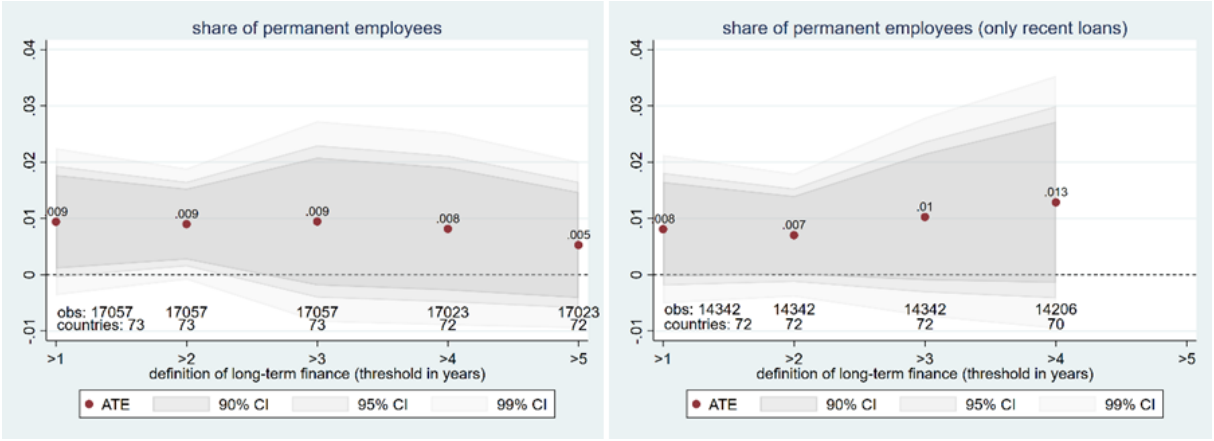

Figure 3.5: ATEs of Share of Permanent Employees (First Approach: LTF vs STF)
Note: The graphs show ATEs for different maturity thresholds of LTF.

Baseline Results for Investments and Firm Performance

Baseline IPWRA estimates for the ATEs on investments and firm performance are positive and mostly significant. However, a key difference to the job quality indicators is the lacking positive trend over maturity thresholds (except for process innovation). The effects on investments in fixed assets and process innovation are (mostly) highly significant as shown in the top row of Figure 3.6. They are also economically significant as access to LTF raises the likelihood of investments in fixed assets by up to 5 percentage points (for 3-year threshold) and by 6.2 percentage points for process innovation (for 4-year threshold). To put this into perspective, about 69 percent of the included firms with STF have invested in fixed assets and roughly 49 percent in process innovation. Effects on investments in product innovation are only significant for the 1-year and 2-year threshold ($p=0.030$ and $p=0.043$). Furthermore, effect sizes are quite small given that roughly 50 percent in the control group undertook such investments: The probability of financing product innovation increases by only up to 2.7 percentage points (for 1-year threshold).

Additional information in the ES dataset helps to better understand the differences in effect sizes and statistical significance for investments in process and product innovation. 'Process innovation' in the ES captures improvements related to the production process and/or the service delivery. In most cases, these improvements include adoption of new technologies as indicated in answers to the open-ended follow-up question. Such investments are generally of longer-term nature and thus require LTF. Consequently, effect sizes increase with higher maturity thresholds. 'Product innovation', in contrast, mainly describes the addition of a new

product or service to the existing portfolio. Depending on the industry of the firm, this may be achieved rather easily (e.g. in industries such as food, textile, garments, wood and furniture, retail and wholesale trade) and thus be feasible in the short term. In other cases, 'product innovation' captures minor modifications to the product, e.g. with regard to the packaging or inputs, which can be implemented in the short term and thus with STF. The open-ended follow-up questions indicate that real quality improvements of the product and services, which may require longer time and thus LTF, are the exception for the ES variable 'product innovation'.

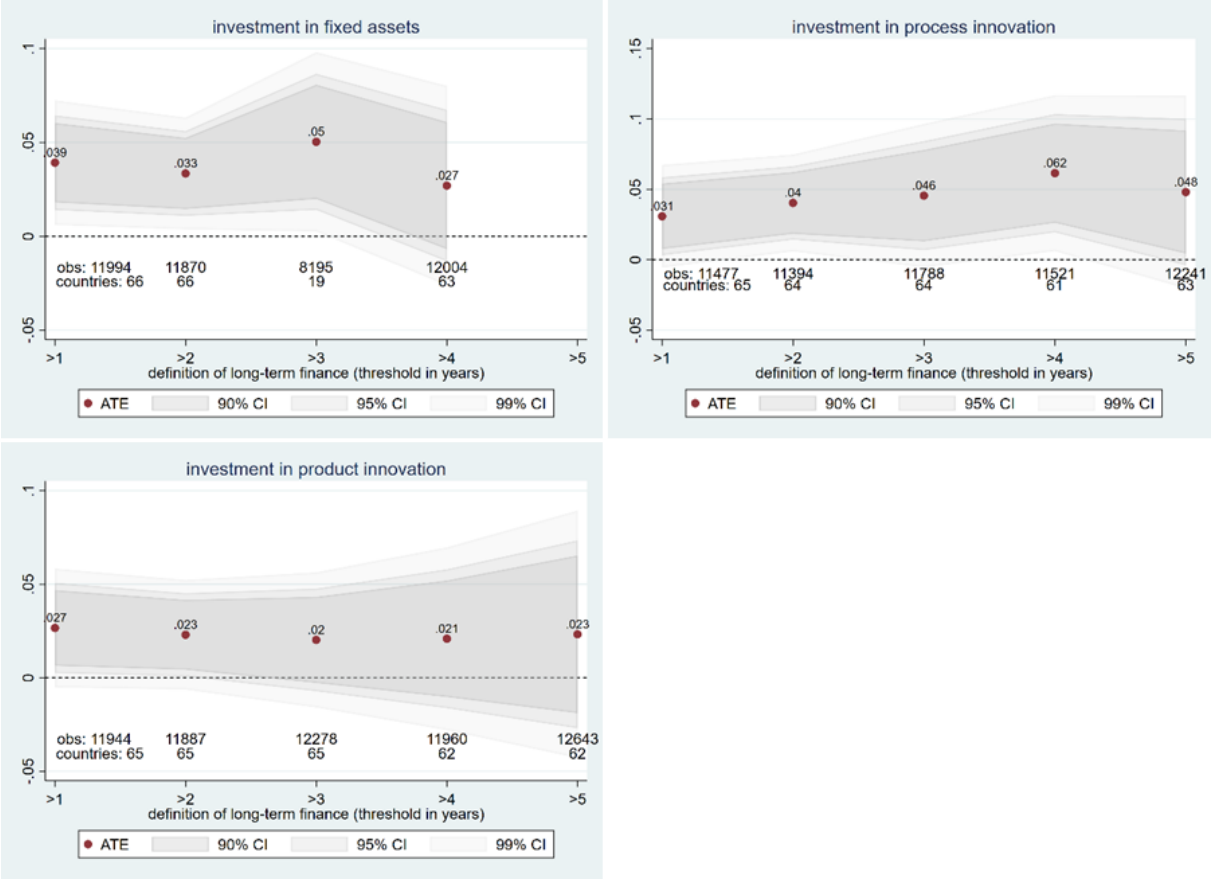

Figure 3.6: ATEs of Investment Variables (First Approach: LTF vs STF)
Note: The graphs show ATEs for different maturity thresholds of LTF.

The effects of LTF on firm performance are positive and quite large, but only partially significant. The graphs on the left show the ATEs for employment and sales growth when assuming an immediate response to the uptake of LTF, while the ones on the right assume a lagged response (by 1 year); they are quite similar in terms of effect sizes, but sales growth exhibits a positive trend (i.e. increase over the maturity thresholds) when assuming a lagged response. As depicted in the top row of Figure 3.7, the growth rate of permanent jobs increases considerably by up to 0.95 percentage points (for 4-year threshold, right graph) over the average growth rate of 5.2 percent among firms with STF. Despite the relative increase of about 18

percent, effects are only significant for the 1-year (left graph: p=0.025; right: p=0.034) and 2-year threshold (p=0.031 and p=0.027). The substantial effect sizes in the sales growth rate of up to 1.14 percentage points (for 4-year threshold, right graph) constitute a relative increase of 51 percent (growth rate of 2.2% in control group), but are only significant for the 3-year threshold (left graph: 0.016; right graph: p=0.010) and 4-year threshold (right graph: p=0.042).

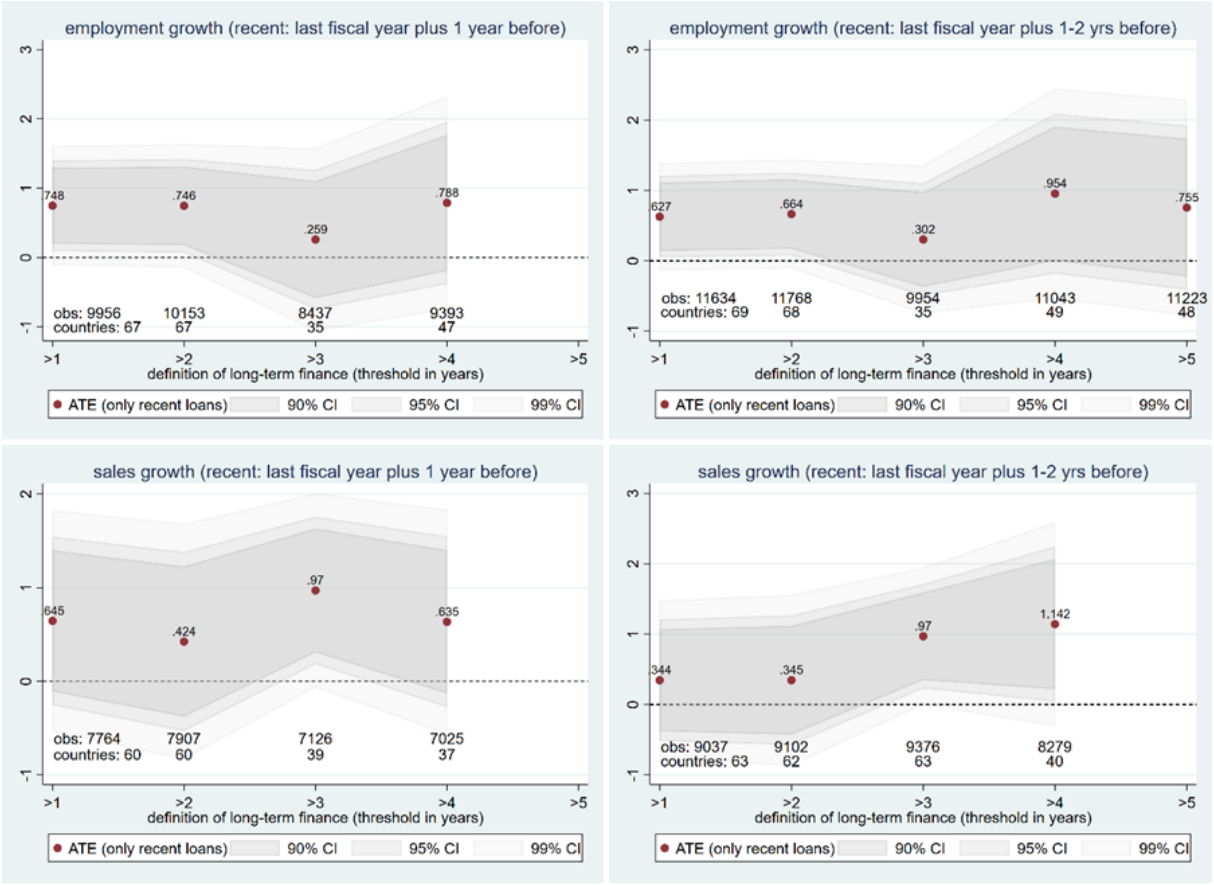

Figure 3.7: ATEs of Employment Growth (Permanent Jobs; Top Row) and Sales Growth (Bottom Row) (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

For almost all investment and firm performance variables, it seems sufficient to provide loans with a maturity of more than 1 year to foster investments and firm growth. One important exception are ATEs of investments in process innovation that increase with higher maturity thresholds – meaning that LTF is needed to facilitate such investments. Given that 'process innovation' in most cases captures adoption of new technologies, this type of investment (and thus LTF) is key to realize productivity gains and to boost firms' long-term growth prospects.

3.5.2. Second Approach: Comparing Firms with Shortly Maturing LTF and Firms with LTF

When comparing firms with shortly maturing long-term loans (<2 years remaining maturity; control) to firms with LTF with longer maturities (treatment), there is support for the conditional independence and the overlap assumption: covariates are balanced between treatment and control groups after reweighting (see Table A3.6 in the Appendix); and in terms of propensity scores, we have positive values for both treated and controls over the whole range of realized values (see Figure A3.7 in the Appendix).

Baseline Results for Job Quality

Results are in line with those of the first approach: Effect sizes for the job quality indicators are positive and increase with rising maturity thresholds, i.e. longer-term loans are associated with more pronounced improvements in job quality.[35] Effect sizes are larger than in the previous approach (for respective thresholds), but statistical significance is lower since the sample size is much smaller and thus estimation less precise. For most indicators, there are not enough observations to (reliably) estimate effects for the 4-year or 5-year threshold.

Firms with long-term loans that mature in the more distant future (in 2 or more years) are more willing to invest in human capital compared to firms with shortly maturing LTF. The likelihood of offering formal training is increased by 4.4 percent (for 3-year threshold; see top row in Figure 3.8). Effects are significant for the 2-year threshold (p=0.059) and 3-year threshold (p=0.093). This increases the share of production workers and the share of non-production workers receiving such training by 4.4 percentage points and 1.8 percentage points respectively (bottom row in Figure 3.8). Yet only the effects for production workers are statistically significant. Given that 26 percent of production workers in the relevant control group benefitted from training offers, the effect is also economically significant as it corresponds to a relative increase of 17 percent.

[35] Results from the propensity score model are presented exemplarily for the sample underlying the analysis of the outcome variable formal training in Table A3.7 in the Appendix.

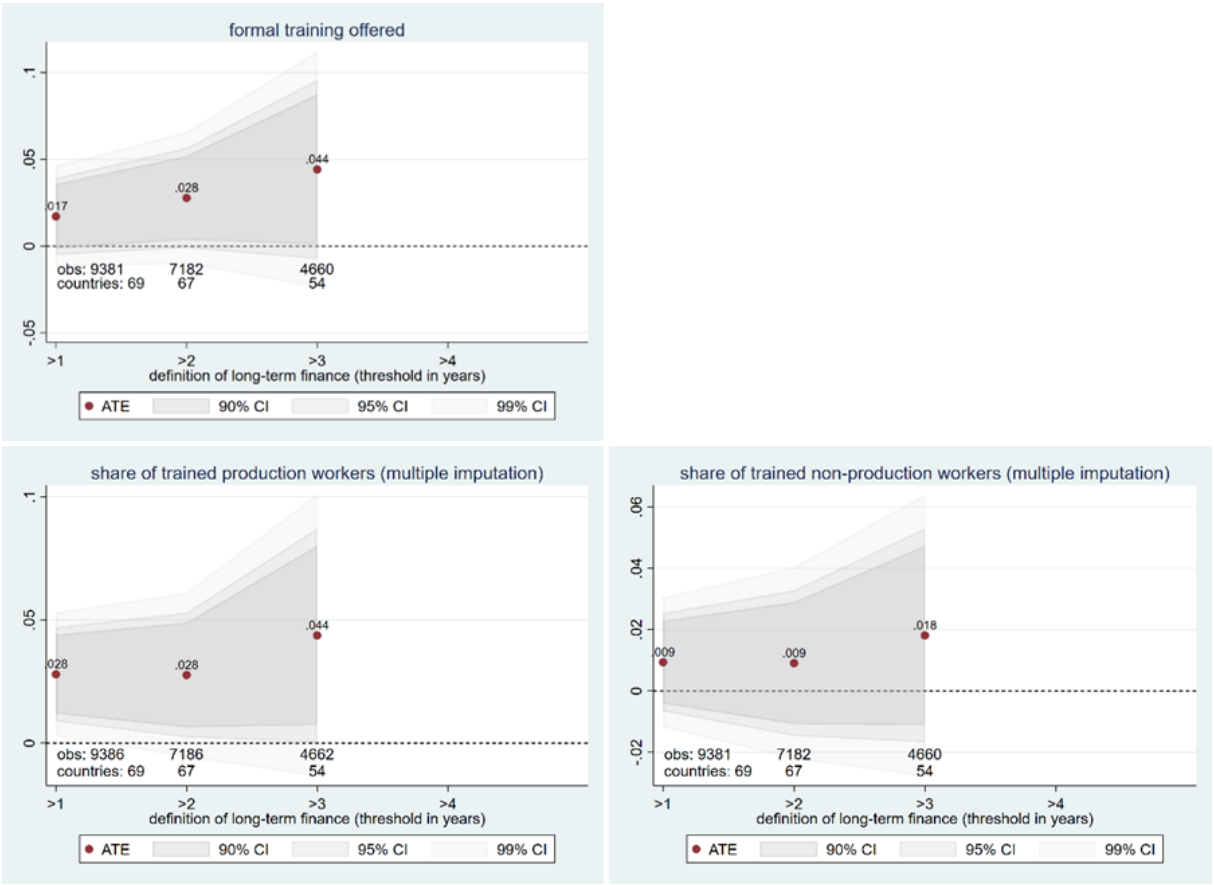

Figure 3.8: ATEs of the Training Variable (Top Row) and of Trained Share of Production Workers and Non-Production Workers (Bottom Row) (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

This (second) approach is unable to identify effects of LTF on stock variables, namely the share of permanent employees and average wage: Both the theoretical framework and the previous analysis suggest that firms with LTF will have alleviated levels for the stock variables irrespective of the remaining maturity of their long-term debt. Consequently, this second approach should find no difference between treatment (firms with LTF) and control group (firms with shortly maturing LTF) for stock variables. Indeed, ATEs for the share of permanent employees and average wage are zero or close to zero.

Baseline Results for Investments and Firm Performance

The results largely underline the findings from the first approach: the effects of longer maturities on investments and firm performance are positive and in most cases highly significant. Overall, the effect sizes are larger than in the first approach and tend to increase with larger maturity thresholds.

The likelihood that firms invest in fixed assets increases by 14 percent (for 3-year threshold; top left in Figure 3.9) if firms have LTF finance that does not mature in less than 2 years. The size of the effect is relatively large, given that, on average, 62 percent of firms in the relevant control group purchased fixed assets. Subsequently, effect sizes are also statistically significant at the 1-percent level for all maturity thresholds. Firms' likelihood of investing in process innovation increases by 5.3 percent (2-year threshold) and 5 percent for investments in product innovation (3-year threshold) as depicted in Figure 3.9. However, effects are marginally significant for product innovation, while they are highly significant for process innovation. Effect sizes are substantial since 45 percent (47%) in the respective control groups invest in process innovation (product innovation).

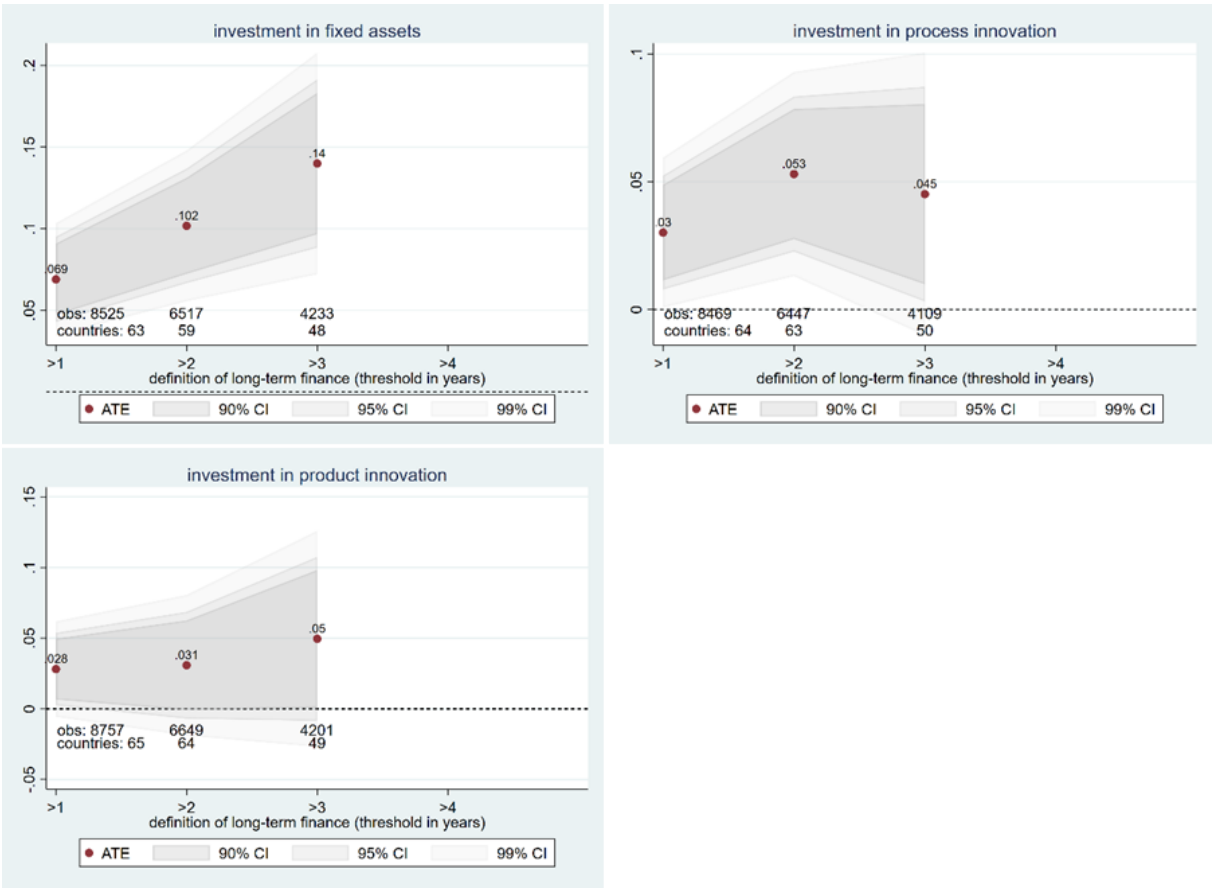

Figure 3.9: ATEs of Investment Variables (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Firms with LTF that expires in the more distant future experience faster growth of permanent jobs and sales. As shown in Figure 3.10, the growth rates increase for employment growth by 1.53 percentage points (2-year threshold) and for sales growth by 1.79 percentage points (3-

year threshold). This corresponds to a relative increase of about 46 percent and 179 percent respectively.[36] Effect sizes are economically and statistically significant.

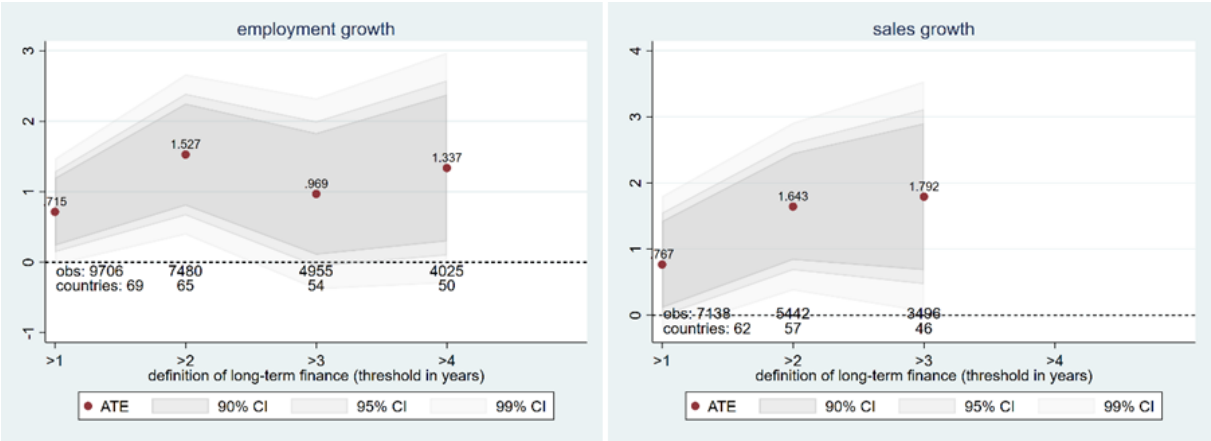

Figure 3.10: ATEs of Employment Growth (Permanent Jobs; Left Panel) and Sales Growth (Right Panel) (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

3.5.3. Robustness Checks

The thrust of this section is twofold. First, it takes a closer look at the role of rollover risk since firms' preference for maturity matching of their assets and liabilities renders rollover risk a main explanatory factor for why LTF fosters crucial productivity-enhancing, long-term investments. Second, this section shows that results are robust to changes on different dimensions: subsample analyses restricted to LMICs or small and medium-sized enterprises

[36] The fact that effect sizes for the growth rates are much larger than in the first approach may be explained by the inability to use the sample of 'recent borrowers'. The control group comprises firms with LTF that matures in less than 2 years. This implies that the control group has very few firms that have taken out their loan recently, i.e. in the last fiscal year or 1-2 years before (otherwise such long-term loans would mature in the more distant future and thus firms would belong to the treatment group). Yet such recent borrowers are expected to exhibit larger (accurate) effects as growth rates are computed between periods before and after the LTF injection (see Section 3.4.4). In order to account for this tendency towards overestimation, one could remove all recent borrowers to ensure comparability between treatment and control group. This leads to effect sizes that are relatively similar to those in the first approach. Including 'years since loan approval' as covariate may also sufficiently control for this issue: Then effect sizes are also similar to the first approach for maturity-thresholds of 2- and 3-years, while the effect for the 1-year threshold is close to zero.

(SMEs); propensity score matching instead of IPWRA; and different thresholds for defining treatment and control groups in the second approach.

The identification strategy relies on different behavior of firms with LTF and those with shortly maturing loans due to rollover risk in economies with frictions in their credit markets. Rollover and liquidation risk introduces the necessity to match maturities of assets and liabilities such that firms tend to use shortly maturing loans for short-run investments and to finance long-term investments with loans of longer maturities. Hence, firms with shortly maturing loans should be unable to undertake similar investments and thus exhibit behaviors different from firms with longer maturities. The robustness check sheds further light on the role of rollover risk by exploiting different degrees of exposure to rollover risk. Separate analyses are run for firms that self-report access to finance as being a constraint (major or very severe obstacle), i.e. that are more severely affected by rollover risk if their current loan matures; and for firms that are less constrained by finance (moderate/minor/no obstacle), i.e. that should feel less pressure from rollover risk even if their loan matures.

Effect sizes of the job quality variables (i.e. differences between treatment and control groups) are attenuated towards zero or even become zero when only looking at financially unconstrained firms (that should feel less pressure from rollover risk) and are considerably larger when only including financially constrained firms in the analysis. This holds both for comparisons between firms with LTF and shortly maturing LTF (second approach) as depicted in Table A3.8 in the Appendix and for comparisons between firms with LTF and STF (first approach) as shown in Figure A3.8. It indicates that rollover risk matters for investments related to improvements in job quality.

Rollover risk also affects some of the investment and firm performance variables, but the emerging picture is not as unambiguous as for the job quality indicators. For the second approach (LTF vs shortly maturing LTF), effect sizes of the subsample of financially constrained firms are substantially larger for investments in fixed assets and in product innovation than those of the subsample of financially unconstrained firms. This suggests that credit market frictions and rollover risk matter. However, effects are similar for investments in process innovation and for employment growth, and (unexpectedly) smaller for sales growth (see Table A3.8 in the Appendix). As shown in Figure A3.9, findings are similar for the first approach (LTF vs STF) – with more noise for investments in fixed asset. In a nutshell, rollover

risk and maturity matching are highly relevant for the job quality indicators, but also matter in the context of several investment and firm performance variables.

In terms of modifications to the sample, the estimation strategy or the chosen definitions, it was first ruled out through subsample analyses that effects were mainly driven by either high-income countries or large firms. High-income countries may affect estimation, since the level of development of financial markets and the availability of LTF may differ from the context of LMICs, which could alter the strength of the effects or the structural impact of LTF. Yet very similar results emerge for LMICs both for the first approach (see Figures A3.10 and A3.11 in the Appendix) and for the second approach (Figures A3.12 and A3.13). In a second robustness check, large firms were dropped, since they enjoy better access to LTF from banks (but also, for instance, from capital markets), and long-term loans may thus play a different role for them. Effects are mostly similar for SMEs both for the first (see Figures A3.14 and A3.15 in the Appendix) and second approach (Figures A3.16 and A3.17).

Furthermore, it was confirmed that results are robust to using propensity score matching instead of IPWRA both for the first (see Figures A3.18 and A3.19 in the Appendix) and second approach (Figures A3.20 and A3.21). Moreover, the main takeaways are not sensitive to how treatment and control groups are defined in the second approach. The baseline employs a threshold of 2 years such that firms with a loan duration of more than 1 year (2, 3, 4 or 5 years) are included into the control group if it matures in less than 2 years and into the treatment group if the remaining loan maturity amounts to two or more years. Effect sizes are computed for reducing the threshold to 1 year (treatment if remaining maturity is $\geq$1 year; left columns of Figures A3.22 and A3.23 in the Appendix) and for raising it to 3 years (treatment if remaining maturity is $\geq$3 years; right columns). The main findings carry over, but effect sizes slightly change in a predictable manner and in line with the findings from the baseline analyses (see Appendix for a more detailed discussion).

3.6. Conclusions

From a theoretical perspective, the effect of LTF on the performance of firms is ambiguous. Empirical evidence from the micro and macro level favors the notion that LTF fosters investments, productivity and growth. Using firm-level data from 73 mostly low- and middle-income countries, this study provides further empirical support thereof. More importantly, it

also analyses the effects on job quality. After all, many of the long-term investments, such as R&D, technology adoption and fixed assets, require complementary investments in labor, such as human capital accumulation, staff training and the like. Consequently, longer-term finance allows firms to pursue more long-term growth strategies, which includes investments in a stable and skilled workforce. This may contribute to better jobs, characterized by training and skill development, higher wages and more stable employment relations. Improved quality of jobs is not only a valuable goal in itself, but more broadly available good jobs also contribute to more cohesive societies (Wietzke, 2014; World Bank, 2012).

The findings indicate that long-term loans have indeed a positive effect on job quality. Even though presented theoretical and descriptive arguments are favorable, it cannot be ruled out completely that endogeneity problems from unobservable variables affect estimation of the effect sizes. LTF is associated with significant increases in formal training, average wage and the share of permanent jobs. The effects on the job quality indicators increase with longer loan maturities (i.e. when loan maturities are not just above 1 year, but above 2, 3, 4 or 5 years) indicating that long-term loans, indeed, facilitate building up a stable and skilled workforce with positive effects for the employees.

LTF is also associated with significantly increasing the likelihood of investments in fixed assets and investments in process innovation. Effects on product innovation are more modest and only marginally significant. LTF also boost employment growth and sales growth, for which effects are substantial, but only significant for certain maturity thresholds. In contrast to job quality, the importance of offering loans with a maturity above 1 year is less clear: The first approach (LTF vs STF) suggests that loans with a maturity above 1 year are sufficient and that increasing the loan maturities further does not lead to larger effects on investments and firm performance (except for process innovation); whereas the second approach (LTF vs shortly maturing LTF) finds some evidence that effect sizes tend to increase with larger maturities even for investments and firm performance.

The results reveal that LTF helps to enable productivity gains and to promote both employment creation and especially the quality of jobs. Availability of longer-term loans, however, is limited – especially in LMICs – and may further decrease due to current developments such as the growing importance of fintechs and digital lending, which is expected to increase short-termism in credit markets. Nevertheless, additional deliberations and trade-offs need to be considered before adopting a policy agenda committed to promoting LTF. First, it has to be noted that it

may require additional reforms and time. Markets generally require good legal infrastructure, a stable economic and political environment and functioning banking and stock markets to provide LTF. Development finance institutions (DFIs) can play an important role in developing markets for LTF, but must not repeat the failures of subsidized lending from the last millennium. Second, not all firms need LTF, and LTF is more likely to go to more transparent, larger firms. This could result in a trade-off, as described by Léon (2020), that more lending with longer maturity goes to larger firms (intensive margin) at the expense of reaching more firms, in particular smaller and younger firms, with STF (extensive margin). More research is needed to better understand the role of LTF in corporate finance. This refers both to exploring its relationship to job quality more thoroughly by using panel data or other means to control for unobservable firm characteristics, and the need to shed more light on the question of how to integrate reforms for LTF into the broader context of financial system development.

A.3 Appendix

(Topics appear in the order of appearance in the main article.)

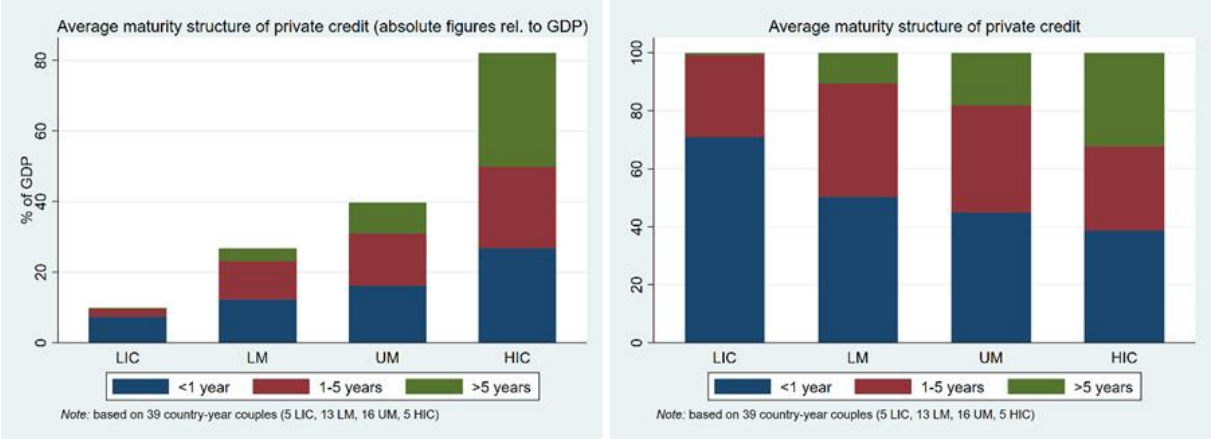

Figure A3.1: Average Maturity Structure for Country-Year Couples Included in This Paper

Note: Author based on data from Gutierrez et al. (2018).

Quality of the Loan Duration Variable in the ES

Data on loan maturity are only available from 2002 to 2009. Even though the variable was discontinued from 2010 onwards, its quality seems very promising. First of all, the number of missing values is relatively small and amounts to less than 6.7 per cent over the 96 country-year couples included in this study. For comparison, another numerical variable that describes a loan characteristic and was continued in the ES, namely the value of required collateral, exhibits 8.3 per cent of missing values over the same sample. Moreover, the ES loan-duration variable is not taken at its face value, but merely used to create a dummy for LTF, which is one for firms with a loan of a duration above the chosen threshold (1, 2, 3, 4 or 5 years).

This dummy aligns quite well with country-level data on maturities of the private credit portfolio. In Figure A3.2, ES data are aggregated to the country-year level as share of firms with long-term loans (using the 1-year threshold to match the definition in the other dataset), and is plotted against the share of LTF in the private credit portfolio of the corresponding country-year couple using the maturity data from Gutierrez et al. (2018). Even though their

dataset is the most comprehensive on national loan maturity structures, it covers only 43 of the 96 country-year couples from my sample. For these observations, the correlation amounts to r=0.58 (r=0.71 when excluding the three outliers at the upper left) and most data points fall into a relatively narrow band around the dotted diagonal. Even with perfect data quality, we would not expect the points to fall unto the diagonal. After all, the share of LTF in corporate lending would only perfectly mirror the respective share in the wider national credit portfolio if LTF was distributed proportionally between household and corporate lending. However, the fact that the shares of LTF for firms do not deviate too much from the share of LTF in the national private credit portfolio raises confidence in the dummy derived from the loan duration variable of the ES. Figure A3.2 further reveals the tendency that availability of LTF increases with the national income level.

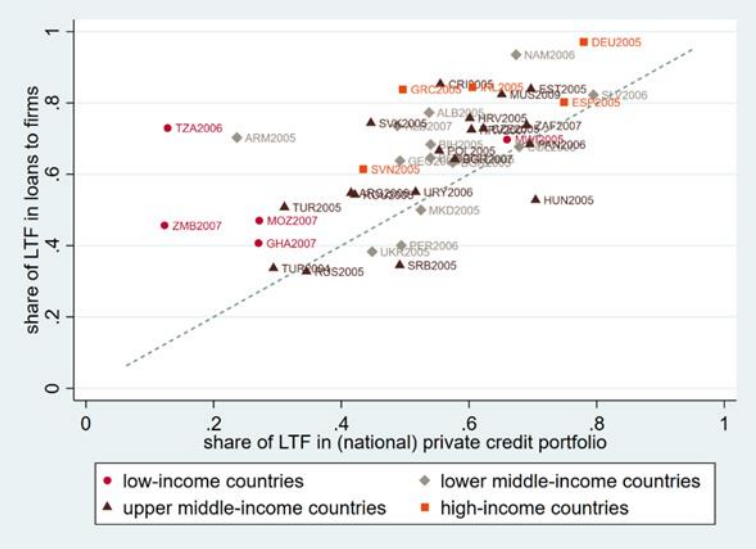

Figure A3.2: Share of LTF in Corporate Lending and Private Credit

Note: Author based on data from Enterprise Surveys.

Multiple Imputation (for Share of Trained Production and Non-Production Workers)

Multiple imputation was only used for the share of production workers and the share of non-production that received training since – in contrast to the other outcome variables (and other controls) – there are variables in the ES dataset that contain useful information to impute missing values. Most importantly, the training dummy whether a firm offered any formal

training in the last fiscal year allows to impute meaningful values for the share of trained (non-) production workers. Hence, imputation was only undertaken if an observation had non-missing values for the training dummy but missings for the shares of trained (non-)production workers. In a first step, simple imputation was employed if the firm offered no formal training (training=0), since both shares must be zero in this case. In a second step, I employed multiple imputation using the mice package in R (Van Buuren & Groothuis-Oudshoorn, 2011), if the firm offered formal (training=1).

Variables used in the multiple imputation comprise all variables from the propensity score model and the conditional mean model. As indicated above, the training dummy was included, too. The share of trained non-production workers (or the share of trained production workers respectively) was added when multiply imputing the share of production workers (the share of non-production workers). Lastly, more variables capturing loan characteristics (loan duration, years since approval of the loan, dummies whether firm has LTF using the different thresholds of 1, 2, 3, 4 and 5 years) were added.[37] Predictive mean matching was chosen to create 10 imputed datasets. The algorithm was given 50 iterations.

The diagnostic plots in Figure A3.3 show the mean (left graphs) and the standard deviations (right graphs) for the imputed values. They indicate that convergence has been achieved and that the procedure worked well. The mean of the share of trained production workers (top left) and the mean of the share of trained non-production workers (bottom left) increase with the first iterations as they should. After all, zeros had been added prior to multiple imputation for observations where the training dummy equaled zero, which has lowered the means beyond their (unknown) true values in the sample. Multiple imputation adds (some) values greater than zero for cases where the training dummies equals one such that the means rise again (towards the unknown true values in the sample). The standard deviation (right graphs) slightly increase accordingly. After few iterations, the means and standard deviations of all 10 imputation stabilize such that values remain within a relatively narrow band. The trace lines of the 10 imputations further intermingle well and do not exhibit any trend.

[37] Note that neither dummies for the different countries nor for the different years were inserted since this would imply running a separate imputation model for each country-year couple. For many country-year couples, the number of observations would be too small to produce reliable imputations. In addition, explanatory factors for the decision which share of the workforce to train are likely to be similar across countries and across different years.

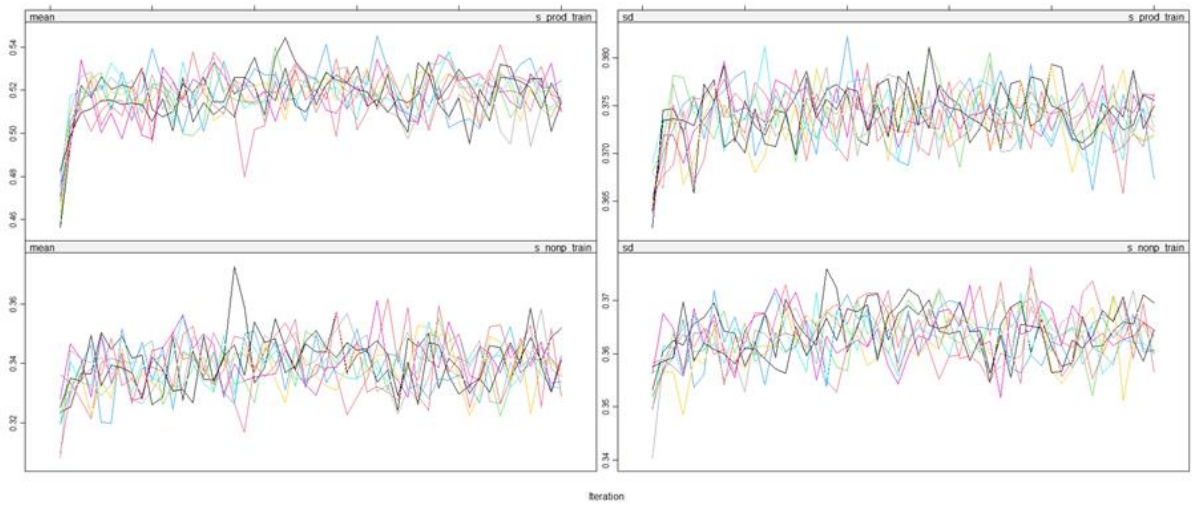

Figure A3.3: Diagnostic Plots for the Multiple Imputation Procedure

Note: Trace lines for means (left) and standard deviations (right) for the imputed values for share of trained production workers (top) and share of trained non-production workers (bottom).

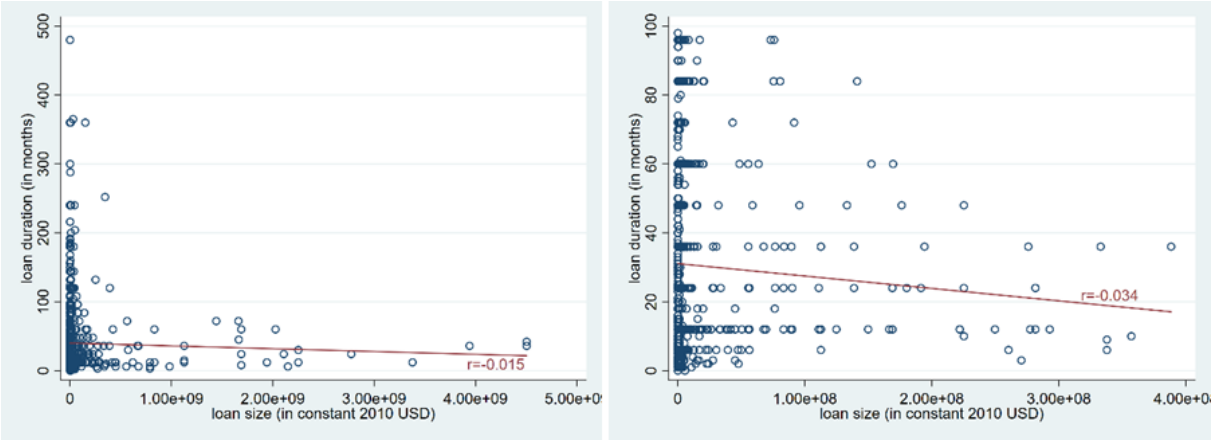

Figure A3.4: Scatter Plots of Loan Size and Loan Duration

Note: Includes linearly fitted lines and correlation coefficients. The right graph zooms in, i.e. larger loan sizes and durations have been ignored. Author's analysis based on data from Enterprise Surveys.

Table A3.1: Firm Characteristics by Different External Finance Situations

	Panel A: Firms **without loans** (d_0) **VS.** firms **with loans** (d_1)			**Panel B:** Firms with **STF** (d_0) **VS.** firms with **LTF** (d_1)														
				Maturity threshold for LTF														
				>1 year			>2 years			>3 years			>4 years			>5 years		
	Mean ($\bar{x}_{d_0}$)	Mean diff. ($\bar{x}_{d_0}$–$\bar{x}_{d_1}$)	Std. diff.	Mean ($\bar{x}_{d_0}$)	Mean diff. ($\bar{x}_{d_0}$–$\bar{x}_{d_1}$)	Std. diff.	Mean ($\bar{x}_{d_0}$)	Mean diff. ($\bar{x}_{d_0}$–$\bar{x}_{d_1}$)	Std. diff.	Mean ($\bar{x}_{d_0}$)	Mean diff. ($\bar{x}_{d_0}$–$\bar{x}_{d_1}$)	Std. diff.	Mean ($\bar{x}_{d_0}$)	Mean diff. ($\bar{x}_{d_0}$–$\bar{x}_{d_1}$)	Std. diff.	Mean ($\bar{x}_{d_0}$)	Mean diff. ($\bar{x}_{d_0}$–$\bar{x}_{d_1}$)	Std. diff.
Firm size	76.8	-120***	0.03	182.5	-9.1	0.01	181.3	-14.3	0.01	178.8	-29.0**	0.02	181.4	-25.9*	0.02	183.3	-39.3*	0.03
Firm age	18.2	-3.1***	0.19	20.6	.5**	-0.03	20.0	-.5*	0.03	19.8	-1.4***	0.08	19.8	-1.8***	0.10	20.0	-2.3***	0.13
Manufacturing	.551	-.06***	0.13	.674	.0003	-0.00	.675	.004	-0.01	.673	-.0003	0.00	.675	.004	-0.01	.675	.02*	-0.03
Exporter	.161	-.12***	0.30	.305	.025***	-0.06	.286	-.005	0.01	.282	-.02***	0.05	.281	-.03***	0.07	.289	.001	-0.00
Foreign-owned	.084	-.001	0.00	.098	.010**	-0.04	.093	.002	-0.01	0.089	-.008**	0.03	.089	-.009**	0.03	.091	-.002	0.01
Gov.-owned	.007	-.02***	0.14	.048	.01***	-0.08	.043	.01***	-0.05	.042	.01***	-0.05	0.041	.01***	-0.05	.040	0.01***	-0.06
Financial statements	.441	-.15***	0.31	.528	-.05***	0.10	.523	-.08***	0.15	.526	-.10***	0.21	.531	-.11***	0.23	.546	-.11***	0.22
Manager experience	16.8	-1.66***	0.14	16.0	1.11***	-0.09	15.7	.82***	-0.07	15.7	1.13***	-0.10	15.5	.85***	-0.07	15.3	.32	-0.03
Certified	.191	-.09***	0.21	.255	.05***	-0.12	.240	.03***	-0.08	.229	.02***	-0.04	.225	.01	-0.02	.225	.01	-0.03

Note: Author's analysis based on data from Enterprise Surveys.

Table A3.2: Description of Variables and Data Sources

Variable	Description and data source
LTF (maturity > 1 year)	Dummy variable equal to one if firm has a loan with more than one year of maturity; from World Bank Enterprise Surveys (ES)
LTF (maturity > 2 year)	Dummy variable equal to one if firm has a loan with more than two years of maturity; from ES
LTF (maturity > 3 year)	Dummy variable equal to one if firm has a loan with more than three years of maturity; from ES
LTF (maturity > 4 year)	Dummy variable equal to one if firm has a loan with more than four years of maturity; from ES
LTF (maturity > 5 year)	Dummy variable equal to one if firm has a loan with more than five years of maturity; from ES
Outcome variables	
Training	Dummy variable equal to one if employees received formal training in the last fiscal year; from ES
Share of production workers trained	Share of production workers that received formal training in the last fiscal year; from ES
Share of non-production workers trained	Share of non-production workers that received formal training in the last fiscal year; from ES
Average wage	Average wage, i.e. total labor costs divided by firm size (employees) relative to national GDP per capita; from ES
Share of permanent employees	Number of permanent, full-time employees relative to firm size (employees); from ES
Investment in fixed assets	Dummy variable equal to one if firm has purchased fixed assets in the last fiscal year; from ES
Product innovation	Dummy variable equal to one if firm has introduced a new product over the last three years; from ES
Process innovation	Dummy variable equal to one if firm has introduced a new or significantly improved process over the last three years; from ES
Employment growth	Average annual growth rate of permanent and full-time employees over the last three fiscal years; from ES
Sales growth	Average annual growth rate of total sales over the last three fiscal years (deflated by the GDP deflator); from ES
Firm characteristics	
Firm size (employees)	Number of full-time employees (temporary, full-time employees are converted into permanent, full-time equivalents using the average length of temporary, full-time employment); from ES
Firm age	Age of firm (in years); from ES
Manufacturing	Dummy variable equal to one if firm is in the manufacturing sector; from ES
Exporters	Dummy variable equal to one if at least 10% of firm's output are exported (directly or indirectly); from ES
Foreign-owned	Dummy variable equal to one if firm is owned to 50% or more by foreign organizations; from ES
Government-owned	Dummy variable equal to one if firm is owned to 50% or more by the government; from ES
Audited financial statements^{+}	Dummy variable equal to one if firm's financial statements are checked and certified by an external auditor; from ES
[Certified]	Dummy variable equal to one if firm has an internationally recognized quality certification; from ES

Table A3.2 (continued)

Variable	Description and data source
Country-level variables	
Inflation	Annual growth rate of the GDP deflator; from Word Bank's World Development Indicators (WDI)
GDP per capita	Gross domestic product per capita (in constant US dollars); from WDI
GDP growth[+]	Annual growth rate of GDP at market prices of constant local currency; from WDI
Private credit per GDP[+]	Domestic credit to the private sector as % of the GDP; from the Financial Development and Structure Dataset (FDSD)
Bank concentration[+]	Share of bank assets held by the three largest banks; from FDSD
Bank overhead costs[+]	Banks' overhead costs as a share of their total assets; from FDSD
Net interest margin[+]	Banks' net interest revenue relative to their interest-bearing assets; from FDSD
Rule of law[+]	Captures, amongst other things, the quality of contract enforcement, property rights, the police, and the courts; from World Bank's Worldwide Governance Indicators

[+] These variables are only included in the treatment model.

[.] Variables in squared brackets are only included in the robustness check.

Overview of Observations across Country-Year Couples

Table A3.3: Distribution of Observations by Country and Year

Country	2002	2003	2004	2005	2006	2007	2009	Total
Albania				88		106		194
Argentina					376			376
Armenia				138				138
Belarus				105				105
Benin			42					42
Bolivia					262			262
Bosnia and Herzegovina				98				98
Botswana					94			94
Brazil		558						558
Bulgaria			144	109		375		628
Burundi					61			61
Chile			497		492			989
China		771						771
Colombia					666			666
Costa Rica				136				136
Croatia				132		404		536
Czech Republic				81				81
Ecuador		229			325			554
Egypt			103					103
El Salvador		260			372			632
Estonia				87				87
Eswatini					57			57
Georgia				69				69
Germany				520				520
Ghana						81		81
Greece				111				111
Guatemala		193			201			394
Guyana			43					43
Honduras		224			190			414
Hungary				269				269
Indonesia		98						98
Ireland				264				264
Kazakhstan				238				238
Korea, Rep.				240				240
Kyrgyz Republic		24		74				98
Latvia				96				96
Lithuania			63	85				148
North Macedonia				50				50
Madagascar				47			66	113
Malawi				43				43
Mali		33				30		63
Mauritania					28			28
Mauritius				79			108	187
Mexico					110			110
Moldova		56		137				193
Morocco			336					336
Mozambique						34		34

Table A3.3 (continued)

Country	2002	2003	2004	2005	2006	2007	2009	Total
Namibia					77			77
Nicaragua		196			174			370
Oman		85						85
Panama					171			171
Paraguay					239			239
Peru	44				382			426
Philippines		96						96
Poland		30		297				327
Portugal				103				103
Romania				245				245
Russia				174				174
Rwanda					64			64
Senegal		79				61		140
Serbia		48		113				161
Slovak Republic				78				78
Slovenia				135				135
South Africa						194		194
Spain				334				334
Sri Lanka			155					155
Tanzania					74			74
Turkey			95	447				542
Uganda		38			86			124
Ukraine				214				214
Uruguay					169			169
Vietnam				813				813
Zambia	69					70		139
Total	113	3,018	1,478	6,249	4,670	1,355	174	17,057

Note: Author based on ES data.

Balancing and Overlap in First Approach (LTF vs STF)

Table A3.4 presents the standardized differences of the means and the variance ratios for all covariates before and after weighting. Standardized differences are moved closer to zero and variance ratios closer to one, which underlines the similarity of control and treatment groups. Hence, balancing has been achieved as almost none of the reweighted covariates deviates more than 0.1 from these targeted values (marked in grey in Table A3.4). Since the analysis comprises ten different outcome variables, and propensity scores are estimated based on the sample of the respective outcome variable and therefore differ, only the results of one outcome variable, share of permanent employees, are presented here as an example. Balancing results are equally good for the other outcome variables. This is in support of the conditional independence assumption.

To show that the overlap assumption has been met, the graphs in Figure A3.5 visualize the estimated propensity scores by treatment and control group for the case that firms have long-term finance (d_i=1); the figure shows, as an example, the estimated propensity scores for the sample of the outcome variable share of permanent employees. Over the whole range of realized values, we have positive values for both treated and controls, which is in favor of the overlap assumption. The same holds for the other nine outcome variables. Moreover, the propensity score model seems to be specified reasonably well, as it generally assigns treated firms higher propensity scores for having long-term finance, which is reflected by the curve of treated firms being skewed to the left and the curve of the controls being skewed to the right. Differentiation between treated and controls becomes harder for higher thresholds of long-term finance (since borrowers of a loan with 4 years maturity, for instance, may not differ much from those with a loan of more than 5 years maturity).

Table A3.4: Covariate Balance Before (Raw) and After Propensity Score Weighting (W.) Using Different Maturity Thresholds for LTF (First Approach: LTF vs STF)

	> 1 year				> 2 years				> 3 years				> 4 years				> 5 years			
	Stand. diff.		Variance ratio		Stand. diff.		Variance ratio		Stand. diff.		Variance ratio		Stand. diff.		Variance ratio		Stand. diff.		Variance ratio	
	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.
Firm size (employees)	-0.16	0.00	1.03	1.08	-0.06	0.00	1.02	1.02	-0.01	0.02	1.05	1.05	0.02	0.04	1.07	1.08	0.01	0.07	1.08	1.15
Age	0.01	0.00	0.92	0.93	0.06	0.00	0.96	0.94	0.11	0.01	0.97	0.96	0.13	0.01	0.97	0.96	0.18	0.06	0.93	0.91
Manufacturing	0.00	0.01	1.00	1.00	-0.01	0.00	1.01	1.00	0.00	0.00	1.00	1.00	-0.01	0.00	1.01	1.00	-0.03	0.02	1.02	0.99
Exporter	-0.06	0.00	0.95	1.00	0.01	-0.01	1.01	0.99	0.05	0.01	1.04	1.00	0.07	0.00	1.06	1.00	0.00	0.01	1.00	1.01
Foreign-owned	-0.04	-0.01	0.91	0.98	-0.01	-0.01	0.98	0.98	0.03	0.01	1.08	1.01	0.03	0.02	1.09	1.05	0.01	0.05	1.02	1.13
Government-owned	-0.08	0.00	0.70	1.01	-0.05	0.00	0.80	1.01	-0.05	0.00	0.79	1.00	-0.05	0.00	0.78	1.00	-0.06	-0.01	0.72	0.97
Audited fin. statement	0.10	0.00	0.98	1.00	0.15	0.00	0.96	1.00	0.21	0.01	0.94	1.00	0.23	0.01	0.92	1.00	0.22	0.01	0.91	1.00
Log of GDP pc	0.25	0.00	1.20	1.01	0.26	0.00	1.23	1.00	0.27	0.00	1.26	1.00	0.28	0.00	1.26	1.00	0.35	0.00	1.24	1.00
Inflation	-0.25	0.00	0.77	0.99	-0.33	0.00	0.69	0.99	-0.33	-0.01	0.66	0.96	-0.30	-0.01	0.67	0.96	-0.29	-0.02	0.73	0.96
GDP growth	-0.39	0.00	0.97	0.99	-0.44	0.00	0.84	1.00	-0.52	0.00	0.80	1.01	-0.51	0.01	0.75	1.02	-0.53	-0.02	0.76	1.06
Private credit per GDP	0.20	0.00	1.15	1.00	0.28	0.00	1.08	1.00	0.33	0.00	1.04	1.00	0.30	0.00	0.98	1.00	0.33	-0.01	0.96	0.99
Bank concen-tration	-0.01	0.00	1.01	1.00	0.00	0.00	0.98	1.00	-0.02	0.00	0.96	1.00	-0.02	0.00	1.02	1.01	0.00	-0.01	1.03	1.01
Bank overhead costs	-0.21	0.00	0.67	1.00	-0.30	0.00	0.68	1.00	-0.35	0.00	0.66	1.00	-0.33	0.00	0.69	1.00	-0.37	0.01	0.70	1.00
Net interest margin	-0.20	0.00	1.01	1.00	-0.33	0.00	0.94	1.00	-0.37	0.00	0.95	1.01	-0.35	0.00	0.94	1.01	-0.35	0.01	0.95	1.00
Rule of law	0.33	0.00	1.42	1.00	0.37	0.00	1.41	1.00	0.43	0.00	1.37	1.01	0.41	0.00	1.31	1.01	0.44	-0.01	1.33	1.02

Note: Exemplarily for the sample underlying the analysis of the outcome variable share of permanent employees. Author's analysis based on data from Enterprise Surveys.

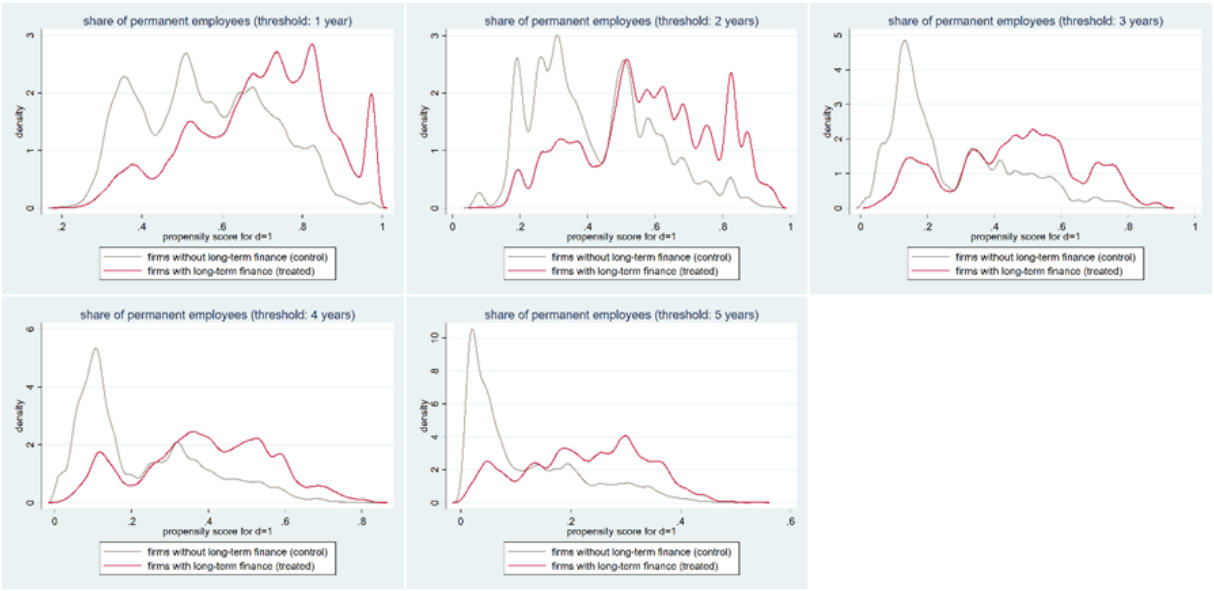

Figure A3.5: Propensity Scores by Treatment Status Using Different Maturity Thresholds for LTF (First Approach: LTF vs STF)

Note: Exemplarily for the sample underlying the analysis of the outcome variable share of permanent employees.

Probit Regression (Propensity Score Model) of the First Approach (LTF vs STF)

Table A3.5 exemplarily shows results from the probit regression estimating the propensity score for the sample underlying the analysis of the outcome variable share of permanent employees for the first approach (LTF vs STF).

Control variables mostly behave as expected – especially when the maturity threshold to differentiate between STF and LTF is higher (i.e. for columns more to the right): Firms size and having audited financial statements significantly and positively affects firms' access to long-term loans; being government-owned and belonging to the manufacturing sector significantly increases firms' likelihood of having a long-term loan. Surprisingly, exporting firms (and older firms) are not more likely to have LTF (sign is even negative, but mostly insignificant).

With regard to the country-level controls, the likelihood of having long-term loans is significantly higher in countries that are richer (log GDP pc), have a lower inflation, are growing (GDP growth) and have a larger financial sector (private credit per GDP). The bank competition measures (concentration, overhead costs, net interest margin) are mostly negative (as expected), but insignificant. Surprisingly, the sign of rule of law is negative, but the effect is insignificant for higher maturity thresholds. The negative sign probably results from the moderate to strong correlation between various country-level controls (yet this multicollinearity is less of a concern since it occurs between country-level controls).

Table A3.5: Probit Regression to Estimate Propensity Score for the First Approach (LTF vs STF; Treatment: Having a Long-Term Loan)

	Maturity threshold for defining LTF				
	>1 year	>2 years	>3 years	>4 years	>5 years
Log firm size	-0.0304*	0.0126	0.0252*	0.0403***	0.0415***
	(0.0168)	(0.0123)	(0.0130)	(0.0140)	(0.0136)
Log firm age	-0.0559***	-0.0396**	-0.0195	-0.00552	0.0221
	(0.0180)	(0.0187)	(0.0212)	(0.0212)	(0.0228)
Manufacturing	0.103***	0.0931**	0.0811**	0.0755**	0.0628*
	(0.0376)	(0.0433)	(0.0384)	(0.0343)	(0.0378)
Exporter	-0.0807**	-0.0430	-0.0348	-0.0212	-0.0906***
	(0.0325)	(0.0320)	(0.0320)	(0.0299)	(0.0326)
Foreign-owned	-0.0614	-0.0490	0.00581	0.00350	-0.0118
	(0.0383)	(0.0383)	(0.0438)	(0.0459)	(0.0469)

Government-owned	0.258***	0.256***	0.258***	0.204***	0.196**
	(0.0833)	(0.0789)	(0.0636)	(0.0743)	(0.0966)
Financial statements	0.0514	0.0313	0.0951***	0.0965***	0.0998***
	(0.0336)	(0.0302)	(0.0279)	(0.0282)	(0.0366)
Log GDP pc	3.813***	2.978***	2.149	0.531	-0.447
	(1.225)	(0.941)	(1.583)	(1.655)	(1.520)
Inflation	-0.0230***	-0.0411***	-0.0611***	-0.0618***	-0.0443***
	(0.00696)	(0.00766)	(0.0153)	(0.0140)	(0.0135)
GDP growth	0.104***	0.100***	0.0960***	0.0767***	0.128***
	(0.0232)	(0.0185)	(0.0309)	(0.0272)	(0.0360)
Private credit per GDP	0.0748***	0.120***	0.133***	0.130***	0.134***
	(0.0120)	(0.00914)	(0.0139)	(0.0158)	(0.0140)
Bank concentration	-0.00185	-0.000469	-0.00277	-0.00432	0.0110*
	(0.00409)	(0.00299)	(0.00449)	(0.00483)	(0.00582)
Bank overhead costs	-0.0168	0.0188	-0.0105	-0.00616	-0.0106
	(0.0107)	(0.0137)	(0.0254)	(0.0193)	(0.0263)
Bank net interest margin	0.0100	-0.0233	0.00885	0.0327	-0.0105
	(0.0134)	(0.0191)	(0.0404)	(0.0368)	(0.0453)
Rule of law	-1.829***	-2.067***	-1.618***	-0.862	-0.176
	(0.408)	(0.244)	(0.449)	(0.525)	(0.413)
Observations	17,057	17,057	17,057	17,023	17,023
Countries	73	73	73	72	72

Regressions employ country fixed effects, time fixed effects and robust standard errors clustered at the country-year level. Definition of the variables are described in Table A3.2.

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Exemplarily for the sample underlying the analysis of the outcome variable share of permanent employees. Data sources are discussed in the text.

Evidence for Complementing Investments in Training: Differentiation by Subsamples of Firms with and without Different Investments

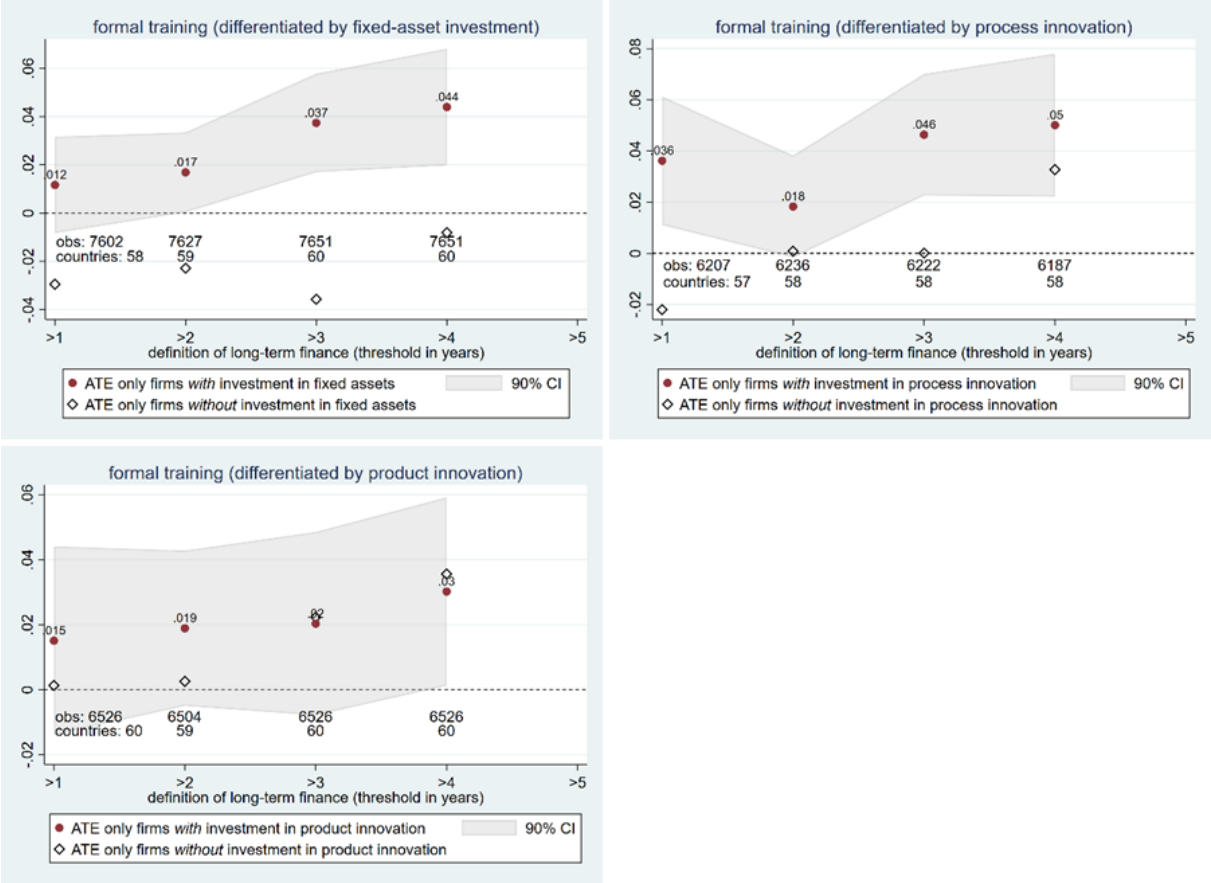

Figure A3.6: ATEs of Formal Training Variable When Using Subsamples of Firms with and without Different Investments (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Balancing and Overlap in Second Approach (LTF vs Shortly Maturing LTF)

Analogous to the balancing and overlap checks for the first approach, Table A3.6 presents the standardized differences of the means and the variance ratios for all covariates before and after weighting for the second approach. Balancing has been achieved as almost none of the reweighted covariates deviates more than 0.1 from these targeted values (marked in grey in Table A3.6). Since the second approach does not work for stock variables (share of permanent employees and average wage), the results of one outcome variable, formal training, are presented here as an example. Balancing results are equally good for the other seven outcome variables. This is in support of the conditional independence assumption.

The graphs in A3.7 visualize, exemplarily for the sample of the outcome variable formal training, the estimated propensity scores by treatment and control group for the case that firms have long-term finance (d_i=1). Over the whole range of realized values, we have positive values for both treated and controls, which is in favor of the overlap assumption. The same holds for the other seven outcome variables. Moreover, the propensity score model seems to be specified reasonably well, as it generally assigns treated firms higher propensity scores for having long-term finance, which is reflected by the curve of treated firms being skewed to the left and the curve of the controls being skewed to the right.

Figure A3.7: Propensity Scores by Treatment Status Using Different Maturity Thresholds for LTF (Second Approach: LTF vs Shortly Maturing LTF)

Note: Exemplarily for the sample underlying the analysis of the outcome variable formal training.

Table A3.6: Covariate Balance Before (Raw) and After Propensity Score Weighting (W.) Using Different Maturity Thresholds for LTF (Second Approach: LTF vs Shortly Maturing LTF)

	> 1 year				> 2 years				> 3 years			
	Stand. diff.		Variance ratio		Stand. diff.		Variance ratio		Stand. diff.		Variance ratio	
	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.	Raw	W.
Firm size (employees)	0.14	0.00	1.01	1.01	0.17	0.01	1.06	1.05	0.19	0.02	1.09	1.03
Age	0.07	0.01	1.14	1.11	0.01	-0.01	1.20	1.17	0.00	-0.02	1.26	1.22
Manufacturing	0.12	0.00	0.87	1.00	0.16	-0.01	0.84	1.01	0.19	0.01	0.81	0.99
Exporter	0.08	0.00	1.07	1.00	0.05	0.00	1.04	1.00	0.06	-0.01	1.04	1.00
Foreign-owned	0.00	0.00	1.01	1.00	0.01	0.00	1.02	1.01	-0.04	-0.02	0.90	0.95
Government-owned	-0.03	0.00	0.85	1.00	-0.05	0.00	0.81	0.99	-0.01	0.01	0.94	1.03
Audited fin. statement	0.16	0.00	0.96	1.00	0.14	-0.01	0.95	1.00	0.12	0.00	0.95	1.00
Log of GDP pc	0.09	0.00	0.99	0.99	-0.01	0.00	0.91	0.99	-0.09	0.00	0.79	0.98
Inflation	-0.03	0.00	0.83	1.02	0.10	-0.01	0.90	1.00	0.21	-0.01	0.95	0.98
GDP growth	-0.20	-0.01	0.76	1.01	-0.02	0.00	0.85	1.00	0.18	0.01	0.86	0.98
Private credit per GDP	0.00	0.00	0.81	1.00	-0.13	0.00	0.82	1.00	-0.22	0.00	0.82	0.98
Bank concen-tration	-0.05	0.00	0.99	0.99	-0.05	-0.01	1.05	1.01	-0.03	-0.02	1.26	1.04
Bank overhead costs	-0.08	0.00	0.83	1.00	0.06	0.00	0.88	1.00	0.17	-0.02	0.86	1.00
Net interest margin	-0.09	0.00	0.80	0.99	0.13	0.00	0.84	0.99	0.31	-0.01	0.80	0.96
Rule of law	0.06	0.00	1.00	1.00	-0.10	0.00	0.92	1.00	-0.26	-0.01	0.88	0.98

Note: Exemplarily for the sample underlying the analysis of the outcome variable formal training. Author's analysis based on data from Enterprise Surveys.

Probit Regression (Propensity Score Model) of the Second Approach (LTF vs Shortly Maturing LTF)

Table A3.7 exemplarily shows results from the probit regression estimating the propensity score for the sample underlying the analysis of the outcome variable formal training for the second approach (LTF vs shortly maturing LTF).

Control variables mostly behave as expected – especially when the maturity threshold is higher (i.e. for columns more to the right): Firms size and having audited financial statements significantly and positively affects firms' access to long-term loans. Surprisingly, exporting firms, foreign-owned firms, government-owned firms and older firms are not more likely to have LTF (signs are sometimes even negative, but mostly insignificant). With regard to the country-level controls, the likelihood of having long-term loans is higher in countries that are richer (log GDP pc), have a lower inflation, are growing (GDP growth) and have a larger financial sector (private credit per GDP) – these coefficients are mostly statistically significant. The bank competition measures (concentration, overhead costs, net interest margin) are mostly negative (as expected) and partially significant. Surprisingly, the sign of rule of law is negative for the 1-year and 2-year maturity threshold, but positive and highly significant for the 3-year threshold. Unexpected signs probably result from the moderate to strong correlation between various country-level controls (yet this multicollinearity is less of a concern since it occurs between country-level controls).

Table A3.7: Probit Regression to Estimate Propensity Score for the Second Approach (LTF vs Shortly Maturing LTF; Treatment: Having a Long-Term Loan)

	Maturity threshold for defining LTF		
	>1 year	>2 years	>3 years
Log firm size	0.109***	0.115***	0.104***
	(0.0136)	(0.0181)	(0.0252)
Log firm age	-0.0544***	-0.0890***	-0.0718
	(0.0207)	(0.0294)	(0.0437)
Manufacturing	-0.0104	0.0152	0.00518
	(0.0540)	(0.0693)	(0.0829)
Exporter	-0.0421	-0.0607	-0.0288
	(0.0391)	(0.0484)	(0.0594)

Foreign-owned	-0.0487	-0.0349	-0.112*
	(0.0516)	(0.0510)	(0.0609)
Government-owned	-0.00179	-0.0874	-0.0567
	(0.0513)	(0.0734)	(0.112)
Financial statements	0.0936***	0.111**	0.104*
	(0.0351)	(0.0439)	(0.0569)
Log GDP pc	4.316**	5.315***	5.541***
	(2.178)	(1.427)	(1.707)
Inflation	0.00516	0.00354	-0.158***
	(0.0169)	(0.0217)	(0.0333)
GDP growth	0.0203	0.0435	0.276***
	(0.0364)	(0.0296)	(0.0480)
Private credit per GDP	0.0878***	0.0543***	0.0299
	(0.0210)	(0.0187)	(0.0227)
Bank concentration	-0.00252	0.00728	0.0466***
	(0.00810)	(0.00519)	(0.0109)
Bank overhead costs	0.0614**	0.0138	-0.378***
	(0.0258)	(0.0349)	(0.0819)
Bank net interest margin	-0.173***	-0.108	0.466***
	(0.0492)	(0.0674)	(0.124)
Rule of law	-1.559**	-1.055*	6.095***
	(0.706)	(0.621)	(1.174)
Observations	9,381	7,182	4,660
Countries	69	67	54

Regressions employ country fixed effects, time fixed effects and robust standard errors clustered at the country-year level. Definition of the variables are described in Table A3.2.

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Exemplarily for the sample underlying the analysis of the outcome variable formal training. Data sources are discussed in the text.

Robustness Check: Subsample Analyses for Financially Unconstrained and Financially Constrained Firms (Importance of Rollover Risk)

Table A3.8: Robustness Check for Subsamples of Financially Unconstrained and Constrained Firms (Second Approach: LTF vs Shortly Maturing LTF)

	Financially **unconstrained** firms (1-year threshold)	Financially **constrained** firms (1-year threshold)
Job quality		
Training	-0.001	0.066
Share of trained production workers	0.014	0.070
Share of trained non-production workers	0.000	0.034
Investments		
Fixed assets	0.050	0.092
Process innovation	0.031	0.030
Product innovation	0.034	0.045
Firm performance		
Employment growth	0.655	0.581
Sales growth	1.004	0.445

Note: The 1-year threshold is used to define LTF.

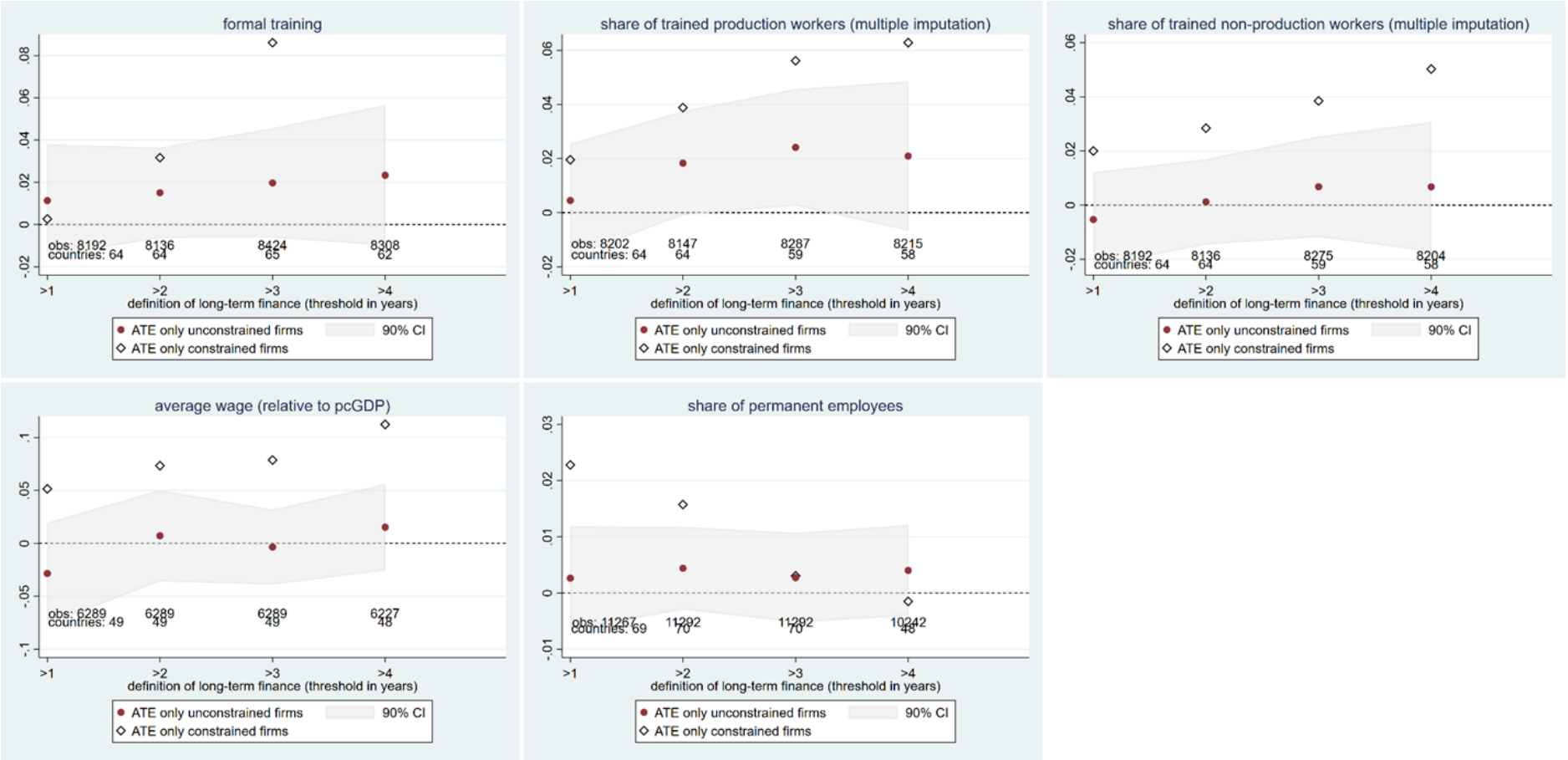

Figure A3.8: Robustness Check for Subsamples of Financially Unconstrained and Constrained Firms: ATEs of Job Quality Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

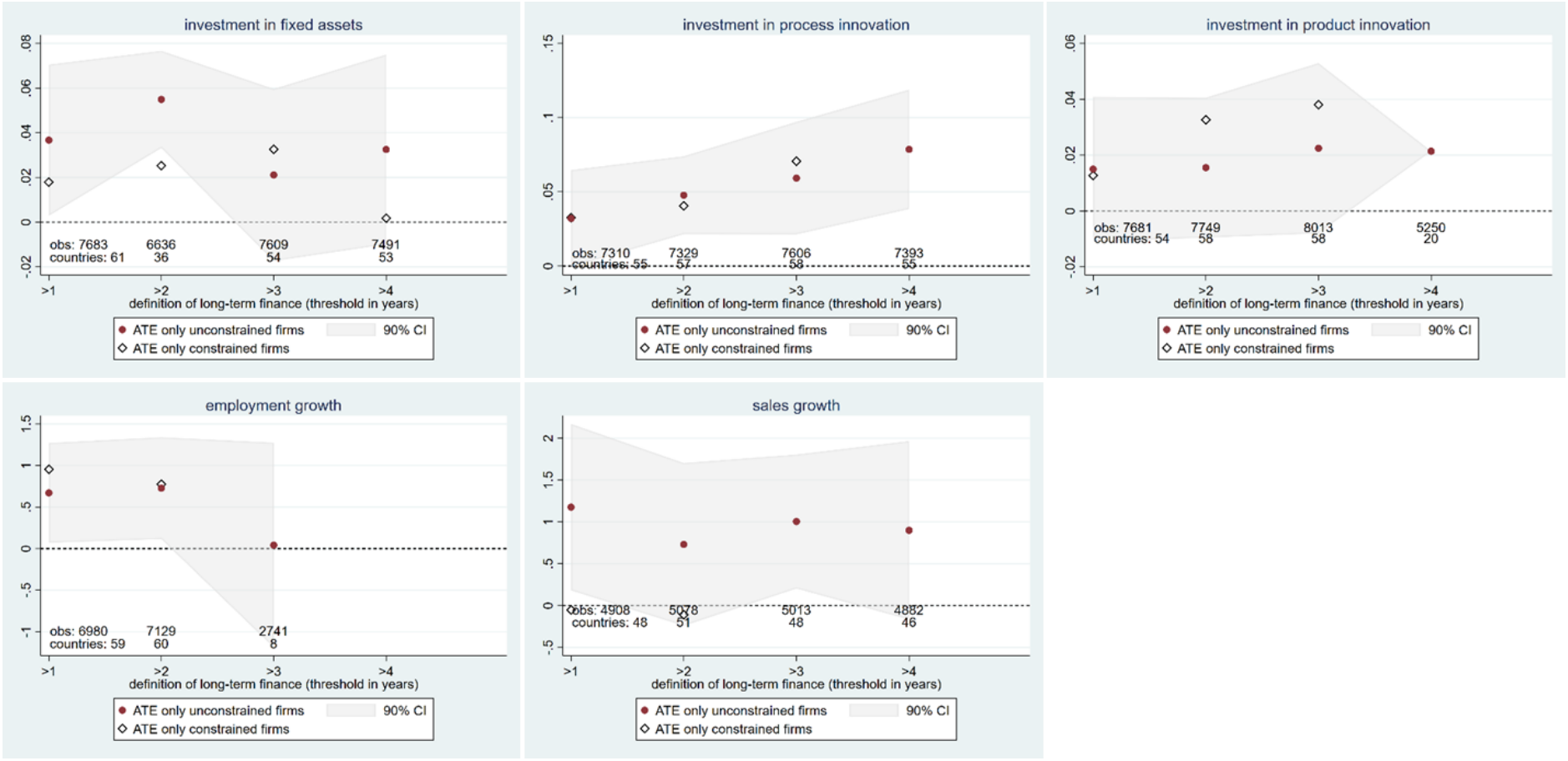

Figure A3.9: Robustness Check for Subsamples of Financially Unconstrained and Constrained Firms: ATEs of Investment and Firm Performance Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Robustness Check: ATEs for LMICs Subsample (First Approach: LTF vs STF)

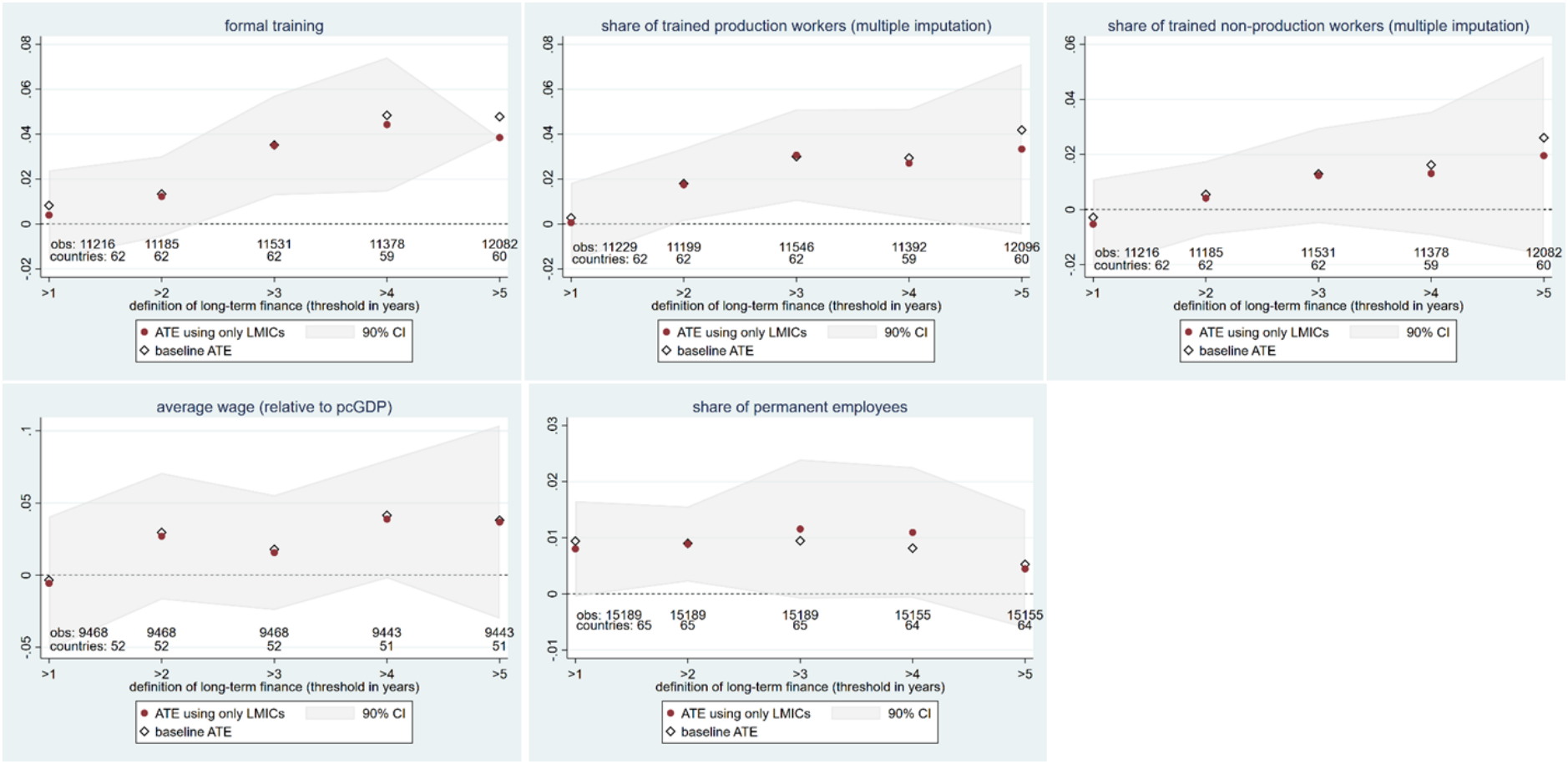

Figure A3.10: Robustness Check for LMICs Subsample: ATEs of Job Quality Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

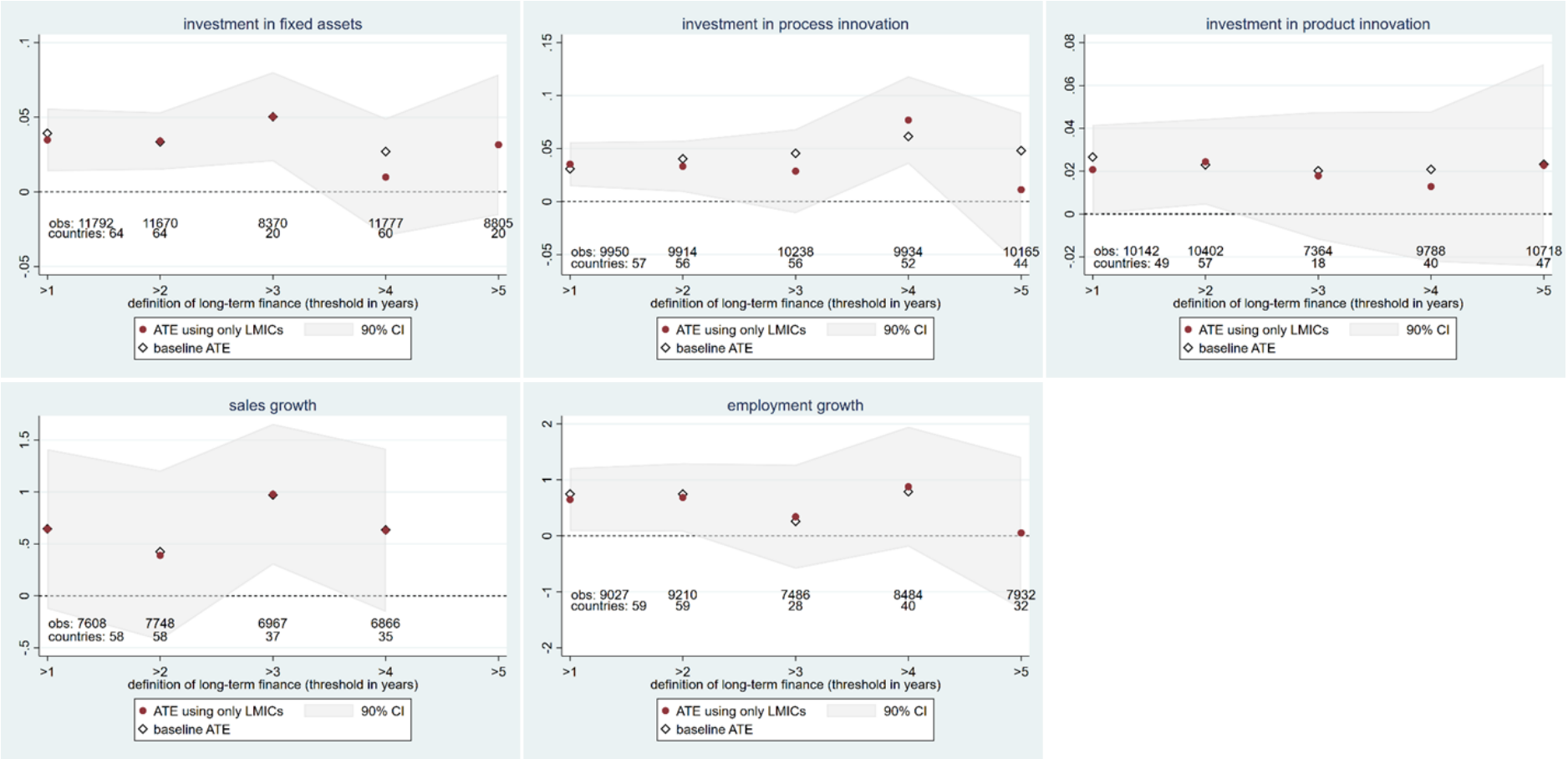

Figure A3.11: Robustness Check for LMICs Subsample: ATEs of Investment and Firm Performance Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Robustness Check: ATEs for LMICs Subsample (Second Approach: LTF vs Shortly Maturing LTF)

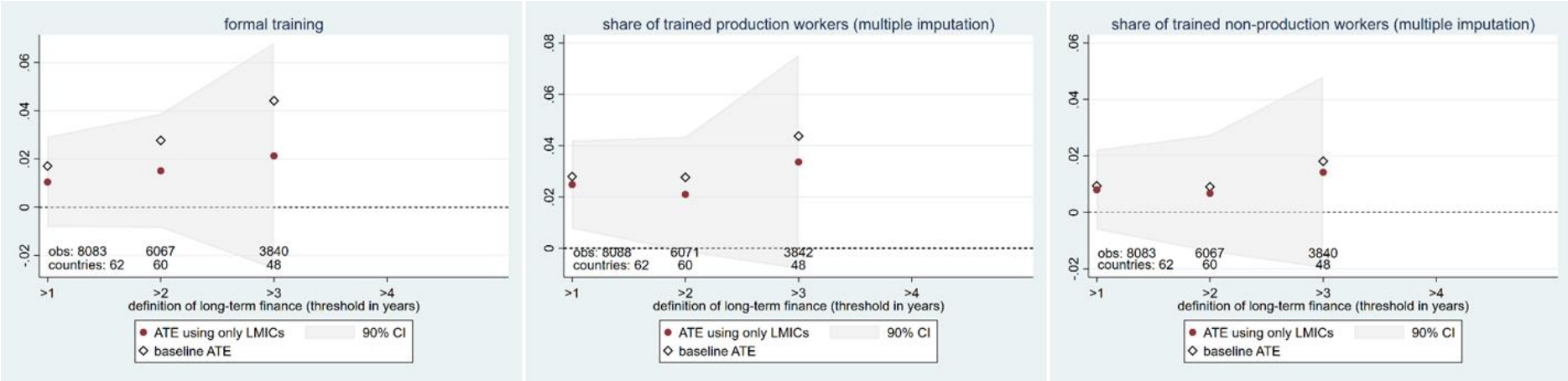

Figure A3.12: Robustness Check for LMICs Subsample: ATEs of Job Quality Variables (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

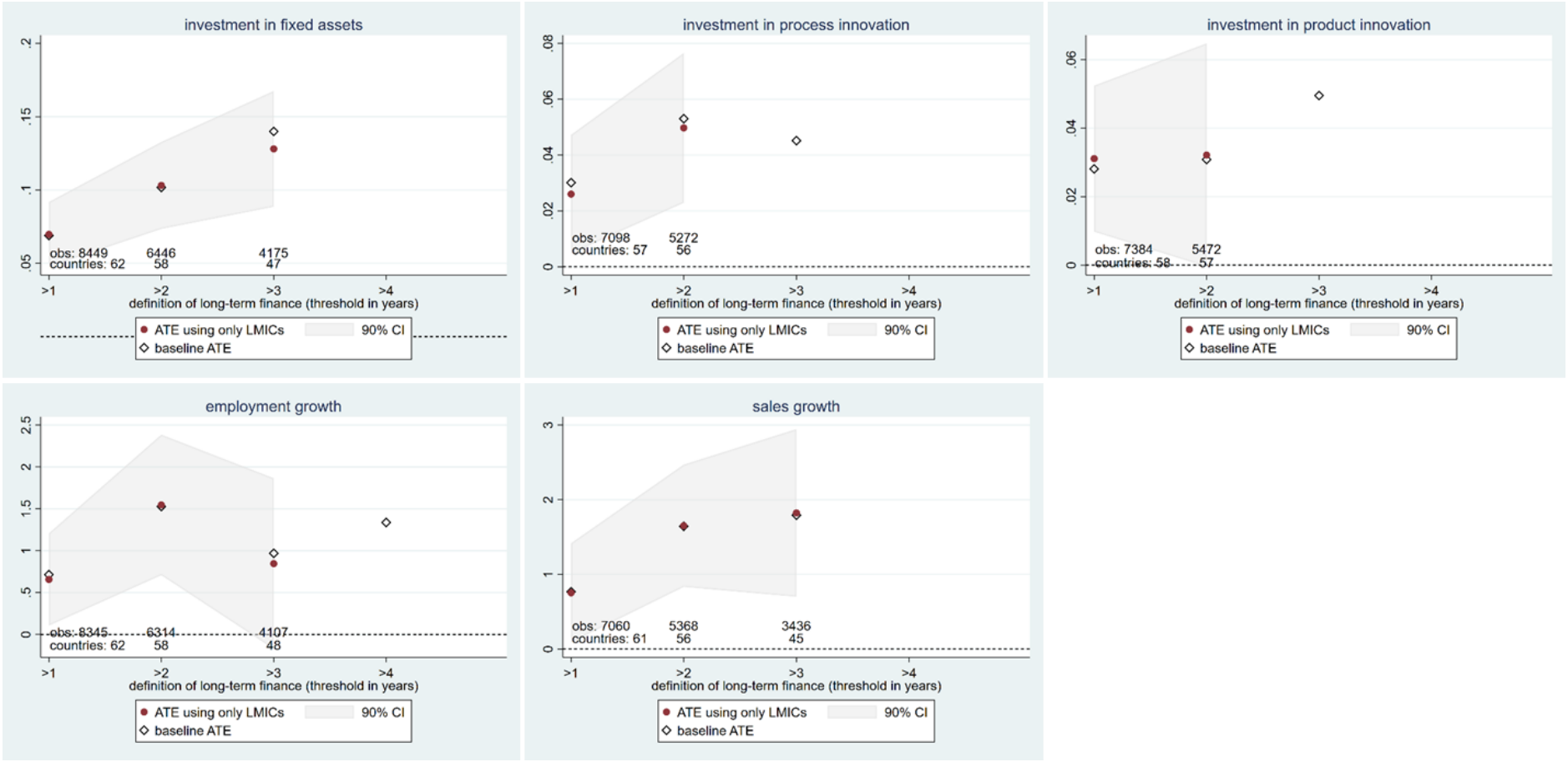

Figure A3.13: Robustness Check for LMICs Subsample: ATEs of Investment and Firm Performance Variables (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Robustness Check: ATEs for SMEs Subsample (First Approach: LTF vs STF)

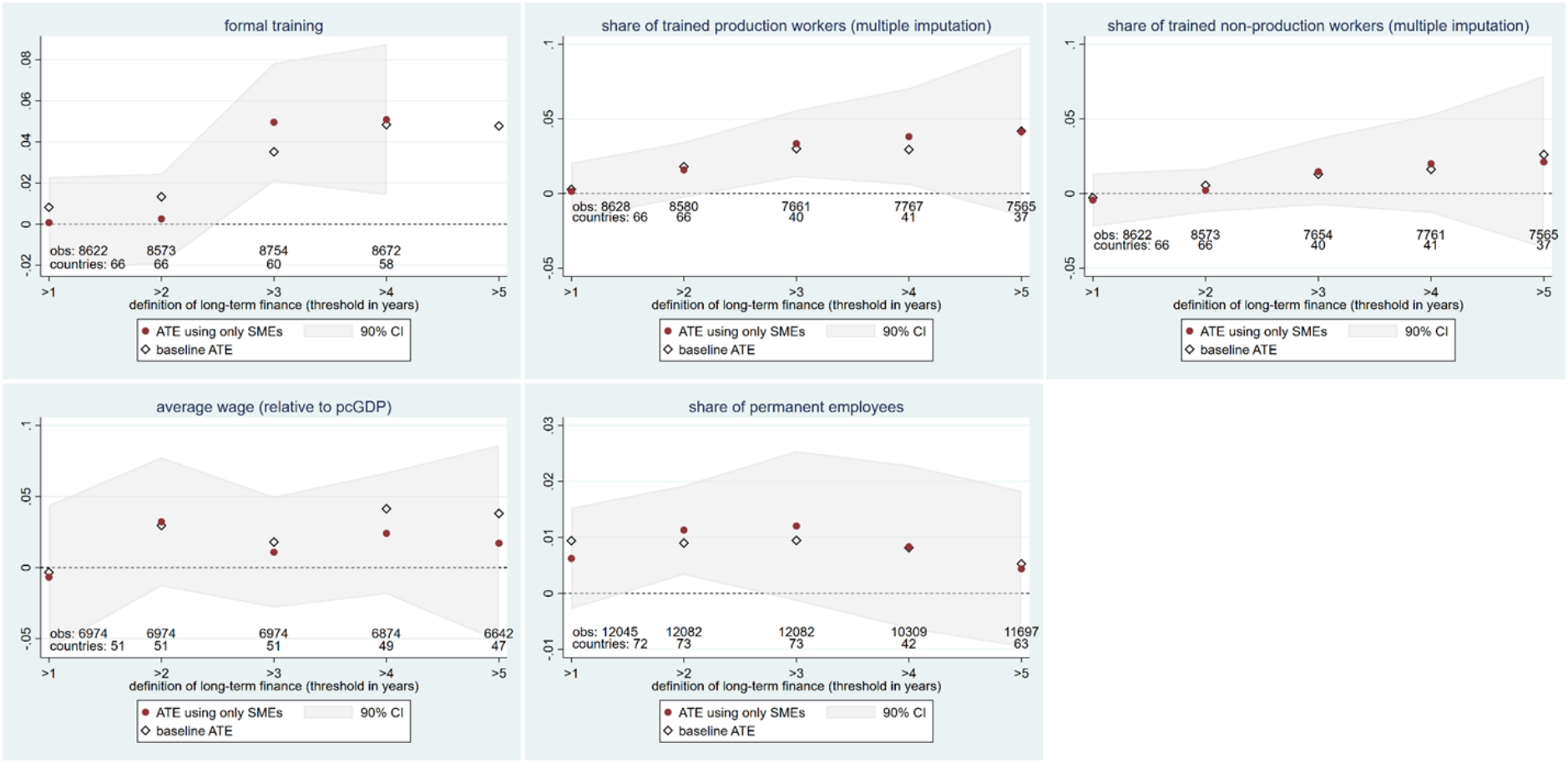

Figure A3.14: Robustness Check for SMEs Subsample: ATEs of Job Quality Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

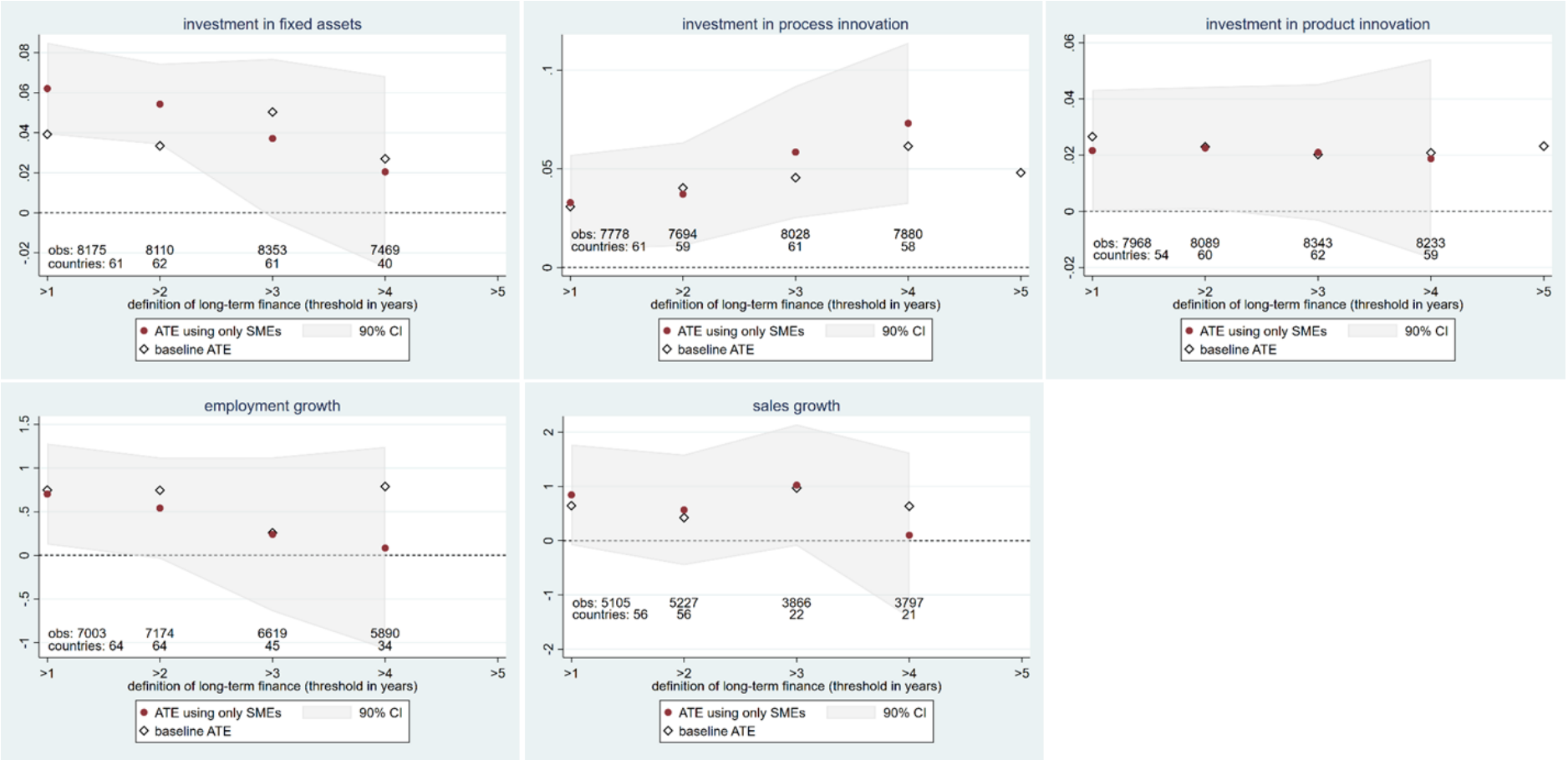

Figure A3.15: Robustness Check for SMEs Subsample: ATEs of Investment and Firm Performance Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Robustness Check: ATEs for SMEs Subsample (Second Approach: LTF vs Shortly Maturing LTF)

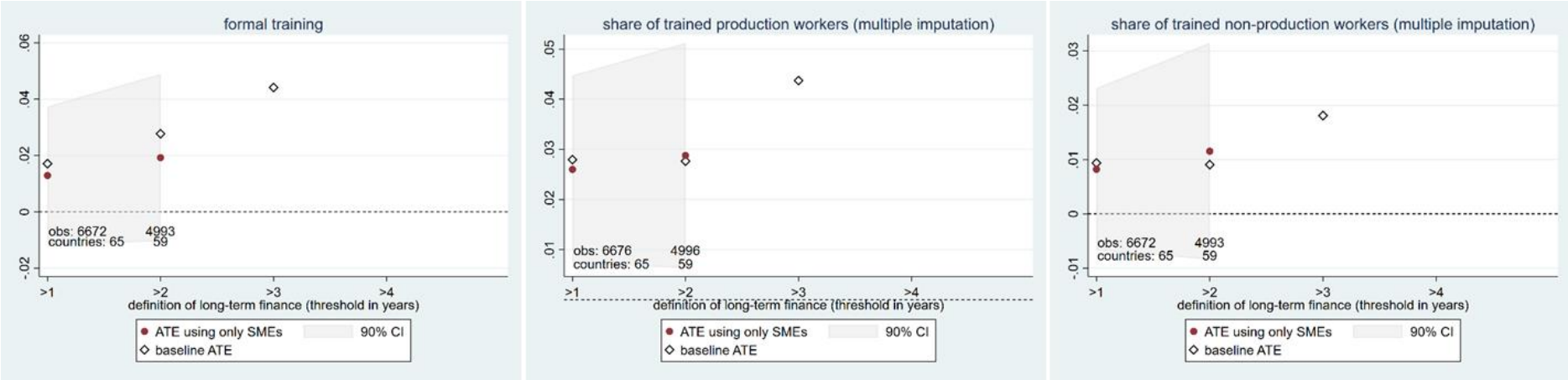

Figure A3.16: Robustness Check for SMEs Subsample: ATEs of Job Quality Variables (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

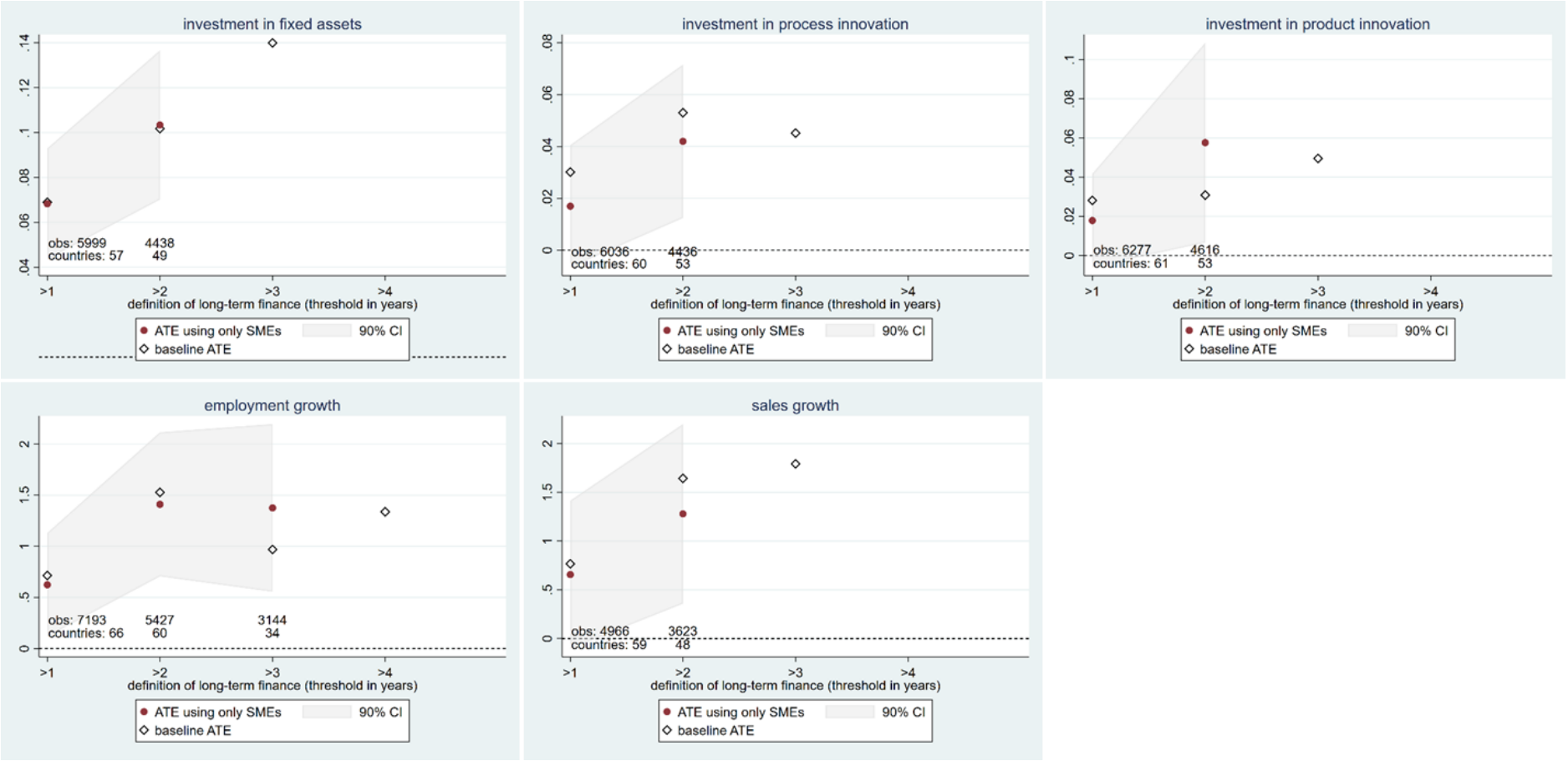

Figure A3.17: Robustness Check for SMEs Subsample: ATEs of Investment and Firm Performance Variables (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Robustness Check: ATEs for Propensity Score Matching Instead of IPWRA (First Approach: LTF vs STF)

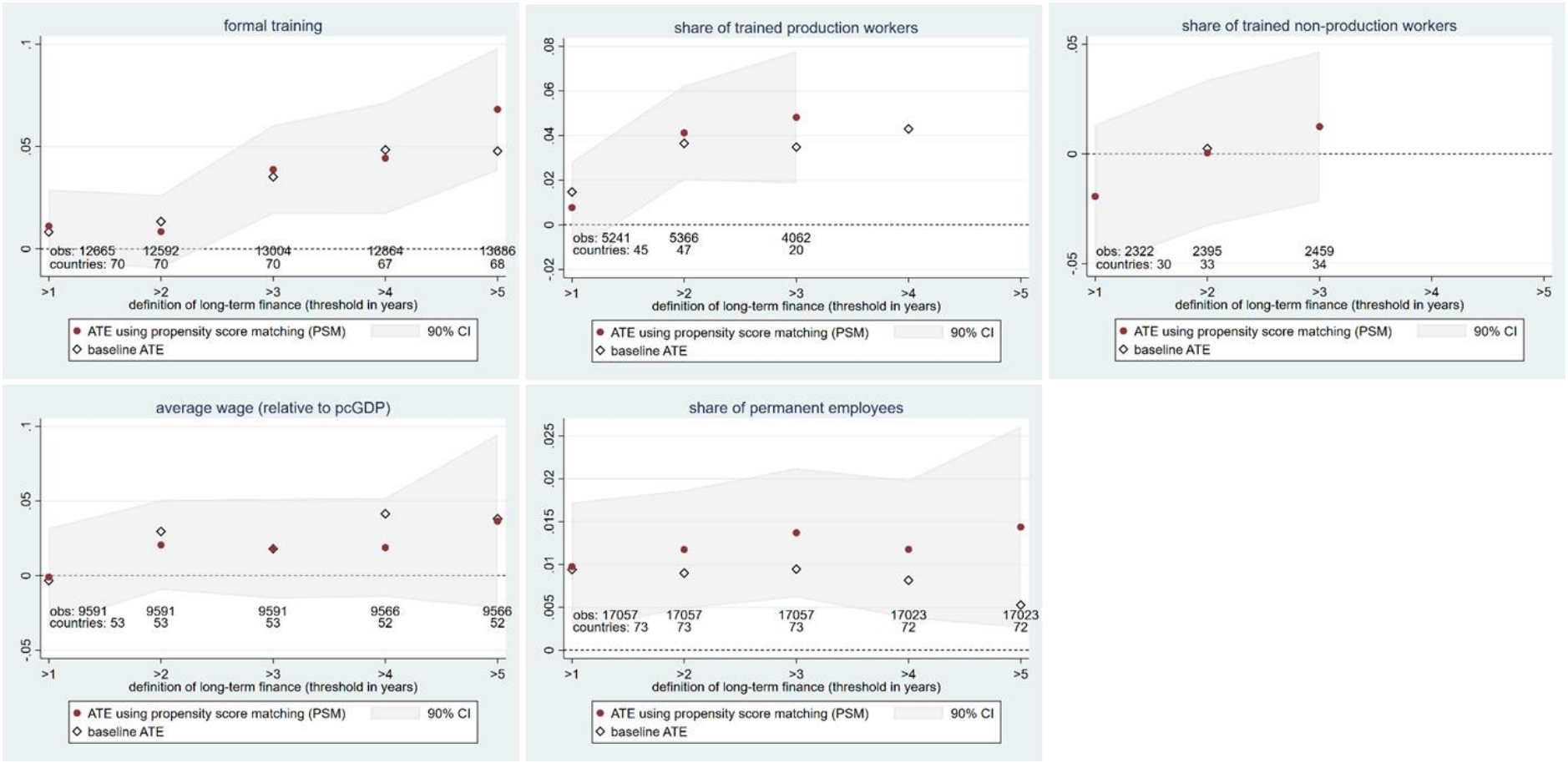

Figure A3.18: Robustness Check for Propensity Score Matching: ATEs of Job Quality Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

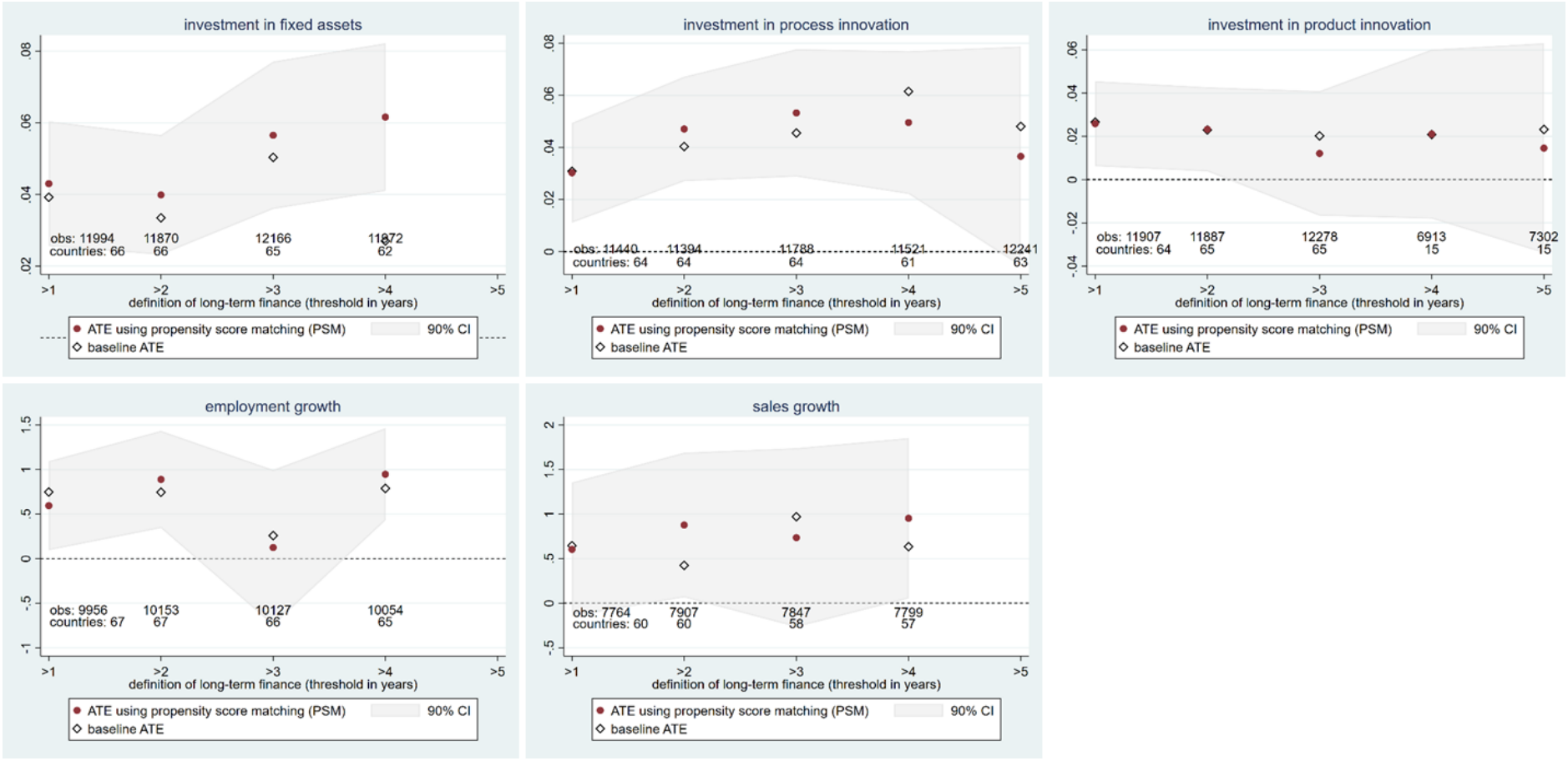

Figure A3.19: Robustness Check for Propensity Score Matching: ATEs of Investment and Firm Performance Variables (First Approach: LTF vs STF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Robustness Check: ATEs for Propensity Score Matching Instead of IPWRA (Second Approach: LTF vs Shortly Maturing LTF)

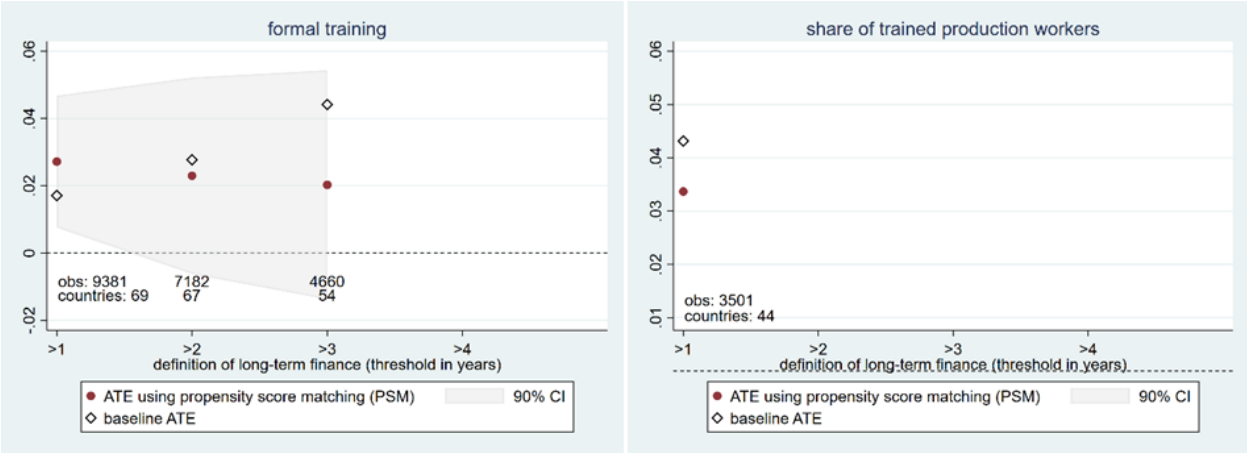

Figure A3.20: Robustness Check for Propensity Score Matching: ATEs of Job Quality Variables (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

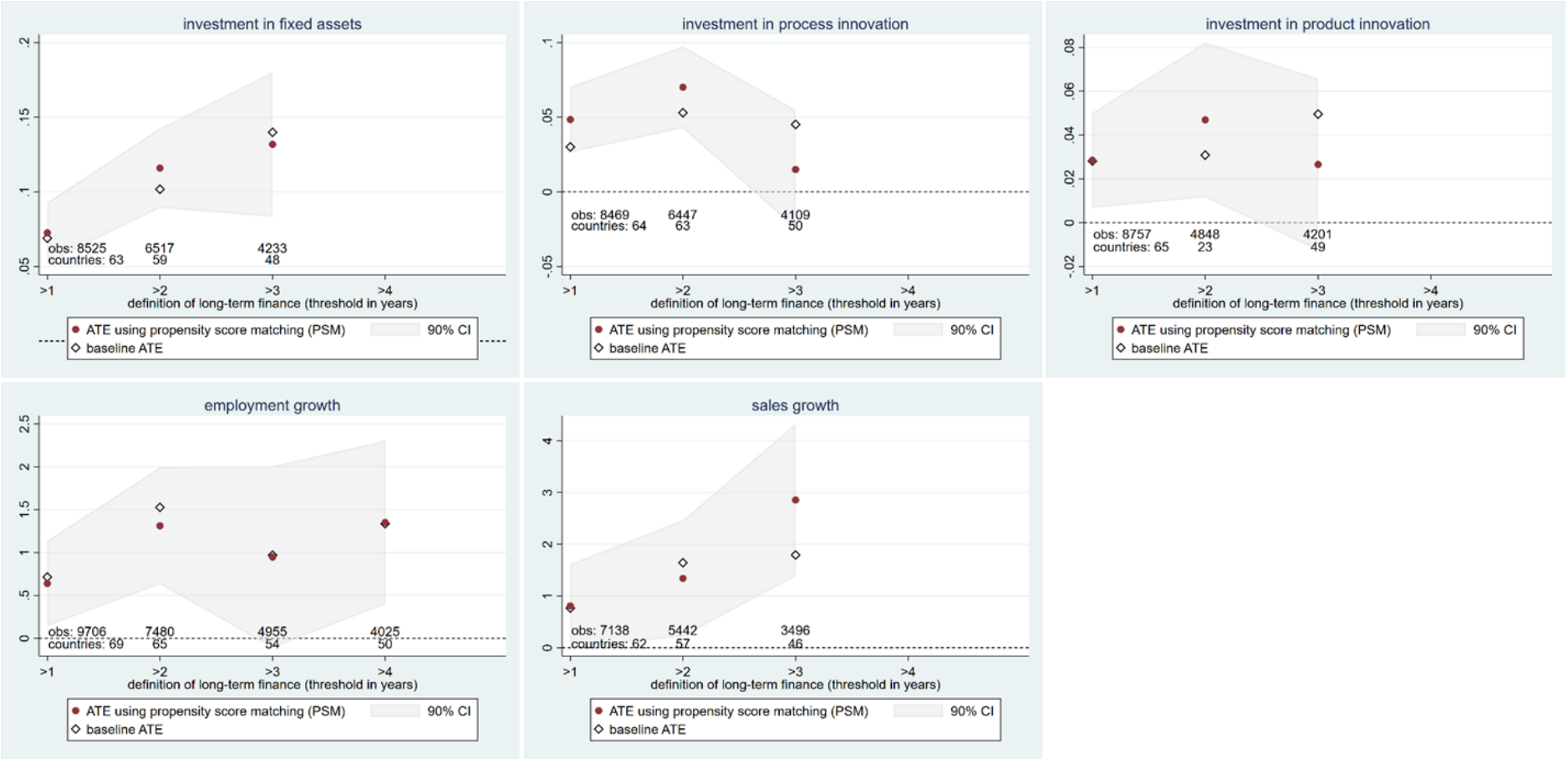

Figure A3.21: Robustness Check for Propensity Score Matching: ATEs of Investment and Firm Performance Variables (Second Approach: LTF vs Shortly Maturing LTF)

Note: The graphs show ATEs for different maturity thresholds of LTF.

Robustness Check: ATEs for Alternative Thresholds for Defining the Treatment and Control Group in the Second Approach (LTF vs Shortly Maturing LTF)

Main takeaways are not sensitive to how treatment and control groups are defined in the second approach. The baseline employs a threshold of two years such that firms with a loan duration of more than 1 year (2, 3, 4 or 5 years) are included into the control group if it matures in less than 2 years and into the treatment group if the remaining loan maturity amounts to 2 or more years. Effect sizes are computed for reducing the threshold to 1 year (treatment if remaining maturity is ≥1 year) and for raising it to 3 years (treatment if remaining maturity is ≥3 years).

While main findings carry over, effect sizes slightly change in a systematic manner in line with the associations found in the baseline analyses. Effect sizes of the training variables[38] are slightly smaller compared to the baseline approach when using the lower threshold (see left column in Figure A3.22); for the higher threshold (right column), effects are larger for the 1- and 2-year loan-duration thresholds than in the baseline, but smaller for the 3-year threshold, such that effect sizes do not rise with increasing maturity thresholds anymore (rather remain on similar levels). This is in line with the findings from the baseline analysis that the remaining maturity matters for investment decisions related to job quality and that longer maturities are associated with larger improvements in job quality: If more firms with rather short maturities are included in the treatment group instead of the control group (implication from lowering the threshold for defining treatment and control groups from 2 years to 1 year, i.e. firms with loans maturing in 1 year are added to the treatment group), the positive effects become smaller. (Note that one drawback of reducing the threshold to 1 year is that the number of observations in the control group is considerably smaller. This is also the reason why effect sizes could only be computed for the 1- and 2-year loan-duration threshold.)

When increasing the threshold, effects become larger for the 1-year and 2-year threshold for loan durations since the treatment group now comprises only firms with a remaining maturity of three or more years; this implies that only firms with a loan duration of three or more years can be in the treatment group. (Note that for this reason the treatment groups for the 1-year and 2-year loan-duration threshold are identical; differences in effect sizes result from differences in the control group. This is a drawback of using the 3-year threshold for remaining loan

[38] Recall that the second approach cannot estimate effects for stock variables as explained in previous sections. Hence, we can only consider the three training variables (flow variables) here and not the other two job quality indicators (namely share of permanent employees and average wage; stock variables).

maturities). Effect sizes are smaller for the 3-year loan-duration threshold than in the baseline since firms with loans that would generally be considered as medium- or long-term finance (e.g. loan duration of 4 years with a remaining maturity of just below 3 years) are moved from the treatment to the control group so that average effects in the control group become larger and thus ATEs become smaller. This is in line with the findings in the first approach for job quality variables that substantial effect sizes materialize for loan maturities of two or more years.

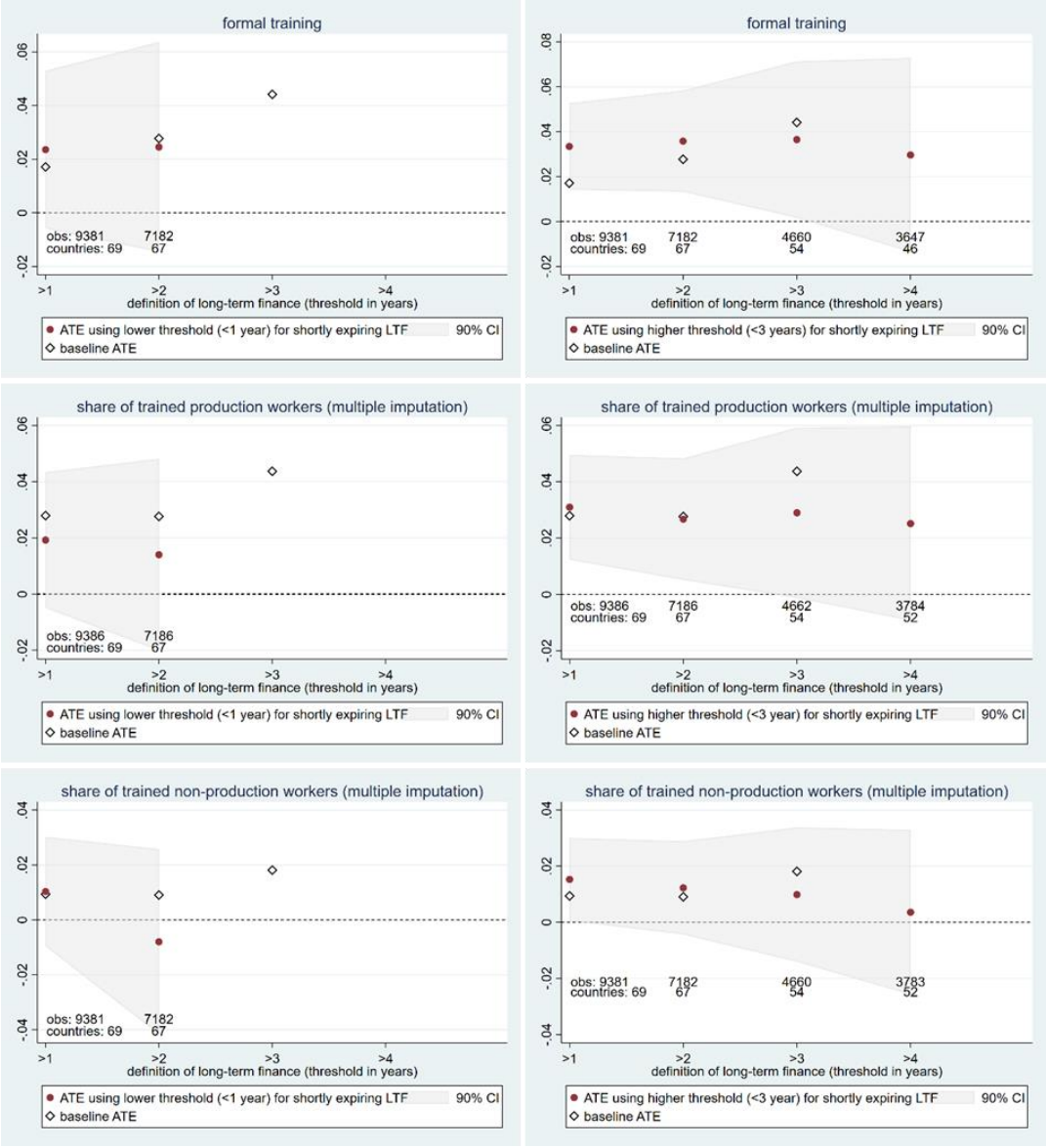

Figure A3.22: ATEs of Job Quality Variables When Using Alternative Thresholds for Defining the Treatment Group (Second Approach: LTF vs Shortly Maturing LTF)

Note: The treatment group is defined as firms with LTF with remaining time to maturity ≥1 year (left column) and remaining time to maturity ≥3 year (right column). The graphs show ATEs for different maturity thresholds of LTF.

Similarly in accordance with the results from the main analysis that effects for investment and firm performance variables already emerge for shorter loan maturities, effect sizes mostly become larger when using the lower threshold (treatment if remaining maturity is ≥1 year) as depicted in the left column of Figure A3.23. This is because firms with shorter maturities, that are still (mostly) long enough to allow for investments related to fixed assets, innovation, employment growth and sales growth, are added to the treatment group. Analogously, the graphs in the right column show that effect sizes are smaller or similar for the higher threshold (treatment if remaining maturity is ≥3 years) since firms with longer remaining maturities, that encourage investment decisions positively related to firm performance and investment variables, are now shifted to the control group.

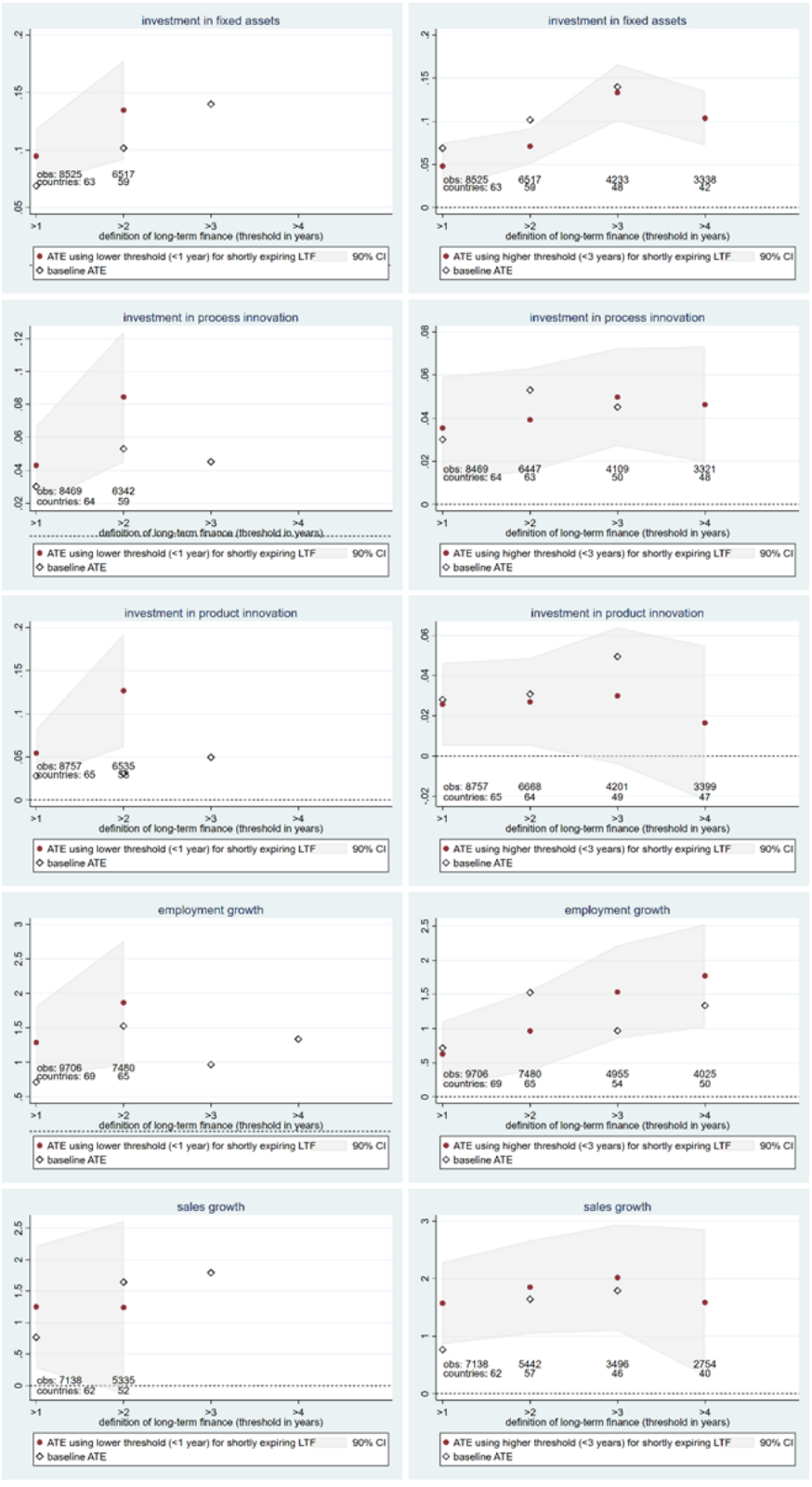

Figure A3.23: ATEs of Investment and Firm Performance Variables When Using Alternative Thresholds for Defining the Treatment Group (Second Approach: LTF vs Shortly Maturing LTF)

Note: The treatment group is defined as firms with LTF with remaining time to maturity ≥1 year (left column) and remaining time to maturity ≥3 year (right column). The graphs show ATEs for different maturity thresholds of LTF.

Chapter 4

The Role of Capital Markets for Small and Medium-Sized Enterprise (SME) Finance

Abstract

SMEs play a crucial role for inclusive development, but their growth is often hampered by lacking access to finance. This paper explores whether capital markets can be harnessed to foster SME finance. Given the negligible use of market-based financing by SMEs, it is analyzed to what extent capital market development indirectly alleviates SMEs' financing constraints by improving their access to loans. Thus, the study builds on the theoretical model by Song and Thakor (2010), which consolidated the view that markets and banks are complementary and co-evolve. Using a modification of the analysis framework by Rajan and Zingales (1998) for 68,712 firm-level observations from 50 mostly low- and middle-income countries for 2006-2019, it empirically investigates the central prediction of Song and Thakor (2010) that capital market development is associated with an increase in bank lending, in particular, towards smaller and riskier firms. I find a positive and significant effect; in support of Song and Thakor (2010), the effect runs through increased capital market usage by financial institutions and expanded loan availability. The findings underline that markets and banks co-evolve and that the most important contribution of capital markets to SME finance is their indirect effect on bank lending and loan availability.

4.1. Introduction

Small and medium-sized enterprises (SMEs) are essential for inclusive economic development. The vast majority of firms in low- and middle-income countries classifies as SMEs. They provide at least 50 percent of the formal jobs and play an important role in employment creation (Ayyagari et al., 2014). Their true significance, however, is underrated by such figures as SMEs provide livelihoods for many more semi-formal and informal workers. In addition, SMEs advance the diversification and decentralization of economic activities as they operate in and move into diverse geographic areas and economic sectors (Disse & Sommer, 2020). Consequently, SMEs make development more inclusive and contribute to economic growth and poverty reduction (Beck, Demirgüç-Kunt, & Maksimovic, 2005). However, the growth and development of many SMEs is hampered by constrained access to finance, which particularly affects younger and smaller firms (Beck et al., 2008). In the World Bank's Enterprise Surveys, SME managers have ranked access to finance as the biggest obstacle to business operations, and reports by the World Bank estimate – depending on the methodology – that an additional 0.9-1.1 trillion USD (corresponding to 26-32% of outstanding SME loans) (Ardic Alper et al., 2013) to 4.5 trillion USD (127%) (Khanna et al., 2017) would be needed to meet the financing needs of SMEs in low- and middle-income countries (LMICs).[39] In the face of this large unmet demand for finance, it seems obvious to consider financing sources beyond the banking sector, which is still the most important provider of formal external finance for SMEs; for instance, harnessing capital markets (i.e. markets for publicly traded equity and privately traded equity as well as market-based debt instruments such as bonds), that move massive volumes of finance.

This paper attempts to assess the role of capital markets for SME finance. Acknowledging existing evidence that SMEs' direct access to external finance through capital markets is very limited or even negligible – especially in LMICs (see Section 4.2.2), I examine to what extent capital market development indirectly alleviates SMEs' financing constraints by improving their access to loans. Thus, this paper empirically investigates a central prediction of the theoretical model by Song and Thakor (2010) on the complementarity and co-evolution of capital markets and the banking sector, namely that capital market development is associated with an increase in bank lending, in particular, towards smaller and riskier firms. An adaptation of the cross-industry cross-country model designed by Léon (2020) is employed using 68,712 firm-level observations from 50 mostly LMICs for the period 2006 to 2019. It is a modification

[39] Figures are as high as 2.6 trillion USD (36%) to 5.2 trillion USD (140%) if micro enterprises are considered as well.

of the seminal analysis framework by Rajan and Zingales (1998) that has been used widely to mitigate endogeneity issues. Intra-country variation resulting from differences in the external financial dependence across sectors (due to differences in technologies and associated capital intensities) allows to identify whether small firms in sectors that are more dependent on external finance are relatively less financially constrained (with regard to credit access) in countries with better developed capital markets. I find a positive and significant effect of capital market development on firms' financial situation indicating that smaller firms are more likely to have sufficient access to loans if they are located in countries with more developed capital markets. These results are robust to changes on various dimensions including instrumental variable (IV) approaches that account for potential endogeneity issues, in particular reverse causality concerns (due to interrelations between the banking sector and capital markets). Lastly, the analysis provides additional evidence that the indirect, positive effect of capital market development on firms' access to loans runs – in line with the theoretical literature on the complementarity and co-evolution of markets and banks (Song & Thakor, 2010) – through the increased usage of capital market instruments by financial institutions and expanded availability of bank loans.

This study contributes to various strands of literature. First, it adds to the literature on the role of capital markets for SMEs. Especially after the global financial crisis 2007-08 and the ensuing contraction of bank lending, capital market financing has received a lot of attention. Institutions with a development mandate such as the World Bank or OECD have explored the challenges and the potential of publicly traded equity for SMEs (e.g. Harwood & Konidaris, 2015; Nassr & Wehinger, 2016). Most studies on this topic are of descriptive nature, for instance on stock exchanges specifically dedicated to SMEs (e.g. Disse & Sommer, 2020; Schellhase & Woodsome, 2017). One notable exception being the work of Bongini et al. (2021) on European SMEs that – due to the very limited usage of market-based instruments by SMEs – analyzes SMEs' potential fit for such financing options. Overview studies aspiring to paint a full picture of the SME financing landscape attest publicly traded equity only a very limited or even negligible role for SMEs, especially in LMICs (e.g. Ayyagari et al., 2017; Quartey et al., 2017). Privately traded shares such as private equity (PE) and venture capital (VC) are considered to be more suitable market-based financing instruments for SMEs despite the fact that they are still nascent and in its early stages (e.g. Ayyagari et al., 2017; Thompson et al., 2018). Even though studies on SMEs and market-based finance generally point out that the primary contribution of capital markets to SME finance are services to (SME-lending) financial

institutions that enable them to improve their funding structure and risk management with subsequent positive effects on their lending activities and ability to serve riskier borrowers (e.g. Thompson et al., 2018; World Bank, 2020), this indirect channel has never been investigated empirically. This is the first study to explore to what extent SMEs benefit from positive effects of capital market development on banking activities and loan availability, and thus helps to improve our understanding of the role of capital markets for SME finance.

Furthermore, this paper contributes to the literature on the relationship between capital markets and the banking sector. Despite some (earlier) work on the competition between markets and banks, most scholars see markets and banks as complementary and co-evolving (see Section 4.2.3). Song and Thakor (2010) have articulated particularly well how the respective comparative advantages of banks (screening and monitoring) and markets (providing liquidity and cost-effective financing) are exploited in various financial instruments that create benefit flows from banks to markets (e.g. securitization) and from markets to banks (e.g. bank equity capital) and thus foster complementarity and co-evolution. Empirical studies, indeed, find evidence for different roles of banks and markets (Levine & Zervos, 1998) and for their complementarity in LMICs in cross-country settings (Demirgüç-Kunt & Maksimovic, 1996) as well as respective country-specific evidence, for instance, for Malaysia (Toh et al., 2019), Nigeria (Arize et al., 2018) and the US (Chatterjee, 2015). My paper provides further evidence for the complementarity, on the one hand, explicitly by showing that Granger causality runs from capital market development to depth in the banking sector and vice versa, and, on the other hand, implicitly by linking capital market development to firms' improved access to bank loans in a cross-country analysis.

Closely related, I provide empirical evidence for a central prediction of the theoretical model by Song and Thakor (2010). Their work played a crucial role in the literature to consolidate the view that markets and banks are complementary and co-evolve. The propositions on respective comparative advantages of banks and markets, and on financial instruments with mutual benefit flows, which were introduced in the previous paragraph, form the theoretical underpinning of their model. They are the pivotal model features that improved upon the existing literature on the relationship between markets and banks and that give rise to the main finding on the complementarity and co-evolution of markets and banks. One of the central implications of their analysis is the prediction that capital market development is associated with an increase in bank lending, in particular, towards smaller and riskier firms. Song and Thakor (2010) themselves state that they 'are not aware of any existing empirical evidence on this prediction,

but believe it is testable'. To the best of my knowledge, this prediction has not been tested since, such that this paper is the first to produce empirical evidence in support of their model prediction.

The rest of the paper is structured as follows. Section 4.2 reviews the literature focusing on the role of capital markets for corporate finance in general and for SMEs in particular as well as on the indirect channel through which capital market development may improve firms' access to loans. Section 4.3 discusses the methodological approach and the regression model before Section 4.4 introduces the data. Section 4.5 presents the results including evidence on the indirect channel and robustness checks, while Section 4.6 summarizes and concludes.

4.2. Background

4.2.1. Capital Market Development and Potential Benefits for Corporate Finance

Capital market development has been shown to foster economic growth (e.g. Demirgüç-Kunt et al., 2013). At least two features are central therein. First, capital markets allow for tailored financial arrangements providing long-term finance to projects with diverse risk profiles, such that capital markets create liquidity and risk sharing opportunities (e.g. Demirgüç-Kunt et al., 2013; Disse & Sommer, 2020). Second, they exhibit significantly less cyclicality than bank financing. Thus, economies with deeper capital markets are less affected by business cycles, i.e. contract less in the face of economic downturns and financial crises and bounce back faster (Gambacorta et al., 2014; Langfield & Pagano, 2016).

De la Torre et al. (2007) identified three fundamentals in the literature that affect the development of capital markets: country income levels (deeper markets in richer countries), quality of laws and the legal system (protection of minority investors' rights), as well as macroeconomic stability. Over the last two decades, domestic capital markets have gained importance in many LMICs. Earlier studies observed that issuance in international markets used to exceed domestic activities in LMICs in the period from 1975 to 2004 (De la Torre et al., 2007). Yet the depth of domestic stock markets in LMICs captured by the ratio of market capitalization to GDP increased from 39 percent in 2004 to 79 percent in 2020 (in high-income countries from 98% to 169%) according to World Bank's Global Financial Development

Database (GFDD).[40] So most of the capital is now raised in domestic markets: In East Asia with particularly strong capital market development, 97 percent of the capital was raised in domestic markets between 2008 and 2016, while the respective figure for emerging countries in other regions amounts to 94 percent (Abraham et al., 2019).

Firms can benefit in various ways from capital market financing as depicted by Disse and Sommer (2020). Most importantly, they can acquire long-term finance without repayment obligations by selling a defined share of ownership (i.e. stocks), which, in addition, allows them to transfer entrepreneurial risk to investors. Innovative firms, start-ups, firms with high growth potential and other enterprises with new, unproven business models and/or limited collateral and financial track record may struggle to borrow from banks and thus depend on risk financing through markets. Moreover, capital market finance may be more cost-effective for certain firms; lastly, it increases firms' visibility and (financial) transparency with positive effects on creditworthiness and debt financing options.

4.2.2. SMEs' Direct Access to Capital Market Financing

SMEs' direct access to market-based financing can take the form of equity financing, which is mainly done through publicly traded shares in stock exchanges or privately traded shares such as PE or VC, or market-based debt financing through bond issuance.[41] In general, SMEs are more dependent on bank loans. Their financing sources are less diversified since asymmetric information, agency risks, and limited collateral and financial track records constrain their access to the full menu of financing instruments (e.g. Bongini et al., 2021). Direct costs (e.g. fees, advisory expenses, brokers' commissions) and indirect costs (e.g. meeting pre-listing and reporting requirements) render market-based finance less cost-effective for raising smaller amounts. Furthermore, several SMEs object the dilution of ownership associated with equity finance or do not have the 'adequate level of institutionalization to cope with the reporting and corporate governance requirements' (Disse & Sommer, 2020). All of these factors stifle the number of listed firms and the value of issued shares and bonds, especially among SMEs. Yet challenges also extend to the demand side, as investors are restrained by more pronounced

[40] Even though there is great heterogeneity across regions (East Asia and Pacific exhibiting by far the fastest growth), domestic capital markets in LMICs exhibit similar positive trends in all regions.

[41] There are other equity financing options (e.g. equity crowdfunding) and other market-based debt instruments (e.g. instruments leveraging receivables or loans). However, the raised amounts are still very small.

problems of imperfect information (as SMEs are more opaque) and poor liquidity in the market that undermines exit options and thus makes purchases of SME shares less attractive (Disse & Sommer, 2020).

Consequently, SMEs rarely use market-based financing. For the first decade in the 2000s, Didier et al. (2014) find for a sample of 51 countries that 'only a few of the largest firms issue securities in the median country' and that this holds for the vast majority of countries. In the second decade of the 21st century, the average size of issuing firms has even increased in emerging economies and high-income countries outside East Asia (Abraham et al., 2019). SMEs' lack of market-based financing has been documented across economies of different income levels, e.g. for West African (Quartey et al., 2017) and European countries (Bongini et al., 2021). This situation has persisted despite the launch of dedicated SME stock exchanges with lighter pre-listing and admission requirements as most SME exchanges are characterized by restricted market capitalization and liquidity (Bongini et al., 2021; Disse & Sommer, 2020). Relative figures on the market capitalization of listed SMEs (and on SME loans) for country-year couples from the sample used in this paper are presented in Figure 4.1 (due to data availability only 19-41 out of 86 country-year couples are included). They buttress the above stylized facts: SMEs are much more dependent on bank loans (yellow boxplot), while SMEs' publicly traded stocks account for negligible shares of SME finance (blue boxplot) or external finance (red boxplot) in most countries (with the median country at 0%, and the country at the 75 percentile (well) below 5%).[42]

Market-based debt instruments such as bonds are even less suited for SMEs. Bond-issuing firms are even larger than those using equity finance (Didier et al., 2014) and bond markets, in general, are found to be underdeveloped in LMICs (Didier et al., 2021). Privately traded equity such as PE and VC has often been described as one of the most promising market-based financing instruments for SMEs (e.g. Ayyagari et al., 2017; Thompson et al., 2018). Its contribution to SME finance, however, is still very limited in most countries (see Figure A4.1 in the Appendix for VC availability across the world). Even in countries with vibrant risk-financing markets such as the US, hypothetical back-of-the-envelope calculations suggest that until 2013 only 0.2 percent of the *newly founded* firms would have received such finance if it had been targeted solely at these new firms (Kaplan & Lerner, 2016). To account for more

[42] Notable exceptions are Thailand and Mauritius with double-digit figures and Cyprus (slightly below 10 percent). Azerbaijan only comes close to 10% in the red boxplot since private credit figures (used as denominator) are small.

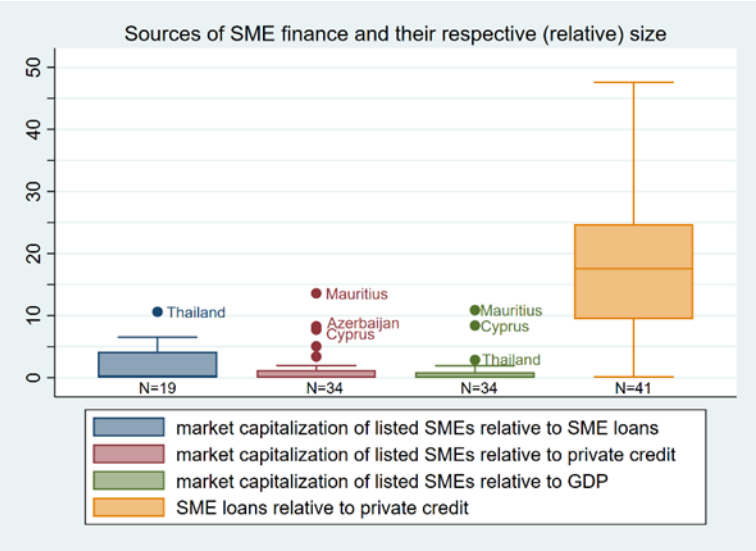

Figure 4.1: Relative Size of Different Sources of SME Finance

Note: Author's visualization and calculation based on data from the World Federation of Exchanges (SMEs' market capitalization), IMF's Financial Access Survey (SME loans) and World Bank's World Development Indicators (private credit and GDP).

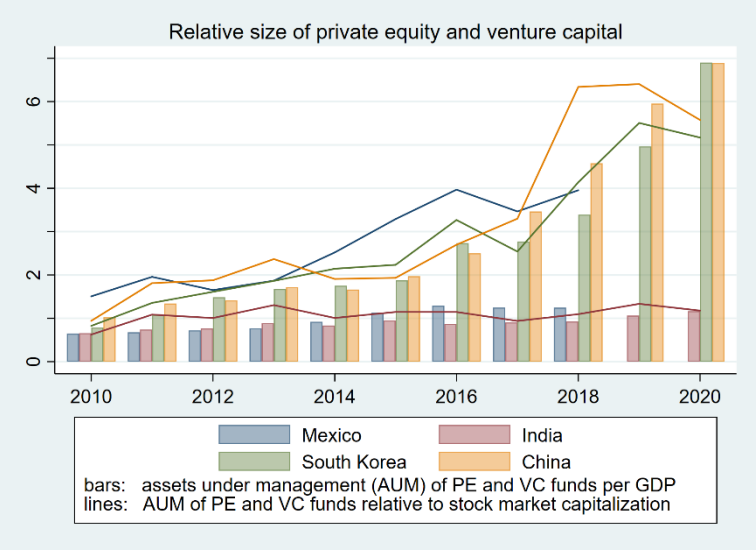

Figure 4.2: Relative Size of PE and VC

Note: The size of PE and VC is capture by assets under management of PE and VC funds. Author's visualization and calculation based on data from Preqin (PE and VC figures from publicly available country reports) as well as World Bank's World Development Indicators (GDP) and Global Financial Development Database (stock market capitalization).

recent developments, Figure 4.2 presents PE and VC data from 2010 to 2020 for four countries with publicly available data (figures comprise PE and VC of all firms, not just SMEs). In countries with vibrant and fast-growing capital markets such as China and South Korea, PE and VC increased substantially. Despite this growth, however, assets under management amounted to a modest 6 percent relative to GDP or 5 to 6 percent relative to stock market capitalization in 2020, which underscores the marginal role of privately traded equity. In other LMICs, the situation is even bleaker as PE and VC stagnated at around 1 percent relative to GDP in spite of reasonable (Mexico) or good (India) stock market performance during that period.

4.2.3. SMEs‘ Indirect Access to Capital Market Funding: Capital Markets and Banks

Even though SMEs hardly acquire external finance through capital markets *directly*, capital market development may *indirectly* improve SMEs' access to finance by increasing the availability of bank loans. This indirect channel builds on the assumption that capital markets and the banking sector complement each other and co-evolve. There is an extensive literature that jointly looks at capital markets and the banking sector. The larger strand of this literature focuses on financial system development and its effect on economic growth. Financial development is found to foster growth irrespective of the structure of the financial system (bank-based versus market-based) (e.g. Arestis et al., 2001; Beck & Levine, 2002; Levine, 2002). More recent literature argues that the relationship is more complex and that capital markets become more important with the economy's level of development (e.g. Demirgüç-Kunt et al., 2013). A smaller strand of this literature directly explores the relationship between capital markets and the banking sector. Even though more recent theoretical and empirical work solidified the view that markets and banks complement each other and co-evolve, a few scholars have argued that markets and banks compete (an overview of this view is provided in the Appendix). Given the thin and (partially) contradictive empirical evidence on the competition between markets and banks, this paper adopts the more common notion of complementarity and co-evolution.

The notion of co-evolution builds on the idea of different, complementing roles of capital markets and banks. Banks are described as having comparative advantages with regard to screening, monitoring and other information-related activities; whereas markets are relatively better at providing liquidity and access to a broad base of investors, which allows for cost-

effective financing since some investors may value the project surplus similarly to the firm seeking finance (Song & Thakor, 2010). Song and Thakor (2010) emphasize that several financial instruments feature the respective comparative advantages and create interactions between banks and markets associated with benefit flows from banks to markets (e.g. securitization) and from markets to banks (e.g. bank equity capital), which results in complementarity and co-evolution. Well-functioning capital markets provide relatively inexpensive equity finance for banks (bank equity capital), which enables banks to improve their funding structures and to expand lending activities towards previously unserved firms and households (Song & Thakor, 2010); this includes riskier borrowers such as SMEs as banks can meet higher capital requirements. Securitization also leverages banks' and markets' respective strengths: Banks assess creditworthiness, grant and monitor credits (i.e. engage in information-related activities) and, in a second step, sell them off in the market (i.e. markets provide liquidity) (Song & Thakor, 2010). Hence, banks can use asset-backed securities instead of deposits to fund such lending activities and thus further expand lending. There are other interactions between banks and markets as well. Capital markets provide information on listed firms applying for loans and thus facilitate banks' screening and monitoring (Disse & Sommer, 2020). Liquid capital markets further increase demand for and supply of banks' off-balance-sheet credit commitments through which banks guarantee liquidity on demand; firms may use such financial products as backup if issuance in the market created insufficient funds (Toh et al., 2019). The complementarity of banks and markets is underscored by a broad base of empirical evidence. It ranges from stylized facts on joint growth of capital markets and banking sectors in the US, the United Kingdom, Germany and Japan between 1960 and 2003 (Song & Thakor, 2010) over cross-country evidence on different roles of banks and markets (Levine & Zervos, 1998) and their complementarity in LMICs (Demirgüç-Kunt & Maksimovic, 1996) to country-specific evidence, for instance, for Malaysia (Toh et al., 2019), Nigeria (Arize et al., 2018) and the US (Chatterjee, 2015).

4.3. Empirical Approach

I adapt Léon's (2020) extension of the influential cross-industry cross-country model of Rajan and Zingales (1998) to firm-level data, to explore whether capital markets alleviate SMEs' financing constraints. This question is not trivial since SMEs' direct access to external finance through capital markets is negligible as depicted in Section 4.2; nevertheless, SMEs may benefit

indirectly as (SME) lenders use capital markets to improve their funding structure and expand their financing activities, which in turn may increase SMEs' access to loans. Before introducing the adaptation of Léon's model, I take a closer look at this indirect channel, its implicit assumptions and potential reverse causality issues.

4.3.1. Underlying Channel: Co-Evolution of Markets and Banks

Two conditions have to be met such that capital market development can alleviate firms' financing constraints (in the absence of direct access to external finance through capital markets). First, markets and banks co-evolve such that capital market development goes hand in hand with increases in banking activities and lending. Second, the expansion of the loan portfolio results in firms' improved access to loans.

To examine the validity of the first condition, I use panel vector autoregression (VAR) analyses for varying numbers of lags of stock market capitalization and private credit and subsequently run Granger causality tests. Since the Im-Pesaran-Shin test signals non-stationarity, growth rates of the two variables are employed to mitigate unit root issues (Abrigo & Love, 2016). Both the hypothesis that stock market capitalization does *not* Granger cause private credit and the hypothesis for *no* Granger causality in the other direction are strongly rejected for the countries in my sample.[43] The results are not sensitive to the number of included lags (1-8 lags have been used) nor to outliers, and constitute additional evidence for the complementarity and co-evolution of capital markets and banks.

It has to be noted that the complementarity and co-evolution of markets and banks could create some reverse causality issues. Even though this paper is interested in the effects of capital market development on credit (or rather subsequent effects on firms' financing constraints), the co-evolution theoretically implies an entanglement of capital and credit markets such that effects should run in both directions, i.e. also from credit market development to capital markets. However, as depicted in Figure A4.2 in the Appendix, financial instruments that create benefit flows from markets to banks (e.g. bank equity capital) are much more important in my

[43] Due to data availability, I can only include between 38 (for 8 lags) and 48 countries (for 1 lag) of the 50 countries from the main analysis. For those countries, panel VAR and Granger causality tests are undertaken for the period 1998-2020 so that even for the maximum number of lags (8), all the years from my sample (2006-2019) are included.

sample with mostly LMICs, whereas instruments that create benefit flows from banks to markets (e.g. securitization) play a very limited role. This is further buttressed by regression outcomes: Disentangling capital market usage by financial institutions (employed in the analysis in the second half of Section 4.5.1) into 'securities' (securitization proxy) and 'shares and other equity' (equity proxy), results in significant effects for the equity proxy and insignificant effects for the securitization proxy. Hence, effects should mainly run from capital markets to credit activities in my sample with mostly LMICs and not the other way round,[44] which supports the validity of the line of investigation in this paper and mitigates reverse causality concerns. Despite this promising evidence, I have additionally employed instrumental variables as robustness check (see Section 4.5.2).

The second condition that deeper credit markets result in firms' improved access to loans is assessed by using private credit instead of market capitalization as key explanatory variable in the model introduced below. Results presented in Table A4.1 in the Appendix indicate that larger credit portfolios significantly alleviate financing constraints of (smaller) firms. Taken together, these findings – in line with the theoretical work by Song and Thakor (2010) – support the notion that capital market development improves firms' financing situation indirectly through positive spillovers on the banking sector and banks' lending activities.

4.3.2. Regression Model

To assess the central prediction of the model by Song and Thakor (2010) that capital markets indirectly alleviate SMEs' financing constraints by improving SMEs' access to bank loans, I employ firm-level data with pooled (repeated) cross sections from the World Bank Enterprise Surveys in a cross-industry cross-country model that is an adaptation of the seminal model by Rajan and Zingales (1998). The paper uses an extension of this model to firm-level data that has been put forth by Léon (2020) who built on the approach by Fafchamps and Schündeln (2013) and applied it to a multi-country context. The underlying seminal analysis framework by Rajan and Zingales (1998) has been used widely in the field of economics to causally link financial development to economic growth. It does so by assuming that the effect of financial

[44] This is further supported by evidence from panel VAR and subsequent Granger causality tests: In my sample, capital market usage by financial institutions Granger causes private credit, but private credit does not Granger cause capital market usage by financial institutions.

development on economic growth runs through firms' improved access to external finance, which allows firms to take advantage of growth opportunities and subsequently fosters economic growth. This paper does not need such an assumption as it is interested in the impact on this intermediate variable, i.e. whether capital market development improves SMEs' access to external finance.

In the spirit of Rajan and Zingales (1998), the model addresses potential endogeneity issues, for instance because of omitted variables, by controlling for time-invariant sector and country characteristics. Sector and country fixed effects can be included since the approach exploits intra-country variation between firms from different sectors (in the same country) that exhibit different credit needs since economic sectors vary in capital intensity and thus in dependence on external finance. Hence, the framework of Rajan and Zingales (1998) is used to analyze whether SMEs in sectors that are more dependent on external finance are relatively less financially constrained in countries with better developed capital markets. The econometric specification follows Léon (2020) who tailored the country-level model of Rajan and Zingales (1998) to be applicable to firm-level data:

$$y_{isc} = \beta(D_{sc} \cdot F_c) + \eta(D_{sc} \cdot Z_c) + \Gamma X_{isc} + \delta D_{sc} + \alpha_s + \alpha_c + \varepsilon_{isc}$$

The dependent variable y_{isc} is a dummy variable that is one if firm i in sector s and country c is financially unconstrained and zero otherwise.[45] It is consciously constructed around the concept of sufficient access to bank loans (see Section 4.4 for details) to only capture the indirect effect of capital market development from increases in bank lending. Main interest lies in β, the net effect of capital market development. As in Rajan and Zingales (1998), it is the coefficient of the interaction between the dependence on external finance (D_{sc}) and financial development (F_c). In my analysis, the financial development variable F_c captures capital market development in country c and is measured by the ratio of stock market capitalization to GDP.[46] The index for dependence on external finance D_{sc} is the key element in the framework of Rajan

[45] A linear model is employed since non-linear specifications such as the probit model may suffer from incidental parameter issues due to the inclusion of many dummies. Nevertheless, it was confirmed that all findings are robust to using probit specifications.

[46] Rajan and Zingales (1998) captured financial development F_c by the sum of domestic credit per GDP and stock market capitalization per GDP. I cannot include credit per GDP since the effect of interest, i.e. the indirect effect of capital market development, is hypothesized to run through the credit variable. (Recall that the dependent variable in this paper measures whether firms are financially unconstrained with regard to access to bank loans, whereas Rajan and Zingales (1998) looked at growth in value added.)

and Zingales (1998). The interaction effect ($D_{sc} \cdot F_c$) reflects their central idea that well-developed capital markets should have a greater effect (on firms' financial constraints) for firms that are more dependent on external finance.

As in Rajan and Zingales (1998), D_{sc} is an index for dependence on external finance. Yet in contrast to their simplification of using the values from the US sectors as benchmarks, I follow Fafchamps and Schündeln (2013) and Léon (2020) to compute (sector-country-specific) D_{sc} based on large firms.[47] This assumes that large firms are less likely to be financially constrained such that their usage of external finance reflects well the financing needs of firms in sector s and country c. Computation of specific measures D_{sc} for each sector-country(-year) couple has been introduced by Léon (2020) to account for the multi-country setting: The same sectors in economically and geographically diverse countries are likely to differ in their usage/need of external finance (e.g. due to different production technologies and capital intensities), which necessitates specific measures D_{sc} for the same sector in different countries (and thus improves upon the original approach by Rajan and Zingales (1998)).

The specification includes fixed effects for the sector (α_s) and country (α_c) to control for time-invariant unobserved effects on these levels. Since the identification strategy relies on intra-country variation on the sector level, sector-country fixed effects cannot be used in this model. In line with Léon (2020), the country-sector specific index D_{sc} is inserted instead. The logic being that unobserved shocks in sector s and country c will affect the usage of external finance (i.e. D_{sc}) such that D_{sc} will adequately capture such sector-country-level shocks as long as large

[47] Note that Léon (2020) and Fafchamps and Schündeln (2013) capture growth opportunity in their index (which is thus labelled G and not D). This takes into account the critique by Fisman and Love (2007) that financial development plays a broader role in promoting growth (e.g. through overcoming informational problems, playing a risk-sharing role, monitoring role, corporate governance role; i.e. roles beyond merely addressing firms' external financial dependence). They subsequently argue that access to finance allows firms in all sectors with good growth opportunities (not just those in sectors with fixed technological financial dependence) to grow and thus modify the analysis framework of Rajan and Zingales (1998) by using growth opportunity instead of external financial dependence. This aligns well with the main interest of these authors to identify firms' growth performance resulting from financial development. (But Léon (2020) nevertheless uses external financial dependence in his robustness check). This paper, however, is concerned with firms' financial constraints (and not the finance-growth-nexus) such that the critique by Fisman and Love (2007) does not apply and the original specification by Rajan and Zingales (1998) (where D captures the external financial dependence, i.e. focuses on the financial dimension) is better suited and thus adopted.

firms are equally affected. As in the underlying model by Léon (2020), standard errors are clustered at the survey level (i.e. country-year level).

A vector of firm characteristics (X_{isc}) accounts for observable firm-level heterogeneity. I employ the controls commonly used in literature on firms' access to finance (e.g. Beck et al., 2008; Love & Martínez Pería, 2015; Sommer, 2022).[48] In order to ensure that the interaction between external financial dependence and capital market development ($D_{sc} \cdot F_c$; and thus our coefficient of interest β) does not pick up effects from potentially confounding (time-variant) country-level variables (Z_c), the model adds the interactions ($D_{sc} \cdot Z_c$). This encompasses four potential confounders, namely competition in the banking sector, country income levels, inflation and quality of the legal system, all of which affect capital market development and additionally may directly influence the dependent variable (firms' financial constraints). For the first potential confounder, I follow Beck and Cull (2014) and jointly use the three measures net interest margin, bank overhead costs and bank concentration to capture competition in banking. This may influence the level of capital market development and in particular SMEs' access to finance and their financial constraints (see e.g. Ryan et al., 2014). Note that the depth of the banking sector (private credit ratio to GDP) cannot be included as a control variable since the main effect of capital market development is hypothesized to run through this channel (see Section 4.2.3). Second, the analysis accounts for the income level (GDP per capita) since it directly affects capital market development (De la Torre et al., 2007) and the income level may further be correlated with other macroeconomic indicators such as institutional quality or corruption that affect capital market development and firms' access to finance. Third, inflation directly hampers capital market development and may additionally capture adverse effects due to its correlation with macroeconomic instability (De la Torre et al., 2007). Lastly, I include rule of law to account for effects of the legal system on capital market development (De la Torre et al., 2007) as well as on firms' access to finance.

[48] Léon (2020) uses a slightly different set of firm-level controls. I deviate from his approach since his firm characteristics exhibit more missing values, which reduces the sample size. Hence, I resort to the firm-level controls well established in the existing literature on firms' access to finance. Yet results are unchanged when employing the controls of Léon (2020).

4.4. Data

This analysis uses data with pooled (repeated) cross sections that mainly stem from World Bank databases, most importantly the Enterprise Surveys (ES), the GFDD and the World Development Indicators (WDI). Firm-level data from the ES dataset are employed because of their unmatched coverage both of firms of all sizes, in particular SMEs, and of countries worldwide, in particular LMICs. Country-level variables are taken from various datasets; details of the sources and variable definitions are given in Table A4.2 in the Appendix, while summary statistics are provided in Table 4.1.

Table 4.1: Summary Statistics

	Obs.	Mean	SD	Min	p25	Median	p75	Max
Firm-level variables								
Unconstrained	44,816	.65	0.48	0	0	1	1	1
Size (employees)	44,816	17.4	11.53	1	8	14	25	49
Age	44,816	18.1	12.73	1	9	15	23	100
Exporter	44,816	.13	0.34	0	0	0	0	1
Foreign-owned	44,816	.04	0.20	0	0	0	0	1
Government-owned	44,816	0	0.05	0	0	0	0	1
Financial statements	44,816	.42	0.49	0	0	0	1	1
Country-level variables								
Stock market capitalization	86	0.324	0.260	0.017	0.148	0.273	0.383	1.358
Net interest margin	78	4.53	2.42	1.30	3.01	3.75	5.27	14.28
Overhead costs	78	3.72	2.96	.67	2.03	2.90	4.40	18.20
Concentration	78	59.95	16.87	27.99	46.25	56.87	70.78	98.82
GDP per capita	78	8,559.85	6,564.62	830.43	3,562.93	7,837.45	11,192.18	33,995.43
Inflation	78	7.31	6.83	-.63	3.05	5.41	9.09	41.12
Rule of law	78	-.10	0.63	-1.42	-.59	-.24	.37	1.30

The *dependent variable* is a dummy capturing whether firms are financially unconstrained with regard to access to loans. I apply the definition that is frequently used in the literature on firms' access to finance (for details, see Popov & Udell, 2012): A firm is considered to be financially constrained either if none of its loan applications was successful in the last fiscal year, i.e. the number of rejections (variable k19 in the ES dataset) is equal to the number of applications (k18);[49] or if the firm is 'discouraged' from applying for loans because of unfavorable conditions (k17) such as complex application procedures, unfavorable interest rates, collateral requirements, loan sizes and maturities or pessimistic attitudes about approval chances. Firms

[49] For the few cases with missing values for k18 and/or k19, I instead used the dummy variable whether the most recent loan application was rejected (k20a).

are financially unconstrained if they suffer from neither of these issues and have a loan (k8) or report to not need a loan (k17).

Main interest lies in the *explanatory variable* capital market development, which is measured by the ratio of stock market capitalization of listed domestic firms to GDP taken from the GFDD.[50] It is the standard variable in the literature for stock market development (e.g. Abraham et al., 2019; Arestis et al., 2001; Arize et al., 2018; Demirgüç-Kunt et al., 2020) and captures the size and depth of the market. As depicted in Table 4.1, it amounts to 27 percent in the median country with ample variation across the sample. As robustness check, an alternative measure of capital market development is employed, the value of traded stocks, which primarily reflects the liquidity of the market.

Since issues of data availability render the approach by Rajan and Zingales (1998) to measure *external financial dependence* through firms' financial structure infeasible, I follow Léon (2020) who also relies on ES data to compute this index. He captures the dependence on external finance through the share of large firms that have loans or lines of credit. As outlined in Section 4.3, it is calculated for every sector-country(-year) couple separately to account for technological differences that translate into different needs of external finance. Large firms are chosen as reference group as they are assumed to face relatively few financial constraints such that their usage of external finance should adequately reflect the need of external finance in a specific sector-country(-year) couple.

In line with Léon (2020), the classification into small and large firms deviates from the definition used in the ES dataset where employees with 100 and more employees are regarded as large and those below that threshold as SMEs. Such a differentiation would not allow for reference groups of sufficient size to reliably calculate sector-country specific dependence scores (D_{sc}) as the ES dataset already has relatively few large firms at the country level (as depicted in Table A4.3 in the Appendix) and, correspondingly, even fewer at the sector-country level. Hence, as in Léon (2020), firms with 50 and more employees are already categorized as large and used as reference group, while the threshold of 100 employees is employed in the robustness check.

[50] For five countries with missing values in the GFDD, data was taken from the World Federation of Exchanges instead.

Relevant *firm characteristics* are included to account for observable heterogeneity across firms. The choice has been guided by previous studies on firms' access to finance (e.g. Beck et al., 2008; Love & Martínez Pería, 2015),[48] and encompasses the size and age of firms in logarithmic form along with dummy variables indicating whether firms are exporters, foreign-owned, government-owned and whether firms have audited financial statements.[51] As for the other variables, detailed definitions are provided in Table A4.2 and summary statistics in Table 4.1. On average, the small firms included in the main analysis have 17 employees and 18 years of age; 13 percent of them qualify as exporters, 42 percent have audited financial statements and the vast majority is privately domestically owned.

Lastly, I control for *country-level variables* of the macroeconomic and institutional environment as these factors may affect both firms' access to finance as well as capital market development. I include three measures (net interest margin, overhead costs, concentration) to jointly capture competition in the banking sector (as e.g. Beck & Cull, 2014) in addition to national income levels (per capita GDP), inflation and the quality of the legal system (rule of law).

The analysis only includes country-year couples from the ES dataset for which there is capital market data. Observations with missing values for firm-level or country-level variables had to be dropped. Following Léon (2020), I further exclude observations that have been used as reference group to compute the external financial dependence D_{sc}. The final sample comprises 68,712 firm-level observations[52] from 50 mostly LMICs (86 country-year couples as several countries appear more than once; for details see Table A4.3) for the period 2006 to 2019. The sample is dominated by observations from upper-middle-income (43% of observations) and lower-middle-income countries (36%), followed by high-income (17%) and low-income countries (4%).

[51] Note that, in contrast to the above-cited literature, no dummy for firms in the manufacturing sector is included since our model controls for that by employing sector fixed effects.

[52] In the baseline, between 22,700 and 24,000 observations have been used as reference group (large firms) to compute D_{sc} and are thus not included in the regressions.

4.5. Results

4.5.1. Baseline Results

The main results for the indirect effect of capital market development on the financing constraints of small firm (i.e. firms with less than 50 employees) via the channel of increased credit availability are presented in Table 4.2. The five columns correspond to different specifications of the model with increasing numbers of control variables from left to right. The first column does not encompass any controls, while the second adds firm characteristics. The third column applies the same approach to the reduced sample for which there is data on the country-level controls. Column 4 additionally includes interactions of external financial dependence (D_{sc}) and the three indicators that jointly measure competition in the banking sector, and Column 5 interactions of D_{sc} and control variables for the macroeconomic and institutional environment (i.e. income level, inflation and quality of the legal system). All specifications include sector and country fixed effects.

Main interest lies in β, the coefficient of the interaction ($D_{sc} \cdot F_c$). A positive sign would indicate that smaller firms in sectors that are more heavily dependent on external finance are more likely to have sufficient access to loans if they are located in countries with more developed capital markets. As depicted in Table 4.2, results strongly buttress that capital market development alleviates firms' financing constraints by improving access to credit. The effect is positive and statistically significant. It is significant at the 5-percent level for the preferred specification in Column 4, which strikes a good balance between including relevant controls such as firm characteristics and features of the banking sector (competition measures) while – in the presence of sector and country fixed effects (as well as D_{sc} for the sector-country level) – forgoing supplementary country-level controls. When only including sector-country couples that have three or more large firms in their reference group to more robustly compute D_{sc}, the effect is significant at the 1-percent level for all specifications as depicted in the robustness checks (see Table A4.4). The effect is also economically significant: If a country without a capital market (e.g. Burundi) were to establish a median-sized stock market, this would increase the share of financially unconstrained (small) firms by 6.8 percentage points. The effect size is substantial considering that only 38 percent of small firms in Burundi are unconstrained.[53]

[53] The computation is based on the median stock market capitalization (27.3%, i.e. 0.273), the average external financial dependence for Burundi (0.83) and the β coefficient from the robustness check (only including sector-country couples with at least three large firms in the reference group: β=0.30). Multiplying these values gives 0.068. If we take the coefficient from the baseline (0.15), we obtain 0.034, which would still amount to a relative increase of 9% for Burundi.

Table 4.2: Baseline Results

	(1)	(2)	(3)	(4)	(5)
D*F	0.112	0.114	0.140*	0.150**	0.135*
	(0.0716)	(0.0709)	(0.0749)	(0.0740)	(0.0768)
D	0.0123	0.00804	-0.00957	-0.0199	0.141
	(0.0303)	(0.0301)	(0.0304)	(0.0934)	(0.287)
Log firm size		0.0445***	0.0435***	0.0435***	0.0435***
		(0.00584)	(0.00610)	(0.00610)	(0.00611)
Log firm age		0.0127***	0.0139***	0.0139***	0.0139***
		(0.00468)	(0.00483)	(0.00483)	(0.00484)
Exporter		0.0137	0.0121	0.0121	0.0121
		(0.00864)	(0.00902)	(0.00901)	(0.00904)
Foreign-owned		0.00614	0.00734	0.00730	0.00727
		(0.0126)	(0.0131)	(0.0131)	(0.0131)
Government-owned		0.0312	0.0317	0.0318	0.0319
		(0.0382)	(0.0383)	(0.0382)	(0.0382)
Financial statements		0.0307*	0.0294	0.0294	0.0293
		(0.0177)	(0.0187)	(0.0187)	(0.0187)
D*net interest margin				0.00390	0.000411
				(0.00917)	(0.0111)
D*overhead				-0.000344	0.0000845
				(0.00257)	(0.00285)
D*concentration				-0.000136	-0.0000789
				(0.00146)	(0.00177)
D* log GDP pc					-0.0165
					(0.0262)
D*inflation					-0.0000433
					(0.00240)
D*rule of law					0.00205
					(0.0449)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	44,816	44,816	42,398	42,398	42,398
R^2	0.124	0.130	0.129	0.129	0.129

The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

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

The control variables mostly exhibit the expected signs. The coefficients on firm size and age are positive and highly significant, suggesting that larger and older firms face fewer financial constraints. Firms with audited financial statements also enjoy better access to loans (significant at 10-15%) as do exporters (but the coefficient is only significant once at 15%). Foreign-owned and government-owned firms are less financially constrained, but effects are insignificant, which may be an artefact of the small number of firms with such ownership structures. The signs on the competition measures are partially positive and negative. Theory suggests that they should be predominantly negative as higher overhead costs, net interest margins and concentration levels point towards less competition in the banking sector, which is associated with less lending to smaller firms. As expected, the effect of inflation is negative and the effect of the legal system positive. The sign of per capita GDP, surprisingly, is negative, but insignificant – just like the effects of the other country-level control variables.

The baseline findings show that capital market development alleviates firms' financing constraints. Taking into consideration that the dummy variable for being financially unconstrained is constructed around the concept of having sufficient access to bank loans, this suggests that the effect of capital market development runs through the indirect channel of increasing banking activities and availability of loans. In the following, I provide further evidence thereof, building on the theoretical foundation of Song and Thakor (2010) that describes how capital markets and the banking sector interact such that this indirect channel can materialize. The two scholars highlight that the complementarity of capital markets and the banking sector arises from instruments that generate benefit flows from banks to markets and vice versa (e.g. bank equity capital, securitization). Hence, the indirect effect of capital market development on firms' access to bank loans should only materialize if banks actually use such instruments that take advantage of a well-developed capital market, i.e. if they acquire relatively cheap equity finance and/or funding through securitization or issuance of other securities. A proxy for the usage of capital markets by financial institutions can be extracted from IMF's Monetary and Financial Statistics (MFS). It captures the ratio of securities, shares and other equity of financial institutions (excluding central banks) to GDP.[54] Using this as key explanatory variable instead of market capitalization leads to similar results as depicted in Table 4.3: The coefficient of interest shows even higher significance and the controls similar patterns as before.[55]

[54] IMF provides absolute figures, and these are set into relation to GDP taken from the WDI.

[55] Note that due to data availability, the sample is smaller when using the variable for capital market usage by financial institutions. However, the above statement is equally valid when employing the baseline approach in this smaller sample.

Table 4.3: Usage of Capital Markets by Financial Institutions as Key Explanatory Variable

	(1)	(2)	(3)	(4)	(5)
D*capital market usage	0.259**	0.276**	0.296**	0.307**	0.296**
	(0.110)	(0.108)	(0.113)	(0.117)	(0.141)
D	0.00121	-0.00282	-0.00989	-0.00843	0.762**
	(0.0348)	(0.0344)	(0.0345)	(0.107)	(0.366)
Log firm size		0.0452***	0.0443***	0.0443***	0.0442***
		(0.00687)	(0.00710)	(0.00711)	(0.00712)
Log firm age		0.0112*	0.0124*	0.0124**	0.0123*
		(0.00603)	(0.00619)	(0.00619)	(0.00619)
Exporter		0.0172+	0.0159	0.0161	0.0161
		(0.0109)	(0.0113)	(0.0113)	(0.0113)
Foreign-owned		-0.00358	-0.00312	-0.00316	-0.00341
		(0.0139)	(0.0144)	(0.0144)	(0.0145)
Government-owned		0.0705	0.0711	0.0715	0.0722
		(0.0534)	(0.0534)	(0.0533)	(0.0534)
Financial statements		0.0433***	0.0425***	0.0426***	0.0425***
		(0.0101)	(0.0104)	(0.0104)	(0.0104)
D*net interest margin				0.0230+	0.0205
				(0.0145)	(0.0142)
D*overhead				-0.0272	-0.0394**
				(0.0214)	(0.0193)
D*concentration				-0.000297	-0.000415
				(0.00205)	(0.00222)
D* log GDP pc					-0.0789**
					(0.0340)
D*inflation					-0.00188
					(0.00306)
D*rule of law					0.0310
					(0.0532)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	33,166	33,166	31,668	31,668	31,668
R^2	0.127	0.135	0.133	0.133	0.133

Usage of capital markets by financial institution used as key explanatory variable (instead of stock market capitalization). The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

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

Table 4.4: Indirect Channel: Usage of Capital Markets by Financial Institutions

	(1)	(2)	(3)	(4)	(5)
D*F	0.102	0.0980	0.126	0.144+	0.0646
	(0.0905)	(0.0888)	(0.0912)	(0.0989)	(0.100)
D*capital market usage	0.183	0.203+	0.208+	0.223+	0.261+
	(0.137)	(0.134)	(0.137)	(0.152)	(0.166)
D	-0.0161	-0.0194	-0.0321	-0.0596	0.694*
	(0.0392)	(0.0392)	(0.0403)	(0.117)	(0.400)
Log firm size		0.0452***	0.0444***	0.0444***	0.0443***
		(0.00686)	(0.00710)	(0.00710)	(0.00711)
Log firm age		0.0112*	0.0124*	0.0124*	0.0123*
		(0.00603)	(0.00619)	(0.00619)	(0.00619)
Exporter		0.0172+	0.0159	0.0161	0.0161
		(0.0109)	(0.0113)	(0.0113)	(0.0113)
Foreign-owned		-0.00358	-0.00311	-0.00319	-0.00340
		(0.0139)	(0.0144)	(0.0144)	(0.0144)
Government-owned		0.0707	0.0713	0.0719	0.0723
		(0.0534)	(0.0535)	(0.0534)	(0.0534)
Financial statements		0.0432***	0.0425***	0.0425***	0.0424***
		(0.0101)	(0.0104)	(0.0104)	(0.0104)
D*net interest margin				0.0246*	0.0212
				(0.0144)	(0.0147)
D*overhead				-0.0264	-0.0382**
				(0.0205)	(0.0189)
D*concentration				-0.0000878	-0.000325
				(0.00207)	(0.00225)
D*log GDP pc					-0.0743**
					(0.0361)
D*inflation					-0.00154
					(0.00294)
D*rule of law					0.0307
					(0.0535)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	33,166	33,166	31,668	31,668	31,668
R^2	0.127	0.135	0.133	0.133	0.133

Regression including both stock market capitalization and usage of capital markets by financial institutions as explanatory variables. The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2. Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In a second step, the variable *capital market usage by financial institutions* is added to the baseline regression framework. The results in Table 4.4 indicate – in line with the indirect channel – that it is the usage of capital markets instruments by financial institutions (and subsequent increases in lending and loan availability) rather than capital market development in itself that matters: The effect of stock market capitalization is no longer significant except for Column 4, where the p-value of 0.150 indicates that even at the 15-percent level it is only marginally significant. The effect of capital market usage by financial institutions, in contrast, is significant at the 15-percent level for almost all specifications.[56]

These findings expand the evidence from the baseline regression that capital market development alleviates firms' financing constraints. Most importantly, it provides additional evidence for the indirect channel through which capital markets foster access to finance for small firms. As suggested by Song and Thakor (2010) in their theoretical model, capital markets and the banking sector are complementary and co-evolve such that capital market development primarily improves the financing situation of small firms indirectly through positive effects on banks' funding options and lending activities, which subsequently enhances firms' access to loans. This indirect channel is particularly important since the direct access to external finance through capital market is negligible for smaller firms as outlined in Section 4.2.

4.5.2. Robustness Checks

The robustness checks underscore that the findings are not sensitive to choices concerning the sample of the reference group to compute D_{sc}, the threshold to define large firms or to choices concerning the key explanatory variable or the dependent variable.[57] The results are given in Tables A4.4-A4.11 in the Appendix.

[56] One potential concern is multicollinearity, which may compromise the ability to properly disentangle the effects of stock market capitalization and capital market usage by financial institutions. However, the two variables are only moderately correlated (r = 0.45), which gives reason for optimism. Even though the results should be interpreted with some caution (e.g. not taking effect sizes at face value), they can still give a good indication of the sign and significance of respective coefficients.

[57] Despite being unreported (available upon request), it has been confirmed that findings remain unchanged when clustering standard errors at the sector-country-year level (as in the robustness check in Léon (2020)), giving each country-year couple the same weight (since number of observations differ across country-year couples) or removing high-income countries from the sample (recall that some scholars found differing importance of capital

First, I address a potential weakness of the analytical approach by Léon (2020) by employing a *more robust computation of external financial dependence* D_{sc}. The index of external financial dependence D_{sc} plays a central role in the chosen model. However, the reference group of large firms to compute the sector-country specific D_{sc} may be very small since the ES dataset entails relatively few large firms. Index scores D_{sc} may not adequately capture the true sector-country specific dependence on external finance if it is based on very few observations, which may distort the estimation. Therefore, Table A4.4 reports results when only sector-country couples are included that have at least three large firms in their respective reference group. The coefficient of interest β becomes highly significant. Similar results (unreported) emerge for increasing the threshold further to five or more large firms.

Results are not sensitive to changing the *definition of large firms*. Following Léon (2020), I move the threshold for classifying firms as large from 50 to 100 employees in the robustness check. As depicted in Table A4.5, the results remain unchanged.

In the baseline model, I use the first lag of stock market capitalization as *key explanatory variable*. Even though market capitalization exhibits relatively little volatility from year to year, I employ an alternative approach as robustness check by using the average value of stock market capitalization over the three years prior to the ES survey year.[58] The sample is reduced from 50 countries (86 country-year couples) to 46 countries (79 country-year couples), but the findings from the main analysis are confirmed and significance levels are even slightly higher (see Table A4.6).

markets dependent on the economic development (e.g. Demirgüç-Kunt et al., 2013)). Results are very similar to the baseline when using the more robust computation of external financial dependence, i.e. removing country-sector couples with less than three large firms.

Through a jackknife-type of approach (unreported, but available upon request) – i.e. resampling 86 times, each time removing one country-year couple – it was confirmed that results are not driven by individual country-year couples. The resulting bias-corrected jackknife estimate for the preferred specification is 0.196 (compared to the baseline estimate of 0.150 from Column 4 in Table 4.2).

Furthermore, results (unreported, but available upon request) are robust to using panel data techniques exploiting the repeated cross sections of the Enterprise Surveys as for example in Love and Martínez Pería (2015) (recall that this paper pools the repeated cross sections). Such an approach reduces the sample to countries that are surveyed for at least two periods (27 instead of 50 countries).

[58] To minimize missing values, I included all country-year couples with at least two non-missing values for the first, second and third lag of stock market capitalization (i.e. one missing value was considered to be tolerable).

Moreover, the robustness check considers a different key explanatory variable, the value of traded domestic and foreign stocks (from World Bank's GFDD), that rather captures the liquidity of capital market than its depth. It is used less frequently than market capitalization, but it is the second common measure in the literature for capital market development (e.g. Demirgüç-Kunt et al., 2013). Since volatility is higher for this variable, I take the average over the first three lags (but similar results emerge for simply using the first lag).[59] Regression outcomes are presented in Table A4.7 and underline that the findings are not sensitive to choices regarding the key explanatory variable.

I employ two *alternative dependent variables* to capture firms' ease to access external finance through the banking sector. Instead of a dummy measuring whether firms are financially unconstrained, I use, first, a dummy that indicates whether firms currently have a loan or line of credit (as e.g. in Beck & Cull, 2014) and, second, a dummy for whether firms used loans in the last fiscal year to finance working capital or fixed assets (as e.g. in Sommer, 2022). As shown in Tables A4.8 and A4.9, results are very similar and significance levels even slightly higher.

Even though the evidence presented in Section 4.3.1 mitigates reverse causality concerns, *IV approaches* are used in addition to address potential endogeneity issues. After all, interrelations between the banking sector and capital markets may not only lead to the hypothesized indirect effect from capital market development to banks' increased lending activities (with positive effects on SMEs' access to credit): Banking sector development may also affect capital markets (see Section 4.3.1 for more details), which may lead to reverse causality issues and other situations where effects from credit markets are wrongly assigned to capital market development.[60] To account for this concern, IV estimation is employed. In the first IV approach,

[59] As for the average over the first three lags of market capitalization, one missing value is considered tolerable.

[60] One potential concern beyond reverse causality, for example, may be that the key explanatory variable (stock market capitalization) picks up the effect of credit market development due to the correlation of the two variables. Especially the first IV approach accounts for this concern. Additionally, in a back-of-the-envelope analysis (unreported), I employed the inverse of the net interest margin and of the overhead costs to improve the linear fit and correlation with the ratio of private credit to GDP. The banking competition measures jointly account for the vast majority of the variation in private credit – almost twice as much as stock market capitalization when regressing private credit on stock market capitalization and the three banking competition measures (using standardized coefficients). This indicates that the banking competition variables adequately control for the national private credit environment such that stock market capitalization is unlikely to merely pick up the effect of credit market development. Results are very similar to the baseline when using the transformations (i.e. inverse) for net interest margin and overheads.

the potentially endogenous variable (stock market capitalization) is instrumented by the index for the strength of investor protection from World Bank's Doing Business dataset in a two-stage least squares (2SLS) estimation.[61] Legislation and regulations with regard to investor protection are central to building trust among (potential) investors and thus to developing capital markets, while they should be inconsequential for banks' lending activities. Indeed, test statistics underscore that the chosen instruments are relevant and valid, i.e. that they are sufficiently correlated with the potentially endogenous stock market capitalization, but uncorrelated with the error term.[62] As depicted in Table A4.10 in the Appendix, results are in support of the previous findings. In an alternative second approach, the first, second and third lags are used as instruments for stock market capitalization. As shown in Table A4.11, the results from this IV approach further strengthen confidence in the findings of the baseline analysis.[63] Test statistics underline the relevance and non-weakness of the instruments.[64]

4.6. Conclusion

This paper examines whether capital market development has indirect, positive effects on SMEs' access to loans. Both scholarly, theoretical work (Song & Thakor, 2010) supported by empirical evidence (Arize et al., 2018; Chatterjee, 2015; Toh et al., 2019) as well as

[61] I use the first and second lag of strength of investor protection as instruments in order to be able to test the overidentifying restrictions (which requires having more instruments than (potentially) endogenous variables). However, results carry through when just using the first lag as single instrument.

Since two countries (Jordan and the Philippines) are outliers that weaken the correlation between strength of investor protection and stock market capitalization and thus undermine the strength and validity of my instrument, I exclude observations from these countries in this first IV approach.

[62] For the preferred specification (Column 4 in the regression output table), for instance, test statistics on the first stage of the 2SLS estimation find a high joint significance of the instruments with p=0.000, F=10.18 (i.e. larger than the critical of 10 suggested in the literature) and a partial R^2 of 0.19. Testing the overidentifying restrictions using the chi-square test by Sargan or Basmann yields p=0.71. Jointly this indicates that the instruments qualify as relevant and valid.

[63] Note that effect sizes are very similar whereas significance is slightly lower. For the preferred specification (Column 4 in the regression output table), for instance, the effect is significant at 10% compared to 5% in the baseline. However, significance at the 5%-level materializes for all specifications (Columns 1-5) in the second IV approach when using the more robust computation of external financial dependence D_{sc} (unreported).

[64] Again, I present test statistics exemplarily for the preferred specification (Column 4): p=0.000 with F=109.56 and partial R^2=0.84 for the first stage; and p=0.83 for the overidentifying restrictions.

international institutions promoting economic development such as the World Bank and OECD (Thompson et al., 2018; World Bank, 2020) regard the complementarity and co-evolution of capital markets and the banking sector as most promising contribution of markets to improve SMEs' access to finance: Well-developed markets enable banks to acquire affordable equity capital, sell off loans (securitization) and use other market-based instruments to improve their funding structure and risk management, which in turn allows banks to expand their lending activities and extend loans to smaller and riskier firms. This indirect channel is paramount since in most countries and especially in LMICs, SMEs cannot access external finance through capital market directly due to internal and external constraints. To explore the indirect effect of capital market development on firms' access to loans – and thus empirically investigate one of the central predictions of the theoretical model by Song and Thakor (2010) that capital market development is associated with an increase in bank lending, in particular, towards smaller and riskier firms – I employ a modification of the cross-industry cross-country model by Léon (2020) using firm-level data from World Bank's Enterprise Surveys. The model employs the analysis framework of Rajan and Zingales (1998) to limit endogeneity issues.

The analysis shows that capital market development positively and significantly affects smaller firms' access to finance indicating that smaller firms in sectors that are more heavily dependent on external finance are more likely to have sufficient access to loans if they are located in countries with more developed capital markets. The results are robust to changes on various dimensions including the computation of the dependence on external finance, the definition of small firms, choices concerning the dependent and key explanatory variables, as well as the use of IV approaches to account for potential reverse causality and endogeneity issues. The paper presents further evidence in support of the hypothesized indirect channel: The findings suggest that the effect of capital market development on smaller firms' improved access to finance runs through increased usage of capital markets by financial institutions and subsequent increases in their lending activities. This is in line with the predictions of the theoretical model by Song and Thakor (2010) that consolidated the view that markets and banks are complementary and co-evolve.

For policymaking, the findings indicate that fostering the development of the main capital markets has positive spillover effects on SME finance as long as regulatory authorities allow lending institutions to engage with the capital market. Of course, the global financial crisis 2007-08 induced by irresponsible securitization practices should serve as a reminder that appropriate regulation is crucial. It needs to strike the delicate balance of fueling financial

development through mutually reinforcing interactions between banks and markets while safeguarding the soundness and stability of banks as well as the overall financial system. Yet the good news is that capital market development is beneficial for SMEs' access to finance even if the development should be limited to the main market and not include advancements in the secondary markets such as dedicated SME exchanges or in PE and VC markets. This does not necessarily imply that governments should direct their primary efforts of promoting SME finance to advancing capital markets. Depending on the current level of development, it may take strenuous institutional and structural reforms over a prolonged period of time to create an environment, that is characterized by a strong legal system, quality laws as well as macroeconomic and political stability, i.e. an environment that is truly conducive to thriving capital markets. Consequently, it may make more sense for various governments to prioritize more direct ways to foster SME finance by improving SMEs' access to bank loans. This could, for instance, comprise measures to reduce problems of information asymmetry by establishing functioning credit-information sharing systems (credit bureaus and registries), to reduce collateral issues by installing moveable asset registries, and to facilitate digitalization in the financial sector in order to make progress with regard to financial inclusion, the ease and costs of using financial services and with regard to competition in the financial sector.

For researchers, the results in this paper can serve as a starting point to investigate interactions between capital markets and the banking sector in more detail. This study provides first empirical evidence for the prediction of the theoretical model by Song and Thakor (2010) that capital market development expands banks' lending activities such that loans are extended to previously unserved smaller and riskier firms. Even though additional evidence is presented that this effect runs through capital market usage by financial institutions and increases in their loan portfolios, I examine this channel on the macro level using aggregate figures of capital market usage by financial institutions at the national level. Future research could focus on the meso or micro level by using bank-level data to shed more light on the relationship between financial institutions and capital markets: Elaborate, for instance, on the financial instruments that link markets and banks, the extent to which such instruments are being used by financial institutions and which internal and external factors influence their usage. The channels delineated by the theoretical work of Song and Thakor (2010) on the complementarity and co-evolution of markets and banks can guide such empirical investigations.

A.4 Appendix

Literature on Competition between Capital Markets and the Banking Sector

Even though more recent theoretical and empirical work solidified the notion that capital markets and banks complement each other and co-evolve, there is a smaller strand of literature arguing that markets and banks compete. Early theoretical work predicts that stock market development, especially increasing liquidity, intensifies competition and negatively affects core banking activities due to adverse effects on the demand for bank deposits (which constitute the central funding source for lending and thus affects loan supply) and the demand for loans. On the one hand, investors are expected to move their savings from bank deposits to the market since they can realize higher (long-term) returns and – with liquid stock markets – sell their securities in case of liquidity shocks (Haubrich & King, 1990; von Thadden, 1998). On the other hand, costs for raising capital through capital markets decreases with increased market liquidity as investors face lower liquidity risks, which diminishes the underpricing problem and the required return on equity such that more firms issue shares and other securities instead of using loans to meet their financing needs (Bencivenga et al., 1995; Levine, 1991). Empirical evidence on the competition between capital markets and banking is limited, though, to one study on the US (Lin, 2019) and a cross-country analysis using bank-level data from 39 countries (Samarasinghe & Uylangco, 2022). Samarasinghe and Uylangco (2022) find the negative effect of market liquidity on loans to become positive when only looking at countries with developed capital markets, which suggests complementarity and co-evolution of markets and banks and contradicts the findings of Lin (2019) (negative effect for the US, a country with a highly developed capital market). Given the thin and (partially) contradictive evidence on competition between markets and banks, my paper adopts the more common notion of complementarity and co-evolution of markets and banks.

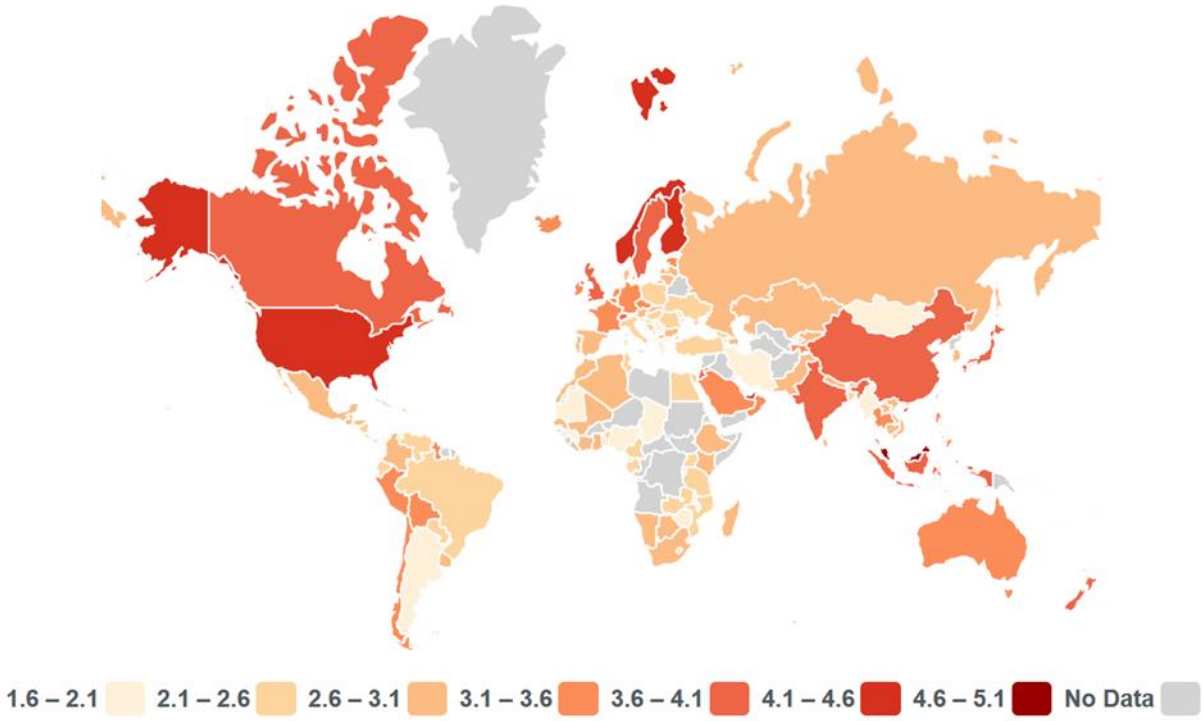

Figure A4.1: Availability of Venture Capital across the World

Note: Index scores range from 1 to 7 (best) and are based on data from 2014 and 2015. Visualization by the World Bank based on data from The Global Information Technology Report 2016 by the World Economic Forum. Terms of use of the World Economic Forum for re-using their data applies.

Evidence Mitigating the Reverse Causality Concerns

The co-evolution of markets and banks theoretically implies an entanglement of capital and credit markets such that effects should run in both directions (i.e. not only from markets to banks, but also in the other direction), which gives rise to reverse causality concerns. However, descriptive and inferential analyses mitigate these concerns: They suggest that financial instruments that create benefit flows from markets to banks (e.g. bank equity capital) are much more important in my sample of mostly LMICs, whereas instruments that create benefit flows from banks to markets (e.g. securitization) play a limited role.

This is visualized in the descriptive statistics in Figure A4.2 on funding sources of financial institutions, where ‘shares and other equity’ may serve as a rough proxy for the relevance of the equity-capital instrument and ‘securities’ as a rough proxy for the relevance of the

securitization instrument. In my sample of mostly LMICs, securitization contributes relatively little (4.7%) to funding financial institutions whereas the contribution of bank equity capital is more than 3.5 times larger (17.1%), which underlines the importance of the latter instrument. This is in support of the notion that in LMICs – with very limited roles for securitization – effects should mainly run from capital markets to credit activities and not the other way round.

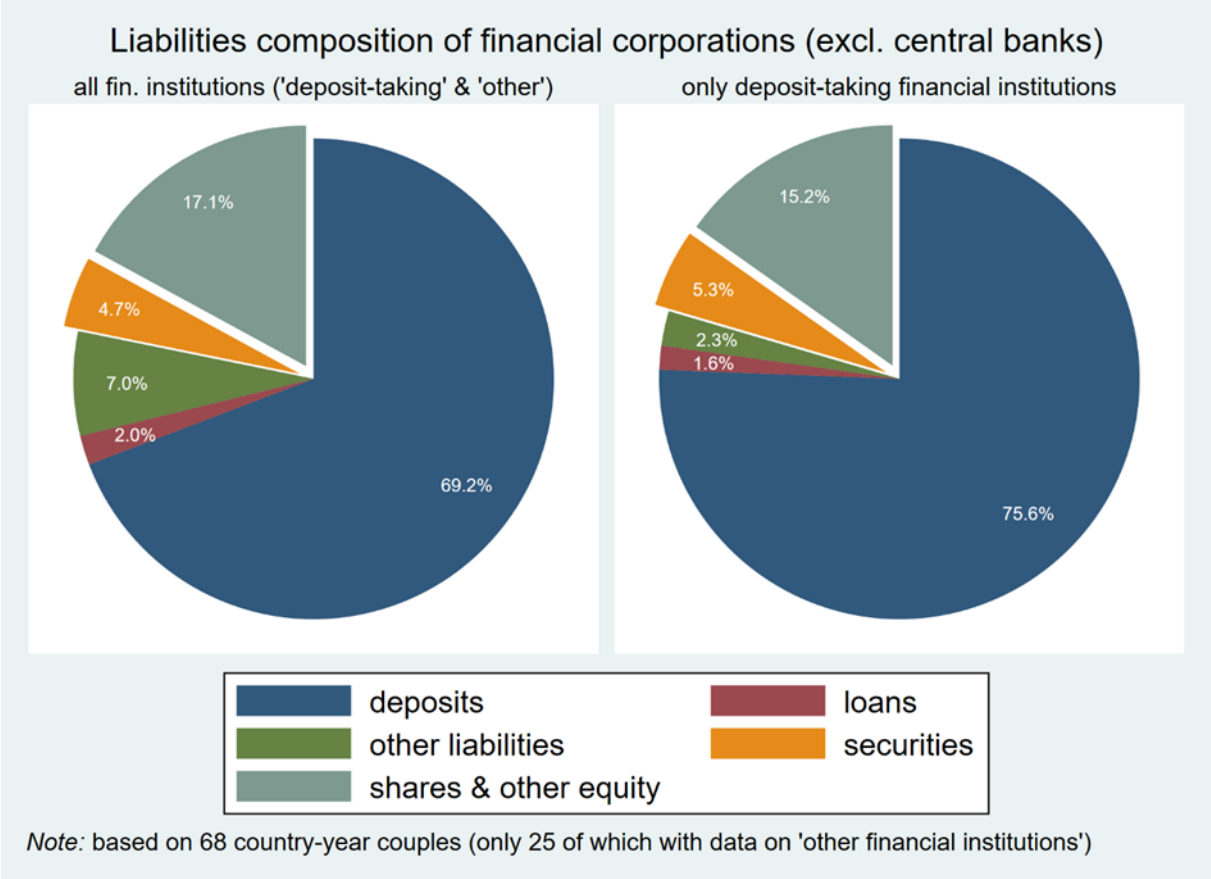

Figure A4.2: Liabilities Composition of Financial Institutions

Note: Author's visualization and calculation based on data from IMF's Monetary and Financial Statistics (MFS).

This view is further buttressed through inferential analyses. The regression analysis from the second half of Section 4.5.1 on capital market usage by financial institutions is refined by disentangling the compound figure on capital market usage by financial institutions into 'securities' (securitization proxy) and 'shares and other equity' (equity proxy). The proxies are each plugged into separate regression equations analogous to the one underlying Table 4.4 (i.e. *usage of capital markets by financial institutions* is replaced by the securitization proxy or respectively by the equity proxy). While the results for the equity proxy are similar (effects are even slightly more significant), the results (also unreported) become insignificant for the

securitization proxy.[65] This further underlines the importance of the equity instrument and the limited importance of the securitization instrument for the countries in my sample. Moreover, this mitigates concerns that the effect from credit markets to capital markets (e.g. through securitization) are economically significant enough to create some reverse causality issue. Thus, it further supports the validity of the line of investigation in this paper to focus on effects from capital markets on banks' credit activities with subsequent effects on firms' access to loans.

[65] The same findings emerge when using the equity proxy and/or the securitization proxy as key explanatory variable(s) in the baseline regression (instead of stock market capitalization) – either in separate regressions or jointly in the same regression: Results of the equity proxy are even slightly more significant (than the baseline results of stock market capitalization), whereas results of the securitization proxy are insignificant.

Table A4.1: Ratio of Private Credit to GDP as Key Explanatory Variable

	(1)	(2)	(3)	(4)	(5)
D*private credit	0.0815	0.0873+	0.106*	0.141**	0.155**
	(0.0566)	(0.0569)	(0.0564)	(0.0582)	(0.0608)
D	0.00481	-0.000451	-0.0198	-0.0658	0.299
	(0.0380)	(0.0381)	(0.0371)	(0.0956)	(0.323)
Log firm size		0.0429***	0.0416***	0.0416***	0.0416***
		(0.00560)	(0.00584)	(0.00584)	(0.00584)
Log firm age		0.0122**	0.0134**	0.0134**	0.0133**
		(0.00495)	(0.00511)	(0.00511)	(0.00512)
Exporter		0.0151*	0.0134	0.0134	0.0134
		(0.00895)	(0.00939)	(0.00937)	(0.00940)
Foreign-owned		0.00216	0.00199	0.00195	0.00186
		(0.0129)	(0.0134)	(0.0134)	(0.0134)
Government-owned		0.0421	0.0424	0.0426	0.0428
		(0.0370)	(0.0371)	(0.0370)	(0.0370)
Financial statements		0.0272+	0.0261	0.0261	0.0260
		(0.0183)	(0.0195)	(0.0195)	(0.0195)
D*net interest margin				0.00896	-0.000107
				(0.00953)	(0.0113)
D*overhead				-0.000746	0.000194
				(0.00455)	(0.00444)
D*concentration				-0.000120	0.000223
				(0.00158)	(0.00181)
D* log GDP pc					-0.0408
					(0.0313)
D*inflation					0.000701
					(0.00318)
D*rule of law					-0.00415
					(0.0515)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	41,599	41,599	39,242	39,242	39,242
R^2	0.125	0.131	0.130	0.130	0.130

The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.2: Description of Variables and Data Sources

Variable	Description and data source
Outcome variables	
Unconstrained	Dummy equal to one if the firm is financially unconstrained according to Popov and Udell (2012); firms are financially constrained if their loan application was rejected or if they are 'discouraged' (not applying for a loan due to complex application procedures, unfavorable interest rates, high collateral requirements, unfavorable loan sizes and maturities, pessimistic expectations about approval chances or due to other reasons); firms are financially unconstrained if these things do not apply and firms have a loan and/or report not to need a loan; from World Bank Enterprise Surveys (ES)
[Access to loans]	Dummy variable equal to 1 if firm has a line of credit or loan from a financial institution; from ES
[Loans for working capital/ fixed assets]	Dummy variable equal to 1 if firm used loans to finance working capital and/or fixed assets in the last fiscal year; from ES
Central explanatory variables	
Stock market capitalization	Market capitalization of listed domestic firms relative to GDP; from World Bank's Global Financial Development Database (GFDD)
[Value of stocks traded]	Value of traded domestic and foreign shares relative to GDP; from GFDD
Dependence on external finance	Share of large firms with a line of credit or loan from a financial institution in the respective country and sector; from ES
Private credit per GDP	Domestic credit to the private sector relative the GDP; from World Bank's World Development Indicators (WDI)
Capital market usage by financial institutions	Securities, shares and other equity of financial institutions (excluding central banks) relative to GDP; from IMF's Monetary and Financial Statistics (MFS)
[Strength of investor Protection]	Index for the strength of investor protection regarding disclosure, liability and litigation with scores of 0 to 30 (DB06-14 methodology); from World Bank's Doing Business (DB)
Firm-level controls	
Firm size (employees)	Number of full-time employees (temporary, full-time employees are converted into permanent, full-time equivalents using the firm-specific average length of temporary, full-time employment); from ES
Firm age	Age of firm (in years); from ES
Exporters	Dummy variable equal to one if at least 10% of firm's output are exported (directly or indirectly); from ES
Foreign-owned	Dummy variable equal to one if firm is owned to 50% or more by foreign organizations; from ES
Government-owned	Dummy variable equal to one if firm is owned to 50% or more by the government; from ES
Audited financial statements	Dummy variable equal to one if firm's financial statements are checked and certified by an external auditor; from ES
Country-level controls	
Bank concentration	Share of bank assets held by the three largest banks; from GFDD
Bank overhead costs	Banks' overhead costs as a share of their total assets; from GFDD
Net interest margin	Banks' net interest revenue relative to their interest-bearing assets; from GFDD
GDP per capita	Gross domestic product per capita (in constant US dollars); from WDI
Inflation	Annual growth rate of the GDP deflator; from WDI
Rule of law	Captures, amongst other things, the quality of contract enforcement, property rights, the police, and the courts on a scale from -2.5 (weak) to 2.5 (strong); from World Bank's Worldwide Governance Indicators

[.] Variables in squared brackets are only used in the robustness check.

Table A4.3: Distribution of Observations across Country-Year Couples

Country	Year	Obs.	Benchmark	
			Size: 50+ employees	Size: 100+ employees.
Argentina	2006	959	340	230
Argentina	2010	948	404	285
Argentina	2017	887	331	229
Azerbaijan	2019	190	49	28
Bosnia and Herzegovina	2009	298	101	63
Brazil	2009	1,123	408	255
Bulgaria	2007	971	338	213
Bulgaria	2009	247	62	40
Bulgaria	2019	712	234	171
Chile	2006	888	352	218
Chile	2010	948	422	303
China	2012	2,363	1,436	892
Colombia	2006	946	219	110
Colombia	2010	898	377	261
Colombia	2017	930	344	208
Costa Rica	2010	408	146	93
Croatia	2007	565	222	158
Croatia	2019	395	163	116
Cyprus	2019	198	53	33
Czech Republic	2019	482	163	108
Côte d'Ivoire	2009	336	48	35
Côte d'Ivoire	2016	225	52	32
Egypt	2013	2,550	760	494
Egypt	2016	1,677	671	485
Eswatini	2006	67	36	28
Ghana	2007	269	39	28
Greece	2018	551	169	118
Hungary	2009	273	122	88
Hungary	2013	239	52	39
Hungary	2019	742	217	140
India	2014	8,348	3,297	2,012
Indonesia	2009	1,167	332	225
Indonesia	2015	1,155	483	328
Israel	2013	462	133	92
Jamaica	2010	244	63	36
Jordan	2013	491	153	102
Jordan	2019	337	56	27
Kazakhstan	2009	498	207	144
Kazakhstan	2013	512	116	65
Kazakhstan	2019	1,280	342	196
Kenya	2007	373	193	128
Lebanon	2013	497	122	78
Lebanon	2019	473	117	51

Table A4.3 (continued)

Country	Year	Obs.	Benchmark	
			Size: 50+ employees	Size: 100+ employees.
Malaysia	2015	727	323	226
Malta	2019	209	46	27
Mauritius	2009	275	75	43
Mexico	2006	1,241	352	230
Mexico	2010	1,308	638	458
Morocco	2013	338	142	94
Morocco	2019	655	270	179
Namibia	2006	84	23	13
Namibia	2014	174	29	7
Nigeria	2007	882	104	35
Nigeria	2014	1,590	188	96
Pakistan	2007	830	184	118
Panama	2006	548	134	66
Panama	2010	266	113	55
Papua New Guinea	2015	49	26	16
Peru	2006	558	181	100
Peru	2010	950	441	290
Peru	2017	936	332	223
Philippines	2009	1,035	445	274
Philippines	2015	933	400	265
Poland	2009	317	105	69
Poland	2013	400	92	53
Poland	2019	1,092	294	197
Romania	2009	396	170	126
Romania	2019	763	256	192
Russia	2012	3,730	861	438
Russia	2019	1,205	463	350
Rwanda	2019	324	79	49
Serbia	2009	340	142	101
Slovak Republic	2009	204	78	53
Slovak Republic	2013	215	50	33
Slovenia	2009	249	102	74
Slovenia	2013	238	50	35
Slovenia	2019	377	101	59
Sri Lanka	2011	501	134	86
Thailand	2016	702	250	177
Turkey	2008	982	416	291
Turkey	2013	1,065	381	236
Turkey	2019	1,437	488	319
Vietnam	2009	929	510	348
Vietnam	2015	901	387	255
West Bank and Gaza	2013	324	34	19
West Bank and Gaza	2019	311	63	39
Total		68,712	23,896	15,399

Table A4.4: Robustness Check: More Robust Computation of D_{sc}

	(1)	(2)	(3)	(4)	(5)
D*F	0.243***	0.246***	0.273***	0.296***	0.303***
	(0.0756)	(0.0757)	(0.0812)	(0.0856)	(0.0906)
D	-0.0507	-0.0540	-0.0675+	-0.187*	-0.245
	(0.0400)	(0.0397)	(0.0409)	(0.0985)	(0.334)
Log firm size		0.0456***	0.0445***	0.0444***	0.0444***
		(0.00594)	(0.00619)	(0.00619)	(0.00619)
Log firm age		0.0115**	0.0126**	0.0127**	0.0127**
		(0.00499)	(0.00515)	(0.00515)	(0.00516)
Exporter		0.0141*	0.0126	0.0126	0.0126
		(0.00844)	(0.00881)	(0.00881)	(0.00884)
Foreign-owned		0.00651	0.00639	0.00652	0.00652
		(0.0127)	(0.0132)	(0.0132)	(0.0133)
Government-owned		0.0227	0.0231	0.0231	0.0231
		(0.0363)	(0.0363)	(0.0362)	(0.0362)
Financial statements		0.0295+	0.0283+	0.0282+	0.0283+
		(0.0181)	(0.0192)	(0.0192)	(0.0192)
D*net interest margin				-0.00148	-0.000644
				(0.0107)	(0.0127)
D*overhead				0.00507	0.00445
				(0.00383)	(0.00485)
D*concentration				0.00173	0.00174
				(0.00165)	(0.00199)
D* log GDP pc					0.00562
					(0.0326)
D*inflation					0.000510
					(0.00380)
D*rule of law					-0.00155
					(0.0647)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	42,870	42,870	40,624	40,624	40,624
R^2	0.115	0.121	0.121	0.121	0.121

This more robust approach only includes sector-country(-year) couples with a reference group of three or more large firms for the computation of D_{sc}. The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.5: Robustness Check: Alternative Definition of Large Firms

	(1)	(2)	(3)	(4)	(5)
D*F	0.0938+	0.105*	0.104+	0.123*	0.0844
	(0.0637)	(0.0617)	(0.0637)	(0.0624)	(0.0595)
D	-0.0207	-0.0243	-0.0317	-0.0228	0.277
	(0.0254)	(0.0250)	(0.0267)	(0.0709)	(0.276)
Log firm size		0.0467***	0.0456***	0.0456***	0.0455***
		(0.00460)	(0.00480)	(0.00481)	(0.00482)
Log firm age		0.0131***	0.0143***	0.0143***	0.0143***
		(0.00415)	(0.00425)	(0.00425)	(0.00425)
Exporter		0.0175**	0.0159**	0.0159**	0.0158**
		(0.00739)	(0.00769)	(0.00766)	(0.00768)
Foreign-owned		0.00369	0.00247	0.00221	0.00208
		(0.0111)	(0.0116)	(0.0116)	(0.0116)
Government-owned		0.0496*	0.0500*	0.0507*	0.0511*
		(0.0282)	(0.0281)	(0.0279)	(0.0278)
Financial statements		0.0339**	0.0330*	0.0330*	0.0330*
		(0.0165)	(0.0174)	(0.0174)	(0.0174)
D*net interest margin				0.00992	0.00724
				(0.00730)	(0.00744)
D*overhead				-0.00256	0.000256
				(0.00244)	(0.00358)
D*concentration				-0.000853	-0.000968
				(0.000995)	(0.00120)
D* log GDP pc					-0.0295
					(0.0265)
D*inflation					-0.00227
					(0.00262)
D*rule of law					0.0153
					(0.0363)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	52,370	52,370	49,617	49,617	49,617
R^2	0.120	0.130	0.128	0.128	0.128

Firms with 100 and more employees (instead of 50+) are defined as large and used as reference group for the computation of D_{sc}. The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.6: Robustness Check: Alternative Key Explanatory Variable Based on Stock Market Capitalization

	(1)	(2)	(3)	(4)	(5)
D*F	0.122*	0.127*	0.161**	0.194***	0.182**
	(0.0720)	(0.0724)	(0.0740)	(0.0716)	(0.0722)
D	0.00333	-0.00337	-0.0280	-0.0444	0.116
	(0.0335)	(0.0333)	(0.0329)	(0.0811)	(0.272)
Log firm size		0.0429***	0.0418***	0.0418***	0.0418***
		(0.00596)	(0.00623)	(0.00624)	(0.00625)
Log firm age		0.0119**	0.0130**	0.0130**	0.0130**
		(0.00495)	(0.00512)	(0.00512)	(0.00513)
Exporter		0.0181**	0.0166*	0.0167*	0.0167*
		(0.00865)	(0.00905)	(0.00901)	(0.00904)
Foreign-owned		0.00873	0.0103	0.0101	0.0101
		(0.0128)	(0.0133)	(0.0133)	(0.0133)
Government-owned		0.0388	0.0395	0.0400	0.0400
		(0.0384)	(0.0385)	(0.0383)	(0.0383)
Financial statements		0.0291+	0.0276	0.0275	0.0275
		(0.0188)	(0.0200)	(0.0200)	(0.0200)
D*net interest margin				0.0127+	0.00956
				(0.00850)	(0.0101)
D*overhead				-0.00000314	0.000234
				(0.00228)	(0.00287)
D*concentration				-0.000866	-0.000926
				(0.00101)	(0.00123)
D* log GDP pc					-0.0159
					(0.0265)
D*inflation					0.000241
					(0.00262)
D*rule of law					0.00773
					(0.0430)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	42,306	42,306	39,888	39,888	39,888
R^2	0.124	0.129	0.128	0.128	0.128

Averages of the first three lags of stock market capitalization (instead of simply the first lag) are used as key explanatory variable. The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.7: Robustness Check: Alternative Key Explanatory Variable Based on Value Traded

	(1)	(2)	(3)	(4)	(5)
D*F	0.139+	0.139+	0.168*	0.176*	0.162*
	(0.0891)	(0.0910)	(0.0894)	(0.0931)	(0.0940)
D	0.0212	0.0166	0.00238	0.0214	0.313
	(0.0228)	(0.0225)	(0.0223)	(0.0753)	(0.282)
Log firm size		0.0435***	0.0423***	0.0423***	0.0423***
		(0.00602)	(0.00630)	(0.00630)	(0.00631)
Log firm age		0.0124**	0.0135***	0.0135***	0.0134***
		(0.00483)	(0.00499)	(0.00499)	(0.00499)
Exporter		0.0175**	0.0162*	0.0162*	0.0162*
		(0.00859)	(0.00897)	(0.00894)	(0.00896)
Foreign-owned		0.00839	0.00941	0.00930	0.00925
		(0.0127)	(0.0132)	(0.0132)	(0.0132)
Government-owned		0.0448	0.0456	0.0460	0.0462
		(0.0386)	(0.0387)	(0.0385)	(0.0385)
Financial statements		0.0288+	0.0272	0.0272	0.0271
		(0.0184)	(0.0196)	(0.0196)	(0.0196)
D*net interest margin				0.00805	0.00450
				(0.00865)	(0.00977)
D*overhead				0.000643	0.00118
				(0.00286)	(0.00346)
D*concentration				-0.000999	-0.00128
				(0.00102)	(0.00125)
D* log GDP pc					-0.0291
					(0.0278)
D*inflation					-0.00000865
					(0.00262)
D*rule of law					0.0238
					(0.0442)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	42,813	42,813	40,418	40,418	40,418
R^2	0.124	0.130	0.129	0.129	0.129

Averages of the first three lags of the value of stocks traded (instead of the first lag of stock market capitalization) are used as key explanatory variable. The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources given in Table A4.2.

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.8: Robustness Check: Alternative Dependent Variable (Access to Loans)

	(1)	(2)	(3)	(4)	(5)
D*F	0.268***	0.268***	0.253**	0.271***	0.243***
	(0.0888)	(0.0896)	(0.0964)	(0.0905)	(0.0876)
D	-0.0122	-0.0208	-0.0191	-0.0126	0.456
	(0.0289)	(0.0301)	(0.0319)	(0.0814)	(0.326)
Log firm size		0.0789***	0.0789***	0.0790***	0.0790***
		(0.00851)	(0.00892)	(0.00892)	(0.00892)
Log firm age		-0.00618	-0.00730+	-0.00730+	-0.00738+
		(0.00437)	(0.00444)	(0.00444)	(0.00444)
Exporter		0.0565***	0.0576***	0.0577***	0.0577***
		(0.00720)	(0.00750)	(0.00749)	(0.00749)
Foreign-owned		-0.0917***	-0.0895***	-0.0898***	-0.0898***
		(0.0145)	(0.0146)	(0.0146)	(0.0146)
Government-owned		-0.111*	-0.112**	-0.111**	-0.111*
		(0.0562)	(0.0563)	(0.0558)	(0.0559)
Financial statements		0.0816***	0.0850***	0.0850***	0.0849***
		(0.0140)	(0.0144)	(0.0145)	(0.0144)
D*net interest margin				-0.00121	-0.00444
				(0.00938)	(0.0106)
D*overhead				0.0111***	0.0116***
				(0.00239)	(0.00294)
D*concentration				-0.000806	-0.00144+
				(0.000905)	(0.000949)
D* log GDP pc					-0.0463
					(0.0337)
D*inflation					0.000539
					(0.00321)
D*rule of law					0.0639+
					(0.0403)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	44,816	44,816	42,398	42,398	42,398
R^2	0.186	0.208	0.202	0.202	0.202

The dependent variable is a dummy variable capturing whether firms have a loan or line of credit (instead of a dummy for being financially unconstrained). As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses
+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.9: Robustness Check: Alternative Dependent Variable (Loans Used to Finance Working Capital or Fixed Assets)

	(1)	(2)	(3)	(4)	(5)
D*F	0.227**	0.221**	0.245**	0.231**	0.187*
	(0.105)	(0.104)	(0.113)	(0.108)	(0.0990)
D	-0.00670	-0.0114	-0.0188	0.119	0.745
	(0.0328)	(0.0329)	(0.0350)	(0.0908)	(0.533)
Log firm size		0.0676***	0.0666***	0.0666***	0.0666***
		(0.00719)	(0.00748)	(0.00747)	(0.00748)
Log firm age		-0.00985*	-0.00894+	-0.00897+	-0.00904*
		(0.00514)	(0.00541)	(0.00541)	(0.00542)
Exporter		0.0760***	0.0801***	0.0800***	0.0800***
		(0.0149)	(0.0153)	(0.0152)	(0.0152)
Foreign-owned		-0.0522	-0.0471	-0.0472	-0.0474
		(0.0387)	(0.0397)	(0.0397)	(0.0397)
Government-owned		-0.0612	-0.0620	-0.0620	-0.0617
		(0.0777)	(0.0777)	(0.0775)	(0.0776)
Financial statements		0.0764***	0.0796***	0.0796***	0.0794***
		(0.0186)	(0.0196)	(0.0196)	(0.0195)
D*net interest margin				-0.000276	-0.0114
				(0.0106)	(0.0125)
D*overhead				0.000422	0.00121
				(0.00537)	(0.00553)
D*concentration				-0.00226*	-0.00238+
				(0.00126)	(0.00152)
D* log GDP pc					-0.0641
					(0.0518)
D*inflation					0.00144
					(0.00392)
D*rule of law					0.0395
					(0.0601)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	42,732	42,732	40,338	40,338	40,338
R^2	0.144	0.163	0.162	0.162	0.162

The dependent variable is a dummy variable capturing whether firms used loans to finance working capital or fixed assets in the last fiscal year (instead of a dummy for being financially unconstrained). As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.10: Robustness Check: IV Approach Based on Strength of Investor Protection Index

	(1)	(2)	(3)	(4)	(5)
D*F	0.393	0.397	0.451+	0.426*	0.448*
	(0.295)	(0.292)	(0.289)	(0.245)	(0.242)
D	-0.0605	-0.0649	-0.0902	-0.146	-0.106
	(0.0807)	(0.0798)	(0.0764)	(0.138)	(0.378)
Log firm size		0.0451***	0.0441***	0.0441***	0.0441***
		(0.00593)	(0.00621)	(0.00621)	(0.00621)
Log firm age		0.0136***	0.0148***	0.0148***	0.0148***
		(0.00471)	(0.00486)	(0.00487)	(0.00487)
Exporter		0.0148*	0.0132	0.0132	0.0132
		(0.00890)	(0.00932)	(0.00930)	(0.00932)
Foreign-owned		0.00226	0.00341	0.00333	0.00331
		(0.0134)	(0.0140)	(0.0139)	(0.0140)
Government-owned		0.0303	0.0308	0.0311	0.0311
		(0.0383)	(0.0383)	(0.0382)	(0.0382)
Financial statements		0.0293+	0.0278+	0.0278+	0.0278+
		(0.0181)	(0.0192)	(0.0191)	(0.0191)
D*net interest margin				0.00708	0.00419
				(0.00975)	(0.0121)
D*overhead				0.000616	0.000272
				(0.00228)	(0.00287)
D*concentration				0.000501	0.000718
				(0.00157)	(0.00188)
D* log GDP pc					-0.00621
					(0.0302)
D*inflation					0.00138
					(0.00259)
D*rule of law					-0.00496
					(0.0449)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	43,074	43,074	40,656	40,656	40,656
R^2	0.125	0.131	0.130	0.130	0.130
First-stage F-test	3.43	3.43	7.06	10.18	10.54
Chi-sq. p-value (over-identification test)	0.40	0.37	0.66	0.71	0.87

The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. The potentially endogenous key explanatory variable (lagged stock market capitalization) is instrumented by the first and second lag of the index for strength of investor protection. Observations from Jordan and the Philippines as outliers with respect to strength of investor protection are excluded. As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table A4.11: Robustness Check: IV Approach Based on Lags of Stock Market Capitalization

	(1)	(2)	(3)	(4)	(5)
D*F	0.0806	0.0856	0.119	0.155*	0.135+
	(0.0816)	(0.0821)	(0.0842)	(0.0855)	(0.0888)
D	0.0110	0.00528	-0.0155	-0.0553	0.171
	(0.0352)	(0.0348)	(0.0344)	(0.0828)	(0.274)
Log firm size		0.0416***	0.0401***	0.0401***	0.0401***
		(0.00648)	(0.00680)	(0.00681)	(0.00682)
Log firm age		0.0147***	0.0161***	0.0161***	0.0161***
		(0.00483)	(0.00497)	(0.00497)	(0.00497)
Exporter		0.0195**	0.0183**	0.0183**	0.0183**
		(0.00884)	(0.00926)	(0.00924)	(0.00927)
Foreign-owned		0.0144	0.0157	0.0156	0.0156
		(0.0133)	(0.0139)	(0.0138)	(0.0139)
Government-owned		0.0148	0.0158	0.0164	0.0165
		(0.0436)	(0.0435)	(0.0433)	(0.0431)
Financial statements		0.0261	0.0240	0.0240	0.0239
		(0.0200)	(0.0214)	(0.0214)	(0.0214)
D*net interest margin				0.0140+	0.0106
				(0.00865)	(0.0105)
D*overhead				-0.00225	-0.00238
				(0.00433)	(0.00467)
D*concentration				-0.000398	-0.000654
				(0.00110)	(0.00131)
D* log GDP pc					-0.0219
					(0.0269)
D*inflation					0.00100
					(0.00274)
D*rule of law					0.0252
					(0.0420)
Dummies					
Sector	Yes	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes	Yes
Observations	37,476	37,476	35,081	35,081	35,081
R^2	0.119	0.124	0.123	0.123	0.123
First-stage F-test	105.02	104.99	105.51	109.56	97.77
Chi-sq. p-value (over-identification test)	0.89	0.90	0.88	0.83	0.85

The dependent variable is a dummy variable capturing whether firms are unconstrained with regard to access to loans. The potentially endogenous key explanatory variable (lagged stock market capitalization, i.e. in t1) is instrumented by its first three lags (i.e. stock market capitalization in t2, t3 and t4). As in the underlying model by Léon (2020), the regression includes fixed effects for country(-year) and sector(-year), and standard errors are clustered at the survey-level. Details on variable definitions and sources are given in Table A4.2.

Standard errors in parentheses
+ $p < 0.15$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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