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The Impact of Bank Competition on Easing Credit Constraints in Developing Countries: Extension of Leon (2015)

A B S T R A C T

The topic of bank competition and its effects on improving credit access for firms in developing countries has received considerable attention in the literature in the past decades. One of the key papers in the field is Leon (2015)'s research who has found a positive effect of bank competition on alleviating credit constraints for 28,642 firms from 69 developing countries over 2006 – 2011 (excl. 2010) period. However, Leon (2015) has overlooked the importance of the crisis as well as the repercussions it might have on the relationship between bank competition and credit access during the after-crisis years. This research offers an extension to Leon (2015)'s by enlarging the sample to 87,932 firms for the same 69 countries for the period 2006 – 2019. In order to thoroughly examine the unique merged dataset that combines both firm-level and country-level characteristics, a probit model with sample selection has been employed to determine whether firms who need credit have received a loan or not. As a result, it has been found that, over the period of 2006 – 2019, bank competition increases credit availability, the number of loan applications as well as credit acceptance rate, which supports the findings of Leon (2015). However, during the crisis years, bank concentration is preferred over bank competition since it reduces credit constraints and encourages firms that need a loan to apply for it. Hence, policy makers are advised to encourage bank competition during economically stable times, while, during crisis times, to save the key banks in the economy as a way to ensure that SMEs get necessary financing.

Master's Thesis

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Introduction

The topic of economic growth in developing countries has received considerable attention from scholars over the past decades (Edwards, 1993; Hanushek, 2013). There has been a lot of academic research on the possible ways that could enhance the development of the countries that are lagging behind the global nations (Mortimore & Vergara, 2004; Romijn & Caniëls, 2011). Notably, most of developing countries' politicians are convinced that foreign investors are the ones who will help the countries develop, and thus national policies are deliberately designed to attract foreign direct investment (Aitken & Harrison, 1999).

Nevertheless, there is a group of scholars who claim that the focus of policy makers should be switched to the advancement of productive entrepreneurship in developing countries achievable by relaxing binding credit constraints (Baliamoune-Lutz, Brixiova, & Ndikumana, 2011). The researchers argue that a healthy business environment will make it possible for high-potential small- and medium-sized enterprises (hereafter, SMEs) to access credit without currently-existing intervening obstacles (e.g. privileged granting of credit, excessive collateral requirements, unclear property rights, etc.), which, in turn, will substantially contribute to country's development level as a whole (Baliamoune-Lutz et al., 2011; Leon, 2015; MarketLine, 2019). Likewise, it is believed that a lack of competition in the banking sector only contributes to the creation of the aforementioned obstacles, instead of eradicating credit constraints. However, the one could claim that poor development of the banking sector can be substituted by other types of financial intermediaries (e.g. venture capitalists, equity markets, etc.) under the condition that they function properly (Magnusson and Wydick, 2002; Schwartz, 1994). Bekaert and Harvey (2017) describe emerging equity markets as underdeveloped and insufficiently integrated in world equity markets, which makes them risky and uncertain. Regarding venture capitalists, Wright, Lockett, and Pruthi (2002) claim that they are hesitant to enter developing countries and invest in local SMEs since a lack of knowledge about the norms and culture results in the prejudice that only the entrepreneurs with the riskiest projects who have been rejected from the banks will ask venture capitalists for financing. As a result, keeping in mind the current trends regarding the non-bank financial intermediaries in the developing countries, it remains highly important to promote bank competition in order to ensure the development of so called "successful private enterprise economies" where SMEs are not constrained to access credit (Baliamoune-Lutz et al., 2011; Cook, 2002).

On the one hand, according to the *market power view,* which is also known as the *structure-performance hypothesis*, excessive bank power resulting from bank concentration slows down even industry-level growth let alone firm-level growth (Leon, 2015). As a solution to the problem,

Baliamoune-Lutz et al. (2011) suggest an increase in the competition of the banking sector which would put a downward pressure on collateral requirements and cost of credit, which, altogether, enhances new business formation. On the other hand, the supporters of the *information hypothesis* claim that bank concentration reduces the cost of credit (Fungáčová, Shamshur, & Weill, 2017) but evidence from the developing countries signals the opposite (MarketLine, 2019).

One of the studies that successfully captures the impact of bank competition on eliminating credit constraints for businesses is the research conducted by Leon (2015). The scholar managed to gather data for nearly 30,000 firms from 69 developing countries which substantially increases external validity and reliability of his research.

However, Leon (2015) has not considered the relationship of bank competition on alleviating credit constraints in the years after the Financial Crisis of 2008 which can be treated as a limitation of his research. There is a group of scholars who prove that the crisis has a substantial effect on banks and the competition between them (Akins, Li, Ng, & Rusticus, 2016; Garicano & Steinwender, 2015; Soedarmono, Machrouh, & Tarazi, 2013). Specifically, Soedarmono et al. (2013) argue that the financial crisis gives a rise to banking sector reforms and other policies that impact the banking sector and have further consequences on access to credit for borrowers. To name one, "too-big-to-fail" subsidies[1] contribute to an increased bank concentration, since they give a rise to market power of a few leading banks (Akins et al., 2016). On top of that, Paulet, Parnaudeau, and Abdessemed (2014) claim that the after-crisis years are also vitally important to take into account, since the crisis can alter the behavior of banks by making them more cautious, which, in turn, would impact their lending decisions. As a result, entrepreneurs that have a need for credit might experience credit rejections for many years after the actual crisis. Brunnermeier (2009) also predicted that, after the crisis, the banking landscape would change dramatically as many policies would have to be put in place impacting bank competition and credit availability. Indeed, Cull, Verrier, and Martinez Peria (2018), by using recently published World Bank's data, report that, during the after-crisis years, the government of Kazakhstan nationalized around 10% of banks that were adversely affected by the Financial Crisis of 2008. A change in bank ownership, might substantially change the behaviour of the banks that underwent the change and have repercussions on competition between them as well as credit access for firms. Therefore, despite the fact that Leon (2015) has included a crisis dummy in his research equalling one if the data for countries were available in 2009 or 2011, it is insufficient to gauge the total impact of the crisis on the relationship that bank competition has on alleviating credit constraints. First of all, the data for 2009 might not incorporate the potential long-lasting effects of the crisis mentioned by Paulet et al.

[1] *The Central Bank acts as a lender of last resort and provides the big banks in the country with emergency liquidity in order to prevent their bankruptcy and negative consequences on the economy as a whole (Kauko, 2014).*

(2014) and Brunnermeier (2009) since it only captures one year of post-crisis adaptation, which can be treated as short-term effects (Oulton & Sebastia-Barriel, 2013). Secondly, datasets for 2010 are omitted from the sample on top of the datasets for 2011 being highly under-represented in the full sample: only two countries out of 69, Iraq and Sri Lanka, have data for 2011. Finally, there are no datasets for the years after 2011 in the analysis. Thereby, this paper aims to answer the following research question: *Does the effect that bank competition alleviates credit constraints in developing countries found by Leon (2015) hold when extending the sample period for 2006 – 2019?* In other words, an extension to Leon (2015) is offered by conducting a similar research using the same data sources (primarily, the World Bank), including the datasets from the period 2012 – 2019 plus datasets for 2010, which were omitted by Leon (2015). Moreover, for some countries several datasets for different years are available which increases the depth of the analysis, and thus, the reliability of the research by the means of adding dynamics to the relationship over time (for instance, full sample includes Turkish firms in 2013, 2015, and 2019 as opposed to 2008 in Leon (2015)'s research). Hence, the following outputs will be generated: the first one will aim to replicate Leon (2015)'s findings by using the guidelines the scholar outlined for gathering and modifying the data; the second one will present a more precise overview of the effect of bank competition on credit constraints by combining the dataset of Leon (2015) with the after-crisis years outside of the scope of Leon (2015)'s research. Last but not least, the third one will have an interaction term indicating the effect during the crisis-years specifically. Only if the same positive influence of bank competition on eliminating credit access for businesses in developing countries is found while using the extended sample, it will be argued that Leon (2015)'s findings are truly robust, can be further generalized and used as a policy implication.

Overall, the extended dataset contains information on 87,932 firms for the same 69 countries over the period of 2006 – 2019. By employing the probit with sample selection method that takes advantage of highly extensive and heterogenous dataset and performs sample selection within it, it has been found that over the longer period of time (2006 – 2019), bank competition, if measured as either *Lerner Index* or *H-statistics*, reduces credit constraints which is in line with the findings of Leon (2015). One of the key contributions of this research is separating the crisis-years from the overall time period and studying the effect of bank competition separately. As such, it has been found that, during crisis years, bank concentration, if measured as *CR3* or *Lerner Index*, increases credit availability as well as the number of credit applications. This finding contradicts the results of Leon (2015), and hence, serves as a confirmation that the effects of the crisis cannot be overlooked and have to be studied in detail due to their peculiarity.

The remainder of the paper is organized as follows. Section 2 offers a review of the relevant theoretical and empirical literature. Section 3 describes the data sources, the variables and the construction of the full sample. Section 4 elaborates on the methodology used in the research. Section

5 presents the results. Section 6 includes various robustness checks. Section 7 concludes and outlines the policy implications.

Literature Review

At the outset, a preliminary note on the types of financial intermediaries as well as the nature of (banking) competition in developing markets must be given. Afterwards, the main theoretical arguments will be provided as well as the relevant empirical research findings.

Financial intermediaries in developing countries

Despite the fact that the focus of this paper is on the effects of the competition between banks, it is important to realize that they are not the only option for entrepreneurs from developing countries to access credit. For instance, Banerjee and Duflo (2011) claim in their book that, apart from formal sources of credit, namely, banks, there are other potential ways to get a loan in developing countries. To name a few: government-sponsored credit programmes, informal money lenders, and microfinance institutions are all different channels through which businesses could attempt obtaining financing. However, the above-mentioned financial intermediaries tend to lend to individuals for non-business purposes. Banerjee and Duflo (2011) note that, for example, microfinance institutions are hesitant to provide entrepreneurs credit, since the requested loan amounts are sizable, hardly falling into the "micro" category.

Schwartz (1994) suggested that developing countries can benefit from the venture capitalists who would provide credit to SMEs. Hellmann, Schure, and Vo (2019) define venture capitalists as investors that specialize in entrepreneurial financing, a term dating back to the 1990s. In other words, they invest in a promising business and become shareholders. The recent trends are as such that governments of developing countries are implementing policies that aim at attracting venture capitalists in the third world. However, cultural differences, informational asymmetries, and a high probability of adverse selection where only entrepreneurs with the riskiest projects will ask venture capitalists for financing, slow down the functioning of this form of entrepreneurial lending (Schwartz, 1994; Wright et al., 2002).

Shortly after the deregulation and financial liberalization of developing countries, foreign investors could access new equity markets and diversify their investments (Kim & Kenny, 2007; Tesar, Stulz, Friedman, & Hatsopoulos, 1999). Magnusson and Wydick (2002) claim that the role of international investors is to stabilize and discipline emerging equity markets in order to protect them from speculation and manipulation, and thus, to ensure their efficiency and proper functioning. In the beginning of the 2000s, Bekaert and Harvey (2002) predicted that, despite gradual and relatively slow

development of emerging equity markets, they would make capital cheaper and more accessible for entrepreneurs as well as reduce the credit burden. Nevertheless, 15 years later, Bekaert and Harvey (2017) argue that emerging equity markets remain underdeveloped and weakly integrated in world capital markets, and hence, the scholars encourage investors to pay careful attention to the high risks associated with such markets and note that these destinations are not as attractive as they might seem.

Banks, contrariwise, possess an advantageous expertise in the screening and monitoring of their potential borrowers, hence, they might be relatively more willing to deal with developing countries' entrepreneurs compared to venture capitalists (Sackett & Shaffer, 2006). Additionally, Liang and Reichert (2012) warn entrepreneurs not to rely on non-bank financial institutions, since they are less regulated and more vulnerable to financial crises as opposed to banks. Therefore, the scope of this paper is exclusively on banks and the competition among them.

The nature of (bank) competition in developing countries

Cook (2002) describes the nature of competition in most of the developing countries as problematic and highly neglected by policy makers. The scholar claims that, despite a wide implementation of economic liberalization reforms, large enterprises in various sectors (incl. banking sector) keep extensive control over the market. Corporations of big sizes are protected by governments by the means of limiting the competition in their industries (e.g. anti-dumping measures[2]), while big banks in times of financial difficulties are bailed out with "too-big-to-fail" subsidies (Cook, 2002; Soedarmono et al., 2013). As a result, a lack of policy makers' understanding of the importance of promoting competition leads to the abuse of privileges by large firms and banks who end up having too much control over the market processes (e.g. ease of entry, price setting, collateral requirements, etc.). Consequently, the market becomes of monopolistic nature or, at best, oligopolistic when several big players in the sector exploit their power (Baliamoune-Lutz et al., 2011; Cook, 2002; Leon, 2015). Therefore, a group of scholars stresses the importance of healthy competition for development of productive entrepreneurship and prosperity of developing countries as a whole (Akins et al., 2016; Baliamoune-Lutz et al., 2011).

Information hypothesis and market power view

The two building blocks of Leon (2015)'s theoretical framework are *information* and *market power* hypotheses that offer opposing views on the role of bank competition in alleviating credit constraints.

[2] *Measures that are imposed by a country that "ensure fair competition by punishing foreign firms that sell their products at "unfair" low prices in the host market" (Mankiw & Swagel, 2005).*

On the one hand, the supporters of *market power view*, which is also known as *structure-performance hypothesis*, claim that credit availability is limited in highly concentrated markets (Besanko & Thakor, 1992). Thereby, it is highly important to increase bank competition to ensure better access to credit for entrepreneurs at lower lending rates (Ryan, O'Toole, & McCann, 2014). As such, Black and Strahan (2002), on the example of the US's banking sector reform of 1970s, have shown that an increase in competition in the banking sector has facilitated entrepreneurship in other sectors. Specifically, the researchers found that prospective entrepreneurs found it easier to access credit which has, in turn, increased the rate of new incorporations.

On the other hand, the *information hypothesis* states that there are potentially positive effects of bank concentration. Especially, the leading banks that have high market shares are willing to lend money to new or young firms without being scared of losing the "competition game" and going bankrupt as they are reassured that they will be protected from the entrance of new banks (Petersen & Rajan, 1995). In line with this reasoning, Bonaccorsi di Patti and Dell'Ariccia (2001) found that bank concentration is favorable for firms in "opaque"[3] industries, since during intense competition between banks no one would dare to lend them money.

Consequently, Leon (2015) claims that if the findings indicate that bank competition does not alleviate credit constraints but only worsens them, this would endorse the *information hypothesis*. However, if the opposite is the case, and bank competition relaxes credit constraints, the *market power view* would be confirmed instead.

Competition-stability and competition-fragility hypotheses

Nevertheless, the *market power* and *information* hypotheses are not the only theoretical arguments addressing credit constrained firms as well as the role of bank competition in this problem. Thereby, there are two more hypotheses, namely, *competition-stability* and *competition-fragility,* that explain how bank competition impacts the access of credit as well as the role risk plays in this relationship.

Specifically, scholars who are in favour of the *competition-stability hypothesis* support bank competition. They argue that when the bank sector is highly concentrated, banks take more risk and abuse their power by charging higher interest rates which makes it harder for borrowers to meet credit obligations in time (Berger, Klapper, & Turk-Ariss, 2009). As a result, similar to the well-known

[3] *Bonaccorsi di Patti and Dell'Ariccia (2001) define "opaque" industries as the ones for which "external lenders are unable to adequately perform the monitoring of entrepreneurial activities" due to information asymmetries.*

"market for lemons" of Akerlof (1978), banks are left out with a riskier set of borrowers. To prevent such a "snowball"[4] spread of risk-taking in the economy, it is important to preserve bank competition forcing banks to charge lower interest rates in order to keep up with rivals and "stay in the game". To sum up, bank competition lowers cost of borrowing for businesses, and thus alleviates credit access (Boyd & De Nicolo, 2005). Indeed, Uhde and Heimeshoff (2009) found support for competition-stability hypothesis by examining the less developed countries: they have determined that bank concentration makes the banking system unstable and too risk-loving which has numerous negative consequences on potential borrowers.

Contrarily, *competition-fragility hypothesis* claims that, in times of bank competition, banks experience lower returns because, instead of acquiring monopoly rents, they have to charge their borrowers lower interest rates (Fu, Lin, & Molyneux, 2014) Hence, to achieve higher profits despite the active competition, banks engage in high-risk activities (e.g. invest in projects that have high likelihood to fail) that offer sizable risk-premium (Berger et al., 2009). Thus, in order to prevent such imprudent behaviour, the hypothesis advises to keep banks concentrated at the expense of higher interest rates and selective granting of credit.

Similar to the logic that Leon (2015) followed, if the results indicate that bank competition alleviates credit constraints, the *competition-stability hypothesis* will be supported and, otherwise, the *competition-fragility hypothesis* will hold.

The role of crisis in bank competition and credit constraints

Since the main contribution of this paper is extending Leon (2015)'s research by including the after-crisis years in the analysis as well as focusing on crisis-years specifically, it is highly important to motivate why the crisis could have intervened in the relationship between bank competition and credit constraints.

Soedarmono et al. (2013) claim that financial crises belong to a critical dimension that cannot be overlooked while studying bank competition and the effects it has on credit constraints. The scholars argue that financial crises trigger the implementation of banking reforms and other policies that result in unintended negative consequences for borrowers. Specifically, the banking system as a whole is expected to get more fragile and vulnerable as a result of any macroeconomic shock (incl. financial crisis) which would lead to difficulties associated with accessing credit (Demirgüç-Kunt & Detragiache, 2005). Soedarmono et al. (2013) predict that a crisis brings back bank concentration since the government bails out and saves only those banks that are big enough and relatively more important to

[4] *Cambridge Dictionary (n.d.) defines a "snowball" effect as a "situation in which something increases in size or importance at a faster and faster rate".*

the economy. Similar to the *market power view,* this will result in a lower access to credit. The scholars also note that governments that are unable to act as "lender of last resort" to banks due to insufficient national savings will be an exception to the above-mentioned predictions, since banks in their countries will have to remain competitive to survive, which will leave credit access relatively less affected. When it comes to on how crisis, through decreased bank competition, actually affects the credit supply, there exist opposing empirical results (Akins et al., 2016; Paulet et al., 2014).

On the one hand, in line with Soedarmono et al. (2013)'s predictions, Garicano and Steinwender (2015) found evidence for significant decreases in the credit supply associated with the banking crisis that resulted from the Financial Crisis of 2008. Paulet et al. (2014) have also determined that, as the crisis hits, banks become relatively more cautious and unwilling to lend as freely as in economically stable times. Additionally, Valverde, Fernández, and Udell (2012) indicated that SMEs were the ones who were hit the most by the crisis with a concentrated banking sector, which made them substantially credit-constrained.

On the other hand, Petersen & Rajan (1995) have claimed that, after any crisis, the environment in the banking sector becomes less competitive which makes survived banks more likely to finance credit-constrained firms even if deemed risky. Similarly, Akins et al. (2016) have found that the countries who could afford paying out "too-big-to-fail" subsidies to big banks, experience less competition in their banking sector provoking banks to engage in riskier behaviour which includes an increase in the supply of credit.

Consequently, given the wide range of both theoretical and empirical literature on the influence of crises on bank competition and credit access, it is necessary to include crisis as well as post-crisis years in the research performed by Leon (2015) to track the effects of bank competition throughout the period before, during and after the crisis. As a result, a relatively more complete overview of the effect of bank competition on credit access will be obtained which will increase the external validity of the findings further and allow for reliable policy implications. As for now, the majority of empirical findings have found that a crisis causes difficulties associated with credit access for entrepreneurs since it distorts bank competition and might have long-lasting effects for the years after the crisis. Hence, the crisis might have had a relatively more pronounced effect on the whole relationship between bank competition and credit constraints than the one studied by Leon (2015); thus, the following hypothesis will be tested: *Bank competition does not alleviate credit constraints in developing countries during the years 2006 – 2019*. If no effect is found, the null hypothesis stating that *bank competition does not affect credit constraints in developing countries over the period 2006 – 2019* will not be rejected. Additionally, the crisis dummy that was introduced by Leon (2015) will be improved by the crisis dummy generated by

FRED[5] in a way that does not limit the scope to only the Financial Crisis of 2008 but also considers national crises. This will contribute to a better observation of the bank competition's influence on credit constraints during the crisis-years specifically.

Data and Variables

Data

The data used in the research is highly extensive, heterogenous, and comes from a variety of sources. The uniqueness of the dataset lies in a combination of firm-level and country-level characteristics, which allows to study firms from developing countries all over the world accounting for specific qualities associated with the countries they are located in. The firm-level variables have been gathered from the World Bank's Enterprise Surveys[6]. The country-level variables that are used in the research have also been gathered from the World Bank, however, from various datasets: to name a few, Global Financial Development Database, World Development Indicators, etc. In order to indicate the persistence of results, several robustness checks had to be run. The variables necessary to execute those robustness checks have been gathered from databases like the Heritage Foundation, the unique database constructed by Claessens and van Horen (2015), etc. In order to extend Leon (2015)'s research and include the years after the crisis, 2012 – 2019 (incl. 2010), it is first necessary to replicate the research of Leon (2015) by using only his data for the years 2006 – 2011 (excl. 2010). Overall, the research is done by combining two datasets, which, for simplicity, will be hereafter called the "Old Dataset 2006 – 2011" (Leon (2015)'s replicated data) and the "New Dataset 2010 – 2019" (includes after-crisis years) which, when merged together, will be referred to as the "Combined Dataset 2006 – 2019". Notably, it has been decided to first construct the datasets separately and merge them afterwards, since, first of all, only the "Old Dataset 2006 – 2011" is needed for replicating Leon (2015)'s results. Secondly, it is interesting to see the dynamics and if there are any changes in the summary statistics between datasets. Thirdly, the World Bank keeps updating its questionnaire manuals, the ways interviews are conducted, and how the datasets are constructed, thus, earlier datasets quite often differ in structure from the recent datasets. The detailed description of the variables present in the datasets can be found in Appendix – Table 5. In order to see for which countries the data has been gathered in the "Old Dataset 2006 – 2011" as well as the "New Dataset 2010 – 2019" refer to Tables 6 and 7 respectively in the Appendix.

In order to assemble the firm-level part for both the "Old Dataset 2006 – 2011" and the "New Dataset 2010 – 2019", first, individual enterprise surveys' full reports have been gathered for 69

[5] *Federal Reserve Bank of St. Louis | https://fred.stlouisfed.org/*
[6] *Enterprise Analysis Unit - World Bank Group https://www.enterprisesurveys.org*

countries that Leon (2015) has used. Since the firms in 69 countries all have been surveyed at different points of time, despite the fact that the World Bank has a general questionnaire manual that usually applies to most of the surveys, some necessary adjustments in the data had to be made before the merging. For instance, some questionnaires were reported in a different language (e.g. Ecuador 2010, Rwanda 2006, etc.) or questions had different names and labels despite the same content (most of the datasets for 2006). Hence, after extensive cleaning and adjusting of the concerned questions, surveys for countries have been merged together. In total, new information on the firm-level is available for 63 out of 69 Leon (2015)'s countries. There has been no update for the following countries: Brazil, Gabon, Iraq, Mauritius, South Africa, and Sri Lanka. Notably, there is no publicly available reason offered by the World Bank for missing updates on these six countries, thus, it will be treated as random. Once the firm-level datasets were ready, country-level variables were added. One of the final steps in the "New Dataset 2010 – 2019" was, following Leon (2015), the exclusion of firms that had more than 1,000 employees since they can no longer be categorized as SMEs (Robson & Gallagher, 1993). Leon (2015) believes that it is easier for relatively larger firms to access other credit institutions (e.g. equity markets), and, thus, having limited access to bank credit will not be as big of a problem as for SMEs that have less than 1,000 employees.

Additionally, Leon (2015) has mentioned that when an interviewer did not believe in the reliability of the observations they have also been excluded. The World Bank's Enterprise Surveys provide three possible options to an interviewer for question a16 the "reliability of the received information": "truthful", "somewhat truthful" and "not truthful". Leon (2015) did not specify whether he excluded "somewhat truthful" or not, however, it has been decided to include it in the sample. For instance, Leon (2015) had 490 firms in the sample for Mali 2007. While gathering the data for Mali 2007, 490 firms remain after combining both "truthful" as well as "somewhat truthful" responses which justifies the inclusion of both responses. Moreover, it is important to mention that for some of the 2010 datasets, the variable a16 was not available, but the closest alternative a17, namely, the "reliability of the estimates presented in the dataset"[7] has been used instead. Finally, in some datasets (e.g. Rwanda, Uganda, etc.) neither a16 nor a17 were present for the whole dataset, thus, following the steps of Leon (2015), total of 22,363 firms had to be fully excluded from the research.

In total, the "Old Dataset 2006 – 2011" has a maximum of 31,236 firms which is more than Leon (2015)'s 28,642. The reason for a bigger sample while replicating Leon (2015)'s results, is that Leon (2015) has excluded every firm that had missing information on at least one firm-level or country-

[7] *Instead of a16's options "truthful", "somewhat truthful", and "not truthful", a17 offers the following options to an interviewer: "estimates are taken directly from the establishment", "estimates are computed with some precision", and "estimates are arbitrary and unreliable numbers". Thus, firms that that had the third option assigned to them were excluded from the research.*

level control from his research. However, it has not been done in the current research, since, by adjusting models and specifications, it was possible to use firms even if they had some missing data. Moreover, some countries did not have information on one specific variable for all of the firms which would lead to an exclusion of the whole country, and hence their exclusion has been avoided. In the summary statistics presented in Appendix – Table 2 it can be clearly seen that the data is kept unbalanced with the number of observations varying per variable. Additionally, some firms responded with "don't know", "refused to answer", "does not apply" and other similar answers that have been labelled by the World Bank as "–9", "–8", and "–7" respectively and not as missing information. However, Leon (2015) does not specify if he treated such responses as missing data. Therefore, there is a chance that the scholar has overlooked these values which, in turn, possibly created a bias by putting a downward pressure on the coefficients of Leon (2015)'s research, especially concerning numeric variables (e.g. experience of the top manager on the board in years, share of products exported abroad, etc.). Negative numbers cannot be considered as real answers to the following questions, since it is impossible to have a negative experience at the job nor it is possible to sell a negative amount of goods abroad. To prevent such problems from occurring in the replicated sample as well as during the construction of the "Combined Dataset", such responses have been treated as missing. In the "New Dataset 2010 – 2019", which is also kept unbalanced, the maximum number of firms available is 56,694. Tables 1, 2, 3, and 4 in Appendix provide summary statistics on the variables reported by Leon (2015), derived from the "Old Dataset 2006 – 2011", the "New Dataset 2010 – 2019" as well as the "Combined Dataset 2006 – 2019" accordingly while Tables 6 and 7 offer the extensive report on the information gathered per country for the key variables of the "Old Dataset 2006 – 2011" and the "New Dataset 2010 – 2019" respectively. In the latter tables the reasons why some datasets had to be omitted are also presented. To sum up, for the years studied by Leon (2015), the "Old Dataset 2006 – 2011" includes 58 countries instead of 69, while the "New Dataset 2010 – 2019" contains information on 63 countries out of 69.

Variables

Dependent Variables

In order to identify and then study the credit constrained firms and the effect that intensified bank competition has on removing the obstacles associated with getting a loan, Leon (2015) has used four key independent variables that were constructed from combining questions from the Enterprise Surveys. By following the steps that Leon (2015) has outlined in his paper, the same four variables have been constructed for the "Old Dataset" and the "New Dataset". Thorough description of the variables can be found in Appendix – Table 5, while the summary statistics is presented in Appendix Tables 1 (Leon (2015)'s data), Table 2 (the "Old Dataset"), Table 3 (the "New Dataset"), and Table 4 (the

"Combined Dataset"). Finally, per country averages can be found in Appendix Table 6 for the "Old Dataset" and in Table 7 for the "New Dataset".

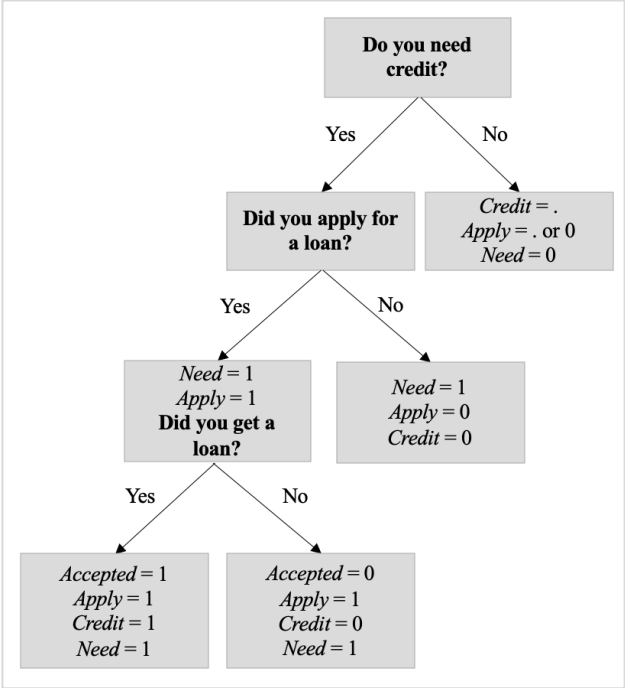
First of all, the variable *Apply* is created by using the question *k16* from the World Bank's Enterprise Surveys[8]. It is a dummy variable which equals one if a firm has applied for a loan in the last year and zero otherwise. This allows to separate the firms into applicants and non-applicants and move forward by studying these two categories. Among applicants, the variable *Accepted* is created which is also a dummy variable that amounts to one when at least one of the applications has been accepted and some credit has been granted, and zero otherwise. Respondents of the Enterprise Survey had an option to specify whether a credit application has been accepted in part or in full, and Leon (2015) has assigned the value of one for an *Accepted* variable for both responses. It was also vitally important to Leon (2015) to determine whether firms had a need for credit before applying, since the logic that if a firm did not apply for credit, then it did not have a need for credit does not hold. As such, in the Enterprise Surveys, an open-ended question *k17* has been asked to non-applicants to determine the reason for not applying for a loan. Thereby, a dummy variable *Need* corresponds to zero for "non-borrowers": the firms who have claimed that their establishment had sufficient funds and, thus, there was "no need for a loan". If any other reason was offered (e.g. complex application process), *Need* takes a value of one and such firms are labelled as "discouraged borrowers". Additionally, firms who did apply for a loan regardless of the outcome of their applications are assumed as having a need for credit, and hence, *Need* equal to one is assigned. Finally, Leon (2015) wanted to group firms that were "discouraged" from applying for credit together with the "denied" ones (who applied, but all of their applications has been turned down) and create a broad category of "credit constrained" firms[9]. This has been performed by creating the dummy variable *Credit* turning into one if the firm had a need for credit and has been granted with a loan. *Credit* equals to zero if a firm applied but was rejected or did not apply but had a need for a loan. Importantly, as seen in Tables 6 and 7 in Appendix, for some countries, the Enterprise Surveys did not always have necessary variables that would allow to construct the variable *Accepted* which also affects the creation of the variable *Need*. For example, Poland in 2009 (according to Table 7) did not have information on how many borrowers actually received credit after applying for it, which makes the average of *Credit* equal to zero since *Credit* would be one only if a firm had a need for credit and had an application for it accepted. However, these firms will not be omitted: the *Credit* cannot be constructed only from firms who have information on the acceptance rate, since then, *Credit* would take

[8] *The detailed description, source, and some information on the extraction from the database for this variable and all other variables can be found in Appendix – Table 4.*

[9] *The paper, just as Leon (2015)'s research, considers firms as credit constrained only if they had a need for credit but were not granted with it or decided not to apply for various reasons. If a different loan amount is granted than requested to a firm, such a firm is not considered as financially constrained, which can be viewed as a limitation of the paper.*

a value of zero only if the application was rejected and not in cases when firms had a need for financing but were discouraged to apply. Consequently, the lack of observations for certain firms on the acceptance rates can be considered as a data limitation. In order to visualize the process of composing the four dependent variables, please refer to Figure 1 below.

Figure 1: Construction of four dependent variables



Source: Enterprise Analysis Unit - World Bank Group

Detailed summary statistics for the "Old Dataset 2006 – 2011", the "New Dataset 2010 – 2019" as well as the "Combined Dataset 2006 – 2019" can be found in Appendix – Table 2, Table 3 and Table 4 accordingly, while the selected summary statistics for only the dependent variables is presented in Table 1 below.

Leon (2015) in his summary statistics, which can be found in Appendix – Table 1, reported that 62.9% of firms needed a loan. Similarly, according to the "Old Dataset 2006 – 2011", 62.6% of firms needed a credit in the years 2006 – 2011 (excl. 2010). With regards to the "New Dataset 2010 – 2019", the need for credit has decreased and in the years after the crisis, 54.5% of firms had a need for bank credit. Notably, the statistics on access to credit per individual country, which can be found in Appendix - Table 7, signals that firms in some countries experienced a much larger need for credit: as such, 83.45% of SMEs had a need for credit in Gambia (num. 22) in 2018, while 85.95% of those have either been rejected or discouraged from applying for needed financing.

Table 1: Summary statistics for dependent variables for the "Old Dataset 2006 - 2011" and the "New Dataset 2010 - 2019".

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
"Old Dataset 2006 – 2011":					
Dependent variables:					
Need	30,870	0.626	0.484	0	1
Credit	12,465	0.339	0.473	0	1
Apply	19,393	0.595	0.491	0	1
Accepted	4,781	0.883	0.321	0	1
"New Dataset 2010 – 2019":					
Dependent variables:					
Need	54,668	0.545	0.498	0	1
Credit	25,317	0.409	0.492	0	1
Apply	30,395	0.519	0.500	0	1
Accepted	11,283	0.917	0.275	0	1

Source: Enterprise Analysis Unit - World Bank Group

Coming back to the full sample overview, Leon (2015) has claimed that for only 57.8% of those who needed credit have applied for it. Similarly, both in the "Old Dataset 2006 – 2011" and the "New Dataset 2010 – 2019" not all who had a need for a loan actually sent an application: only 59.5% and 51.9% respectively. Among the ones who have actually applied, Leon (2015) reported quite a high loans' acceptance rate: 85%. The "Old Dataset 2006 – 2011" report a little higher number, specifically, 88.3%. Interestingly, over the years, the acceptance rate has increased substantially and now constitutes nearly 92%. On the one hand, there is a possibility that the banks have developed a skill to effectively and efficiently monitor the borrowers and became more willing to grant them credit. On the other hand, such a high loan-approval rate during after-crisis years could signal increased risk-taking of banks who have been saved by the government during the crisis (Berger et al., 2009).

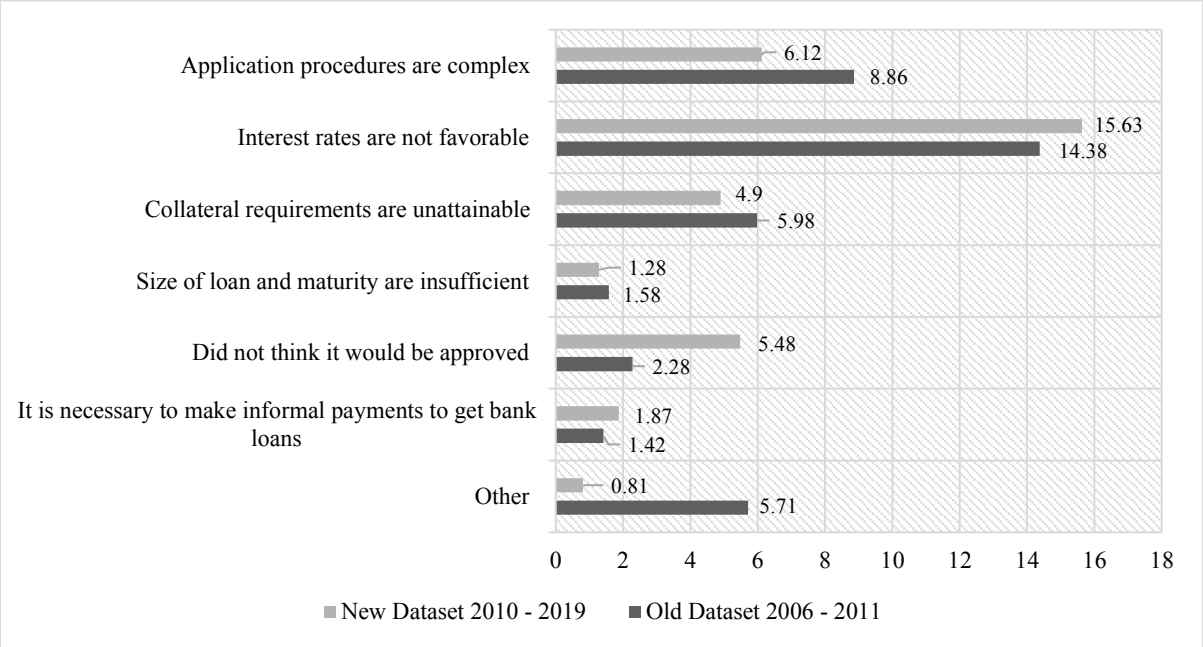
Additionally, it is vitally important to discuss credit constrained borrowers: they are the ones who needed a loan and either applied but got rejected or the ones who did not apply for various reasons. In Leon (2015)'s sample there are 50.9% of credit constrained firms, which is lower than 66% of firms from the "Old Dataset 2006 – 2011". Nevertheless, both values signal that during 2006 – 2011 (excl. 2010) years, a substantial number of firms have been credit constrained. Regarding the "New Dataset 2010 – 2019", the share of credit constrained firms has decreased overtime, however, it remains quite sizable at around 59%. In the after-crisis years, not much has changed and firms in developing countries keep experiencing obstacles while accessing credit. As such, the "Combined Dataset 2006 – 2019" reports in Appendix – Table 4 that over 13 years, on average, 61.4% of firms in the developing world remain credit-constrained.

On top of that, it is worth investigating the main reasons given by credit constrained firms in both the "Old Dataset 2006 – 2011" and the "New 2010 – 2019" samples for not applying for credit. For the "Old Dataset 2006 – 2011" out of 19,335 registered responses for question *k17* that asked for the main reason for not applying for a loan, the majority of respondents, 59.79% of firms, have claimed that they had sufficient capital, and, hence, had no need for a loan. Similarly, in the "New Dataset 2010 – 2019" out of 38,885 firms, 63.91% had no need for credit. Nevertheless, a closer look into the reasons provided by the remaining respondents in the both samples is worth taking, what turned some of the firms into discouraged borrowers? Figure 2 depicts the main reasons offered by credit constrained firms who had a need for credit but refused to apply for it and the percentage of the firms who have chosen a particular answer. The responses of the firms from the "Old Dataset 2006 – 2011" and the "New Dataset 2010 – 2019" are presented in dark grey and light grey respectively. Interestingly, for both the "Old Dataset 2006 – 2011" as well as the "New Dataset 2010 – 2019", the highest portion of firms, that is 14.38% and 15.63% respectively, has indicated unfavourable interest rates as the main reason for not applying for a loan. This signals that the problem of banks charging SMEs relatively higher interest rates, in order to offset the screening and monitoring costs discussed by Banerjee and Duflo (2011), does indeed take place in developing countries and, in turn, discourages prospective borrowers to apply for a loan.

Moreover, there is an upward trend that can be observed over the years which signals that high interest rates constitute a big problem in the developing world that is yet to be solved. Boyd and deNicolo (2005), the supporters of *competition-stability hypothesis*, have claimed that high interest rates will remain a persistent problem unless the market power of individual banks will be reduced which will allow bank competition to intensify. The second most answered option in the both samples highlights the difficulties that potential borrowers experience during the application process: 8.86% for the "Old Database 2006 – 2011" and 6.12% for the "New Dataset 2010 – 2019". Probably, if the application procedures were made more understandable for an average citizen and if they were clearly defined in steps, more loan applicants would be observed. Collateral requirements also remain quite a serious problem over the years and make the obstacles associated with applying for a loan more severe.

A handful of firms in both the "Old Dataset 2006 – 2011" and the "New Dataset 2010 – 2019" (1.42% and 1.87%) have indicated that they did not apply for loans because they had to make informal payments. Coupled with an observed upward trend over the years, this suggests that corruption remains a huge problem in the developing world since it disseminates its consequences to various sectors with the banking one not being an exception.

Figure 2: Credit-constrained firms' reason for not applying for a loan



Source: Enterprise Analysis Unit - World Bank Group

Independent variables: measures of competition

In order to thoroughly study the impact that bank competition has on credit constraints, Leon (2015) follows the advice of Degryse, Kim, and Ongena (2009) and uses several measures of bank competition that all capture distinct characteristics and effects of competition. Specifically, Leon (2015) includes in his research the share of assets held by three largest banks which is known as Concentration Ratio (hereafter, *CR3*), *Boone indicator* that captures the dynamism of markets, *Lerner Index* that analyses the relatively static setting of the markets, and Panzar-Rosse *H-statistics*. All four indicators have been gathered from the World Bank's Global Financial Development Database[10] and are described in detail later. Additionally, just as Leon (2015) did, all the country-level variables including the main independent variables have been lagged. Thus, if the Enterprise Survey offers the data for Uganda in 2013; *CR3, Lerner Index, Boone Indicator*, *H-statistics* as well as other country-level control variables are gathered for 2012. The summary statistics for independent variables only can be found in Table 2 below:

[10] *Global Financial Development Database (GFDD), The World Bank*

Table 2: Summary statistics for independent variables for the "Old Dataset 2006 - 2011" and the "New Dataset 2010 - 2019".

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
"Old Dataset 2006 – 2011":					
CR3	57	62.24	18.98	21.59	100
Boone Indicator	58	-0.00666	0.844	-1.759	8.659
Lerner Index	55	0.262	0.0875	-0.00202	0.595
H-statistics	1	-	-	-	-
"New Dataset 2010 – 2019":					
CR3	72	54.45	19.14	26.93	100
Boone Indicator	53	-0.0328	0.598	-1.563	6.497
Lerner Index	46	0.252	0.141	-0.00258	1.020
H-statistics	34	0.636	0.178	0.189	0.920

Source: Global Financial Development Database (GFDD), The World Bank

First of all, *CR3* which is defined by the World Bank as the "share of assets held by three largest banks as percent of total assets" has been extracted from the World Bank's Global Financial Development Database just as Leon (2015) did. However, some of the values reported by Leon (2015) do not match the values found in the World Bank database five years after his research. Leon (2015) reports the *CR3*'s value of 56% for Kazakhstan in 2008, while, as it can be seen in Appendix - Table 6, the available value in the World Bank is 62.77%. Most likely, the World Bank has re-calculated some of the coefficients using improved methods which resulted in deviating numbers, since, during the data extraction, it is written that the data was update for the last time in 2019. Nevertheless, the mean for *CR3* of approximately 62% determined by using the "Old Dataset" does not diverge substantially from the reported by Leon (2015)'s mean of 65%. In the "New Dataset" the average share of assets held by top-three banks in a country has decreased and became around 54.5% which indicates that the "key" banks have lost their market power over the years and this might be due to intensified bank competition.

Secondly, Leon (2015) uses the *Boone indicator* which indicates that in more competitive markets, the most efficient establishments gain the most in profits and efficiency (Boone, 2008). Thereby, when using the *Boone* indicator in the banking sector, the bank's market power is calculated by the elasticity of profits to marginal cost and the lower the resulting *Boone Indicator* is, the higher the degree of competition (Maino, Massara, Saiz, Sharma, & Sy, 2019). Considering the Table 7 in the Appendix which offers an overview for interbank competition including the *Boone Indicator* per individual countries from the "New Dataset 2010 – 2019", the outliers are Belarus (num. 6) in 2013 which reports having a perfectly competitive banking sector with a value of –1.56 as well as Slovenia which signals the opposite: extremely concentrated market with the value of 6.50. Referring to summary statistics for the "Old Database 2006 – 2011" in Table 2 above, the mean value of *Boone indicator* of –0.0067 is negative but is highly close to zero and describes that, on average, bank competition in developing countries is limited. Interestingly, Leon (2015)'s mean of *Boone indicator* is higher than in the "Old Dataset 2006 – 2011": 0.090, which is a sign that there was even less bank competition in

developing countries than recently gathered data presents. However, according to the World Bank, the last updates on *Boone Indicator*'s values have been performed the 30th of October in 2019, hence, the data that is now available in the Global Financial Development Database will be considered as relatively more reliable. The one could expect that overtime competition intensifies, indeed, the mean of *Boone Indicator* in the "New Dataset 2010 – 2019" remains negative and decreases further to –0.033 signalling a movement towards competitive banking sector. Thus, by considering only the *Boone* Indicator, the predictions of Akins et al. (2016) regarding a substantially reduced bank competition because of the crisis does not seem to hold, since bank competition in developing countries seems to rise in the years after the crisis. Despite the fact that Leon (2015) stressed how the *Boone Indicator* captures both the dynamic effects of weakened entry barriers as well as competitive practices of the firms, the main disadvantage of the indicator is that it focuses too much on efficiency gains and profits that arise due to competition. In reality, this is not the only relationship that competition affects, and hence, inclusion of more indices will allow to get a clearer understanding of bank competition's effects also on credit constraints.

Third, Leon (2015) uses the *Lerner index* since it "captures the extent to which banks can maintain a price level above their own marginal costs" and, similarly to *CR3*, it can be used as a measure of a bank's market power. In existing research, the *Lerner index* has been calculated by taking a mark-up of prices over marginal costs (Jiménez, Lopez, & Saurina, 2013). The lower the bank competition is, the higher the *Lerner index* will be (Jiménez et al., 2013). Leon (2015) reported a mean of 0.25 for the *Lerner index* in his research, which is quite close to the mean of 0.26 calculated based on the data from the "Old Dataset 2006 – 2011". Both of the values signal some market power of banks. However, the values are quite far from the value of one which would indicate extreme market power. Notably, during the after-crisis years, the average *Lerner index*, generally, has decreased but remained similar to the above-mentioned means and, based on Table 2 present earlier in the sub-section, takes a value of 0.25. Here, a slight downward trend of the *Lerner index* can be viewed as contradictory to Soedarmono et al. (2013)'s anticipation of lowered competition as a consequence of the crisis.

Finally, Leon (2015) uses Panzar-Rosse *H-statistics* which is the "elasticity of bank revenues relative to input prices" and can also be used to assess the nature of bank competition in a country. *H-statistics* being less or equal to zero is a signal of bank collusion and oligopoly when the largest banks have the control of the market. Normally, the one would want *H-statistics* to equal one since this would indicate that there is a sufficient level of competition in the market, however, it is believed that this can only happen in the long-run (Shaffer, 2004). In cases when *H-statistics* lies between zero and one, banks operate under monopolistic competition (Panzar & Rosse, 1987). Claessens and Laeven (2004) claim that *H-statistics* is an appropriate measure for comparing bank competition among various countries. Despite the fact that Leon (2015) argues that *H-statistics* was available for his sample for 35 out of 69

countries, the World Bank's Global Financial Development Database has a value only for Sri Lanka out of 69 countries for corresponding years, thus, in Table 2 *H-statistics* row is kept empty since presenting information on one country is not representative of the whole sample. However, *H-statistics* was available for 33 countries at least for one of the after-crisis years which made it possible to use this indicator in the "Combined Dataset 2006 – 2019". As such, Leon (2015) reported *H-statistics* mean of 0.650 for 2006 – 2011 (excl. 2010) which signals that monopolistic competition has dominated the banking sector of developing countries. After the crisis has occurred, the *H-statistics* has decreased to 0.636, according to the "New Dataset 2010 – 2019", meaning that a shift from perfect competition has occurred towards the oligopoly setting, but, in general, it has remained within the boundaries of monopolistic competition. Notably, the summary statistics presented in Appendix – Table 4 for the "Combined Dataset" has a mean of 0.633 which is calculated based on Sri Lanka 2011 combined with the data from the "New Dataset".

Control variables

In his research, Leon (2015) has included 14 firm-level control variables and 7 country-level control variables and made sure that all firms in the sample have information on all of the 21 control-variables. This sub-section offers an overview of the control variables, while the extensive description of all the variables together with sources and the way of construction can be found in Appendix – Table 5. Summary statistics for control variables is presented in Appendix Tables 2 and 3 for the "Old Dataset 2006 – 2011" and the "New Dataset 2010 – 2019" respectively.

First of all, Leon (2015) controls for the *Firm Size* that is measured by the number of permanent full-time employees. This variable is also necessary in order to identify SMEs that have 1,000 or less employees. Afterwards, controlling for *Firm Age* is essential since it allows to identify the firms that might need credit the most (Iyer, Peydró, da-Rocha-Lopes, & Schoar, 2014). For instance, Cole and Mehran (2018) have determined that relatively younger firms have a higher need for financing since they have not yet formed a sufficient capital base that would allow them to operate independently and without credit obligations. Notably, average firm age varies between 16-18 across the samples with the lowest being reported by Leon (2015) and the highest by the "New Dataset 2010 – 2019". Notably, Enterprise Surveys allow to start calculating *Firm Age* from either the beginning of operations of the firm or from the official registration. The two dates are not always the same and sometimes can be separated by a ten-year span. Thus, it has been decided to construct *Firm Age* using date of the beginning of operations, since, according to Bennett (2009), many firms in developing countries prefer to operate informally in order to avoid paying high registration fees. Additionally, by being informally registered, firms minimize the costs they would have to bear in case of bankruptcy which would not be possible

had the firm formally registered (Woodruff, de Mel, & McKenzie, 2013). Thus, in the developing world setting, the date of the beginning of operations would be the most reliable indicator of the *Firm Age*.

Additionally, Leon (2015) controls for different firm characteristics to see whether, for example, the firms that have a top manager who is more experienced in the sector (*Experience*) can access the credit relatively easier or not. Thereby, various firm-characteristics that potentially can contribute to a higher likelihood of a firm being granted with a loan include having financial statements certified by an independent auditor (*Audited)*, a firm being owned by a foreign corporation (*Foreign-owned*), by the government (*State-owned*) or is being a part of a larger firm (*Subsidiary*). Moreover, in order to further analyse the ownership structure of the firm, share of assets held by the largest owner(s) is included (*Largest Owner*). To assess whether a firm has relatively more potential to sustain itself financially, the attention is paid to whether a firm has its shares publicly traded (*Publicly Listed*) or not *(Privately Listed*) and whether a firm is an exporter or not (*Exporter*). Regarding the *Exporter* control, Leon (2015) did not specify how the variable has precisely been constructed while the Enterprise Surveys make a distinction between firms that are exporting directly and the ones who export indirectly through an intermediary. Given the fact that firms that use a third-party to sell their products abroad are still considered as exporters (Ahn, Khandelwal, & Wei, 2011), both direct and indirect exporters have been used to create an *Exporter* variable which is a dummy and takes a value of one if 10% or more of a firm's sales are being exported and zero otherwise. In order to investigate the willingness of a firm to invest, information on whether a firm sent an application to obtain a construction permit or not in the past two years has also been extracted from the Enterprise Surveys (*Construction*).

Despite the fact that some firm characteristics might put a firm into a more favourable position relative to other firms, there are additional difficulties that might hamper its financial well-being. For instance, the variable *Obstacles* captures an extent to which uneducated workforce is an obstacle for a firm on a Likert scale. The values vary from zero to four, ranging from the absence of such an obstacle to it being very severe respectively. According to Leon (2015) (summary statistics presented in Appendix – Table 1), variable *Obstacles* was, on average, 1.51, and hence, lied in between a minor and a moderate obstacle. Similarly, the "Old Dataset 2006 – 2011" offers an average of 1.59, while the "New Dataset 2010 – 2019" signals some improvement since the value decreased to 1.44. Finally, to examine whether a firm might need credit in order to finance working capital, the share of sales being paid after delivery by the customers has been included among other controls (*WK*).

According to Leon (2015), various country-specific characteristics might have a substantial influence on access to credit of SMEs as well as on interbank competition. As such, in order to capture the *Financial Development* of a certain developing economy, a share of domestic credit to private sector relative to GDP has been included. Furthermore, such essential characteristics as *GDP per capita* and

Inflation could not be overlooked when constructing a database from so many heterogenous countries. For example, Clarke, Cull, and Martínez Pería (2006) have also controlled for *GDP per capita* to assess market opportunities across countries, while Leon (2015) has included *Inflation* as well as real growth of GDP labelled as *Growth* to address the stability of each individual economy at a macro level.

Baliamoune-Lutz et al. (2011) have stressed in their paper the important role that well-developed juridical institutes as well as credit information that is accessible to both borrowers and lenders play in eradicating credit constraints. Therefore, Leon (2015) included strength of *Legal Rights* and depth of *Credit Information* to evaluate differences across countries regarding the access to finance and their competition. *Credit Information* is an index that ranges from 0 to 6 and, according to the World Bank, captures the "coverage, scope and accessibility of credit information available through public agencies or private credit bureaus"[11]. Higher values mean that extensive information is available for various interested parties. A lot of countries did not have information on *Credit Information* for the most recent years (e.g. Russia, Peru, Paraguay, etc.) which resulted in their elimination from calculating the baseline results and performing robustness checks, however, they still have been used at earlier stages of the research when these controls have not been yet introduced. However, the average score among the ones who have information in the "New Dataset 2010 – 2019" (Appendix – Table 3) is nearly 4 which signals the existence of quite some availability of credit information in developing countries. This score is higher than the average provided by Leon (2015) as well as the "Old Dataset 2006 – 2011": 3.2, which indicates that there is a positive trend and, over the years, more credit information became available to the public. Regarding the *Legal Rights*, the index varies from 0 to 10 and is defined in the Doing Business database as a "degree to which collateral and bankruptcy laws protect the rights of the borrowers and lenders". Similarly, the higher the index, the better the protection. A similar upward trend can be noticed with this index: the mean of 5.4 for *Legal Rights* for the "New Dataset 2010 – 2019" is higher than 5 and 5.2 in the "Old Dataset 2006 – 2011" and Leon (2015)'s summary statistics respectively.

Special attention has to be paid to the *Crisis* dummy that Leon (2015) used as a way to observe how Financial Crisis of 2008 have impacted bank competition and its effect on credit availability. The variable *Crisis (Leon)* has been constructed in the exact same was as Leon (2015) did and it equals one when firms of a certain country have been surveyed either in 2009 or 2011 and zero otherwise. However, variable *Crisis (Leon)* can overgeneralize the effect of the crisis since Leon (2015) has uniformly categorized countries as suffering from crisis simply by the year in which they have been surveyed. As an improvement to *Crisis (Leon)*, a dummy variable *Crisis (NBER*[12]*)* that has been

[11] *World Bank, Doing Business project | http://www.doingbusiness.org/*
[12] *National Bureau of Economic Research*

extracted form FRED[13] which equals one only if a certain country actually had suffered from a crisis in a certain year. Additionally, FRED also considers national crises and does not limit its focus on the financial crisis of 2008. For instance, Estonia, according to FRED did not have a crisis during the year 2009, while Leon (2015) has treated it otherwise. Moreover, FRED claims that Estonia has experienced a crisis in the years 2013 – 2015, outside of the scope of Leon (2015)'s research. Despite the fact that detailed crisis data is only available for 11 countries out of 69[14], *Crisis (NBER*) will be used in the research in order to compare its effect with the impact that *Crisis (Leon)* has on credit availability over the years. Furthermore, in order to take advantage of the uniquely constructed *Crisis (NBER)* variable, it will be used in an interaction term together with the *Competition* variable in order to observe the effect of bank competition on credit constraints directly during the crisis years (incl. the financial crisis of 2008 as well as other national crises).

Last but not least, Leon (2015) controls for *Institutional Development* which is also known as government effectiveness and defined by its creators Kaufmann, Kraay, and Mastruzzi (2011) as an index that ranges from –2.5 to 2.5 and incorporates "the perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies". The higher the index, the more effective the government is, the more developed the institutions are. Leon (2015)'s reported average of *Institutional Development* across samples countries is – 0.22 (in the "Old Dataset 2006 – 2011" the mean is – 0.19), over the years, the average *Institutional Development* did not become positive, but it did follow the upward trend and, according to the summary statistics on the "New Dataset 2010 – 2019", is of value – 0.09.

Finally, correlation tables for the key variables used in the research can be found in Appendix Tables 24.1 – 24.3. As it can be observed, the majority of correlations are weak, that is, lower or equal 30%, which allows to use the variables together in the model. Hence, the problem of multicollinearity does not seem to be present in the used dataset, since the correlations are below the cut-off of 80% (Studenmund, 2014). Notably, some of the correlations between dependent variables could not be obtained due to high interdependency between them (e.g. *Accepted* can only have values if *Apply* = 1). Additionally, *Credit* is highly correlated with *Apply* for similar reasons: whether *Credit* takes a value of zero or one depends on whether *Apply* is zero or one.

[13] *Federal Reserve Bank of St. Louis | https://fred.stlouisfed.org/*

[14] *Chile, Czech Republic, Estonia, Hungary, Mexico, Poland, Russia, Slovak Republic, Slovenia, Turkey, and South Africa.*

Methodology

The aim of this research is to investigate whether bank competition reduces credit constraints, where the latter ones are measured by a dummy variable *Credit* that, by definition, can only take values zero or one. Leon (2015) claimed that because of the binary nature of *Credit* variable, a binary model would be more applicable to test the relationship of interest. As such, the same specification as the one offered by Leon (2015) will be used to replicate the findings of the scholar as well as to offer an extension by checking whether the results hold during a longer time frame of 2006 – 2019:

$$(1)\ Probability\left(Credit_{fc} = 1 |\ Need_{fc} = 1\right) = \Phi(\alpha + \beta Competition_c + \mathrm{K}\boldsymbol{Firm - level}_{fc} + \mathrm{A}\boldsymbol{Country - level}_c)$$

Additionally, in order to closely study the effect of bank competition on credit availability, specifically during the crisis years, the following specification will be used:

$$\begin{aligned}(2)\ Probability\left(Credit_{fc} = 1 |\ Need_{fc} = 1\right) \\ = \Phi(\alpha + \beta Competition_c + \gamma Crisis(NBER)_c + \omega Competition_c \# Crisis(NBER)_c \\ + \mathrm{K}\boldsymbol{Firm - level}_{fc} + \mathrm{A}\boldsymbol{Country - level}_c)\end{aligned}$$

All of the datasets used in the research possess information on firms from various countries, hence, regardless of the specification, *f* stands for a firm while *c* refers to a country. Since there are 14 firm-level control variables and 7 country-level variables, they are indicated together as matrices of firm-level characteristics and country-level characteristics respectively. Notably, *Firm-level*$_{fc}$ controls (e.g. age of the firm, ownership of the firm, etc.) have both *f* and *c* present, while *Country-level*$_c$ (e.g. GDP per capita) have only *c* because those characteristics only differ per country. Referring back to Figure 1 that visualizes the process of constructing the dependent variables, *Credit*$_{fc}$ can take a value of one only if the firm *f* from country *c* initially had a need for credit. Hence, the specification above, with the help of the β coefficient, aims to determine how a unit change in *Competition*$_c$ affects the probability of a firm that has a need for credit actually being granted with a loan. The independent variable labelled as *Competition*$_c$ will be changed to *CR3*, *Boone Indicator*, *Lerner Index* or *H-statistics* depending on the model, but, generally, the coefficient of β, in the specification (1), will indicate the impact of competition on credit availability over the years.

Regarding the specification (2) that assesses the effect of bank competition on credit availability during the crisis years with the help of an interaction term, the ω coefficient attempts to answer the following question: How will the probability of firms that need credit (*Need*$_{fc}$ = 1) actually getting credit (*Credit*$_{fc}$ = 1) will change after a unit change in *Competition*$_c$? In addition to that, it is vitally important to capture the direct effects of the *Competition*$_c$ (β coefficient) and *Crisis (NBER)*$_c$ (γ coefficient) to

observe whether they change once an interaction term is added. Leon (2015), in his findings, has determined that, generally, competition alleviates credit constraints, while crisis, by itself, has no effect on credit availability. Hence, as a contribution to current research, it is worth investigating how competition influences access to credit during crisis-years which is done with the help of specification (2).

Notably, Leon (2015) uses the inverse of *CR3, Lerner Indicator, and Boone Index* in order to facilitate the interpretation of the results. Normally, higher *CR3* would signal the lower competition, however, when it is inversed, it will mean the opposite. However, the author did not elaborate on how exactly did he inverse the indices (e.g. were there any changes in scale, etc.), thus, in this research the original indices will be used. Hence, the interpretation of the coefficients will depend on the competition measure used in a certain model. Thereby, Table 3 presents how the coefficients have to be interpreted:

Table 3: Interpretation of competition coefficients

Name of the index	***Relationship with competition***	***When do market power view and competition-stability hypothesis hold?***	***When do information hypothesis and competition-fragility hypothesis hold?***
CR3	Negative	$\beta < 0$	$\beta > 0$
Boone Indicator	Negative	$\beta < 0$	$\beta > 0$
Lerner Index	Negative	$\beta < 0$	$\beta > 0$
H-statistics	Positive	$\beta > 0$	$\beta < 0$

Note: Interpretation is possible conditional on β being statistically significant.

If β is insignificant, regardless of index under consideration, it will signal that bank competition has no effect on credit availability and the null hypothesis will not be rejected.

According to the summary statistics of the "Combined Dataset 2006 – 2019" from Appendix – Table 4, some of the control variables have substantially less observations compared to the rest. Thereby, the models that aim to replicate Leon (2015) will introduce all the variables at the same time just like Leon (2015) did. However, it has been decided to gradually add variables from the "Combined Dataset 2006 – 2019" into models to construct the main extended results. First of all, no controls are included whatsoever in order to observe the model with the main dependent and independent variables only. Afterwards, all the firm-level variables are added. Next, the country-level variables are included with the exception of *Legal Rights* and *Credit Information*. It is necessary since only 139 out of 155 datasets have information on *Legal Rights* and *Credit Information* in the Doing Business database, which substantially reduces the sample size since all the firms from those datasets will have to be excluded from the "Combined Dataset 2006 – 2019" due to due missing data. Hence, in order to make use of those firms and analyse the coefficients for all but the two country-variables with them, they will

not be added together with other country-level characteristics. Overall, step-by-step addition of control variables is also necessary to trace the changes in explanatory power of the model which would allow to point out the differences between firm-level and country-level effects (Angrist & Pischke, 2015).

The choice of the econometric method has been directly affected by the information on credit availability that is present for firms in both the "Old Dataset 2006 – 2011" as well as the "Combined Dataset 2006 – 2019". As mentioned earlier, it is possible to determine whether credit is available to a certain firm or whether it has difficulties accessing it only if the firm has actual need for credit at the time it has been surveyed by the World Bank. According to the Appendix, in the "Old Dataset 2006 – 2011" and the "Combined Dataset 2006 – 2019", around 63% and 58% of firms respectively have a need for credit. While for the remaining firms who did not have a need for credit at the time that they were surveyed, it is unknown whether those firms would have been credit constrained had such need arisen. Constructing the dataset that would consist only of firms that have a need for credit would be too narrow and not representative of the whole country let alone the whole developing world. Hence, Leon (2015) has decided to use Probit with Sample Selection model (hereafter, PSS model) that has been developed by Van de Ven and Van Praag (1981) and is being used in cases when a dependent variable is observed only when a certain condition is met (Miranda & Rabe-Hesketh, 2006). Applied to current research, the *Credit* variable is observed only when a firm has a *Need* for credit. As a result, two equations are estimated by the PSS model: the selection equation and the outcome equation. The first equation addresses the need for credit which is observed in the datasets at hand. In order to use a PSS model, it is important to define the selection variable (*Need*) by using its proxies that do not directly affect the *Credit* variable. In other words, for the model to run smoothly, at least one variable has to be present in selection equation which is not included in the outcome equation. Leon (2015) uses *Construction* and *WK,* the definitions of which can be re-familiarized with in Appendix – Table 5. As a result, the outcome equation contains only the selected sample and credit constraints are analysed there.

Results

The determinants of need for credit

First of all, with the help of the simple probit model without sample selection, the determinants of need of credit are presented. Thereby, using the "Old Database 2006 – 2011", Table 8 in Appendix reports the coefficients which are very close to the ones that Leon (2015) has found. As such, a similar positive effect of firm size on the need for credit has been found. On the one hand, firms that are foreign-owned or belong to a subsidiary, publicly listed or privately held desire less credit. Exporters, on the other hand, desire more credit just like the firms that experience obstacles in light of an uneducated workforce, firms that are planning to make an investment and the firms that accept after-delivery

payments from their customers. Regarding the country-level variables, similar to Leon (2015), in countries with poorly developed legal rights the need for credit is lower. This might be related to a lack of trust in law enforcement and rights' protection, which makes potential borrowers seek credit elsewhere (e.g. from informal lenders as suggested by Duflo and Banerjee (2011)). Additionally, unlike Leon (2015), it is found that in countries with higher inflation, faster growth, and better institutional development, the need for credit is also larger. Despite the fact that Leon (2015) did not find any effect of bank competition on need for credit, replicated results based on the "Old Dataset 2006 – 2011" have found a decrease in the Boone indicator meaning that the intensified competition leads to an increased need for credit. Probably, during the times when there are more banks in the market, borrowers have an increased need for bank credit since they hope for lower interest rates as a result of the rivalry between banks for clients.

Regarding the results obtained with the extended "Combined Database 2006 – 2019" that can be found in Appendix – Table 9, quite a substantial amount of Leon (2015)'s findings are confirmed when it comes to determinants of credit. As such, over the years, firms that have a need for credit are not very heterogeneous and, quite the contrary, they share certain characteristics: they employ more people, engage in exporting, experience struggles associated with uneducated workforce, invest, and finance working capital. Additionally, a new determinant is found: firms that have been audited are more likely to have a need for credit. This can probably be explained by the fact that if a firm has its financial statements certified, its factual as well as perceived trustworthiness increases resulting in a higher desire for credit from banks because their loan applications are less likely to get rejected. Interestingly, when more years are considered (2006 – 2019), the higher the growth rate of the country the less likely its firms have a need for credit, which was the opposite when only 2006 – 2011 period was considered. Regarding competition, according to Model 2 of Table 9, the higher the share of assets held by top-three banks, the lower the competition, the higher the need for credit. Thus, the model that uses *CR3* as a measure of competition, suggests that potential borrowers have a higher need for credit in times of increased market power and bank concentration. Nevertheless, Models 4 and 5 signal the opposite: the lower the Lerner index is as well as the higher the H-statistics, the higher the competition, the more need firms have for credit. Regarding the crisis years, Table 9 suggested that during the financial crisis of 2008 firms had a higher need for credit. When the same models are run for the 11 countries using *Crisis (NBER)*, a positive effect twice as large in magnitude than *Crisis (Leon)* is found, however, these findings have not been reported since the rest of the coefficients are highly similar both in direction and magnitude with an exception of competition variables that predict having no influence on the need of credit.

Baseline results

The main purpose of this research is to investigate whether bank competition reduces the credit constraints of firms in developing countries. In order to construct the baseline results, the PSS Model is used. The dependent variable amounts to one if a firm that needed credit had access to it, or, in other words, was not credit constrained. First of all, the replication of Leon (2015)'s baseline results can be found in Appendix – Table 10. Results obtained with the help of the "Old Database 2006 – 2011" indicate no effect of competition on credit availability, while Leon (2015) has found a positive effect. Additionally, results of Model 3 are presented for Boone indicator and do not include industry fixed effects since the necessary convergence could not be achieved. Moreover, the Wald test cannot confirm the relevance of the sample selection in Models 3 and 4. Hence, for these models the null hypothesis assuming that the PSS Model's estimates are more informative compared to simple probit model's estimates cannot be rejected. Moving on to control variables, a positive effect of a firm size on credit availability is confirmed: it is easier for larger firms to get access to bank credit. Being audited is also a robust indicator for an increased chance to get a credit. Experiencing obstacles in light of uneducated workforce loses its significance and has no effect on credit availability. Finally, unlike in Leon (2015)'s findings, the crisis dummy designed by Leon (2015) has a highly negative effect on credit availability meaning that during 2009 as well as 2011 firms had a substantially reduced likelihood to get credit.

Moving on to the "Combined Dataset 2006 – 2019", the overview of the main results regarding the effects of bank competition over the extended period of time as well as during the crisis-years specifically are presented below in the Tables 4 and 5 respectively. This is necessary to obverse the evolution of the effect as more controls are being added.

First of all, no control variables are added in the models. The full baseline results without control variables can be found in Table 4 above. It was impossible to run such model for *Lerner Index* since no convergence could be found, nevertheless, for the rest of the models the Wald test confirms the relevance of PSS model. As such, results suggest that the share of assets held by top-three banks relative to total assets (*CR3*) has no effect on credit availability. Model 3 that uses the *Boone Indicator* for measuring competition suggests that credit availability increases with bank concentration, which supports the *information hypothesis.* Finally, Model 7, with the help of the *H-statistics,* supports the *market power hypothesis* and the belief that bank competition alleviates credit constraints. Interestingly, when the same models without the controls but with the interaction *Crisis (NBER)*[15] are performed, the

[15] *Interaction has been performed with Crisis (NBER) instead of Crisis (Leon). Despite the fact that the former variable is available for less countries, it does not focus only on Financial Crisis 2008 but also takes into account national crises of countries which provides with a complete understanding on what happens in countries during crisis years.*

Table 4: Overview of the baseline results for the period 2006 - 2019 using the "Combined Dataset".

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	CR3		Boone		Lerner		H-stat	
No control variables								
Competition	**0.000525**		**0.0574*** **				**0.317** **	
	(0.00174)		**(0.0210)**				**(0.134)**	
Observations	55,644		51,597				37,993	
Wald Test	945.81***		380.62***				268.18***	
Only firm-level controls								
Competition	**0.000203**		**0.0360**		**-0.342**		**0.184**	
	(0.00136)		**(0.0253)**		**(0.227)**		**(0.150)**	
Observations	52,155		48,317		46,277		37,150	
Wald Test	64.55***		63.16***		44.95***		122.74***	
VARIABLES	CR3(L)	CR3(N)	Boone(L)	CR3(N)	Lerner(L)	Lerner(N)	H-stat(L)	H-stat(N)
With controls (excl. Legal Rights, Credit Information)								
Competition	**0.00167**	**-0.00474**	**0.0392**	**-0.0449**	**-0.333**	**-0.0820**	**0.461** **	**-20.60*** **
	(0.00159)	**(0.00955)**	**(0.0362)**	**(0.0565)**	**(0.314)**	**(2.026)**	**(0.198)**	**(5.843)**
Observations	52,005	34,568	48,317	34,568	46,277	33,854	37,150	32,395
Wald Test	86.61***	2.78*	79.43***	2.19	73.66***	3.85*	172.40***	10.15***
With all controls: Full baseline results								
Competition	**-0.000258**	**-0.00952**	**0.0513** **	**0.239**	**-0.618***	**-3.249**	**0.462** **	**-3.249**
	(0.00190)	**(0.00851)**	**(0.0216)**	**(0.148)**	**(0.353)**	**(5.535)**	**(0.230)**	**(5.535)**
Observations	45,210	31,864	46,103	31,866	44,055	31,776	35,233	31,776
Wald Test	71.84***	3.22*	70.12***	4.72**	58.39***	2.77*	31.05***	2.77*

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator and Lerner Index are used unlike Leon (2015).
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
*** p<0.01, ** p<0.05, * p<0.1*

results from Model 2 suggest that increased bank competition measured by the *Boone Indicator* will alleviate credit constraints during the crisis years (Table 5). However, Models 1 and 3 confirm the *information hypothesis* and favour bank concentration. Because of the contradictory results, it is wise to move forward and add firm-level control variables to the models to observe whether convergence in predictions is achieved.

Table 5: Overview of the baseline results for the period 2006 - 2019 with the special focus on crisis-years using the "Combined Dataset".

VARIABLES	(1) CR3	(2) Boone	(3) Lerner	(4) H-stat
No control variables				
Competition	-0.00114	0.0670***	1.590**	0.00963
	(0.00411)	(0.0140)	(0.739)	(1.635)
Crisis (NBER)	-0.807**	-0.166	-6.238***	-0.118
	(0.381)	(0.206)	(2.397)	(1.109)
Crisis (NBER) # Competition	**0.0136****	**-0.193*****	**21.48*****	**0.491**
	(0.00566)	**(0.0691)**	**(8.191)**	**(1.739)**
Observations	35,163	35,163	34,314	32,731
Wald Test	12.06***	14.02***	7.91**	4.69**
Only firm-level controls				
Competition	-0.00736	0.0697***	1.322	0.0336
	(0.00561)	(0.0159)	(1.013)	(1.187)
Crisis (NBER)	-1.217**	-0.178	-10.46***	-0.281
	(0.615)	(0.278)	(4.033)	(0.914)
Crisis (NBER) # Competition	**0.0217****	**-0.287****	**37.03****	**0.634**
	(0.00971)	**(0.119)**	**(14.51)**	**(1.412)**
Observations	34,568	34,568	33,854	32,395
Wald Test	15.19***	12.50***	3.92*	8.37***
With controls (excl. Legal Rights, Credit Information)				
Competition	-0.0527***	0.00640	-1.017	-20.60***
	(0.0186)	(0.0671)	(1.375)	(5.843)
Crisis (NBER)	-3.444***	-0.647*	-10.62*	0.372***
	(0.957)	(0.372)	(6.196)	(0.143)
Crisis (NBER) # Competition	**0.0577*****	**-0.342****	**37.04***	
	(0.0203)	**(0.146)**	**(21.76)**	
Observations	34,568	34,568	33,854	32,395
Wald Test	7.11**	2.51	1.62	10.15***
With all controls:				
Full baseline results				
Competition	-0.144***	0.280**	-4.663	
	(0.0373)	(0.143)	(3.770)	
Crisis (NBER)	-11.10***	-0.486	-13.70**	
	(3.241)	(0.571)	(5.880)	
Crisis (NBER) # Competition	**0.177*****	**-0.449*****	**50.51****	
	(0.0492)	**(0.155)**	**(20.50)**	
Observations	31,864	31,866	31,776	
Wald Test	3.98*	4.96**	2.99*	

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator and Lerner Index are used unlike Leon (2015).
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Despite the fact that *WK* is available for 73,389 firms out of 87,932, it is still included in the model since it identifies the selection equation and determines the *Need* variable. Full results can be found in Appendix – Table 13 while the main effect is depicted in Table 4 above. Employing more workers, being audited, exporting, and being privately held increases the chances of firms to get credit. However, the firms that are foreign-owned, state-owned, experience troubles because of uneducated workforce have a lower likelihood of getting credit. Most importantly, in all models, bank competition has no effect on credit availability. After adding the crisis interaction term, the full results for which

can be found in Table 14 in the Appendix while the selected ones are in Table 5 above, the firm-level results do not change, while the effects of competition are in the same direction as in model without any controls. Models 1 and 3 of Table 5 suggest that, overall, during the period of 2006 – 2019, bank competition is favourable for credit availability, while during the crisis years, bank concentration measured by either *CR3* or *Lerner Index* enhances credit availability. Notably, in Models 1 and 3 in Table 5, *Crisis (NBER)* alone predicts reduced access to credit during crisis years, however, once combined with reduced bank competition it suggests increased credit availability for SMEs. Hence, firms can get needed credit during crisis years conditional on increased bank concentration which will be a catalyst of banks' risk-taking behavior (Boyd & de Nicolo, 2005). This preliminary finding contradicts the expectations of Demirgüç-Kunt and Detragiache (2005) that with increased bank concentration access to credit will be highly problematic.

As stated earlier, country-level variables *Credit Information* and *Legal Rights* are not available for many countries (e.g. Nicaragua, Swaziland, Russia, etc.) resulting in 139 datasets out of 155 having information on them. Hence, the next step is to introduce all firm-level and country-level variables with the exception of *Credit Information* and *Legal Rights* to take advantage of a higher number of observations. As a result, Table 15 in Appendix reports similar to Table 13 results when it comes to firm-level variables. Once again, it is confirmed that there are certain kind of characteristics typical to firms that are more likely to get credit from banks. Regarding the newly added country-level characteristics, the Financial Crisis of 2008 had a substantial negative effect on credit availability: for instance, Model 7 suggests that the crisis reduces firms' likelihood of getting credit by 274.4%. Concerning the competition (overview in Table 4 above), no effect is predicted on credit constraints in Models 1 – 6, and the change can be observed in Models 7 and 8 that use *H-statistics* to measure competition. According to Model 7, after adding selected country-level control variables, a one-unit change in *H-statistics* generates a 46.1% change in probability that a firm that needs credit gets it. Surprisingly, after changing the crisis dummy from *Crisis (Leon)* to *Crisis (NBER)*, the effect of competition becomes highly negative and almost 20 times larger than the effect found in Model 7. Such a drastic change might be due to reduced number of countries under consideration as well as less firms that make it to the outcome equation of the model. Adding crisis interaction into the model (full results are reported in Table 16 in Appendix), again, does not substantially change the effects of control variables. However, according to Table 5 above, bank competition effects are robust to addition of new control variables: again, Models 1 and 3, that measure competition with *CR3* and *Lerner Index* respectively, suggest that bank concentration has a beneficial impact on reducing credit constraints, however, Wald Test is not significant for Model 3. Model 2, using *Boone Indicator*, supports bank competition during crisis-years, however, Wald Test does not justify the use of PSS method for this model either. Notably, *Competition* alone in Table 5 in Models 1 and 4 has a positive effect of credit availability, while *Crisis (NBER)* predicts higher credit constraints in Models 1 – 3.

Finally, the full baseline results can be found in Table 17 in the Appendix. The Wald test for all of the Models rejects null hypothesis and confirms that the PSS Model is more informative in this setting compared to the simple probit model. Crisis dummy introduced by Leon (2015) is highly significant in every model and, for example, in Model 9, it suggests that during 2009 and 2011, a firm that needed credit was 660% less likely to actually be granted with it. However, this variable is advised to be trusted with caution. Leon (2015) has uniformly assigned a value of one to every country for which data was available for 2009, while, FRED[16] has claimed that every country has to be studied individually before it is treated as the one suffering from the crisis. Thus, Leon (2015) might have overgeneralized the crisis effect, since the models that include FRED's crisis dummy find no effect of crisis on credit availability. Regarding firm-level characteristics, being a larger firm highly reduces the possibility of a firm to be credit constrained and these are a highly robust findings across the years and the samples. Being foreign-owned, surprisingly, increases the likelihood of suffering from credit-rationing. For convenience, the results for bank competition can be found in Table 4 above. *Lerner index* in Model 5 as well as *H-statistics* in Model 7 suggest that with increased competition, credit availability increases. This is in line with the findings of Leon (2015) for the years 2006 – 2011 (excl. 2010) and it also confirms the predictions of *market power view* as well as *competition-stability hypothesis.* Nevertheless, Model 3, with *Boone Indicator* as an independent variable, supports the *information hypothesis* as well as the *competition-fragility hypothesis* since it finds a negative effect of increased bank competition on credit availability and hence, it favours bank concentration. It also supports the findings of Petersen and Rajan (1995) who have argued that, because of long-term crisis effects, bank concentration increases and banks are more willing to finance credit-constrained firms.

Full baseline results with the help of a crisis interaction can be found in Table 18 in Appendix, while selected effects of bank competition are offered in Table 5 above. Models 1 and 3 of Table 5 confirm that, when measuring bank competition with *CR3* or *Lerner index*, a significant support of enormous magnitude for the role of bank concentration in alleviating credit constraints specifically during the times of crisis can be found. For instance, when measuring competition as *CR3*, the more assets top-three banks hold, the easier it is for firms to get credit regardless of whether a country is experiencing crisis. Unfortunately, results could not be obtained for *H-statistics* since convergence was not achieved probably due to the highly reduced sample size.

[16] *Federal Reserve Bank of St. Louis | https://fred.stlouisfed.org/*

Robustness

The results obtained with the "Combined Database 2006 – 2019" do not fully support Leon (2015)'s findings and often suggest that, during crisis-years, bank concentration is an effective facilitator in reducing credit constraints. Such results might be considered as controversial; thus, it is worth running several robustness checks. Notably, the main difference between the main specifications presented in Methodology section and the robustness equations is the addition of a new control variable to the latter equations. For instance, the first robustness check aims to determine the role of foreign ownership of banks in the relationship between bank competition and credit availability, hence, the variable *Foreign Banks*$_c$ is now added to the *Country-level*$_c$ matrix in both specification for the "Combined Database 2006 – 2019" as well as the specification that captures crisis-period in detail. The exception is the last robustness check that examines exactly the same specifications as in the Methodology section on the reduced sample of firms located outside the economic capitals of their countries and no new control-variables are added in that case. Finally, the overview of the data sources as well as some information on how the robustness variables have been constructed can be found in Appendix – Table 5. Summary statistics for the variables used in robustness checks can be found in Table 6 below:

Table 6: Summary statistics for robustness variables

VARIABLES	Obs.	# of Countries	Mean	S.D.	Min	Max
Foreign Banks	55,454	58	0.419	0.295	0	1
Financial Freedom	86,445	67	45.73	21.65	0	80
Economic Capital	56,688	63	0.367	0.482	0	1
Securities Activities Restrictions	31,163	50	1.722	0.806	1	4
Insurance Activities Restrictions	30,307	48	2.577	0.683	1	4
Real Estate Activities Restrictions	30,307	48	2.432	0.895	1	4

Foreign Banks

Leon (2015) in his research has claimed that the presence of foreign banks in a country has a potential of alleviating credit constraints for borrowers, especially, if those are SMEs. As such, he has included a robustness check for foreign ownership of the banks by using the dataset constructed by Claessens and Horen (2014) which covered the 1995 – 2009 time periods. An updated database has become available which allowed to gather information on the share of bank assets held by foreigners for years which were not available to Leon (2015), specifically, 2010 – 2013 (Claessens & van Horen, 2015). As such, the data on foreign ownership of banks has been available for 58 out of 69 countries in the "Combined Database 2006 – 2019". According to Table 6 above, across 58 developing countries, around 42% of banks are owned by foreigners. The variable *Foreign Banks* has been constructed by calculating the share of foreign banks relative to the total amount of banks in a certain country.

According to Claessens and van Horen (2015), a bank is treated as foreign-owned if 50% or more of its shares are held by non-natives. Existing research claims that an increased presence of foreign banks eases the credit access for entrepreneurs in the host country by increasing banking competition and improving financing conditions (Beck, Demirguc-Kunt, & Maksimovic, 2004; Kiyota, 2011). Hence, it is expected that foreign banks will contribute to alleviating credit constraints.

Table 19 in Appendix reports all the robustness results for the "Combined Database 2006 – 2019". According to Panel A, when using the *Crisis (Leon)* dummy as a crisis control, *Foreign Banks* have no effect on credit availability in any of the models. Regarding the effects of competition, Model 7 confirms positive impact on credit availability which, in turn, verifies the robustness of this finding. Additionally, Table 17 did not find any effect of competition measured as *CR3* on credit availability. A similar finding has been reported in Model 1 of Table 19 when controlling for foreign ownership, meaning that this finding is also robust. When using *Crisis (NBER)* as a control, again, no convergence could be achieved for *H-statistics*. Nevertheless, previously insignificant results, now suggest that competition, measured by the *Boone Indicator*, increases credit availability in the long-term once *Foreign Banks* control is added. However, if bank competition is measured by *Lerner Index* the opposite findings is evident and the support for *information-hypothesis* can be offered.

Similarly, referring to the Table 20 that interacts bank competition with crisis years, Model 2 reports that bank competition, measured by the *Boone Indicator*, is beneficial for credit access in times of crisis which confirms the robustness of the exact finding in the baseline results in Table 18. Moreover, if competition is measured by either *CR3* or the *Lerner Index*, bank concentration reduces credit constraints in times of crisis and this finding is robust once controlling for foreign ownership.

Interestingly, most of the Models in Tables 19 and 20 that include *Crisis (NBER),* report that an increase in the foreign ownership of banks substantially reduces credit availability in the host country, which contradicts the findings of Beck et al. (2004) and Kiyota (2011). Giannetti and Ongena (2012) have argued that foreign banks are unwilling to finance small domestic firms and are more likely to cooperate with multinational enterprises, which might explain the negative direction of the coefficients.

Financial Freedom

Financial Freedom belongs to the Open Markets dimension that together with the Rule of Law, Government Size, and Regulatory Efficiency dimensions constitute a larger *Economic Freedom Index* that has been constructed by the Heritage Foundation[17]. The index aims to trace the economic, political,

[17] *The Heritage Foundation | https://www.heritage.org/index/*

and financial progress of various economies across the world. *Financial Freedom* index has been chosen by Leon (2015) since the scholar believes that governments that are relatively more decentralized and give power of decision making to various sectors and institutions are more likely to have freely competing banks and little credit constraints. The higher the *Financial Freedom* index, the more freedom a country has in a certain dimension. Specifically, the countries ranked 80 – 100 are considered as "free" (Miller, Kim, & Roberts, 2020). As such, *Financial Freedom* index is available for 67 countries out of 69 in the "Combined Dataset". *Financial Freedom* index, on average, is ranked 45.73 in the dataset which signals that most of the countries are "repressed" in terms of financial activity.

The findings in Panel B in Models 3 and 7 of Table 19 confirm the baseline results (Table 17). Hence, to argue what effect bank competition has on credit availability, it is critically important which index is used to measure bank competition. As such, after controlling for financial freedom, Model 3, using the *Boone Indicator*, favours bank concentration and supports the *information hypothesis*, while Model 7, that measures bank competition with *H-statistics*, confirms the positive impact of bank competition on alleviating credit constraints. Table 20, that includes a crisis interaction, supports the baseline result of Table 18 as well as the robustness using *Foreign Banks*: if bank competition is measured by the *Boone Indicator*, it has a favourable effect on credit availability during the crisis-years; if bank competition is measured by *CR3* or *Lerner Index*, a higher market power of banks eases access to credit for SMEs.

Notably, almost all Models in both Table 19 and 20 find a negative effect of increased financial freedom on credit availability in developing countries. This contradicts not only the expectations of Leon (2015) but also his robustness findings.

Activity restrictions

Leon (2015) offers another explanation on how competition might affect credit constraints by introducing the *Activities Restrictions* control. The financial regulation of banking sector in particular might play a role: low government intervention in controlling the activities that banks engage might contribute to the elimination of credit constraints. Leon (2015) refers to Barth, Caprio, and Levine (2008) to construct a composite measure of *Activity Restrictions* out of the data gathered from the World Bank's Bank Regulation and Supervision Survey[18]. Additionally, Leon (2015) claimed that *Activity Restrictions* can not only be used as a robustness check but also as a proxy for the *Financial Freedom* index. The latter aspect is highly useful especially after negative effect of *Financial Freedom* on credit

[18] *Bank Regulation and Supervision Survey | https://www.worldbank.org/en/research/brief/BRSS*

availability has been found in Panel B. In the current research, a recent version of the Bank Regulation and Supervision Survey has been taken, specifically, the one that covers the periods of 2011 – 2016 which is outside the scope of Leon (2015)'s paper. The World Bank divides the scope of bank activities into three categories: securities activities (e.g. portfolio management), insurance activities (e.g. reinsurance policies), and real estate activities (e.g. selling real estate). Overall, with the help of this measure, it is possible to assess how easily banks can engage in the above listed activities without asking for permission from the government. The measure varies from 1 to 4: 1 – Unrestricted activities; 2 – Permitted activities; 3 – Restricted activities; 4 – Prohibited activities. However, a composite measure for activity restrictions that combines the three types of activities suggested by Barth et al. (2008) has not been constructed. Instead, *Securities Activities Restrictions*, *Insurance Activities Restrictions*, and *Real Estate Activities Restrictions* have been used individually in order to investigate whether restrictions on specific activities hinder the freedom in the banking sector. Thereby, 50 countries out of 69 from the "Combined Dataset 2006 – 2019" had information on the restrictions of security activities with a reported average of 1.7 which signals that these activities are not restricted in most of the countries. Information on restricted insurance as well as real estate activities is present for 48 countries and Table 6 above depicts that these activities are more restricted as compared to securities activities. As such, measures vary, on average, from 2.6 to 2.4 respectively which suggests that activities are permitted but under certain conditions.

The robustness results from Table 19's Panel C suggest that only the restriction of one type of activities, specifically, securities activities, has a negative effect on credit availability. This finding is relatively more intuitive than the *Financial Freedom* one, since it suggests that with reduced government intervention and control over the banking sector comes reduction of credit constraints. With regards to competition coefficients, again, it is confirmed that the choice of index is vital when determining the effect of bank competition. Robustness of benefits coming from bank concentration when using the *Boone indicator* as well as favourable effects of bank competition when measured by *H-statistics* are confirmed. Moreover, new results have arisen: when controlling for crisis with *Crisis (NBER)*, after adding activity restrictions controls, bank competition, measured as *CR3*, alleviates credit constraints. Furthermore, the positive effects of bank concentration on credit availability measured by the *Boone Indicator* become even stronger according to Model 4 once crisis is measured with *Crisis (NBER)* instead of *Crisis (Leon)*. Unfortunately, due to limited sample size and collinearity, the effect of crisis interactions could not be assessed.

Non-capital cities

Regarding the fourth robustness check, Leon (2015) has claimed that in many developing countries most of the business activity is not evenly spread within the countries. The scholar has suggested that the effect of bank competition on alleviating credit constraints might not hold in regions and cities outside the economic centres since they are relatively less developed and hardly accessible. Interestingly, the economic capital is not always the official national capital of the country. For instance, in Tanzania, the economic capital is Dar es Salaam, while the national capital is Dodoma (Kironde, 1993). Such difference between national and economic capitals is worth paying attention to while constructing the variable that would separate firms into sub-samples, since Leon (2015) insists that the focus has to be put on the main economic centres of the countries where the most of business formation happens. Thereby, it is exactly the firms located in economic centres that have been excluded from the sample while running the robustness check. Despite the fact that Leon (2015) in his paper argues that "the surveys do not provide information about *cities* where firms are located", such information has been found for the most firms from the "Combined Database 2006 – 2019". As such, 36.7% of firms are located in the economic capitals, therefore, it is interesting to observe the effects of bank competition on credit constraints outside the business centres.

Table 19 from the Appendix supports the robustness of the results that found beneficial impact of bank competition if measured as *H-statistics* on credit availability. Furthermore, in Table 17, bank competition, measured as *CR3*, had no effect on credit availability, however, it does alleviate credit constraints if considering a sub-sample of firms outside the economic capitals. Moreover, Panel D also confirms the positive effect of bank competition measured as *Lerner index* on credit availability that was found in baseline results in Table 17. Overall, Panel D suggests that bank competition does relax obstacles associated with getting credit for SMEs outside the main economic capitals over the long term. Additionally, Table 20 suggests that reduced bank competition, measured with the *Boone Indicator*, is beneficial for credit availability during crisis-years, which makes this finding highly robust since it did not change over the gradual introduction of controls and reduction of the sample size. Additionally, Panel D in Table 20, with the help of *H-statistics,* supports the role of bank competition and its beneficial impact on credit availability, which again signals the importance of choosing the index to measure competition.

Bank competition and its channels to impact credit availability

Despite the fact that the primary interest of the research is to investigate whether bank competition increases credit availability for firms, it is interesting to also consider the potential influences of bank competition at earlier stages of firms' decision-making process associated with getting a credit.

Bank competition and loan applications

As it has been shown in the summary statistics in Appendix – Table 4, not all firms who need credit actually apply for it even though the acceptance rate is, generally, quite high. It is necessary to return to the notion of "discouraged borrowers" that has been discussed in the Data and Variables sections as well as the reasons for not applying for loans presented in Figure 2. According to the Enterprise Surveys, among the explanations offered to an interviewer for not applying for a loan, "discouraged" firms have listed difficult application processes, high interest rates, etc. On top of that, Chakravarty and Xiang (2009) have determined that level of bank competition actually determines the likelihood of SMEs either applying for loans or getting discouraged from doing it. Leon (2015) has also hypothesized that, in times of high bank competition, interest rates might go down and more credit applications will be submitted by firms. Hence, by using the same selection equation that helped to construct the baseline results, the specifications that allow to observe the impact of bank competition on loan applications have been modified as follows:

$$(1)\ Probability\left(Apply_{fc}=1 \mid Need_{fc}=1\right)=\Phi(\alpha+\beta Competition_{c}+\mathrm{K}\boldsymbol{Firm-level}_{fc}+\mathrm{A}\boldsymbol{Country-level}_{c})$$

$$\begin{aligned}(2)\ Probability\left(Apply_{fc}=1 \mid Need_{fc}=1\right)&\\ =\Phi(\alpha+\beta Competition_{c}+\gamma Crisis(NBER)_{c}+\omega Competition_{c}\#Crisis(NBER)_{c}&\\ +\mathrm{K}\boldsymbol{Firm-level}_{fc}+\mathrm{A}\boldsymbol{Country-level}_{c})&\end{aligned}$$

To briefly elaborate on specification (1), the main focus is to capture the effect that a unit change in $Competition_c$ might have on a probability of a firm that is in need for financing ($Need_{fc}$ = 1) to apply for credit ($Apply_{fc}$ = 1). Firm-level as well as country-level characteristics have not been changed as compared to the main specification in the Methodology section. Similarly, specification (2) allows to determine the effect of bank competition on applications for credit during crisis-years.

Leon (2015) has found that loan applications are submitted more often during the times of high bank competition. These findings are confirmed when extending Leon (2015)'s sample to the time period of 2006 – 2019 and measuring bank competition with either *CR3* or *H-statistics*. According to Table 21 in Appendix, Model 4 suggests that as the share of assets held by top-three banks (*CR3*)

decreases which, in turn, intensifies the bank competition, more firms apply for a loan. Similarly, Model 9 depicts that one-unit increase in *H-statistics* generates a 37.6% change in the probability of a firm needing a loan actually applying for it. Nevertheless, the results that contradict Leon (2015)'s findings have also been found and are represented in Table 21 in Models 6, 8, and 10. In the latter case with measuring bank competition by *H-statistics*, simply changing the way the crisis is measured already changes the magnitude and direction of the effect. Again, depending on the way bank competition is measured, support for either bank competition or bank concentration is offered.

The Model 3 in Table 22, that includes the crisis interaction, supports the finding that during bank concentration more loans are being submitted by firms. The potential explanation for this result is two-sided. On the one hand, firms might need credit so much, that they apply for loans despite the recession and highly oligopolistic nature of the banking sector in order to minimize the chances of getting bankrupt. This argument is supported with positive effect that *Crisis (NBER)* has on loan applications that can be found in Model 2 of Table 22. However, in Model 3, *Crisis (NBER)* alone has a negative effect on application rate, hence, firms are generally discouraged from applying for credit at times of crisis. Hence, on the other hand, firms might be aware that the government tends to offer "too-big-to-fail" subsidies to large banks in order to preserve their functioning. Specifically, firms might have already observed the behaviour of the government as well as the reaction of the banks in earlier economic downturns that are quite common in developing countries (Redelico, Proto, & Ausloos, 2008). If, earlier, the largest banks, after receiving the bail-out subsidies, have engaged in risky behaviour and it has resulted in a higher supply of credit, firms might form their expectations accordingly and apply for loans, despite the crisis, with the hope to get desired loans (Akins et al., 2016; Soedarmono et al., 2013).

Finally, Table 22 also elaborates on characteristics of firms that either increase or decrease the likelihood of applying for loans. Firms that are of bigger size, engage in exporting, get audited, either publicly listed or privately held as well as those that experience obstacles associated with an uneducated workforce are more likely to apply for credit. This cannot be said about the firms that are foreign-owned or have a large share of assets owned by the largest owned. Additionally, firms that do operate in countries with poor law enforcement are less likely to apply for loans. These findings are primarily in line with the ones reported by Leon (2015).

Interbank Competition and Loan Application Outcome

Once again referring to the summary statistics in Table 4 of the Appendix, it can be seen that not all firms who have applied for credit have received it. Thus, it is interesting to investigate the potential reasons for such statistics and whether bank competition or bank concentration play a role in this. As such, following Leon (2015), the selection equation has been slightly modified since the variable that groups firms into the sub-sample has been changed from *Need* to *Apply*. Hence, new identification variable *Obstacles* has been added to *WK* and *Construction*, since all of them, according to Leon (2015), directly influence the decision of the firm to apply. Specifically, if a firm needs additional funds in order to make an investment or finance working capital, it will consider a possibility of applying for a loan. Similarly, firms who are constrained with an uneducated workforce might need more money in order to sustain their businesses. The dependent variable is *Accepted* which will allow to investigate whether the firms who have applied for loans have been turned down or have received the desired credit. Consequently, the specifications for this sub-section have been adapted as follows:

$$(1)\ Probability\left(Accepted_{fc} = 1 | \ Apply_{fc} = 1\right) = \Phi(\alpha + \ \beta Competition_c + \ \mathrm{K}\boldsymbol{Firm - level}_{fc} + \mathrm{A}\boldsymbol{Country - level}_c)$$

$$(2)\ Probability\left(Accepted_{fc} = 1 | \ Apply_{fc} = 1\right) = \Phi(\alpha + \ \beta Competition_c + \gamma Crisis(NBER)_c + \omega Competition_c \# Crisis(NBER)_c + \mathrm{K}\boldsymbol{Firm - level}_{fc} + \mathrm{A}\boldsymbol{Country - level}_c)$$

The specification (1) aims to answer the following question: conditional on the fact that a firm has applied for credit ($Apply_{fc} = 1$), what is the probability of having its application accepted ($Accepted_{fc} = 1$) if $Competition_c$ undergoes a one-unit change in its value? Specification (2) asks the same question, however, it focuses on the effects of competition specifically during the crisis-years. Firm-level as well as country-level characteristics have not been changed with the exception of the *Obstacles* variable which has been excluded from the regression output since it serves as an identifier for the selection equation.

Only Model 4 in Table 23 confirms the findings of Leon (2015): as the share of assets held by top-three banks (*CR3*) decreases, bank competition increases, and more loans get approved. Despite the fact that 5 out of 8 models do not find any effect of competition on acceptance rate of loans, Models 5 and 6 offer high support for bank concentration and its positive effect on loan approvals when measured by the *Boone Indicator.* As such, regardless of how the crisis is measured, as banks have more market power, more loans get approved. This finding supports the *information hypothesis* as well as the *competition-fragility hypothesis* which claim that when having higher market power, banks feel safer and are willing to lend to relatively more riskier firms like SMEs (Berger et al., 2009). Unfortunately,

it was not possible to add the crisis interaction with competition in this case and make use of specification (2) due to the highly reduced sub-sample of firms in the outcome equation which made it difficult to achieve convergence in the PSS Model.

In his table on interbank competition and loan application decision, Leon (2015) finds that less applications were approved during the crisis years. However, after extending the sampling period for 2006 – 2019 both *Crisis (LEON)* as well as *Crisis (NBER)* generate a highly significant positive effect on loan acceptance rate (Models 1 – 3, and 5). This also contradicts the findings of Paulet et al. (2014) who have found that during and after crisis banks become more cautious in their lending decisions and are unwilling to lend to SMEs. Again, firms that operate for longer time, employ more workers, belong to a larger firm, get their financial statements certified by independent experts are more likely to have their loan applications approved. Notably, *Credit Information* has a highly significant positive effect on acceptance rate, which is in line with Baliamoune-Lutz et al. (2011) who have stressed the importance of transparency when it comes to monitoring potential applicants as well as assessing their past credit history.

Conclusion and Policy Implications

After the UNCTAD[19] (2019)'s reveal that a lot of foreign direct investment activities in developing countries are of extractive nature with little benefits to the local population, governments of the third-world countries became less willing to attract foreign investors as much as they did before. Hence, researchers from all over the world have started suggesting new ways of increasing prosperity and growth in the developing countries. There is a group of scholars who claim that, as of right now, SMEs of developing countries are credit-constrained which slows down the development of productive entrepreneurship which is a big contributor to prosperity of third-world countries. Therefore, it is suggested that increasing credit availability is possible by the means of intensified competition between banks (Baliamoune-Lutz et al., 2011). One of the key supporters of bank competition is Leon (2015) who, on the example of 28,642 firms from 69 developing countries for the period 2006 – 2011 (excl. 2010), has found the positive effect of bank competition on alleviating credit constraints. However, Leon (2015) has not paid sufficient attention to the effects that crisis as well as after-crisis years could have on the relationship between bank competition and credit constraints. As such, current research extends Leon (2015)'s sample to the period of 2006 – 2019 (incl. 2010) in order to thoroughly investigate whether bank competition indeed increases credit availability for SMEs in the developing countries. Additionally, special attention is paid to the relationship in question particularly during the crisis years. Leon (2015)'s crisis dummy has also been improved: instead of assigning crisis to every

[19] *United Nations Conference on Trade and Development*

country uniformly, each country's economic situation has been studied in detail by FRED before concluding if a country is suffering from crisis. Thus, not only the Financial Crisis of 2008 is taken into account but also country-specific national crises. As such, the data for the total of 87,932 firms from the same as Leon (2015)'s 69 developing countries for the period of 2006 – 2019 have been gathered from several databases of the World Bank, Claessens and van Horen (2015)'s unique database, the Heritage Foundation, etc. The data has been treated in the same way as Leon (2015) has described in order to maximize the similarity of the datasets and to achieve results that are both reliable and generalizable.

After extending the sample to the period of 2006 – 2019, it has been found that over the long term, facilitating and promoting bank competition should be the focus of policy makers if they desire to develop entrepreneurship which, in turn, might enhance the overall development of their countries. Most empirical support can be observed when measuring bank competition with the *H-statistics*: the results are highly robust after controlling for foreign ownership of banks, financial freedom, restrictions on banking activities as well as after reducing the sample size to firms outside the key economic capitals. These findings are in line with Leon (2015)'s conclusions. Hence, based on these findings, the research question can be answered as follows: effect that bank competition alleviates credit constraints in developing countries found by Leon (2015) holds when extending the sample for the period 2006 – 2019. Hence, the hypothesis stating that over the longer period of time (2006 – 2019) bank competition does not alleviate credit constraints in developing countries cannot be confirmed. Nevertheless, the main contribution of this research is a unique combination of studying bank competition and its effects on credit constraints both over the years (2006 – 2019) as well as specifically during the times of crisis. As such, by using the same data for 2006 – 2019 as for the study over the years, the support for the *information hypothesis, the competition-fragility hypothesis* as well as the findings of Akins et al. (2016) has been found when the focus is switched to crisis-years specifically. Thereby, when bank competition is measured by either *CR3* or *Lerner Index*, in times of crisis, bank concentration has a positive effect of credit availability. Hence, during crisis years, the positive effect that bank competition has on alleviating credit constraints found by Leon (2015) does not hold during crisis-years, meaning that bank competition does not alleviate credit constraints in times of crisis.

Hence, the added value of the current research, is that it confirms that controlling for crisis just like Leon (2015) did is insufficient due to peculiar nature of such shock which has substantial repercussions on the whole economy (Brunnermeier, 2009; Soedarmono et al., 2013). Leon (2015) has overgeneralized the effect of bank competition on credit constraints, since the scholar has overlooked that, during crisis years, competition is not always beneficial to SMEs and their struggles of accessing credit market. In current research, the crisis dummy alone signals that the crisis generates credit constraints. Nevertheless, if during the crisis bank competition is reduced, credit availability for SMEs

increases. These findings are also highly robust to adding information on foreign banks and financial freedom as well as observing the effect only for firms outside the main business cities. Possibly, at unusual crisis-times, average-performing banks either exit the market or become very careful in their lending decisions, which makes them unwilling to engage in fierce competition with larger banks (Paultet et al., 2014). Nevertheless, according to Akins et al. (2016) and Soedarmono et al. (2013), the key banks in the economy are bailed out by the government and are shielded against competition in order to avoid their bankruptcy and additional pressure on already suffering economy. As a result, relatively strong banks are aware of the protection they are granted and engage in risky behavior (e.g. investing in perilous projects, insufficiently performing screening activities, etc.) which, in turn, leads to a higher supply of credit and relaxed credit constraints (Iyer, Peydró, da-Rocha-Lopes, & Schoar, 2014; Kauko, 2014).

Moreover, as support for bank concentration during the crisis years, it has been found that, firms are less likely to submit loan applications during crisis. However, loan applications increase if the banking sector is concentrated and competition is limited during the crisis. Hence, firms, that are in need of credit, according to their past experience might be aware that, as Iyer et al. (2014) suggested, stronger and larger banks supply credit during crisis, and hence apply for loans despite the crisis.

As a result, as an advice for policy makers, based on the obtained results, would be to avoid uniform promotion and facilitation of bank competition as Leon (2015) as well as Baliamoune-Lutz et al. (2011) have suggested. Instead, analysing economic situation and stability in the country, and then act upon accordingly is considered relatively more favourable option. Especially during the current times when the Corona Crisis is expected by Mehlum and Torvik (2020) to hit the developing world to a large extent, policy makers are encouraged to prevent bankruptcy of the largest banks in their economies by various means including subsidization. Otherwise, if governments let banks compete at times of crisis as well as make them internalize responsibilities and costs just like Wilmarth (2010) suggested, not only many banks will go bankrupt but also SMEs will bear negative consequences since the latter ones will be either discouraged from applying for credit or turned down by banks that are focused on their survival. Offering the necessary protection to banks will serve as a shield for SMEs by granting them credit to save their businesses.

To mention a few limitations of the current research, first of all, despite the fact that crisis dummy constructed by FRED better captures crisis years than Leon (2015)'s dummy, it is available for a limited number of countries (11 out of 69). Hence, having information on crises for all 69 countries beyond the Financial Crisis of 2008 can be an advantageous contribution of future research. Another data limitation concerns the construction of the *Accepted* dummy: for many countries the Enterprise Surveys did not provide information necessary to construct this variable. Thus, using more extensive

data on credit acceptance might further enhance the representativeness of the findings. To add on that, as a consequence of limited data for some variables, convergence could not always be achieved for the analysis because of largely reduced number of observations in the outcome equation. Hence, enriching the data further might be a means to arrive at relatively more extensive results. To sum up, the findings might suffer from omitted variable bias since some variables have been inevitably excluded from the research (e.g. data for countries that had no information on reliability has not been used; in order to achieve convergence some control-variables have been omitted; the PSS Model filters the data to split it into sub-samples). Hence, as a general solution, filling in the gaps of missing information by having more data available could we a way to prevent exclusion of important variables (e.g. *Credit Information*, *Legal Rights*). Next, despite the fact that the PSS Model is an appropriate measure in current research since it makes use of the wide range of data as well as its selected sub-samples, this method cannot rule out the possibility of a reverse causality. Therefore, it cannot be argued with confidence that the found effect is undoubtedly causal. Leon (2015) has not addressed this potential problem in his research, however, finding an instrument or a policy change that would apply for all 69 countries might be an option to consider. This would allow the use of regression discontinuity or difference-in-difference approaches which, in turn, could confirm the causality from bank competition to credit availability.

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Appendix

Table 1: Summary Statistics offered by Leon (2015) in his paper "Does Bank Competition Alleviate Credit Constraints in Developing Countries?"

Table 1
Summary statistics.

Variable	Obs.	Mean	Std. Dev	Min	Max
Independent variables					
Need	28642	0.629	0.483	0	1
Credit	18028	0.491	0.500	0	1
Apply	18028	0.578	0.494	0	1
Accepted	10414	0.850	0.357	0	1
Dependent variables					
Firm-level variables					
Firm size	28642	59.421	114.857	0	1000
Age	28642	16.781	14.680	0	108
Experience	28642	17.224	11.170	0	75
Largest owner	28642	78.322	26.642	0	100
Foreign-owned	28642	0.098	0.298	0	1
State-owned	28642	0.005	0.073	0	1
Exporter	28642	0.135	0.342	0	1
Subsidiary	28642	0.125	0.331	0	1
Audited	28642	0.471	0.499	0	1
Publicly listed	28642	0.049	0.216	0	1
Privately held	28642	0.584	0.493	0	1
Obstacles	28642	1.510	1.358	0	4
WK	28642	48.442	39.897	0	100
Construction	28642	0.157	0.364	0	1
Country-level variables					
CR3	69	64.997	18.778	26.080	100
Boone	69	−0.090	0.238	−1.590	0.540
Lerner	50	0.250	0.068	0.124	0.437
H-stat	35	0.650	0.220	−0.020	0.990
Fin. Dev.	69	31.017	23.000	1.560	95.970
GDPpc	69	2669.067	2715.244	92.367	13836.2
Growth	69	5.713	3.930	−4.244	21.713
Inflation	69	10.199	10.706	−1.741	80.750
Legal rights	69	5.159	2.311	1	10
Credit Info	69	3.191	2.174	0	6
Institution Dev.	69	−0.219	0.619	−1.605	1.142

Table 2: Summary Statistics for the "Old Dataset", years 2006-2011 (excl. 2010)

VARIABLES	Obs.	Mean	Std. Dev.	Min	Max
Independent variables:					
Need	30,870	0.626	0.484	0	1
Credit	12,465	0.339	0.473	0	1
Apply	19,393	0.595	0.491	0	1
Accepted	4,781	0.883	0.321	0	1
Dependent variables:					
Firm-level variables					
Firm Size	31,236	64.72	121.4	0	1,000
Firm Age	30,925	17.79	16.50	0	196
Experience	30,310	18.14	11.09	0	75
Largest Owner	28,181	77.92	26.86	0	100
Foreign-owned	30,534	0.0906	0.287	0	1
State-owned	30,534	0.00609	0.0778	0	1
Exporter	31,172	0.184	0.387	0	1
Subsidiary	31,233	0.123	0.329	0	1
Audited	30,757	0.462	0.499	0	1
Publicly Listed	31,236	0.0576	0.233	0	1
Privately Listed	31,236	0.560	0.496	0	1
Obstacles	30,819	1.590	1.377	0	4
WK	29,062	50.73	39.83	0	100
Construction	30,174	0.162	0.368	0	1
Country-level variables					
CR3	57	62.24	18.98	21.59	100
Boone	58	-0.00666	0.844	-1.759	8.659
Lerner	55	0.262	0.0875	-0.00202	0.595
H-stat	1	-	-	-	-
Financial Development	58*	38.90	30.75	5.393	157.0
GDP per capita	58	6,449	4,643	386.7	25,430
Growth	58	5.517	2.582	-5.089	12.58
Inflation	58	10.72	11.62	0.678	80.75
Legal Rights	56	4.991	2.352	0	10
Credit Information	56	3.012	2.383	0	6
Institutional Development	58	-0.190	0.600	-1.284	1.236
Crisis (Leon)	58	0.399	0.490	0	1
Crisis (NBER)	11	0.447	0.497	0	1

For firm-level variables number of observations is measured in firms, while for country-level variables in countries, since the latter ones do not change per firm.

**As it can be seen in Table 6 of Appendix, 11 countries had to be excluded from the research since the reliability of the estimates could not be assessed. Thus, 31, 236 firms from 58 countries is the maximum number of observations for the "Old Dataset".*

Table 3: Summary Statistics for the "New Dataset 2010 – 2019"

VARIABLES	Obs.	Mean	S.D.	Min	Max
Independent variables:					
Need	54,668	0.545	0.498	0	1
Credit	25,317	0.409	0.492	0	1
Apply	30,395	0.519	0.500	0	1
Accepted	11,283	0.917	0.275	0	1
Dependent variables:					
Firm-level variables					
Firm Size	56,694	58.43	115.0	0	1,000
Firm Age	56,088	18.15	14.97	0	210
Experience	55,437	19.01	11.27	1	100
Largest Owner	53,052	80.77	25.49	0	100
Foreign-owned	56,185	0.0760	0.265	0	1
State-owned	56,203	0.00439	0.0661	0	1
Exporter	55,942	0.192	0.394	0	1
Subsidiary	56,692	0.123	0.329	0	1
Audited	49,860	0.424	0.494	0	1
Publicly Listed	56,694	0.0453	0.208	0	1
Privately Listed	56,694	0.499	0.500	0	1
Obstacles	50,052	1.439	1.303	0	4
WK	44,325	40.11	37.90	0	100
Construction	56,396	0.142	0.349	0	1
Country-level variables*					
CR3	72	54.45	19.14	26.93	100
Boone	53	-0.0328	0.598	-1.563	6.497
Lerner	46	0.252	0.141	-0.00258	1.020
H-stat	34	0.636	0.178	0.189	0.920
Financial Development	93	41.49	20.48	5.724	102.2
GDP per capita	97	8,403	5,660	242.8	26,768
Growth	97	3.031	3.172	-7.652	12.32
Inflation	97	8.441	9.666	-16.76	75.28
Legal Rights	83	5.358	2.227	0	10
Credit Information	83	3.975	2.148	0	6
Institutional Development	97	-0.0868	0.579	-1.655	1.248
Crisis (NBER)	11	0.165	0.372	0	1

For firm-level variables number of observations is measured in firms, while for country-level variables in countries, since the latter ones do not change per firm.

**The maximum number of observations in the "New Dataset" can be: 56,694 for firms, 63 for countries and 97 for datasets. As such, 97 datasets consist of 56,694 firms from 63 countries with the possibility of being surveyed at several years which explains why the number of datasets is larger than number of countries.*

Table 4: Summary Statistics for the "Combined Dataset 2006-2019"

VARIABLES	Obs.	Mean	S.D.	Min	Max
Independent variables:					
Need	85,538	0.574	0.494	0	1
Credit	37,782	0.386	0.487	0	1
Apply	49,788	0.549	0.498	0	1
Accepted	16,064	0.907	0.290	0	1
Dependent variables:					
Firm-level variables					
Firm Size	87,932	60.67	117.4	0	1,000
Firm Age	87,015	18.02	15.53	0	210
Experience	85,749	18.70	11.22	0	100
Largest Owner	81,234	79.78	26.01	0	100
Foreign-owned	86,721	0.0812	0.273	0	1
State-owned	86,739	0.00499	0.0705	0	1
Exporter	87,116	0.189	0.392	0	1
Subsidiary	87,927	0.123	0.329	0	1
Audited	80,617	0.438	0.496	0	1
Publicly Listed	87,932	0.0497	0.217	0	1
Privately Listed	87,932	0.520	0.500	0	1
Obstacles	80,873	1.496	1.334	0	4
WK	73,389	44.32	39.03	0	100
Construction	86,572	0.149	0.356	0	1
Country-level variables					
CR3	129	57.74	19.46	21.59	100
Boone	111	-0.0203	0.726	-1.759	8.659
Lerner	97	0.257	0.119	-0.00258	1.020
H-stat	35	0.633	0.176	0.189	0.920
Financial Development	151	40.39	25.39	5.393	157.0
GDP per capita	155*	7,709	5,403	242.8	26,768
Growth	155	3.914	3.205	-7.652	12.58
Inflation	155	9.251	10.46	-16.76	80.75
Legal Rights	139	5.180	2.296	0	10
Credit Information	139	3.508	2.316	0	6
Institutional Development	155	-0.123	0.589	-1.655	1.248
Crisis (LEON)	155	0.142	0.349	0	1
Crisis (NBER)	11	0.236	0.425	0	1

The maximum number of observations in the "Combined Dataset" can be: 87,932 for firms, 69 for countries and 155 for datasets. As such, 155 datasets consist of 87,932 firms from 69 countries with the possibility of being surveyed at several years which explains why the number of datasets is larger than number of countries.

Table 5: Variable description by Leon (2015), data source, relevant variables in the database, definition in the database

Variable Name	Leon (2015)'s definition	Source	Corresponding question in the database	Definition/question in the database
Dependent Variables:				
Need	Dummy variable equals to 1 if a firm needed external funds in the last year.	WBES[a]	K17	Main reason for not applying for new loans or new lines of credit. Need = 0 if the answer "no need for a loan; establishment has sufficient funds", Need = 1 if any other reason given (e.g. "interest rates are not favorable", "did not think it would be approved", etc.)
Credit	Dummy variable equals to 1 if a firm that needed external funds had access to credit and 0 if a firm that needed external funds refused to	WBES	K20A1, K20A, K18, K19, K17	Credit = 1 if applied and got accepted; Credit = 0 if applied but got turned down OR did not apply but had a need of credit.

	apply or was turned down.			
Apply	Dummy variable equals to 1 if a firm needed external funds and applied for loans and 0 if the firm did not apply.	WBES	K16	In [previous year], did this establishment apply for new loans or lines of credit? Yes/no question.
Accepted	Dummy variable equals to 1 if a firm applied for loans and received at least one line of credit and 0 if a firm applied but did not receive a line of credit.	WBES	K20A1, K20A, K18, K19	K20A1 (application was approved in full/application was approved in part/application was rejected) K20A (application was approved/application was rejected) K18 (number of applications) and K19 (number of rejections)
Independent Variables:				
Firm-level variables				
Firm Size	Number of permanent full-time employees	WBES	L1	Number of permanent full-time workers last complete fiscal year.
Firm Age	Age of the firms (in years)	WBES	B5	Difference between the year of the survey and the "year establishment began operations".
Experience	Experience in this sector that the top manager has (in years)	WBES	B7	How many years of experience working in this sector does the top manager have?
Largest Owner	Share of assets held by the largest owner	WBES	B3	What percentage of this firm does (do) the largest owner(s) own?
Foreign-owned	Dummy variable equals to 1 if 50% or more of the firm is owned by foreign organization	WBES	B2B	Percentage owned by private foreign individuals, companies or organizations.
State-owned	Dummy variable equals to 1 if 50% or more of the firm is owned by the government	WBES	B2C	Percentage owned by government/state.
Exporter	Dummy variable equals to 1 if 10% or more of sales are exported	WBES	D3C, D3B	D3C: Percentage of Sales: Direct Exports. D3B: Percentage of Sales: Indirect Exports.
Subsidiary	Dummy variable equals to 1 if the firm is part of larger firm	WBES	A7	Establishment part of a multi-establishment firm? Yes/no question.
Audited	Dummy variable equals to 1 if the firm have its annual financial statement checked and certified by an external auditor	WBES	K21	Financial statements checked and certified by external auditor in last fiscal year? Yes/no question.
Publicly Listed	Dummy variable equals to 1 if the firms is a publicly listed company	WBES	B1	B1: Legal Status of The Firm; Publicly Listed = 1 if the answer is "Shareholding company with shares traded".
Privately Listed	Dummy variable equals to 1 if the firms is a limited liability company	WBES	B1	B1: Legal Status of The Firm Privately Listed = 1 if the answer is "Shareholding company with non-traded/privately traded shares".
Obstacles	Firm's assessment of growth obstacle induced by an inadequately educated workforce (ranges from 0 (no obstacle) to 4)	WBES	L30B	How much of an obstacle is the inadequately educated workforce? (1 – "No obstacle"; 2 – "Minor obstacle", 3 – "Major obstacle", 4 – "Very severe obstacle").
WK	Proportion of goods or services paid for after the delivery	WBES	K2C or C2A3 depending on the year of the dataset	In last fiscal year, what is the percentage of total annual sales paid for after delivery?

Construction	Dummy variable equals to 1 if the firm submit an application to obtain a construction-related permit over the last two years	WBES	G2	Application to obtain a construction-related permit submitted over the last two years? Yes/no question.
Country-level variables				
CR3	Share of banking system assets held by the three largest banks	GFDD[b]	Bank concentration (%)	"Share of assets held by three largest banks as percent of total assets" (Global Financial Development Database (GFDD), The World Bank).
Boone	Value of the Boone index	GFDD	Boone indicator	-
Lerner	Value of the Lerner index	GFDD	Lerner index	-
H-stat	Value of the H-statistics	GFDD	H-statistic	-
Financial Development	Domestic credit to the private sector to GDP	GFDD	Domestic credit to private sector (as a percentage of GDP)	-
GDP per capita	GDP per capita (Constant USD)	WDI[c]	GDP per capita (constant US$)	"GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products" (World Bank national accounts data, and OECD National Accounts data files).
Growth	Real growth of the GDP	WDI	GDP growth (annual %)	"Annual percentage growth rate of GDP at market prices based on constant local currency" (World Bank national accounts data, and OECD National Accounts data files).
Inflation	Annual change in the GDP deflator	WDI	Inflation, GDP deflator (annual %)	"Inflation as measured by the annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency" (World Bank national accounts data, and OECD National Accounts data files).
Legal Rights	The strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders (0–10)	DB[d]		"Whether certain features that facilitate lending exist within the appli-cable collateral and bankruptcy laws" (World Bank Group, Doing Business Project http://www.doingbusiness.org/).
Credit Information	Depth of credit information index is a measure of the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau (0–6)	DB		"Coverage, scope and accessibility of credit information available through credit reporting service providers such as credit bureaus or credit registries" (World Bank Group, Doing Business Project http://www.doingbusiness.org/).
Institutional Development	Composite index of institutional development	WGI[e]	Government Effectiveness	"The quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and

				implementation, and the credibility of the government's commitment to such policies" (Kaufmann, Kraay, & Mastruzzi, 2011).
Crisis (NBER)	Dummy variable equals to 1 if a country at a certain year experienced crisis (not only Financial Crisis 2008)	Federal Reserve Bank of St. Louis	Recession dummy	-
Robustness variables				
Foreign Banks		Claessens and van Horen (2015)		
Financial Freedom		The Heritage Foundation		
Activity Restrictions		BRSS[f]		
Non-capital cities		WBES	A3C, A2, City	A3C: Is the firm located in the main business city?

Note: a = World Bank Enterprise Surveys; b = Global Financial Development Database; c = World Development Indicators; d = Doing Business Database; e = World Governance Indicators; f = World Bank's Bank Regulation and Supervision Survey

Table 6: Access to credit and interbank competition per country, the "Old Dataset"

Country	Year	# of firms	Need	Credit	Apply	Accept	CR3	Boone	Lerner	H-stat
1. Albania	2007	296	46.53	66.37	69.78	98.68	91.03	-0.11	0.23	-
2. Angola*	2006	425	-	24.64	16.71	24.64	77.11	-0.09	0.29	-
3. Argentina***	2006	1,014	65.58	0	54.31	-	46.40	-0.12	0.22	-
4. Armenia***	2009	355	58.36	0	71.22	-	47.77	-0.14	0.31	-
5. Azerbaijan***	2009	356	55.40	0	29.80	-	60.67	-0.09	0.49	-
6. Belarus***	2008	269	74.43	0	70.71	-	80.60	-1.76	0.24	-
7. Bolivia	2006	602	65.28	56	62.76	91.70	72.99	-0.09	0.19	-
8. Bosnia***	2009	347	76.83	0.00	73.03	-	56.22	-0.04	0.19	-
9. Botswana*	2006	342	22.58	46.15	19.01	77.42	78.49	-0.13	0.28	-
10. Brazil**/***	2009	1,719	66.76	0	77.98	-	46.92	-0.13	0.16	-
11. Bulgaria***	2007/ 2009	1287	44.43	0	48.02	-	40.53	-0.10	0.28	-
12. Burundi*	2006	270	59.66	34.03	27.04	67.12	100.00	20.15	0.20	-
13. Chile	2006	982	69.65	84.23	87.56	97.09	55.98	-0.01	0.21	-
14. Colombia	2006	990	74.44	77.69	82.90	94.00	66.17	-0.20	0.33	-
15. Croatia	2007	619	65.40	61.33	74.38	82.14	54.72	-0.14	0.27	-
16. Czech.Rep.***	2009	235	53.25	0	76.80	-	67.16	-0.11	0.26	-
17. D.R. Of Congo*	2006	340	85.03	6.52	12.35	28.57	61.59	-	-	-
18. Ecuador	2006	639	67.76	80.52	84.15	96.03	49.75	0.02	0.25	-
19. El Salvador**	2006	679	60.00	66.33	72.35	92.58	72.68	-0.04	0.32	-
20. Estonia**	2009	270	53.76	0	81.38	-	93.38	-0.16	0.21	-
21. Gabon	2009	165	50.32	0	29.11	-	100.00	-0.11	-	-
22. Gambia*	2006	174	61.07	14.66	14.37	68.00	100.00	-0.12	0.33	-
23. Georgia**	2008	351	62.43	0	70.59	-	71.03	-0.05	0.27	-
24. Ghana	2007	614	82.57	17.36	28.40	61.11	88.27	-0.18	0.45	-
25. Guatemala	2006	509	47.71	60.70	66.67	93.29	49.88	-0.09	0.41	-
26. Honduras	2006	425	61.41	61.72	68.58	90.80	52.86	-0.16	0.18	-
27. Hungary	2009	283	40.99	0	74.14	-	47.20	-0.14	0.21	-
28. Iraq***	2011	692	67.01	0	27.72	-	91.10	0.00	-	-
29. Ivory Coast***	2009	501	87.27	0	14.59	-	61.04	-0.09	0.26	-
30. Kazakhstan***	2009	519	60.62	0	60.19	-	62.77	0.33	0.33	-
31. Laos	2009	352	43.23	27.33	27.33	100.00	96.96	0.00	-	-

32. Latvia***	2009	263	59.16	0	64.29	-	60.70	-0.22	0.17	-
33. Lesotho***	2009	140	53.68	0	60.81	-	100.00	-0.18	-	-
34. Liberia***	2009	150	65.75	0	34.69	-	-	0.00	-	-
35. Lithuania***	2009	268	59.00	0	80.75	-	72.52	-0.03	0.27	-
36. Macedonia***	2009	358	58.87	0	60.95	-	72.76	-0.08	0.28	-
37. Madagascar**/***	2009	441	60.59	0	39.47	-	89.72	-0.01	0.30	-
38. Mali	2007	490	85.31	10.53	31.34	33.59	70.03	-0.06	0.33	-
39. Mauritania*	2006	237	81.22	10.40	23.63	38.18	75.22	-0.02	0.49	-
40. Mauritius***	2009	391	40.85	0	60.37	-	50.56	-0.02	0.31	-
41. Mexico**	2006	1434	37.31	23.35	31.30	83.70	62.48	0.08	-	-
42. Moldova***	2009	354	70.74	0	71.31	-	45.83	-0.10	0.29	-
43. Mongolia***	2009	356	81.46	0	71.38	-	100.00	-0.06	0.59	-
44. Montenegro***	2009	114	78.07	0	64.04	-	80.03	0.02	0.00	-
45. Mozambique	2007	599	77.68	14.32	22.53	64.08	100.00	-0.04	0.27	-
46. Namibia*	2006	329	18.79	47.60	20.67	69.12	78.05	-0.02	-	-
47. Nicaragua	2006	458	57.11	57.98	64.37	90.85	84.00	-0.05	-	-
48. Panama	2006	599	45.24	69.91	74.51	98.14	44.25	-0.14	0.33	-
49. Paraguay	2006	584	60.39	60.62	63.56	95.17	52.76	0.13	0.13	-
50. Peru	2006	622	76.85	78.85	81.47	97.11	76.83	-0.12	0.42	-
51. Poland***	2009	428	52.21	0	71.10	-	37.12	-0.10	0.23	-
52. Romania***	2009	519	62.04	0	71.03	-	53.46	-0.12	0.27	-
53. Russia**/***	2009	941	69.51	0	68.47	-	21.59	-0.06	0.25	-
54. Rwanda*	2006	212	67.59	38.03	33.02	78.26	87.01	-0.13	0.23	-
55. Senegal	2007	504	79.96	15.63	28.78	54.31	69.25	-0.08	0.35	-
56. Serbia***	2009	380	76.06	0	77.00	-	39.93	-0.97	0.14	-
57. Sierra-Leone***	2009	145	79.31	0	35.65	-	60.97	-0.28	0.14	-
58. Slovak. Rep.***	2009	262	52.11	0	68.15	-	63.99	0.00	0.27	-
59. Slovenia***	2009	272	64.07	0.00	91.95	-	53.99	8.66	0.18	-
60. South Africa	2007	1046	49.23	35.09	42.64	82.19	76.00	-0.12	0.15	-
61. Sri Lanka***	2011	588	73.71	0	33.17	-	100.00	0.00	0.27	0.55
62. Swaziland*	2006	307	32.11	41.80	20.07	83.61	81.10	-0.41	0.20	-
63. Tajikistan***	2008	341	61.95	0	58.02	-	100.00	-0.27	-	-
64. Tanzania*	2006	419	77.69	39.36	22.91	78.72	57.48	-0.03	0.35	-
65. Turkey***	2008	1091	64.15	0	87.50	-	42.51	-0.09	0.21	-
66. Uganda*	2006	563	60.68	40.08	20.43	84.82	62.99	-0.03	-	-
67. Ukraine***	2008	817	67.12	0	54.93	-	48.59	-0.14	0.26	-
68. Uruguay	2006	611	61.70	43.02	49.87	90.59	68.29	0.68	0.18	-
69. Zambia	2007	600	63.55	23.68	30.45	77.59	54.97	-0.09	0.32	-

** Omitted because of no information on reliability ** Omitted because one or more firm-level and/or country-level variables were missing *** Variables necessary to construct Accept(ed) were missing (no k18, k19, k20a, or k20a1 in the original World Bank's document)*

Table 7: Access to credit and interbank competition per country, the "New Dataset 2010 – 2019"

Country	Year	# of firms	Need	Credit	Apply	Accept	CR3	Boone	Lerner	H-stat
1. Albania	2013	342	30.54	31.03	32	96.43	56.35	-0.05	0.26	0.48
2. Angola	2010	318	49.50	0.00	21.25	.	66.29	-0.05	0.47	.
3. Argentina**	2017	968	65.62	53.45	55.72	97.18	52.45	.	.	.
3. Argentina	2010	967	78.71	0.00	59.95	.	42.32	-0.15	0.26	.
4. Armenia	2013	355	55.43	60.94	63.08	96.69	38.81	-0.13	0.25	0.64
5. Azerbaijan	2013	386	50.55	26.14	28.88	100.00	56.35	-0.07	0.30	0.44
6. Belarus**	2018	576	55.04	54.14	52.60	94.01	49.79	.	.	.

6. Belarus	2013	353	59.82	48.81	58.13	96.47	59.62	-1.56	0.20	0.81
7. Bolivia**	2017	344	61.54	57.53	59.81	96.40	43.52	.	.	.
7. Bolivia***	2010	298	61.19	0.00	70.00	.	72.40	-0.10	0.27	.
8. Bosnia**	2019	350	45.83	60.14	63.06	95.70	.	.	.	.
8. Bosnia	2013	358	46.55	60.87	63.69	92.45	44.65	-0.04	0.26	0.44
9. Botswana***	2010	257	44.27	0.00	51.79	.	74.21	-0.11	0.19	.
10. Brazil*	-	-	-	-	-	-	-	-	-	-
11. Bulgaria	2013	290	50.18	35.71	35.57	96.15	42.99	-0.08	0.25	0.58
12. Burundi	2014	151	74.00	53.15	56.76	93.65	100.00	0.13	0.28	0.66
13. Chile***	2010	982	69.57	0.00	84.08	.	59.84	-0.04	0.36	.
14. Colombia**	2017	950	75.74	71.27	73.91	96.72	78.69	.	.	.
14. Colombia***	2010	891	77.56	0.00	79.22	.	70.91	-0.16	0.37	.
15. Croatia**	2019	397	38.04	82.55	84.77	97.62	.	.	.	.
15. Croatia	2013	353	51.30	40.46	55.25	73.68	58.18	-0.09	0.28	0.41
16. Czech.Rep.**	2019	499	35.15	84.97	86.78	98.00	.	.	.	.
16. Czech.Rep.	2013	248	34.31	75.31	75.86	93.85	61.61	-0.08	0.38	0.52
17. D.R. Of Congo	2013	519	65.63	19.24	27.85	87.50	.	0.00	.	.
18. Ecuador**	2017	347	65.90	66.97	70.31	96.69	58.61	.	.	.
18. Ecuador***	2010	343	65.98	0.00	85.33	.	54.31	0.05	0.17	.
19. El Salvador**	2016	699	54.84	52.05	53.58	95.48	82.17	.	.	.
19. El Salvador	2010	274	69.60	0.00	67.89	.	63.91	-0.01	0.33	.
20. Estonia**	2019	360	34.83	73.11	77.95	92.55	.	.	.	.
20. Estonia	2013	272	38.64	70.59	72.38	94.74	93.93	-0.11	.	0.86
21. Gabon*	-	-	-	-	-	-	-	-	-	-
22. Gambia**	2018	151	83.45	14.05	15.32	89.47	100.00	.	.	.
23. Georgia**	2019	561	41.02	72.07	78.26	90.91	.	.	.	.
23. Georgia	2013	355	44.76	63.64	68.55	93.33	72.97	-0.01	0.28	0.31
24. Ghana	2013	714	77.83	26.78	30.64	87.20	39.08	-0.13	0.43	0.19
25. Guatemala**	2017	325	47.98	61.59	64.52	95.88	66.77	.	.	.
25. Guatemala	2010	447	54.46	0.00	61.51	.	66.47	-0.06	1.02	.
26. Honduras**	2016	329	57.41	53.59	55.43	96.04	54.84	.	.	.
26. Honduras	2010	305	65.17	0.00	62.24	.	53.56	-0.10	0.25	.
27. Hungary	2013	298	51.05	45.14	49.32	91.55	52.20	-0.13	0.10	0.61
28. Iraq*	-	-	-	-	-	-	-	-	-	-
29. Ivory Coast**	2016	347	67.18	25.12	34.23	81.25	49.36	.	.	.
30. Kazakhstan	2019	1409	42.18	30.27	39.63	80.77	.	.	.	.
30. Kazakhstan	2013	595	46.70	28.69	38.26	80.00	46.16	0.18	0.32	0.65
31. Laos**	2018	324	42.57	47.24	44.76	96.77	79.93	.	.	.
31. Laos**	2016	363	53.69	25.93	26.42	96.08	78.99	.	.	.
31. Laos**	2012	377	47.66	61.21	61.33	98.06	94.65	0.00	.	.
32. Latvia**	2019	355	37.91	58.06	64.06	91.14	.	.	.	.
32. Latvia	2013	332	25.16	30.26	39.33	69.70	50.60	-0.17	0.36	0.32
33. Lesotho**	2016	142	54.29	50.00	52.63	97.37	96.81	.	.	.
34. Liberia**	2017	149	65.31	25.81	30.21	92.31	.	.	.	.
35. Lithuania**	2019	358	33.05	52.59	64.41	82.43	.	.	.	.
35. Lithuania	2013	262	45.15	44.23	51.24	77.97	83.85	-0.02	0.28	0.87
36. Macedonia**	2019	356	45.82	51.59	53.05	95.29	.	.	.	.
36. Macedonia	2013	357	42.94	48.00	50.66	96.00	68.24	-0.06	0.22	0.31
37. Madagascar**	2013	527	46.72	21.90	20.35	92.98	93.58	0.02	0.21	0.60

38. Mali**	2016	169	72.48	43.69	49.11	90.00	48.92	.	.	.
39. Mauritania	2014	145	68.06	38.54	44.90	88.10	69.39	0.00	0.47	0.22
40. Mauritius*	-	-	-	-	-	-	-	-	-	-
41. Mexico**	2010	1308	56.27	0.00	62.99	.	58.06	-0.05	.	.
42. Moldova**	2019	345	54.41	33.89	41.18	84.72	.	.	.	.
42. Moldova	2013	339	43.56	44.29	50.68	84.93	51.88	-0.02	0.28	0.42
43. Mongolia**	2019	354	83.05	42.32	47.96	88.57	.	.	.	.
43. Mongolia	2013	357	72.91	55.19	63.39	89.26	96.54	-0.04	.	.
44. Montenegro**	2019	149	54.93	64.10	63.75	98.04	.	.	.	.
44. Montenegro	2013	149	61.67	34.72	40.00	89.29	60.05	0.00	0.00	.
45. Mozambique**	2018	585	55.06	12.29	19.81	84.09	76.89	.	.	.
46. Namibia	2014	566	49.70	33.18	41.92	91.14	85.45	-0.01	.	0.49
47. Nicaragua**	2016	324	51.10	60.25	61.59	97.98	94.67	.	.	.
48. Panama	2010	209	23.38	0.00	57.14	.	56.39	-0.12	0.32	.
49. Paraguay**	2017	355	44.84	80.00	79.49	100.00	49.22	.	.	.
49. Paraguay	2010	353	66.76	0.00	82.83	.	59.81	-0.06	0.19	-
50. Peru**	2017	956	76.97	80.26	82.26	97.41	71.89	.	.	.
50. Peru	2010	932	82.65	0.00	85.81	.	75.45	-0.09	0.46	.
51. Poland**	2019	1309	28.81	46.94	46.95	94.71	.	.	.	.
51. Poland	2013	529	35.77	62.89	69.32	90.91	34.32	-0.08	0.29	0.67
52. Romania	2013	534	61.89	56.35	60.79	93.33	55.28	-0.04	0.23	0.92
53. Russia**	2019	1299	53.79	22.19	27.59	86.55	.	.	.	.
53. Russia**	2012	4152	57.57	35.72	47.34	77.60	26.93	-0.10	0.06	0.72
54. Rwanda**	2019	359	66.67	25.33	28.63	87.88	.	.	.	.
55. Senegal	2014	575	65.36	20.60	24.01	97.18	59.62	-0.05	0.29	0.37
56. Serbia**	2019	351	50.88	79.04	78.65	99.25	.	.	.	.
56. Serbia	2013	355	62.68	60.73	62.16	97.08	39.80	-0.28	0.01	0.74
57. Sierra-Leone**	2017	150	72.67	18.10	27.52	73.08	.	.	.	.
58. Slovak. Rep.**	2019	422	30.24	39.20	43.31	92.45	.	.	.	.
58. Slovak. Rep.	2013	267	37.80	58.24	63.54	94.64	65.43	0.01	0.27	0.60
59. Slovenia**	2019	400	44.19	86.13	87.01	98.03	.	.	.	.
59. Slovenia	2013	262	48.45	73.39	77.17	93.81	51.49	6.50	0.25	0.60
60. South Africa*	-	-	-	-	-	-	-	-	-	-
61. Sri Lanka*	-	-	-	-	-	-	-	-	-	-
62. Swaziland**	2016	141	59.85	25.32	25.00	100.00	87.42	.	.	.
63. Tajikistan**	2019	340	36.22	36.84	39.67	93.33	.	.	.	.
63. Tajikistan	2013	345	42.73	42.22	46.85	93.44	95.71	-0.28	.	.
64. Tanzania	2013	696	74.20	15.97	18.62	91.25	51.81	-0.03	0.24	0.40
65. Turkey**	2019	1611	50.80	46.38	47.82	97.29	.	.	.	.
65. Turkey	2015	5941	43.36	43.39	45.29	93.84	38.49	-0.03	0.22	0.78
65. Turkey	2013	1294	46.15	79.77	79.38	97.18	39.54	-0.03	0.26	0.75
66. Uganda	2013	702	58.28	13.18	16.30	92.00	52.87	-0.06	0.36	0.37
67. Ukraine**	2019	1293	63.98	19.31	25.00	85.23	.	.	.	.
67. Ukraine	2013	979	62.17	21.24	25.92	88.49	26.99	-0.25	0.15	0.74
68. Uruguay**	2017	337	56.57	70.12	75.40	95.83	69.20	.	.	.
69. Zambia**	2019	594	64.35	10.80	17.85	78.00	.	.	.	.
69. Zambia	2013	700	55.30	15.91	22.25	80.00	50.70	-0.10	0.32	0.47

*Note: *No update ** One/More firm-level and/or country-level control variable(s) is/are missing ***Impossible to construct Accepted (no k18, k19, k20a1, k20a)*

Table 8: The determinants of need of credit. Replication of Leon (2015) with "Old Dataset 2006-2011"

VARIABLES	(1) None	(2) CR3	(4) Boone	(6) Lerner
Firm-level variables				
ln (Firm Size)	0.0219**	0.0216**	0.0214**	0.0234**
	(0.00897)	(0.00898)	(0.00897)	(0.00933)
ln (Firm Age)	-0.0193	-0.0203	-0.0187	-0.0230
	(0.0135)	(0.0135)	(0.0135)	(0.0141)
ln (Experience)	-0.00253	-0.000962	-0.00241	-0.00782
	(0.0152)	(0.0152)	(0.0152)	(0.0159)
Largest Owner	-0.000644*	-0.000676*	-0.000617	-0.000599
	(0.000379)	(0.000381)	(0.000379)	(0.000392)
Foreign-owned	-0.324***	-0.321***	-0.323***	-0.325***
	(0.0344)	(0.0346)	(0.0344)	(0.0361)
State-owned	0.0908	0.0781	0.0828	0.135
	(0.126)	(0.127)	(0.126)	(0.139)
Exporter	0.0926***	0.0916***	0.0944***	0.0812***
	(0.0259)	(0.0259)	(0.0259)	(0.0266)
Subsidiary	-0.252***	-0.251***	-0.253***	-0.241***
	(0.0307)	(0.0308)	(0.0308)	(0.0322)
Audited	0.00287	0.00361	0.00118	-0.00630
	(0.0203)	(0.0203)	(0.0203)	(0.0214)
Publicly listed	-0.104**	-0.0978**	-0.0995**	-0.0731
	(0.0486)	(0.0489)	(0.0487)	(0.0522)
Privately held	-0.0845***	-0.0845***	-0.0803***	-0.113***
	(0.0229)	(0.0229)	(0.0230)	(0.0241)
Obstacles	0.0649***	0.0650***	0.0644***	0.0649***
	(0.00737)	(0.00737)	(0.00738)	(0.00772)
WK	0.000923***	0.000922***	0.000927***	0.00121***
	(0.000263)	(0.000263)	(0.000263)	(0.000276)
Construction	0.268***	0.269***	0.269***	0.298***
	(0.0267)	(0.0267)	(0.0267)	(0.0278)
Country-level variables				
Competition		**0.000497**	**-0.0190***	**-0.160**
		(0.000723)	**(0.00983)**	**(0.128)**
Financial Development	-0.000931**	-0.000982**	-0.000905**	-0.000569
	(0.000372)	(0.000387)	(0.000373)	(0.000384)
ln (GDP per capita)	-0.155***	-0.154***	-0.153***	-0.186***
	(0.0187)	(0.0198)	(0.0188)	(0.0217)
Growth	0.0127***	0.0123***	0.0126***	0.0118**
	(0.00455)	(0.00462)	(0.00455)	(0.00492)
Inflation	0.00423***	0.00410***	0.00413***	0.00537***
	(0.000830)	(0.000851)	(0.000831)	(0.000914)
Legal Rights	-0.0512***	-0.0497***	-0.0528***	-0.0656***
	(0.00490)	(0.00552)	(0.00498)	(0.00531)
Credit Information	-0.0259***	-0.0254***	-0.0292***	-0.0319***
	(0.00530)	(0.00537)	(0.00559)	(0.00567)
Institutional Development	0.145***	0.144***	0.154***	0.112***
	(0.0230)	(0.0232)	(0.0235)	(0.0254)
Crisis (LEON (2015))	0.0535*	0.0538*	0.0602**	0.0904***
	(0.0279)	(0.0289)	(0.0281)	(0.0298)
Industry FE	YES	YES	YES	YES
Observations	20,038	19,991	20,038	18,531
# of Countries	54	54	54	54

Dependent variable is a dummy Need = 1 if the firm desired bank credit and 0 otherwise
Robust standard errors in parentheses.
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Estimates are obtained with the help of simple probit model.
**** p<0.01, ** p<0.05, * p<0.1*

Table 9: The determinants of need of credit. Extension of Leon (2015) with "Combined Dataset 2006-2019 (incl. 2010)"

VARIABLES	(1) None(L)	(2) CR3(L)	(3) Boone(L)	(4) Lerner(L)	(5) H-stat(L)
Firm-level variables					
ln (Firm Size)	0.0261***	0.0274***	0.0262***	0.0283***	0.00261
	(0.00661)	(0.00665)	(0.00661)	(0.00688)	(0.0127)
ln (Firm Age)	-0.00421	-0.00608	-0.00439	-0.0126	0.0110
	(0.0102)	(0.0103)	(0.0102)	(0.0107)	(0.0210)
ln (Experience)	0.0209*	0.0232**	0.0209*	0.0216*	0.0210
	(0.0109)	(0.0110)	(0.0109)	(0.0114)	(0.0202)
Largest Owner	-0.000797***	-0.000813***	-0.000803***	-0.000750***	-0.000238
	(0.000274)	(0.000275)	(0.000274)	(0.000283)	(0.000533)
Foreign-owned	-0.337***	-0.341***	-0.337***	-0.344***	-0.297***
	(0.0249)	(0.0251)	(0.0249)	(0.0260)	(0.0497)
State-owned	-0.0283	-0.0327	-0.0265	-0.0322	-0.0434
	(0.103)	(0.104)	(0.103)	(0.111)	(0.206)
Exporter	0.0526***	0.0524***	0.0523***	0.0499***	0.0474
	(0.0186)	(0.0186)	(0.0186)	(0.0191)	(0.0345)
Subsidiary	-0.154***	-0.154***	-0.153***	-0.140***	-0.165***
	(0.0220)	(0.0222)	(0.0221)	(0.0230)	(0.0444)
Audited	0.0377**	0.0399***	0.0380**	0.0313**	0.0850***
	(0.0148)	(0.0149)	(0.0148)	(0.0155)	(0.0274)
Publicly listed	-0.108***	-0.103***	-0.109***	-0.0663*	0.108
	(0.0366)	(0.0367)	(0.0367)	(0.0385)	(0.0962)
Privately held	-0.0870***	-0.0857***	-0.0879***	-0.0806***	0.0418
	(0.0165)	(0.0166)	(0.0166)	(0.0173)	(0.0365)
Obstacles	0.0814***	0.0804***	0.0815***	0.0784***	0.0606***
	(0.00540)	(0.00544)	(0.00541)	(0.00566)	(0.0105)
WK	0.00201***	0.00201***	0.00201***	0.00223***	0.00315***
	(0.000196)	(0.000196)	(0.000196)	(0.000204)	(0.000380)
Construction	0.222***	0.221***	0.222***	0.234***	0.108***
	(0.0193)	(0.0193)	(0.0193)	(0.0202)	(0.0380)
Country-level variables					
Competition		**0.00139*** **	**0.00440**	**-0.129***	**0.283*** **
		(0.000462)	**(0.00800)**	**(0.0667)**	**(0.0886)**
Financial Development	-0.00130***	-0.00142***	-0.00130***	-0.00135***	0.000717
	(0.000304)	(0.000306)	(0.000304)	(0.000314)	(0.00127)
ln (GDP per capita)	-0.159***	-0.157***	-0.160***	-0.202***	-0.158***
	(0.0132)	(0.0142)	(0.0133)	(0.0150)	(0.0331)
Growth	-0.00360	-0.00459**	-0.00347	-0.00701***	0.0180***
	(0.00230)	(0.00232)	(0.00231)	(0.00247)	(0.00594)
Inflation	0.00437***	0.00437***	0.00442***	0.00465***	0.00253**
	(0.000607)	(0.000618)	(0.000613)	(0.000634)	(0.00126)
Legal Rights	-0.0257***	-0.0213***	-0.0253***	-0.0366***	0.00727
	(0.00329)	(0.00353)	(0.00334)	(0.00348)	(0.00670)
Credit Information	-0.0116***	-0.00968**	-0.0108**	-0.0173***	-0.0373***
	(0.00400)	(0.00409)	(0.00424)	(0.00430)	(0.0104)
Inst. Dev.	0.0384**	0.0426**	0.0368**	0.0541***	-0.122***
	(0.0165)	(0.0174)	(0.0167)	(0.0183)	(0.0442)
Crisis (LEON (2015))	0.0714***	0.0711***	0.0706***	0.104***	0.463***
	(0.0207)	(0.0212)	(0.0208)	(0.0221)	(0.0814)
Observations	36,821	36,379	36,821	33,926	10,952
Industry FE	YES	YES	YES	YES	YES

The dependent variable is a dummy Need: 1 if the firm desired bank credit and 0 otherwise
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Robust standard errors in parentheses.
Estimates are obtained with the help of simple probit model.
**** p<0.01, ** p<0.05, * p<0.1*

Table 10: Interbank competition and credit availability. Replication of Leon (2015) by using the "Old Dataset 2006-2011"

VARIABLES	(1) None	(2) CR3	(3) Boone Indicator	(4) Lerner Index
Firm-level variables				
ln (Firm Size)	0.143***	0.151***	0.201***	0.210***
	(0.0249)	(0.0306)	(0.0591)	(0.0580)
ln (Firm Age)	-0.00263	0.00205	0.0153	0.00869
	(0.0186)	(0.0204)	(0.0271)	(0.0180)
ln (Experience)	0.0161	0.0191	0.00972	-0.00295
	(0.0231)	(0.0234)	(0.0344)	(0.0331)
Largest Owner	0.000337	0.000607	0.000751	0.000151
	(0.000756)	(0.000838)	(0.00114)	(0.00113)
Foreign-owned	-0.0259	-0.0236	-0.00547	-0.0340
	(0.0382)	(0.0412)	(0.0563)	(0.0551)
State-owned	-0.241*	-0.267	-0.235	-0.357**
	(0.141)	(0.163)	(0.168)	(0.170)
Exporter	-0.00398	-0.0106	-0.0248	0.0133
	(0.0302)	(0.0345)	(0.0510)	(0.0615)
Subsidiary	0.0289	0.0414	-0.0218	0.0981
	(0.0469)	(0.0529)	(0.0784)	(0.0756)
Audited	0.152***	0.173**	0.167**	0.216**
	(0.0588)	(0.0682)	(0.0840)	(0.0932)
Publicly listed	0.103**	0.115**	0.243	0.192*
	(0.0479)	(0.0555)	(0.179)	(0.101)
Privately held	0.153***	0.169***	0.255*	0.241**
	(0.0537)	(0.0621)	(0.143)	(0.123)
Obstacles	-0.00110	3.48e-05	-0.00741	0.00806
	(0.0127)	(0.0131)	(0.0185)	(0.0196)
Country-level variables				
Competition		**0.00567**	**-0.0788**	**0.880**
		(0.00577)	**(0.330)**	**(0.724)**
Financial Development	8.65e-05	-0.000499	-0.00153	-1.49e-05
	(0.00228)	(0.00285)	(0.00381)	(0.00359)
ln (GDP per capita)	0.0475	0.101	0.0338	0.0690
	(0.0893)	(0.122)	(0.172)	(0.156)
Growth	-0.0188	-0.0343	-0.0973	-0.0213
	(0.0247)	(0.0312)	(0.0743)	(0.0337)
Inflation	0.000705	-2.22e-05	-0.00294	-0.000372
	(0.00275)	(0.00326)	(0.00476)	(0.00355)
Legal Rights	-0.0460	-0.0292	-0.0369	-0.0518
	(0.0478)	(0.0564)	(0.0592)	(0.0709)
Credit Information	0.0541	0.0556*	0.0874	0.0685
	(0.0334)	(0.0333)	(0.0560)	(0.0514)
Institutional Development	0.0206	-0.00210	0.139	0.0422
	(0.106)	(0.142)	(0.293)	(0.205)
Crisis (LEON (2015))	-2.269***	-2.332***	-2.393**	-5.116***
	(0.362)	(0.376)	(0.933)	(1.978)
Industry FE	YES	YES	NO	YES
Observations	19,629	19,613	20,261	18,983
# of Countries	54	54	54	54
Wald test	18.97***	10.25**	1.46	1.28

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
**** p<0.01, ** p<0.05, * p<0.1*

Table 11: Baselines results without control variables by using the "Combined Dataset 2006 – 2019"

VARIABLES	(1) CR3	(2) Boone	(3) H-stat
Competition	**0.000525**	**0.0574*** **	**0.317** **
	(0.00174)	**(0.0210)**	**(0.134)**
Observations	55,644	51,597	37,993
Selected observations	26,163	22,116	8,512
Control variables	NO	NO	NO
Wald test	945.81***	380.62***	268.18***

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Model with Lerner Index has bit omitted since no convergence could be achieved.
*** p<0.01, ** p<0.05, * p<0.1*

Table 12: Baseline results for crisis years without controls by using the "Combined Dataset 2006 – 2019"

VARIABLES	(1) CR3	(2) Boone	(3) Lerner	(4) H-stat
Competition	-0.00114	0.0670***	1.590**	0.00963
	(0.00411)	(0.0140)	(0.739)	(1.635)
Crisis (NBER)	-0.807**	-0.166	-6.238***	-0.118
	(0.381)	(0.206)	(2.397)	(1.109)
Crisis (NBER) # Competition	**0.0136** **	**-0.193*** **	**21.48*** **	**0.491**
	(0.00566)	**(0.0691)**	**(8.191)**	**(1.739)**
Observations	35,163	35,163	34,314	32,731
Control variables	NO	NO	NO	NO
Wald Test	12.06***	14.02***	7.91**	4.69**

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Model with Lerner Index has bit omitted since no convergence could be achieved.
*** p<0.01, ** p<0.05, *p<0.1*

Table 13: Baseline results only with firm-level controls by using the "Combined Dataset 2006 – 2019"

VARIABLES	(1) None	(2) CR3	(3) Boone	(4) Lerner	(5) H-stat
Firm-level variables					
ln (Firm Size)	0.115***	0.127***	0.102***	0.112***	0.0926***
	(0.0152)	(0.0204)	(0.0200)	(0.0216)	(0.0146)
ln (Firm Age)	0.0140	0.00809	0.00432	-0.00347	0.00769
	(0.0143)	(0.0154)	(0.0141)	(0.0162)	(0.0166)
ln (Experience)	0.0328***	0.0213	0.0114	0.0164	0.0303*
	(0.0124)	(0.0129)	(0.0141)	(0.0158)	(0.0184)
Largest Owner	-0.000309	0.000334	0.000395	0.000203	-0.000377
	(0.000390)	(0.000425)	(0.000420)	(0.000420)	(0.000475)
Foreign-owned	-0.107***	-0.132***	-0.123***	-0.112***	-0.105**
	(0.0301)	(0.0332)	(0.0356)	(0.0378)	(0.0415)
State-owned	-0.149**	-0.208***	-0.112	-0.115	-0.0219
	(0.0679)	(0.0652)	(0.0830)	(0.0902)	(0.0928)
Exporter	0.0968***	0.0889***	0.0899***	0.0960***	0.0984***
	(0.0269)	(0.0312)	(0.0324)	(0.0359)	(0.0321)
Subsidiary	0.0228	-0.00184	-0.000861	0.0125	0.00737
	(0.0306)	(0.0319)	(0.0366)	(0.0379)	(0.0396)
Audited	0.169***	0.143***	0.156***	0.154***	0.167***
	(0.0327)	(0.0297)	(0.0264)	(0.0322)	(0.0334)
Publicly listed	-0.0232	0.0517	0.0883*	0.0747	0.144*
	(0.0494)	(0.0542)	(0.0506)	(0.0523)	(0.0821)
Privately held	0.145***	0.213***	0.231***	0.210***	0.160**
	(0.0417)	(0.0444)	(0.0518)	(0.0548)	(0.0652)
Obstacles	-0.0255***	-0.0282**	-0.0264***	-0.0311**	-0.00201
	(0.00984)	(0.0112)	(0.0102)	(0.0122)	(0.0115)
Competition		**0.000203**	**0.0360**	**-0.342**	**0.184**
		(0.00136)	**(0.0253)**	**(0.227)**	**(0.150)**
Observations	57,242	52,155	48,317	46,277	37,150
Selected observations	27,761	22,674	18,836	16,796	7,669
Industry FE	YES	YES	YES	YES	YES
Firm-level controls	YES	YES	YES	YES	YES
Wald test	131.93***	64.55***	63.16***	44.95***	122.74***

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator, and Lerner index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
**** p<0.01, ** p<0.05, * p<0.1*

Table 14: Baseline results with firm-level controls and interaction for crisis years using the "Combined Dataset 2006 – 2019"

	(1)	(2)	(3)	(4)
VARIABLES	CR3	Boone	Lerner	H-stat
Firm-level variables				
ln (Firm Size)	0.121***	0.123***	0.167***	0.113**
	(0.0445)	(0.0397)	(0.0536)	(0.0485)
ln (Firm Age)	0.0420	0.0337	-0.0351	0.0110
	(0.0285)	(0.0247)	(0.0384)	(0.0236)
ln (Experience)	0.0567	0.0520	0.0671	0.0317
	(0.0364)	(0.0386)	(0.0562)	(0.0249)
Largest Owner	-0.000180	0.000164	-0.000158	-0.000329
	(0.000558)	(0.000625)	(0.000834)	(0.000557)
Foreign-owned	-0.258***	-0.309***	-0.230***	-0.0888
	(0.0673)	(0.0774)	(0.0807)	(0.106)
State-owned	0.174**	0.127*	0.0581	0.0589
	(0.0883)	(0.0767)	(0.0633)	(0.0649)
Exporter	0.172***	0.169***	0.169**	0.155***
	(0.0595)	(0.0645)	(0.0817)	(0.0414)
Subsidiary	-0.0259	-0.0449	-0.0713	0.0466
	(0.0562)	(0.0493)	(0.0652)	(0.0504)
Audited	0.261***	0.235***	0.216***	0.236***
	(0.0578)	(0.0411)	(0.0671)	(0.0635)
Publicly listed	-0.250**	-0.126	0.103*	-0.254***
	(0.101)	(0.0774)	(0.0567)	(0.0736)
Privately held	0.00601	0.119	0.236*	-0.144**
	(0.105)	(0.130)	(0.129)	(0.0686)
Obstacles	-0.0331	-0.0293	-0.0160	-0.0247
	(0.0240)	(0.0222)	(0.0283)	(0.0160)
Country-level variables				
Competition	-0.00736	0.0697***	1.322	0.0336
	(0.00561)	(0.0159)	(1.013)	(1.187)
Crisis (NBER)	-1.217**	-0.178	-10.46***	-0.281
	(0.615)	(0.278)	(4.033)	(0.914)
Crisis (NBER)#Competition	**0.0217****	**-0.287****	**37.03****	**0.634**
	(0.00971)	**(0.119)**	**(14.51)**	**(1.412)**
Observations	34,568	34,568	33,854	32,395
All controls	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES
Wald Test	15.19***	12.50***	3.92*	8.37***

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator, and Lerner index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
*** p<0.01, ** p<0.05, * p<0.1*

Table 15: Baseline results with selected firm-level and country-level control variables by using the "Combined Dataset 2006 – 2019"

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	None(L)	None(N)	CR3(L)	CR3(N)	Boone(L)	Boone(N)	Lerner(L)	Lerner(N)	H-stat(L)	H-stat(N)
Firm-level variables										
ln (Firm Size)	0.138***	0.150***	0.139***	0.150***	0.113***	0.149***	0.117***	0.170***	0.102***	0.136***
	(0.0198)	(0.0503)	(0.0205)	(0.0474)	(0.0200)	(0.0538)	(0.0193)	(0.0451)	(0.0135)	(0.0458)
ln (Firm Age)	0.0175	0.0277	0.0176	0.0256	0.0127	0.0288	9.16e-05	0.0124	0.00354	-0.00365
	(0.0159)	(0.0325)	(0.0163)	(0.0302)	(0.0150)	(0.0331)	(0.0135)	(0.0244)	(0.0152)	(0.0226)
ln (Experience)	0.0163	0.0211	0.0192	0.0173	0.0132	0.0211	0.00329	0.0302	0.00942	0.00233
	(0.0120)	(0.0404)	(0.0121)	(0.0350)	(0.0131)	(0.0419)	(0.0116)	(0.0382)	(0.0156)	(0.0167)
Largest Owner	0.000194	-0.000320	0.000265	-0.000271	0.000484	-0.000305	0.000430	-0.000273	-0.000218	-0.000113
	(0.000381)	(0.000847)	(0.000370)	(0.000807)	(0.000394)	(0.000841)	(0.000372)	(0.000868)	(0.000392)	(0.000651)
Foreign-owned	-0.105***	-0.293***	-0.122***	-0.293***	-0.120***	-0.290**	-0.116***	-0.230***	-0.133***	-0.113
	(0.0327)	(0.107)	(0.0321)	(0.0998)	(0.0334)	(0.116)	(0.0339)	(0.0797)	(0.0354)	(0.112)
State-owned	-0.226***	0.145	-0.220***	0.122	-0.0803	0.149	-0.0681	0.214**	-0.0404	0.0462
	(0.0710)	(0.0969)	(0.0699)	(0.0904)	(0.0942)	(0.100)	(0.0901)	(0.107)	(0.0773)	(0.0420)
Exporter	0.0901***	0.0512	0.0865***	0.0523	0.0976***	0.0496	0.0837***	0.0647	0.0417*	0.0187
	(0.0266)	(0.0388)	(0.0278)	(0.0378)	(0.0303)	(0.0420)	(0.0275)	(0.0416)	(0.0245)	(0.0369)
Subsidiary	-0.00710	-0.0522	-0.0134	-0.0540	-0.0170	-0.0521	0.00204	-0.0677	0.0119	0.00297
	(0.0326)	(0.0547)	(0.0334)	(0.0564)	(0.0393)	(0.0547)	(0.0379)	(0.0595)	(0.0348)	(0.0357)
Audited	0.158***	0.233***	0.149***	0.239***	0.157***	0.229***	0.145***	0.173***	0.170***	0.197***
	(0.0300)	(0.0780)	(0.0298)	(0.0774)	(0.0303)	(0.0860)	(0.0320)	(0.0534)	(0.0251)	(0.0586)
Publicly listed	0.0685	-0.0477	0.0738	-0.0406	0.139**	-0.0467	0.172***	-0.0397	0.172**	-0.100
	(0.0633)	(0.121)	(0.0609)	(0.113)	(0.0615)	(0.122)	(0.0638)	(0.138)	(0.0784)	(0.0809)
Privately held	0.169***	0.105	0.169***	0.115	0.207***	0.102	0.197***	0.106	0.122***	-0.0597
	(0.0383)	(0.179)	(0.0389)	(0.177)	(0.0475)	(0.186)	(0.0462)	(0.175)	(0.0374)	(0.0751)
Obstacles	-0.0145	-0.0217	-0.0154	-0.0225	-0.0119	-0.0212	-0.0142	-0.0158	0.00459	-0.00694
	(0.00967)	(0.0235)	(0.00991)	(0.0236)	(0.00907)	(0.0246)	(0.00997)	(0.0211)	(0.00862)	(0.00896)
Country-level variables										
Competition			**0.00167**	**-0.00474**	**0.0392**	**-0.0449**	**-0.333**	**-0.0820**	**0.461****	**-20.60*****
			(0.00159)	**(0.00955)**	**(0.0362)**	**(0.0565)**	**(0.314)**	**(2.026)**	**(0.198)**	**(5.843)**
Fin. Dev.	0.00108	-3.77e-05	0.00110	0.00115	0.000900	0.00138	-0.00104	-0.00320	-0.00273	0.107***
	(0.00204)	(0.00188)	(0.00212)	(0.00323)	(0.00193)	(0.00224)	(0.00145)	(0.00286)	(0.00281)	(0.0296)
ln (GDP per capita)	0.0636*	1.231**	0.0743*	1.249**	0.0395	1.508**	0.0218	0.683	-0.0406	-7.773***
	(0.0367)	(0.535)	(0.0395)	(0.537)	(0.0353)	(0.656)	(0.0393)	(0.624)	(0.0414)	(2.292)
Growth	0.0299**	0.147*	0.0296**	0.146**	0.0305**	0.142*	0.0187	0.0925	-0.00849	0.462***
	(0.0133)	(0.0757)	(0.0136)	(0.0738)	(0.0145)	(0.0790)	(0.0139)	(0.0906)	(0.0101)	(0.115)
Inflation	-0.00189	-0.0108	-0.00179	-0.0179	-0.00130	-0.0143	-0.00155	-0.0431	-0.000272	0.310***
	(0.00176)	(0.0187)	(0.00163)	(0.0228)	(0.00165)	(0.0207)	(0.00149)	(0.0298)	(0.00186)	(0.0970)
Inst. Dev.	0.0441	0.268	0.0337	0.230	0.0459	0.152	0.155*	-0.193	0.299***	6.833***
	(0.0655)	(0.197)	(0.0688)	(0.198)	(0.0685)	(0.277)	(0.0801)	(0.300)	(0.0869)	(2.062)
Crisis (LEON (2015))	-1.631***		-1.636***		-1.459***		-2.744***		-1.939***	
	(0.235)		(0.237)		(0.237)		(0.389)		(0.229)	
Crisis (NBER)		-0.655*		-0.652*		-0.679*		-0.837*		0.372***
		(0.373)		(0.364)		(0.371)		(0.448)		(0.143)
Observations	52,454	34,568	52,005	34,568	48,317	34,568	46,277	33,854	37,150	32,395
All controls	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Wald test	96.48***	2.60	86.61***	2.78*	79.43***	2.19	73.66***	3.85*	172.40***	10.15***

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
Note: The non-inversed of CR3, Boone indicator, and Lerner index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Models with "L" include Leon (2015)'s crisis dummy, while the ones with "N" – crisis dummy constructed by NBER.
**** p<0.01, ** p<0.05, * p<0.1*

Table 16: Baseline results with selected firm-level and country-level control variables and crisis interaction by using the "Combined Dataset 2006 – 2019"

	(1)	(2)	(3)	(4)
VARIABLES	CR3	Boone	Lerner	H-stat
Firm-level variables				
ln (Firm Size)	0.168***	0.150***	0.143**	0.136***
	(0.0431)	(0.0507)	(0.0670)	(0.0458)
ln (Firm Age)	0.0225	0.0274	-0.00774	-0.00365
	(0.0309)	(0.0326)	(0.0160)	(0.0226)
ln (Experience)	0.0105	0.0222	0.0386	0.00233
	(0.0270)	(0.0418)	(0.0570)	(0.0167)
Largest Owner	-0.000330	-0.000338	-0.000360	-0.000113
	(0.000783)	(0.000881)	(0.000832)	(0.000651)
Foreign-owned	-0.268***	-0.293***	-0.182*	-0.113
	(0.0767)	(0.110)	(0.104)	(0.112)
State-owned	0.0685	0.141	0.0355	0.0462
	(0.0883)	(0.0948)	(0.0390)	(0.0420)
Exporter	-0.00238	0.0518	0.0667	0.0187
	(0.0315)	(0.0413)	(0.0453)	(0.0369)
Subsidiary	-0.0748	-0.0497	-0.0329	0.00297
	(0.0536)	(0.0540)	(0.0429)	(0.0357)
Audited	0.244***	0.235***	0.185**	0.197***
	(0.0646)	(0.0824)	(0.0882)	(0.0586)
Publicly listed	-0.0604	-0.0522	0.0911	-0.100
	(0.0751)	(0.119)	(0.170)	(0.0809)
Privately held	0.0487	0.104	0.155	-0.0597
	(0.106)	(0.179)	(0.221)	(0.0751)
Obstacles	-0.00411	-0.0218	-0.00748	-0.00694
	(0.0155)	(0.0237)	(0.0193)	(0.00896)
Country-level variables				
Competition	-0.0527***	0.00640	-1.017	-20.60***
	(0.0186)	(0.0671)	(1.375)	(5.843)
Crisis (NBER)	-3.444***	-0.647*	-10.62*	0.372***
	(0.957)	(0.372)	(6.196)	(0.143)
Crisis (NBER)#Competition	**0.0577*** **	**-0.342** **	**37.04***	
	(0.0203)	**(0.146)**	**(21.76)**	
Financial Development	0.00986**	0.000700	-0.00105	0.107***
	(0.00437)	(0.00212)	(0.00203)	(0.0296)
ln (GDP per capita)	0.671	1.393**	1.165*	-7.773***
	(0.468)	(0.646)	(0.705)	(2.292)
Growth	0.121*	0.152*	0.139	0.462***
	(0.0648)	(0.0788)	(0.0855)	(0.115)
Inflation	-0.0902***	-0.0116	-0.0432*	0.310***
	(0.0275)	(0.0209)	(0.0248)	(0.0970)
Inst. Dev.	-0.163	0.215	-0.256	6.833***
	(0.170)	(0.280)	(0.226)	(2.062)
Observations	34,568	34,568	33,854	32,395
All controls	NO	NO	NO	NO
Industry FE	YES	YES	YES	YES
Wald Test	7.11**	2.51	1.62	10.15***

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
Note: The non-inversed of CR3, Boone indicator, and Lerner index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
It was impossible to report an interaction term for Model 4 due to collinearity.
**** p<0.01, ** p<0.05, * p<0.1*

Table 17: Interbank competition and credit availability. Extension of Leon (2015) by using the "Combined Dataset 2006 – 2019"

VARIABLES	(1) None (L)	(2) None (N)	(3) CR3 (L)	(4) CR3 (N)	(5) Boone (L)	(6) Boone (N)	(7) Lerner (L)	(8) Lerner (N)	(9) H-stat (L)	(10) H-stat (N)
Firm-level variables										
ln (Firm Size)	0.118***	0.167***	0.117***	0.162***	0.105***	0.145***	0.110***	0.155**	0.114***	0.155**
	(0.0190)	(0.0543)	(0.0187)	(0.0558)	(0.0169)	(0.0509)	(0.0191)	(0.0610)	(0.0226)	(0.0610)
ln (Firm Age)	0.00534	0.0231	0.00533	0.0141	0.00336	0.0261	0.000140	0.0244	0.0237	0.0244
	(0.0150)	(0.0375)	(0.0152)	(0.0365)	(0.0169)	(0.0407)	(0.0157)	(0.0381)	(0.0233)	(0.0381)
ln (Experience)	0.00694	0.0830**	0.00693	0.0818**	0.00981	0.0899**	0.00422	0.0840**	0.0364	0.0840**
	(0.0137)	(0.0362)	(0.0136)	(0.0366)	(0.0144)	(0.0354)	(0.0133)	(0.0405)	(0.0236)	(0.0405)
Largest Owner	0.000523	-0.00225***	0.000573	-0.00230***	0.000525	-0.00216**	0.000489	-0.00232***	-0.00143**	-0.00232***
	(0.000460)	(0.000711)	(0.000457)	(0.000711)	(0.000480)	(0.000923)	(0.000443)	(0.000668)	(0.000627)	(0.000668)
Foreign-owned	-0.0972***	-0.204**	-0.103***	-0.207**	-0.0782**	-0.203**	-0.102***	-0.172**	-0.109**	-0.172**
	(0.0343)	(0.0869)	(0.0343)	(0.0862)	(0.0334)	(0.0843)	(0.0343)	(0.0846)	(0.0511)	(0.0846)
State-owned	-0.137	-0.0178	-0.125	-0.185	-0.0760	-0.214	-0.135	-0.215	-0.136	-0.215
	(0.0864)	(0.405)	(0.0878)	(0.409)	(0.0809)	(0.279)	(0.0862)	(0.381)	(0.154)	(0.381)
Exporter	0.0808***	0.0119	0.0771***	0.0176	0.0379	-0.00410	0.0829***	0.0249	0.0273	0.0249
	(0.0265)	(0.0315)	(0.0258)	(0.0331)	(0.0232)	(0.0479)	(0.0254)	(0.0285)	(0.0342)	(0.0285)
Subsidiary	-0.00220	-0.109*	-0.00956	-0.110*	-0.0245	-0.0985*	-0.00281	-0.102*	0.00851	-0.102*
	(0.0403)	(0.0658)	(0.0401)	(0.0662)	(0.0493)	(0.0587)	(0.0410)	(0.0610)	(0.0489)	(0.0610)
Audited	0.139***	0.125**	0.131***	0.145***	0.118***	0.156***	0.130***	0.105*	0.218***	0.105*
	(0.0358)	(0.0545)	(0.0343)	(0.0514)	(0.0401)	(0.0417)	(0.0337)	(0.0580)	(0.0514)	(0.0580)
Publicly listed	0.158**	-0.287*	0.169**	-0.269	0.139*	-0.194	0.190***	-0.269*	0.229**	-0.269*
	(0.0756)	(0.173)	(0.0727)	(0.171)	(0.0717)	(0.169)	(0.0717)	(0.151)	(0.109)	(0.151)
Privately held	0.207***	0.218	0.210***	0.250	0.167***	0.302	0.191***	0.181	0.115**	0.181
	(0.0518)	(0.164)	(0.0519)	(0.170)	(0.0522)	(0.191)	(0.0502)	(0.148)	(0.0513)	(0.148)
Obstacles	-0.0169	-0.0267	-0.0178	-0.0286	-0.0132	-0.0333	-0.0139	-0.0202	0.0166	-0.0202
	(0.0120)	(0.0397)	(0.0117)	(0.0408)	(0.0133)	(0.0391)	(0.0116)	(0.0397)	(0.0145)	(0.0397)
Country-level variables										
Competition			**-0.000258**	**-0.00952**	**0.0513****	**0.239**	**-0.618***	**-3.249**	**0.462****	**-3.249**
			(0.00190)	**(0.00851)**	**(0.0216)**	**(0.148)**	**(0.353)**	**(5.535)**	**(0.230)**	**(5.535)**
Financial Development	-0.000738	0.00838	-0.000773	0.0120	-0.000221	5.27e-05	-0.00159	0.0111	-0.00187	0.0111
	(0.00130)	(0.00581)	(0.00129)	(0.00749)	(0.00224)	(0.00660)	(0.00154)	(0.0122)	(0.00324)	(0.0122)
ln (GDP per capita)	0.0334	2.906**	0.00509	3.130**	0.00787	1.767	0.00701	3.630	-0.126	3.630
	(0.0591)	(1.398)	(0.0634)	(1.544)	(0.0587)	(1.260)	(0.0640)	(2.996)	(0.0771)	(2.996)
Growth	0.0264**	0.0494	0.0259*	0.0613	0.0244**	0.0898	0.0293*	0.0785	-0.00230	0.0785
	(0.0131)	(0.109)	(0.0133)	(0.102)	(0.0106)	(0.0970)	(0.0151)	(0.130)	(0.0154)	(0.130)
Inflation	-0.00121	0.122	-0.00104	0.138	-0.00152	0.131	-0.000556	0.0561	-0.00122	0.0561
	(0.00123)	(0.195)	(0.00134)	(0.198)	(0.00128)	(0.188)	(0.00100)	(0.273)	(0.00231)	(0.273)
Legal Rights	-0.0143	0.0326	-0.0123	0.0622	-0.0275**	0.146	-0.0127	-0.0615	-0.0411**	-0.0615
	(0.0169)	(0.148)	(0.0184)	(0.160)	(0.0139)	(0.177)	(0.0164)	(0.220)	(0.0191)	(0.220)
Credit Information	0.0306	0.282	0.0359	0.276	0.0419**	0.486**	0.0318	0.529	0.0534**	0.529
	(0.0214)	(0.181)	(0.0221)	(0.182)	(0.0207)	(0.234)	(0.0229)	(0.538)	(0.0229)	(0.538)
Inst. Dev.	0.0984	-0.866*	0.131*	-0.700*	0.0753	0.104	0.144*	-0.889**	0.343**	-0.889**
	(0.0649)	(0.454)	(0.0693)	(0.391)	(0.0701)	(0.203)	(0.0799)	(0.416)	(0.142)	(0.416)
Crisis (LEON (2015))	-1.449***		-1.397***		-1.228***		-2.748***		-6.600***	
	(0.244)		(0.234)		(0.205)		(0.412)		(0.225)	
Crisis (NBER)		-0.458		-0.407		-0.762		-0.460		-0.460
		(0.506)		(0.484)		(0.610)		(0.617)		(0.617)
Observations	45,469	31,864	45,210	31,864	46,103	31,866	44,055	31,776	35,233	31,776
Industry FE	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES
Wald test	66.00***	3.40*	71.84***	3.22*	70.12***	4.72**	58.39***	2.77*	31.05***	2.77*

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Models with "L" include Leon (2015)'s crisis dummy, while the ones with "N" – crisis dummy constructed by NBER.
**** p<0.01, ** p<0.05, * p<0.1*

Table 18: Baseline results with an interaction term using the "Combined Dataset 2006 – 2019"

VARIABLES	(1) CR3	(2) Boone	(3) Lerner
Firm-level variables			
1.CrisisNBER#c.CR3			
ln (Firm Size)	0.148**	0.145***	0.124*
	(0.0578)	(0.0538)	(0.0656)
ln (Firm Age)	0.00401	0.0254	-0.0232
	(0.0300)	(0.0410)	(0.0223)
ln (Experience)	0.0711*	0.0932**	0.0895*
	(0.0395)	(0.0394)	(0.0502)
Largest Owner	-0.00222***	-0.00227***	-0.00223***
	(0.000410)	(0.000766)	(0.000465)
Foreign-owned	-0.164*	-0.184**	-0.0834
	(0.0955)	(0.0838)	(0.0941)
State-owned	-0.0676	-0.218	-0.396**
	(0.326)	(0.271)	(0.193)
Exporter	-0.000632	-0.00943	0.0207
	(0.0288)	(0.0472)	(0.0277)
Subsidiary	-0.120**	-0.0950*	-0.0972**
	(0.0543)	(0.0564)	(0.0446)
Audited	0.123***	0.148***	0.155***
	(0.0325)	(0.0447)	(0.0466)
Publicly listed	-0.274**	-0.227	-0.0658*
	(0.117)	(0.158)	(0.0398)
Privately owned	0.168	0.241	0.151
	(0.140)	(0.167)	(0.122)
Obstacles	-0.0212	-0.0192	-0.00830
	(0.0340)	(0.0343)	(0.0325)
Country-level variables			
Competition	-0.144***	0.280**	-4.663
	(0.0373)	(0.143)	(3.770)
Crisis (NBER)	-11.10***	-0.486	-13.70**
	(3.241)	(0.571)	(5.880)
Crisis (NBER) # Competition	**0.177*** **	**-0.449*** **	**50.51** **
	(0.0492)	**(0.155)**	**(20.50)**
Financial Development	0.00836	0.00210	-0.00988
	(0.0110)	(0.00533)	(0.0110)
ln (GDP per capita)	-4.937	2.421**	-1.634
	(3.222)	(1.137)	(2.211)
Growth	0.416**	0.0334	0.262
	(0.162)	(0.0780)	(0.186)
Inflation	-1.197**	0.362*	-0.597
	(0.536)	(0.188)	(0.496)
Legal Rights	-0.295	0.298	-0.644*
	(0.247)	(0.182)	(0.373)
Credit Information	0.585**	0.266	0.233
	(0.260)	(0.200)	(0.270)
Inst. Dev.	1.188**	0.0816	-0.542*
	(0.532)	(0.168)	(0.288)
Observations	31,864	31,866	31,776
Industry FE	YES	NO	YES
Wald Test	3.98*	4.96**	2.99*

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
*** p<0.01, ** p<0.05, * p<0.1*

Table 19: Robustness checks for the "Combined dataset 2006 – 2019"

VARIABLES	(1) CR3(L)	(2) CR3(N)	(3) Boone(L)	(4) Boone(N)	(5) Lerner(L)	(6) Lerner(N)	(7) H-stat(L)	(8) H-stat(N)
Panel A: Foreign Banks								
Competition	**-0.000141**	**-0.00455**	**0.0364**	**-0.230****	**-0.657**	**6.312***	**0.596****	
	(0.00226)	**(0.00979)**	**(0.0291)**	**(0.103)**	**(0.400)**	**(3.466)**	**(0.294)**	
Foreign Banks	-0.254	-2.647**	-0.290	-8.104***	-0.279	-5.382***	0.0134	
	(0.223)	(1.033)	(0.211)	(2.883)	(0.239)	(1.470)	(0.237)	
Observations	43,726	31,866	44,603	31,866	43,058	31,778	34,757	
Industry FE	YES	NO	NO	NO	YES	NO	YES	
All firm-level and country-level controls	YES	NO	YES	YES	YES	NO	YES	
Wald test	48.24***	3.20*	24.39***	2.67	48.00***	1.78	12.04***	
Panel B: Financial Freedom								
Competition	**0.000774**	**-0.00891**	**0.0374***	**0.181**	**-0.487**	**1.766**	**0.460****	
	(0.00212)	**(0.00961)**	**(0.0224)**	**(0.139)**	**(0.325)**	**(4.824)**	**(0.233)**	
Financial Freedom	-0.00586*	-0.00950*	-0.00544**	-0.00882*	-0.00537*	-0.0142*	-0.000433	
	(0.00301)	(0.00511)	(0.00231)	(0.00501)	(0.00279)	(0.00745)	(0.00379)	
Observations	44,863	31,866	45,740	31,866	43,980	31,778	35,233	
Industry FE	YES	NO	NO	NO	YES	NO	YES	
All firm-level and country-level controls	YES	NO	YES	NO	YES	NO	YES	
Wald test	111.26***	3.62*	134.12***	3.78*	92.03***	3.37*	30.48***	
Panel C: Activities Restrictions								
Competition	**-0.00105**	**-0.00852*****	**0.0402****	**1.219*****	**-0.447**	**-0.321**	**0.321***	**0.247**
	(0.00154)	**(0.00288)**	**(0.0191)**	**(0.412)**	**(0.407)**	**(0.397)**	**(0.191)**	**(0.206)**
Securities activities	-0.0935**	-1.002**	-0.0776**	-16.59***	-0.137***	-0.0590	-0.0741***	-0.0468
	(0.0370)	(0.458)	(0.0393)	(5.727)	(0.0526)	(0.0623)	(0.0248)	(0.0469)
Insurance activities	-0.0170		0.00295		-0.0340		0.00269	
	(0.0345)		(0.0311)		(0.0479)		(0.0385)	
Real Estate activities	0.00299		0.00884		0.0144		0.0353	
	(0.0299)		(0.0304)		(0.0428)		(0.0378)	
Observations	34,662	32,395	34,662	32,395	34,361	34,361	34,490	34,490
Industry FE	YES	NO	NO	NO	YES	NO	YES	NO
All firm-level and country-level controls	YES	NO	YES	NO	YES	NO	YES	NO
Wald test	94.65***	6.25**	85.30***	6.25**	41.59***	56.69***	112.81***	42.64***
Panel D: Firms outside economic capitals								
Competition	**0.00254**	**-0.00937***	**0.0457**	**0.0699**	**-1.188****	**-1.030**	**0.381***	**-1.087**
	(0.00271)	**(0.00501)**	**(0.0330)**	**(0.0501)**	**(0.521)**	**(1.239)**	**(0.209)**	**(1.748)**
Observations	16,183	14,866	16,364	14,866	15,950	14,678	15,637	14,711
Industry FE	YES	NO	YES	NO	YES	NO	YES	NO
All firm-level and country-level controls	YES	NO	YES	NO	YES	NO	YES	NO
Wald test	20.92***	8.79**	30.42***	8.86***	32.04***	6.87 **	90.13***	7.78**

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Models with "L" include Leon (2015)'s crisis dummy, while the ones with "N" – crisis dummy constructed by NBER.
For panels A and B with Crisis (NBER) Int. Dev. Variable has been omitted in order to facilitate convergence, for panels C and D Credit Information and Legal Rights have also been omitted.
**** p<0.01, ** p<0.05, * p<0.1*

Table 20: Robustness checks for the effect of bank competition during crisis-years for the "Combined Dataset 2006 – 2019"

VARIABLES	(1) CR3	(2) Boone	(3) Lerner	(4) H-stat
Panel A: Foreign Banks				
Competition	-0.0444***	0.203	-1.072	-36.56***
	(0.0161)	(0.137)	(3.411)	(12.90)
Crisis (NBER)	-3.060***	-0.276	-12.87**	-0.403***
	(0.843)	(0.532)	(5.934)	(0.134)
Crisis (NBER) # Competition	**0.0511*** **	**-0.496*** **	**46.07** **	
	(0.0184)	**(0.186)**	**(20.98)**	
Foreign Banks	-0.757	-2.597***	-1.584	6.884***
	(0.478)	(1.001)	(1.260)	(2.526)
Observations	34,570	31,866	31,778	32,395
Industry FE	NO	NO	NO	NO
All controls	NO	NO	NO	NO
Wald test	7.02**	2.73*	3.64*	6.27**
Panel B: Financial Freedom				
Competition	-0.0533***	-0.0828	-1.026	
	(0.0180)	(0.0598)	(1.609)	
Crisis (NBER)	-3.558***	-0.656	-11.40***	
	(1.035)	(0.411)	(4.318)	
Crisis (NBER) # Competition	**0.0621*** **	**-0.354** **	**39.82*** **	
	(0.0221)	**(0.139)**	**(14.96)**	
Financial Freedom	-0.0119***	-0.00680	-0.00761	
	(0.00458)	(0.00476)	(0.00510)	
Observations	34,570	34,570	33,856	
Industry FE	NO	NO	NO	
All controls	NO	NO	NO	
Wald test	5.31**	4.39**	4.05**	
Panel D: Firms outside economic capitals				
Competition	-0.0233	0.0848		-15.67***
	(0.0173)	(0.0618)		(2.988)
Crisis (NBER)	-0.975	-0.844***		-4.469***
	(1.032)	(0.170)		(0.860)
Crisis (NBER) # Competition	0.0158	-8.769***		6.925***
	(0.0210)	(2.126)		(1.372)
Observations	14,866	14,866		14,711
Industry FE	NO	NO		NO
All controls	NO	NO		NO
Wald test	8.46***	8.77***		7.74**

The dependent variable is Credit which equals 1 if a firm had a need for credit and was not credit constrained.
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015).
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Int. Dev., Credit Information and Legal Rights variables have been removed in order to facilitate convergence.
**** p<0.01, ** p<0.05, * p<0.1*

Table 21: Interbank competition and loan applications using the "Combined Dataset 2006 – 2019"

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	None(L)	None(N)	CR3(L)	CR3(N)	Boone(L)	Boone(N)	Lerner(L)	Lerner(N)	H-stat(L)	H-stat(N)
Firm-level variables										
ln (Firm Size)	0.156***	0.173***	0.158***	0.170***	0.154***	0.164***	0.152***	0.159***	0.0716***	0.0243
	(0.0156)	(0.0453)	(0.0161)	(0.0462)	(0.0158)	(0.0513)	(0.0167)	(0.0459)	(0.0131)	(0.0225)
ln (Firm Age)	-0.0199	0.000886	-0.0182	-0.00950	-0.0274**	-0.00448	-0.0189	-0.0121	-0.00298	0.0143
	(0.0124)	(0.0287)	(0.0129)	(0.0255)	(0.0132)	(0.0266)	(0.0121)	(0.0257)	(0.0180)	(0.0166)
ln (Experience)	0.0259*	0.0417	0.0261*	0.0406	0.0249	0.0432*	0.0261	0.0369	0.0308	0.0629***
	(0.0149)	(0.0272)	(0.0151)	(0.0274)	(0.0160)	(0.0237)	(0.0160)	(0.0278)	(0.0188)	(0.0217)
Largest Owner	-0.00117**	-0.00212***	-0.00117**	-0.00222***	-0.00101*	-0.00236***	-0.00123**	-0.00211***	-0.000761*	-0.00175***
	(0.000482)	(0.000392)	(0.000476)	(0.000406)	(0.000532)	(0.000344)	(0.000499)	(0.000443)	(0.000422)	(0.000282)
Foreign owned	-0.0987***	-0.0594	-0.103***	-0.0636	-0.0893***	-0.0531	-0.0905***	-0.0402	-0.0759	0.116
	(0.0266)	(0.0633)	(0.0272)	(0.0651)	(0.0268)	(0.0533)	(0.0274)	(0.0609)	(0.0463)	(0.103)
State owned	-0.105	-0.310	-0.101	-0.453	-0.0662	-0.404	-0.123	-0.515	-0.0955	0.0199
	(0.125)	(0.306)	(0.128)	(0.289)	(0.133)	(0.255)	(0.154)	(0.329)	(0.115)	(0.0611)
Exporter	0.0924***	0.0549	0.0902***	0.0584	0.0668***	0.0107	0.0894***	0.0664*	0.0448*	-0.00504
	(0.0245)	(0.0347)	(0.0246)	(0.0362)	(0.0246)	(0.0365)	(0.0256)	(0.0351)	(0.0233)	(0.0449)
Subsidiary	-0.0176	-0.151***	-0.0183	-0.157***	-0.0213	-0.120***	-0.0217	-0.160***	0.0166	-0.0575
	(0.0344)	(0.0458)	(0.0349)	(0.0455)	(0.0331)	(0.0453)	(0.0358)	(0.0470)	(0.0381)	(0.0891)
Audited	0.133***	0.164***	0.127***	0.182***	0.123***	0.185***	0.140***	0.169***	0.173***	0.174***
	(0.0273)	(0.0428)	(0.0269)	(0.0467)	(0.0305)	(0.0452)	(0.0286)	(0.0451)	(0.0379)	(0.0482)
Publicly listed	0.110*	-0.481***	0.110*	-0.480***	0.117*	-0.461***	0.108*	-0.442***	0.210***	-0.0279
	(0.0620)	(0.131)	(0.0609)	(0.133)	(0.0600)	(0.128)	(0.0641)	(0.132)	(0.0764)	(0.170)
Privately held	0.129***	-0.00191	0.127***	0.0284	0.118***	0.00815	0.130***	0.0471	0.0889**	-0.0200
	(0.0361)	(0.0695)	(0.0356)	(0.0610)	(0.0374)	(0.0659)	(0.0366)	(0.0661)	(0.0430)	(0.0481)
Obstacles	0.0279***	0.0217	0.0278***	0.0172	0.0209	0.0235	0.0261**	0.0158	0.0221**	-0.0268
	(0.0105)	(0.0183)	(0.0104)	(0.0183)	(0.0133)	(0.0189)	(0.0107)	(0.0189)	(0.00978)	(0.0178)
Country-level variables										
Competition			**0.00128**	**-0.00969*****	**0.0304**	**0.111*****	**0.165**	**2.281*****	**0.376*****	**-2.720*****
			(0.00208)	**(0.00232)**	**(0.0299)**	**(0.0230)**	**(0.286)**	**(0.723)**	**(0.145)**	**(0.523)**
Financial Development	-0.000790	-0.000501	-0.000885	0.00231***	-4.75e-05	-0.00259**	-0.000751	-0.00189	-0.00181	0.0221***
	(0.00162)	(0.00160)	(0.00167)	(0.000802)	(0.00199)	(0.00131)	(0.00156)	(0.00127)	(0.00219)	(0.00402)
ln (GDP per capita)	0.0474	0.512**	0.0547	0.550***	0.0318	0.346*	0.0712	0.0991	-0.0669	-0.205
	(0.0502)	(0.234)	(0.0547)	(0.145)	(0.0530)	(0.187)	(0.0644)	(0.240)	(0.0625)	(0.132)
Growth	0.0126	0.00244	0.0116	0.0299**	0.00697	-0.000607	0.0124	-0.00525	-0.00465	0.110***
	(0.00927)	(0.0212)	(0.00916)	(0.0130)	(0.00684)	(0.0171)	(0.0107)	(0.0175)	(0.0125)	(0.0142)
Inflation	-0.00129	0.0752***	-0.00149	0.0418**	-0.00131	0.0757***	-0.00162	0.0959***	-0.000764	-0.00103
	(0.00119)	(0.0268)	(0.00122)	(0.0183)	(0.00120)	(0.0235)	(0.00136)	(0.0304)	(0.00178)	(0.0110)
Legal Rights	-0.0284**	-0.101***	-0.0237	-0.108***	-0.0285**	-0.0532**	-0.0275*	-0.0542	-0.0349**	
	(0.0139)	(0.0335)	(0.0166)	(0.0168)	(0.0130)	(0.0217)	(0.0159)	(0.0346)	(0.0145)	
Credit Information	0.0435**	0.0542	0.0434**	0.0748***	0.0417**	0.187***	0.0394**	-0.0746	0.0297	0.0604***
	(0.0181)	(0.0451)	(0.0185)	(0.0248)	(0.0190)	(0.0385)	(0.0191)	(0.0515)	(0.0183)	(0.0177)
Inst. Dev.	0.0975*	0.251**	0.0946	0.417***	0.0825	0.289***	0.0845	0.133	0.317***	
	(0.0585)	(0.126)	(0.0663)	(0.120)	(0.0634)	(0.0521)	(0.0741)	(0.178)	(0.102)	
Crisis (LEON (2015))	0.0209		0.0104		0.0447		0.0378		-0.294***	
	(0.0746)		(0.0807)		(0.0802)		(0.0817)		(0.0913)	
Crisis (NBER)		0.292***		0.300***		0.203***		0.293***		
		(0.0646)		(0.0527)		(0.0580)		(0.0564)		
Observations	52,355	33,474	52,061	33,474	53,339	33,481	50,619	33,386	35,512	30,518
Industry FE	YES	YES	YES	YES	NO	NO	YES	YES	YES	NO
Wald test	176.00***	9.56***	156.04***	9.54***	149.04***	11.37***	143.63***	8.63***	60.05***	0.42

The dependent variable equals 1 if a firm that had a need for credit (Need = 1) has applied for a loan (Apply = 1)
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Models with "L" include Leon (2015)'s crisis dummy, while the ones with "N" – crisis dummy constructed by NBER.
**** p<0.01, ** p<0.05, * p<0.1*

Table 22: Interbank competition and loan applications with crisis interaction by using the "Combined Sample 2006 – 2019"

	(1)	(2)	(3)	(4)
VARIABLES	CR3	Boone	Lerner	H-stat
Firm-level variables				
ln (Firm Size)	0.170***	0.164***	0.158***	0.0242
	(0.0463)	(0.0510)	(0.0458)	(0.0227)
ln (Firm Age)	-0.00979	-0.00467	-0.0145	0.0143
	(0.0251)	(0.0268)	(0.0250)	(0.0176)
ln (Experience)	0.0403	0.0433*	0.0376	0.0629***
	(0.0276)	(0.0236)	(0.0276)	(0.0199)
Largest Owner	-0.00223***	-0.00233***	-0.00210***	-0.00175***
	(0.000407)	(0.000356)	(0.000421)	(0.000270)
Foreign-owned	-0.0632	-0.0531	-0.0347	0.116
	(0.0656)	(0.0534)	(0.0613)	(0.104)
State-owned	-0.449	-0.407	-0.524*	0.0199
	(0.288)	(0.253)	(0.317)	(0.0609)
Exporter	0.0578	0.0110	0.0646*	-0.00503
	(0.0361)	(0.0363)	(0.0351)	(0.0447)
Subsidiary	-0.157***	-0.120***	-0.161***	-0.0575
	(0.0457)	(0.0451)	(0.0462)	(0.0877)
Audited	0.182***	0.185***	0.173***	0.174***
	(0.0465)	(0.0452)	(0.0440)	(0.0397)
Publicly listed	-0.480***	-0.460***	-0.437***	-0.0277
	(0.133)	(0.128)	(0.132)	(0.171)
Privately held	0.0257	0.0149	0.0408	-0.0198
	(0.0624)	(0.0703)	(0.0671)	(0.0401)
Obstacles	0.0174	0.0222	0.0172	-0.0268
	(0.0183)	(0.0196)	(0.0190)	(0.0175)
Country-level variables				
Competition	-0.0130***	0.108***	2.312***	-2.721***
	(0.00377)	(0.0221)	(0.623)	(0.566)
Crisis (NBER)	0.0831	0.158**	-0.486*	
	(0.265)	(0.0654)	(0.257)	
Crisis (NBER) # Competition	**0.00402**	**0.0323**	**3.310*** **	
	(0.00502)	**(0.0313)**	**(1.001)**	
Financial Development	0.00234***	-0.00294**	-0.00287**	0.0221***
	(0.000817)	(0.00130)	(0.00117)	(0.00436)
ln (GDP per capita)	0.384***	0.262	-0.134	-0.205
	(0.139)	(0.181)	(0.225)	(0.128)
Growth	0.0366**	0.00697	-0.00404	0.110***
	(0.0168)	(0.0169)	(0.0140)	(0.0165)
Inflation	0.0217	0.0466	0.0961***	-0.00105
	(0.0319)	(0.0307)	(0.0212)	(0.0110)
Legal Rights	-0.112***	-0.0688**	-0.0683**	
	(0.0151)	(0.0306)	(0.0299)	
Credit Information	0.0643***	0.218***	-0.137***	0.0604***
	(0.0172)	(0.0612)	(0.0403)	(0.0187)
Inst. Dev.	0.469***	0.287***	0.156	
	(0.107)	(0.0585)	(0.166)	
Observations	33,474	33,481	33,386	30,518
Industry FE	YES	NO	YES	NO
Wald Test	9.24***	10.95***	8.72***	0.64

The dependent variable equals 1 if a firm that had a need for credit (Need = 1) has applied for a loan (Apply = 1)
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015).
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
*** p<0.01, ** p<0.05, * p<0.1*

Table 23: Interbank competition and loan rejection/acceptation using the "Combined Dataset 2006 – 2019"

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	None(L)	None(N)	CR3(L)	CR3(N)	Boone(L)	Boone(N)	Lerner(L)	Lerner(N)	H-stat(L)	H-stat(N)
Firm-level variables										
ln (Firm Size)	0.220***	0.314***	0.220***	0.314***	0.214***	0.289***	0.221***	0.286***	0.300***	0.293*
	(0.0338)	(0.0830)	(0.0336)	(0.0830)	(0.0323)	(0.0842)	(0.0350)	(0.0761)	(0.0598)	(0.152)
ln (Firm Age)	0.161***	0.0477	0.155***	0.0477	0.159***	0.0543	0.151***	0.0369	0.224***	0.177***
	(0.0333)	(0.0444)	(0.0335)	(0.0444)	(0.0304)	(0.0496)	(0.0359)	(0.0440)	(0.0742)	(0.0648)
ln (Experience)	-0.00750	0.146	-0.0103	0.146	-0.00751	0.104	0.000730	0.163	-0.0622	-0.212
	(0.0373)	(0.103)	(0.0373)	(0.103)	(0.0387)	(0.119)	(0.0382)	(0.101)	(0.0652)	(0.181)
Largest Owner	0.000234	-0.00266	0.000478	-0.00266	-0.000116	-0.00304	0.000534	-0.00239	-0.00192	-0.00576*
	(0.00117)	(0.00314)	(0.00110)	(0.00314)	(0.00116)	(0.00258)	(0.00116)	(0.00303)	(0.00208)	(0.00336)
Foreign owned	-0.196*	-0.573**	-0.204*	-0.573**	-0.209**	-0.499**	-0.204*	-0.500**	-0.349**	-0.162
	(0.107)	(0.230)	(0.106)	(0.230)	(0.0979)	(0.232)	(0.111)	(0.233)	(0.160)	(0.366)
State owned	-0.594**	4.003***	-0.572*	4.003***	-0.517*	4.043***	-0.609**	4.235***	3.939***	4.639***
	(0.301)	(0.602)	(0.304)	(0.602)	(0.307)	(0.222)	(0.298)	(0.610)	(0.287)	(0.149)
Exporter	-0.143**	-0.139	-0.141**	-0.139	-0.156**	-0.181	-0.128*	-0.0949	-0.143	-0.200
	(0.0715)	(0.182)	(0.0705)	(0.182)	(0.0721)	(0.199)	(0.0719)	(0.192)	(0.0931)	(0.265)
Subsidiary	0.364***	0.0290	0.344***	0.0290	0.354***	0.00252	0.334***	0.0190	0.275*	-0.126
	(0.0993)	(0.115)	(0.0988)	(0.115)	(0.0928)	(0.116)	(0.101)	(0.115)	(0.161)	(0.138)
Audited	0.201***	0.124	0.192***	0.124	0.216***	0.140	0.194***	0.127	0.174**	-0.162
	(0.0547)	(0.176)	(0.0544)	(0.176)	(0.0547)	(0.161)	(0.0560)	(0.174)	(0.0886)	(0.117)
Publicly listed	0.277	-0.666***	0.310	-0.666***	0.290	-0.671***	0.268	-0.611***	0.480	3.602***
	(0.203)	(0.153)	(0.202)	(0.153)	(0.195)	(0.144)	(0.207)	(0.148)	(0.405)	(0.244)
Privately held	0.0717	-0.0434	0.0956	-0.0434	0.0530	-0.0616	0.0625	-0.0497	0.0641	-0.173
	(0.0781)	(0.107)	(0.0743)	(0.107)	(0.0787)	(0.0777)	(0.0729)	(0.108)	(0.105)	(0.160)
Country-level variables										
Competition			**-0.00329**	**-0.00789***	**0.105*****	**0.0460***	**-0.837**	**-7.983**	**0.763**	**-1.438**
			(0.00371)	**(0.00426)**	**(0.0397)**	**(0.0264)**	**(0.588)**	**(6.706)**	**(0.581)**	**(1.514)**
Fin. Dev.	-0.00338**	-0.00764***	-0.00319**	-0.00158	-0.00409***	-0.00571***	-0.00453**	-0.0634*	-0.00587	-0.000986
	(0.00168)	(0.00144)	(0.00155)	(0.00373)	(0.00149)	(0.000919)	(0.00206)	(0.0380)	(0.00587)	(0.0112)
ln (GDP per capita)	0.139	-0.423	0.0649	1.623**	0.117	0.842**	0.115	-13.68	-0.302	0.452
	(0.112)	(0.669)	(0.117)	(0.740)	(0.0929)	(0.340)	(0.123)	(9.645)	(0.234)	(0.327)
Growth	0.0154	0.112**	0.0187	0.161***	0.0251	0.112***	0.0285	0.808*	-0.0146	0.133***
	(0.0211)	(0.0511)	(0.0207)	(0.0293)	(0.0213)	(0.0150)	(0.0255)	(0.441)	(0.0370)	(0.0444)
Inflation	-0.00211	-0.0515	-0.00158	0.153	-0.00169	0.0687	-0.00114	-2.603	0.00143	0.0970***
	(0.00292)	(0.0641)	(0.00291)	(0.114)	(0.00284)	(0.0520)	(0.00277)	(1.810)	(0.00565)	(0.0340)
Legal Rights	0.0293	-0.207**	0.0269	0.111	0.0298	0.0243	0.0364	-2.103	-0.0385	
	(0.0349)	(0.0937)	(0.0388)	(0.107)	(0.0263)	(0.0479)	(0.0354)	(1.438)	(0.0437)	
Credit Information	0.108***	-0.122	0.118***	-0.246***	0.140***	-0.137***	0.120***	0.736	0.0565	-0.172***
	(0.0278)	(0.0825)	(0.0300)	(0.0818)	(0.0196)	(0.0210)	(0.0306)	(0.729)	(0.0440)	(0.0429)
Inst. Dev.	-0.153	0.0620	-0.0808	0.0962	-0.175	-0.345***	-0.106		0.326	
	(0.118)	(0.245)	(0.117)	(0.254)	(0.142)	(0.118)	(0.126)		(0.329)	
Crisis (LEON (2015))	5.158***		5.261***		6.360***					
	(0.255)		(0.268)		(0.237)					
Crisis(NBER)		0.533*								
		(0.288)								
Observations	24,849	19,619	24,795	19,619	25,065	19,619	24,321	19,552	20,658	18,876
Industry FE	YES	YES	YES	YES	NO	NO	YES	YES	YES	NO
Wald test	7.49**	10.79***	8.83***	10.79***	7.62**	6.84**	9.39***	9.83***	1.05	4.58**

The dependent variable equals 1 if a firm has applied for a loan (Apply = 1) has obtained the credit (Accepted = 1)
The non-inversed of CR3, Boone indicator, and Lerner Index are used unlike Leon (2015)
Standard errors have been adjusted for clustering at country-level.
Estimates are obtained with the help of PSS Model.
Models with "L" include Leon (2015)'s crisis dummy, while the ones with "N" – crisis dummy constructed by NBER.
For some Models Crisis (NBER), Crisis (Leon), Legal Rights, Inst. Dev. have been omitted due to collinearity.
**** p<0.01, ** p<0.05, * p<0.1*

Table 24.1: Correlation table of the main variables in the "Combined Dataset 2006 – 2019"

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1 - Apply	1													
2 - Need	.	1												
3 - Accepted	.	.	1											
4 - Credit	0.9214	.	1	1										
5 - ln (Firm Size)	0.2975	0.0568	0.1758	0.2756	1									
6 - ln (Firm Age)	0.1355	0.0216	0.1372	0.1444	0.2993	1								
7 - ln (Experience)	0.1111	0.0201	0.0771	0.1161	0.1131	0.4376	1							
8 - Largest Owner	-0.1509	-0.0431	-0.0638	-0.1214	-0.2407	-0.1581	-0.109	1						
9 - Foreign-owned	0.0207	-0.0505	0.0093	0.0135	0.1908	-0.0073	-0.0428	-0.0276	1					
10 - State-owned	0.0068	0.0024	0.0074	0.0062	0.0712	0.0441	-0.0156	-0.0153	-0.0156	1				
11 - Exporter	0.1279	0.026	0.0477	0.1324	0.2997	0.1172	0.0651	-0.0902	0.1587	0.0115	1			
12 - Subsidiary	0.0688	-0.0201	0.0619	0.0655	0.2117	0.0721	-0.0075	-0.063	0.1763	0.0383	0.0631	1		
13 - Audited	0.2003	0.0398	0.1176	0.1948	0.3315	0.1512	0.06	-0.1065	0.1622	0.0251	0.145	0.1687	1	
14 - Publicly listed	0.0458	0.002	0.019	0.0237	0.1788	0.107	-0.0072	-0.077	0.0496	0.1442	0.0471	0.0858	0.0918	1

Table 24.2: Correlation table of the main variables in the "Combined Dataset 2006 – 2019"

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
15 - Privately held	0.1646	0.0039	0.025	0.1549	0.2386	0.0419	0.0216	-0.2233	0.0509	-0.0298	0.1004	0.0432	0.0591	-0.2381
16 - Obstacles	0.111	0.0988	0.036	0.0424	0.1596	0.0746	0.0654	-0.1041	0.0155	-0.0025	0.0494	0.039	0.0628	0.0188
17 - CR3	-0.0161	0.0553	0.0242	-0.0087	0.0106	-0.0042	-0.0496	0.0257	0.0915	-0.0005	0.0046	0.0594	0.0798	-0.0224
18 - Boone	0.0396	-0.0136	0.0154	0.0496	0.0064	0.0345	0.0268	0.0189	0.0116	-0.0355	0.0515	-0.0276	-0.0224	-0.0007
19 - Lerner	0.0123	0.04	0.0107	-0.0672	0.0437	0.0421	0.0266	-0.0079	0.0547	-0.0077	0.0577	0.0239	0.1025	0.0115
20 - H-stat	0.1378	-0.0629	0.0212	0.1425	-0.0629	-0.0219	0.0807	-0.0294	-0.1289	0.0184	-0.0273	-0.0532	-0.1181	-0.0121
21 - Fin. Dev.	0.1176	-0.0821	0.0429	0.1404	-0.0074	0.0266	0.0434	0.0159	-0.0551	-0.0254	0.0214	0.0037	0.0792	-0.0234
22 - ln (GDPpc)	0.1924	-0.1116	0.0845	0.177	0.0692	0.0915	0.1396	-0.0814	-0.0954	-0.0102	0.0665	-0.0321	-0.035	-0.0157
23 - Growth	-0.0597	0.0089	-0.0431	-0.0181	-0.0942	-0.1467	-0.107	0.12	-0.0208	0.0181	-0.0469	-0.0573	-0.0438	0.0056
24 - Inflation	-0.0868	0.0661	-0.0948	-0.1026	-0.0189	-0.059	-0.0817	0.0018	-0.0434	0.0438	-0.0659	-0.014	-0.0457	0.0166
25 - Legal Rights	-0.0429	-0.0476	-0.0252	-0.0818	0.0299	-0.0273	-0.0486	0.0095	0.0184	-0.0156	0.0454	-0.0283	-0.0137	0.0064
26 - Credit Info	0.2394	-0.0692	0.189	0.2572	0.0763	0.1723	0.2037	-0.1407	-0.0745	-0.0394	0.0619	0.0164	0.11	-0.0332
27 - Inst. Dev.	0.1522	-0.1101	0.0485	0.1756	0.0206	0.0943	0.1313	-0.048	-0.0385	-0.0396	0.1086	-0.0126	0.0222	-0.0709
28 - Crisis (Leon)	0.0416	0.051	0.0162	-0.2288	0.0599	-0.0376	-0.049	-0.0091	0.0293	0.0129	-0.0232	-0.0061	-0.004	0.0512
29 -Crisis (NBER)	0.0987	0.0291	0.0253	-0.0676	0.1568	0.054	-0.0162	-0.0669	0.0684	0.0113	0.1191	-0.0236	0.0214	0.0832

Table 24.3: Correlation table of the main variables in the "Combined Dataset 2006 – 2019"

	15	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
15 - Privately held	1														
16 - Obstacles	0.0478	1													
17 - CR3	-0.1343	-0.0455	1												
18 - Boone	0.0569	-0.0454	-0.0058	1											
19 - Lerner	-0.1117	0.025	0.4105	-0.0228	1										
20 - H-stat	0.0442	0.0302	-0.353	-0.0507	-0.573	1									
21 - Fin. Dev.	0.0713	-0.0501	-0.1983	0.1191	-0.2302	0.548	1								
22 - ln (GDPpc)	0.2331	0.0978	-0.4914	0.1474	-0.313	0.6363	0.4751	1							
23 - Growth	-0.1106	-0.0497	0.0802	-0.073	0.0202	-0.0247	-0.0623	-0.2506	1						
24 - Inflation	0.0181	0.0014	-0.0608	-0.1442	-0.0855	0.163	-0.201	-0.0562	0.0933	1					
25 - Legal Rights	0.1487	-0.078	-0.2553	-0.0388	0.0309	-0.382	0.2165	0.0861	-0.0312	-0.0241	1				
26 - Credit Info	0.2322	0.0755	-0.3298	-0.0986	-0.1158	0.6004	0.3756	0.6232	-0.315	-0.2324	-0.0593	1			
27 - Inst. Dev.	0.1038	-0.0133	-0.1818	0.2235	-0.0757	0.2063	0.5882	0.6913	-0.1521	-0.1723	0.2201	0.4137	1		
28 - Crisis (Leon)	-0.0111	0.0873	0.0895	0.0808	-0.0064	-0.0767	-0.0088	0.0131	0.1655	0.0942	0.0493	-0.2133	-0.0588	1	
29 -Crisis (NBER)	0.1867	0.0103	0.0416	0.1417	0.2471	-0.1799	-0.1501	0.2379	-0.0092	-0.1709	0.4674	-0.1068	0.1268	0.4247	1