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# Does Bank Competition Reduce Cost of Credit?

## Cross-Country Evidence from Europe<sup>1</sup>

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### Abstract

Despite the extensive debate on the effects of bank competition on economic welfare and growth, only a handful of single-country studies deal with the impact of bank competition on the cost of credit. We contribute to the literature by investigating the impact of bank competition on the cost of credit in a cross-country setting. Using a panel of firms from 20 European countries covering the period 2001–2011, we consider a broad set of measures of bank competition, including two structural measures (Herfindahl-Hirschman index and CR5), and two non-structural indicators (Lerner index and H-statistic). We find that bank competition increases the cost of credit and observe that the positive influence of bank competition is stronger for smaller companies. Our findings accord with the information hypothesis, whereby a lack of competition incentivizes banks to invest in soft information and conversely increased competition raises the cost of credit. This positive impact of bank competition is however influenced by the institutional and economic framework, as well as by the crisis.

**JEL Codes:** G21, L11.

**Keywords:** bank competition, bank concentration, cost of credit.

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## 1. Introduction

The debate on the effects of bank competition on economic welfare and growth is far from settled. While the virtues of competition are obvious for many industries, increased competition in the banking industry has dubious benefits due to the peculiar features of the industry and the crucial role of information. Bank competition can be detrimental to financial stability, while information asymmetries influence the relationship between bank competition and access to credit (Beck, Demirgüç-Kunt and Levine, 2006; Berger, Klapper, and Turk-Ariss, 2009; Schaeck, Cihak and Wolfe, 2009; Beck, De Jonghe, and Schepens, 2013; Ryan, O'Toole, and McCann, 2014).<sup>2</sup>

The theoretical literature provides conflicting predictions concerning the impact of competition on access to credit. The *market power hypothesis* suggests that greater bank competition relaxes financing constraints and leads to lower lending rates. This hypothesis is in line with the general economic theory that suggests that greater competition is associated with lower prices. The *information hypothesis* rejects this view, arguing that increased bank competition bolsters financing obstacles and drives up lending rates. The information hypothesis assumes that lower competition increases the incentive for banks to invest in relationship lending<sup>3</sup>, so that they can have greater soft information reducing information asymmetries. Thus, a higher level of bank competition lowers investment in banking relationships and impairs access to credit (Petersen and Rajan, 1995; Dell'Ariccia and Marquez, 2006).<sup>4</sup>

A large body of empirical literature considers the influence of bank competition on access to credit. While these studies range widely in geographic scope and employ a variety of indicators for access to credit and competition measures, they usually come down on the side of the market power hypothesis, i.e. that greater bank competition is

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<sup>2</sup> Literature on bank competition also investigates the effects of bank competition on market structure of non-financial firms (Cetorelli, 2004) and identifies the determinants of bank competition (Claessens and Laeven, 2004).

<sup>3</sup> For more details concerning the literature on relationship lending see Kysucky and Norden (2016).

<sup>4</sup> While Petersen and Rajan (1995) conclude that greater competition reduces lending rents for banks and hence contributes to diminish their investment in lending relationships, Boot and Thakor (2000) extend this analysis by considering that this result is observed if banks are only engaged in relationship lending. They find that the effect of competition on relationship lending is dependent on the activities of the bank in both relationship and transaction lending but also on the potential competition faced by the bank from capital markets.

associated with better access to credit. In a cross-country study, for example, Beck, Demirgüç-Kunt, and Maksimovic (2004) investigate the impact of bank concentration on access to finance measured by survey data on the financing obstacles perceived by firms. They find a positive impact of bank concentration on financing obstacles. Love and Peria (2012) also perform a similar cross-country investigation using an alternative measure for bank competition, the Lerner index. Although competition alleviates financing obstacles they find the effect depends on the economic and financial environment. Carbo-Valverde, Rodriguez-Fernandez, and Udell (2009) analyze the relation between bank competition and credit availability, measured at the firm level by the dependence on trade credit, on a sample of Spanish small and medium-sized enterprises (SMEs). They, too, find that greater bank competition is associated with lower credit constraints. Ryan, O'Toole, and McCann (2014) examine the impact of bank competition measured by the Lerner index on credit constraints for a sample of firms from 20 European countries. They identify financial constraints through sensitivity of investment to the availability of internal financing. Their findings indicate that bank competition diminishes credit constraints.<sup>5</sup>

While bank competition is found to facilitate access to credit in line with the market power hypothesis, the literature says little about the channels through which market power provides this beneficial effect. Bank competition seems to contribute to better access to credit by relaxing lending conditions such as collateral requirements (Hainz, Weill, and Godlewski, 2013) and reducing the cost of credit. It is then reasonable to ask whether greater bank competition actually reduces the cost of credit in line with this intuition and whether the market power hypothesis really drives a counterintuitive relation between competition and price on lending markets.

Notably, most studies give short shrift to the impact of bank competition on the cost of credit. The handful of works that take on this topic stem from the seminal investigation of Petersen and Rajan (1995) on the impact of bank concentration on loan rates. They

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<sup>5</sup> A few studies have also investigated the impact of competition on relationship lending, which is connected to our research question since competition can affect access to credit through greater or lower investment in relationship banking. Elsas (2005) and Degryse and Ongena (2007) provide evidence of a u-shaped relation between bank concentration and the investment of banks in relationship lending. Presbitero and Zazzaro (2011) extend these works by suggesting that the non-monotonicity of this link comes from the influence of the organizational structure of local credit markets through the presence or the absence of large and functionally distant banks.

find lower loan rates in concentrated banking markets, evidence that supports the information hypothesis. In contrast, several single-country studies (Sapienza, 2002, for Italy; Kim, Kristiansen, and Vale, 2005, for Norway; and Degryse and Ongena, 2005, for Belgium) provide evidence that supports the market power hypothesis, i.e. they find a positive influence of bank concentration on loan rates.

Our aim in this study is to examine the impact of bank competition on the cost of credit. We advance the understanding of bank competition by providing the first cross-country analysis investigating the impact of bank competition on the cost of credit using micro-level data. In a cross-country sample, we utilize the variation in bank competition that guarantees satisfactory degrees of freedom for the estimations. We use a panel of firms from 20 European countries for which we have firm-level data on the cost of credit. The banking sector plays dominant role as a source of financing for firms in the majority of these countries. Beck, Demirgüç-Kunt, and Levine (2004) show that the institutional and economic framework influences the impact of bank concentration on access to credit. Here, we investigate the possible influences of the institutional and economic environment of a country on competition and cost of credit. Our large cross-country sample provides a suitable setting for determining whether country characteristics influence this relationship.

To this end, we consider a broad set of indicators to measure bank competition. The measurement of competition is subject of a major debate in the empirical literature on banking. Structural measures such as the Herfindahl-Hirschman index and concentration indices are widely adopted (e.g. ECB, 2014), even if they only infer degree of competition from indirect proxies such as market share rather than provide exact measures of competition. In contrast, non-structural measures such as the Lerner index and the H-statistic infer bank conduct directly and have become increasingly popular in empirical works on banking. For example, Maudos and Fernandez de Guevara (2007), Turk-Ariss (2010) and Carbo-Valverde, Rodriguez-Fernandez, and Udell (2009) all show that the link between bank competition and financing constraints can be influenced by the choice of competition measure. An analysis of the effects of bank competition must therefore consider several competition metrics to check if results are consistent across these measures. We use four competition measures in our work: two non-structural

indicators (Lerner index and the H-statistic) and two structural measures (Herfindahl-Hirschman index and CR5). Our analysis provides a comprehensive view of the influence of bank competition on the cost of credit.

We face several challenges in our investigation. First, the measurement of the *cost of credit at the firm level* is difficult due to data constraints. Data on individual loans are available notably through credit registries but they are single-country datasets (e.g., Degryse and Ongena, 2005) or they are available exclusively for large loans (e.g. Qian and Strahan, 2007). Our question, however, is of particular interest for small companies, given the potential role of bank incentives to invest in soft information and the limited access of these companies to other sources of finance. Thus, we use accounting data to measure the cost of credit and calculate the ratio of interest expenses to total bank debt. This indicator measures the implicit interest rate charged by banks. Carbo-Valverde, Rodriguez-Fernandez, and Udell (2009) also use this indicator to measure the loan interest rate for each firm.

Second, we must rely on *aggregate measures of competition* because we require information on a battery of competition measures for a large set of European countries and therefore it is impossible to measure bank competition at the local level for each firm. Such information is only available at the aggregate level, which explains the common use of aggregate measures of bank competition in cross-country studies on the impact of bank competition (e.g. Beck, Demirgüç-Kunt, and Levine, 2004; Love and Peria, 2012; Hainz, Weill, and Godlewski, 2013; and Ryan, O'Toole, and McCann, 2014). As a consequence, a limitation of our work is the fact that we do not have bank-firm specific information.

This study is divided into five sections. Section 2 presents the data. Section 3 describes the measures of competition and the econometric specifications. Section 4 displays the results. Section 5 provides concluding remarks.

## **2. Data**

We use firm-level data from Amadeus, the database maintained by Bureau van Dijk, which contains comprehensive financial information on public and private companies

across Europe. Focusing on EU 20 countries for the period from 2001 to 2011,<sup>6</sup> our sample contains over 13 million firm-year observations for more than 4.5 million firms. The annual panel is constructed by combining multiple updates of the Amadeus database. Every update contains a snapshot of currently active population of firms and the up to ten most recent years of firms' financial data. If a firm stops providing financial statements, it is removed from the database after four years. Using multiple snapshots of the database lets us add back observations for firms not present in more recent updates. It eliminates the survivorship bias and extends firms' historical financial data beyond the most recent ten years.

Most firms in Amadeus report unconsolidated financial statements, but consolidated statements are provided if available. In our dataset, we use unconsolidated financial statements to avoid double counting firms and subsidiaries or operations abroad and exclude firms that report only consolidated statements. We also exclude the financial intermediation sector and insurance industries (NACE codes 64–66), which have a different balance sheet and specific liability structure.

The key firm-level variable is *Cost of credit* defined as the difference between the ratio of financial expenses divided by bank debt<sup>7</sup> and the country's nominal short-term interest rate. This measure of the implicit interest rate, which is in line with Carbo-Valverde, Rodriguez-Fernandez, and Udell (2009),<sup>8</sup> captures the cost of credit well. The majority of our sample consists of micro and small enterprises that lack access to non-bank funding sources, so the majority of their financial expenses are loan expenses.

Two firm-level control variables are taken from the literature. The first is *Size* defined as the log of total assets as firms of different size have different financing patterns (Beck, Demirgüç-Kunt, and Maksimovic, 2008). The second is *Tangibility*, measured as the ratio of tangible fixed assets to total assets. A higher proportion of tangible assets that could serve as collateral may indicate better opportunities for obtaining external financing.

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<sup>6</sup> Austria, Belgium, Bulgaria, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Latvia, the Netherlands, Poland, Portugal, Slovenia, Romania, Slovakia, and Spain.

<sup>7</sup> Bank debt in the Amadeus database is decomposed between short-term bank debt ("loans") and long-term bank debt ("long-term debt"). We define bank debt as the sum of both components.

<sup>8</sup> Carbo-Valverde, Rodriguez-Fernandez, and Udell (2009) define the loan interest spread as the difference between the ratio of loan expenses to bank loans outstanding and the interbank interest rate.

To assess whether the impact of competition differs depending on firm size, we distinguish among micro firms (i.e. firms with fewer than ten employees or a turnover or total assets less than 2 million euros), small and medium-sized firms (either less than 250 employees or a turnover less than 50 million euros or balance sheet total less than 43 million euros) and large firms.<sup>9</sup> Micro firms (36 %), and small and medium-sized firms (58 %) together constitute about 94 % of our entire sample.

Country-specific variables come from different datasets. Two competition measures (Lerner index, CR5) come from the Global Financial Development Database (GFDD). As the Herfindahl-Hirschman index is missing in this database, we draw on the ECB's SDW database for our information. As the H-statistic has many missing values in the GFDD, we use the H-statistic estimated with Bankscope data from Weill (2013).

One additional country-level variable comes from the GFDD: *Private credit* defined as the ratio of private credit by deposit money banks and other financial institutions to GDP. *GDP per capita* and *Inflation* are both extracted from the World Development Indicators. *Rule of law* comes from the Worldwide Governance Indicators.

Following other studies, we require that all key variables have non-missing values. All explanatory variables are truncated at 1 %, top and bottom. The resulting sample constitutes an unbalanced panel.

Descriptive statistics of all variables are presented in Table 1 and Table 2 reports descriptive statistics concerning our competition measures by country. The definitions of variables are provided in the Appendix.

### 3. Methodology

#### 3.1 Competition measures

The literature on industrial organization provides a number of indicators, based on different methodological approaches, for measuring bank competition. They can be classified into two categories. The first relies on the traditional Structure-Conduct-

<sup>9</sup> For a detailed classification of firms by size in Europe, see [http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index\\_en.htm](http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm)

Performance (SCP) model, whereby structural indicators are used to measure competition. The SCP paradigm states that higher concentration in the banking market is negatively associated with competitive conduct and leads to higher profitability as banks are able to set higher loan rates or lower deposit rates. Indicators used to measure competition include the Herfindahl-Hirschman index (HHI) and  $n$ -bank concentration ratios such as CR5, the market share of the five largest banks.

Unlike the SCP, the second category of competition measures, which are based on the new empirical industrial organization, develops non-structural measures of competition that take into account bank conduct. While the SCP approach posits that competition can be inferred from indirect proxies like market structure or market share, non-structural measures measure directly banks' conduct in response to changes in demand and supply conditions without taking market structure into account. These measures include the Lerner index and the H-statistic based on the Rosse-Panzar model. All rely on the analysis of the effective behavior of firms in the market.

Both structural and non-structural measures of competition are used in empirical banking studies. However, given the limitations of structural measures, non-structural measures have recently become increasingly important.

To provide a broad perspective of the impact of bank competition on the cost of credit, we follow the existing research and consider four measures of bank competition.

The Herfindahl-Hirschman index and CR5 are structural measures. The Herfindahl-Hirschman index is the sum of the squares of market shares for all firms in the industry. During the observation period, its value ranges between 0.0158 in 2001 to 0.4039 in 2005. CR5 is the five-bank concentration ratio defined as the percentage of the market controlled by the top five banks in the market in total assets. By this measure, the banking systems of European countries are fairly concentrated (maximum value 100 for Estonia, minimum value 47.85 for Italy).

We further employ two non-structural measures. The Lerner index is defined as the difference between price and marginal cost, divided by price. It indicates the effective behavior of banks by measuring the ability of a bank to set its price above marginal cost and thus the individual bank's market power. A higher Lerner index value suggests lower bank competition. Its mean values by country are generally within the range from 0.09

for Germany to 0.27 for Bulgaria (Finland, with a value of -0.12, is the exception). The H-statistic is estimated using the Rosse-Panzar model (Rosse and Panzar, 1977). It is the sum of the elasticities of total revenues to input prices. The H-statistic value provides information on the nature of competition in a market. A value below or equal to 0 indicates monopoly, between 0 and 1 monopolistic competition, and 1 perfect competition. Following the lead of e.g. Claessens and Laeven (2004), we consider the H-statistic as a continuous measure of competition. It ranges between -0.1575 and 0.8324 in our sample.

### 3.2 Econometric specifications

Our main interest is the relationship between competition in the banking sector and the cost of credit for a firm. Panel dimension of our data enables us to control for firm-level heterogeneity. We start with the estimation of the following base specification:

$$y_{ijt} = \alpha + \beta X_{ijt} + \gamma Z_{jt} + Competition_{jt} + \theta_i + \mu_t + \varepsilon_{ijt}, \quad (1)$$

where  $y_{ijt}$  is the cost of bank credit for firm  $i$  in country  $j$  at time  $t$ ;  $X$  is a set of firm-specific determinants (*Size, Tangibility*);  $Z$  is a set of country-level variables (*Private credit, Rule of law, GDP per capita, Inflation*); *Competition* stands for one of the four competition measures;  $\theta$  is a firm fixed effect,  $\mu$  is a time fixed effect, and  $\varepsilon$  is a random error term.

All models are estimated with firm fixed effects. Standard errors are clustered at the country\*industry level. Even if clustering by country might be preferable in some cases (Pepper, 2002), the true standard errors could be consistently estimated when the number of clusters approaches infinity. When the number of clusters is low (less than 50) and cluster sizes unbalanced,<sup>10</sup> inference using a cluster-robust estimator may be incorrect (Nichols and Shaffer, 2007; Cameron and Miller, 2015). Thus, clustering by country is inappropriate and we employ clustering at the country\*industry level.

There are several arguments based on which possible endogeneity problem can be reduced in our empirical analysis. First, bank competition is computed at the country level, while measures for cost of credit are firm-level characteristics coming from a

<sup>10</sup> The low number of clusters may range from less than 20 to less than 50 clusters in the balanced case and even more clusters in the unbalanced case (Cameron and Miller, 2015).

different data source. It is therefore unlikely that cost of credit measures can influence bank competition. Second, the panel structure of our dataset allows us to include firm-level fixed effects and thus remove all time-invariant unobservable effects that could potentially affect both bank competition and cost of credit. Third, we perform the main estimations by lagging the observations by one year for all independent variables to reduce the contemporaneous reverse causality. Our main results do not change.<sup>11</sup> In addition, we perform a robustness check by employing instrumental variables estimations.

## 4. Results

This section presents the results of the estimations. We first comment on the main estimations and then provide the results by firm size and by opacity level. We continue with results including various interactions and complete the analysis with results for different sub-periods and several robustness tests.

### 4.1 Main estimations

We perform regressions explaining what determines the cost of credit. Four regressions are estimated, each employing a different competition measure. Results are reported in Table 3. With the exception of the H-statistic, higher values of competition measures are associated with lower level of competition.

We observe that the coefficients are significant and negative for the Herfindahl-Hirschman index and CR5. These findings support the view that bank concentration is negatively associated with the cost of credit. We observe a similar pattern, i.e. a significant and negative coefficient, for the Lerner index. The coefficient for the H-statistic is positive but not significant. The results for the four competition measures thus indicate that bank competition increases the cost of credit. This finding accords with the information hypothesis, whereby competition does not undermine the cost of credit.

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<sup>11</sup> These estimations are available upon request.

Notably, both structural and non-structural measures lead to the same conclusion, indicating that the difference in results does not reflect the difference between structural and non-structural measures of competition.

To see the economic significance of the main results reported in Table 3, consider the case in which Lerner index changes by one standard deviation (i.e., 0.1). Then the cost of credit changes by  $0.01144 \times 0.1 = 0.001144$ , representing a 1.66% change from the mean value of the cost of credit. Similarly, the results in column (3) of Table 3 imply that for the same change in CR5 (one standard deviation), the cost of credit changes by 0.004114 or 5.96% from the mean. Furthermore, according to the results in column (4) the change in Herfindahl-Hirschman index leads to a change of 0.007029 in the cost of credit, which is 10.2% change from the mean.<sup>12</sup> Therefore, the effect of the competition on the cost of credit is economically meaningful.

In analyzing other explanatory variables, we note that firm size and tangibility of assets are significantly negative, in line with the intuition that larger firms and firms with higher tangibility of assets are more likely to have lower cost of credit. As expected, better law enforcement favors lower cost of credit, while higher inflation has a positive association with cost of credit. Interestingly, greater financial and economic development tend to enhance the cost of credit. This might be explained by the fact that access to credit is easier in more financially and economically developed countries, so young, riskier firms are also able to obtain credit. As these firms need to pay higher interest to compensate for their higher risk, the average cost of credit rises.

#### 4.2 Estimations by size and by opacity

Our main estimations indicate that bank competition influences the cost of credit in line with the information hypothesis, which says that banks invest more in soft information when competition is lower. Such investment helps banks mitigate information problems in lending. As a result, the information hypothesis should apply predominantly to SMEs, which typically are more opaque than larger firms (Berger and Udell, 1995). There is a large strand of literature showing that information asymmetries play a more significant

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<sup>12</sup> We do not discuss the economic significance of the results for H-statistics as the estimated coefficient is not significant.

role for SMEs, leading to the fact that investment of banks in relationship lending is of prime importance for their access to credit.

Following this hypothesis, we further investigate whether the relation between bank competition and the cost of credit differs with the size of firms. We expect to observe greater positive influence of bank competition on the cost of credit for smaller companies. We re-estimate our regressions by considering separately groups of firms by size: micro companies, SMEs, and large companies. The estimation results are presented in Tables 4 and 5.

Our findings strongly support the information hypothesis. The coefficient estimates for both the Lerner index and the Herfindahl-Hirschman index are negative and significant, indicating a higher cost of credit in more competitive environments for micro companies and SMEs. The coefficient is not significant for large companies. In the case of the H-statistic, the estimated coefficient is positive and significant for micro companies, but not significant for SMEs and large companies. These results support the information hypothesis even if the estimated coefficient for H-statistic was not significant in the main estimations. Here the H-statistic indicates that greater competition is associated with greater cost of credit for smaller companies. This is in line with the hypothesis that bank competition contributes to a higher cost of credit for these more opaque borrowers. We see, however, no difference for different sizes of firms in the findings for CR5: the coefficient is significantly negative for all three size classes of firms.

In line with the view that information hypothesis applies in particular to more opaque companies, we additionally examine whether the relation between bank competition and cost of credit differs with the opacity of firms. Opacity is hard to define and measure and therefore size is commonly used as a proxy for opacity. However Bonaccorsi di Patti and Dell'Ariccia (2004) propose to use the ratio of total assets to fixed assets at the industry level as an indicator of private information. We utilize this indicator to classify all companies of our sample in three groups of equal size based on their level of opacity: high opacity, medium opacity, low opacity. We run our main regressions by considering each group of companies. The results are reported in Tables 6

and 7.

The results are in line with the information hypothesis. The coefficient of competition variable is significant and negative for high opacity and medium opacity groups but not significant for low opacity group with the Lerner index and HHI. The positive impact of competition on cost of credit is only observed for the most opaque companies, which accords with the information hypothesis. With CR5 measure, we have a significantly negative coefficient for all three groups of firms. However, the coefficient is higher in absolute value when opacity increases, which tends to confirm greater positive impact of competition on cost of credit for more opaque companies. We do not observe any link between opacity and the relation between competition and cost of credit for the H-statistic: the estimated coefficient is not significant for any of the three groups.

The estimations by firms' size and by opacity level therefore indicate that the positive impact of bank competition on cost of credit is primarily observed for smaller and more opaque firms that are most likely to be subject to adverse selection and other informational problems. These results provide additional support in favor of the information hypothesis.

#### **4.3 Interactions with country-level variables**

Our main estimations indicate that greater bank competition tends to contribute to higher cost of credit. As shown by Beck, Demirgüç-Kunt, and Maksimovic (2004), this influence can be either exacerbated or mitigated by the institutional and economic framework. We therefore consider three factors of this framework: financial development, economic development, and institutional development. Beck, Demirgüç-Kunt, and Maksimovic (2004) also take these three factors into account in their analysis of the relation between bank concentration and financing obstacles.

The information hypothesis posits that banks invest in soft information to gain better information about opaque borrowers. As a consequence, country-specific factors that affect information asymmetries may impact the relationship between bank competition and the cost of credit.

While, to our best knowledge, we provide the first cross-country analysis on the relation between bank competition and the cost of credit, it is worth mentioning that the related literature on bank competition and access to credit reports mixed results. Beck, Demirgüç-Kunt, and Maksimovic (2004) find no impact of financial development on the relation between bank concentration and financing obstacles, while greater economic and institutional development relaxes financing constraints and bank concentration increases financing obstacles. Similarly, Love and Peria (2012) report that low bank competition decreases access to finance, but greater financial development mitigates the negative impact of low bank competition and facilitates access to credit.

For bank competition and the cost of credit, we expect financial development and economic development to mitigate the existing positive relationship. Financial and economic development is often associated with lower information asymmetries (Godlewski and Weill, 2011), which could be due to the higher quality of risk analysis conducted by bank employees before loan approval. In any case, it seems reasonable to assume that the quality of the risk analysis increases with knowledge and skills of bank employees, which are positively related to financial and economic development. The information hypothesis further implies that opaque borrowers are the ones benefitting most from banks' investment in information collection. Hence, low competition should be more beneficial for the cost of credit in a country with higher financial and economic development, as such country is expected to face lower information asymmetries.

We assume that better law enforcement mitigates the positive relation between bank competition and the cost of credit. As observed by Beck, Demirgüç-Kunt, and Maksimovic (2004), a better institutional environment makes enforcement of contracts easier and increases the capacity of banks to screen potential borrowers. Better quality of institutions diminishes information asymmetries, mitigating the relevance of the information hypothesis.

For empirical testing of variations in the impact of bank competition on the cost of credit depending on country-level development, we include interaction terms between bank competition and financial, economic and institutional development indicators in our main model. If the information hypothesis applies, we expect positive and significant

coefficients for the interaction terms when bank competition is measured by Lerner index, CR5, and the Herfindahl-Hirschman index (higher values for these competition indicators are associated with lower competition). We also expect lower H-statistic values for lower competition, and thus coefficients for interaction terms that are significantly negative. The estimation results are reported in Tables 8-10.

For financial development (Table 8), we obtain the expected positive sign for the interaction term between bank competition and *Private credit* with CR5 and HHI, but the coefficient is not significant. The interaction term is negative and significant when bank competition is measured by Lerner index, while the interaction term between the H-statistic and *Private credit* is significantly positive. These results suggest that greater financial development strengthens the beneficial impact of low competition to attenuate the cost of credit, and further, that lower competition helps lower the cost of credit, an effect amplified by greater financial development.

How should we interpret such results? Apparently, greater financial development can provide greater incentives for banks to invest in relationship lending, notably through economies of scale associated with investment in soft information. As such, the information hypothesis gains relevance as the level of financial development increases.

For economic development (Table 9), we find evidence supporting our initial conjecture that greater GDP per capita lowers the beneficial impact of low competition on the cost of credit. This is evidenced by a positive and significant interaction term between bank competition and *GDP per capita* when competition is measured by Lerner index and CR5, and by a negative and significant interaction term between H-statistic and *GDP per capita*. In addition, the interaction term is positive but not significant for HHI.

We find mixed results when accounting for the institutional development (Table 10). On the one hand, the results with Lerner index, and H-statistic, support the expected view that greater institutional development reduces the beneficial impact of low competition on the cost of credit. The interaction term with *Rule of law* is positive and significant with Lerner index, and negative and significant with H-statistic. On the other hand, both structural measures of competition tend to support the opposite view, i.e. the

interaction term with *Rule of law* is negative and significant for CR5 and negative but not significant for the Herfindahl-Hirschman index.

Based on the above results, our investigation on how the institutional and economic framework influences the relation between competition and the cost of credit yields mixed conclusions. Financial development tends to foster the negative relation between bank competition and the cost of credit, while economic development seems to bolster it. Institutional development has no clear influence on the relationship of bank competition and the cost of credit.

#### 4.4 Crisis period

We extend our analysis by examining if the crisis years that are part of our sample period influenced the relation between bank competition and the cost of credit. The crisis can exert an impact on the relation by affecting both competition and cost of credit. Namely, crisis could have reduced the degree of competition on banking markets in Europe by reducing the number of competitors due to mergers and acquisitions. Further, it could have increased cost of credit through higher loan losses and lower incentives for banks to invest in soft information with the increase of bank costs.

To investigate the impact of the crisis, we redo our estimations by adding a dummy variable equal to one for the crisis years 2008 to 2011 and an interaction term between the dummy variable and the competition measure (Table 11). We note that the interaction term in all four specifications has an opposite sign from the competition measure. It is significant for competition measures with the exception of CR5. This supports the view that crisis periods weaken the impact of bank competition on the cost of credit. Here, the crisis reduces the positive impact of competition on the cost of credit for all competition measures.

This conclusion is important. It suggests that the impact of bank competition changes during periods of crisis, which means policy prescriptions need to adjust to take this into account. Indeed, while our results suggest that bank competition should not be fostered to lower the cost of credit, this policy would not apply in times of crisis.

#### 4.5. Robustness tests

We check the robustness of our main findings in several different ways.

First, we use an alternative measure for the cost of credit in our estimations (Table 12). Using available items for a large number of companies in the Amadeus database, we redefine cost of credit as interest paid divided by total bank debt and observe results in line with the information hypothesis, i.e. the coefficients are significantly negative for the Lerner index and CR5 and positive for the H-statistic. While significant in the main estimations, the negative coefficient for HHI is not significant here. Nevertheless, these results generally align with our main estimations and thus provide additional support for the information hypothesis.

Second, we perform estimations without accounting for firm fixed effects (Table 13). This is motivated by the fact that our estimations combine the use of firm fixed effects and country-level indicators of bank competition. By not accounting for firm fixed effects we are able to exploit the cross-sectional and times series variation of the data. The results without firm fixed effects are in line with the main results: the estimated coefficients are significant and negative for the Lerner index, CR5 and HHI while the coefficient is positive and not significant for the H-statistic.

Third, we take into account debt composition in the estimations (Table 14). Our finding in favor of the information hypothesis can be influenced by the fact that greater competition leads banks to provide lines of credit which are more expensive. In such a case our result would reflect a debt composition effect. To check this possibility, we include the ratio *Short-to-long-term debt* defined as the ratio of short-term debt to long-term debt to our main estimations. Due to the fact that many firms included in our sample do not have long-term debt, the ratio cannot be calculated for them. Since we do not want to lose these observations with useful information, we generate an additional variable *No long-term debt*, which is equal to one when a firm has no long-term debt and to zero otherwise.<sup>13</sup> We find that the results for the competition measures are in line with our

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<sup>13</sup> We treat missing values for long-term debt with the method of dummy variable adjustment: when long-term debt is zero, the ratio *Short-to-long-term debt* is equal to short-term debt divided by 0.000001. Alternatively, we also perform these estimations by considering only firms with positive long-term debt and we obtain exactly the same results.

main estimations when debt composition is taken into account: we observe a significantly negative coefficient for Lerner, CR5, and HHI. The estimated coefficient for H-statistic is positive but not significant. The ratio *Short-to-long-term debt* is not significant in the regressions.

Fourth, we test the simultaneous inclusion of one structural measure and one non-structural measure of competition in the estimations (Table 15). Our aim is to investigate the relation between bank competition and cost of credit, and we do so by testing alternatively different measures of bank competition, which can be structural and non-structural. It can be argued that these two types of indicators do not measure the same dimension and may therefore not be considered as substitutes. To this end, we redo estimations in which we include together one structural measure (CR5 or HHI) and one non-structural measure (the Lerner index or the H-statistic). We observe that the main findings on the positive relation between bank competition and cost of credit are valid. We still find that the estimated coefficients for Lerner index, CR5, and HHI are significant and negative, while the H-statistic is positive.

Fifth, we investigate whether results differ between old and young firms (Table 16). These estimations allow to account for the potential influence of firm entry on the relation between bank competition and cost of credit as this relation can be driven by the firm entry ratio which influences borrowing demand and loan rates.<sup>14</sup> Age of firms provides information on the recent or old entry of firms to the market. We run our main estimations separately for young firms defined as those having an age lower than 9 years and old firms. The threshold of 9 years has been chosen since it is the median of the sample. We find exactly the same results for young and old firms, with a significant and negative coefficient for the Lerner index, CR5, and HHI, and a positive coefficient for the H-statistic. This confirms that our main result is not driven by the increase in firm entry.

Sixth, we include the squared term for the competition measure in the estimations to consider possible nonlinearity in the relation between bank competition and cost of credit (Table 17). The coefficients for the squared term are significant for all four of our competition measures, but do not necessarily support a nonlinear relation.

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<sup>14</sup> We have also performed estimations in which we include the ratio of new established firms to total firms, computed from Amadeus database. The results are similar.

In the case of Lerner index, the squared term and the linear term for bank competition are both significant and negative. Hence, the inclusion of a squared term supports the linear relation observed in the main estimations.

For the H-statistic and CR5, the inclusion of the squared term is of particular interest. The linear term alone is significantly negative and the squared term is significantly positive with the H-statistic, while the linear term alone is significantly positive and the squared term is significantly negative with the CR5. In other words, we observe a nonlinear relation for both indicators with greater competition disfavoring the cost of credit up to a certain value, above which greater competition favors the cost of credit.

We can compute this threshold for each indicator. For the H-statistic, the threshold is 0.005 while it is 0.621 for CR5. Both values are in the range of the values for the sample and below the mean. Thus, the analysis of the nonlinear relation suggests that the result that competition strengthens the cost of credit should only be observed after competition attains a certain level.

For the Herfindahl-Hirschman index, we also observe evidence in favor of a different nonlinear relation. The linear term alone is significantly negative and the squared term is significantly positive. These results support the view that initially the HHI value rises (i.e. competition goes down) and the cost of credit falls until a certain value for HHI is attained. Above that, the HHI value suggests the cost of credit rises. The threshold is 0.0026, which is in the range of our sample. Hence, this negative relationship between the Herfindahl-Hirschman index and the cost of credit, in line with our finding that greater competition fosters cost of credit, reverses for values of HHI above this threshold.

Our analysis of the nonlinear relationship between bank competition and the cost of credit shows results differ depending on the competition indicator. However, they all provide evidence that greater competition strengthens the cost of credit for some values.

Finally, we address the potential endogeneity concern by re-estimating our main specification using an instrumental variable strategy. To be valid, an instrumental variable needs to be correlated with the included endogenous variable and not correlated with the error process. We argue that past levels of financial development of a country

and past levels of bank performance are correlated with the current level of bank competition, but not correlated with the current interest rates charged by banks. This is because the industry structure changes relatively slowly over time when compared to interest rates. We, therefore, collect the financial development and bank performance measures from the Global Financial Development database with the lag of five years. As our four different competition measures capture different dimensions of the market, we use different sets of instruments for each competition measure. To ensure that our instruments are valid we run a battery of statistical tests.<sup>15</sup>

The results of the instrumental variables estimations are presented in Tables 18 and 19. All the competition measures are significant and have the sign consistent with our main estimations.

## 5. Conclusions

In this paper, we analyzed the impact of bank competition on the cost of credit using a cross-country sample of firms from 20 European countries over the period 2001–2011. The market power hypothesis predicts that we should observe a negative relationship between bank competition and the cost of credit, because greater competition reduces the market power of banks. The information hypothesis, in contrast, expects a positive link due to the incentives of banks to invest in soft information. While this question has been investigated in single-country studies, it has never been studied in a cross-country framework. We fill this gap and consider four competition measures commonly used in the literature to take into account the possible differences across these measures.

Our main finding is that bank competition enhances cost of credit in line with the information hypothesis. Our baseline estimations show a positive relation between bank competition and the cost of credit with each of our four competition measures. We find that this positive influence of bank competition is stronger for smaller companies, which also accords with the information hypothesis.

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<sup>15</sup> While we report F-statistic for the test of the joint significance of instruments in the first stage regression and Hansen J statistic for the overidentifying restrictions test in Tables 18 and 19, other tests recommended by Baum, Schaffer and Stillman (2007) are also run and available upon request.

The positive impact of bank competition is influenced by two additional characteristics. It is lower during periods of crisis, and the institutional and economic framework influences the relation between competition and the cost of credit.

Overall, these findings do not support the intuitive view that bank competition contributes to a reduction of prices in line with the general economic theory. Nevertheless, the banking industry is special due to the importance of information asymmetries that provide incentive to invest in technologies that reduce such asymmetries. As such, greater competition may shape bank behavior through lower incentives that result in higher lending rates. We corroborate the theoretical and empirical arguments of Petersen and Rajan (1995), who find lower loan rates in concentrated banking markets.

The take-away lesson for policymakers here is that pro-competitive policies in the banking industry can have detrimental effects. Our findings also agree with the view that banking competition can have a detrimental influence on financial stability and bank efficiency (Maudos and Fernandez de Guevara, 2007; Casu and Girardone, 2010).

The vices of greater bank competition, however, need to be put into perspective with the benefits on access to credit, as stressed by Beck, Demirgüç-Kunt, and Maksimovic (2004) and Ryan, O'Toole, and McCann (2014). Bank competition can contribute to better access to credit by lowering financing obstacles such as collateral requirements, even if it does not diminish the cost of credit. In addition, the influence of the cost of credit on access to credit is dependent on the elasticity of credit demand.

The present paper provides the first cross-country investigation of the impact of bank competition on the cost of credit. Our analysis may be extended in a number of ways to check the general applicability of these findings for other countries and the relevance of our interpretations of the findings.

## References

- Baum, C. F., Schaffer, M. E., & Stillman, S. (2007). "Enhanced routines for instrumental variables/GMM estimation and testing." *Stata Journal*, 7(4), 465-506.
- Beck, T., O. De Jonghe, and G. Schepens (2013). "Bank Competition and Stability: Cross-Country Heterogeneity." *Journal of Financial Intermediation*, 22, 218-244.
- Beck, T., A. Demirgüç-Kunt, and R. Levine (2006). "Bank Concentration, Competition and Crises." *Journal of Banking and Finance*, 30(5), 1581-1603.
- Beck, T., A. Demirgüç-Kunt, and V. Maksimovic (2004). "Bank Competition and Access to Finance: International Evidence." *Journal of Money, Credit and Banking*, 36(3), 627-654.
- Beck, T., A. Demirgüç-Kunt, and V. Maksimovic (2008). "Financing patterns around the world: Are small firms different?" *Journal of Financial Economics*, 89(3), 467-487.
- Berger, A., L. Klapper, and R. Turk-Ariss (2009). "Bank Competition and Financial Stability." *Journal of Financial Services Research*, 21, 849-870.
- Berger, A. and G. Udell (1995). "Relationship Lending and Lines of Credit in Small Firm Finance." *Journal of Business*, 68, 351-381.
- Boot, A., and A. Thakor (2000). "Can Relationship Banking Survive Competition?" *Journal of Finance*, 55(2), 679-713.
- Boyd, J., and G. De Nicolo (2005). "The Theory of Bank Risk Taking and Competition Revisited." *Journal of Finance*, 60(3), 1329-1343.
- Cameron, A. C., and D. L. Miller (2015). "A Practitioner's Guide to Cluster-Robust Inference." *Journal of Human Resources*, 50(2), 317-373.
- Carbo, S., D. Humphrey, J. Maudos, and P. Molyneux (2009). "Cross-Country Comparisons of Competition and Pricing Power in European Banking." *Journal of International Money and Finance*, 28, 115-134.
- Carbo-Valverde, S., F. Rodriguez Fernandez, and G. Udell (2009). "Bank Market Power and SME Financing Constraints." *Review of Finance*, 13, 309-340.
- Casu, B., and C. Girardone (2009). "Testing the Relationship between Competition and Efficiency in Banking: A Panel Data Analysis." *Economics Letters*, 105, 134-137.
- Cetorelli, N. (2004). "The Real Effects of Bank Competition." *Journal of Money, Credit and Banking*, 36(3), 543-558.
- Claessens, S., and L. Laeven (2004). "What Drives Bank Competition? Some International Evidence." *Journal of Money, Credit and Banking*, 36(3), 563-583.

- Claessens, S., and L. Laeven (2005). "Financial Dependence, Banking Sector Competition and Economic Growth." *Journal of the European Economic Association*, 3(1), 179-207.
- Degryse, H., and S. Ongena (2005). "Distance, Lending Relationships, and Competition." *Journal of Finance*, 60, 231-266.
- Degryse, H., and S. Ongena (2007). "The Impact of Competition on Bank Orientation." *Journal of Financial Intermediation*, 16(3), 399-424.
- Dell'Ariccia, G., and R. Marquez (2006). "Lending Booms and Lending Standards." *Journal of Finance*, 61(5), 2511-2546.
- ECB (2014). *Banking Structures Report*, European Central Bank.
- Elsas, R. (2005). "Empirical Determinants of Relationship Lending." *Journal of Financial Intermediation*, 14(1), 32-57.
- Godlewski, C., and L. Weill (2011). "Does Collateral Help Mitigate Adverse Selection? A Cross-Country Analysis." *Journal of Financial Services Research*, 40(1), 49-78.
- Hainz, C., L. Weill, and C. Godlewski (2013). "Bank Competition and Collateral: Theory and Evidence." *Journal of Financial Services Research*, 44(2), 131-148.
- Kim, M., E. Kristiansen, and B. Vale (2005). "Endogenous Product Differentiation in Credit Markets: What Do Borrowers Pay For?" *Journal of Banking and Finance*, 29(3), 681-699.
- Kysucky, V. and L. Norden (2016). "The Benefits of Relationship Lending in a Cross-Country Context: A Meta-Analysis." *Management Science*, 62(1), 90-110.
- Love, I., and M. Peria (2015). "How Bank Competition Affects Firms' Access to Finance." *World Bank Economic Review*, 29(3), 413-448.
- Maudos, J., and J. Fernandez de Guevara (2007). "The Cost of Market Power in Banking: Social Welfare Loss vs. Inefficiency Cost." *Journal of Banking and Finance*, 31, 2103-2125.
- Nichols, A., and Schaffer, M. (2007). "Clustered Errors in Stata." In *United Kingdom Stata Users' Group Meeting*, September.
- Pepper, J. V. (2002). "Robust Inferences from Random Clustered Samples: An Application using Data from the Panel Study of Income Dynamics." *Economics Letters*, 75(3), 341-345.
- Petersen, M., and R. Rajan (1995). "The Effect of Credit Market Competition on Lending Relations." *Quarterly Journal of Economics*, 110(2), 407-443.
- Presbitero, A. and A. Zazzaro (2011). "Competition and Relationship Lending: Friends or Foes?" *Journal of Financial Intermediation*, 20, 387-413.

- Qian, J., and P. Strahan (2007). "How Laws & Institutions Shape Financial Contracts: The Case of Bank Loans." *Journal of Finance*, 62(6), 2803-2834.
- Ryan, R., C. O'Toole, and F. McCann (2014). "Does Bank Market Power Affect SME Financing Constraints?" *Journal of Banking and Finance*, 49, 495-505.
- Sapienza, P. (2002). "The Effects of Banking Mergers on Loan Contracts." *Journal of Finance*, 57(1), 329-368.
- Schaeck, K., M. Cihak and S. Wolfe (2009). "Are Competitive Banking Systems More Stable?" *Journal of Money, Credit and Banking*, 41(4), 711-734.
- Turk-Ariss, R. (2010). "On the Implications of Market Power in Banking: Evidence from Developing Countries." *Journal of Banking and Finance*, 34(4), 765-775.
- Weill, L. (2013). "Bank Competition in the EU: How Has It Evolved?" *Journal of International Financial Markets, Institutions and Money*, 26, 100-112.

**Table 1.**  
**Descriptive statistics**

This table provides descriptive statistics for the main firm-level variables used in the econometric analysis. Variable definitions are provided in the Appendix. Competition measures are scaled by 100 and the unit of observation is the firm-year.

| Variable                   | Obs.       | Mean   | Std. Dev. | Min    | Max    |
|----------------------------|------------|--------|-----------|--------|--------|
| Firm size                  | 15 876 307 | -0.174 | 2.029     | -4.422 | 7.784  |
| Profitability              | 15 815 714 | 0.032  | 0.153     | -1.007 | 0.534  |
| Tangibility                | 14 787 186 | 0.301  | 0.277     | 0.000  | 0.982  |
| Cost of credit             | 15 514 105 | 0.069  | 0.097     | -0.046 | 0.500  |
| Lerner                     | 15 340 332 | 0.002  | 0.001     | -0.016 | 0.005  |
| H-statistic                | 13 445 483 | 0.006  | 0.002     | -0.002 | 0.008  |
| CR5                        | 15 691 243 | 0.786  | 0.121     | 0.479  | 1.000  |
| Herfindahl-Hirschman index | 15 760 781 | 0.001  | 0.001     | 0.000  | 0.004  |
| Private credit             | 15 528 718 | 115.5  | 41.00     | 14.28  | 237.6  |
| Rule of law                | 15 760 781 | 1.109  | 0.407     | -0.160 | 1.977  |
| GDP per capita             | 15 760 781 | 29 214 | 6 691     | 3 490  | 51 721 |
| Inflation                  | 15 760 781 | 2.244  | 1.239     | -4.480 | 15.403 |

**Table 2.**  
**Descriptive statistics of the competition measures by countries**

This table provides descriptive statistics for the competition measures for each country.

|             | Lerner |           | H-statistic |           | CR5    |           | HHI   |           |
|-------------|--------|-----------|-------------|-----------|--------|-----------|-------|-----------|
|             | Mean   | Std. Dev. | Mean        | Std. Dev. | Mean   | Std. Dev. | Mean  | Std. Dev. |
| Austria     | 0.158  | 0.045     | 0.647       | 0.144     | 56.812 | 13.679    | 0.051 | 0.008     |
| Belgium     | 0.241  | 0.030     | 0.561       | 0.197     | 74.506 | 10.386    | 0.183 | 0.029     |
| Bulgaria    | 0.270  | 0.037     | 0.346       | 0.142     | 83.151 | 5.097     | 0.077 | 0.006     |
| Czech Rep.  | 0.225  | 0.098     | 0.464       | 0.126     | 76.068 | 5.205     | 0.111 | 0.008     |
| Estonia     | 0.222  | 0.071     | 0.717       | 0.173     | 99.869 | 0.392     | 0.352 | 0.052     |
| Finland     | -0.124 | 0.602     | 0.665       | 0.108     | 99.126 | 1.101     | 0.280 | 0.053     |
| France      | 0.177  | 0.038     | 0.558       | 0.195     | 37.493 | 4.882     | 0.064 | 0.006     |
| Germany     | 0.094  | 0.038     | 0.583       | 0.163     | 60.776 | 11.268    | 0.020 | 0.005     |
| Hungary     | 0.195  | 0.038     | 0.547       | 0.133     | 85.693 | 3.503     | 0.083 | 0.003     |
| Ireland     | 0.230  | 0.043     | 0.286       | 0.193     | 96.539 | 5.820     | 0.069 | 0.014     |
| Italy       | 0.247  | 0.048     | 0.589       | 0.137     | 58.952 | 22.736    | 0.029 | 0.007     |
| Latvia      | 0.223  | 0.044     | 0.408       | 0.256     | 69.392 | 3.392     | 0.111 | 0.010     |
| Lithuania   | 0.137  | 0.054     | 0.574       | 0.147     | 89.498 | 2.660     | 0.192 | 0.027     |
| Netherlands | 0.175  | 0.057     | 0.544       | 0.202     | 94.884 | 5.522     | 0.190 | 0.016     |
| Poland      | 0.215  | 0.064     | 0.533       | 0.189     | 64.465 | 7.514     | 0.066 | 0.010     |
| Portugal    | 0.180  | 0.154     | 0.585       | 0.120     | 91.237 | 7.552     | 0.111 | 0.008     |
| Romania     | 0.184  | 0.063     | 0.470       | 0.246     | 84.520 | 3.852     | 0.102 | 0.015     |
| Slovak Rep. | 0.109  | 0.054     | 0.456       | 0.068     | 97.658 | 2.296     | 0.119 | 0.007     |
| Slovenia    | 0.231  | 0.071     | 0.593       | 0.261     | 92.145 | 2.500     | 0.135 | 0.016     |
| Spain       | 0.167  | 0.103     | 0.594       | 0.160     | 83.299 | 15.284    | 0.050 | 0.004     |

**Table 3.**  
**Main estimations**

Panel estimations with firm and time fixed effects. Competition measure indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of credit</i> |                        |                         |                        |
|--------------------|--------------------------------------------|------------------------|-------------------------|------------------------|
|                    | Lerner                                     | H-statistic            | CR5                     | HHI                    |
| Competition        | -1.144***<br>(0.338)                       | 0.341<br>(0.450)       | -0.034***<br>(0.006)    | -7.029***<br>(1.573)   |
| Size               | -0.003***<br>(0.001)                       | -0.003***<br>(0.001)   | -0.003***<br>(0.001)    | -0.003***<br>(0.001)   |
| Tangibility        | -0.042***<br>(0.006)                       | -0.041***<br>(0.006)   | -0.042***<br>(0.006)    | -0.042***<br>(0.006)   |
| Private credit     | -1.42e-04**<br>(0.000)                     | -5.56e-05<br>(0.000)   | -1.57e-04***<br>(0.000) | -1.29e-04**<br>(0.000) |
| Rule of law        | -0.076***<br>(0.006)                       | -0.079***<br>(0.006)   | -0.063***<br>(0.006)    | -0.069***<br>(0.006)   |
| GDP per capita     | 9.47e-06***<br>(0.000)                     | 8.70e-06***<br>(0.000) | 8.76e-06***<br>(0.000)  | 7.85e-06***<br>(0.000) |
| Inflation          | 0.002***<br>(0.000)                        | 0.003***<br>(0.001)    | 0.002***<br>(0.000)     | 0.002***<br>(0.001)    |
| Firm fixed effects | Yes                                        | Yes                    | Yes                     | Yes                    |
| Time fixed effects | Yes                                        | Yes                    | Yes                     | Yes                    |
| R <sup>2</sup>     | 0.031                                      | 0.032                  | 0.031                   | 0.030                  |
| N                  | 13 273 412                                 | 11 733 614             | 13 568 509              | 13 632 690             |

**Table 4.**  
**Estimations by firm size (1/2)**

Panel estimations with firm and time fixed effects. Competition measure indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of Credit</i> |                        |                        |                        |                        |                        |
|--------------------|--------------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|                    | Lerner                                     |                        |                        | H-statistic            |                        |                        |
|                    | Micro                                      | SME                    | Large                  | Micro                  | SME                    | Large                  |
| Competition        | -1.225***<br>(0.335)                       | -1.306***<br>(0.452)   | -0.191<br>(0.632)      | 1.933***<br>(0.610)    | 0.716<br>(0.564)       | 0.869<br>(2.173)       |
| Size               | -0.021***<br>(0.002)                       | -0.009***<br>(0.002)   | -0.011***<br>(0.003)   | -0.022***<br>(0.002)   | -0.010***<br>(0.003)   | -0.006**<br>(0.003)    |
| Tangibility        | -0.042***<br>(0.006)                       | -0.045***<br>(0.007)   | -0.057***<br>(0.014)   | -0.041***<br>(0.006)   | -0.043***<br>(0.007)   | -0.023**<br>(0.012)    |
| Private credit     | 2.47e-05<br>(0.000)                        | -1.80e-04**<br>(0.000) | 1.59e-04**<br>(0.000)  | 9.27e-05<br>(0.000)    | -7.93e-05<br>(0.000)   | 2.07e-04**<br>(0.000)  |
| Rule of law        | -0.063***<br>(0.007)                       | -0.079***<br>(0.008)   | -0.035***<br>(0.013)   | -0.071***<br>(0.006)   | -0.086***<br>(0.007)   | -0.046***<br>(0.018)   |
| GDP per capita     | 1.21e-05***<br>(0.000)                     | 8.80e-06***<br>(0.000) | 6.14e-06***<br>(0.000) | 9.92e-06***<br>(0.000) | 8.31e-06***<br>(0.000) | 7.65e-06***<br>(0.000) |
| Inflation          | 0.003***<br>(0.001)                        | 0.001**<br>(0.001)     | 0.001<br>(0.001)       | 0.005***<br>(0.001)    | 0.003***<br>(0.001)    | 0.001<br>(0.001)       |
| Firm fixed effects | Yes                                        | Yes                    | Yes                    | Yes                    | Yes                    | Yes                    |
| Time fixed effects | Yes                                        | Yes                    | Yes                    | Yes                    | Yes                    | Yes                    |
| R <sup>2</sup>     | 0.036                                      | 0.034                  | 0.016                  | 0.039                  | 0.036                  | 0.020                  |
| N                  | 5 289 345                                  | 7 414 912              | 569 155                | 4 704 424              | 6 659 335              | 369 855                |

**Table 5.****Estimations by firm size (2/2)**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of Credit</i> |                         |                        |                            |                        |                        |
|--------------------|--------------------------------------------|-------------------------|------------------------|----------------------------|------------------------|------------------------|
|                    | CR5                                        |                         |                        | Herfindahl-Hirschman index |                        |                        |
|                    | Micro                                      | SME                     | Large                  | Micro                      | SME                    | Large                  |
| Competition        | -0.055***<br>(0.005)                       | -0.031***<br>(0.007)    | -0.061***<br>(0.015)   | -10.642***<br>(1.731)      | -7.807***<br>(1.715)   | -2.294<br>(6.561)      |
| Size               | -0.021***<br>(0.002)                       | -0.009***<br>(0.002)    | -0.011***<br>(0.003)   | -0.021***<br>(0.002)       | -0.009***<br>(0.002)   | -0.011***<br>(0.003)   |
| Tangibility        | -0.042***<br>(0.006)                       | -0.044***<br>(0.006)    | -0.057***<br>(0.014)   | -0.042***<br>(0.006)       | -0.044***<br>(0.006)   | -0.057***<br>(0.013)   |
| Private credit     | -3.53e-05<br>(0.000)                       | -1.88e-04***<br>(0.000) | 1.77e-04**<br>(0.000)  | 4.02e-05<br>(0.000)        | -1.66e-04**<br>(0.000) | 1.62e-04**<br>(0.000)  |
| Rule of law        | -0.053***<br>(0.006)                       | -0.066***<br>(0.008)    | -0.007<br>(0.011)      | -0.054***<br>(0.007)       | -0.073***<br>(0.009)   | -0.032**<br>(0.013)    |
| GDP per capita     | 1.17e-05***<br>(0.000)                     | 8.00e-06***<br>(0.000)  | 5.87e-06***<br>(0.000) | 9.69e-06***<br>(0.000)     | 7.33e-06***<br>(0.000) | 5.60e-06***<br>(0.000) |
| Inflation          | 0.003***<br>(0.000)                        | 0.002***<br>(0.001)     | 0.001<br>(0.001)       | 0.003***<br>(0.001)        | 0.001**<br>(0.001)     | 0.001<br>(0.001)       |
| Firm fixed effects | Yes                                        | Yes                     | Yes                    | Yes                        | Yes                    | Yes                    |
| Time fixed effects | Yes                                        | Yes                     | Yes                    | Yes                        | Yes                    | Yes                    |
| R <sup>2</sup>     | 0.037                                      | 0.034                   | 0.017                  | 0.036                      | 0.034                  | 0.016                  |
| N                  | 5 402 133                                  | 7 594 598               | 571 778                | 5 430 217                  | 7 629 706              | 572 767                |

**Table 6.**  
**Estimations by firm opacity (1/2)**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of Credit</i> |                         |                        |                        |                        |                        |
|--------------------|--------------------------------------------|-------------------------|------------------------|------------------------|------------------------|------------------------|
|                    | Lerner                                     |                         |                        | H-statistic            |                        |                        |
|                    | High                                       | Medium                  | Low                    | High                   | Medium                 | Low                    |
| Competition        | -1.188***<br>(0.357)                       | -1.609***<br>(0.608)    | -0.697<br>(0.959)      | -0.305<br>(0.603)      | 0.805<br>(0.631)       | -0.215<br>(1.447)      |
| Size               | -0.007***<br>(0.002)                       | -0.002**<br>(0.001)     | -0.001<br>(0.001)      | -0.007***<br>(0.002)   | -0.002*<br>(0.001)     | -0.001<br>(0.001)      |
| Tangibility        | -0.049***<br>(0.009)                       | -0.054***<br>(0.007)    | -0.037***<br>(0.008)   | -0.047***<br>(0.009)   | -0.052***<br>(0.007)   | -0.036***<br>(0.007)   |
| Private Credit     | -1.50e-04**<br>(0.000)                     | -1.71e-04***<br>(0.000) | -1.05e-04<br>(0.000)   | -6.24e-05<br>(0.000)   | -9.29e-05<br>(0.000)   | -3.84e-05<br>(0.000)   |
| Rule of Law        | -0.058***<br>(0.014)                       | -0.079***<br>(0.006)    | -0.081***<br>(0.009)   | -0.074***<br>(0.013)   | -0.081***<br>(0.006)   | -0.081***<br>(0.010)   |
| GDP per capita     | 1.13e-05***<br>(0.000)                     | 9.25e-06***<br>(0.000)  | 3.65e-06***<br>(0.000) | 1.09e-05***<br>(0.000) | 8.50e-06***<br>(0.000) | 4.58e-06***<br>(0.000) |
| Inflation          | 0.002***<br>(0.000)                        | 0.003***<br>(0.001)     | 0.002*<br>(0.001)      | 0.003***<br>(0.001)    | 0.004***<br>(0.001)    | 0.004***<br>(0.001)    |
| Firm fixed effects | Yes                                        | Yes                     | Yes                    | Yes                    | Yes                    | Yes                    |
| Time fixed effects | Yes                                        | Yes                     | Yes                    | Yes                    | Yes                    | Yes                    |
| R <sup>2</sup>     | 0.034                                      | 0.034                   | 0.034                  | 0.036                  | 0.035                  | 0.035                  |
| N                  | 3806792                                    | 3869817                 | 3821820                | 3299379                | 3404961                | 3448898                |

**Table 7.**  
**Estimations by firm opacity (2/2)**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of Credit</i> |                         |                      |                        |                        |                        |
|--------------------|--------------------------------------------|-------------------------|----------------------|------------------------|------------------------|------------------------|
|                    | CR5                                        |                         |                      | HHI                    |                        |                        |
|                    | High                                       | Medium                  | Low                  | High                   | Medium                 | Low                    |
| Competition        | -0.049***<br>(0.012)                       | -0.039***<br>(0.008)    | -0.024***<br>(0.007) | -6.595***<br>(1.617)   | -7.994***<br>(2.960)   | 6.153<br>(7.441)       |
| Size               | -0.007***<br>(0.002)                       | -0.002**<br>(0.001)     | -0.001<br>(0.001)    | -0.007***<br>(0.002)   | -0.002***<br>(0.001)   | -0.001*<br>(0.001)     |
| Tangibility        | -0.048***<br>(0.009)                       | -0.054***<br>(0.007)    | -0.037***<br>(0.008) | -0.048***<br>(0.009)   | -0.053***<br>(0.007)   | -0.037***<br>(0.008)   |
| Private Credit     | -1.88e-04***<br>(0.000)                    | -1.90e-04***<br>(0.000) | -1.07e-04<br>(0.000) | -1.44e-04*<br>(0.000)  | -1.57e-04**<br>(0.000) | -9.15e-05<br>(0.000)   |
| Rule of Law        | -0.048***<br>(0.012)                       | -0.064***<br>(0.006)    | -0.066***<br>(0.009) | -0.052***<br>(0.013)   | -0.071***<br>(0.007)   | -0.078***<br>(0.010)   |
| GDP per capita     | 1.10e-05***<br>(0.000)                     | 8.54e-06***<br>(0.000)  | 2.27e-06*<br>(0.000) | 9.06e-06***<br>(0.000) | 7.53e-06***<br>(0.000) | 3.21e-06***<br>(0.000) |
| Inflation          | 0.002***<br>(0.000)                        | 0.003***<br>(0.001)     | 0.002*<br>(0.001)    | 0.002***<br>(0.000)    | 0.003***<br>(0.001)    | 0.002*<br>(0.001)      |
| Firm fixed effects | Yes                                        | Yes                     | Yes                  | Yes                    | Yes                    | Yes                    |
| Time fixed effects | Yes                                        | Yes                     | Yes                  | Yes                    | Yes                    | Yes                    |
| R <sup>2</sup>     | 0.035                                      | 0.034                   | 0.034                | 0.034                  | 0.034                  | 0.033                  |
| N                  | 3846764                                    | 3937418                 | 3950329              | 3876413                | 3951000                | 3963451                |

**Table 8.**  
**Impact of financial development**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                              | Dependent variable = <i>Cost of credit</i> |                         |                         |                        |
|------------------------------|--------------------------------------------|-------------------------|-------------------------|------------------------|
|                              | Lerner                                     | H-statistic             | CR5                     | HHI                    |
| Competition                  | -0.030<br>(0.332)                          | -3.969***<br>(0.500)    | -0.043***<br>(0.014)    | -7.359<br>(5.808)      |
| Competition × Private credit | -0.014***<br>(0.005)                       | 0.058***<br>(0.005)     | 1.10e-04<br>(0.000)     | 0.004<br>(0.065)       |
| Size                         | -0.003***<br>(0.001)                       | -0.004***<br>(0.001)    | -0.003***<br>(0.001)    | -0.003***<br>(0.001)   |
| Tangibility                  | -0.042***<br>(0.006)                       | -0.041***<br>(0.006)    | -0.042***<br>(0.006)    | -0.042***<br>(0.006)   |
| Private credit               | -1.22e-04*<br>(0.000)                      | -3.97e-04***<br>(0.000) | -2.47e-04***<br>(0.000) | -1.30e-04**<br>(0.000) |
| Rule of law                  | -0.078***<br>(0.006)                       | -0.078***<br>(0.006)    | -0.063***<br>(0.006)    | -0.069***<br>(0.006)   |
| GDP per capita               | 9.58e-06***<br>(0.000)                     | 8.40e-06***<br>(0.000)  | 8.58e-06***<br>(0.000)  | 7.83e-06***<br>(0.000) |
| Inflation                    | 0.002***<br>(0.000)                        | 0.002***<br>(0.000)     | 0.002***<br>(0.000)     | 0.002***<br>(0.001)    |
| Firm fixed effects           | Yes                                        | Yes                     | Yes                     | Yes                    |
| Time fixed effects           | Yes                                        | Yes                     | Yes                     | Yes                    |
| R <sup>2</sup>               | 0.031                                      | 0.034                   | 0.031                   | 0.030                  |
| N                            | 13 273 412                                 | 11 733 614              | 13 568 509              | 13 632 690             |

**Table 9.**  
**Impact of economic development**

Panel estimations with firm and time fixed effects. Competition measure is indicated at the top of the column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Variable definitions are provided in the Appendix.

|                              | Dependent variable = <i>Cost of credit</i> |                         |                         |                        |
|------------------------------|--------------------------------------------|-------------------------|-------------------------|------------------------|
|                              | Lerner                                     | H-statistic             | CR5                     | HHI                    |
| Competition                  | -19.121***<br>(2.467)                      | 10.895***<br>(1.215)    | -0.186***<br>(0.034)    | -11.193<br>(12.950)    |
| Competition × GDP per capita | 0.001***<br>(0.000)                        | -3.10e-04***<br>(0.000) | 5.11e-06***<br>(0.000)  | 1.11e-04<br>(0.000)    |
| Size                         | -0.003***<br>(0.001)                       | -0.003***<br>(0.001)    | -0.003***<br>(0.001)    | -0.003***<br>(0.001)   |
| Tangibility                  | -0.042***<br>(0.006)                       | -0.041***<br>(0.006)    | -0.042***<br>(0.006)    | -0.042***<br>(0.006)   |
| Private credit               | -1.30e-04**<br>(0.000)                     | -5.81e-05<br>(0.000)    | -1.58e-04***<br>(0.000) | -1.28e-04**<br>(0.000) |
| Rule of law                  | -0.091***<br>(0.007)                       | -0.075***<br>(0.006)    | -0.062***<br>(0.006)    | -0.069***<br>(0.006)   |
| GDP per capita               | 8.91e-06***<br>(0.000)                     | 1.03e-05***<br>(0.000)  | 4.68e-06***<br>(0.000)  | 7.63e-06***<br>(0.000) |
| Inflation                    | 0.002***<br>(0.000)                        | 0.002***<br>(0.000)     | 0.002***<br>(0.000)     | 0.002***<br>(0.000)    |
| Firm fixed effects           | Yes                                        | Yes                     | Yes                     | Yes                    |
| Time fixed effects           | Yes                                        | Yes                     | Yes                     | Yes                    |
| R <sup>2</sup>               | 0.031                                      | 0.033                   | 0.031                   | 0.030                  |
| N                            | 13 273 412                                 | 11 733 614              | 13 568 509              | 13 632 690             |

**Table 10.**  
**Impact of institutional development**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% level, respectively. Variable definitions are provided in the Appendix.

|                           | Dependent variable = <i>Cost of credit</i> |                        |                         |                        |
|---------------------------|--------------------------------------------|------------------------|-------------------------|------------------------|
|                           | Lerner                                     | H-statistic            | CR5                     | HHI                    |
| Competition               | -8.382***<br>(1.811)                       | 14.068***<br>(1.531)   | 0.026***<br>(0.005)     | -1.093<br>(7.092)      |
| Competition × Rule of law | 4.130***<br>(0.916)                        | -8.814***<br>(0.948)   | -0.090***<br>(0.007)    | -4.235<br>(4.304)      |
| Size                      | -0.003***<br>(0.001)                       | -0.004***<br>(0.001)   | -0.003***<br>(0.001)    | -0.003***<br>(0.001)   |
| Tangibility               | -0.042***<br>(0.006)                       | -0.041***<br>(0.006)   | -0.042***<br>(0.006)    | -0.042***<br>(0.006)   |
| Private credit            | -1.54e-04***<br>(0.000)                    | -4.60e-05<br>(0.000)   | -2.33e-04***<br>(0.000) | -1.29e-04**<br>(0.000) |
| Rule of law               | -0.090***<br>(0.006)                       | -0.020**<br>(0.009)    | 0.012*<br>(0.006)       | -0.066***<br>(0.006)   |
| GDP per capita            | 9.56e-06***<br>(0.000)                     | 7.88e-06***<br>(0.000) | 9.11e-06***<br>(0.000)  | 8.00e-06***<br>(0.000) |
| Inflation                 | 0.002***<br>(0.000)                        | 0.004***<br>(0.000)    | 0.002***<br>(0.000)     | 0.002***<br>(0.000)    |
| Firm fixed effects        | Yes                                        | Yes                    | Yes                     | Yes                    |
| Time fixed effects        | Yes                                        | Yes                    | Yes                     | Yes                    |
| R <sup>2</sup>            | 0.031                                      | 0.034                  | 0.031                   | 0.030                  |
| N                         | 13 273 412                                 | 11 733 614             | 13 568 509              | 13 632 690             |

**Table 11.**  
**Estimations for the crisis period**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                      | Dependent variable = <i>Cost of credit</i> |                        |                         |                        |
|----------------------|--------------------------------------------|------------------------|-------------------------|------------------------|
|                      | Lerner                                     | H-statistic            | CR5                     | HHI                    |
| Competition          | -1.823***<br>(0.530)                       | 3.978***<br>(0.608)    | -0.033***<br>(0.006)    | -8.493***<br>(2.041)   |
| Competition × Crisis | 9.419***<br>(0.985)                        | -11.089***<br>(2.129)  | 0.006<br>(0.007)        | 5.340***<br>(1.070)    |
| Size                 | -0.004***<br>(0.001)                       | -0.004***<br>(0.001)   | -0.003***<br>(0.001)    | -0.003***<br>(0.001)   |
| Tangibility          | -0.042***<br>(0.006)                       | -0.041***<br>(0.006)   | -0.042***<br>(0.006)    | -0.042***<br>(0.006)   |
| Private credit       | -9.73e-05*<br>(0.000)                      | -2.41e-05<br>(0.000)   | -1.59e-04***<br>(0.000) | -1.11e-04*<br>(0.000)  |
| Rule of law          | -0.073***<br>(0.006)                       | -0.080***<br>(0.006)   | -0.063***<br>(0.006)    | -0.068***<br>(0.006)   |
| GDP per capita       | 8.42e-06***<br>(0.000)                     | 6.95e-06***<br>(0.000) | 8.37e-06***<br>(0.000)  | 6.45e-06***<br>(0.000) |
| Inflation            | 0.003***<br>(0.001)                        | 0.003***<br>(0.000)    | 0.002***<br>(0.000)     | 0.002***<br>(0.000)    |
| Firm fixed effects   | Yes                                        | Yes                    | Yes                     | Yes                    |
| Time fixed effects   | Yes                                        | Yes                    | Yes                     | Yes                    |
| R <sup>2</sup>       | 0.032                                      | 0.033                  | 0.031                   | 0.030                  |
| N                    | 13 273 412                                 | 11 733 614             | 13 568 509              | 13 632 690             |

**Table 12.**  
**Robustness check: Alternative measure of cost of credit**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of credit</i> |                        |                        |                        |
|--------------------|--------------------------------------------|------------------------|------------------------|------------------------|
|                    | Lerner                                     | H-statistic            | CR5                    | HHI                    |
| Competition        | -1.411**<br>(0.581)                        | 0.277<br>(0.837)       | -0.058***<br>(0.009)   | -0.335<br>(3.949)      |
| Size               | -0.003***<br>(0.001)                       | -0.003***<br>(0.001)   | -0.003***<br>(0.001)   | -0.004***<br>(0.001)   |
| Tangibility        | -0.027***<br>(0.004)                       | -0.026***<br>(0.004)   | -0.028***<br>(0.004)   | -0.028***<br>(0.004)   |
| Private credit     | 8.26e-05<br>(0.000)                        | 1.54e-04**<br>(0.000)  | 6.71e-05<br>(0.000)    | 8.88e-05<br>(0.000)    |
| Rule of law        | -0.096***<br>(0.007)                       | -0.098***<br>(0.008)   | -0.072***<br>(0.006)   | -0.090***<br>(0.008)   |
| GDP per capita     | 7.17e-06***<br>(0.000)                     | 7.42e-06***<br>(0.000) | 5.56e-06***<br>(0.000) | 6.49e-06***<br>(0.000) |
| Inflation          | 0.003***<br>(0.001)                        | 0.004***<br>(0.001)    | 0.003***<br>(0.001)    | 0.003**<br>(0.001)     |
| Firm fixed effects | Yes                                        | Yes                    | Yes                    | Yes                    |
| Time fixed effects | Yes                                        | Yes                    | Yes                    | Yes                    |
| R <sup>2</sup>     | 0.049                                      | 0.051                  | 0.050                  | 0.048                  |
| N                  | 10 643 150                                 | 9 454 541              | 10 933 579             | 10 997 664             |

**Table 13.**  
**Robustness check: Estimations without firm effects**

OLS estimations. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                        | Dependent variable = <i>Cost of credit</i> |                        |                        |                        |
|------------------------|--------------------------------------------|------------------------|------------------------|------------------------|
|                        | Lerner                                     | H-statistic            | CR5                    | HHI                    |
| Competition            | -1.229***<br>(0.288)                       | 0.305<br>(0.911)       | -0.055***<br>(0.005)   | -5.555***<br>(1.931)   |
| Size                   | -0.001*<br>(0.001)                         | -0.001<br>(0.001)      | -0.001*<br>(0.001)     | -0.001**<br>(0.001)    |
| Tangibility            | -0.043***<br>(0.004)                       | -0.043***<br>(0.004)   | -0.043***<br>(0.004)   | -0.043***<br>(0.004)   |
| Private credit         | -3.90e-05<br>(0.000)                       | 2.13e-05<br>(0.000)    | -8.28e-05**<br>(0.000) | -4.01e-05<br>(0.000)   |
| Rule of law            | -0.073***<br>(0.007)                       | -0.076***<br>(0.006)   | -0.053***<br>(0.006)   | -0.069***<br>(0.007)   |
| GDP per capita         | 5.68e-06***<br>(0.000)                     | 5.64e-06***<br>(0.000) | 4.15e-06***<br>(0.000) | 4.86e-06***<br>(0.000) |
| Inflation              | -1.41e-04<br>(0.000)                       | 1.16e-03***<br>(0.000) | 1.85e-04<br>(0.000)    | -2.51e-04<br>(0.000)   |
| Time fixed effects     | Yes                                        | Yes                    | Yes                    | Yes                    |
| Industry fixed effects | Yes                                        | Yes                    | Yes                    | Yes                    |
| Country fixed effects  | Yes                                        | Yes                    | Yes                    | Yes                    |
| R <sup>2</sup>         | 0.061                                      | 0.060                  | 0.062                  | 0.061                  |
| N                      | 13 273 412                                 | 11 733 614             | 13 568 509             | 13 632 690             |

**Table 14.**  
**Robustness check: Estimations accounting for debt composition**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                         | Dependent variable = <i>Cost of credit</i> |                         |                         |                         |
|-------------------------|--------------------------------------------|-------------------------|-------------------------|-------------------------|
|                         | Lerner                                     | H-statistic             | CR5                     | HHI                     |
| Competition             | -0.486**<br>(0.228)                        | 0.333<br>(0.430)        | -0.019***<br>(0.004)    | -6.772***<br>(1.591)    |
| Size                    | -0.003***<br>(0.001)                       | -0.002***<br>(0.001)    | -0.002***<br>(0.001)    | -0.003***<br>(0.001)    |
| Tangibility             | -0.037***<br>(0.005)                       | -0.035***<br>(0.005)    | -0.036***<br>(0.005)    | -0.036***<br>(0.005)    |
| Private credit          | -3.00e-04***<br>(0.000)                    | -2.32e-04***<br>(0.000) | -3.03e-04***<br>(0.000) | -2.87e-04***<br>(0.000) |
| Rule of law             | -0.050***<br>(0.004)                       | -0.051***<br>(0.004)    | -0.043***<br>(0.004)    | -0.045***<br>(0.004)    |
| GDP per capita          | 5.27e-06***<br>(0.000)                     | 4.68e-06***<br>(0.000)  | 4.97e-06***<br>(0.000)  | 4.21e-06***<br>(0.000)  |
| Inflation               | 0.001**<br>(0.000)                         | 0.002***<br>(0.000)     | 0.001***<br>(0.000)     | 0.001**<br>(0.000)      |
| Short-to-long-term debt | 5.21e-10<br>(0.000)                        | 1.15e-09<br>(0.000)     | 5.24e-10<br>(0.000)     | 5.08e-10<br>(0.000)     |
| No long-term debt       | 0.050***<br>(0.004)                        | 0.050***<br>(0.004)     | 0.049***<br>(0.004)     | 0.049***<br>(0.004)     |
| Firm fixed effects      | Yes                                        | Yes                     | Yes                     | Yes                     |
| Time fixed effects      | Yes                                        | Yes                     | Yes                     | Yes                     |
| R <sup>2</sup>          | 0.060                                      | 0.062                   | 0.059                   | 0.059                   |
| N                       | 13 273 412                                 | 11 733 614              | 13 568 509              | 13 632 690              |

**Table 15.**  
**Robustness check: Estimations including structural**  
**and non-structural measures of competition**

Panel estimations with firm and time fixed effects. The main competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of credit</i> |             |             |             |
|--------------------|--------------------------------------------|-------------|-------------|-------------|
|                    | Lerner                                     | Lerner      | H-statistic | H-statistic |
| Competition        | -2.671***                                  | -1.097***   | 0.411       | 1.250***    |
| (non-structural)   | (0.660)                                    | (0.342)     | (0.433)     | (0.449)     |
| CR5                | -0.035***                                  |             | -0.037***   |             |
|                    | (0.006)                                    |             | (0.006)     |             |
| HHI                |                                            | -4.807**    |             | -24.335***  |
|                    |                                            | (2.015)     |             | (3.568)     |
| Size               | -0.003***                                  | -0.003***   | -0.003***   | -0.002***   |
|                    | (0.001)                                    | (0.001)     | (0.001)     | (0.001)     |
| Tangibility        | -0.042***                                  | -0.042***   | -0.041***   | -0.041***   |
|                    | (0.006)                                    | (0.006)     | (0.006)     | (0.006)     |
| Private credit     | -1.71e-04***                               | -1.40e-04** | -9.44e-05*  | -5.04e-05   |
|                    | (0.000)                                    | (0.000)     | (0.000)     | (0.000)     |
| Rule of law        | -0.070***                                  | -0.074***   | -0.068***   | -0.074***   |
|                    | (0.005)                                    | (0.006)     | (0.006)     | (0.006)     |
| GDP per capita     | 9.70e-06***                                | 9.05e-06*** | 8.18e-06*** | 6.66e-06*** |
|                    | (0.000)                                    | (0.000)     | (0.000)     | (0.000)     |
| Inflation          | 0.002***                                   | 0.002***    | 0.004***    | 0.003***    |
|                    | (0.000)                                    | (0.000)     | (0.000)     | (0.000)     |
| Firm fixed effects | Yes                                        | Yes         | Yes         | Yes         |
| Time fixed effects | Yes                                        | Yes         | Yes         | Yes         |
| R <sup>2</sup>     | 0.031                                      | 0.031       | 0.033       | 0.033       |
| N                  | 13 238 318                                 | 13 273 412  | 11 715 718  | 11 733 614  |

**Table 16.**  
**Robustness check: Estimations by firms' age**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                    | Dependent variable = <i>Cost of credit</i> |                      |                      |                      |                        |                      |                      |                      |
|--------------------|--------------------------------------------|----------------------|----------------------|----------------------|------------------------|----------------------|----------------------|----------------------|
|                    | Firm Age < Median (=9)                     |                      |                      |                      | Firm Age ≥ Median (=9) |                      |                      |                      |
|                    | Lerner                                     | H-statistic          | CR5                  | HHI                  | Lerner                 | H-statistic          | CR5                  | HHI                  |
| Competition        | -1.086***<br>(0.390)                       | -0.614<br>(0.514)    | -0.025***<br>(0.005) | -5.741**<br>(2.627)  | -1.147***<br>(0.334)   | -0.114<br>(0.498)    | -0.039***<br>(0.007) | -8.066***<br>(1.288) |
| Size               | -0.002***<br>(0.001)                       | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.002***<br>(0.001) | -0.004***<br>(0.001)   | -0.004***<br>(0.001) | -0.004***<br>(0.001) | -0.004***<br>(0.001) |
| Tangibility        | -0.040***<br>(0.007)                       | -0.039***<br>(0.007) | -0.040***<br>(0.006) | -0.041***<br>(0.006) | -0.043***<br>(0.006)   | -0.042***<br>(0.006) | -0.043***<br>(0.006) | -0.043***<br>(0.006) |
| Private credit     | 0.000<br>(0.000)                           | 0.000<br>(0.000)     | 0.000<br>(0.000)     | 0.000<br>(0.000)     | -0.000***<br>(0.000)   | -0.000<br>(0.000)    | -0.000***<br>(0.000) | -0.000***<br>(0.000) |
| Rule of law        | -0.059***<br>(0.007)                       | -0.063***<br>(0.007) | -0.051***<br>(0.006) | -0.053***<br>(0.007) | -0.080***<br>(0.007)   | -0.084***<br>(0.006) | -0.064***<br>(0.007) | -0.073***<br>(0.007) |
| GDP per capita     | 0.000***<br>(0.000)                        | 0.000***<br>(0.000)  | 0.000***<br>(0.000)  | 0.000***<br>(0.000)  | 0.000***<br>(0.000)    | 0.000***<br>(0.000)  | 0.000***<br>(0.000)  | 0.000***<br>(0.000)  |
| Inflation          | 0.002***<br>(0.001)                        | 0.003***<br>(0.001)  | 0.002***<br>(0.001)  | 0.002***<br>(0.001)  | 0.002***<br>(0.000)    | 0.004***<br>(0.000)  | 0.002***<br>(0.000)  | 0.002***<br>(0.000)  |
| Firm fixed effects | Yes                                        | Yes                  | Yes                  | Yes                  | Yes                    | Yes                  | Yes                  | Yes                  |
| Time fixed effects | Yes                                        | Yes                  | Yes                  | Yes                  | Yes                    | Yes                  | Yes                  | Yes                  |
| R <sup>2</sup>     | 0.026                                      | 0.028                | 0.026                | 0.026                | 0.035                  | 0.036                | 0.035                | 0.034                |
| N                  | 5878584                                    | 5226190              | 5991163              | 6015890              | 6980205                | 6133419              | 7150289              | 7187567              |

**Table 17.**  
**Robustness check: Nonlinear relation**

Panel estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering at the country\*industry level. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                     | Dependent variable = <i>Cost of credit</i> |                          |                         |                          |
|---------------------|--------------------------------------------|--------------------------|-------------------------|--------------------------|
|                     | Lerner                                     | H-statistic              | CR5                     | HHI                      |
| Competition         | -2.411***<br>(0.612)                       | -31.417***<br>(4.153)    | 0.190***<br>(0.033)     | -28.534***<br>(10.278)   |
| Competition squared | -129.632***<br>(40.170)                    | 2997.767***<br>(393.882) | -0.153***<br>(0.023)    | 5369.688**<br>(2276.056) |
| Size                | -0.003***<br>(0.001)                       | -0.005***<br>(0.001)     | -0.003***<br>(0.001)    | -0.003***<br>(0.001)     |
| Tangibility         | -0.042***<br>(0.006)                       | -0.041***<br>(0.006)     | -0.042***<br>(0.006)    | -0.042***<br>(0.006)     |
| Private credit      | -1.47e-04**<br>(0.000)                     | -3.36e-05<br>(0.000)     | -1.96e-04***<br>(0.000) | -1.28e-04**<br>(0.000)   |
| Rule of law         | -0.079***<br>(0.006)                       | -0.088***<br>(0.005)     | -0.066***<br>(0.007)    | -0.064***<br>(0.008)     |
| GDP per capita      | 9.51e-06***<br>(0.000)                     | 7.61e-06***<br>(0.000)   | 1.04e-05***<br>(0.000)  | 6.79e-06***<br>(0.000)   |
| Inflation           | 0.002***<br>(0.000)                        | 0.003***<br>(0.000)      | 0.002***<br>(0.000)     | 0.001***<br>(0.000)      |
| Firm fixed effects  | Yes                                        | Yes                      | Yes                     | Yes                      |
| Time fixed effects  | Yes                                        | Yes                      | Yes                     | Yes                      |
| R <sup>2</sup>      | 0.031                                      | 0.034                    | 0.031                   | 0.030                    |
| N                   | 13 273 412                                 | 11 733 614               | 13 568 509              | 13 632 690               |

**Table 18.**  
**Robustness check: IV estimation (1/2)**

IV estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering by firms. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                                                                        | Lerner                  |                         | H-statistic             |                        |
|------------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|------------------------|
|                                                                        |                         | Cost of Credit          |                         | Cost of Credit         |
| Competition                                                            |                         | -0.957***<br>(0.040)    |                         | 17.206***<br>(0.189)   |
| Size                                                                   | 7.34e-05***<br>(0.000)  | -0.003***<br>(0.000)    | 1.03e-04***<br>(0.000)  | 2.31e-04***<br>(0.000) |
| Tangibility                                                            | 9.60e-06***<br>(0.000)  | -0.042***<br>(0.000)    | 7.31e-06***<br>(0.000)  | -0.039***<br>(0.000)   |
| Private credit                                                         | -4.93e-06***<br>(0.000) | -1.26e-04***<br>(0.000) | -4.23e-06***<br>(0.000) | -7.4e-05***<br>(0.000) |
| Rule of law                                                            | -0.002***<br>(0.000)    | -0.075***<br>(0.000)    | 0.003***<br>(0.000)     | -0.114***<br>(0.001)   |
| GDP per capita                                                         | 8.63e-08***<br>(0.000)  | 9.31e-06***<br>(0.000)  | -3.36e-07***<br>(0.000) | 1.43e-05***<br>(0.000) |
| Inflation                                                              | -2.17e-04***<br>(0.000) | 0.002***<br>(0.000)     | -5.1e-05***<br>(0.000)  | 0.003***<br>(0.000)    |
| Outstanding international public debt securities to GDP <sub>t-5</sub> | -1.50e-04***<br>(0.000) |                         |                         |                        |
| Turnover ratio for stock market <sub>t-5</sub>                         | 2.48e-06***<br>(0.000)  |                         |                         |                        |
| Bank capital to total assets <sub>t-5</sub>                            |                         |                         | 1.79e-04***<br>(0.000)  |                        |
| Bank net interest margin <sub>t-5</sub>                                |                         |                         | 3.49e-04***<br>(0.000)  |                        |
| Time FEs                                                               |                         | Yes                     |                         | Yes                    |
| Firm FEs                                                               |                         | Yes                     |                         | Yes                    |
| F-statistic                                                            | 7.3e+06***              |                         | 1.4e+05***              |                        |
| Hansen J statistic                                                     |                         | 0.199                   |                         | 0.079                  |
| R <sup>2</sup>                                                         | 0.812                   | 0.031                   | 0.9647                  | 0.024                  |
| N                                                                      | 11,187,326              | 11,187,326              | 9,550,169               | 9,550,169              |

**Table 19.**  
**Robustness check: IV estimation (2/2)**

IV estimations with firm and time fixed effects. Competition measure is indicated at top of column. Standard errors (in parentheses) are robust to arbitrary heteroscedasticity and allow for serial correlation through clustering by firms. \*, \*\*, and \*\*\* denote an estimate significantly different from 0 at the 10%, 5%, and 1% levels, respectively. Variable definitions are provided in the Appendix.

|                                                                        | CR5                  |                        | HHI                     |                         |
|------------------------------------------------------------------------|----------------------|------------------------|-------------------------|-------------------------|
|                                                                        | Cost of Credit       |                        | Cost of Credit          |                         |
| Competition                                                            |                      | -0.193***<br>(0.001)   |                         | -17.589***<br>(0.734)   |
| Size                                                                   | 0.006***<br>(0.000)  | -0.002***<br>(0.000)   | 2.39e-06***<br>(0.000)  | -0.003***<br>(0.000)    |
| Tangibility                                                            | -0.001***<br>(0.000) | -0.042***<br>(0.000)   | 6.73e-06***<br>(0.000)  | -0.041***<br>(0.000)    |
| Private credit                                                         | 0.001***<br>(0.000)  | -2.67e-04<br>(0.000)   | -2.74e-06<br>(0.000)    | -2.28e-04***<br>(0.000) |
| Rule of law                                                            | 0.213***<br>(0.000)  | -0.023***<br>(0.000)   | 3.66e-04***<br>(0.000)  | -0.076***<br>(0.001)    |
| GDP per capita                                                         | 0.020***<br>(0.000)  | 9.59e-06***<br>(0.000) | -3.82e-08***<br>(0.000) | 8.41e-06***<br>(0.000)  |
| Inflation                                                              |                      | 0.003***<br>(0.000)    | -2.14e-05***<br>(0.000) | -4.37e-04***<br>(0.000) |
| Bank return on assets (after tax) <sub>t-5</sub>                       | 0.021***<br>(0.000)  |                        |                         |                         |
| Stock market capitalization to GDP <sub>t-5</sub>                      | 0.001***<br>(0.000)  |                        |                         |                         |
| Outstanding international public debt securities to GDP <sub>t-5</sub> |                      |                        | -5.33e-06***<br>(0.000) |                         |
| Private credit deposits <sub>t-5</sub>                                 |                      |                        | 6.23e-06***<br>(0.000)  |                         |
| Time FEs                                                               |                      | Yes                    |                         | Yes                     |
| Firm FEs                                                               |                      | Yes                    |                         | Yes                     |
| F-statistic                                                            | 5.2e+05***           |                        | 1.8e+05***              |                         |
| Hansen J statistic                                                     |                      | 1.29                   |                         | 0.676                   |
| R <sup>2</sup>                                                         | 0.480                | 0.023                  | 0.375                   | 0.031                   |
| N                                                                      | 11,154,953           | 11,154,953             | 10,117,193              | 10,117,193              |

## Appendix

| Variable                                                | Definition                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Firm size                                               | = $\log(\text{total assets})$ . Source: Amadeus.                                                                                                                                                                                                                                                                                                                                                                          |
| Tangibility                                             | = $\text{tangible fixed assets} / \text{total assets}$ . Source: Amadeus.                                                                                                                                                                                                                                                                                                                                                 |
| Cost of credit                                          | = $(\text{financial expenses} / \text{total debt}) - \text{country nominal short-term interest rate}$ . Source: Amadeus and SDW.                                                                                                                                                                                                                                                                                          |
| Lerner                                                  | Measure of market power in the banking market that compares output pricing and marginal costs (i.e. markup). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries. Source: Global Financial Development Database, World Bank.                                                                                                                                 |
| CR5                                                     | Assets of five largest banks as a share of total commercial banking assets. Source: Global Financial Development Database, World Bank.                                                                                                                                                                                                                                                                                    |
| H-statistic                                             | Degree of competition in the banking market as measured by the elasticity of bank revenues relative to input prices. The H-statistic suggests market structure on a continuum with 0 indicating monopoly and 1 perfect competition. Source: Weill (2013)                                                                                                                                                                  |
| Herfindahl-Hirschman index                              | Defined as the sum of the squares of the market shares of all firms within the industry with market share expressed as a fraction. Source: ECB SDW Database.                                                                                                                                                                                                                                                              |
| Rule of law                                             | This variable captures the extent to which agents have confidence in the rule of law and how well they expect members of society to abide by the rules. In particular, looks at the perceptions about the quality of enforcement of contract law and property rights, as well as the behavior of the police and the courts, and the frequency of crime and violence. Source: Worldwide Governance Indicators, World Bank. |
| Private credit                                          | Private credit by deposit money banks to GDP. Source: Global Financial Development Database, World Bank.                                                                                                                                                                                                                                                                                                                  |
| Outstanding international public debt securities to GDP | Amount of public international debt securities (amount outstanding), as a share of GDP. It covers long-term bonds and notes and money market instruments placed on international markets. Source: Global Financial Development Database, World Bank.                                                                                                                                                                      |
| Turnover ratio for stock market                         | Total value of shares traded during the period divided by the average market capitalization for the period. Source: Global Financial Development Database, World Bank.                                                                                                                                                                                                                                                    |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bank capital to total assets       | Ratio of bank capital and reserves to total assets. Capital and reserves include funds contributed by owners, retained earnings, general and special reserves, provisions, and valuation adjustments. Capital includes tier 1 capital (paid-up shares and common stock), which is a common feature in all countries' banking systems, and total regulatory capital, which includes several specified types of subordinated debt instruments that need not be repaid if the funds are required to maintain minimum capital levels (these comprise tier 2 and tier 3 capital). Total assets include all nonfinancial and financial assets. Source: Global Financial Development Database, World Bank. |
| Bank net interest margin           | Accounting value of bank's net interest revenue as a share of its average interest-bearing (total earning) assets. Source: Global Financial Development Database, World Bank.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Bank return on assets              | Commercial banks' after-tax net income to yearly averaged total assets. Source: Global Financial Development Database, World Bank.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Stock market capitalization to GDP | Total value of all listed shares in a stock market as a percentage of GDP. Source: Global Financial Development Database, World Bank.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Private credit deposits            | The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. Source: Global Financial Development Database, World Bank.                                                                                                                                                                                                                                                                                                                                                                                            |

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