How Bank Competition Affects Firms' Access to Finance

Inessa Love and María Soledad Martínez Pería *

Using multi-year, firm-level surveys for 53 countries, this paper explores the impact of bank competition on firms' access to finance. We find that low competition, as measured by high values on the Lerner index or Boone indicator, diminishes firms' access to finance. In addition, the impact of competition on access to finance depends on the quality and scope of credit information sharing mechanisms, and better credit information mitigates the damaging impact of low competition. Overall, our paper offers consistent international evidence that supports the market power hypothesis, which argues that market power reduces access, and rejects the information hypothesis, which suggests that low competition improves access because it allows banks to internalize the investment in building firm-specific relationships. JEL codes: G20, L1.

The impact of bank competition on financial markets and firms is an important topic for policymakers and researchers alike.[1] Interest in this subject intensified during the recent global financial crisis, as many questioned whether high bank competition was partly to blame.[2] At the same time, the downfall of some institutions as a result of the crisis and the emergency measures taken by some governments to address this episode, such as mergers, bailouts, recapitalizations, and extension of guarantees, have led to concerns about the future of bank competition and its potential implications for access to bank finance.[3]

Existing theories provide ambiguous predictions regarding the impact of bank competition on access to finance. The conventional *market power hypothesis* argues that competition in the banking system reduces the cost of finance and increases the availability of credit. In contrast, the *information hypothesis* argues that in the presence of information asymmetries and agency costs, bank competition can reduce access to finance by making it more difficult for banks to internalize the costs of investing in building lending relationships, particularly with opaque clients (Petersen and Rajan 1995; Marquez 2002; Hauswald and Marquez 2006).

Previous empirical evidence, which has mostly used concentration measures as proxies for competition, is also mixed. For example, Petersen and Rajan (1994, 1995) and Fischer (2000) find that higher concentration is associated with greater credit availability, whereas Zarutskie (2003), Beck et al. (2004), and Chong et al. (2012) find the reverse.

Recently, a number of papers have called into question the use of concentration measures to capture competition, advocating for the use of non-structural measures such as the Lerner index and the Boone indicator instead.[4] Maudos and Fernandez de Guevara (2006) show that such non-structural measures are more precise and robust measures of bank market power and are often uncorrelated with concentration measures. Claessens and Laeven (2004) also argue that the degree of contestability (i.e., the threat of entry) determines bank competition and that concentration is not a good predictor of competition.

The key contribution of our paper is that it examines the link between bank competition and access to finance using firm-level cross-country panel data, which allows us to control for other country characteristics that might influence firms' access to finance. We use non-structural measures of competition such as the Lerner index and Boone indicator, which are calculated using bank-level data, as well as a direct measure of firms' access to finance. In addition, we provide a more direct test of the information hypothesis by considering the interactions of competition with features of credit information sharing schemes, and we distinguish between private and public credit information provision.

Specifically, we use multi-year firm-level surveys for 53 countries covering nearly 70,000 firms (i.e., we have multiple surveys per country, but the same firms are not necessarily surveyed in different years). In addition, we use a smaller firm-level panel dataset for 42 countries that covers approximately 14,000 firms surveyed two or more times. This dataset allows us to verify that competition facilitates firms' access to finance while controlling for firm fixed effects. We find that low bank competition is associated with diminished access

4. Higher values of both the Lerner index and the Boone indicator signal lower levels of competition. Studies that use the Lerner index as measures of bank competition include Fernandez de Guevara et al. (2005, 2007), Berger et al. (2009), Carbó-Valverde et al. (2009a, b), Turk-Ariss (2009), Anzoategui et al. (2010), Beck et al. (2013), Anzoategui et al. (2012), and Delis (2012). Studies that use the Boone indicator to measure competition include Van Leuvensteijn et al. (2011, 2013), Bikker and Van Leuvensteijn (2008), Schaeck et al. (2009), Delis (2012), Tabak et al. (2012), and World Bank (2012).

to finance by firms. This result is robust to including bank concentration measures, which are not significant. In addition, we find that countries with better credit information sharing mechanisms experience a less damaging effect of low levels of bank competition. The interaction results present a more direct test of the information hypothesis, which we reject in favor of the market power hypothesis. Furthermore, we show that private credit bureaus help mitigate the damaging impact of low competition, whereas public credit registries do not. Finally, we explore the extent to which capital markets, as an alternative source of financing, could be a meaningful counterforce to counteract the negative effect of bank competition, but we find only weak support for this hypothesis.

Three papers are closely related to ours. Carbó-Valverde et al. (2009b) use the Lerner index to examine the link between bank competition and access to finance in Spain. Beck et al. (2004) use cross-country data for 73 countries for one period and find that bank concentration has a negative impact on firm access. Claessens and Laeven (2005) use a cross-section of industry-level data in 16 countries and find that greater competition allows financially dependent industries to grow faster. Our paper advances these papers in several ways. First, we extend this research to a larger international setting and use panel data techniques, which allow us to use country-specific (or firm-specific) fixed effects. Thus, we test whether the relationship between competition and access to finance is present over time and across many countries while controlling for unobservable country-specific characteristics. This is important because the quality of institutions or regulations, which is likely to vary significantly across countries, can affect both access to finance and the degree of banking competition. These indicators change slowly over time and are captured by country fixed effects in our regressions. Previous work has either focused on a single country (i.e., Carbó-Valverde et al. 2009b) or analyzed cross-country data for a specific year (i.e., Beck et al. 2004; Claessens and Laeven 2005).

Second, we use an objective indicator of a firm's access to finance rather than using proxies, such as dependence on trade finance, a measure of financial dependence used by Claessens and Laeven (2005), or subjective measures of perceived financial obstacles, such as those used by Beck et al. (2004). Specifically, we use an indicator that captures whether a firm uses credit products, such as a loan, overdraft, or a line of credit. Although all measures have advantages and disadvantages (for example, Fisman and Love (2007) argue that a popular financial dependence measure actually proxies for a firm's growth opportunities), we offer a direct test of access to finance using a measure that is intuitive, easily available, and widely used by policymakers.

Third, we use several direct measures of competition in our estimations with and without controlling for concentration measures. Finally, we present new evidence on the interaction of the degree of competition with features of credit information sharing schemes and stock market development.

The rest of the paper is organized as follows. First, we present a review of the literature and discusses the hypotheses we seek to test. We then introduce our

data and present summary statistics, followed by an outline of our regression model. Next, our baseline results are given. We discuss the results of interactions of the bank competition variables with credit information sharing measures and with stock market development and finally conclude. Appendices A1 and A2 contain detailed descriptions of the construction of the firm-level measure of access to finance and the estimation method for the Lerner index, respectively.

RELATED LITERATURE AND HYPOTHESES

Two main theories explain the relationship between competition and access to finance. The standard industrial organization models suggest that competition lowers the cost of finance and increases the efficiency of banking institutions. For example, Vives (2001) states that the contribution of competition to allocative, productive, and dynamic efficiency in banking is no different than in any other industry. The pressure of competition allows for innovation and the expansion of services, which should increase the availability of finance to more firms. Competition also pushes banks toward riskier borrowers, again expanding access to a wider variety of firms. Thus, the *market power hypothesis* predicts that low competition (i.e., high market power) will reduce access.

However, because of adverse selection and moral hazard problems that arise due to information asymmetries between banks and their borrowers, banks have incentives to invest in monitoring and private information acquisition. Banks with more market power (i.e., lower competitive pressures) have more incentives to invest in information acquisition and build long-term relationships with borrowers because they can better internalize the costs of these activities and because they face a lower risk of borrowers leaving for another bank (Petersen and Rajan 1994, 1995). Thus, the *information hypothesis* predicts that low competition (i.e., high market power) will increase access to credit, particularly for opaque firms.

Credit information sharing mechanisms can help to overcome adverse selection and moral hazard problems in credit markets (Pagano and Jappelli 1993; Padilla and Pagano 2000). Credit reporting allows borrowers to build a credit history and to use a documented track record of responsible borrowing and repayment as "reputational collateral" to access credit outside of established lending relationships (Love and Mylenko 2003). Thus, reliable credit information can serve as a substitute for bank-firm relationships. Multiple empirical studies have confirmed that information sharing results in more lending and better access to finance.[5]

Thus, theory and evidence suggest that the presence and type of credit information sharing schemes can have direct implications for the costs and benefits of banks acquiring private information on their borrowers. Specifically, in an

5. See, for example, Jappelli and Pagano (2002), Love and Mylenko (2005), Djankov et al. (2007), Brown et al. (2009), and Houston et al. (2010).

environment where good credit information sharing schemes are in place, asymmetric information should be less of a concern for banks; hence, they will have fewer incentives to invest in private information acquisition and to build long-term lending relationships with firms based on soft information. Thus, these banks will have less to lose (in terms of relationship capital) with higher competition. In addition, Brown and Zehnder (2007) show that credit information sharing weakens lenders' ability to extract rents from relationships, which should further reduce the benefit of market power.

We perform two tests to establish the validity of the market power hypothesis versus the information hypothesis. The first test is a simple regression of firm-level access on the degree of bank competition.[6] The second test, which is a more direct test, involves including the interaction of the bank competition measures with variables that characterize credit information sharing schemes across countries.

The *information hypothesis* predicts a positive sign on the Lerner index and the Boone indicator in the first test (i.e., competition is bad for access in general) and a negative sign on the interaction of these measures with the credit information sharing variables in the second test. The negative interaction term shows that competition is not as bad in an environment with good credit information sharing schemes because banks are less reliant on their ability to internalize the costs of acquiring private information.

Alternatively, the *market power hypothesis* predicts a negative sign on the Lerner index or the Boone indicator; that is, higher measures imply less competition and less access. According to this theory, the main mechanism by which competition enhances access is by lowering the costs of finance. Thus, the effect of market power on access is likely to be more muted in environments with relatively low costs. In other words, cost reductions forced by competitive pressures will be less important in environments with low costs than they are in environments with high costs. Well-developed credit information sharing arrangements reduce the costs of finance by making it less costly for banks to acquire information on their borrowers and to enforce repayment. In other words, the bank can acquire information about the quality of borrowers and their past credit performance relatively cheaply and easily through a credit bureau or registry rather than by collecting this information through a lengthy relationship-building process. Thus, credit information allows for better (and cheaper) screening of borrowers and reduces adverse selection. In addition, a threat of a poor credit history minimizes moral hazard problems (i.e., firms making riskier choices after they obtain loans) and ensures prompt repayment (i.e., reduces enforcement costs). Therefore, improvements in credit information sharing mechanisms lower the costs of lending. From our earlier arguments, it follows that the impact of bank competition will be less pronounced in an environment with lower initial costs of finance. Hence, the *market power hypothesis* predicts a negative sign on

6. Because our data are firm level, reverse causality from access to competition is unlikely.

the Lerner index or the Boone indicator (i.e., low competition is bad for access) and a positive sign on the interaction with the credit information variables (i.e., competition is less important in an environment with good information and, hence, lower costs). In other words, competition and good information sharing schemes both serve as means of lowering the costs of finance and increasing its availability.[7]

Our paper is related to several other strands of literature. First, the literature on credit information sharing (cited above) is related to our paper because it has direct implications on the relationship between competition and access to finance. Second, the literature on the impact of bank mergers on access to finance is related to our paper because bank mergers in general reduce competition. Several prior studies on the impact of bank mergers on SME lending find that these firms can be hurt by mergers (see, among others, Peek and Rosengren 1996; Berger et al. 1998; Sapienza 2002; Bonaccorsi di Patti and Gobbi 2007; Degryse et al. 2011). Erel (2011) shows that although bank mergers can generally benefit borrowers through lower interest rates, if the geographical overlap between merging banks is extensive enough to significantly increase concentration in banking markets, then spreads will increase after mergers.

Third, a related body of literature for the US has examined the impact of bank deregulation, which also increases bank competition, on access to finance. Zarutskie (2006) finds that deregulation in the US, which increased the competitiveness of US banking markets, caused newly formed firms to use significantly less external debt, consistent with the notion that competition exacerbates credit constrains. Rice and Strahan (2010) exploit the geographical variation in branching restrictions across US states and find that in states that are more open to branching, small firms are more likely to borrow and do so at lower rates. However, the authors find that there no effects on the amount that small firms can borrow.

Finally, a separate body of literature examines the consequences of bank competition on financial stability. For example, greater bank competition may weaken screening incentives (Boot and Thakor 2000) and lead to excessive risk taking (Allen and Gale 2000). Contrary to this view, Schaeck et al. (2009) present evidence that more competitive banking systems are less prone to systemic crises and that time to crisis is longer in a competitive environment. Boyd and De Nicolo (2005) support this view with some theoretical motivations. In this paper, we do not consider the impact of competition on the riskiness of loans (or risk-shifting behavior by banks) or the franchise value of the bank. Our main focus is the impact of competition on access to finance by firms.

---

7. It is possible that information sharing can also promote more competition, whereas the degree of competition may affect the emergence of information sharing mechanisms (Bruhn et al. 2013). However, in this paper, we treat bank competition and information availability as exogenous because our outcome variable is firm-level access to finance.

D ata

We combine firm-, bank- and country-level data from various sources to construct the variables used in the paper. The firm-level data come from World Bank Enterprise Surveys.[8] The data are collected in several waves and contain repeated cross-sections for the countries in our sample. Because our goal is to isolate within-country variation in bank competition across time, we only focus on countries that have survey data for at least two years.

We use firm survey data to construct our measure of access to finance and several control variables. A*ccess to finance* is an indicator variable that equals one when a firm has a loan, overdraft, or line of credit and equals zero otherwise. A detailed description of the process used to construct our measure of access to finance is provided in the appendix (Appendix 1). We prefer to use this objective measure of access to credit rather than subjective measures of financing obstacles included in the Enterprise Surveys because the former is more comparable across countries and does not depend on cultural biases that might influence individuals' perceptions. Furthermore, the objective measure is more reliable and easier to interpret.

We also include several firm-level variables that may influence the extent of firms' access to finance, such as firm size, measured as the log of the number of employees, a dummy for firms in the manufacturing industry (the omitted category is service and other industries), a dummy for exporting firms, a dummy for foreign-owned firms, a dummy for government-owned firms, and the log of firm age in years.

The bank-level data come from Bankscope, a commercial database produced by Bureau Van Dijk, including annual balance sheet and income statement information for banks around the world. Only banks classified as commercial, cooperative, Islamic, savings, and bank holding companies are considered in the analysis. We omit central banks and investment banks because they are not directly involved in providing loans to firms.

To construct the *Lerner index,* we use annual bank-level data and estimate a translog cost function using all available data for each country. We then calculate the marginal cost equation (by taking the derivative of the translog cost equation) and, finally, the Lerner index for each bank, which we then average for each country and year. Intuitively, the Lerner index captures the ability of a bank to charge a price above its marginal cost. A detailed description of the process we use to calculate the Lerner index is available in the appendix (Appendix 2).

For robustness, we use two additional measures of competition. The first one is also a Lerner index calculated by Clerides et al. (2013). The main difference between their index and ours is that they use a different model to estimate banks' marginal costs. They use the smooth coefficient model, which is a semiparametric approach that allows for a flexible cost structure, rather than the more

---

8. The data are available at www.enterprisesurveys.org [accessed July 17, 2014].

commonly used parametric translog specification, which we adopt. We use this measure as a robustness check on our own calculations and refer to it as the "alternate Lerner index".

The second measure is the Boone indicator, which is also calculated by Clerides et al. (2013). The Boone indicator measures profit elasticity, which is the percentage decrease in profits resulting from a one percent increase in the marginal cost. Although the Boone indicator has a solid theoretical justification (Boone 2008), the way in which it relates to competition is less intuitive than in the case of the Lerner index. This measure captures the impact of competition on the relative profits of more and less efficient banks based on the reasoning that in a more competitive industry, firms are punished more harshly for being inefficient (Boone 2008). The profit elasticity is negative (because profits decrease when marginal costs increase); thus, higher absolute values are interpreted as indicative of a more competitive industry. In other words, this measure has the same direction as the Lerner index (i.e., higher actual negative values mean less competition).

Finally, we use bank-level data to construct two commonly used measures of concentration. *Concentration 3* is the share of banking system assets held by the three largest banks in each country, and the *Herfindahl index* is the sum of the squared market shares of each bank.[9] In both cases, higher values indicate more concentration. These measures help us test the validity of the structure-conduct-performance paradigm, which assumes a causal relationship among the structure of the banking industry, firm conduct, and performance. This paradigm suggests that fewer and larger firms are more likely to engage in anticompetitive behavior. In this framework, competition is negatively related to measures of concentration, such as the share of assets held by the top three banks and the Herfindahl index.

Our final dataset is limited to countries that have firm-level data on access to finance from the Enterprise Surveys, concentration ratios and bank competition measures, such as the Lerner index or the Boone indicator. In addition, we limit the sample to countries that enter at least twice in the merged dataset, which allows us to control for country-specific fixed effects. This dataset contains information on 53 countries for the 2002–10 period (Table 1).

At the firm level, we have more than 68,000 observations. Some countries had only two surveys during our time frame, whereas others have had three or more, with a maximum of five surveys for Bulgaria. The coverage of firms varies by country. For example, India has more than 4,000 firms covered in two surveys, whereas Malawi has fewer than 300 firms covered in two surveys.[10] In addition, we use a smaller subset of our data that includes a sample of firms that were

---

9. The Herfindahl index, calculated as $\sum_{i=1}^{n} \left[\frac{\text{assets}_i}{\text{total assets}}\right]^2$, gives greater weight to larger banks.

10. To control for uneven sample size, we test the robustness of our results to weighting our regressions by the inverse of the square root of the number of firms in the survey so that each country carries the same importance in our estimations.

TABLE 1. Number of Firms by Country and Year of Survey

| | Survey Year | | | | | | | | | | |
	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	# of Surveys
Albania	167			202		276				645	3
Angola					421				306	727	2
Argentina					1019				1017	2036	2
Armenia	169			351				356		876	3
Azerbaijan	167			345				291		803	3
Bangladesh	948					1471				2419	2
Belarus	247			325			240			812	3
Benin			182					143		325	2
Bolivia					603				346	949	2
Bosnia-Herzegovina				200				343		543	2
Botswana					340				260	600	2
Brazil		1619						1170		2789	2
Bulgaria	242		492	298		1008		269		2309	5
Burkina Faso					138			357		495	2
Cameroon					168			351		519	2
Chile			941		989				1003	2933	3
China	1353	1572								2925	2
Colombia					990				934	1924	2
Congo					338				334	672	2
Croatia	169			227		615				1011	3
Czech Republic	258			334				223		815	3
El Salvador		463			681					1144	2
Estonia	164			216				264		644	3
Georgia	172			198			334			704	3
Guatemala		431			503					934	2
Honduras		446			421					867	2
Hungary	243			605				283		1131	3

(Continued)

TABLE 1. Continued

	Survey Year										
	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	# of Surveys
India	1461				3086					4547	2
Indonesia		644						1313		1957	2
Kazakhstan	246			582				464		1292	3
Kenya		211				653				864	2
Latvia	170			203				262		635	3
Lithuania	197		228	205				267		897	4
Macedonia	165			199				354		718	3
Malawi				146				145		291	2
Mali		131				490			295	916	3
Mauritius				159				374		533	2
Moldova	173	103		349				354		979	4
Nicaragua		450			466					916	2
Peru	120				626				980	1726	3
Philippines		600						1093		1693	2
Poland	493	104		971				402		1970	4
Romania	250			594				472		1316	3
Russian Federation	489			593				903		1985	3
Serbia & Montenegro				298				482		780	2
Slovakia	158			212				252		622	3
Slovenia	185			221				271		677	3
South Africa		424				929				1353	2
Turkey	503		550	1276			1083			3412	4
Ukraine	446			588			756			1790	3
Uruguay					583				584	1167	2
Vietnam				1080				1014		2094	2
Zambia	190					482				672	2
Total	9545	7198	2393	10977	11372	5924	2413	12472	6059	68353	137

Source: Enterprise Surveys.

surveyed more than once, comprising 6,759 firms and 14,000 observations. This smaller sample allows us to conduct firm fixed-effect estimations, as we discuss later.

Our bank-level sample contains data on 3,409 banks and more than 16,000 bank-year observations, which we use to calculate the Lerner index over time for each country (Table 2).[11]

Finally, we supplement our dataset with annual country-level data from several sources (Table 3, Panel A). We obtain data on GDP per capita and inflation from the World Bank *World Development Indicators* database. Data on the presence and quality of credit information schemes come from the World Bank *Doing Business* dataset.[12] Data on stock market development come from the *Global Financial Development Report Database*.

We report basic summary statistics for the firm survey variables and country-level variables (Table 3, Panel B). More than half of the firms in our sample have access to finance; in other words, they use at least one of three credit products, such as loans, lines of credit, or overdrafts.[13] The average (median) size of our firms is approximately 100 (25) employees, and firm size varies from one to more than 1,700. Thus, most of the firms in our sample are small and medium-sized enterprises. The median firm age is 12 years, and the average age is almost 18. Firm age varies from one-year-old startups to nearly 200-year-old firms. In our sample, 62 percent of firms are in manufacturing (the rest are in services, retail or construction), 23 percent are exporters (classified as such if they export at least 10 percent of their total output), approximately 10 percent are foreign owned, and approximately 5 percent are considered government owned.

The Lerner index has an average of 0.25, a median of 0.23 and a standard deviation of approximately 0.07. The range is between 0.07 (which indicates very low markups and, hence, high bank competition) and 0.43 (which implies very high markups and, therefore, low bank competition). The alternate Lerner has a similar distribution. The Boone indicator is negative, as stated earlier, and ranges from −0.65 (high competition) to −0.35 (low competition). The average bank concentration is high, with the top three banks comprising nearly 60 percent of total bank assets. The lowest share of assets held by the top three banks is approximately 28 percent, whereas the highest is over 98 percent. The Herfindahl index varies between 0.05 and 0.74.

We next present the correlation between the three competition measures and two concentration measures (Table 3, Panel C). The Lerner index and the alternate Lerner have a reasonably high correlation of 0.63, but the correlation with the Boone indicator is lower and ranges between 0.2 and 0.36 for both Lerner

11. Because we use one-year lagged values of the Lerner index in our regression, we report bank data for 2001–9.

12. Data available at www.doingbusiness.org [accessed July 17, 2014].

13. Although in principle, it would be interesting to distinguish between firms that have access to each of these types of products, unfortunately, the design of the Enterprise Surveys does not allow for this possibility.

TABLE 2. Lerner Index by Country and Year

Countries	Lerner Index								
	2001	2002	2003	2004	2005	2006	2007	2008	2009
Albania	0.382	0.207	0.269	0.246	0.296	0.260	0.265	0.254	0.272
Algeria	0.255	0.362	0.404	0.452	0.510	0.509	0.447	0.504	0.550
Angola	0.449	0.463	0.616	0.537	0.437	0.399	0.368	0.396	0.430
Argentina	0.184	1.385	0.499	0.282	0.286	0.274	0.249	0.255	0.290
Armenia	0.261	0.276	0.370	0.346	0.311	0.343	0.309	0.307	0.213
Azerbaijan	0.429	0.277	0.348	0.349	0.338	0.277	0.274	0.281	0.267
Bangladesh	0.247	0.213	0.227	1.021	0.273	0.281	0.249	0.270	0.291
Belarus	0.254	0.198	0.189	0.199	0.203	0.244	0.294	0.275	0.287
Benin	0.295	0.292	0.267	0.248	0.232	0.172	0.213	0.272	0.314
Bolivia	0.177	0.247	0.181	0.160	0.167	0.194	0.235	0.303	0.230
Bosnia-Herzegovina				0.162	0.200	0.194	0.230	0.177	0.199
Botswana	0.227	0.207	0.227	0.273	0.252	0.303	0.207	0.281	0.185
Brazil	0.174	0.181	0.226	0.191	0.229	0.239	0.256	0.357	0.239
Bulgaria	0.290	0.206	0.245	0.225	0.237	0.284	0.285	0.254	0.268
Burkina Faso	0.310	0.375	0.343	0.307	0.337	0.298	0.314	0.212	0.258
Cameroon	0.471	0.478	0.451	0.450	0.421	0.417	0.406	0.380	0.221
Chile	0.317	0.288	0.279	0.209	0.300	0.347	0.383	0.231	0.377
China	0.224	0.295	0.319	0.314	0.336	0.354	0.351	0.336	0.331
Colombia	0.126	0.124	0.200	0.217	0.267	0.232	0.270	0.244	0.325
Congo	0.250	0.134	0.243	0.258	0.163	0.210	0.168	0.138	0.182
Costa Rica	0.107	0.109	0.199	0.204	0.195	0.186	0.201	0.157	0.135
Croatia	0.205	0.196	0.188	0.172	0.190	0.183	0.184	0.257	0.163
Czech Republic	0.100	0.127	0.184	0.196	0.177	0.176	0.222	0.221	0.301
Dominican Republic	0.141	0.129	0.134	0.190	0.141	0.135	0.117	0.134	0.148
Egypt	0.182	0.172	0.229	0.188	0.217	0.190	0.260	0.222	0.220
El Salvador	0.266	0.301	0.256	0.296	0.332	0.314	0.327	0.333	0.328
Estonia	0.066	0.129	0.171	0.176	0.257	0.344	0.252	0.161	0.160
Ethiopia	0.451	0.349	0.446	0.514	0.556	0.609	0.516	0.539	0.511
Georgia	0.405	0.349	0.341	0.332	0.403	0.374	0.239	0.272	0.276
Ghana		0.401	0.296	0.313	0.214	0.220	0.193	0.257	0.225
Guatemala	0.097	0.107	0.163	0.160	0.193	0.198	0.206	0.236	0.213
Honduras	0.136	0.198	0.269	0.183	0.188	0.211	0.217	0.259	0.228
Hungary	0.176	0.183	0.197	0.222	0.224	0.233	0.228	0.192	0.226
India	0.153	0.207	0.228	0.276	0.232	0.226	0.224	0.199	0.213
Indonesia	0.194	0.194	0.207	0.243	0.226	0.227	0.229	0.230	0.214
Ivory Coast	0.269	0.259	0.229	0.251	0.274	0.242	0.256	0.235	0.294
Jamaica	0.202	0.202	0.225	0.217	0.236	0.230	0.221	0.278	0.285
Jordan	0.194	0.217	0.286	0.307	0.417	0.333	0.287	0.289	0.286
Kazakhstan	0.338	0.323	0.321	0.317	0.320	0.274	0.348	0.313	0.318
Kenya	0.192	0.209	0.261	0.246	0.268	0.277	0.290	0.246	0.245
Korea	0.228	0.241	0.262	0.279	0.271	0.261	0.248	0.213	0.223
Latvia	0.240	0.294	0.322	0.309	0.321	0.309	0.280	0.281	0.222
Lebanon	0.130	0.152	0.178	0.145	0.165	0.150	0.141	0.167	0.203
Lithuania	0.117	0.183	0.175	0.172	0.206	0.199	0.203	0.180	0.115
Macedonia	0.384	0.311	0.300	0.337	0.396	0.367	0.310	0.214	0.233
Malawi	0.322	0.365	0.309	0.280	0.370	0.350	0.377	0.353	0.392
Malaysia	0.302	0.326	0.339	0.334	0.313	0.303	0.301	0.293	0.326

(Continued)

TABLE 2. Continued

Countries	Lerner Index								
	2001	2002	2003	2004	2005	2006	2007	2008	2009
Mali	0.293	0.284	0.312	0.291	0.293	0.323	0.244	0.221	0.241
Mauritania	0.274	0.288	0.300	0.250	0.362	0.398	0.309	0.396	0.407
Mauritius	0.289	0.394	0.238	0.285	0.283	0.288	0.272	0.294	0.263
Mexico	0.132	0.136	0.164	0.175	0.186	0.185	0.204	0.222	0.248
Moldova	0.365	0.388	0.340	0.349	0.268	0.288	0.298	0.243	0.290
Mozambique	0.291	0.197	0.164	0.198	0.247	0.243	0.221	0.253	0.315
Nepal	0.293	0.260	0.238	0.298	0.324	0.312	0.303	0.284	0.286
Nicaragua	0.193	0.190	0.271	0.374	0.372	0.355	0.396	0.398	0.407
Nigeria	0.290	0.266	0.233	0.233	0.270	0.320	0.323	0.365	0.331
Oman	0.279	0.404	0.409	0.437	0.435	0.430	0.365	0.411	0.434
Pakistan	0.129	0.173	0.280	0.292	0.332	0.302	0.238	0.240	0.218
Panama	0.226	0.272	0.309	0.302	0.307	0.298	0.270	0.289	0.292
Paraguay	0.090	0.056	0.042	0.072	0.124	0.094	0.108	0.079	0.096
Peru	0.170	0.224	0.217	0.714	0.321	0.316	0.339	0.352	0.354
Philippines	0.055	0.187	0.190	0.227	0.227	0.232	0.228	0.182	0.225
Poland	0.172	0.201	0.215	0.225	0.221	0.227	0.262	0.240	0.270
Romania	0.215	0.216	0.183	0.179	0.211	0.181	0.181	0.195	0.183
Russian Federation	0.319	0.259	0.258	0.235	0.245	0.244	0.251	0.253	0.104
Serbia		0.376	0.350	0.338	0.333	0.272	0.207	0.168	0.180
Sierra Leone	0.495	0.487	0.462	0.443	0.372	0.336	0.189	0.135	0.149
Slovakia	0.112	0.125	0.163	0.116	0.138	0.194	0.179	0.210	0.221
Slovenia	0.183	0.200	0.193	0.223	0.199	0.193	0.220	0.147	0.208
South Africa	0.347	0.374	0.240	0.154	0.244	0.293	0.319	0.292	0.272
Sri Lanka	0.174	0.183	0.227	0.240	0.220	0.251	0.228	0.215	0.232
Tanzania			0.468	0.429	0.284	0.319	0.303	0.325	0.273
Thailand	0.194	0.220	0.301	0.344	0.340	0.290	0.289	0.291	0.350
Turkey	0.229	0.199	0.263	0.196	0.217	0.207	0.209	0.201	0.265
Ukraine	0.223	0.208	0.216	0.234	0.207	0.245	0.216	0.269	0.262
Uruguay	0.001	0.092	0.033	0.151	0.236	0.193	0.256	0.231	0.229
Uzbekistan	0.580	0.373	0.293	0.290	0.318	0.350	0.357	0.310	0.286
Venezuela	0.238	0.279	0.299	0.314	0.267	0.305	0.280	0.263	0.300
Vietnam	0.263	0.246	0.203	0.213	0.231	0.237	0.246	0.214	0.243
Zambia	0.353	0.200	0.075	0.241	0.307	0.348	0.364	0.376	0.346

Source: Authors' analysis based on Bankscope data, as discussed in Appendix 2.

measures. There is a fairly low correlation between competition measures and concentration measures, which ranges between 0.10 and 0.15, but there is a high correlation among the two concentration measures (0.85).

REGRESSION MODEL

Our goal is to evaluate the impact of bank competition on firms' access to finance. To do so, we estimate the following simple model:

$$Access_{i,c,t} = a_c + b_1 \, Bank \, Competition_{c,t-1} + b_2 F_{i,c,t} + b_3 X_{c,t-1} + e_{i,c,t} \qquad (1)$$

TABLE 3. Panel A: Variable Description and Data Sources

Variable	Description and Data Source
Firm-Level Variables	
Access to finance	Dummy variable equal to 1 if the firm has access to bank finance (loan, overdraft or line of credit) from World Bank Enterprise Surveys.
Firm size (employees)	Number of permanent full-time employees from World Bank Enterprise Surveys.
Manufacturing	Dummy variable equal to 1 if the firm is in the manufacturing sector from World Bank Enterprise Surveys.
Exporter	Dummy variable equal to 1 if 10 percent or more of sales are exported directly or indirectly by the firm from World Bank Enterprise Surveys.
Foreign-owned	Dummy variable equal to 1 if 50 percent or more of the firm is owned by foreign organizations from World Bank Enterprise Surveys.
Government-owned	Dummy variable equal to 1 if 10 percent or more of the firm is owned by the government from World Bank Enterprise Surveys.
Firm age	Age of the firm in years from World Bank Enterprise Surveys.
Country-Level Variables	
Lerner index	Lerner index constructed using variables from Bankscope (see Appendix 2).
Lerner index (alternate)	Lerner index as calculated by Clerides et al. (2013) using semi-parametric estimation methodology.
Boone Indicator	Boone indicator is the profit elasticity (percentage decrease in profits resulting from a 1 percent increase in the marginal cost) as calculated by Clerides et al. (2013).
Concentration 3	Fraction of total assets held by top three banks from Bankscope.
Herfindahl index	Herfindahl index calculated as the sum over all banks in the country of the squared market share (in terms of assets) of each bank from Bankscope.
Inflation rate	Inflation calculated as the annual change in the GDP deflator from the World Development Indicators (WDI) World Bank.
GDP per capita	Gross Domestic Product per capita (constant US dollars) from WDI.
Depth of credit information	Depth of credit information is a measure of the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau, both by law and in practice. (0–6) Obtained from Doing Business Indicators.
Public credit registry coverage	The public credit registry coverage indicator reports the number of individuals and firms listed in a public credit registry's database as a percentage of the adult population. Obtained from Doing Business Indicators.
Private credit bureau coverage	The private credit bureau coverage indicator reports the number of individuals and firms listed in a private credit bureau's database as a percentage of the adult population. Obtained from Doing Business Indicators.
Stock market capitalization	Total value of all listed shares in a stock market as a percentage of GDP. Obtained from GFDR.

Source: As listed for each variable in the table.

TABLE 3. Panel B: Summary Statistics

Variable	Obs	Mean	Median	Standard Deviation	Min	Max
Firm-Level Variables						
Access to finance	68353	0.602	1	0.489	0	1
Firm size (employees)	68353	100.622	25	207.429	1	1755
Manufacturing	68353	0.623	1	0.485	0	1
Exporter	68353	0.235	0	0.424	0	1
Foreign-owned	68353	0.095	0	0.293	0	1
Government-owned	68353	0.049	0	0.217	0	1
Firm age	68353	17.729	12	16.983	1	193
Country-Level Variables						
Lerner index	68353	0.251	0.235	0.067	0.066	0.437
Lerner index (alternate)	67356	0.264	0.257	0.085	−0.017	0.454
Boone Indicator	67356	−0.453	−0.417	0.073	−0.653	−0.349
Concentration 3	67720	0.589	0.567	0.172	0.279	0.985
Herfindahl index	68353	0.188	0.142	0.132	0.050	0.714
Inflation rate	68353	0.086	0.062	0.088	−0.074	0.795
GDP per capita	68353	2779.944	1896.774	2470.976	91.232	13836.190
Depth of credit information	49217	3.479	4	1.944	0	6
Public credit registry coverage	49217	6.934	0.8	10.040	0	34.3
Private credit bureau coverage	49217	20.987	3.3	28.718	0	100
Stock market capitalization	54807	30.913	23.435	33.608	0.429	238.914

Source: Authors' analysis based on data sources discussed in the text.

TABLE 3. Panel C: Correlation Matrix for Competition and Concentration Measures

	Lerner index	Lerner index (alternate)	Boone indicator	Concentration 3	Herfindahl Index
Lerner index	1				
Lerner index (alternate)	0.6329	1			
Boone indicator	0.2076	0.3617	1		
Concentration 3	0.1243	0.1668	0.157	1	
Herfindahl Index	0.1099	0.1146	0.0845	0.8529	1

Source: Authors' analysis based on data sources discussed in the text.

where *Access* is the indicator variable for whether firm i in country c at time t has a bank loan, line of credit, or overdraft; *Bank Competition* refers to our Lerner index, the alternate Lerner index or the Boone indicator; and F and X represent firm-level (e.g., size, manufacturing, exporter) and country-level (e.g., inflation and GDP per capita) control variables, respectively, as described in the data section. We capture unobservable differences between countries by including country fixed effects (represented in equation 1 by a_c), and we cluster errors at

the country-year level.[14] Thus, our estimates capture within-country variation in the relationship between bank competition and access to finance. We assume that country-level measures of bank competition are exogenous to the firm-level measure of access to finance. In other words, each individual firm is not large enough to affect country-level measures of bank competition. However, to further mitigate any possible reverse causality concerns, we use one-year lagged values for both bank competition and the other country-level control variables.

BASELINE RESULTS

Under the *market power hypothesis*, which predicts that competition is good for access, we expect the Lerner index and the Boone indicator to be negative. The opposite is true under the *information hypothesis*. In our baseline results for the estimation of equation (1), we observe that both the Lerner index and the Boone indicator are negative and significant in all specifications (Table 4). This establishes our first main result: low bank competition is associated with lower access to finance, thus supporting the market power hypothesis.

In columns (b) and (c), we present robustness tests on our main Lerner index. First, because the Lerner index is an estimated variable, we weight our regression by the inverse of its standard deviation. This accounts for the precision with which the Lerner index is estimated and gives less weight to those observations that are estimated with less precision (i.e., those that have larger standard errors). Second, because the number of firms varies for different surveys, we add an additional weighting factor, which is the inverse of the square root of the number of observations (i.e., firms) in each country-year. This gives relatively less weight to countries with a large number of observations, which otherwise will be overrepresented in the sample. In model (c), we combine the two weighting factors in a product form (i.e., the weight equals the product of the inverse of the Lerner's standard deviation and the inverse of the square root of the number of firms in the country and year). The regressions shown in columns (b) and (c) show that our results are robust to each of the weighting methods.

Because we estimate the regressions using a linear probability model, we can interpret the coefficient on the Lerner index as an increase in the probability of access to finance. In our sample, one standard deviation of the Lerner index is approximately 0.07. Using the estimated coefficient of 0.79 (from model (b) in Table 4), we find that a one-standard-deviation change in the Lerner index results in a change of approximately 5.5 percentage points in the probability of having access to finance. In our sample, the average access to finance dummy equals one for approximately 60 percent of all firms, with a standard deviation of approximately 49 percent. Thus, a 5-percentage-point change is modest for an average country, but it is more economically important for a country that initially has low access.

---

14. Because of the inclusion of country fixed effects and to avoid an incidental parameters problem, we report our results using a linear probability model. However, our results are robust to using a fixed-effects logit model.

TABLE 4. Baseline Regressions

| Variables | Access to finance | | | | |
	(a)	(b)	(c)	(d)	(e)
Lerner index	−0.596**	−0.793**	−0.488***		
	[0.268]	[0.321]	[0.173]		
Lerner index (alternate)				−0.545**	
				[0.256]	
Boone indicator					−0.788***
					[0.300]
Log firm size	0.087***	0.089***	0.090***	0.086***	0.086***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Manufacturing	0.029***	0.030**	0.020*	0.035***	0.030***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Exporter	0.031***	0.028***	0.044***	0.031***	0.031***
	[0.008]	[0.010]	[0.012]	[0.008]	[0.008]
Foreign owned	−0.079***	−0.091***	−0.084***	−0.083***	−0.083***
	[0.011]	[0.011]	[0.013]	[0.011]	[0.011]
Government owned	−0.136***	−0.167***	−0.226***	−0.136***	−0.136***
	[0.031]	[0.035]	[0.038]	[0.031]	[0.031]
Log firm age	0.013***	0.016***	0.016**	0.012***	0.012***
	[0.004]	[0.004]	[0.007]	[0.004]	[0.004]
Inflation rate	−0.330**	−0.404**	−0.154	−0.493**	−0.457***
	[0.144]	[0.166]	[0.121]	[0.202]	[0.168]
Log GDP per capita	0.237***	0.248***	0.334***	0.254***	0.193**
	[0.072]	[0.080]	[0.045]	[0.062]	[0.075]
Constant	−1.207**	−1.215*	−1.984***	−1.359***	−1.361***
	[0.568]	[0.634]	[0.341]	[0.497]	[0.475]
Observations	68,353	68,353	68,353	67,356	67,356
R-squared	0.211	0.186	0.183	0.207	0.209
No. of countries	53	53	53	51	51

The regressions above are estimated using country fixed effects and robust standard errors clustered at the country-year level. See Table 3 Panel A for the variable definitions and data sources. The dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft, or a line of credit. The *Lerner index* is a measure of bank competition (higher values imply lower levels of competition). The *Lerner index (alternate)* is the Lerner index, as calculated by Clerides et al. (2013). The *Boone indicator* is a measure of profit elasticity. *Log firm size* is the logarithm of the firm's number of permanent employees. *Log firm age* is the logarithm of the firm's age in years. *Government-owned* and *Foreign-owned* are dummy variables that equal one if the firm has government or foreign ownership, respectively. *Exporter* is a dummy variable that indicates whether the firm is an exporting firm. *Manufacturing* is a dummy variable that takes the value of 1 if the firm is in the manufacturing industry. *Log GDP per capita* is the logarithm of the GDP per capita (constant dollars). The *inflation rate* is measured as the growth rate of the GDP deflator (annual). The results in column (b) are weighted by the inverse of the standard deviation of the Lerner Index; those in column (c) are weighted by the inverse of (the square root of the number of firms × the inverse of the standard deviation of the Lerner Index).

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

Source: Authors' analysis based on data sources discussed in the text.

In the following two columns (columns (d) and (e) of Table 4), we report the results using the alternate Lerner and the Boone indicator as measures of competition. Both of these measures are negative and statistically significant. Using

these measures, we are able to confirm our baseline result from column (a) that lower levels of competition lead to lower access to finance.

Most of the control variables included in the baseline result (Table 4) have the predicted signs. Larger and older firms are more likely to have access to finance. Manufacturing firms are more likely than service and retail enterprises to have access to finance because they have more collateral, which helps them obtain financing. Exporters are also more likely to have access to bank finance; however, foreign-owned firms are less likely to have access. This might be because foreign firms can obtain financing from their parent companies and, thus, do not need to borrow from local banks. At the same time, government-owned firms appear less likely to have access to bank finance, which is surprising. We find that GDP per capita, which proxies for the overall level of development in a country, is associated with a higher likelihood of access to finance. The inflation rate has a negative association with our measure of access to finance, which is not surprising. Because of the country fixed effects, these variables capture the impact of the variation in inflation and GDP per capita from the long-run country average.

In the following table, we present results related to the impact of competition on access to finance while controlling for bank concentration (Table 5). Thus, we add either the concentration ratio or the Herfindahl index to our regressions with the Lerner and Boone measures. Neither measure of concentration is statistically significant, and our main result that competition is good for access is unaffected. This confirms findings from earlier studies, (e.g., Claessens and Laeven, 2004), which found that concentration is not a good predictor of competition. Furthermore, these results do not lend support to the structure-conduct-performance paradigm.

In the results we have reported so far, we treated competition as exogenous to a firm because it is unlikely that each individual firm will affect the degree of competition in a country. To check the robustness of our results, we perform an additional test on a smaller sub-sample of firms, for which we have repeated observations over time. Although the World Bank Enterprise Surveys mostly contain repeated waves of surveys (i.e., the same firms are not surveyed in different waves), a smaller subset of firms was matched across the survey waves, allowing us to construct a firm-level panel for approximately 6,700 firms with a total of 14,000 observations covering 42 countries and 104 country-years. This sample contains only firms that were surveyed at least two or more times. This is a much smaller sample relative to our main sample, covering 68,000 observations in 53 countries and comprising 137 country-years. However, the advantage of this sample is that it allows us to control for firm-specific fixed effects (rather than country-specific effects, as we do in our main results). This allows us to analyze how changes in competition affect access to finance within a firm.

The results from our firm fixed-effects regressions are presented next (Table 6). As before, we find that regardless of the specific measure of bank competition used, low competition has a significant and negative impact (i.e., lower competition means lower access). Because our bank competition measures are constructed at the country-year level, we continue to cluster the errors at the

TABLE 5. Regressions Controlling for Bank Concentration Measures

| Variables | Access to finance | | | | | |
	(a)	(b)	(c)	(d)	(e)	(f)
Lerner index	−0.543**	−0.595**				
	[0.263]	[0.254]				
Lerner index (alternate)			−0.546**	−0.543**		
			[0.245]	[0.250]		
Boone indicator					−0.808***	−0.786***
					[0.303]	[0.297]
Concentration 3	−0.081		−0.118		−0.092	
	[0.147]		[0.145]		[0.147]	
Herfindahl index		−0.004		−0.028		−0.015
		[0.139]		[0.145]		[0.142]
Log firm size	0.087***	0.087***	0.086***	0.086***	0.085***	0.086***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Manufacturing	0.030***	0.029***	0.035***	0.035***	0.030***	0.030***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Exporter	0.031***	0.031***	0.031***	0.031***	0.031***	0.032***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
Foreign owned	−0.080***	−0.079***	−0.085***	−0.083***	−0.084***	−0.083***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Government owned	−0.134***	−0.136***	−0.133***	−0.136***	−0.133***	−0.135***
	[0.031]	[0.031]	[0.031]	[0.031]	[0.031]	[0.031]
Log firm age	0.013***	0.013***	0.012***	0.012***	0.012***	0.012***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]

(Continued)

TABLE 5. Continued

Variables	Access to finance					
	(a)	(b)	(c)	(d)	(e)	(f)
Inflation rate	−0.332**	−0.330**	−0.492**	−0.493**	−0.464***	−0.457***
	[0.141]	[0.144]	[0.197]	[0.201]	[0.166]	[0.167]
Log GDP per capita	0.198*	0.236***	0.200**	0.245***	0.147	0.188**
	[0.101]	[0.089]	[0.089]	[0.077]	[0.099]	[0.089]
Constant	−0.793	−1.198*	−0.769	−1.289**	−0.861	−1.323**
	[0.888]	[0.718]	[0.801]	[0.639]	[0.775]	[0.611]
Observations	67,720	68,353	66,723	67,356	66,723	67,356
R-squared	0.213	0.211	0.209	0.207	0.211	0.209
No. of countries	53	53	51	51	51	51

The regressions above are estimated using country fixed effects and robust standard errors clustered at the country-year level. See Table 3 Panel A for the variable definitions and data sources. The dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft, or a line of credit. The *Lerner index* is a measure of bank competition (higher values imply lower levels of competition). *Lerner index (alternate)* is the Lerner index, as calculated by Clerides et al. (2013). The *Boone indicator* is a measure of profit elasticity. The *Herfindahl index (HI)* and *Concentration 3* are measures of bank concentration. *Log firm size* is the logarithm the number of permanent employees. *Log firm age* is the logarithm of the firm's age in years. *Government owned* and *Foreign owned* are dummy variables that equal one if the firm has government or foreign ownership, respectively. *Exporter* is a dummy variable that indicates whether the firm is an exporting firm. *Manufacturing* is a dummy variable that takes a value of 1 if the firm is in the manufacturing industry. *Log GDP per capita* is the logarithm of the GDP per capita (constant dollars). The *inflation rate* is measured as the growth rate of the GDP deflator (annual).

*** p < 0.01.

** p < 0.05.

* p < 0.1.

Source: Authors' analysis based on data sources discussed in the text.

TABLE 6. Firm-Level Panel Regressions

Variables	Access to finance				
	(a)	(b)	(c)	(d)	(e)
Lerner index	−0.415***	−0.479**	−0.500*		
	[0.146]	[0.219]	[0.272]		
Lerner index (alternate)				−0.271**	
				[0.125]	
Boone indicator					−0.318***
					[0.077]
Log firm size	0.055***	0.062***	0.065***	0.057***	0.057***
	[0.011]	[0.019]	[0.020]	[0.011]	[0.011]
Manufacturing	0.008	−0.006	−0.018	0.015	0.014
	[0.015]	[0.028]	[0.044]	[0.017]	[0.016]
Exporter	0.045**	0.039	0.053	0.042**	0.043**
	[0.017]	[0.033]	[0.034]	[0.017]	[0.017]
Foreign owned	−0.021	−0.003	−0.017	−0.024	−0.027
	[0.031]	[0.043]	[0.065]	[0.032]	[0.032]
Government owned	−0.003	0.001	−0.007	−0.000	−0.006
	[0.048]	[0.071]	[0.066]	[0.052]	[0.051]
Log firm age	0.016	0.018	0.036	0.015	0.016
	[0.012]	[0.022]	[0.022]	[0.013]	[0.012]
Inflation rate	0.082	0.050	0.081	0.068	0.094
	[0.081]	[0.149]	[0.122]	[0.086]	[0.084]
Log GDP per capita	0.235***	0.260***	0.232***	0.249***	0.214***
	[0.042]	[0.075]	[0.067]	[0.040]	[0.038]
Constant	−1.314***	−1.552***	−1.440**	−1.466***	−1.414***
	[0.322]	[0.572]	[0.544]	[0.310]	[0.304]
Observations	13,794	13,794	13,794	13,598	13,598
R-squared	0.025	0.740	0.763	0.023	0.024
No. of Countries	42	42	42	41	41

The regressions above are estimated using firm fixed effects and robust standard errors clustered at the country-year level. See Table 3 Panel A for the variable definitions and data sources. The dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft, or a line of credit. The *Lerner index* is a measure of bank competition (higher values imply lower levels of competition). The *Lerner index (alternate)* is the Lerner index, as calculated by Clerides et al. (2013). The *Boone indicator* is a measure of profit elasticity. *Log firm size* is the logarithm of the firm's number of permanent employees. *Log firm age* is the logarithm of the firm's age in years. *Government owned* and *Foreign owned* are dummy variables that equal one if the firm has government or foreign ownership, respectively. *Exporter* is a dummy variable that indicates whether the firm is an exporting firm. *Manufacturing* is a dummy variable that takes a value of 1 if the firm is in the manufacturing industry. *Log GDP per capita* is the logarithm of the GDP per capita (constant dollars). The *inflation rate* is measured as the growth rate of the GDP deflator (annual). The results in column (b) are weighted by the inverse of the standard deviation of the Lerner Index; those in column (c) are weighted by the inverse of (the square root of the number of firms × the inverse of the standard deviation of the Lerner Index).

*** p < 0.01.

** p < 0.05.

* p < 0.1.

Source: Authors' analysis based on data sources discussed in the text.

country-year level (although clustering at the firm level produces even more significant results). We continue to use the smaller firm-level panel and add concentration measures as a robustness check (Table 7). The concentration measures

TABLE 7. Firm-Level Panel Regressions Controlling for Bank Concentration Measures

Variables	Access to finance					
	(a)	(b)	(c)	(d)	(e)	(f)
Lerner index	−0.443**	−0.415***				
	[0.194]	[0.146]				
Lerner index (alternate)			−0.332**	−0.352**		
			[0.133]	[0.145]		
Boone indicator					−0.302***	−0.324***
					[0.083]	[0.079]
Concentration 3	−0.058		−0.131**		−0.032	
	[0.068]		[0.057]		[0.075]	
Herfindahl index		0.002		−0.124		0.038
		[0.054]		[0.076]		[0.057]
Log firm size	0.057***	0.055***	0.058***	0.057***	0.058***	0.057***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Manufacturing	0.003	0.008	0.011	0.017	0.008	0.014
	[0.015]	[0.015]	[0.016]	[0.017]	[0.016]	[0.016]
Exporter	0.041**	0.045**	0.038**	0.042**	0.039**	0.043**
	[0.018]	[0.017]	[0.018]	[0.017]	[0.017]	[0.017]
Foreign owned	−0.021	−0.021	−0.024	−0.024	−0.026	−0.026
	[0.033]	[0.031]	[0.034]	[0.032]	[0.034]	[0.032]
Government owned	0.005	−0.003	0.008	0.001	0.001	−0.006
	[0.051]	[0.048]	[0.055]	[0.052]	[0.054]	[0.051]
Log firm age	0.015	0.016	0.016	0.016	0.015	0.016
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.013]
Inflation rate	0.087	0.081	0.092	0.081	0.103	0.087
	[0.074]	[0.081]	[0.066]	[0.077]	[0.079]	[0.088]
Log GDP per capita	0.216***	0.236***	0.210***	0.229***	0.205***	0.221***
	[0.043]	[0.041]	[0.035]	[0.038]	[0.037]	[0.037]

Constant	−1.125***	−1.317***	−1.074***	−1.272***	−1.314***	−1.478***
	[0.364]	[0.317]	[0.296]	[0.302]	[0.328]	[0.300]
Observations	13,497	13,794	13,301	13,598	13,301	13,598
R-squared	0.026	0.025	0.025	0.024	0.025	0.024
No. of countries	42	42	41	41	41	41

The regressions above are estimated using firm fixed effects and robust standard errors clustered at the country-year level. See Table 3 Panel A for the variable definitions and data sources. The dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft, or a line of credit. The *Lerner index* is a measure of bank competition (higher values imply lower levels of competition). *Lerner index (alternate)* is the Lerner index, as calculated by Clerides et al. (2013). The *Boone indicator* is a measure of profit elasticity. The *Herfindahl index (HI)* and *Concentration 3* are measures of bank concentration. *Log firm size* is the logarithm the number of permanent employees. *Log firm age* is the logarithm of the firm's age in years. *Government owned* and *Foreign owned* are dummy variables that equal one if the firm has government or foreign ownership, respectively. *Exporter* is a dummy variable that indicates whether the firm is an exporting firm. *Manufacturing* is a dummy variable that takes a value of 1 if the firm is in the manufacturing industry. *Log GDP per capita* is the logarithm of the GDP per capita (constant dollars). The *inflation rate* is measured as the growth rate of the GDP deflator (annual).

*** p < 0.01.

** p < 0.05.

* p < 0.1.

Source: Authors' analysis based on data sources discussed in the text.

are largely insignificant (one of the concentration measures is significant in one specification) and our competition measures are not affected when controlling for concentration. Although we prefer to use the larger sample of firms, the firm fixed-effects results serve to further alleviate concerns about endogeneity.

CREDIT INFORMATION SHARING, STOCK MARKET DEVELOPMENT AND BANK COMPETITION

As discussed previously, the quality and scope of credit information sharing schemes in a country can affect the impact of competition on access. In this section, we present results in which we interact our competition measures with measures of credit information sharing. Specifically, we use three measures of credit information sharing schemes in a country: the *depth of credit information,* the *public registry coverage* and the *private bureau coverage*. These variables are part of the World Bank Doing Business database.

The depth of credit information variable is an index that measures rules and practices affecting the coverage, scope, and accessibility of credit information available through either a public credit registry or a private credit bureau.[15] It is higher for countries for which data are available on firms and individuals. In countries in which positive credit information (for example, outstanding loan amounts and patterns of on-time repayments) and negative information (for example, late payments and the number and amount of defaults and bankruptcies) are distributed, data on more than two years of history are shared, and credit information databases include small loans. This index does not identify whether such data come from a public credit registry, a private credit bureau, or both. However, previous studies have suggested that private credit bureaus are better able to reduce information asymmetries than private credit registries (Miller 2003; World Bank 2012). One of the main reasons is that public registries are largely established to monitor systemic risks in a country and thus often cover only large loans and do not usually include historical data on borrowers. However, the historical data are most important as a substitute for the lender-borrower relationships. To distinguish between private and public information sharing mechanisms, we include two more variables representing, respectively, the coverage of public credit registries and private credit bureaus, measured as the percentage of the adult population covered by each.

The first three columns of our next table present the interactions of the competition measures with the country-level index of the depth of credit information (Table 8).[16] We find that the Lerner indexes and the Boone indicator are negative and highly significant, whereas the interaction with the depth of credit information index is positive and significant.

15. See www.doingbusiness.org [accessed July 17, 2014].

16. Because the credit information index for our sample has very low variability from year to year and is not available for earlier years, we use country average credit information in our interaction term. The average is subsumed into the country fixed effects and does not enter on its own.

TABLE 8. Regressions Including the Interaction of Competition with Credit Information

Variables	Access to finance								
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Lerner index	−2.567*** [0.781]			−1.367*** [0.398]			−1.023** [0.396]		
Lerner index (alternate)		−2.162*** [0.648]			−1.142*** [0.376]			−0.656* [0.379]	
Boone indicator			−1.732** [0.671]			−1.064*** [0.382]			−0.432 [0.398]
Lerner X Depth of credit information	0.504*** [0.176]								
Lerner (alt) X Depth of credit information		0.396*** [0.132]							
Boone X Depth of credit information			0.258* [0.139]						
Lerner X Private bureau coverage				0.025*** [0.009]					
Lerner (alt) X Private bureau coverage					0.027** [0.011]				
Boone X Private bureau coverage						0.014** [0.007]			
Lerner X Public registry coverage							0.036 [0.027]		
Lerner (alt) X Public registry coverage								0.003 [0.021]	
Boone X Public registry coverage									−0.053 [0.039]
Log firm size	0.087*** [0.004]	0.086*** [0.004]	0.087*** [0.004]	0.088*** [0.004]	0.086*** [0.003]	0.086*** [0.003]	0.088*** [0.004]	0.088*** [0.004]	0.087*** [0.004]
Manufacturing	0.022** [0.009]	0.024*** [0.009]	0.020** [0.009]	0.022** [0.009]	0.026*** [0.009]	0.021** [0.009]	0.021** [0.009]	0.027*** [0.010]	0.024** [0.010]

(Continued)

TABLE 8. Continued

	Access to finance								
Variables	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Exporter	0.032***	0.032***	0.032***	0.032***	0.031***	0.031***	0.032***	0.031***	0.031***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
Foreign owned	−0.080***	−0.083***	−0.083***	−0.080***	−0.084***	−0.084***	−0.080***	−0.084***	−0.085***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Government owned	−0.175***	−0.170***	−0.174***	−0.177***	−0.172***	−0.176***	−0.178***	−0.177***	−0.174***
	[0.027]	[0.029]	[0.027]	[0.027]	[0.029]	[0.028]	[0.027]	[0.028]	[0.028]
Log firm age	0.010***	0.009**	0.010***	0.010***	0.009**	0.010***	0.011***	0.010**	0.010***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Inflation rate	−0.351**	−0.478***	−0.474***	−0.320**	−0.500***	−0.473***	−0.322**	−0.513**	−0.388**
	[0.147]	[0.175]	[0.163]	[0.144]	[0.172]	[0.163]	[0.146]	[0.203]	[0.158]
Log GDP per capita	0.163**	0.190***	0.133	0.196***	0.208***	0.144*	0.199***	0.238***	0.223**
	[0.076]	[0.066]	[0.082]	[0.074]	[0.066]	[0.081]	[0.075]	[0.065]	[0.088]
Constant	−0.092	−0.497	−1.296***	−0.675	−0.875	−1.113**	−0.804	−1.213**	−1.435***
	[0.717]	[0.576]	[0.442]	[0.618]	[0.549]	[0.492]	[0.615]	[0.542]	[0.520]
Observations	65,428	64,431	64,431	65,428	64,431	64,431	65,428	64,431	64,431
R-squared	0.222	0.218	0.217	0.221	0.217	0.217	0.219	0.214	0.217
No. of countries	52	50	50	52	50	50	52	50	50

The regressions above are estimated using country fixed effects and robust standard errors clustered at the country-year level. See Table 3 Panel A for the variable definitions and data sources. The dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft, or a line of credit. The *Lerner index* is a measure of bank competition (higher values imply lower levels of competition). *Lerner index (alternate)* is the Lerner index, as calculated by Clerides et al. (2013). The *Boone indicator* is a measure of profit elasticity. *Log firm size* is the logarithm of the number of permanent employees. *Log firm age* is the logarithm of the firm's age in years. *Government owned* and *Foreign owned* are dummy variables that equal one if the firm has government or foreign ownership, respectively. *Exporter* is a dummy variable that indicates whether the firm is an exporting firm. *Manufacturing* is a dummy variable that takes a value of 1 if the firm is in the manufacturing industry. *Log GDP per capita* is the logarithm of the GDP per capita (constant dollars). The *inflation rate* is measured as the growth rate of the GDP deflator (annual). *Depth of credit information*, the *Public registry coverage* and the *Private bureau coverage* are the country averages of the respective credit information variables.

*** p < 0.01.

** p < 0.05.

* p < 0.1.

Source: Authors' analysis based on data sources discussed in the text.

The credit information index varies from zero to six, with an average of approximately 3 and a standard deviation of 2. Using the coefficients estimated in model (a), our results suggest that for a country with average credit information (depth of credit information index equal to three), the Lerner has a negative impact of 1.05, whereas for a country with low credit information (the depth of credit information equal to one), the impact more than doubles to -2.06. In contrast, for countries with a high level of credit information (the depth of credit information equal to 5), the impact is negligible at -0.04. Translating these into changes in the probability of access to finance, we find that in a country with low credit information availability, a one-standard-deviation increase in the Lerner index (equal to 0.067) results in an approximately 13-percentage-point decrease in the probability of access to finance. However, in a country with good credit information sharing mechanisms, there is practically no impact. Thus, better credit information significantly mitigates the negative impact of low bank competition. This finding is consistent with the market power hypothesis but not with the information hypothesis. This is in line with our previous results on the average impact of competition (i.e., the sign on the Lerner when it is not interacted), which, again, are consistent with the market power hypothesis but not the information hypothesis.

In the next three columns (columns d, e, and f of Table 8), we interact our competition measures with the extent of private credit bureau coverage. We find that the interactions are positive and significant. These results suggest that private credit bureaus are able to mitigate information asymmetries in credit markets and reduce the negative impact of low competition on access. In the final three columns (columns g, h, i of Table 8), we interact our competition measures with the public credit registry coverage variable. None of the interactions are statistically significant. Our results are in line with some recent arguments suggesting that public registries do not, in general, provide good-quality credit information to significantly reduce information asymmetries between banks and their borrowers (World Bank 2012).

We perform one robustness check on our interaction results and add to our previous regressions the squared terms for our Lerner and Boone measures, respectively. This test alleviates the concern that our interaction results simply capture non-linearities in the impact of competition on access. Our results show that the interactions are not affected by the addition of these squared terms (Table 9). The squared terms are significantly positive, suggesting that the relationship between competition and access may be non-linear. Because our Lerner index ranges from 0.07 to 0.43, the estimates (column (a) of Table 9) imply that the impact of the Lerner ranges from -0.33 at the low value of the Lerner (i.e., high degree of competition) to -1.33 at the high value of the Lerner (i.e., low competition). Thus, the impact is negative for the whole range of our data with a slight flattening (i.e., smaller marginal impact) at the high values.[17]

17. The minimum of the quadratic function is reached at approximately 0.496, which is not in our data. Thus, the quadratic terms simply indicate the flattening of the impact at the high levels actually observed in our data rather than a turn around.

TABLE 9. Regressions Including the Interaction of Competition with Credit Information with Competition Squared

	Access to finance								
Variables	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Lerner index	−5.449*** [1.447]			−4.154*** [1.401]			−3.477** [1.436]		
Lerner index (alternate)		−2.857*** [1.007]			−1.673* [0.900]			−0.884 [0.873]	
Boone indicator			−5.977** [2.367]			−6.215*** [2.373]			−5.834** [2.717]
Lerner X Depth of credit information	0.498*** [0.152]								
Lerner(alt) X Depth of credit information		0.415*** [0.130]							
Boone X Depth of credit information			0.242** [0.121]						
Lerner X Private bureau coverage				0.025*** [0.008]					
Lerner (alt) X Private bureau coverage					0.028** [0.011]				
Boone X Private bureau coverage						0.015** [0.006]			
Lerner X Public registry coverage							0.018 [0.028]		
Lerner (alt) X Public registry coverage								0.002 [0.021]	
Boone X Public registry coverage									−0.060* [0.036]
Lerner index squared	5.465** [2.096]			5.291** [2.311]			4.919* [2.583]		
Lerner index (alt) squared		1.179 [1.171]			0.980 [1.279]			0.464 [1.426]	
Boone indicator squared			−4.368** [2.085]			−5.200** [2.257]			−5.530** [2.485]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log firm size	0.087***	0.086***	0.087***	0.087***	0.086***	0.086***	0.088***	0.088***	0.087***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.003]	[0.003]	[0.004]	[0.004]	[0.004]
Manufacturing	0.019**	0.024***	0.020**	0.019**	0.026***	0.021**	0.019**	0.027***	0.024**
	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.010]	[0.009]
Exporter	0.033***	0.033***	0.031***	0.032***	0.032***	0.031***	0.032***	0.031***	0.030***
	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]	[0.008]
Foreign owned	−0.080***	−0.083***	−0.083***	−0.080***	−0.084***	−0.083***	−0.079***	−0.084***	−0.085***
	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]	[0.011]
Government owned	−0.174***	−0.171***	−0.173***	−0.176***	−0.173***	−0.174***	−0.176***	−0.177***	−0.172***
	[0.027]	[0.029]	[0.028]	[0.027]	[0.029]	[0.028]	[0.027]	[0.028]	[0.028]
Log firm age	0.010***	0.009**	0.010***	0.010***	0.009**	0.010**	0.011***	0.010**	0.010***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]
Inflation rate	−0.303**	−0.534**	−0.368**	−0.274*	−0.547***	−0.350**	−0.281*	−0.534**	−0.246*
	[0.146]	[0.210]	[0.170]	[0.144]	[0.205]	[0.161]	[0.143]	[0.228]	[0.129]
Log GDP per capita	0.220***	0.207***	0.139*	0.251***	0.224***	0.146*	0.262***	0.247***	0.234***
	[0.066]	[0.062]	[0.077]	[0.065]	[0.063]	[0.078]	[0.062]	[0.066]	[0.078]
Constant	−0.149	−0.523	−2.348***	−0.733	−0.915*	−2.358***	−0.973*	−1.248**	−2.798***
	[0.630]	[0.551]	[0.614]	[0.558]	[0.523]	[0.591]	[0.540]	[0.530]	[0.524]
Observations	65,428	64,431	64,431	65,428	64,431	64,431	65,428	64,431	64,431
R-squared	0.223	0.218	0.218	0.223	0.217	0.218	0.220	0.214	0.218
No. of countries	52	50	50	52	50	50	52	50	50

The regressions above are estimated using country fixed effects and robust standard errors clustered at the country-year level. See Table 3 Panel A for the variable definitions and data sources. The dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft, or a line of credit. The *Lerner index* is a measure of bank competition (higher values imply lower levels of competition). *Lerner index (alternate)* is the Lerner index, as calculated by Clerides et al. (2013). The *Boone indicator* is a measure of profit elasticity. *Log firm size* is the logarithm of the number of permanent employees. *Log firm age* is the logarithm of the firm's age in years. *Government owned* and *Foreign owned* are dummy variables that equal one if the firm has government or foreign ownership, respectively. *Exporter* is a dummy variable that indicates whether the firm is an exporting firm. *Manufacturing* is a dummy variable that takes a value of 1 if the firm is in the manufacturing industry. *Log GDP per capita* is the logarithm of the GDP per capita (constant dollars). The *inflation rate* is measured as the growth rate of the GDP deflator (annual). *Depth of credit information*, the *Public registry coverage* and the *Private bureau coverage* are the country averages of the respective credit information variables.

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$

Source: Authors' analysis based on data sources discussed in the text.

Because, in principle, access to alternative sources of financing can mitigate the negative impact of a lack of competition on firms' access to finance, we also explore regressions in which we interact our measures of bank competition with a measure of stock market development (Table 10). The results provide weak evidence in favor of this hypothesis. Only one of the three interaction terms is negative and significant. The weak results might be because most of the firms in our data are SMEs and, therefore, are not listed on the stock exchange. Thus, these firms are unlikely to benefit from improved stock market development.

CONCLUSIONS

Theory on the impact of bank competition on access to finance offers conflicting predictions, and the existing empirical literature provides mixed results and suffers from a number of limitations. By combining multi-year firm-level data on access to finance with panel country-level data on bank competition, this paper offers new evidence on the link between bank competition and access to finance. One advantage of our dataset is that it allows us to control for unobserved differences between countries using country fixed effects. Thus, we are able to isolate within-country variation in bank competition and access to finance. Using a smaller sample, we are also able to control for firm-specific fixed effects, which help further alleviate endogeneity concerns. We use direct measures of banks' pricing behavior (such as the Lerner index and the Boone indicator) and direct measures of access to finance by firms.

Our results indicate that higher bank competition, as measured by lower levels of the Lerner index or the Boone indicator, increases firms' access to finance. These results are robust after controlling for commonly used concentration measures, which are not significant. In addition, we find that the impact of competition on access to finance depends on the nature of the credit information sharing schemes in place. Specifically, better credit information sharing schemes can mitigate the damaging impact of low bank competition. Moreover, we find that the degree of private credit bureau coverage is significant in alleviating information asymmetries and reducing the negative impact of low competition, whereas public registry coverage is not. These results do not suggest that public registries are not important; they can certainly play an important role in monitoring bank risks and supporting bank regulators in ensuring financial system stability. However, our results suggest that public registries have limitations in terms of reducing information asymmetries that can affect firms' access to finance.

Overall, our results suggest that there are benefits to promoting bank competition for firms' access to finance. We leave for future research an analysis of the specific policies (e.g., adopting low barriers to bank entry and exit, fostering competitive pressures from non-bank competitors, implementing measures to ensure consumer protection) that regulators can implement to increase competition in the banking sector. Our results also suggest that facilitating access to credit information, especially through wider coverage of private credit bureaus, is important in supporting firm access to finance and reducing the negative impacts of low bank competition.

TABLE 10. Regressions Including the Interaction of Competition with Stock Market Capitalization

Variables	Access to finance		
	(a)	(b)	(c)
Lerner index	−1.600***		
	[0.284]		
Lerner index (alternate)		−1.423***	
		[0.398]	
Boone indicator			−0.592*
			[0.323]
Lerner X Stock market capitalization	0.025***		
	[0.005]		
Lerner (alt) X Stock market capitalization		0.017	
		[0.012]	
Boone X Stock market capitalization			−0.026
			[0.017]
Log firm size	0.087***	0.086***	0.084***
	[0.004]	[0.004]	[0.004]
Manufacturing	0.034**	0.039***	0.025**
	[0.013]	[0.013]	[0.012]
Exporter	0.029***	0.031***	0.034***
	[0.009]	[0.009]	[0.009]
Foreign owned	−0.087***	−0.089***	−0.084***
	[0.012]	[0.012]	[0.012]
Government owned	−0.135***	−0.126***	−0.127***
	[0.035]	[0.034]	[0.034]
Log firm age	0.014***	0.013***	0.014***
	[0.004]	[0.004]	[0.004]
Inflation rate	−0.673***	−1.090***	−0.923***
	[0.203]	[0.229]	[0.175]
Log GDP per capita	0.244***	0.288***	0.216***
	[0.085]	[0.073]	[0.063]
Constant	−1.440*	−1.798**	−1.971***
	[0.820]	[0.705]	[0.510]
Observations	54,807	54,807	54,807
R-squared	0.192	0.194	0.198
No. of countries	37	37	37

The regressions above are estimated using country fixed effects and robust standard errors clustered at the country-year level. See Table 3 Panel A for the variable definitions and data sources. The dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft, or a line of credit. The *Lerner index* is a measure of bank competition (higher values imply lower levels of competition). *Lerner index (alternate)* is the Lerner index, as calculated by Clerides et al. (2013). The *Boone indicator* is a measure of profit elasticity. *Log firm size* is the logarithm of the number of permanent employees. *Log firm age* is the logarithm of the firm's age in years. *Government owned* and *Foreign owned* are dummy variables that equal one if the firm has government or foreign ownership, respectively. *Exporter* is a dummy variable that indicates whether the firm is an exporting firm. *Manufacturing* is a dummy variable that takes a value of 1 if the firm is in the manufacturing industry. *Log GDP per capita* is the logarithm of the GDP per capita (constant dollars). The *inflation rate* is measured as the growth rate of the GDP deflator (annual). *Stock market capitalization* is the country average of the total value of all listed shares in a stock market as a percentage of GDP.

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

Source: Authors' analysis based on data sources discussed in the text.

APPENDIX

A1: CONSTRUCTING THE MEASURE OF ACCESS TO FINANCE

We use the World Bank Enterprise Surveys dataset (www.enterprisesurveys.org) assembled with a module of identical questions that were included in all questionnaires. The common framework of the questionnaire enables cross-country analysis using variables specified in the core module.

A complication in constructing the measure of access stems from changes in the core survey modules for surveys administered after 2005. That is, the variables required to construct a measure of access are defined differently in the old (2002–05) and new (2006–10) core modules.

From the old surveys, we consider the following questions:

- "Do you have an overdraft facility or line of credit?": Yes/No
- "For the most recent loan or overdraft":

    ○ When was this financing approved (year)?
    ○ Did the financing require collateral or a deposit?
    ○ If yes, what share of collateral was:
      ■ Land and buildings?
      ■ Machinery?
      ■ Intangible assets (accounts receivable, inventory)?
      ■ Personal assets of owner/manager (e.g., house)?
    ○ What was the approximate value of collateral required as a percentage of the loan value?
    ○ What is the loan's approximate annual cost/rate of interest?
    ○ What is the duration (term) of the loan?

From the new surveys, we consider the following questions:

- "At this time, does this establishment have an overdraft facility?": Yes/No
- "At this time, does this establishment have a line of credit or loan from a financial institution?": Yes/No

Given the nature of the differences in the questionnaires, the overdraft facility, line of credit, and loan are impossible to identify separately. We define *access to finance* as access to any one of the three credit facilities. For countries with surveys using the new core module (i.e., surveys that took place between 2006 and 2010), *access to finance* is a dummy variable that takes the value of 1 if the firm responds "yes" to either of the two questions and 0 if the firm responds "no" to both. For countries with surveys using the old core module (i.e., those that took place between 2002 and 2005), *access to finance* is equal to one if (a) the firm responds yes to the first question about having an overdraft facility and line of credit and/or if (b) the firm provides a response to any of the questions about its most recent loan or overdraft facility. In other words, we assume that

firms that answer any further questions about their most recent loan or overdraft facility have access to at least one of the two types of financing.

A2: CONSTRUCTING THE LERNER INDEX [18]

The Lerner index is defined as the difference between banking output prices and marginal costs (relative to prices). It is calculated as follows:

$$Lerner\ Index = \frac{P - MC}{P},$$

where P is the price of outputs and MC is the marginal cost.

Price is calculated as the total gross revenue of the bank divided by the total assets. We compute the marginal costs by taking the derivative with respect to total assets from the following empirical specification of the translog cost function:

$$\ln(C_{it}) = \alpha_{0i} + \beta_0 \ln(Q_{it}) + \beta_1 0.5[\ln(Q_{it})]^2 + \alpha_1 \ln(W_{1it}) + \alpha_2 \ln(W_{2it}) + \alpha_3 \ln(W_{3it})$$

$$+ \beta_2 \ln(Q_{it})^* \ln(W_{1it}) + \beta_3 \ln(Q_{it})^* \ln(W_{2it}) + \beta_4 \ln(Q_{it})^* \ln(W_{3it})$$

$$+ \alpha_4 \ln(W_{1it})^* \ln(W_{2it}) + \alpha_5 \ln(W_{1it})^* \ln(W_{3it}) + \alpha_6 \ln(W_{2it})^* \ln(W_{3it})$$

$$+ \alpha_7 0.5[\ln(W_{1it})]^2 + \alpha_8 0.5[\ln(W_{2it})]^2 + \alpha_9 0.5[\ln(W_{3it})]^2$$

$$+ \alpha_{10} \ln(Equity)_{it} + \alpha_{11} \ln(Net\ Loans)_{it} + F_i + Y_t + e_{it,}$$

where C_{it} is the total operating plus financial costs for bank i in time period t, Q is the total assets, W_1 is the ratio of interest expenses to total deposits, W_2 is the ratio of personnel expenses to total assets, W_3 is the ratio of other operating and administrative expenses to total assets, Equity is the ratio of firm equity to total assets, Net Loans is the ratio of net loans to total assets, F_i are bank fixed effects, and Y_t are the full set of year dummies. A constrained fixed-effects regression with time dummies is estimated under restrictions of symmetry and homogeneity of degree one in the price of inputs.

We use bank-level data from Bankscope to calculate the Lerner index. Only banks classified as commercial, cooperative, Islamic, savings, and bank holding companies are considered in the analysis. Within each country, we omit outlying observations that are in the top and bottom first percentile of the distribution for $\ln(W_1)$, $\ln(W_2)$, $\ln(W_3)$ and their interaction with each other, $\ln(Equity)$ and $\ln(Net\ Loans)$.

Under the assumption that the slope of the cost function within a country is constant over time, we calculate the marginal costs (MC) for all banks in a country from a single translog cost function regression over the entire range of

---

18. We follow the literature on the Lerner index mentioned in footnote 11.

available years from 1996 to 2010. Using the estimated coefficients, MC is calculated as follows:

$$MC_{it} = (\beta_0 + \beta_1{}^*\ln(Q_{it}) + \beta_2{}^*\ln(W_{1it})$$
$$+ \beta_3{}^*\ln(W_{2it}) + \beta_4{}^*\ln(W_{3it}))^*(C_{it}/\text{Total Assets}).$$

Variations in the bank-level Lerner within a country are, thus, a result of variations in Q, W_1, W_2, W_3, C, total assets and P. When the degrees of freedom in the fixed-effects regression for a country are less than 20, we do not compute the Lerner index due to low precision. In addition, the computed Lerner levels for banks within a country falling in the top and bottom first percentiles of the distribution are omitted as outliers. The Lerner index for a country in a particular year is the average of all bank-level Lerners for that year.

References

Allen, F., and D. Gale. 2000. *Comparing Financial Systems*. Cambridge, MA: MIT Press.

Anzoategui, D., M. Martinez Peria, and R. Rocha. 2010. "Bank Competition in the Middle East And Northern Africa Region." *Review of Middle East Economics and Finance* 6 (2) : 26–48.

Anzoategui, D., M. Martinez Peria, and M. Melecky. 2012. "Bank Competition in Russia: An Examination at Different Levels of Aggregation." *Emerging Markets Review* 13 (1) : 42–57.

Beck, T., O. De Jonghe, and G. Schepens. 2013. "Bank Competition and Stability: Cross-Country Heterogeneity." *Journal of Financial Intermediation* 22 (2) : 218–44.

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) : 627–48.

Berger, A.N., I. Hasan, and M. Zhou. 2009. "Bank Ownership and Efficiency in China: What will Happen in the World's Largest Nation?" *Journal of Banking and Finance* 33 (1) : 113–30.

Berger, A. N., A. Saunders, J. Scalise, and G. Udell. 1998. "The Effects of Bank Mergers and Acquisitions on Small Business Lending." *Journal of Financial Economics* 50 : 187–229.

Bikker, J., and M. van Leuvensteijn. 2008. "Competition and Efficiency in the Dutch Life Insurance Industry." *Applied Economics* 40 (16) : 2063–84.

Bonaccorsi di Patti, E., and G. Gobbi. 2007. "Winners or Losers? The Effects of Banking Consolidation on Borrowers." *Journal of Finance* 62 : 669–96.

Boone, J. 2008. "A New Way to Measure Competition". *Economic Journal* 118 (531) : 1245–61.

Boot, A. W. A., and A. Thakor. 2000. "Can Relationship Banking Survive Competition?" *Journal of Finance* 55 (2) : 679–713.

Boyd, J. H., and G. De Nicoló. 2005. "The Theory of Bank Risk-Taking and Competition Revisited." *Journal of Finance* 60 : 1329–43.

Brown, M., T. Jappelli, and M. Pagano. 2009. "Information Sharing and Credit: Firm-Level Evidence from Transition Countries," *Journal of Financial Intermediation* 18 (2) : 151–72.

Brown, M., and C. Zender. 2007. "Credit Reporting, Relationship Banking, and Loan Repayment." *Journal of Money, Credit and Banking* 39 (8) : 1883–918.

Bruhn, M., S. Farazi, and M. Kanz. 2013. "Bank Competition, Concentration, and Credit Reporting," Policy Research Working Paper WPS 6442, World Bank, Policy Research Department, Washington, DC.

Carbó-Valverde, S., D. Humphrey, J. Maudos, and P. Molyneux. 2009a. "Cross-Country Comparisons of Competition and Pricing Power in European Banking." *Journal of International Money and Finance* 28 (1) : 115–34.

Carbó-Valverde, S., F. Rodriguez-Fernandez, and G. Udell. 2009b. "Bank Market Power and SME Financing Constraints." *Review of Finance* 13 (2) : 309–40.

Chong, T. T. L., L. Lu, and S. Ongena. 2012. "Does Banking Competition Alleviate or Worsen Credit Constraints Faced by Small and Medium Enterprises? Evidence from China." CentER Discussion Paper, 2012–013, Tilburg University.

Claessens, S., and L. Laeven. 2004. "What Drives Bank Competition? Some International Evidence." *Journal of Money, Credit, and Banking* 36 (3) : 563–83.

———. 2005. "Financial Dependence, Banking Sector Competition, and Economic Growth." *Journal of the European Economic Association* 3 (1) : 179–207.

Clerides, S., M. Delis, and S. Kokas. 2013. "A New Data Set on Bank Competition in National Banking Markets." Working Papers in Economics, 08–2013, University of Cyprus.

Delis, M. D. 2012. "Bank Competition, Financial Reform, and Institutions: The Importance of Being Developed." *Journal of Development Economics* 97 (2) : 450–65.

Dell'Ariccia, G., D. Igan, and L. Laeven. 2008. "Credit Booms and Lending Standards: Evidence from the Subprime Mortgage Market." International Monetary Fund Working Paper 08/106.

Degryse, H., N. Masschelein, and J. Mitchell. 2011. "Staying, Dropping, or Switching: The Impact of Bank Merges on Small Firms." *Review of Financial Studies* 24 (4) : 1102–40.

Djankov, S., C. McLiesh, and A. Shleifer. 2007. "Private Credit in 129 Countries. *Journal of Financial Economics* 84 (2) : 299–329.

Erel, I. 2011. "The Effect of Bank Mergers on Loan Prices: Evidence from the United States." *Review of Financial Studies* 24 (4) : 1068–101.

Fernandez de Guevara, J., J. Maudos, and F. Perez. 2005. "Market Power in European Banking Sectors." *Journal of Financial Services Research* 27 (2) : 109–37.

———. "Integration and Competition in the European Financial Markets," *Journal of International Money and Finance* 26 (1) : 26–45.

Fisman, R., and I. Love. 2007. "Financial Dependence and Growth Revisited." *Journal of European Economic Association* 5 (2–3) : 470–9.

Fischer, K-H. 2000. "Acquisition of Information in Loan Markets and Bank Market Power: An empirical investigation." Working Paper, Goethe University, Frankfurt.

Hauswald, R., and R. Marquez. 2006. "Competition and Strategic Information Acquisition in Credit Markets." *Review of Financial Studies* 19 (3) : 967–1000.

Houston, J., C. Lin, P. Lin, and Y. Ma. 2010. "Creditor Rights, Information Sharing, and Bank Risk Taking." *Journal of Financial Economics* 96 (3) : 485–512.

Jappelli, T., and M. Pagano. 2002. "Information Sharing, Lending and Defaults: Cross-Country Evidence." *Journal of Banking and Finance* 26 (10) : 2017–45.

Lerner, A. 1934. "The Concept of Monopoly and the Measurement of Monopoly Power." *Review of Economic Studies* 1 : 157–75.

Love, I. 2003. "Financial Development and Financing Constraints: International Evidence from the Structural Investment Model." *Review of Financial Studies* 16 (3) : 765–91.

Love, I., and N. Mylenko. 2005. "Credit Reporting and Financing Constraints." *Credit Technology* 50 : 7–33.

Marquez, R. 2002. "Competition, Adverse Selection, and Information Dispersion in the Banking Industry." *Review of Financial Studies* 15 (3) : 901–26.

Maudos, J., and J. Fernandez de Guevara. 2006. "Banking Competition, Financial Dependence and Economic Growth." MPRA Paper 15254, University Library of Munich, Germany.

Miller, M. 2003. Credit Reporting Systems and the International Economy. Cambridge, MA: MIT Press.

OECD. 2009. The Financial Crisis: Reforms and Exit Strategies. http://www.oecd.org/dataoecd/55/47/43091457.pdf

———. 2010. "Competition, Concentration, and Stability in the Banking Sector." OECD Policy Roundtables. http://www.oecd.org/dataoecd/52/46/46040053.pdf

Padilla, A. J., and M. Pagano. 2000. "Sharing Default Information as a Borrower Discipline Device." *European Economic Review* 44 (10) : 1951–80.

Pagano, M., and T. Jappelli. 1993. "Information Sharing in Credit Markets." *Journal of Finance* 48 (5) : 1693–718.

Peek, J., and E. Rosegren. 1996. "Small Business Credit Availability: How Important is Size of Lender." In A. Saunders, and I. Walter, eds., *Financial System Design: The Case for Universal Banking.* Homewood, IL: Irwin Publishing.

Petersen, M. A., and R. Rajan. 1994. "The Benefits of Lending Relationships: Evidence from Small Business Data." *Journal of Finance* 49 (1) : 3–37.

Petersen, M. A., and R. Rajan. 1995. "The Effect of Credit Market Competition on Lending Relationships." *The Quarterly Journal of Economics* 110 (2) : 407–43.

Rice, T., and P. Strahan. 2010. "Does Credit Competition Affect Small-Firm Finance?" *Journal of Finance* 65 (3) : 861–89.

Sapienza, P. 2002. "The Effects of Banking Mergers on Loan Contracts." *Journal of Finance* 57 (1) : 329–68.

Schaeck, K., M. Čihák, and S. Wolfe. 2009. "Are Competitive Banking Systems More Stable?" *Journal of Money, Credit, and Banking* 41 (4) : 711–34.

Tabak, B., D. Fazio, and D. Cajueriro. 2012. "The Relationship Between Banking Market Competition and Risk-Taking: Do Size and Capitalization Matter?" *Journal of Banking and Finance* 36 (12) : 3366–81.

Turk-Ariss, R. 2009. "Competitive Behavior in Middle East and North Africa Banking Systems." *The Quarterly Review of Economics and Finance* 49 (2): 693–710.

van Leuvensteijn, M., J. Bikker, A. van Rixtel, and C. Sorensen. 2011. "A New Approach to Measuring Competition in the Loans Market of the Euro Area." *Applied Economics* 43 (23): 3155–67.

van Leuvensteijn, M., C. Sorensen, J. Bikker, and A. van Rixtel. 2013. "Impact of Bank Competition on the Interest Rate Pass-Through in the Euro Area." *Applied Economics* 45 (11): 1359–80.

Vives, X. 2001. "Competition in the Changing World of Banking." *Oxford Review of Economic Policy* 17 (4) : 535–45.

World Bank. 2012. Global Financial Development Report. Rethinking The Role of the State in Finance. Washington, DC: World Bank.

Zarutskie, R. 2003. "Does Bank Competition Affect How Much Firms Can Borrow? New Evidence from the US." Proceedings of a Conference on Bank Structure and Competition, Federal Reserve Bank of Chicago, Chicago, IL.

———. 2006. "Evidence on the Effects of Bank Competition on Firm Borrowing and Investment." *Journal of Financial Economics* 81 (3) : 503–37.