

The Impact of Credit Information Sharing Reforms on Firm Financing

Maria Soledad Martinez Peria
Sandeep Singh



WORLD BANK GROUP

Development Research Group

Finance and Private Sector Development Team

August 2014

Abstract

This paper analyzes the impact of introducing credit information-sharing systems on firms' access to finance. The analysis uses multi-year, firm-level surveys for 63 countries covering more than 75,000 firms over the period 2002–13. The results reveal that credit bureau reforms, but not credit registry reforms, have a significant and robust effect on firm financing. After the introduction of a credit bureau, the likelihood that a firm has access to finance increases, interest rates drop, maturity lengthens, and the

share of working capital financed by banks increases. The effects of credit bureau reforms are more pronounced the greater the coverage of the credit bureau and the scope and accessibility of the credit information-sharing scheme. Credit bureau reforms also have a greater impact on firms' access to finance in countries where contract enforcement is weaker. Finally, there is some evidence that the effects of credit bureau reform are more pronounced for smaller, less experienced, and more opaque firms.

This paper is a product of the Finance and Private Sector Development Team, Development Research Group. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at mmartinezperia@worldbank.org and ssingh13@worldbank.org.

The Policy Research Working Paper Series disseminates the findings of work in progress to encourage the exchange of ideas about development issues. An objective of the series is to get the findings out quickly, even if the presentations are less than fully polished. The papers carry the names of the authors and should be cited accordingly. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

The Impact of Credit Information Sharing Reforms on Firm Financing*

Maria Soledad Martinez Peria and Sandeep Singh

Keywords: credit information sharing, access to finance

JEL classification: D82, G21, G28, O16,

* The authors are with the Finance and Private Sector Development Research Team of the World Bank. We thank Shalini Sankaranarayan for data, comments and suggestions. We also received helpful inputs from Jennifer Barksy, Alexis Diamond, and participants in the IFC brown bag seminar held on May 27, 2014.

I – Introduction

According to the most recent World Bank Enterprise Survey Data, firms in developing countries report that access to finance is the biggest obstacle for the growth of their operations. Across all regions, 17 percent of firms report that access to finance is the biggest obstacle. In some regions, access to finance is an even larger obstacle. For example, in Sub-Saharan Africa close to a quarter of the firms report access to finance to be the top obstacle.

An important impediment to firm financing is asymmetric information: a firm seeking to borrow from a lender in the credit market has better information about its financial state and its ability and willingness to repay the loan than the lender. Asymmetric information can lead borrowers less seriously intent on repaying loans to be more willing to seek out loans (adverse selection) and borrowers to use loaned funds in ways that are inconsistent with the interest of the lender (moral hazard). Seminal work by Stiglitz and Weiss (1981) shows that under asymmetric information the equilibrium interest rate is such that demand for credit exceeds supply - even borrowers willing to pay the market equilibrium interest rate are not able to get a loan (credit rationing).

Credit information sharing schemes are mechanisms that can help lenders and borrowers overcome asymmetric information problems because the schemes allow lenders to share with other lenders information about their clients, either through a privately held credit bureau (CB) or publicly regulated credit registry (CR). Such credit information schemes disseminate knowledge of payment history, total debt exposure, and overall credit worthiness, thus bridging the information divide between lenders and borrowers.

The theoretical literature on credit information argues that credit information sharing schemes can increase firm financing and lower financial constraints. In particular, theoretical

studies emphasize four different mechanisms through which information sharing can potentially impact firm financing: (i) easing adverse selection, (ii) lowering informational rents, (iii) disciplining borrowers by reducing moral hazard, and (iv) reducing over-indebtedness of borrowers (see Klein, 1992; Pagano and Jappelli, 1993; Vercammen, 1995; Padilla and Pagano, 1997; Padilla and Pagano, 2000).

Using multi-year firm-level surveys for 63 countries covering more than 75,000 firms over the period 2002–13, this paper empirically analyzes the impact of introducing credit information sharing schemes on firms' access to finance. We also examine how the coverage, scope and accessibility of the credit information sharing scheme as well as the strength of the contractual environment affect the impact of credit information sharing reforms on firms' access to finance. Our analysis also investigates whether credit information sharing reforms impact different firms differently. In particular, we distinguish firms by their size, experience, and opacity. Finally, to test the robustness of our results, we conduct firm-level panel estimations where we are able to control for time invariant firm-level heterogeneity and we run instrumental variable estimations where we explicitly instrument for the likelihood of CB reforms.

Our results reveal that CB reforms, but not CR reforms, have an effect on firm financing. After the introduction of a CB, the likelihood that a firm has access to finance increases, interest rates drop, maturity lengthens, and the share of working capital financed by banks increases. The effects of CB reform are more pronounced (i) the greater the coverage of the CB and the scope and accessibility of the credit information sharing scheme and (ii) the weaker the contractual environment. We also find some evidence that CB reform effects are more pronounced for smaller, less experienced, and more opaque firms. Finally, we find that our results do not change

significantly when we focus on a smaller firm-level panel data where we can control for firm-fixed effects or when we explicitly instrument for the introduction of CB reforms.

Our paper is related to an extensive literature that has studied the relationship between information sharing, bank lending volumes, perceived financial constraints, and default rates. One set of papers uses country-level data to compare the amount of bank lending in countries with and without information sharing systems or with less developed systems (Jappelli and Pagano, 2002; Detragiache, Gupta, and Tressel, 2005; Djankov, McLiesh, and Shleifer, 2007). Analyses of the relationship between credit information sharing schemes and measures of aggregate credit at the country level have at least two important drawbacks. First, correlations suggested by regressions at the aggregate country level are more likely to suffer from omitted variable bias. Second, such aggregate regressions are not instructive to answer questions about the differential impact of firm characteristics on the overall effect of credit information on access to finance.

Another set of papers uses firm-level data to examine the relationships between countries' information sharing systems and firm's access to bank lending. Galindo and Miller (2001) use firm-level balance sheet data from 23 countries to estimate an investment equation that measures the degree of credit constraint as the sensitivity of investment to cash flow. Paired with a self-collected online survey of CBs and CRs, they find that scope and quality of credit information schemes are correlated with lower financing constraints. Love and Mylenko (2003) study the impact of the existence of CB/CR on more directly obtained firm level dependent variables - perceived financing constraint, a subjective ranking provided by the World Bank Environment Survey respondents, and the reliance of firms on bank financing. They find

empirical evidence that the existence of CBs, but not CRs reduces perceived financing constraint and increases use of bank financing, and find the effect is stronger for smaller firms.

Both papers consider a cross-section of firms and credit information data at one point in time. As such, these estimates report correlations that are not necessarily causal. That is, the results may tell us that banks lend more to firms in countries with information sharing systems than in countries without these systems. However, this finding does not necessarily mean that the implementation of an information sharing scheme caused banks to lend more to firms. Instead, the relationship may be driven by third factors that are not considered in the analysis or are simply unobserved. Essentially, estimates from cross sectional data are more likely to struggle with bias due to omitted variables.

A similar cross sectional analysis for 24 countries in 2002 from Eastern Europe and the Former Soviet Union by Brown, Jappelli and Pagano (2009) is supplemented by firm level panel data from 2002 and 2005. By introducing a time dimension, and also by controlling for unobserved firm heterogeneity with panel fixed effects, their estimate of the effect of credit information sharing on the extent of access to and the cost of finance is more robust, and better explains the causal role of improving the scope and quality of credit information. The sample of countries considered by the authors is, however, narrow, and the dependent variables are subjective survey responses on constraints and cost perceived by the respondent. The nature of their data on credit information also does not allow a distinction between the effect of CB and CR.

A third strand of the literature tries to exploit natural or randomized experiments to estimate the causal effect of credit information sharing on firm credit and default (Luoto, McIntosh, and Wydick, 2007; de Janvry, McIntosh, and Sadoulet, 2010, Hertzberg, Liberti,

Paravasini, 2011; Behr and Sonnekalb, 2012). These studies typically examine the implementation or expansion of credit information systems that showed some variation in terms of which lenders used the credit information or which firms were covered in the information sharing system. This generates a counterfactual or comparison group for the treatment group of lenders or firms with credit information sharing. The results are causal under the assumption that the counterfactual is valid (i.e., the treatment and comparison groups are indeed comparable in terms of their observable and unobservable characteristics). While the causal impact is well identified in these studies, because the focus is on very specific experiments, the external validity of these results is more questionable.

Our paper contributes to the existing literature on the impact of credit information sharing schemes in a number of substantial ways. Our analysis uses the most comprehensive coverage of firms and countries to date. We also take a wide-ranging approach to measuring firm financing instead of relying on self-assessed perceived financial constraint ratings considered by previous firm-level analyses. In particular, we use five varied objective measures of use and cost of financing. We also have the most complete data to date on credit information schemes, including their introduction, coverage, and detailed information on changes in scope and quality, some of which consists of internal raw data not made publicly available in the annual Doing Business reports. Most importantly, our estimation strategy is able to identify the causal impact of credit information on firm financing. Following a difference-in-difference type of approach, we compare access to bank finance pre and post the reform of credit information sharing system in 27 countries (i.e., the reform or treatment sample) against firms in all countries that did not implement these reforms during our sample frame (36 countries). This difference-in-difference approach controlling for fixed country and time effects allows us to isolate the causal impact

credit information sharing reforms on firms' access to bank finance. We are also able to verify the robustness of our results using a firm level panel data set and, separately, instrumenting for the likelihood that a country introduces a credit information sharing scheme. In addition, our analysis contributes to the understanding of how estimates of the impact of credit information schemes differ by firm characteristics (size, experience, and opaqueness). Finally, in our analysis we distinguish between credit bureaus and credit registries. The latter tend to be public institutions that are usually managed by central banks or bank supervision agencies. In general credit registry data are geared towards use by policymakers, regulators, and other officials that supervise the financial system. In contrast, credit bureaus are privately owned commercial enterprises which tend to cater to the information requirements of commercial lenders. Thus, they typically provide additional value-added services, such as credit scores and collection services.

The rest of the paper is organized as follows. Section II describes our data. Section III discusses our empirical methodology. Section IV presents our results and Section V concludes.

II- Data

Our empirical estimations are based on survey data collected at the firm-level paired with country-level data from a variety of sources. We obtain firm-level data on firm's access to finance across 63 countries over the period 2002-2013 from the World Bank Enterprise Surveys (WBES). In particular, we focus on five main aspects of firms' access to finance: (a) whether they have loan, line of credit or overdraft, (b) the interest rate they pay on their most recent loan, (c) the maturity of their most recent loan, (d) the fraction of working capital financed by banks,

and (e) the fraction of fixed assets financed by banks.¹ From the WBES, we also gather information on different firm characteristics including firm size, age, ownership type (government or foreign owned), exporter status, and sector (manufacturing versus services).

Our second main dataset is the Doing Business data. From this source we are able to identify the countries and the year in which they introduced their credit information sharing systems (be they bureaus or registries). Also, from this source we collect information on different aspects of the functioning of these credit information systems. In particular, we gather data on the coverage of bureaus and registries and on the scope and accessibility of the credit information sharing schemes (represented in the Doing Business data as the *depth of credit information index*). From another module of the Doing Business data, we also obtain information on the time, cost, and number of procedures related to enforcing contracts in court.

The third database we use is the *World Development Indicators* produced by the World Bank. From this source, we obtain macro level data such as the inflation rate, the GDP growth rate, and credit to the private sector. We also obtain an additional country-level covariate relating to the contractual environment (the Law and Order index) from the International Country Risk Guide (ICRG) published by the PRS Group.

Among countries covered by the WBES, we restrict our sample to two groups of countries: a) countries that introduced a CB/CR within the sample period with at least one survey before the introduction and at least one after, and b) countries that never introduced a CB/CR but have available at least two rounds of surveys. Our estimation strategy is akin to a difference-in-difference approach, as discussed in more detail in the next section, so we refer to the two sets of countries as the treatment/reform group and control group, respectively. Both the treatment and control sample consist of only countries that have had at least two rounds of

¹ Appendix 1 explains how each of the measures of access to finance was constructed.

surveys², allowing us to utilize country fixed effects. Table 1 shows the countries included in our analysis along with the year in which firm-level surveys were conducted. This table also shows the year in which credit bureaus and/or credit registries were introduced.

In Figure 1 (Figure 2), we compute the annual mean for each measure of firm financing separately for the CB (CR) reform sample and control sample, and plot the time trend of these averages³. Concentrating on the first graph of the dichotomous variable for whether the firm has access to a loan, line of credit or overdraft, we notice that firms in both the treatment and control countries on average have increased access over the sample period. A reflexive comparison of the impact of CB reform on access to finance for only the countries that introduced a CB would have falsely attributed the secular upward trend to the impact of CB introduction. Our use of a counterfactual allows us to assess the causal impact of CB/CR reform in relation to a control group that did not introduce such reform. At the beginning of the sample period, the two groups have similar mean levels of access, but the increase in the treatment group as countries steadily introduce CB reforms is at a greater pace than the control sample. While in our regression analysis we will introduce various firm and country level controls, as well as well as fixed effects, Figure 1 provides preliminary suggestive evidence that the increase in access to finance is greater among the reform group than the control group. Our estimation strategy, after controlling for all relevant factors, will be able to identify the impact of credit information reform on access to finance as the differential increase of the reform sample over the control sample. The rest of the graphs in Figure 1 and Figure 2 show a qualitative similar summary.

² Each round of survey consists of a repeated cross-section with a new nationally representative sample. A small sub-sample of firms in certain countries are re-interviewed to form a firm-level panel.

³ We regress country mean access to finance variables on year dummies, and plot the resulting predicted values to get the time trend.

Table 2 shows definitions and sources for all variables used in our subsequent regressions. In Table 3, we provide descriptive statistics. Just over half the firms in our sample have access to a loan, line of credit or overdraft protection. Firms with a loan pay on average an interest rate of almost 14 percent, with an average maturity of over 30 months. While the median firm obtains no fraction of financing from banks for working capital and fixed assets, the mean is 13 percent and 17 percent, respectively. Firms on average have been in business for about 12 years and employ 28 permanent employees. Just over 50 percent of firms in our sample are in the manufacturing sector, 10 percent are foreign owned, 5 percent are government owned, and 21 percent of firms are exporters.

III- Empirical methodology

We estimate the impact of credit bureau reform, and separately credit registry reform, using the empirical specification in equation (1) below:

$$Finance\ Indicator_{i,j,t} = \beta^1 Credit\ information\ sharing\ reform_{j,t} + \beta^2 X_{i,j,t} + \beta^3 Z_{j,t} + \alpha_j + \gamma_t + \varepsilon_{i,j,t} \quad (1)$$

where *Finance Indicator* refers to five different measures of firm financing for firm *i* in country *j* at time *t*: (a) *Access to finance* is a dummy that takes the value of 1 if the firm has a line of credit, loan or overdraft⁴, (b) *Interest Rate* refers to the interest rate paid by the firm on the most recent loan and, (c) *Maturity* is the maturity (in months) for the firm's most recent loan, (d) *Working capital by banks* refers to the fraction of working capital of the firm that is financed by

⁴ When the dependent variable is *Access to finance*, we estimate a logit model and report marginal effects in the result tables.

banks, (e) *Fixed assets by banks* is the fraction of fixed assets of the firm that is financed by banks.

The primary variable of interest, *Credit information sharing reform*, refers to either *Credit bureau reform* or *Credit registry reform*. *Credit bureau reform* equals one for the countries that introduced a credit bureau – Armenia, Bulgaria, Croatia, Czech Republic, Ecuador, Georgia, Kazakhstan, Kenya Kyrgyzstan, Macedonia, Moldova, Nicaragua, Romania, Russia, Rwanda, Serbia, Slovakia, Slovenia, Uganda and Ukraine – for the years after the reform. *Credit registry reform* equals one for all countries that introduced a credit registry - Armenia, Azerbaijan, Belarus, Bosnia Herzegovina, China, Czech Republic, Ecuador, Guatemala, Latvia, Mauritius, and Nicaragua- for the years after the reform. These variables can be thought of as the interaction of a dummy for the set of countries that introduced a reform during the sample period (i.e., the treatment sample) with a country-specific dummy which identifies the years after reform. Thus, this empirical methodology is akin to a difference-in-difference format, comparing countries with reform and countries without reform, and years pre- and post-reform.

In terms of controls, X is a matrix of firm-level characteristics including firm size, age, ownership type (government or foreign owned), exporter status, and sector (manufacturing versus services). Z refers to a matrix of country-level variables that might influence firms' access to finance, which includes the inflation rate, the GDP growth rate, and a measure of financial sector development (private credit to GDP).

α_j are country fixed effects. These are important in the estimations as they allow us to capture any time-invariant country-specific characteristics that can impact access to finance (e.g., such as the quality of the contract laws and their enforcement which usually do not change much over time). Country fixed effects can also capture country specific differences in the demand for

loans. Time effects (γ_t) control for the impact of common shocks across countries. Hence, country and time fixed effects help isolate the impact of bureau/registry reform from all other country differences and time effects.

On the basis of predictions from the theoretical literature, we expect CB and CR introductions to increase overall use of firm financing at more favorable terms. In particular, we expect the sign of CB reform and CR reform estimates to be positive on access to a loan, line of credit or overdraft, fraction of working capital financed by bank, fraction of fixed assets financed by banks, and maturity of loans. We expect the opposite sign on interest rate as lenders face lower risk premiums from better informed loans.

In addition to the baseline specification, we explore how the impact of credit information schemes on firm financing varies by quality and scope of CB/CR, country institutional environment, and firm characteristics. We analyze the differential impact in each case by looking at the significance of estimates of the interaction terms with the credit information reform variables.

IV- Results

Baseline estimations

Table 4 presents results for the estimations described above, assessing the impact of credit bureau and credit registry reform on firm financing. The table shows that the introduction of a credit bureau is associated with an increase in the probability that firms have access to finance, a reduction in loan interests, a lengthening of loan maturities, and an increase in the fraction of working capital financed by banks. These effects are not only statistically but also economically significant. The introduction of a credit bureau is associated with a 7 percentage

point increase in the probability that a firm will have access to credit, a 5 percentage points decline in the interest rate charged on loans, a 7 month extension in loan maturity, and a 4 percentage point increase in the fraction of working capital financed by banks. On the other hand, the establishment of a credit registry does not have a robust effect on firm financing except for a 3 percentage point increase in the fraction of fixed assets financed by banks.

There are a number of reasons why the introduction of a credit registry might not have a significant impact on firm financing. First, credit registries are often used for supervisory purposes and, hence, might have high minimum loan limits. Second, they might not provide positive and negative information, which is most useful to financial institutions. Third, to the extent that they are run by the government, in countries with bad bureaucracies, they might not function effectively and, hence, might not be used often. Given that we do not find registry reform to affect firm financing, in the rest of the analysis, we concentrate solely on credit bureau reforms.

Differences in CB scope and quality

In our baseline estimations for CB reform, we identified the impact of the introduction of a credit bureau, while treating all CBs in the same way. However, CBs may differ substantially depending on the breadth of coverage and quality of data. Countries that introduce a CB with more dimensions of information that, for example, covers more firms, conveys both positive and negative information, includes information from non-financial institutions, maintains a longer history etc, could differentially impact the effect of CB reform on firm financing. We test this hypothesis in our empirical analysis by introducing an interaction term of CB reform with the Doing Business *depth of credit information index* and, separately, with the *CB coverage*

(expressed as percentage of total adults in the country).⁵ The depth of credit information index ranges from 1 to 6 depending on how many of the following features are present in the credit information sharing schemes: (a) data on both firms and individuals are distributed, (b) both positive credit information (for example, outstanding loan amounts and pattern of on-time repayments) and negative information (for example, late payments and the number and amount of defaults and bankruptcies) are distributed, (c) data from retailers and utility companies as well as financial institutions are distributed; (d) more than 2 years of historical data are distributed; (e) data on loan amounts below 1% of income per capita are distributed; and (f) borrowers have the right to access their data in the largest credit registry or bureau in the economy. The private credit bureau coverage indicator reports the number of individuals and firms listed by a private credit bureau's database as a percentage of the adult population.

Table 5 shows that access to finance increases by 0.4 percentage points when a CB is introduced with a one percentage point higher coverage. We can glean the impact of CB coverage by looking at a change in coverage from the 25th percentile to the 75th percentile of countries (37.4 percent). The estimates in Table 5 indicate that such a change in coverage leads to an additional 15 percentage point increase in the probability of access to finance by firms. We find qualitatively similar effects of CB coverage on loan maturity. Similarly, a 1 point increase in the depth of credit information index⁶ (this also corresponds with a move from 25th percentile of the index to the 75th percentile) increases the impact of CB reform on access to finance by 2 percentage points. Loans have a 1.3 percentage point lower interest and 1.5 months higher maturity when CB reform is introduced with a 1 point higher depth of credit information index.

⁵ We introduce these variables as country averages mainly because of data availability issues. The Doing Business database starts in 2005, whereas our enterprise survey sample dates back to 2002. In addition, our aim with the interaction is to explore the differential impact across countries.

⁶ The depth of credit information index ranges from 0 to 6 with each point corresponding to the existence of an additional measure of rules and practices affecting the coverage, scope and accessibility of credit information.

Lastly, the fraction of working capital and fixed assets financed by banks increases by 1.2 and 0.8 percentage points, respectively, when CB reform takes effect with a 1 point higher depth of credit information score.

We are able to add further depth to our analysis of CB scope and quality as we have access to raw data on each subcomponent comprising the credit information index. In Table 6, we separately add the interaction of CB reform with each of the disaggregated subcomponents of the credit information index. We find strong evidence that almost all factors relevant to the scope and quality of CB are vital contributors to CB reforms' positive effect on access to finance. In particular, we find that when CB is introduced with coverage for both individuals and firms, positive as well as negative information, historical data longer than two years, data on small loans and borrowers' access to CB data, the effect on access to finance is stronger. In other words, the addition of each of these dimensions to the CB increases its effectiveness in terms of increasing firms' access to finance. We find qualitative similar effects for other dependent variables as well (not reported).

Differences in the contractual environment

The institutional environment surrounding transactions between borrowers and lenders will likely influence lending decisions. In case of dispute or default, the cost of contract enforcement, both in terms of time and monetary value, may dissuade parties from transacting. With the introduction of a CB, firms in an environment characterized by an underdeveloped contract enforcement regime may benefit differentially more than those in a strong contractual environment. Lenders now have an alternate mechanism to screen out habitually delinquent borrowers, and subsequently to punish borrowers who fail to make payment as contracted. We

thus expect that the impact of CB reform to be higher for firms in countries with high contract enforcement costs.

The Enforcing Contract module of the Doing Business report ranks countries on the time, cost and number of procedures involved from the moment the lender files the lawsuit until payment is eventually received. We combine the three components into a single standardized index using weights derived from principal component factor (PCF) analysis.⁷ We also use the ICRG Law and Order risk rating⁸ as a more general measure of the contractual environment. The Law and Order rating assesses strength and impartiality of the legal system (Law), and of popular observance of the law (Order). The variable ranges from two to six, and higher values correspond to better institutional environment.

Table 7 shows the differential effect of CB reform when one considers the heterogeneity in enforcement environment across countries. We are able to verify the hypothesis that the impact of CB reform on access to finance is greater in countries with a less developed contract enforcement environment.⁹ For all dependent variables except interest rate, we find that the positive impact of CB reform is differentially greater for countries that score lower on the Doing Business contract enforcement index. In the case of the more general Law and Order ICRG variable, we find statistically significant and qualitatively consistent effects on the interest rate and on fraction of working capital and fixed assets financed by banks.

⁷ The weights assigned to the standardized (with mean 0 and standard deviation 1) subcomponents cost (% of claims), time (days) and number of procedures are 0.74, 0.53 and 0.75 respectively. Higher values of the index correspond with better enforcement.

⁸ PRS group publishes the International Country Risk Guide (ICRG) annually with information on 22 variables with risk ratings for political, financial, and economic factors. See < www.prsgroup.com > for more details.

⁹ We consider the interaction of CB reform with the average of DB contract enforcement index. The index has very low variability across time in our sample and is not available for earlier years. Since our aim with this interaction is to study variability across countries, we feel this approach of interacting with the country average overcomes data non-availability without compromising our analysis. The averaged index itself is subsumed into the country fixed effects and does not enter on its own. For consistency, we do the same for the ICRG Law and Order index.

Reforming legal institutions related to enforcement is a lengthy and cumbersome process, making them harder to bring about. For countries where low enforcement is a binding constraint on the willingness of lenders and borrowers to agree financing terms, our results suggests that CB introduction can be an especially useful alternate policy tool to increase firms' access to finance.

Differences across firm size, transparency and experience

As SMEs state that access to finance is one the main constraints on their growth, we explore whether the impact of CB reform varies across firm size. SMEs generally do not participate in equity markets, so they are dependent on banks and other financial institutions for external finance. Thus, any mechanism that removes informational asymmetries between lenders and borrowers may be especially helpful to SMEs. Smaller firms may also benefit more from CB reform because they lack alternative means of signaling their credit worthiness.

We introduce interactions of the CB reform variable with separate dummies for micro (less than 5 employees), small (5-19 employees) and medium sized firms (20-99 employees).¹⁰ Results in Table 8 show that there is strong evidence that smaller firms benefit more from CB reform. We find that micro and small firms benefit more in terms of access to finance, and in the percentage of fixed assets and working capital financed by banks. With CB introduction, when compared to large firms, access to finance for micro and small firms increases by an additional 7 and 8 percentage points, respectively. On the other hand, while our baseline result indicated that CB reform leads to lowering of interest rates overall, the rate for larger firms appear to differentially fall more than that for SMEs following CB reform.

¹⁰ Large sized firms (greater than 100 employees) are the omitted reference category.

In our baseline estimations, we assumed all firms benefit equally from CB reforms. However, the asymmetric information wedge between lenders and borrowers is more likely to be greater when firms are less transparent. The theoretical literature suggests that credit information schemes are more likely to benefit opaque firms who have a hard time disseminating information to signal their credit quality. We explore this possibility by introducing two measures of firm transparency. The first measure is a dummy which captures whether a firm is audited by an external auditor. The second is a dummy for whether the firm has received a quality certification by the International Organization for Standardization, an international standard-setting body composed of representatives from various national standards organizations.

The results in Table 9 show that firms that are audited externally (and hence are less opaque) benefit less from CB reforms in terms of the likelihood of accessing financing and in terms of the share of working capital and fixed assets financed by banks. However, only the results on working capital and fixed assets financing are statistically significant. In this case we find that transparent firms exhibit an increase in working capital and fixed assets financed by banks which is almost 2 and 3 percentage points lower, respectively, than that observed for opaque (i.e., non-audited) firms.

In addition, we learn from the results in Table 9 that firms that receive an ISO certification, which we consider as an alternate proxy for transparency, experience fewer benefits from a CB reform in terms of the likelihood of accessing financing and the share of fixed assets financed by banks. We find that firms with an ISO certification have a 5 percentage point lower likelihood of access to finance following a CB reform and exhibit a 2 percentage point lower share of fixed assets financed by banks.

We next explore whether younger and less experienced firms are differentially impacted by the introduction of a credit bureau. Younger firms are more likely to struggle in a credit environment that lacks credit information sharing because they are especially impacted by informational asymmetry, since they typically do not have established relationship with lenders. CB reform may allow younger firms to more quickly establish credit worthiness and increase access to finance. At the same time, a majority of firms in our sample are SMEs, and thus the role of the top manager in establishing lender relationships may be equally important. For example, a new firm may hire an experienced manager with established relationships with banks and be able to leverage these relationships to their benefit. CB reform may allow firms without experienced managers to overcome informational asymmetry in a more substantial way than firms whose managers already benefit from a history of lender relationships.

We investigate these hypotheses by introducing an interaction term of CB reform with the log of firm age and, separately, with the number of years of experience of the firms' top manager. In Table 10, we find a statistically significant differential effect of CB reform for younger firms for the fraction of fixed assets financed by banks. In particular, a 1 percent decrease in firm age when CB is reformed leads to an incremental increase by 1.7 percentage point in the fraction of fixed assets financed by banks. The impact on fixed asset financing is logical considering younger firms tend to be more asset constrained and more eager to finance fixed assets during their early growth phase. To put the point estimate in perspective, a decrease in firm age by 13 years from the 75th percentile (20 years) to the 25th percentile (7 years) leads to an increased impacted by CB reform on firms' fraction of financed fixed assets by 2 additional percentage points.

The heterogeneous effect of CB reform is much more consistently observed when considering the experience of top managers. Firms with inexperienced managers gained more access to finance and greater fraction of working capital and fixed asset financing from the CB introduction.

Robustness checks: estimates using a panel of firms and instrumenting for reforms

Firms interviewed in each round of survey by WBES are a nationally representative sample of the private sector in that year. Since the same firm is not necessarily interviewed again in subsequent surveys of the country, our baseline estimation sample essentially consists of repeated cross sections over time. However, for a smaller subset of firms in some countries of our baseline sample, the WBES interviews and identifies when the same firms are re-interviewed over time. This firm-level panel consists of about 3,600 firms in 38 countries out of the CB reform baseline sample. While the sample size is much smaller (only about 14% of the baseline sample), the panel data allows us to control for time invariant firm-level heterogeneity. As a check of robustness of our baseline results, we estimate the impact of CB reform on firm financing for this sample with firm fixed effects. Our estimates are thus able to capture within firm effects of CB reform on access to finance.

As shown in Table 11, we find that estimates using firm fixed effects on panel data are largely consistent with our baseline results. The within firm estimates show that a firm without access to a loan, line of credit or overdraft is 5 percentage point more likely to have access following CB introduction. The panel regressions for interest rate and maturity, by definition, cover firms who have a loan both before and after CB introduction (for the treatment sample). We see that among this sample, firms had loans with a 12 percentage point lower interest rate

and 11 month higher maturity. Finally, there is a 6 percentage point within firm increase in the use of banks to finance fixed assets.

Our assumption in the paper so far has been to treat CB reforms as exogenous. An issue with identifying the effect of CB reform on firm financing is the potential that reform is endogenous. In other words, existence of unobserved determinants (or observed variables that are not appropriately controlled) of access to finance that also drive CB reform will bias our estimates of the impact of reform. Our estimation strategy uses fixed effects to control for unobservables that are time invariant. In addition, since our analysis is at the firm level, we are able to appropriately control for a wide range of time varying firm and country level variables. Nevertheless, as robustness check we allow for reverse causality and we explicitly address the concern of endogeneity by estimating the impact of CB reform using Two-Stage Least Squares (2SLS) regressions.

The body of empirical research on the determinants of financial reform largely finds that there appear to be no consistent macro or institutional predictors of financial reform.¹¹ At the same time, Abiad and Mody (2005), Lora and Olivera (2004), and Heckelman and Mazumder (2013) find strong evidence for regional convergence in financial reform: reform appears to be driven by the gap to regional leaders. Guided by findings from this literature, we propose using the fraction of countries in the region¹² with existing CBs and fraction of countries in the region that have introduced CBs in the last 5 years as instruments for the potentially endogenous CB reform variable.¹³

¹¹ We look at the literature on determinant of financial reform in general as those pertaining to credit information schemes in particular do not exist.

¹² We use the World Bank's region classification which includes East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South Asia and Sub-Saharan Africa.

¹³ Our intention with the two instruments is to capture both the overall existence of CB's in the region as well as the intensity of recent reform. A restriction to reform in the last 5 years is an arbitrary benchmark, but changing it to 3 years or 7 years does not alter the IV estimates.

As shown at the bottom of Table 12, the exclusion restriction for the instruments is convincing: the existence of a CB in other countries should not impact access to finance by firms in a given country directly or through other channels besides its impact on the endogenous reform variable. We test for overidentifying restrictions, and report the Hansen's J statistics and p-values. As shown in Table 12, for all 5 regressions, we fail to reject the null hypothesis that the instruments are jointly valid. We also establish that instrument relevance is strong: more countries in the region with established CB's and recently introduced CB's is more likely to lead a country in that region to introduce its own CB. We report the first stage of the 2SLS regressions in Table 12. As expected, both the exogenous excluded instruments have a positive impact on the introduction of a CB. We formally test weak identification in the first stage by calculating Kleibergen-Paap rk statistic, and confirming they are above Stock-Yogo critical values for all specifications except interest rate.¹⁴

In Table 12, we also present 2nd stage estimates for the impact of CB introduction on all five dependent variables.¹⁵ We find that the estimates are qualitatively consistent with the baseline results, albeit with higher point estimates.¹⁶ The result in our baseline specification and subsequent analysis using the same quasi difference-in-difference approach does not appear to have been driven by endogeneity.

¹⁴ The more commonly used Cragg-Donald Wald statistics and corresponding Stock-Yogo critical values are only valid with i.i.d errors. Our comparison of more generalized KP rk statistics with Stock-Yogo critical values is not strictly valid and only meant as suggestive. The KP rk statistics are also above the general critical value of 10.

¹⁵ For the case of clustered standard errors like ours, in the tables we present the weak-instrument robust inference Anderson-Rubin statistics for testing the significance of the endogenous regressor in the structural equation (Finlay et al 2009).

¹⁶ We also estimated the instrumental variable regressions using 2 step GMM estimators. Results (not reported) do not change.

V- Conclusions

Access to finance is perceived by firms as a big obstacle to their growth. Theory predicts that credit information sharing systems can help alleviate firms' financial constraints and facilitate access to finance. The existing empirical literature on the impact of credit information sharing schemes is limited and with few exceptions not able to identify well the causal effect of information sharing on firm financing.

Using multi-year firm-level surveys for 63 countries covering more than 75,000 firms over the period 2002–13, we analyzed the impact of the reform (i.e., introduction) of credit information sharing systems on firms' access to finance. Our results revealed that credit bureau (CB) reforms but not credit registry reforms (CR) have an effect on firm financing. After the introduction of a CB, the likelihood that a firm has access to finance increases, interest rates drop, maturity lengthens, and the share of working capital financed by banks increases. The effects of CB reform are more pronounced the greater the coverage of the CB and the scope and accessibility of the credit information sharing scheme and the weaker the contractual environment. We also find some evidence that CB reform effects are more pronounced for smaller, less experienced, and more opaque firms. Finally, our results are robust to focusing on a smaller panel of firms, which allows us to control for firm-fixed effects, and to instrumenting for the likelihood of credit information sharing reforms.

References

- Abiad, A., and Mody, A., 2005. Financial reform: What shakes it? What shapes it? *American Economic Review* 95(1), 66-88
- Behr, P., and Sonnekalb, S., 2012. The effect of information sharing between lenders on access to credit, cost of credit, and loan performance. Evidence from a credit registry introduction. *Journal of Banking & Finance* 36(11), 3017-3032.
- Brown, M., Jappelli, T., and Pagano, M., 2009. Information sharing and credit: firm-level evidence from transition countries. *Journal of Financial Intermediation* 18, 151–172.
- de Janvry, A., McIntosh, C., and Sadoulet, E., 2010. The supply - and demand – side impacts of credit market information. *Journal of Development Economics* 93, 173-188.
- Detragiache, E., Gupta, P., and Tressel, T., 2005. Finance in lower-income countries: An empirical exploration. International Monetary Fund Working Paper 05/167.
- Doing Business, 2013. <http://www.doingbusiness.org>. The World Bank.
- Djankov, S., McLiesh, C., and Shleifer, A., 2007. Private credit in 129 countries. *Journal of Financial Economics* 84, 299-329.
- Enterprise Surveys, 2013. <http://www.enterprisesurveys.org>. The World Bank.
- Galindo, A., and Miller, M., 2001. Can credit registries reduce credit constraints? Empirical evidence on the role of credit registries in firm investment decisions.” IDB-IIC 42nd Annual Meeting. Santiago, Chile.
- Heckelman, J., and Mazumder, S., 2013. Are we there yet? On the convergence of financial reforms. *Economics of Governance* 14(4), 385-409.
- Hertzberg, A., Liberti, J., and Paravisini, D., 2011. Public information and coordination: Evidence from a credit registry expansion. *Journal of Finance* 66 (2), 379-412.
- Jappelli, T., and Pagano, M., 2002. Information sharing, lending and defaults: Cross-country evidence. *Journal of Banking and Finance*, 2017-2045.
- Jappelli, T., and Pagano, M., 2003. Public credit information: A European Perspective. In *Credit Reporting Systems and the International Economy*, by Margaret J. Miller, 81-114. Cambridge, MA: The MIT Press.
- Klein, D., 1992. Promise keeping in the great society: a model of credit information sharing. *Economics and Politics* 4 (2), 117–136.

Lora, E., and Olivera, M., 2004. What makes reforms likely: Political economy determinants of reforms in Latin America. *Journal of Applied Economics* 7(1), 99-135.

Love, I., and Mylenko, N., 2003. Credit reporting and financing constraints, World Bank Policy Research Working Paper 3142.

Luoto, J., McIntosh, C., and Wydick, B., 2007. Credit information systems in less developed countries: A test with microfinance in Guatemala, *Economic Development and Cultural Change* 55(2), 313–334.

Miller, M., 2003. Credit Reporting systems around the globe: The state of the art in public credit registries and private credit reporting firms. In *Credit Reporting Systems and the International Economy*, by Margaret J. Miller, 25-79. Cambridge, Massachusetts: The MIT Press.

Pagano, M., and Jappelli, T., 1993. Information sharing in credit markets. *Journal of Finance*, 1693-1718.

Padilla, A., and Pagano, M., 1997. Endogenous communication among lenders and entrepreneurial incentives. *The Review of Financial Studies*, 205-236.

Padilla, A., and Pagano, M., 2000. Sharing default information as a borrower discipline device, *European Economic Review*, 1951-1980.

Stiglitz, J. E., and Weiss, A., 1981. Credit rationing in markets with imperfect information. *American Economic Review*, 393-410.

Vercammen, J., 1995. Credit bureau policy and sustainable reputation effects in credit markets. *Economica* 62, 461–478.

Table 1: Countries and surveys in our firm-level database

		Credit Bureau reform year	Credit Registry reform year	Control sample for CB regressions	Control sample for CR regressions
Country	Survey years				
Albania	2002, 2005, 2007			x	x
Angola	2006, 2010			x	x
Armenia	2002, 2005, 2009	2007	2003		
Azerbaijan	2002, 2005, 2009, 2013		2005	x	
Bangladesh	2002, 2007, 2013			x	
Belarus	2002, 2005, 2008, 2013		2007	x	
Benin	2004, 2009			x	
Bosnia-Herzegovina	2002, 2005, 2009, 2013		2007		
Botswana	2006, 2010				x
Bulgaria	2002, 2004, 2005, 2007, 2009, 2013	2005			
Burkina Faso	2006, 2009			x	
Cameroon	2006, 2009			x	
Cape Verde	2006, 2009			x	
China	2002, 2003, 2012		2004	x	
Colombia	2006, 2010				x
Congo	2006, 2010			x	x
Croatia	2002, 2005, 2007, 2009, 2013	2007			x
Czech Republic	2002, 2005, 2009	2002	2002		
Ecuador	2003, 2006, 2010	2005	2008		
Eritrea	2002, 2009			x	x
Estonia	2002, 2005, 2009				x
Georgia	2002, 2005, 2008, 2013	2005			x
Guatemala	2003, 2006, 2010		2004		
Guyana	2004, 2010			x	x
Hungary	2002, 2005, 2009				x
Indonesia	2003, 2009			x	
Jamaica	2005, 2010			x	x
Kazakhstan	2002, 2005, 2009, 2013	2006			x
Kenya	2003, 2007, 2013	2008			x
Kyrgyzstan	2002, 2003, 2005	2003			x
Latvia	2002, 2005, 2009		2008	x	
Lebanon	2006, 2013			x	
Lesotho	2003, 2009			x	x
Lithuania	2002, 2004, 2005, 2009			x	
Macedonia	2002, 2005, 2009, 2013	2011			
Madagascar	2005, 2009			x	
Malawi	2005, 2009			x	x
Mali	2003, 2007, 2010			x	
Mauritius	2005, 2009		2005	x	
Mexico	2006, 2010				x
Moldova	2002, 2003, 2005, 2009, 2013	2011			x
Mongolia	2004, 2009			x	

Country	Survey years	Credit Bureau reform year	Credit Registry reform year	Control sample for CB regressions	Control sample for CR regressions
Nepal	2009, 2013				x
Nicaragua	2003, 2006, 2010	2005	2007		
Niger	2005, 2009			x	
Panama	2006, 2010				x
Philippines	2003, 2009				x
Poland	2002, 2003, 2005, 2009				x
Romania	2002, 2005, 2009	2004			
Russia	2002, 2005, 2009	2006			x
Rwanda	2006, 2011	2010			
Senegal	2003, 2007			x	
Serbia-Montenegro	2002, 2005, 2009, 2013	2004			x
Slovakia	2002, 2005, 2009	2004			
Slovenia	2002, 2005, 2009, 2013	2008			
South Africa	2003, 2007				x
Sri Lanka	2004, 2011				x
Tajikistan	2002, 2003, 2005, 2008			x	x
Tanzania	2003, 2006, 2013			x	x
Uganda	2003, 2006, 2013	2009			x
Ukraine	2002, 2005, 2008, 2013	2007			x
Vietnam	2005, 2009			x	
Zambia	2002, 2007			x	x

Note: For the Credit Registry/Bureau reform regressions, the treatment sample consists of countries with a Credit Registry/Bureau reform in between two or more years of available Enterprise Survey data. The control sample consists of countries with two or more years of Enterprise Surveys, but where Credit Registry/Bureau do not exist.

Table 2: Variable definitions

Variable	Data Source: Description
<i>Firm-Level Variables</i>	
Access to finance	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm has access to finance (loan, overdraft or line of credit)
Working capital financed by banks	<i>Enterprise Survey</i> : Fraction of working capital financed by banks
Fixed assets financed by banks	<i>Enterprise Survey</i> : Fraction of fixed assets financed by banks
Interest rate	<i>Enterprise Survey</i> : Interest rate for most recent loan by the firm
Maturity	<i>Enterprise Survey</i> : Maturity (in months) for most recent loan by the firm
Firm size (employees)	<i>Enterprise Survey</i> : Number of permanent full time employees of the firm
Manufacturing	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm is in the manufacturing sector.
Exporter	<i>Enterprise Survey</i> : Dummy variable. 1 if 10% or more of sales are exported directly or indirectly by the firm
Foreign owned	<i>Enterprise Survey</i> : Dummy variable. 1 if 50% or more of the firm is owned by foreign organizations
Government owned	<i>Enterprise Survey</i> : Dummy variable. 1 if 50% or more of the firm is owned by the government
Firm age	<i>Enterprise Survey</i> : Age of the firm in years
Micro sized	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm has less than 5 employees
Small sized	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm has between 5 and 19 employees
Medium sized	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm has between 20 and 99 employees
Manager experience	<i>Enterprise Survey</i> : Number of years of experience of the top manager in the sector.
Externally audited	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm has its annual financial statement reviewed by an external auditor
ISO certification	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm received ISO (e.g. 9000, 9002 or 14,000) certification
<i>Country-Level Variables</i>	
Private credit	<i>World Development Indicators</i> : Domestic credit to private sector (fraction of GDP)
Inflation rate	<i>World Development Indicators</i> : Inflation, GDP deflator (annual)
GDP Growth rate	<i>World Development Indicators</i> : Real GDP Growth rate (annual)
Contract enforcement index	<i>Doing Business</i> : Principal component factor analysis of time, cost and number of procedures of enforcing a contract
Law and order index	<i>PRS Group ICRG</i> : Assesses strength and impartiality of the legal system (Law), and of popular observance of the law (Order)

Variable	Data Source: Description
<i>Credit Information Variables</i>	
Credit bureau reform	<i>Doing Business</i> : Dummy variable. 1 for a country that established a private credit bureau in the period of or following the reform.
Credit registry reform	<i>Doing Business</i> : Dummy variable. 1 for a country that established a public credit registry in the period of or following the reform.
CB coverage	<i>Doing Business</i> : Number of individuals and firms listed in the country's credit bureau's database as a percentage of the adult population.
Depth of credit information	<i>Doing Business</i> : Coverage, scope and accessibility of credit information in CB or CR (on a scale of 0 to 6)
CI – Firms and individuals	<i>Doing Business</i> : Dummy variable. 1 if CB or CR contains information on both firms and individuals. Component of the Depth of credit information index.
CI – Positive and negative	<i>Doing Business</i> : CB or CR contains both positive and negative information. Component of the Depth of credit information index.
CI - Non Financial	<i>Doing Business</i> : CB or CR contains information from utilities and retailers in addition to financial institutions. Component of the Depth of credit information index.
CI – Historical	<i>Doing Business</i> : CB or CR contains more than two years of historical data. Component of the Depth of credit information index.
CI - Small loans	<i>Doing Business</i> : CB or CR contains information on loan amounts below 1% of income per capita. Component of the Depth of credit information index.
CI - Borrowers access	<i>Doing Business</i> : CB or CR information can be accessed by borrowers. Component of the Depth of credit information index.

Table 3: Descriptive statistics

Variable	Obs	Mean	Median	Standard Deviation	Min	Max
<i>Firm-Level Variables</i>						
Access to finance	75424	0.534	1	0.499	0	1
Working capital financed by banks	63325	0.127	0	0.244	0	1
Fixed Assets financed by banks	41355	0.168	0	0.316	0	1
Interest rate	12296	0.136	0.120	0.079	0	0.6
Maturity	16147	30.527	21	28.452	0	180
Log firm size	75424	3.349	3.135	1.482	0	7.409
Manufacturing	75424	0.560	1	0.496	0	1
Exporter	75424	0.212	0	0.409	0	1
Foreign owned	75424	0.099	0	0.299	0	1
Government owned	75424	0.054	0	0.225	0	1
Log firm age	75424	2.473	2.485	0.815	0	5.278
Micro sized	75424	0.123	0	0.328	0	1
Small sized	75424	0.329	0	0.470	0	1
Medium sized	75424	0.328	0	0.470	0	1
Manger experience	54263	15.496	14	10.623	0	80
Externally audited	74313	0.509	1	0.500	0	1
ISO certification	71610	0.202	0	0.402	0	1
<i>Country-Level Variables</i>						
Private credit	73180	0.456	0.289	0.790	0.02	13.4
Inflation rate	75424	0.105	0.065	0.422	-0.074	12.716
GDP growth (annual)	75424	0.054	0.056	0.057	-0.098	1.393
Contract enforcement index	75424	0.124	0.349	0.906	-2.148	1.683
Law and order index	65143	3.337	3.5	1.005	1	5
<i>Credit Information Variables</i>						
Credit bureau reform	75424	0.203	0	0.402	0	1
Credit registry reform	75424	0.118	0	0.323	0	1
Credit bureau coverage	58514	14.738	0	24.748	0	100
Depth of credit information index	58514	3.185	4	2.005	0	6
CI - Firms and individuals	58514	0.737	1	0.440	0	1
CI - Positive and negative	58514	0.653	1	0.476	0	1
CI - Non financial	58514	0.236	0	0.425	0	1
CI – Historical	58514	0.505	1	0.500	0	1
CI - Small loans	58514	0.597	1	0.491	0	1
CI - Borrowers access	58514	0.457	0	0.498	0	1

Table 4: Impact of credit bureau and credit registry reform on firm financing

The regressions below are estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. For the Access to Finance regressions, the estimates are marginal effects from a fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance		Interest rate		Maturity		Working capital by banks		Fixed assets by banks	
Credit bureau reform	0.068*		-0.050**		6.720***		0.037**		0.022	
	[0.037]		[0.023]		[2.201]		[0.017]		[0.016]	
Credit registry reform		0.002		0.018		-0.345		0.023		0.029*
		[0.042]		[0.011]		[2.726]		[0.015]		[0.017]
Log firm size	0.112***	0.105***	-0.003***	-0.004***	0.794***	0.828**	0.028***	0.023***	0.030***	0.027***
	[0.005]	[0.005]	[0.001]	[0.001]	[0.262]	[0.315]	[0.002]	[0.002]	[0.002]	[0.002]
Manufacturing	0.028**	0.016	0.000	0.001	-0.595	-0.873	0.008*	0.006	0.019***	0.013**
	[0.013]	[0.012]	[0.002]	[0.002]	[0.812]	[0.698]	[0.005]	[0.004]	[0.005]	[0.005]
Exporter	0.063***	0.084***	-0.004*	-0.001	-0.284	0.354	0.030***	0.030***	0.018***	0.017***
	[0.012]	[0.011]	[0.002]	[0.002]	[0.763]	[0.881]	[0.006]	[0.004]	[0.007]	[0.006]
Foreign owned	-0.068***	-0.085***	-0.013***	-0.011***	-0.501	0.117	-0.034***	-0.034***	-0.051***	-0.059***
	[0.016]	[0.015]	[0.003]	[0.003]	[1.027]	[1.069]	[0.007]	[0.006]	[0.008]	[0.009]
Government owned	-0.159***	-0.180***	0.005	0.005	0.747	1.226	-0.021	-0.039**	-0.038*	-0.072***
	[0.034]	[0.039]	[0.004]	[0.004]	[1.273]	[1.260]	[0.020]	[0.017]	[0.022]	[0.017]
Log firm age	0.016***	0.021***	-0.001	-0.000	-1.092*	-0.743	0.006**	0.004	-0.002	0.001
	[0.005]	[0.006]	[0.001]	[0.001]	[0.593]	[0.490]	[0.002]	[0.002]	[0.003]	[0.003]
Inflation rate	-0.047	0.027	0.052*	0.012	8.879	18.171***	-0.002	0.007	-0.003	-0.014
	[0.038]	[0.049]	[0.030]	[0.013]	[8.395]	[6.577]	[0.020]	[0.022]	[0.022]	[0.021]
GDP growth rate	0.361	-0.323	-0.149*	-0.317***	111.335	144.196*	0.021	-0.085	0.020	0.142
	[0.327]	[0.431]	[0.089]	[0.083]	[100.021]	[78.733]	[0.184]	[0.197]	[0.189]	[0.188]
Private credit	0.182	-0.227	-0.160**	0.015	29.640*	47.652***	0.136**	0.054	0.145**	0.224***
	[0.137]	[0.189]	[0.071]	[0.020]	[14.957]	[16.377]	[0.058]	[0.055]	[0.071]	[0.057]
Constant			0.150***	0.159***	32.801***	30.121***	-0.019	0.002	0.010	0.002
			[0.007]	[0.007]	[5.424]	[4.796]	[0.035]	[0.032]	[0.030]	[0.027]
Observations	55,176	51,649	8,106	6,780	10,663	9,360	45,577	43,618	31,132	28,422
R-squared	0.153	0.168	0.548	0.555	0.152	0.186	0.124	0.096	0.078	0.081
Treatment	20	11	17	8	19	11	20	11	20	11
Control	30	32	19	21	14	18	29	32	30	32

Table 5: Interaction of CB reform with coverage and credit information

The regressions below are estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. For the Access to Finance regressions, the estimates are marginal effects from a fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance		Interest rate		Maturity		Working capital by banks		Fixed assets by banks	
CB reform X	0.004**		0.000		0.318***		0.001		0.001	
Credit bureau coverage	[0.002]		[0.000]		[0.077]		[0.001]		[0.001]	
CB reform X		0.021**		-0.013**		1.547***		0.012***		0.008**
Depth of credit information		[0.010]		[0.006]		[0.504]		[0.004]		[0.004]
Log firm size	0.112***	0.112***	-0.003***	-0.003***	0.810***	0.790***	0.028***	0.028***	0.030***	0.030***
	[0.005]	[0.005]	[0.001]	[0.001]	[0.261]	[0.262]	[0.002]	[0.002]	[0.002]	[0.002]
Manufacturing	0.028**	0.028**	0.000	0.000	-0.445	-0.611	0.009*	0.008*	0.019***	0.018***
	[0.013]	[0.013]	[0.002]	[0.002]	[0.805]	[0.812]	[0.005]	[0.005]	[0.005]	[0.005]
Exporter	0.063***	0.063***	-0.004**	-0.004*	-0.326	-0.280	0.030***	0.030***	0.018***	0.018***
	[0.012]	[0.012]	[0.002]	[0.002]	[0.764]	[0.763]	[0.006]	[0.006]	[0.007]	[0.007]
Foreign owned	-0.068***	-0.068***	-0.013***	-0.013***	-0.498	-0.507	-0.034***	-0.034***	-0.051***	-0.051***
	[0.016]	[0.016]	[0.003]	[0.003]	[1.030]	[1.025]	[0.007]	[0.007]	[0.008]	[0.008]
Government owned	-0.158***	-0.159***	0.004	0.005	0.622	0.758	-0.021	-0.021	-0.038*	-0.038*
	[0.034]	[0.034]	[0.004]	[0.004]	[1.297]	[1.271]	[0.020]	[0.020]	[0.022]	[0.022]
Log firm age	0.015***	0.016***	-0.001	-0.001	-1.127*	-1.086*	0.006**	0.006**	-0.002	-0.002
	[0.005]	[0.005]	[0.001]	[0.001]	[0.593]	[0.593]	[0.002]	[0.002]	[0.003]	[0.003]
Private credit	0.245*	0.169	-0.050	-0.163**	46.373***	28.234*	0.165***	0.124**	0.164**	0.137*
	[0.137]	[0.136]	[0.046]	[0.069]	[16.763]	[14.775]	[0.058]	[0.056]	[0.066]	[0.071]
Inflation rate	-0.033	-0.034	0.091**	0.051*	18.103*	8.607	0.002	0.006	-0.000	0.002
	[0.033]	[0.037]	[0.040]	[0.030]	[9.892]	[8.546]	[0.021]	[0.021]	[0.021]	[0.022]
GDP growth rate	0.262	0.238	-0.247**	-0.149*	138.129	113.364	-0.004	-0.061	0.006	-0.024
	[0.303]	[0.325]	[0.093]	[0.088]	[93.663]	[98.969]	[0.191]	[0.192]	[0.184]	[0.190]
Constant			0.156***	0.150***	29.965***	32.793***	-0.022	-0.011	0.009	0.015
			[0.008]	[0.007]	[4.866]	[5.408]	[0.034]	[0.036]	[0.030]	[0.031]
Observations	55,176	55,176	8,106	8,106	10,663	10,663	45,577	45,577	31,132	31,132
R-squared	0.154	0.153	0.542	0.548	0.152	0.152	0.123	0.124	0.077	0.078
Treatment	20	20	17	17	19	19	20	20	20	20
Control	30	30	19	19	14	14	29	29	30	30

Table 6: Interaction of CB reform with credit information sub-components

The regressions below are estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. For the Access to Finance regressions, the estimates are marginal effects from a fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance					
CB reform X	0.097**					
Firms and individuals	[0.042]					
CB reform X		0.095**				
Positive and negative		[0.046]				
CB reform X			0.080			
Non-financial			[0.070]			
CB reform X				0.114**		
Historical data				[0.055]		
CB reform X					0.101**	
Small loans					[0.051]	
CB reform X						0.074*
Borrowers access						[0.042]
Log firm size	0.112***	0.112***	0.113***	0.112***	0.112***	0.112***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Manufacturing	0.028**	0.028**	0.030**	0.028**	0.028**	0.028**
	[0.013]	[0.013]	[0.013]	[0.013]	[0.013]	[0.013]
Exporter	0.063***	0.063***	0.063***	0.063***	0.063***	0.063***
	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]	[0.012]
Foreign owned	-	-	-	-	-	-
	0.068***	-0.069***	-0.070***	-0.069***	-0.069***	-0.069***
	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]	[0.016]
Government owned	-	-	-	-	-	-
	0.159***	-0.159***	-0.160***	-0.159***	-0.159***	-0.159***
	[0.034]	[0.034]	[0.034]	[0.034]	[0.034]	[0.034]
Log firm age	0.015***	0.015***	0.015***	0.015***	0.016***	0.015***
	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]	[0.005]
Inflation rate	-0.029	-0.041	-0.038	-0.041	-0.04	-0.041
	[0.037]	[0.037]	[0.043]	[0.037]	[0.037]	[0.039]
GDP growth rate	0.189	0.296	0.268	0.317	0.283	0.303
	[0.322]	[0.322]	[0.376]	[0.322]	[0.323]	[0.336]
Private credit	0.188	0.167	0.192	0.205	0.179	0.185
	[0.134]	[0.138]	[0.139]	[0.139]	[0.135]	[0.134]
Observations	55,176	55,176	55,176	55,176	55,176	55,176
R-squared	0.153	0.153	0.153	0.153	0.153	0.153
Treatment	20	20	20	20	20	20
Control	30	30	30	30	30	30

Table 7: Interaction of CB reform with enforcement variables

The regressions below are estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. For the Access to Finance regressions, the estimates are marginal effects from a fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance		Interest rate		Maturity		Working capital by		Fixed assets by banks	
CB Reform	0.120***	0.162	0.032	-0.287**	12.309***	13.915**	0.059***	0.121***	0.043**	0.143***
	[0.045]	[0.102]	[0.022]	[0.112]	[2.830]	[6.249]	[0.018]	[0.036]	[0.020]	[0.044]
CB reform X	-0.112**		-0.108**		-12.457**		-0.054***		-0.046**	
Contract enforcement index	[0.044]		[0.046]		[4.744]		[0.018]		[0.020]	
CB reform X		-0.024		0.055**		-2.100		-0.025**		-0.033***
Law and order index		[0.028]		[0.023]		[1.974]		[0.010]		[0.012]
Log firm size	0.112***	0.113***	-0.003***	-0.003***	0.783***	0.693**	0.028***	0.029***	0.030***	0.031***
	[0.005]	[0.005]	[0.001]	[0.001]	[0.262]	[0.269]	[0.002]	[0.002]	[0.002]	[0.003]
Manufacturing	0.030**	0.035**	0.000	0.001	-0.530	-0.423	0.009*	0.005	0.019***	0.020***
	[0.013]	[0.014]	[0.002]	[0.002]	[0.804]	[0.834]	[0.005]	[0.005]	[0.005]	[0.005]
Exporter	0.062***	0.060***	-0.004*	-0.005**	-0.308	0.083	0.029***	0.030***	0.018**	0.015**
	[0.012]	[0.012]	[0.002]	[0.002]	[0.759]	[0.796]	[0.006]	[0.006]	[0.007]	[0.007]
Foreign owned	-0.069***	-0.062***	-0.013***	-0.014***	-0.522	-0.559	-0.034***	-0.034***	-0.052***	-0.049***
	[0.016]	[0.017]	[0.003]	[0.004]	[1.019]	[1.070]	[0.007]	[0.008]	[0.008]	[0.009]
Government owned	-0.160***	-0.147***	0.005	0.003	0.775	0.743	-0.021	-0.017	-0.038*	-0.034
	[0.034]	[0.035]	[0.004]	[0.003]	[1.270]	[1.320]	[0.020]	[0.021]	[0.022]	[0.023]
Log firm age	0.016***	0.017***	-0.001	-0.001	-1.076*	-0.967	0.006**	0.006***	-0.002	-0.002
	[0.005]	[0.006]	[0.001]	[0.001]	[0.593]	[0.631]	[0.002]	[0.002]	[0.003]	[0.003]
Private credit	0.183	0.225	-0.148**	-0.170	24.103	27.579	0.131**	0.041	0.134*	0.108
	[0.133]	[0.181]	[0.058]	[0.105]	[16.424]	[19.440]	[0.053]	[0.063]	[0.070]	[0.072]
Inflation rate	-0.033	-0.020	0.113***	-0.017	14.137	15.635	0.007	0.044**	0.003	0.030
	[0.035]	[0.045]	[0.036]	[0.040]	[9.551]	[10.806]	[0.020]	[0.019]	[0.021]	[0.019]
GDP growth rate	0.235	0.159	-0.118	-0.506***	122.305	206.862	-0.058	-0.395**	-0.036	-0.267
	[0.308]	[0.414]	[0.089]	[0.133]	[100.711]	[135.190]	[0.185]	[0.174]	[0.186]	[0.168]
Constant			0.144***	0.174***	32.318***	28.271***	-0.017	-0.001	0.011	0.019
			[0.007]	[0.009]	[5.636]	[7.017]	[0.034]	[0.037]	[0.030]	[0.028]
Observations	55,176	48,870	8,106	7,303	10,663	9,954	45,577	40,835	31,132	27,580
R-squared	0.154	0.158	0.550	0.555	0.153	0.146	0.125	0.131	0.078	0.079
Treatment	20	16	17	14	19	16	20	16	20	16
Control	30	24	19	15	14	12	29	23	30	24

Table 8: Interaction of CB reform with firm size

The regressions below are estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. For the Access to Finance regressions, the estimates are marginal effects from a fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance	Interest rate	Maturity	Working capital by banks	Fixed assets by banks
CB reform	0.025 [0.044]	-0.059** [0.023]	6.022** [2.510]	0.019 [0.020]	-0.005 [0.018]
CB reform X Micro sized firm	0.070** [0.032]	0.024*** [0.007]	-3.281 [3.653]	0.028* [0.015]	0.039** [0.017]
CB reform X Small sized firm	0.080*** [0.030]	0.009*** [0.003]	2.953 [2.874]	0.027* [0.015]	0.044*** [0.015]
CB reform X Medium sized firm	0.022 [0.026]	0.009* [0.005]	0.673 [2.039]	0.011 [0.012]	0.031** [0.012]
Micro sized firm	-0.394*** [0.015]	0.010** [0.004]	-1.602 [1.494]	-0.111*** [0.009]	-0.133*** [0.011]
Small sized firm	-0.342*** [0.015]	0.009*** [0.003]	-3.448*** [1.090]	-0.100*** [0.010]	-0.102*** [0.011]
Medium sized firm	-0.155*** [0.011]	0.006*** [0.002]	-1.574** [0.715]	-0.051*** [0.008]	-0.047*** [0.010]
Manufacturing	0.033** [0.013]	0.000 [0.002]	-0.561 [0.808]	0.009* [0.005]	0.020*** [0.005]
Exporter	0.078*** [0.011]	-0.004** [0.002]	-0.185 [0.758]	0.033*** [0.006]	0.022*** [0.007]
Foreign owned	-0.057*** [0.015]	-0.014*** [0.003]	-0.398 [1.017]	-0.031*** [0.007]	-0.048*** [0.008]
Government owned	-0.134*** [0.033]	0.004 [0.004]	0.960 [1.288]	-0.015 [0.020]	-0.032 [0.022]
Log firm age	0.020*** [0.005]	-0.001 [0.001]	-1.021* [0.574]	0.007*** [0.002]	-0.000 [0.003]
Inflation rate	-0.043 [0.038]	0.050 [0.030]	8.671 [8.372]	-0.001 [0.020]	-0.003 [0.022]
GDP growth rate	0.322 [0.330]	-0.150* [0.088]	109.346 [99.482]	0.015 [0.183]	0.019 [0.188]
Private credit	0.184 [0.137]	-0.158** [0.070]	28.948* [15.096]	0.139** [0.058]	0.145** [0.071]
Constant		0.133*** [0.007]	37.307*** [5.223]	0.134*** [0.035]	0.171*** [0.032]
Observations	55,176	8,106	10,663	45,577	31,132
R-squared	0.149	0.548	0.152	0.122	0.076
Treatment	20	17	19	20	20
Control	30	19	14	29	30

Table 9: Interaction of CB reform with externally audited and ISO certification dummy variables

The regressions below are estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. For the Access to Finance regressions, the estimates are marginal effects from a fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance		Interest rate		Maturity		Working capital by banks		Fixed assets by banks	
CB Reform	0.078**	0.049	-0.050**	-0.052**	6.664**	7.701***	0.042**	0.019	0.037**	0.010
	[0.038]	[0.035]	[0.022]	[0.022]	[2.538]	[2.305]	[0.017]	[0.012]	[0.017]	[0.014]
CB reform X	-0.037		0.002		-0.050		-0.019**		-0.029**	
Externally audited	[0.024]		[0.007]		[1.989]		[0.009]		[0.012]	
CB reform X		-0.046**		-0.001		1.730		-0.017		-0.021*
ISO certification		[0.020]		[0.006]		[2.802]		[0.012]		[0.012]
Externally audited	0.092***		-0.002		1.550		0.034***		0.036***	
	[0.012]		[0.002]		[1.296]		[0.005]		[0.007]	
ISO certification		0.098***		-0.002		-0.421		0.036***		0.013
		[0.011]		[0.002]		[0.777]		[0.009]		[0.009]
Log firm size	0.104***	0.106***	-0.003***	-0.004***	0.626**	0.523	0.025***	0.026***	0.027***	0.029***
	[0.005]	[0.005]	[0.001]	[0.001]	[0.256]	[0.317]	[0.002]	[0.002]	[0.002]	[0.002]
Manufacturing	0.032**	0.016	0.000	0.001	-0.632	-0.199	0.009**	0.003	0.019***	0.014***
	[0.013]	[0.013]	[0.002]	[0.002]	[0.817]	[0.781]	[0.005]	[0.004]	[0.005]	[0.005]
Exporter	0.058***	0.063***	-0.003*	-0.003	-0.450	-1.515**	0.028***	0.029***	0.016**	0.019***
	[0.011]	[0.011]	[0.002]	[0.002]	[0.755]	[0.615]	[0.006]	[0.006]	[0.007]	[0.007]
Foreign owned	-0.084***	-0.075***	-0.013***	-0.013***	-0.592	-0.827	-0.039***	-0.036***	-0.057***	-0.052***
	[0.016]	[0.015]	[0.004]	[0.004]	[1.019]	[0.804]	[0.008]	[0.007]	[0.008]	[0.008]
Government owned	-0.163***	-0.165***	0.004	0.006*	0.704	1.365	-0.023	-0.021	-0.039*	-0.043**
	[0.034]	[0.034]	[0.004]	[0.004]	[1.234]	[1.110]	[0.020]	[0.018]	[0.022]	[0.020]
Log firm age	0.013**	0.015***	-0.001	-0.001	-1.046*	-1.006**	0.005**	0.005**	-0.003	-0.002
	[0.006]	[0.006]	[0.001]	[0.001]	[0.553]	[0.468]	[0.002]	[0.002]	[0.003]	[0.003]
Private credit	0.199	0.203	-0.159**	-0.172**	29.319*	45.639**	0.138**	0.124**	0.153**	0.137**
	[0.138]	[0.141]	[0.068]	[0.072]	[15.145]	[12.998]	[0.057]	[0.056]	[0.072]	[0.068]
Inflation rate	-0.047	-0.068*	0.066**	0.059*	9.240	-4.646	-0.004	-0.018	-0.003	-0.007
	[0.037]	[0.037]	[0.028]	[0.031]	[8.756]	[4.762]	[0.020]	[0.019]	[0.021]	[0.020]
GDP growth rate	0.339	0.535*	-0.142	-0.065	116.438	-59.602	0.031	0.192	0.019	0.072
	[0.317]	[0.316]	[0.089]	[0.077]	[102.083]	[40.032]	[0.180]	[0.168]	[0.186]	[0.179]
Constant			0.149***	0.147***	31.252**	42.427**	-0.029	-0.047*	-0.004	-0.009
			[0.007]	[0.006]	[5.517]	[3.158]	[0.040]	[0.024]	[0.032]	[0.024]
Observations	54,301	52,131	7,978	6,237	10,502	8,638	44,820	42,904	30,619	28,953
R-squared	0.156	0.152	0.552	0.572	0.152	0.179	0.126	0.118	0.079	0.075
Treatment	20	20	17	15	19	17	20	20	20	20
Control	30	30	19	18	14	13	29	29	30	30

Table 10: Interaction of CB reform with firm age and manager experience

The regressions below are estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. For the Access to Finance regressions, the estimates are marginal effects from a fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance		Interest rate	Maturity		Working capital by banks		Fixed assets by banks	
CB Reform	0.098**	0.168***	-0.040	7.088*	35.423**	0.046**	0.053**	0.064***	0.064***
	[0.049]	[0.054]	[0.027]	[4.142]	[12.644]	[0.023]	[0.023]	[0.023]	[0.024]
CB reform X	-0.012		-0.004	-0.149		-0.004		-0.017***	
Log firm age	[0.013]		[0.004]	[1.427]		[0.006]		[0.006]	
CB reform X		-0.003***		-0.022		-0.002***			-0.001*
Manager experience		[0.001]		[0.067]		[0.001]			[0.001]
Manager experience		0.001		-0.059		0.000			-0.000
		[0.001]		[0.049]		[0.000]			[0.000]
Log firm size	0.112***	0.123***	-0.003***	0.794***	2.692***	0.028***	0.035***	0.030***	0.034***
	[0.005]	[0.006]	[0.001]	[0.264]	[0.687]	[0.002]	[0.004]	[0.002]	[0.004]
Manufacturing	0.028**	-0.001	0.000	-0.595	-1.316	0.008*	0.000	0.019***	0.012
	[0.013]	[0.016]	[0.002]	[0.812]	[1.757]	[0.005]	[0.006]	[0.005]	[0.007]
Exporter	0.063***	0.066***	-0.004*	-0.282	1.310	0.030***	0.033***	0.018***	0.016
	[0.012]	[0.016]	[0.002]	[0.767]	[1.664]	[0.006]	[0.010]	[0.007]	[0.012]
Foreign owned	-0.068***	-0.073***	-0.014***	-0.502	5.516**	-0.034***	-0.050***	-0.052***	-0.059***
	[0.016]	[0.025]	[0.003]	[1.024]	[2.088]	[0.007]	[0.012]	[0.008]	[0.012]
Government owned	-0.160***	-0.089**	0.005	0.742	3.490	-0.021	0.048	-0.039*	0.013
	[0.033]	[0.038]	[0.004]	[1.269]	[4.641]	[0.020]	[0.030]	[0.022]	[0.034]
Log firm age	0.018***	0.033***	-0.001	-1.073	0.257	0.006**	0.012***	0.002	0.003
	[0.006]	[0.006]	[0.001]	[0.652]	[0.985]	[0.003]	[0.003]	[0.003]	[0.005]
Private credit	0.184	0.604**	-0.161**	29.615*	-366.522**	0.137**	0.275***	0.149**	0.252***
	[0.138]	[0.235]	[0.071]	[14.972]	[128.240]	[0.059]	[0.078]	[0.071]	[0.090]
Inflation rate	-0.048	0.108	0.051	8.857	314.686***	-0.002	0.125	-0.004	0.008
	[0.038]	[0.105]	[0.031]	[8.384]	[81.019]	[0.020]	[0.076]	[0.022]	[0.037]
GDP growth rate	0.367	0.257	-0.150*	111.424	-98.003	0.022	0.171	0.030	0.501*
	[0.327]	[0.470]	[0.089]	[100.092]	[236.384]	[0.184]	[0.274]	[0.189]	[0.261]
Constant			0.150***	32.760***	19.049	-0.020	-0.093*	0.002	-0.086
			[0.007]	[5.481]	[21.923]	[0.035]	[0.052]	[0.031]	[0.053]
Observations	55,176	33,125	8,106	10,663	2,314	45,577	21,656	31,132	15,482
R-squared	0.153	0.192	0.548	0.152	0.157	0.124	0.134	0.078	0.072
Treatment	20	14	17	19	4	20	7	20	14
Control	30	19	19	14	6	29	15	30	18

Table 11: Panel sample with firm fixed effects

The regressions below are estimated using firm fixed effects and robust standard errors, clustered at the firm level. For the Access to Finance regressions, the estimates are marginal effects after fixed effects logit regression. See Table 2 for the variable definitions. *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance	Interest rate	Maturity	Working capital by banks	Fixed assets by banks
CB Reform	0.051*** [0.018]	-0.120*** [0.021]	11.271*** [3.257]	0.011 [0.012]	0.060*** [0.019]
Log firm size	0.047*** [0.009]	0.023*** [0.008]	-0.001 [2.608]	0.004 [0.008]	0.018 [0.013]
Manufacturing	0.023 [0.025]	-0.031*** [0.011]	-7.421 [5.019]	0.018 [0.016]	0.044 [0.030]
Exporter	0.052** [0.024]	0.011 [0.009]	-2.395 [4.537]	0.038** [0.018]	0.001 [0.026]
Foreign owned	-0.022 [0.031]	-0.033** [0.017]	-5.471 [6.983]	0.006 [0.022]	0.006 [0.036]
Government owned	-0.036 [0.042]	-0.004 [0.018]	6.233 [7.610]	0.013 [0.030]	-0.062 [0.039]
Log firm age	0.032*** [0.011]	0.006 [0.008]	8.486** [3.468]	0.017** [0.008]	-0.002 [0.015]
Inflation rate	0.019 [0.060]	0.051 [0.048]	-24.907** [10.15]	-0.015 [0.027]	0.039 [0.058]
GDP growth rate	-0.440* [0.266]	-0.375** [0.175]	322.777*** [111.423]	-0.183* [0.096]	-0.346 [0.266]
Private credit	-0.004 [0.006]	-0.259*** [0.034]	58.789*** [20.515]	-0.004 [0.004]	-0.015 [0.013]
Constant		0.152*** [0.028]	16.936 [10.523]	0.047 [0.032]	0.104* [0.058]
Observations	7,535	576	936	5,114	3,325
R-squared	0.0333	0.426	0.076	0.007	0.011
Treatment	20	15	17	20	20
Control	18	11	9	18	18
Number of unique firms	3638	288	468	2,557	1,625

Table 12: Instrumental variable regressions

The regressions below are first and second stages of 2SLS regressions estimated using country and year fixed effects and robust standard errors, clustered at the country-year level. . *** p<0.01, ** p<0.05, * p<0.1

Variables	Access to finance	CB Reform	Interest rate	CB Reform	Maturity	CB Reform	Working capital by banks	CB Reform	Fixed assets by banks	CB Reform
Model	2SLS	1 st Stage	2SLS	1 st Stage	2SLS	1 st Stage	2SLS	1 st Stage	2SLS	1 st Stage
CB Reform	0.329*** [0.079]		-0.095* [0.051]		16.525** [6.867]		0.164*** [0.029]		0.229*** [0.048]	
Log firm size	0.089*** [0.004]	0.002 [0.002]	-0.003*** [0.001]	-0.003*** [0.001]	0.783*** [0.262]	-0.002 [0.001]	0.027*** [0.002]	0.002 [0.001]	0.027*** [0.002]	0.003* [0.002]
Manufacturing	0.018 [0.011]	0.000 [0.014]	0.000 [0.002]	0.001 [0.009]	-0.897 [0.818]	0.012 [0.011]	0.007 [0.005]	-0.008 [0.014]	0.012** [0.006]	0.009 [0.014]
Exporter	0.050*** [0.009]	0.001 [0.004]	-0.003* [0.002]	0.002 [0.002]	-0.262 [0.754]	-0.003 [0.002]	0.028*** [0.006]	0.008** [0.003]	0.017** [0.007]	0.003 [0.004]
Foreign owned	-0.049*** [0.013]	-0.009* [0.005]	-0.013*** [0.003]	-0.001 [0.003]	-0.533 [0.999]	0.004 [0.005]	-0.032*** [0.007]	0.002 [0.005]	-0.048*** [0.008]	-0.002 [0.005]
Government owned	-0.126*** [0.028]	-0.004 [0.009]	0.006 [0.004]	0.016*** [0.006]	0.738 [1.257]	0.011** [0.005]	-0.018 [0.019]	-0.004 [0.008]	-0.035* [0.021]	-0.012 [0.008]
Log firm age	0.014*** [0.004]	-0.005* [0.003]	-0.001 [0.001]	-0.000 [0.001]	-1.004* [0.581]	-0.006** [0.002]	0.007*** [0.002]	-0.003 [0.003]	-0.000 [0.003]	-0.002 [0.003]
Inflation rate	-0.038 [0.042]	-0.039 [0.110]	0.029 [0.050]	-0.451 [0.343]	14.694 [9.092]	-0.026 [0.360]	0.006 [0.025]	-0.143 [0.104]	0.022 [0.037]	-0.109 [0.120]
GDP growth rate	0.224 [0.378]	0.501 [0.978]	-0.067 [0.123]	1.202 [0.908]	76.910 [114.817]	4.964*** [1.756]	-0.059 [0.228]	1.358 [0.929]	-0.208 [0.332]	1.052 [1.044]
Private credit	-0.071 [0.153]	-0.008 [0.327]	-0.240** [0.095]	-2.240*** [0.636]	28.700 [17.532]	-2.290*** [0.836]	0.047 [0.090]	0.098 [0.386]	0.008 [0.111]	-0.091 [0.338]
Regional fraction of countries with CB		1.141*** [0.338]		0.530 [0.504]		2.640*** [0.683]		1.499*** [0.314]		1.318*** [0.366]
Regional fraction of countries with CB reform in last 5 years		0.878* [0.461]		2.129* [1.099]		0.600 [1.020]		1.087** [0.502]		0.788 [0.491]
Constant	0.370** [0.177]	-0.649*** [0.163]	0.145*** [0.009]	-0.420*** [0.150]	35.48*** [6.525]	-1.036*** [0.231]	0.015 [0.044]	-0.804*** [0.181]	0.072 [0.048]	-0.647*** [0.149]

Table 12: Instrumental variable regressions (continued)

Variables	Access to finance	CB Reform	Interest rate	CB Reform	Maturity	CB Reform	Working capital by banks	CB Reform	Fixed assets by banks	CB Reform
Model	2SLS	First Stage	2SLS	First Stage	2SLS	First Stage	2SLS	First Stage	2SLS	First Stage
Observations	55,176	55,176	8,106	8,106	10,663	10,663	45,577	45,577	31,132	31,132
R-squared	0.176	0.781	0.543	0.822	0.148	0.834	0.112	0.793	0.052	0.767
Treatment	20	20	17	17	19	19	20	20	20	20
Control	30	30	19	19	14	14	29	29	30	30
Kleibergen-Paap rk stat (weak instrument)	23.55		6.044		14.35		26.73		22.04	
Endogeneity test C Statistics	13.58		1.193		8.210		10.77		24.25	
Endogeneity test p-value	0.000228		0.275		0.00416		0.00103		8.45e-07	
AR weak-robust-inference test statistic	25.39		17.05		46.34		103.4		104.4	
AR stat p-value	3.06e-06		0.000198		8.64e-11		0		0	
Overidentification test Hansen J statistics	0.267		1.884		0.339		0.0553		0.467	
Overid test p-value	0.606		0.170		0.560		0.814		0.494	

Figure 1: Average trend of access variables for treatment and control countries in CB sample

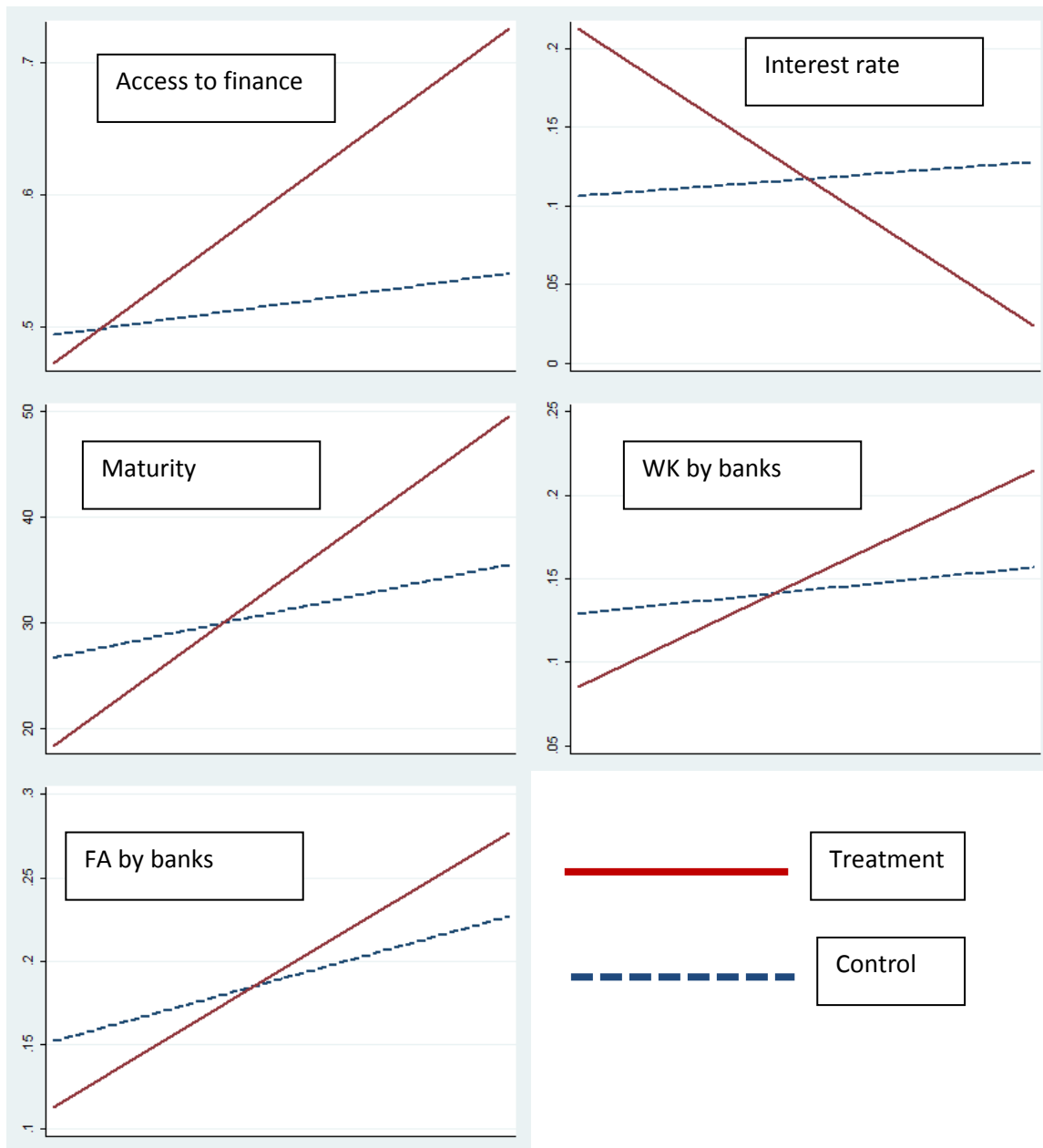
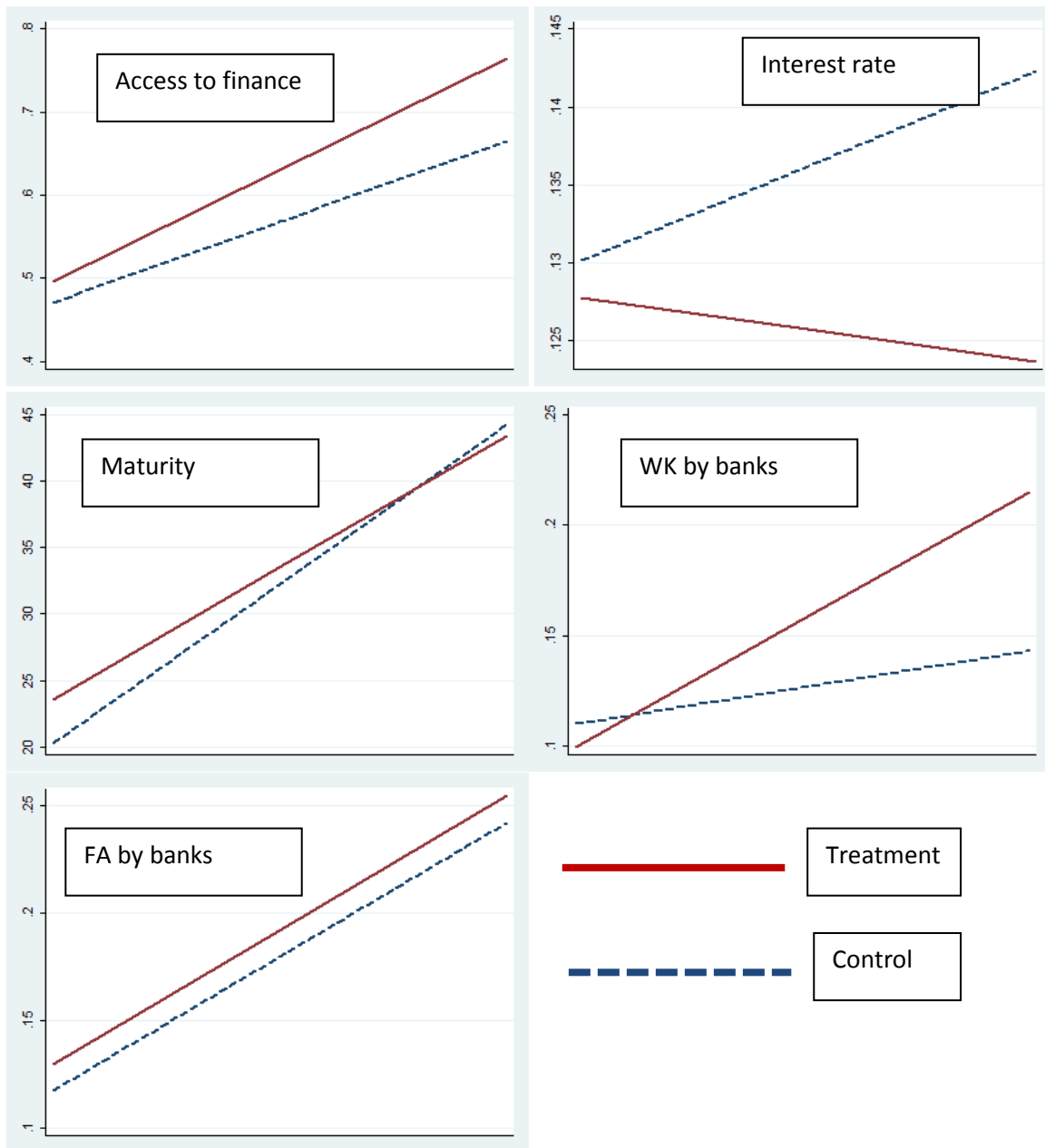


Figure 2: Average trend of access variables for treatment and control countries in CR sample



Appendix 1: Constructing the measure of access to finance

We use the World Bank Enterprise Surveys dataset assembled with a module of identical questions included in all questionnaires. The common framework of the questionnaire enables cross-country analyses using variables specified in the core module.

A complication in constructing the measure of access stems from changes in the core survey modules made for surveys administered after 2005. That is, the variables required to construct a measure of access are defined differently in the old (2002-2005) and new (2006-2013) 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 differences in the questionnaires, overdraft facility, line of credit, and loan are impossible to identify separately. We define *access to finance* as having 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 2006-2013), *access to finance*, is a dummy variable that takes value 1 if the firm responds “yes” to either of the two questions, and 0 if “no” to both. For countries with surveys using the old core module (i.e., those that took place between 2002-2005), *access to finance* is equal to one if (a) the firm responds yes to the first question on having an overdraft facility and line of credit and/or if (b) the firm provides a response to any of the questions about their most recent loan or overdraft facility. In other words, we assume that firms answering any further questions about their most recent loan or overdraft facility have access to at least one of the two types of financing.