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Collateral Registries for Movable Assets: Does Their  
Introduction Spur Firms' Access to Bank Finance?

By

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## **Collateral Registries for Movable Assets:**

### **Does Their Introduction Spur Firms' Access to Bank Finance?**

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#### **Abstract:**

Using firm-level surveys for up to 73 countries, this paper explores the impact of introducing collateral registries for movable assets on firms' access to bank finance. It compares firms' access to bank finance in seven countries that introduced collateral registries for movable assets against three control groups: firms in all countries that did not introduce a registry, firms in a sample of seven countries matched by location and income per capita to the countries that introduced registries for movable assets, and firms in countries that undertook other types of collateral reforms but did not set up registries for movable assets. Overall, the analysis finds that introducing collateral registries for movable assets increases firms' access to bank finance. There is also evidence that this effect is larger among smaller and younger firms.

**Keywords:** movable collateral, access to bank finance

**JEL:** K20, G21, G30

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## 1. Introduction

To reduce asymmetric information problems associated with extending credit and increase the chances of loan repayment, banks typically require collateral from their borrowers.<sup>1</sup> For example, according to World Bank Enterprise Surveys performed in over 100 countries, collateral was required in over 75% of all loans.<sup>2</sup> Many theoretical models postulate that the availability of collateral is a binding constraint on financing, and that this constraint is more binding in underdeveloped financial markets (Liberti and Mian, 2010). Empirically, insufficient collateral is one of the main reasons firms are rejected when they apply for bank credit (Fleisig et al., 2006).

Movable assets, as opposed to fixed assets such as land or buildings, often account for most of the assets of private firms and comprise an especially large share of assets for micro, small and medium-size enterprises. However, banks in developing countries are usually reluctant to accept movable assets as collateral due to the inadequate legal and regulatory environment in which banks and firms co-exist. In this context, movable assets become “dead capital” (Fleisig et al, 2006).<sup>3</sup>

While a sound legal and regulatory framework is essential to allow movable assets to be used as collateral, registries for movable assets fulfill two key functions: to notify parties about the existence of a security interest in movable property (of existing liens) and to establish the priority of creditors vis-a-vis third parties (Alvarez de la Campa, 2011). Therefore, without a well-functioning registry for movable assets, even the best secured transactions laws could be ineffective or even unusable.

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<sup>1</sup> See Steijvers and Voordeckers (2009) for a recent survey of empirical studies on the use of collateral to mitigate credit rationing.

<sup>2</sup> Enterprise surveys are available at <http://www.enterprisesurveys.org/>

<sup>3</sup> For example, Safavian et al. (2006) claim that nearly 90 percent of movable property that could serve as collateral for a loan in the United States would likely be unacceptable to a lender in Nigeria.

Given the importance of collateral registries for movable assets, 18 countries have established such registries in the past decade.<sup>4</sup> However, to our knowledge there is no systematic empirical evidence on whether such reforms have been effective in fulfilling their primary goal: improving firms' access to bank finance.<sup>5</sup> This paper seeks to fill this gap in the literature.

Specifically, this paper explores the impact of introducing collateral registries for movable assets on firms' access to bank finance using firm-level surveys for 73 countries. Following a difference-in-difference approach, we compare access to bank finance pre and post the introduction of movable collateral registries in seven countries (i.e., the reform or treatment sample) against three different "control" groups: a) firms in all countries that did not implement collateral reforms during our sample frame (59 countries), b) firms in a sample of seven countries matched by region and income per capita to the countries that introduced movable collateral registries, and c) firms in countries that undertook collateral legal reforms but did not set up registries for movable assets (7 countries). This difference-in-difference approach controlling for fixed country and time effects allows us to isolate the impact of the introduction of movable collateral registries on firms' access to bank finance. In addition, we discuss possible endogeneity concerns that may arise and, to address them, we perform an instrumental variable (IV) estimation using the time-varying share of pre-existing collateral registries in the region as an instrument. Our instrument is a strong predictor of registry reform and we believe easily passes the exclusion restriction, since the share of countries with a collateral registry in the region is unlikely to affect firm-level access to finance in a country by any other channels. Our results are robust to this approach.

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<sup>4</sup> Data constraints force us to limit our analysis of the impact of the introduction of collateral registries to 7 countries because we can only use countries with existing firm-level surveys before and after the reform introduction.

<sup>5</sup> There is some anecdotal evidence based on case studies reported in IFC (2010) that two countries that have introduced electronic registries have reported an increase in registrations and cheaper credit.

Overall, we find that introducing movable collateral registries increases firms' access to bank finance. In particular, our baseline estimations indicate that the introduction of registries for movable assets is associated with an increase in the likelihood that a firm has a bank loan, line of credit or overdraft, a rise in the share of the firm's working capital and fixed assets financed by banks, a reduction in the interest rates paid on loans, and an increase in the maturity of bank loans. The impact is economically significant: registry reform increases access to bank finance by almost 10 percentage points and access to loans by 8 percentage points. These are sizeable effects considering that in our sample, about 60 percent of firms have access to finance and 47 percent have a loan. There is also some evidence that the impact of the introduction of registries for movable assets on firms' access to bank finance is larger among smaller firms, who also report a reduction in a subjective, perception-based measure of finance obstacles. Finally, we find that young firms benefit disproportionately more from movable collateral registries, consistent with evidence that they generally are more constrained and lack fixed assets that older firms have had the time to accumulate.

Our paper is related to the large literature that investigates whether collateral reduces credit rationing and increases access to finance, which follows the seminal work of Stiglitz and Weiss (1981). However, this literature largely focuses on the US and other developed countries.<sup>6</sup> One of the few related papers that uses non-US data is Liberti and Mian (2010), who investigate how financial development affects the costs and types of collateral used in 15 countries. They find that the cost of collateral declines with improved financial development. More relevant for our study, they also find that in more financially developed countries firms can use more "firm-specific" assets, i.e., movable assets. However, they do not investigate the impact of the cost of collateral on firms' access to finance as their data come from one large multinational bank;

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<sup>6</sup> See Steijvers and Voordeckers (2009) for a recent survey.

neither do they explore changes in collateral laws and the introduction of collateral registries for movable assets, which is the focus of our paper.

Another related and recent study is by Nguyen and Qian (2012), who investigate the prevalence and determinants of the use of collateral in 43 countries and find that in countries with better institutions, firms are less likely to pledge collateral. However, their study does not consider the relationship between movable collateral registries and access to finance.

Our paper is also closely related to the literature on the establishment of credit bureaus and credit registries, which play a similar role to collateral registries in improving credit availability. Theory suggests that information sharing can overcome adverse selection and moral hazard problems in credit markets (Pagano and Jappelli, 1993 and Padilla and Pagano, 2000). The ability of creditors to repossess collateral should have a similar effect on reducing adverse selection and moral hazard in credit markets. Using aggregate cross-country data Jappelli and Pagano (2002) show that bank lending is higher and credit risk is lower in countries where lenders share information. Similarly, Djankov, McLiesh and Shleifer (2007) show that the quality of credit information is correlated with higher levels of private credit. Using firm level data Love and Mylenko (2005) show that the establishment of credit registries reduces firms' credit constraints and, more recently, Brown, Jappelli and Pagano (2009) use panel data from 24 countries in Eastern Europe to show that information sharing is associated with improved availability and lower cost of credit to firms. Using bank-level data, Houston et al. (2010) show that greater information sharing leads to higher bank profitability, lower bank risk, a reduced likelihood of financial crisis, and higher economic growth. While the research in support of the establishment of credit information sharing schemes has flourished in recent decades, to our

knowledge, this is the first paper to investigate the impact of introducing of collateral registries for movable assets on firms' access to finance.

Finally, our paper also relates to a broader literature that investigates the importance of the legal system for the availability and costs of finance. Following the seminal work of La Porta et al (1998), who brought to the spotlight the relationship between creditor rights and financial development, a number of subsequent studies have explored this relationship empirically in various settings. For example, Demirguc-Kunt and Maksimovic (1998) find that in countries whose legal systems score high on an efficiency index, a greater proportion of firms use long-term external financing. Djankov et al. (2007) find that better creditor protection is associated with higher ratios of private credit to GDP. Qian and Strahan (2007) find that better creditor protection results in more concentrated ownership of syndicated loans, longer maturities, and lower interest rates. Bae and Goyal (2009) find that weaker enforceability of contracts results in smaller loan amounts, shorter loan maturities, and higher loan spreads. More closely related to our work, Haselmann et al. (2010) find that legal reforms increase the supply of bank credit in 12 transition countries. Importantly, they also find that changes in collateral laws have larger impact than changes in bankruptcy laws. However, none of the papers above has investigated the specific reform we are focusing on – the introduction of collateral registries for movable assets.

The rest of the paper is structured as follows. Section 2 gives background information on collateral registries. Section 3 discusses the data used in our analysis. Section 4 lays out the empirical methodology. Section 5 presents the empirical results. Section 6 concludes.

## **2. Collateral Registries**

Many firms in developing countries cite access to finance as one of the key obstacles to the operation and growth of their business. An important reason for lack of finance is the information asymmetry problem faced by banks, which is exacerbated in developing countries. For example, dependable information on borrowers is often unavailable in developing countries because credit reporting is weak and ineffective, accounting standards are lax and firms' financial statements are unreliable. Therefore, collateral is the most common mechanism lenders use to deal with asymmetric information. Information about the value of collateral is often easier to obtain than information about the borrower. In addition, collateral prevents the intentional default and, hence, helps avoid moral hazard. As a result, loans secured by collateral have more favorable terms – such as longer maturity and lower interest - than unsecured loans do, for any given borrower or size of loan. In addition, collateralized loans tend to have a much larger size relative to the borrower's income (Fleisig et al, 2006).

Despite the advantages offered by the use of collateral, one of the reasons most cited by firms for lack of finance is insufficient, unacceptable or unsuitable collateral. For example, in the developing world 78% of the capital stock of businesses is typically in movable assets such as machinery, equipment or receivables, and only 22% is in immovable property (see Alvarez de la Campa, 2011). In contrast, in the US only about 60% of the capital stock is movable assets and, importantly, lenders consider such assets as reliable source of collateral (Safavian et al., 2006). Hence, movable assets are the main type of collateral that firms, especially those in developing countries, can pledge to obtain bank financing. However, banks in developing countries prefer land and real estate as collateral. As a result, there is a large mismatch between the collateral firms have and that banks will accept. This mismatch is responsible for lack of access to finance



for all but the largest firms. Surveys reveal that when firms apply for a loan or a line of credit, the most common reason why their applications are rejected is insufficient collateral (Fleisig et al., 2006). Often firms do not even apply for loans because they expect their applications to be rejected.

Two main reasons banks in developing countries are reluctant to accept movable assets as collateral are the weak and ineffective legal protection and the lack of collateral registries. Specifically, three conditions are required for banks to be able to accept movable assets as collateral: the creation of security interest, the perfection of security interest, and the enforcement of security interest (see Fleisig, 1995). The movable collateral registry is a necessary component as it allows for the “perfection” of security interest. In simple terms, this means that the lender has to be able to establish whether the asset that is being pledged as collateral has already been used as collateral on another loan. Lack of such information can cause conflicts in establishing the priority of claims and will make lenders reluctant to use such assets as collateral. For example, before the reform of Bulgaria’s secured transactions law, the collateral pledges had to be recorded in notarial registries. However, there were hundreds of such registries around the country and, not surprisingly, they were rarely used for such purpose (see Fleisig et al., 2006). Another interesting case is that of Peru, which had a total of 32 different registries for recordation of different types of collateral (see Fleisig et al., 2006). Often, the same pledge could be registered in different types of registries. For example, a fishing company’s boat could be registered in a boat registry, a company registry, or an inventory registry. Furthermore, if several pledges were recorded in different systems, it was unclear which pledge had priority.

Alvarez de la Campa et al. (2012) offer a review of the international standards and best practices regarding the functioning of movable collateral registries.<sup>7</sup> The study also summarizes the experiences and practices in place in 35 countries around the world as captured by a survey of registries conducted in 2010.<sup>8</sup> To summarize, while the existence of registry is not a sufficient condition for lenders to be able to use movable assets as collateral, it appears to be a necessary condition without which even the best set of collateral laws is likely to be ineffective.

### 3. Data

We use two main datasets to study the impact of the introduction of collateral registries for movable assets on firms' access to bank finance: the *Doing Business* and the *Enterprise Surveys* datasets compiled by the World Bank.<sup>9</sup> The *Doing Business* dataset contains annual measures of business regulations for local firms in 185 economies since 2004.<sup>10</sup> In particular, this dataset allows us to identify the countries and years when movable collateral registries were introduced. We also use this source to pinpoint countries that undertook other types of reforms that strengthened collateral laws.

The *Enterprise Survey* dataset provides firm-level data on access to bank finance and other firm characteristics. The survey includes various questions on access to bank finance. First, the survey asks firms if they have a loan, line of credit or overdraft.<sup>11</sup> Second, the survey identifies firms that currently have a loan. Third, the survey asks firms to report the share of working capital and, separately, of fixed assets financed by banks. Fourth, for firms that have a

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<sup>7</sup> In particular, the study discusses the principles established in the 2002 Organization of American States Inter-American Law on Secured Transactions and the 2007 United Nations Commission on International Trade Law Guide on Secured Transactions.

<sup>8</sup> Table 2 (on page 18) in Alvarez de la Campa et al. (2012) presents a list and description of the key features of an efficient movable collateral registry.

<sup>9</sup> Fleisig et al. (2006) endorse the use of these datasets to study the impact of reforming collateral regimes.

<sup>10</sup> The *Doing Business* dataset can be found at <http://www.doingbusiness.org>.

<sup>11</sup> Appendix 1 describes in detail how we generate the dependent variables.

loan, the dataset includes information on the interest rate and maturity of the most recent loan. Finally, the Enterprise Survey asks firms to rate the severity of access to finance as an obstacle for their operations and growth. The Enterprise Survey also includes information on other firm characteristics such as size, ownership, exporter status, and sector, which we include as control variables in our estimations.

In order to be able to control for country fixed effects in our estimations, we only consider countries with at least two Enterprise Surveys since 2002, when these surveys were published with standardized country data matched to a common set of questions to allow cross-country analyses. In addition, because our primary interest is to study the impact of the introduction of collateral registries for movable assets on access to finance, we are only able to include countries with such reforms that have at least one enterprise survey before the reform and at least one after the reform. Our final sample includes 73 countries. Among these countries, 7 introduced a collateral registry for movable assets (Bosnia, Croatia, Guatemala, Peru, Rwanda, Serbia, and Ukraine) and 7 implemented other types of collateral reforms without introducing a registry for movable assets (Armenia, Georgia, Kyrgyzstan, Mauritius, Poland, Romania, and Vietnam).<sup>12</sup> We also pick a sample of 7 countries from our sample of non-reform countries: – Macedonia, Czech Republic, Ecuador, El Salvador, Belarus, Burkina Faso and Azerbaijan- that are matched to the registry reform countries based on their region and their per capita GDP. Table 1 shows the countries and surveys used in our analysis and identifies (a) countries that introduced collateral registries for movable assets, (b) countries that introduced other collateral

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<sup>12</sup> The collateral registry is one of the items in the Doing Business “Getting Credit” index, which in addition contains 7 components that pertain to movable collateral laws and two components pertaining to bankruptcy laws. Some of the collateral reforms outside from the introduction of a registry include: allowing out-of-court enforcement of collateral (e.g., Armenia, Georgia, Mauritius, Romania) and introducing a law that allows a business to grant a nonpossessory security right in a single category of movable assets (such as accounts receivable or inventory), without requiring a specific description of the collateral (e.g., Kyrgyzstan, Vietnam).

reforms, (c) countries that did not introduce any reforms and are not part of the matched sample, and (d) countries matched based on availability of surveys, region and GDP per capita to our sample of countries that introduced a collateral registry for movable assets.<sup>13</sup> Table 2 lists the treatment countries (i.e., those that introduced movable collateral registries) along with their respective matched countries, including details on the survey years, region, and GDP per capita (our three matching criteria).

For each country that introduced a registry for movable collateral, Figure 1 shows the share of firms that reported having access to a line of credit, loan or overdraft in the period before and after the registry for movable collateral was introduced. With the exception of Guatemala, all countries that introduced a registry for movable collateral seemed to have experienced a significant increase in access.<sup>14</sup> These figures, however, do not establish that the introduction of a collateral registry *causes* an increase in access to finance. For example, the increase in access to finance post reform shown in Figure 1 could be capturing a secular worldwide trend upwards in overall access. In order to better portray the effect of the introduction of a collateral registry for movable assets, we next graphically compare the reform countries with a counterfactual. Figure 2 compares the share of firms with access to a bank loan, line of credit or overdraft pre and post reform in countries that introduced collateral registries for movable assets vis-a-vis the matched sample of countries that did not introduce such registries. This graph shows that there is in fact an increase in share of firms with access to finance even for the group of countries that did not introduce a registry, but that the increase is higher among reform countries. Figure 2 offers prima facie evidence that introducing a collateral registry for

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<sup>13</sup> The matched countries may or may not have a pre-existing registry, but have not had a registry reform (i.e. new registry introduction) within our sample frame.

<sup>14</sup> Alvarez de la Campa et al. (2012) conduct a survey of movable registries in 35 jurisdictions including Guatemala and show that, relative to other registries, the Guatemalan registry charged higher fees and consequently was not used frequently by firms.

movable assets improves firm access to finance. However, more rigorous evidence that controls for firm characteristics and country and time effects is required to be able to reach more definitive conclusions regarding the impact of introducing a registry for movable assets. We turn to this analysis next.

#### 4. Empirical Methodology

We examine the impact of introducing a collateral registry for movable assets on firms' access to bank finance by estimating equation (1) below:

$$\text{Access Finance Indicator}_{i,j,t} = \beta \text{Registry reform}_{j,t} + X_{i,j,t} + Z_{j,t} + \alpha_j + \gamma_t + \varepsilon_{i,j,t} \quad (1)$$

where *Access Finance Indicator* refers to seven different measures of firms' access to credit for firm  $i$  in country  $j$  at time  $t$ : *Access to Finance* is a dummy that takes the value of 1 if the firm has a line of credit, loan or overdraft; *Access to Loans* is a dummy that captures whether the firm has an outstanding loan; *Financing Obstacle* takes the value of 1 if the firm considers access to finance a major or severe obstacle to its operations and growth; *Working Capital Financed by Banks* is the percentage of the firm's working capital that is financed by banks; *Fixed Assets Financed by Banks* is the share of the firm's fixed assets financed by banks; *Interest Rate* refers to the interest rate paid by the firm on the most recent loan and, finally, *Maturity* is the maturity (in months) for the firm's most recent loan.  $X$  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), obtained from the World Development Indicators database.  $\alpha_j$  and  $\gamma_t$  represent country and year fixed effects, respectively. Country fixed effects are important in our estimations as they allow us to capture any other country-specific characteristics that can impact access to finance, such as the quality of the contract laws and their enforcement. Country fixed effects can also capture country specific differences in the demand for loans. Time effects control for the impact of common shocks across countries. Hence, country and time fixed effects help isolate the impact of collateral registry reform from all other country differences and time effects. Table 3 provides data sources and detailed definitions for each of the variables used in our estimations. Table 4 presents summary statistics.

Our primary variable of interest is *Registry Reform*, which is equal to one for all countries that introduced a collateral registry for movable assets but only for the years after the reform. Thus, the *Registry Reform* variable can be thought of as the interaction of a dummy for the set of countries that introduced a collateral registry for movable assets during our sample period (i.e. the treatment sample) with a country-specific dummy which identifies the years after reform. Thus, our empirical methodology is akin to a difference-in-difference format, comparing countries with reform and countries without reform, and comparing years pre- and post-reform. Because of the country fixed effects, we do not need to include a separate time-invariant dummy for reform countries.

We conduct different estimations of equation (1) varying the sample of countries included in the regressions. The “treatment sample” (i.e., those 7 countries that introduced collateral registries for movable assets – i.e. the “reform” countries) does not change, but we vary the “control group”. First, we consider all non-reform countries as part of the control group.

This includes 59 countries.<sup>15</sup> Second, we consider a matched sample of countries, obtained by pairing each of the reform countries with a country in the same region with a similar level of per capita income. This sample includes a total of 14 countries (i.e., 7 reformers and 7 matched controls). Finally, because most countries (with the exception of Croatia, Guatemala, and Serbia) that introduced collateral registries for movable assets also reformed their collateral laws, we consider as control countries those that reformed their collateral legal framework, but did not introduce a collateral registry for movable assets.<sup>16</sup> This sample consists of 7 countries that undertook changes in their collateral laws. By comparing the sample of countries that introduced the registry with those that undertook other collateral (legal) reforms, we are able to isolate the impact of the introduction of a registry for movable collateral.

Finally, we allow for a heterogeneous impact of registry reform across firms by estimating a version of equation (1) interacting the *Registry Reform* dummy with firm size dummies and, separately, firm age. In particular, we include two dummies for small (those with less than 20 employees) and medium sized (those with 20 to 99 employees) firms. A priori, we expect SMEs and young firms, which have been shown to be more credit constrained, to benefit more from the introduction of a collateral registry for movable assets.

## 5. Results

### 5.1. Baseline estimations

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<sup>15</sup> This sample includes countries that did not have a registry reform in our sample, and countries that had a registry reform for the whole sample. The fixed effects included in all our regressions proxy for the “type” of country – i.e. always with a registry or never with a registry.

<sup>16</sup> We also tried running regressions including as the treatment group only those countries that introduced a movable collateral registry without undertaking any other legal reform (i.e., Croatia, Guatemala and Serbia) and found similar results.

Table 5 shows our baseline estimations where we assess the impact of the introduction of collateral registries for movable assets on firm access to bank finance. As discussed above, we do this by comparing different indicators of firms' access to finance before and after the introduction of movable collateral registries vis-a-vis the complete sample of 59 countries that did not set up a collateral registry for movable assets during our period of analysis. Columns (1) and (2) report marginal effects from fixed effect logit estimations. These show that the introduction of a collateral registry for movable assets has a statistically significant and positive impact on the likelihood that a firm has access to finance broadly (access to a loan, line of credit or overdraft) or narrowly (access to a loan) defined. This effect is also economically significant: the introduction of a collateral registry for movable assets increases access to bank finance by almost 10 percentage points and access to loans by 8 percentage points. These are sizeable effects, considering that on average 60 percent of firms have access to finance and 47 percent have a loan.

As shown in columns (4) and (5), respectively, the introduction of a movable collateral registry also increases the percentage of working capital and of fixed assets financed by banks by 10 and 20 percent, respectively. These effects are very large considering that in our sample on average 14 and 18 percent of firms' working capital and fixed assets, respectively, are financed by banks.

For firms with a loan, columns (6) and (7) show that the introduction of a collateral registry for movable assets affects loan terms significantly. In particular, the introduction of a registry is associated with a 3 percentage point reduction in interest rates and a 6 month extension of the maturity of a loan. As before, these effects are considerable, given that the average interest rate is 13 percent and the average loan maturity is 31 months.



## ***5.2. Exploring differences by firm size and age***

An extensive literature has shown that small and medium sized firms tend to be more financially constrained than their large counterparts (Schiffer and Weder, 2001; Cressy, 2002, IADB, 2004; and Beck et al., 2005, 2006, and 2008). Hence, it is interesting to investigate whether SMEs are more likely to benefit from the introduction of collateral registries for movable assets which effectively allow firms to widen the range of assets that they can pledge in exchange for financing. Table 6 repeats our baseline estimations (i.e., those including all non-reform countries as part of the control group) but incorporating interactions of the registry reform variable with separate dummies that identify small (5-19 employees) and medium sized firms (20-99 employees). The results provide some evidence that small firms benefit more than large firms from the introduction of registries for movable collateral. In particular, the impact of registries is stronger for small firms in the regressions for the probability that the firm reports experiencing severe financing constraints, and the share of working capital and of fixed assets financed by banks. Interestingly, the subjective reporting of financing constraints by firms is only significantly reduced for small and medium firms (as it was not significant for the overall sample in our previous regressions).

We also explore whether firms of different age are differentially impacted by the introduction of a collateral registry for movable assets. Younger firms are more likely to struggle in a credit environment that lacks a registry because they have shorter credit histories and typically do not have established relationships with lenders (Berger, 1995; Cole, 1998; Chakrobarty et al., 2006; Menkoff et al., 2006; Steijvers et al., 2009, Ezeoha et al., 2011). In addition, they are less likely to have fixed assets to pledge as collateral and thus stand to benefit more from the movable credit registries, which allow them to expand the range of assets they can

pledge as collateral (Steijvers et al., 2009). Thus, the introduction of a movable collateral registry may enhance younger firms' ability to obtain credit, more so than it does for older firms with longer credit histories and more fixed assets. We investigate the veracity of this line of reasoning by introducing the interaction of firm age (log) and registry reform to our baseline regression (comparing to all non-reform countries). The results in Table 7 provide strong evidence that younger firms benefit substantially more than older firms from the introduction of movable collateral registries. In particular, younger firms have greater access to finance and loans, report being less credit constrained, have greater shares of working capital and fixed assets financed by banks, and are able to negotiate longer maturity on bank loans after the introduction of movable collateral registry.

### ***5.3. Robustness checks***

We conduct a number of estimations to verify the robustness of our results. First, to correct for cross-country differences in the number of firms (i.e., to account for the fact that, for example, in two rounds of surveys, over 4,500 firms were surveyed in India and less than 300 were surveyed in Malawi) we conduct regressions weighted by the inverse of the number of observations per country. Effectively, what we do when we apply this weighting scheme is to give equal weight to each country in our sample. These results, reported in Table 8 show that the introduction of registries for movable assets continues to have a significant impact on most indicators of access to finance once we weight our estimations by the inverse of the number of firms sampled in each country. In particular, we find that the adoption of a collateral registry for movable assets has a positive impact on the likelihood that a firm has access to a loan, line of

credit or overdraft; it significantly lowers the interest rate on loans, while at the same time increasing the maturity of the financing.

Second, we run estimations where we contrast results for the seven countries that introduced a collateral registry for movable assets against a matched sample of seven countries selected based on the availability of pre- and post-reform surveys, the geographic location, and GDP per capita of each reform country. These results are reported in Table 9. Despite a large drop in our sample size, our results remain robust. Thus, Table 9 confirms that the adoption of a collateral registry for movable assets has a positive impact on the likelihood that a firm has access to a loan, line of credit or overdraft; it increases the share of working capital financed by banks, and it significantly lowers the interest rate on loans.

Third, because four out of the seven countries that introduced collateral registries also introduced other changes to their collateral legal framework, we run estimations with a control sample of countries that introduced reforms to their collateral laws but did not set up a movable collateral registry. The purpose of these estimations is to isolate the impact of setting up a registry for movable collateral from that of changes in collateral laws that are often undertaken at the same time the movable collateral registry is introduced. These results, presented in Table 10, show that the introduction of a collateral registry for movable assets increases the likelihood that the firm will have access to finance broadly defined (i.e., access to a loan, line of credit or overdraft), raises the share of fixed assets financed by banks and lengthens the maturity of bank loans. Hence, the introduction of a movable collateral registry has an impact on access to finance over and above the impact of changes in the collateral laws. In additional regressions (not reported), we reproduce Table 6 and Table 7 with interactions of registry reform with size and age, respectively, using our matched control sample and the sample of countries that introduced

changes to their collateral laws. For both these alternate samples, the results show that the impact of registries is stronger for small firms and for younger firms.<sup>17</sup>

Finally, we run estimations with additional country controls in lieu of private credit to capture the effect of the credit environment. As a robustness check, in Table 11 we drop private credit and alternatively control for the closing business, credit information and contract enforcement indices<sup>18</sup> from the Doing Business database. Results in Table 11 show that the sign and statistical significance of the registry reform variable is generally unchanged by the introduction of these alternate controls for credit environment.

#### ***5.4. Addressing the potential endogeneity of reform***

A possible concern with our analysis is that estimates for the impact of collateral registry reform on access to finance may suffer from bias due to endogeneity in the location and timing of registry introduction. For example, a country's increased demand for finance may also drive the country to reform their collateral registry, thus leading countries with higher increases in access to finance to self-select into the treatment group. In such a scenario, the impact on access to finance we observe, even with the control sample, would be attributed to the pre-reform increase in demand for finance, and not to the causal effect of reform. Another possible source of bias could come from omitted variables that affect the introduction of the registry reform and also increase access to finance. Thus, it is important to understand what is driving the registry reform.

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<sup>17</sup> These results are available upon request.

<sup>18</sup> The credit information index is directly drawn from the Getting Credit module. We created the enforcing contract and closing business indices using principal component factor analysis from information available in their respective modules. Higher values on these indices correspond to stricter contract enforcement environment and lesser procedural constraint to closing a business, respectively. Both the indices are standardized with mean 0 and standard deviation 1.

The body of empirical research on the determinants of financial reform largely finds that there appear to be no consistent predictors of financial reform.<sup>19</sup> Abiad and Mody (2005) and Lora and Olivera (2004) find that distributional variables, political, and ideological systems do not drive financial reform. They do find that crises appear to lead to reform. Also, both these papers, along with Heckelman and Mazumder (2013) find strong evidence for regional convergence: reform appears to be dictated by the gap to regional leaders. For the purpose of our paper, regional convergence will not bias the estimates since it would not directly affect firm level access to finance. Crisis variables on the other hand, could potentially bias our baseline estimates as they are likely also correlated with movements in access to finance. However, for the seven treatment countries we verified that there was no systemic banking, currency or debt crisis preceding registry reform years (Laeven and Fabian 2013). Thus, the endogeneity concern is not very prominent in our case.

For the sake of thoroughness, however, we explicitly address the concern of endogeneity by estimating the impact of reform using instrumental variables (IV) regression. Guided by findings from the literature discussed above, we use the fraction of countries in the region with existing collateral registries for movable assets as an instrument for the potentially endogenous reform variable. We call this variable *regional registry share*. The advantage of this variable is that it varies by country and time. We first establish that instrument relevance is strong: that more countries in the region with an established registry increase the likelihood that a country will introduce its own registry. The first stage regressions are reported in Table 12 and show strong significance of regional registry share, i.e., our instrument, in predicting registry

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<sup>19</sup> We looked at the literature on determinants of financial reform in general as those pertaining to collateral registry in particular do not exist.

reform.<sup>20,21</sup> The exclusion restriction for the instrument is also convincing: the existence of a registry in other countries in the region should not impact access to finance by firms in the country directly or through any other channels besides its impact on the endogenous reform variable.

In Table 13, we present IV estimates on the impact of the introduction of collateral registries for movable assets.<sup>22,23</sup> We find the effects qualitatively consistent with the baseline and statistically significant for access to finance, percentage of working capital and fixed assets financed by banks, and maturity of loans.<sup>24</sup>

## 6. Conclusions

In this paper, we investigate the impact of the introduction of collateral registries for movable assets on firms' access to finance. Despite strong theoretical arguments that suggest that the introduction of such registries should improve access to finance, there is no prior evidence that systematically demonstrates that such reforms indeed accomplish their goals.

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<sup>20</sup> In the case of interest rates, the results are only marginally significant, at about 15%, but our sample size drops almost 10 fold from close to 60,000 observations to about 6,200 observations.

<sup>21</sup> We exclude countries that already had a registry in the beginning of our sample period to predict the first stage with more precision. Our IV results still hold with the larger control sample that includes countries that had a registry throughout the sample. In the first stage, we calculate the Cragg-Donald Wald statistic, which are significantly higher than the Stock-Yogo critical values for strong instrument. However, this is only suggestive as the statistics is only valid in the case of i.i.d errors.

<sup>22</sup> 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).

<sup>23</sup> We have also tested for endogeneity of the reform variable (using Sargan-Hansen difference statistics test in lieu of the more conventional Durbin-Wu-Hausman test that is only valid under i.i.d error). The results were mixed, but for access to finance, access to loan, financial obstacle and interest rate regressions, we failed to reject the null hypothesis, even at 10% significance level, that the reform variable is exogenous.

<sup>24</sup> In addition, we have experimented with a Heckit model, in which we select reforming countries in the first stage and estimate the impact among the reforming countries in the second stage. We obtained significant results in all specifications. However, we prefer to use IV estimates since they allow for instrumenting for the reforming country and timing of reform, while Heckit estimates only pick up the reforming countries in the first stage and do not address the timing of the reform. Nevertheless, both approaches confirm robustness of our results and alleviate endogeneity concerns.

We find that in countries that have introduced registries for movable collateral firms indeed experience increased access to bank finance, as well as declines in interest rates and extensions in loan maturity. We find that this impact is economically significant given that the number of firms with access to finance increases by about 10 percent, on average. Our methodology and robustness tests allow us to isolate the impact of registry reform from all other relevant country characteristics and time effects. In addition, we show that introducing a new registry for movable collateral has stronger benefits for small firms and for young firms, which are often more constrained in their access to finance and do not have many fixed assets that can serve as collateral.

Our paper provides the first rigorous evidence to suggest that introducing a registry for movable collateral has important benefits for firms' access to finance. This evidence has clear policy implications and may add weight to otherwise pervasive theoretical arguments that suggest that collateral registries can reduce information asymmetries between borrowers and lenders and improve access to finance.

One limitation of the paper is our relatively small sample of reformers, since we only have seven countries that introduced registries for movable collateral for which we are able to obtain pre and post reform data. Given the small sample of reformers, we are forced to treat all reforms homogeneously, but as argued by Alvarez de la Campa et al. (2012) not all registries operate in the same way (e.g., some are less flexible in terms of the procedures to register assets, some charge higher fees than others, etc.). Surely, differences in the way registries operate might affect the extent to which the introduction of a registry increases access to finance. As more countries introduce collateral registries for movable assets and more firm surveys post reform become available, it will be important to further test the robustness of our results and to examine

how differences in the functioning of collateral registries for movable assets affect their impact on access to finance.



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**Table 1: Countries and surveys included in the analysis**

The registry and collateral reform data come from disaggregated components of the Doing Business Legal Rights Index. As the Doing Business Report references data from the preceding year, we lag the Doing Business data by one year when matching it to the Enterprise Survey data. After matching, we consider the survey years before the reform year as pre-reform and those on or after the reform as post-reform for the two-way fixed effects analysis. *Registry reform year* refers to the year when countries introduced a collateral registry for movable assets. *Collateral reform year* refers to the year when countries introduced changes in their collateral legal framework. *Control sample* refers to those countries that did not undertake any changes in the collateral framework. *Matched control sample* refers to the countries matched to the registry reform countries based on their region and GDP per capita.

Country	Survey years	(a) Registry reform year	(b) Collateral reform year	(c) Control sample	(d) Matched control sample
Albania	2002, 2005, 2007			x	
Angola	2006, 2010			x	
Argentina	2006, 2010			x	
Armenia	2002, 2005, 2009		2006		
Azerbaijan	2002, 2005, 2009				X
Bangladesh	2002, 2007			x	
Belarus	2002, 2005, 2008				X
Benin	2004, 2009			x	
Bolivia	2006, 2010			x	
Bosnia-Herzegovina	2002, 2005, 2009	2005			
Botswana	2006, 2010			x	
Brazil	2003, 2009			x	
Bulgaria	2002, 2004, 2005, 2007, 2009			x	
Burkina Faso	2006 2009				X
Cameroon	2006, 2009			x	
Cape Verde	2006, 2009			x	
Chile	2004, 2006, 2010			x	
China	2002, 2003			x	
Colombia	2006, 2010			x	
Costa Rica	2005, 2010			x	
Croatia	2002, 2005, 2007, 2009	2007			
Czech Republic	2002, 2005, 2009				x
Dem. Rep. of Congo	2006, 2010			x	
Dominican Republic	2005, 2010			x	
Ecuador	2003, 2006, 2010				x
El Salvador	2003, 2006, 2010				x
Eritrea	2002, 2009			x	
Estonia	2002, 2005, 2009			x	
Georgia	2002, 2005, 2008		2008		
Guatemala	2003, 2006, 2010	2009			
Guyana	2004, 2010			x	
Honduras	2003, 2006, 2010			x	
Hungary	2002, 2005, 2009			x	
Indonesia	2003, 2009			x	
Jamaica	2005, 2010			x	
Kazakhstan	2002, 2005, 2009			x	
Kenya	2003, 2007			x	

<b>Country</b>	<b>Survey years</b>	<b>(a) Registry reform year</b>	<b>(b) Collateral reform year</b>	<b>(c) Control sample</b>	<b>(d) Matched control sample</b>
Kyrgyzstan	2002, 2005, 2009		2006		
Latvia	2002, 2005, 2009			x	
Lesotho	2003, 2009			x	
Lithuania	2002, 2004, 2005, 2009			x	
Macedonia	2002, 2005, 2009				x
Madagascar	2005, 2009			x	
Malawi	2005, 2009			x	
Mali	2003, 2007, 2010			x	
Mauritius	2005, 2009		2009		
Mexico	2006, 2010			x	
Moldova	2002, 2003, 2005, 2009			x	
Mongolia	2004, 2009			x	
Nicaragua	2003, 2006, 2010			x	
Niger	2005, 2009			x	
Pakistan	2002, 2007			x	
Panama	2006, 2010			x	
Paraguay	2006, 2010			x	
Peru	2002, 2006, 2010	2006			
Philippines	2003, 2009			x	
Poland	2002, 2003, 2005, 2009		2009		
Romania	2002, 2005, 2009		2007		
Russia	2002, 2005, 2009			x	
Rwanda	2006, 2011	2009			
Senegal	2003, 2007			x	
Serbia-Montenegro	2002, 2005, 2009	2006			
Slovakia	2002, 2005, 2009			x	
Slovenia	2002, 2005, 2009			x	
South Africa	2003, 2007			x	
Tajikistan	2002, 2003, 2005, 2008			x	
Tanzania	2003, 2006			x	
Turkey	2002, 2004, 2005, 2008			x	
Uganda	2003, 2006			x	
Ukraine	2002, 2005 2008	2005			
Uruguay	2006, 2010			x	
Vietnam	2005, 2009		2007		
Zambia	2002, 2007			x	

**Table 2: Countries that introduced a registry for movable collateral and their matched control group**

The registry and collateral reform data come from disaggregated components of the Doing Business Legal Rights Index. As the Doing Business report references data from the preceding year, we lag the Doing Business data by one year when matching it to the Enterprise Survey data. After matching, we consider the survey years before the reform year as pre-reform, and those on or after the reform as post-reform for the two-way fixed effects analysis.

Treatment Country				Matched Control Country			
Country	Survey years	Region	GDP per capita (pre reform) US dollars	Country	Survey years	Region	GDP per capita US dollars
Bosnia-Herzegovina	2002, 2005, 2009	Eastern Europe	1,766	Macedonia	2002, 2005, 2009	Eastern Europe	1,827
Croatia	2002, 2005, 2007, 2009	Eastern Europe	5,782	Czech Republic	2002, 2005, 2009	Eastern Europe	6,275
Guatemala	2003, 2006, 2010	Latin America	1,761	Ecuador	2003, 2006, 2010	Latin America	1,562
Peru	2002, 2006, 2010	Latin America	2,374	El Salvador	2003, 3006, 2010	Latin America	2,438
Rwanda	2006, 2011	Sub-Saharan Africa	272	Burkina Faso	2006, 2009	Sub-Saharan Africa	255
Serbia-Montenegro	2002, 2005, 2009	Eastern Europe	1,003	Belarus	2002, 2005, 2008	Eastern Europe	1,701
Ukraine	2002, 2005 2008	Eastern Europe	928	Azerbaijan	2002, 2005, 2009	Eastern Europe	945

**Table 3: Variable Description**

This table provides definitions and data sources for all variables used in our estimations

<b>Variable</b>	<b>Data Source: Description</b>
<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)
Access to loan	<i>Enterprise Survey</i> : Dummy variable. 1 if the firm has an outstanding loan
Financial obstacle	<i>Enterprise Survey</i> : Dummy variable. 1 if access to finance is a major or severe obstacle for the firm
Working capital financed by banks	<i>Enterprise Survey</i> : Proportion of working capital financed by banks
Fixed assets financed by banks	<i>Enterprise Survey</i> : Proportion 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
<i>Country-Level Variables</i>	
Registry reform	<i>Doing Business</i> : Dummy variable. 1 for a country that established a registry for movable assets in the period of or following the reform.
Inflation rate	<i>World Development Indicators</i> : Inflation, GDP deflator (annual)
Private credit	<i>World Development Indicators</i> : Domestic credit to private sector (fraction of GDP)
GDP Growth rate	<i>World Development Indicators</i> : Real GDP Growth rate (annual)
Credit information index	<i>Doing Business</i> : Depth of credit information index (0-6)
Closing business index	<i>Doing Business</i> : Principal component factor analysis of time, cost and recovery rate of closing a business
Contract enforcement index	<i>Doing Business</i> : Principal component factor analysis of time, cost and number of procedures of enforcing a contract
Regional registry existence	<i>Doing Business</i> : Fraction of countries in a region that have established a registry for movable assets in the year.



**Table 4: Summary Statistics**

This table provides descriptive statistics for all variables used in our estimations. Variable definitions are in Table 3.

Variable	Obs	Mean	Median	Standard Deviation	Min	Max
<i>Firm-Level Variables</i>						
Access to finance	80675	0.601	1	0.490	0	1
Access to loan	79045	0.476	0	0.499	0	1
Financial obstacle	77010	0.333	0	0.471	0	1
Working capital financed by banks	68052	0.143	0	0.259	0	1
Fixed Assets financed by banks	47873	0.189	0	0.335	0	1
Interest rate	13632	0.137	0.120	0.085	0	0.600
Maturity	21219	31.947	24.000	31.053	0	180
Log firm size	80675	3.412	3.219	1.481	0	7.438
Manufacturing	80675	0.611	1	0.488	0	1
Exporter	80675	0.226	0	0.418	0	1
Foreign owned	80675	0.103	0	0.304	0	1
Government owned	80675	0.046	0	0.210	0	1
Log firm age	80675	2.552	2.565	0.848	0	5.278
<i>Country-Level Variables</i>						
Registry reform	80675	0.066	0	0.248	0	1
Private credit	80675	0.390	0.283	0.479	0.019	13.400
Inflation rate	80675	0.087	0.064	0.097	-0.074	0.884
GDP growth (annual)	80675	0.049	0.052	0.038	-0.098	0.206
Closing business index	79966	0.066	0.168	0.551	-2.119	0.959
Credit information index	79676	3.442	4	2.043	0	6
Contract enforcement index	79966	0.093	0.252	0.835	-2.337	1.716
Regional registry existence	80675	0.388	0.367	0.177	0.087	0.667

**Table 5: Baseline estimations - Countries with registry reform (treatment) vs. countries with no reform (control).**

The two-way fixed effects regressions below are estimated using country fixed effects and year dummies, and with robust standard errors clustered at the country-year level. Regressions (1) - (3) are marginal effects from two-way fixed effects Logit regressions. Regressions (4) and (5) are two-way fixed effects tobit regressions. The first 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 second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *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 is government or foreign owned and zero otherwise. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. *Private credit* is a financial development variable that measures domestic credit to private sector as a fraction of GDP. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Registry reform	0.095*** [0.032]	0.083** [0.034]	-0.022 [0.039]	0.105* [0.056]	0.200*** [0.073]	-0.029* [0.016]	6.199** [2.880]
Log firm size	0.106*** [0.004]	0.097*** [0.004]	-0.021*** [0.003]	0.104*** [0.005]	0.159*** [0.011]	-0.003*** [0.001]	0.641** [0.247]
Manufacturing	0.004 [0.011]	0.018** [0.009]	0.073*** [0.008]	0.018 [0.013]	0.091*** [0.024]	-0.000 [0.002]	0.216 [0.821]
Exporter	0.061*** [0.010]	0.057*** [0.008]	0.010 [0.008]	0.084*** [0.013]	0.047** [0.021]	-0.004*** [0.001]	-0.163 [0.732]
Foreign owned	-0.073*** [0.013]	-0.128*** [0.011]	-0.109*** [0.007]	-0.159*** [0.018]	-0.351*** [0.035]	-0.010*** [0.003]	-1.471 [0.942]
Government owned	-0.176*** [0.038]	-0.135*** [0.032]	-0.005 [0.016]	-0.215*** [0.031]	-0.395*** [0.065]	0.003 [0.003]	0.578 [1.317]
Log firm age	0.020*** [0.004]	0.010** [0.005]	-0.007* [0.004]	0.007 [0.006]	-0.018* [0.010]	-0.001 [0.001]	-0.698 [0.503]
Private credit	-0.041 [0.162]	0.051 [0.174]	0.242 [0.150]	0.270 [0.192]	1.270*** [0.289]	0.021 [0.020]	-16.826 [21.517]
Inflation rate	-0.351*** [0.119]	-0.284** [0.124]	0.035 [0.081]	-0.522*** [0.123]	-0.869*** [0.227]	0.067* [0.036]	11.858 [11.060]
GDP growth rate	-0.022 [0.332]	-0.316 [0.411]	0.252 [0.434]	-0.004 [0.742]	0.652 [0.865]	-0.722*** [0.219]	27.880 [51.227]
Constant				-0.693*** [0.156]	-1.431*** [0.205]	0.176*** [0.015]	38.738*** [4.610]
Observations	72,713	71,006	69,125	61,071	41,747	8,954	14,819
R-squared	0.198	0.131	0.109	0.119	0.094	0.533	0.157
Treatment	7	7	7	7	7	4	6
Control	59	58	58	57	58	33	32

**Table 6: Interactions with firm size. Comparing registry reform countries with no reform countries**

The two-way fixed effects regressions below are estimated using country fixed effects and year dummies, and with robust standard errors clustered at the country-year level. Regressions (1) - (3) are marginal effects from two-way fixed effects Logit regressions. Regressions (4) and (5) are two-way fixed effects tobit regressions. The first 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 second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *Small firms* is a dummy for firms with less than 20 employees. *Medium firms* is a dummy for firms between 20 and 99 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 is government or foreign owned and zero otherwise, respectively. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. *Private credit* is a financial development variable that measures domestic credit to private sector as a fraction of GDP. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Registry reform	0.085*** [0.030]	0.103*** [0.035]	0.035 [0.048]	0.075 [0.047]	0.076 [0.064]	-0.028* [0.016]	3.991 [3.402]
Registry reform X Small sized firm	0.028 [0.038]	-0.026 [0.033]	-0.071*** [0.026]	0.080* [0.048]	0.275*** [0.067]	-0.001 [0.005]	3.161 [4.394]
Registry reform X Medium sized firm	0.008 [0.026]	-0.008 [0.028]	-0.067*** [0.017]	0.009 [0.039]	0.110 [0.088]	-0.003 [0.003]	2.968 [3.392]
Small sized firm	-0.333*** [0.013]	-0.290*** [0.013]	0.078*** [0.012]	-0.340*** [0.019]	-0.546*** [0.036]	0.007** [0.003]	-2.478** [1.006]
Medium sized firm	-0.136*** [0.010]	-0.114*** [0.010]	0.054*** [0.009]	-0.101*** [0.012]	-0.180*** [0.024]	0.005* [0.002]	-0.941 [0.659]
Manufacturing	0.012 [0.011]	0.025*** [0.009]	0.071*** [0.008]	0.020 [0.013]	0.094*** [0.024]	-0.001 [0.002]	0.219 [0.817]
Exporter	0.076*** [0.009]	0.073*** [0.008]	0.008 [0.008]	0.104*** [0.013]	0.073*** [0.021]	-0.005*** [0.001]	-0.087 [0.712]
Foreign owned	-0.056*** [0.012]	-0.109*** [0.011]	-0.111*** [0.007]	-0.138*** [0.017]	-0.321*** [0.034]	-0.011*** [0.003]	-1.371 [0.945]
Government owned	-0.139*** [0.035]	-0.105*** [0.031]	-0.011 [0.015]	-0.179*** [0.030]	-0.341*** [0.064]	0.002 [0.003]	0.808 [1.315]
Log firm age	0.027*** [0.004]	0.017*** [0.004]	-0.009** [0.004]	0.014** [0.006]	-0.004 [0.010]	-0.002* [0.001]	-0.639 [0.497]
Private credit	-0.012 [0.161]	0.070 [0.174]	0.236 [0.150]	0.276 [0.192]	1.271*** [0.284]	0.022 [0.020]	-16.932 [21.533]
Inflation rate	-0.353*** [0.119]	-0.285** [0.123]	0.035 [0.081]	-0.520*** [0.123]	-0.851*** [0.224]	0.067* [0.036]	11.901 [11.048]
GDP growth rate	-0.014 [0.333]	-0.305 [0.409]	0.249 [0.432]	0.045 [0.733]	0.700 [0.863]	-0.724*** [0.220]	27.693 [51.119]
Constant				-0.188 [0.153]	-0.639*** [0.201]	0.163*** [0.016]	42.154*** [4.742]
Observations	72,713	71,006	69,125	61,071	41,747	8,954	14,819
R-squared	0.192	0.125	0.109	0.116	0.0660	0.532	0.157
Treatment	7	7	7	7	7	4	6
Control	59	58	58	57	58	33	32

**Table 7: Interactions with firm age. Comparing registry reform countries with no reform countries**

The two-way fixed effects regressions below are estimated using country fixed effects and year dummies, and with robust standard errors clustered at the country-year level. Regressions (1) - (3) are marginal effects from two-way fixed effects Logit regressions. Regressions (4) and (5) are two-way fixed effects tobit regressions. The first 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 second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *Small firms* is a dummy for firms with less than 20 employees. *Medium firms* is a dummy for firms between 20 and 99 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 is government or foreign owned and zero otherwise, respectively. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. *Private credit* is a financial development variable that measures domestic credit to private sector as a fraction of GDP. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Registry reform	0.194*** [0.032]	0.155*** [0.052]	-0.099** [0.045]	0.209*** [0.068]	0.421*** [0.137]	-0.036** [0.016]	11.588*** [4.331]
Registry reform X Firm Log Age	-0.049*** [0.012]	-0.027** [0.012]	0.032*** [0.012]	-0.037*** [0.013]	-0.079** [0.035]	0.003 [0.002]	-2.049** [0.978]
Log firm size	0.106*** [0.004]	0.097*** [0.004]	-0.021*** [0.003]	0.104*** [0.005]	0.159*** [0.011]	-0.003*** [0.001]	0.658*** [0.246]
Manufacturing	0.003 [0.011]	0.018** [0.009]	0.073*** [0.008]	0.018 [0.013]	0.090*** [0.024]	-0.000 [0.002]	0.195 [0.820]
Exporter	0.061*** [0.010]	0.057*** [0.008]	0.010 [0.008]	0.084*** [0.013]	0.048** [0.021]	-0.004*** [0.001]	-0.173 [0.732]
Foreign owned	-0.073*** [0.013]	-0.128*** [0.011]	-0.109*** [0.007]	-0.159*** [0.018]	-0.351*** [0.035]	-0.010*** [0.003]	-1.479 [0.942]
Government owned	-0.174*** [0.038]	-0.134*** [0.032]	-0.007 [0.016]	-0.213*** [0.031]	-0.391*** [0.065]	0.003 [0.003]	0.584 [1.306]
Log firm age	0.023*** [0.004]	0.012** [0.005]	-0.009** [0.004]	0.009 [0.006]	-0.011 [0.011]	-0.001 [0.001]	-0.550 [0.534]
Private credit	-0.045 [0.162]	0.049 [0.174]	0.245 [0.150]	0.266 [0.192]	1.269*** [0.289]	0.021 [0.020]	-16.799 [21.560]
Inflation rate	-0.355*** [0.119]	-0.286** [0.124]	0.037 [0.081]	-0.523*** [0.123]	-0.869*** [0.227]	0.067* [0.036]	11.671 [11.073]
GDP growth rate	-0.023 [0.332]	-0.317 [0.411]	0.254 [0.434]	-0.004 [0.741]	0.657 [0.864]	-0.722*** [0.219]	27.510 [51.261]
Constant				-0.697*** [0.156]	-1.444*** [0.205]	0.176*** [0.015]	38.427*** [4.613]
Observations	72,713	71,006	69,125	61,071	41,747	8,954	14,819
R-squared	0.198	0.131	0.109	0.117	0.0673	0.533	0.157
Treatment	7	7	7	7	7	4	6
Control	59	58	58	57	58	33	32

**Table 8: Baseline estimations weighted by the inverse of the number of firms surveyed in each country**

The two-way fixed effects regressions below comparing countries that implemented registry reform to those with no reform (control) are estimated using country fixed effects and year dummies and with robust standard errors clustered at the country-year level. Regressions (1) - (3) are marginal effects from two-way fixed effects Logit regressions. Regressions (4) and (5) are two-way fixed effects tobit regressions. All estimations are weighted by the inverse of the number of firms surveyed in each country. The first 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 second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *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 is government or foreign owned. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. *Private credit* is a financial development variable that measures domestic credit to private sector as a fraction of GDP. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Registry reform	0.105*** [0.033]	0.120*** [0.036]	-0.033 [0.037]	0.099 [0.086]	0.175 [0.135]	-0.052*** [0.014]	5.070* [2.585]
Log firm size	0.109*** [0.005]	0.096*** [0.004]	-0.022*** [0.003]	0.095*** [0.006]	0.146*** [0.010]	-0.003*** [0.001]	0.512* [0.298]
Manufacturing	-0.003 [0.010]	0.015* [0.009]	0.069*** [0.008]	-0.001 [0.014]	0.062** [0.028]	0.001 [0.002]	-0.235 [0.771]
Exporter	0.062*** [0.011]	0.056*** [0.010]	0.015* [0.008]	0.082*** [0.013]	0.069*** [0.027]	-0.004** [0.002]	-0.026 [0.722]
Foreign owned	-0.080*** [0.014]	-0.123*** [0.011]	-0.117*** [0.008]	-0.118*** [0.017]	-0.284*** [0.034]	-0.012*** [0.003]	-1.412 [1.001]
Government owned	-0.222*** [0.025]	-0.174*** [0.021]	-0.002 [0.018]	-0.213*** [0.034]	-0.350*** [0.074]	0.005* [0.003]	1.577 [1.434]
Log firm age	0.020*** [0.006]	0.007 [0.005]	-0.003 [0.004]	0.011 [0.008]	-0.013 [0.014]	-0.001 [0.001]	-1.074** [0.496]
Private credit	-0.002 [0.115]	0.114 [0.106]	0.328* [0.187]	0.715** [0.341]	1.391*** [0.510]	0.001 [0.024]	-9.379 [19.146]
Inflation rate	-0.219** [0.087]	-0.172** [0.080]	0.061 [0.097]	-0.513*** [0.191]	-0.760* [0.390]	0.075*** [0.027]	7.580 [9.230]
GDP growth rate	0.579** [0.277]	0.265 [0.264]	0.901* [0.529]	0.488 [1.108]	0.850 [1.505]	-0.349** [0.136]	25.801 [50.876]
Constant				-0.475** [0.231]	-0.948** [0.384]	0.152*** [0.010]	39.153*** [4.491]
Observations	72,713	71,006	69,125	61,071	41,747	8,954	14,819
R-squared	0.180	0.126	0.118	0.109	0.0675	0.533	0.164
Treatment	7	7	7	7	7	4	6
Control	59	58	58	57	58	33	32

**Table 9: Countries with registry reform compared to a matched sample of countries based on location and income**

The two-way fixed effects regressions below compare countries that implemented registry reform (i.e., introduced a collateral registry for movable assets) to a matched sample based on countries location and GDP per capita. Results are estimated using country fixed effects and year dummies and with robust standard errors clustered at the country-year level. Regressions (1) - (3) are marginal effects from two-way fixed effects Logit regressions. Regressions (4) and (5) are two-way fixed effects tobit regressions. The first 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 second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *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 is government or foreign owned and zero otherwise. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. *Private credit* is a financial development variable that measures domestic credit to private sector as a fraction of GDP. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Registry reform	0.067** [0.034]	0.080** [0.037]	-0.018 [0.035]	0.069** [0.028]	0.146 [0.098]	-0.045*** [0.014]	0.773 [1.135]
Log firm size	0.096*** [0.006]	0.107*** [0.006]	-0.023*** [0.004]	0.099*** [0.009]	0.145*** [0.014]	-0.006*** [0.002]	0.407 [0.315]
Manufacturing	-0.018 [0.019]	0.012 [0.017]	0.057*** [0.011]	-0.007 [0.026]	0.075* [0.041]	0.003 [0.003]	1.193 [0.821]
Exporter	0.066*** [0.016]	0.059*** [0.016]	0.018 [0.011]	0.110*** [0.014]	0.091** [0.039]	0.005 [0.005]	-1.380 [1.306]
Foreign owned	-0.075*** [0.020]	-0.161*** [0.024]	-0.087*** [0.014]	-0.185*** [0.025]	-0.418*** [0.054]	-0.023** [0.010]	-3.023* [1.543]
Government owned	-0.175*** [0.034]	-0.175*** [0.034]	0.054** [0.021]	-0.173*** [0.060]	-0.491*** [0.130]	0.014** [0.005]	-4.574* [2.309]
Log firm age	-0.001 [0.008]	-0.001 [0.008]	0.002 [0.007]	-0.006 [0.010]	-0.016 [0.019]	0.002 [0.003]	-0.518 [0.748]
Private credit	-0.134 [0.170]	-0.217 [0.177]	-0.745*** [0.174]	0.800*** [0.227]	-0.830 [0.763]	-0.108** [0.048]	9.527 [7.948]
Inflation rate	-0.134** [0.067]	-0.145** [0.072]	0.274*** [0.081]	-0.449*** [0.065]	0.033 [0.306]	0.104*** [0.015]	-10.843*** [2.866]
GDP growth rate	0.250 [0.512]	1.119* [0.619]	1.709*** [0.662]	-2.181*** [0.515]	1.875 [1.752]	0.333** [0.132]	-138.820*** [29.103]
Constant				-0.868*** [0.077]	-1.863*** [0.251]	0.157*** [0.012]	24.081*** [2.901]
Observations	14,695	14,841	14,409	11,695	9,448	1,455	4,157
R-squared	0.209	0.145	0.0800	0.131	0.135	0.547	0.225
Treatment	7	7	7	7	7	4	6
Control	7	7	7	7	7	4	6

**Table 10: Countries with registry reform compared to countries with other collateral laws without registry reform**

The two-way fixed effects regressions below compare countries that implemented registry reform to countries that implemented other collateral reforms. Results are estimated using country fixed effects and year dummies and with robust standard errors clustered at the country-year level. Regressions (1) - (3) are marginal effects from two-way fixed effects Logit regressions. Regressions (4) and (5) are two-way fixed effects tobit regressions. The first 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 second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *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 is government or foreign owned and zero otherwise. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. *Private credit* is a financial development variable that measures domestic credit to private sector as a fraction of GDP. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Registry reform	0.102*** [0.030]	0.048 [0.037]	-0.002 [0.045]	0.097 [0.059]	0.248*** [0.093]	0.014 [0.037]	3.669*** [1.204]
Log firm size	0.098*** [0.005]	0.102*** [0.005]	-0.019*** [0.004]	0.092*** [0.007]	0.141*** [0.010]	-0.006*** [0.001]	0.693** [0.327]
Manufacturing	0.019 [0.021]	0.030* [0.018]	0.046*** [0.012]	0.038 [0.028]	0.118*** [0.032]	-0.002 [0.004]	0.276 [0.867]
Exporter	0.047** [0.019]	0.043** [0.018]	0.019** [0.009]	0.064*** [0.023]	0.002 [0.038]	0.002 [0.004]	-0.756 [1.243]
Foreign owned	-0.131*** [0.026]	-0.162*** [0.023]	-0.104*** [0.015]	-0.166*** [0.037]	-0.306*** [0.053]	-0.019** [0.008]	-1.633 [1.055]
Government owned	-0.167*** [0.054]	-0.176*** [0.044]	0.039* [0.022]	-0.085 [0.090]	-0.205 [0.175]	0.017*** [0.006]	-3.035 [1.939]
Log firm age	-0.003 [0.009]	-0.007 [0.008]	-0.005 [0.007]	0.004 [0.011]	-0.015 [0.021]	0.001 [0.002]	-1.788** [0.664]
Private credit	-0.381 [0.240]	0.025 [0.260]	-0.284 [0.329]	0.437 [0.631]	0.222 [0.647]	-0.532 [0.351]	-15.975 [10.361]
Inflation rate	-0.241** [0.115]	-0.247** [0.123]	-0.109 [0.128]	-0.289 [0.200]	-0.817** [0.324]	0.164** [0.066]	-1.484 [1.677]
GDP growth rate	-1.201** [0.562]	-0.119 [0.648]	-0.198 [0.860]	-2.295 [2.282]	-2.891* [1.683]	-0.190 [0.551]	-85.419*** [19.148]
Constant				-0.490** [0.203]	-1.044*** [0.174]	0.244*** [0.049]	23.500*** [2.905]
Observations	16,099	16,215	15,740	12,700	10,948	2,445	3,968
R-squared	0.148	0.111	0.0659	0.135	0.114	0.461	0.204
Treatment	7	7	7	7	7	4	6
Control	7	7	7	7	7	6	6

**Table 11: Alternative credit environment controls - Comparing registry reform countries with non reformers**

The two-way fixed effects regressions below are estimated using country fixed effects and year dummies, and with robust standard errors clustered at the country-year level. Regressions (1) - (3) are marginal effects from two-way fixed effects Logit regressions. Regressions (4) and (5) are two-way fixed effects tobit regressions. The first 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 second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *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 is government or foreign owned and zero otherwise. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). *Credit information index*, *Contract enforcement index* and *Closing business index* are doing business indicators for the credit environment of a country. \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Registry reform	0.081** [0.035]	0.069** [0.033]	-0.017 [0.040]	0.096* [0.054]	0.142 [0.097]	-0.008 [0.012]	10.593*** [3.651]
Log firm size	0.106*** [0.004]	0.099*** [0.004]	-0.021*** [0.003]	0.104*** [0.005]	0.160*** [0.011]	-0.003*** [0.001]	0.508** [0.251]
Manufacturing	0.010 [0.011]	0.024*** [0.009]	0.071*** [0.007]	0.017 [0.013]	0.098*** [0.025]	-0.001 [0.002]	-0.297 [0.786]
Exporter	0.058*** [0.010]	0.055*** [0.008]	0.010 [0.007]	0.086*** [0.013]	0.043** [0.021]	-0.005*** [0.002]	0.135 [0.756]
Foreign owned	-0.070*** [0.013]	-0.128*** [0.011]	-0.108*** [0.008]	-0.159*** [0.018]	-0.348*** [0.035]	-0.011*** [0.003]	-1.238 [0.915]
Government owned	-0.166*** [0.037]	-0.133*** [0.031]	-0.003 [0.015]	-0.211*** [0.031]	-0.382*** [0.064]	0.005 [0.003]	0.875 [1.213]
Log firm age	0.019*** [0.004]	0.009** [0.005]	-0.008* [0.004]	0.006 [0.006]	-0.020* [0.011]	-0.001 [0.001]	-0.467 [0.473]
Inflation rate	-0.340*** [0.109]	-0.220** [0.101]	-0.026 [0.069]	-0.701*** [0.146]	-0.762*** [0.283]	0.027 [0.024]	-2.797 [5.921]
GDP growth rate	-0.315 [0.400]	-0.680 [0.449]	-0.000 [0.346]	-1.477** [0.731]	-1.038 [0.899]	-1.014*** [0.231]	-51.134 [34.548]
Closing Business Index	0.067 [0.074]	0.292*** [0.076]	-0.260*** [0.060]	-0.152*** [0.043]	0.216 [0.138]	-0.038 [0.038]	-12.987 [9.962]
Credit information index	-0.017 [0.013]	-0.020 [0.013]	0.022* [0.012]	0.035 [0.028]	0.028 [0.029]	0.009* [0.005]	13.096*** [2.458]
Contract Enforcement Index	0.194** [0.082]	0.228*** [0.078]	-0.123* [0.068]	0.425*** [0.118]	0.251* [0.140]	-0.063*** [0.023]	-8.828 [5.816]
Constant				-1.034*** [0.172]	-0.925*** [0.351]	0.128 [0.087]	19.141 [20.831]
Observations	72,370	70,653	68,776	60,706	41,421	9,032	14,958
R-squared	0.198	0.134	0.111	0.119	0.0668	0.553	0.168
Treatment	7	7	7	7	7	4	6
Control	57	56	56	55	56	32	32



**Table 12: First stage of instrumental variable regressions**

The following are the first stages of IV regression with *Registry reform* from the structural equation instrumented with *Regional registry share*, defined as the fraction of countries in a region that have already established a registry for movable assets. *Registry reform* is the instrumented dummy variable for a country that established a registry for movable assets in the period of or following the reform. \*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2nd Stage Dependent Variable	Access to finance	Access to loans	Financial obstacle	Working capital financed by banks	Fixed assets financed by banks	Interest rate	Maturity
Instrumented Variable	Registry reform	Registry reform	Registry reform	Registry reform	Registry reform	Registry reform	Registry reform
Regional registry share	0.832*** [0.289]	0.748** [0.295]	0.754*** [0.287]	0.731** [0.305]	0.918*** [0.302]	0.527 [0.328]	1.492*** [0.479]
Log firm size	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	-0.000 [0.001]	-0.002* [0.001]	0.002 [0.002]
Manufacturing	-0.002 [0.005]	-0.003 [0.005]	-0.002 [0.005]	-0.004 [0.005]	-0.007 [0.005]	0.001 [0.005]	-0.000 [0.008]
Exporter	0.002 [0.002]	0.003* [0.002]	0.001 [0.002]	0.001 [0.002]	0.005* [0.003]	-0.001 [0.003]	0.001 [0.003]
Foreign owned	-0.002 [0.002]	-0.001 [0.003]	-0.003 [0.002]	-0.001 [0.002]	-0.004 [0.002]	0.011* [0.006]	0.001 [0.005]
Government owned	-0.013* [0.007]	-0.013* [0.007]	-0.017* [0.009]	-0.003 [0.006]	-0.018** [0.009]	0.002 [0.003]	0.000 [0.004]
Log firm age	0.000 [0.001]	0.001 [0.001]	0.001 [0.001]	0.001 [0.001]	0.002** [0.001]	0.001 [0.001]	0.001 [0.002]
Inflation rate	0.174 [0.271]	0.176 [0.275]	0.176 [0.271]	0.432** [0.171]	0.023 [0.292]	0.379 [0.257]	0.810** [0.365]
GDP growth rate	-0.662 [0.751]	-0.639 [0.763]	-0.679 [0.768]	0.239 [0.591]	-1.094 [0.840]	-0.240 [0.611]	0.857 [1.489]
Private credit	-0.013 [0.245]	-0.001 [0.244]	-0.005 [0.240]	-0.112 [0.264]	0.034 [0.254]	0.951 [0.794]	-0.968 [1.091]
Constant	-0.034 [0.083]	-0.070 [0.112]	-0.049 [0.088]	-0.140** [0.067]	0.033 [0.089]	0.276 [0.300]	-0.172* [0.097]
Observations	59,070	57,106	55,691	50,280	32,840	6,220	11,038
R-squared	0.771	0.772	0.778	0.762	0.788	0.731	0.813
Countries	51	50	50	49	50	24	24

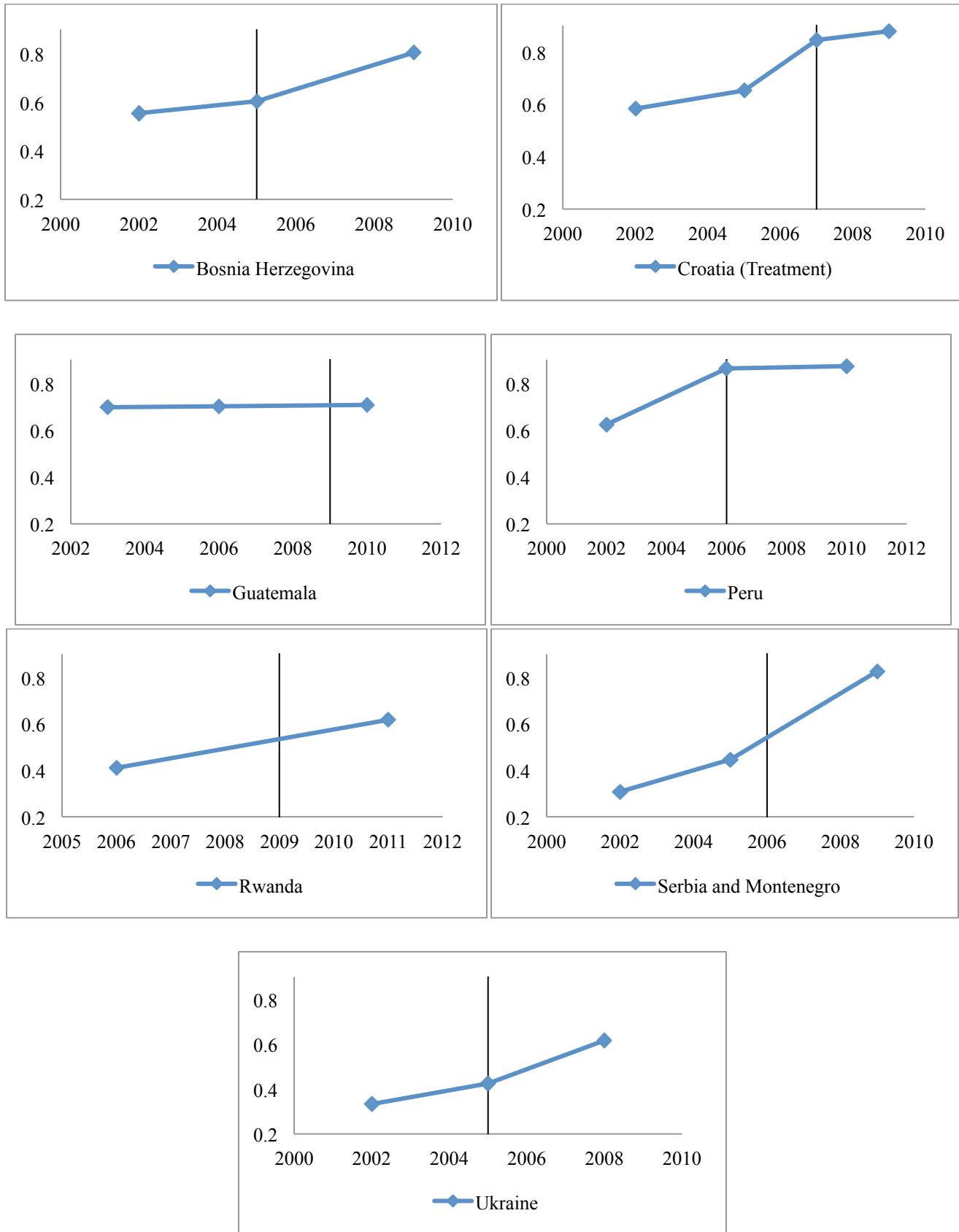
**Table 13: Instrumental variable estimations**

*Registry reform* is instrumented using *Regional registry existence* in the following two-way fixed effects IV regressions. *Registry reform* is a dummy variable for a country that established a registry for movable assets in the period of or following the reform. *Regional registry existence* is the fraction of countries in a region that has already established a registry for movable assets.

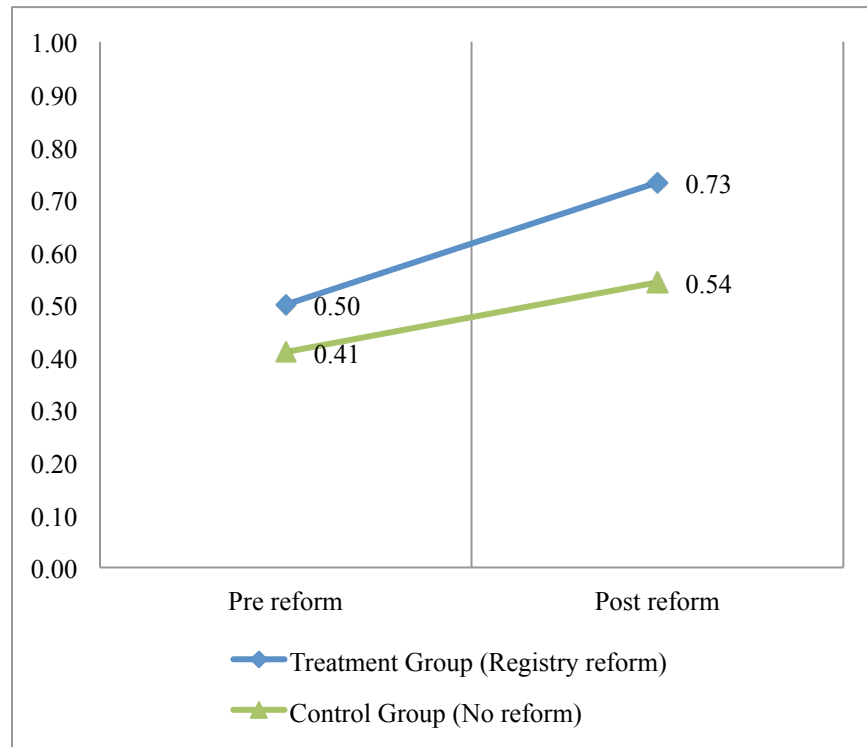
The first dependent variable *Access to finance* is a dummy variable that indicates whether the firm has access to a loan, overdraft or a line of credit. The second dependent variable *Access to loan* is a dummy variable that indicates whether the firm has a loan outstanding. The third dependent variable *Financing obstacle* measures whether access to financing is a major or severe obstacle for the firm. *Working capital financed by banks* measures the proportion of the firm's working capital that is financed by banks. *Fixed assets financed by banks* measures the proportion of the firm's fixed assets that is financed by banks. *Interest rate* and *Maturity* refer to the most recent loan obtained by the firm. *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 is government or foreign owned and zero otherwise. *Exporter* is a dummy variable that indicates if the firm is an exporting firm. *Manufacturing* is a dummy variable that takes value 1 if the firm is in the manufacturing industry. *Private credit* is a financial development variable that measures domestic credit to private sector as a fraction of GDP. The *inflation rate* is measured as the growth rate of the GDP deflator (annual). AR test refers to the weak-instrument robust inference Anderson-Rubin statistics for testing the significance of the endogenous regressor *Registry reform* in the respective structural equations.\*\*\*, \*\*, and \* denote p-values below 0.01, 0.05, and 0.1, respectively.

Variables	(1) Access to finance	(2) Access to loans	(3) Financial obstacle	(4) Working capital financed by banks	(5) Fixed assets financed by banks	(6) Interest rate	(7) Maturity
Registry reform	0.347** [0.164]	-0.057 [0.234]	0.287 [0.231]	0.355** [0.155]	0.298*** [0.098]	0.153 [0.211]	19.733** [7.792]
Log firm size	0.082*** [0.004]	0.084*** [0.004]	-0.020*** [0.003]	0.027*** [0.002]	0.029*** [0.002]	-0.001 [0.001]	0.477* [0.265]
Manufacturing	0.003 [0.010]	0.015* [0.009]	0.073*** [0.008]	0.004 [0.005]	0.013** [0.006]	0.000 [0.002]	-0.521 [0.918]
Exporter	0.037*** [0.008]	0.043*** [0.008]	0.012* [0.007]	0.030*** [0.005]	0.009 [0.006]	-0.005*** [0.002]	-0.229 [0.843]
Foreign owned	-0.050*** [0.011]	-0.107*** [0.012]	-0.103*** [0.009]	-0.048*** [0.007]	-0.071*** [0.009]	-0.014*** [0.005]	-1.203 [0.876]
Government owned	-0.099*** [0.031]	-0.096*** [0.031]	0.005 [0.018]	-0.048*** [0.008]	-0.070*** [0.012]	0.003 [0.004]	-0.325 [1.504]
Log firm age	0.015*** [0.004]	0.009** [0.004]	-0.004 [0.004]	0.002 [0.002]	-0.001 [0.002]	-0.002 [0.001]	-0.281 [0.513]
Inflation rate	-0.337*** [0.111]	-0.262** [0.113]	0.005 [0.114]	-0.208*** [0.079]	-0.164* [0.090]	-0.025 [0.075]	-19.220*** [7.211]
GDP growth rate	0.415 [0.399]	-0.144 [0.397]	0.636 [0.535]	-0.003 [0.281]	0.373 [0.309]	-0.910*** [0.218]	-53.611** [26.026]
Private credit	-0.026 [0.174]	0.149 [0.203]	0.008 [0.194]	0.023 [0.108]	0.159 [0.109]	-0.122 [0.304]	68.369*** [21.465]
Constant	0.324*** [0.039]	0.055 [0.107]	0.701*** [0.111]	0.098*** [0.034]	0.103*** [0.031]	0.310*** [0.078]	33.479*** [3.366]
Observations	59,070	57,106	55,691	50,280	32,840	6,220	11,038
R-squared	0.243	0.176	0.136	0.096	0.085	0.484	0.141
Treatment	7	7	7	7	7	4	6
Control	44	43	43	42	43	20	18
AR test p-value	0.00940	0.803	0.201	0	4.08e-10	0.393	1.18e-05
AR test statistic	6.745	0.0620	1.638	43.56	39.07	0.730	19.20

**Figure 1: Access to finance before and after the introduction of a collateral registry for movable assets**



**Figure 2: Average access to finance before and after registry reform in treatment and matched control countries**



## Appendix 1: Constructing the dependent variables

We use the core module of the Enterprise Survey dataset, which includes a set of identical questions included in all questionnaires. This common framework of the questionnaire enables cross-country analyses using variables specified in the core module.

A complication in variable construction stems from changes in the core survey modules made for surveys administered after 2005. Variables of interest to us are defined differently in the old (2002-2005) and new (2006-2010) core modules. Here we describe the assumptions made in constructing a common dependent variable by reconciling responses to questions in the old and new surveys.

### *a) Access to finance*

Information on firms' access to an overdraft facility, line of credit or loan is collected from the following questions

#### Old Surveys

- “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?

## New Surveys

- “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. Instead, we define Access to finance as having access to any one of the three credit facilities. The dependent variable, Access to finance, is coded as a dummy variable that takes value 1 if the firm responds “yes” to either of the two questions, and 0 if “no” to both. A further obstacle arises due to the loan or overdraft question in the old surveys not being a dichotomous yes/no query. We assume that firms answering any further questions about their most recent loan or overdraft facility have access to at least one.

### *b) Working capital financed by banks*

The core module question on the proportion of working capital financed by banks in the old surveys separately identifies the proportion coming from domestic and foreign banks. The new survey core module modifies this into a single question for financing by all banks irrespective of nationality. We aggregate the proportions from foreign and domestic banks in the old survey to make it consistent with the new survey response. We also omit firms from our analyses when the total sum of proportions of working capital financed through all sources exceeds 100.