

CREDIT REPORTING AND FINANCING CONSTRAINTS

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Abstract

We combine firm-level data from the World Bank Business Environment Survey (WBES) with data on private and public credit registries to investigate whether the presence of the credit registry in a country is associated with lower financing constraints, as perceived by managers and higher share of bank financing. We find that the existence of private credit registries is associated with lower financing constraints and higher share of bank financing, while the existence of public credit registries does not seem to have a significant effect on these perceived financing constraints. We also find that small and medium firms tend to have higher share of bank financing in countries where private registries exist and stronger rule of law is associated with more effective private credit registries. Finally, we find some evidence that the presence of a public credit registry benefits younger firms relatively more than older firms.

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A large body of recent literature shows that access to credit is essential for development and growth. However, asymmetric information between borrowers and lenders results in inefficient allocation of credit and credit rationing. Collateral is commonly used as one of the tools to reduce this asymmetric information. However, collateralization of loans is often problematic especially in the developing country context and especially for new firms, micro-entrepreneurs, and SMEs which often lack significant fixed assets that could be presented as collateral. In addition, the costs for lenders related to seizure and liquidation of collateral can be significant, and the process can take a long time.

The alternative mechanisms for reducing asymmetric information are monitoring and screening by lenders. For example, in many countries it is common to grant credit to a firm only after the firm has had an account with the bank and that bank could observe cash flow for some period of time, typically six months to a year. Another example is a group lending approach, mostly employed by microfinance institutions, which allows lenders to provide loans to individual borrowers who, via participation in the group, have developed a credit history with the institution. In these examples credit history of a borrower, sometimes referred to as “reputational collateral”, enables an individual or a firm to gain access to financing.

Information accumulated by lenders through monitoring and screening can be shared among credit providers creating a credit market environment with lower informational asymmetries and leading to more efficient allocation of credit. The institutional arrangements allowing creditors to exchange information on past payment behavior of individuals and firms are commonly known as credit bureaus or credit

registries. Such registries collect and distribute factual data on payment performance, as well as other information used to assess creditworthiness of a borrower. These information sharing mechanisms may be able to lower information asymmetries and support larger lending volumes, thus softening financing constraints faced by firms and individual borrowers. In this paper we use the results of a firm level survey to investigate the impact of existence of credit reporting institutions on firms financing constraints.

We combine responses of about 5000 enterprises from 51 countries around the world from the World Bank Business Environment Survey (WBES)¹ with a survey of credit registries around the world conducted at the World Bank and described in Miller (2003). We use two alternative variables to measure financing constraints. The first one is based on the answers given by firm managers to the question in the WBES survey about the degree of financing constraints that firms face.² We test whether perceptions of the borrowers with regards to the credit constraints they face are related to the presence of credit registry in their country. In addition, we test whether public and private credit registries have the same or different effect on perceived financing constraints and whether they act as complements or substitutes. Another measure that we employ is use of the bank credit by firms. Clearly, the fact that the firm does not have any loans on the books does not necessarily imply that bank financing is unavailable. Many other firm level and macro level factors are at play. We control for such macro factors as interest rate and economic growth as well as firm size, ownership, age and industry. While this

¹ The World Bank Business Environment Survey was conducted by the World Bank in 1999.

² The question asks the firms to rate the severity of different factors for operation and growth of the business on a scale from 1 to 4 with 4 being a “major obstacle” and 1 as “no obstacle.” We use the reported degree of obstacle with respect to availability of financing as a measure of perceived financing constraints.

measure is not necessarily a measure of financing constraint, in our view it is a useful proxy for availability of bank finance.

We expect to find different effects of public and private registries on credit market outcomes because the two types of registries differ significantly in the way they operate. Public registries are often established by Central Banks with the main purpose of bank supervision, while private registries are created by market participants with the purpose of sharing information among lenders. As a consequence, public registries usually collect information only on loans above certain amount, focusing on credits which are likely to have a systemic effect on the economy. In addition, public registries usually collect information only from supervised institutions, and store only a few key data items.³ On the other side, private registries are more likely to collect information from a wide variety of sources including non-bank creditors, and store more details on the borrowers. Another key difference is the fact that public registries often do not provide a history of a borrower, but rather a current status, while private registries supply a report on the payment history. Finally, private bureaus often provide value added services such as decision making tools and credit scoring. See Miller (2003) for a more detailed discussion on the differences between public and private registries.

These arguments suggest that public registries could play at best a limited role in alleviating a firm's financing constraints. Indeed, we find no evidence that existence of a public credit registry is associated with reduction in perceived financing constraints or with a higher reliance on bank financing by firms. On the other side, the existence of a

³ For example, out of 37 public registries that responded to the survey, 31 make data available only to institutions providing data, which in most countries would mean exclusion of non-bank financial institutions and other non-bank credit providers. The growing importance of non-bank lenders, including

private credit bureau is strongly associated with reduction in a firm's perceived financing constraints and a higher share of bank financing. The effect of private registries is robust to controlling for other potential determinants of financing constraints such as the overall level of economic and financial development, the quality of the legal system (rule of law), legal origin and others.

The main contribution of our study is the use of firm-level data, which allows us to answer several other important questions that have not been addressed before. First, we test whether the existence of registries has disproportional effect on firms of difference sizes. It is possible that small firms could benefit more from the presence of registries because they are more "opaque" and face larger information asymmetries. We do find that in countries where private credit registry exists, small and medium firms have higher proportion of bank financing. We do not find similar effect on perceived financing constraints. It is possible that while private credit registry does make finance somewhat more available to smaller firms, it is not sufficient to satisfy financing needs of these firms.

Second, we test whether existence of a registry has different effects on young and old firms. To benefit from the registry the firm needs to accumulate some credit history of prompt repayment of credit and young firms that have not had a chance to establish such a history may not benefit from the registry immediately. However, we do not find support for this hypothesis. Instead we find an indication that new firms gain from the existence of public registry.

leasing and factoring companies around the world, implies that leaving out information on their clients would significantly undermine the predictive power of available database.

The rest of the paper is structured as follows: section I discusses related literature, section II describes the data, section III presents results and section IV discusses implications and limitations of our study and provides directions for further research.

I. Related Literature

This paper builds on two lines of research: 1) studies of firm financing constraints and their determinants; and 2) relatively new field of research focusing on the role of credit reporting institutions in decreasing information asymmetries and their effect on the credit market. Below we briefly review the papers related to credit registries and information sharing and refer interested readers to surveys of literature on financing constraints in Schiantarelli (1996) and Hubbard (1998).

In a theoretical model of information sharing, Jappelli and Pagano (1993) show that exchange of information on borrower type decreases default rates and reduces average interest rates. In a related paper Padilla and Pagano (1997) show that information sharing among borrowers would lead to lower interest rates and increased lending. Empirically testing these predictions Jappelli and Pagano (2001) find that credit information sharing is associated with higher lending, measured by private credit to GNP ratio, and lower defaults.

Miller (2003) presents a comprehensive study of credit reporting systems in nearly 80 countries around the world. She discusses credit registries in both public and private credit sectors, investigates the view of credit reporting by borrowers and derives international trends in development of credit registries.

We are aware of only one study of the impact of credit information on financing constraints: Galindo and Miller (2001), using firm-level data from Worldscope, study how the quality of information in the registry affects financing constraints for firms in Latin America. They find that index of the information coverage in the credit registry is associated with reduction in the sensitivity of investment to availability of internal funding, indicating lower financing constraints. Unlike Galindo and Miller (2001) we use self-reported degree of financing constraints by firms rather than relying on the investment-cash flow sensitivity model, which has been questioned recently by numerous authors (see, for example, Kaplan and Zingales (1997)). In addition, we distinguish between public and private registries (while they don't) and investigate the differential effect of credit registries on small and medium firms and young and old firms.

Our paper is also related to three recent studies of firm financing constraints using the same WBES data. Clarke et. al (2001) investigate the impact of foreign bank entry on access to finance for domestic firms and Beck et. al (2002a) study the effect of banking sector concentration on financing constraints faced by firms. The methodology used in our paper follows closely these two previous papers. Other related evidence is presented in Beck et. al (2002b) who find that financing constraints represent a significant obstacle to growth, especially for small firms.

II. Data and methodology

To investigate the effects of credit reporting on financing constraints we combine firm-level data from the World Business Environment Survey (WBES) and country-level responses from the Public and Private Credit Registry surveys conducted by the World

Bank. The WBES was conducted in 1999-2000 and covers more than 10,000 firms in 80 countries. After merging it with registry survey data and eliminating observations with missing key data, our sample includes 51 developed and developing countries in all regions of the world and covers about 5000 firms. In the WBES survey, firm managers and owners were requested to answer questions about business environment including such issues as corruption, judiciary, infrastructure, regulation and taxation, and access to financing. Thus the survey allows us to study the opinions of managers on the relative importance of various issues in doing business.

To measure perceived financing constraints we use answers to a question about various factors that represent constraints to the operation and growth of a business. The respondents were asked to rate various constraints including financing, infrastructure, inflation and other on scale from 1 to 4, with 1 meaning “no obstacle” and 4 a “major obstacle” for operations and growth of the business. Our focus is on the answers to the sub question about access to financing. Our main dependent variable is a dummy which equals one if firms report financing as a “major constraint” and zero otherwise. We use a binary indicator because we are concerned that respondents might have a difficult time distinguishing between a “minor obstacle” or “moderate obstacle” and so the relative ranking would clearly be a matter of a personal opinion. Using only a binary indicator somewhat mitigates this problem as it is likely that managers are better able to identify the “major obstacles” relative to other “less severe obstacles”. In addition, in the survey the number of possible factors selected as the “major obstacle” was limited to 3 out of 12

possible obstacles, which adds additional credibility to the “major obstacle” response relative to other responses.⁴

To measure reliance on bank funding by firms we use the answer to the question on the firm’s financing structure in the past year. Managers were asked to provide percentage of financing coming from the following sources: internal funds and retained earnings, equity, local commercial banks, investment funds and development banks, other state services, foreign banks, family or friends, money lenders, supplier credit, and leasing arrangement. Our main dependent variable reflects cumulative share of financing obtained from commercial banks, development banks and foreign banks in overall firm financing. It is common in survey data to see many answers clustered around round numbers.⁵ We define our dependent variable to take this pattern into account: it takes value of 0 if there is no bank financing, value of one if bank financing share is less or equal to 10%, value of 2 if it is more than 10% but less or equal to 20%, and so on. We have also conducted robustness checks using dummy variable equal to one if share of bank financing is non-zero and received similar results.

Our two models can simply be written as:

$$\text{Pr. (Finance is a major obstacle)}_{ic} = \alpha X_{ic} + \beta \text{REGISTRY}_c + \gamma M_c + e_{ic}. \quad (1)$$

$$\text{Pr. (Level of bank finance)}_{ic} = \alpha X_{ic} + \beta \text{REGISTRY}_c + \gamma M_c + e_{ic}. \quad (2)$$

⁴ However, we have also used the categorical answers with all 4 relative responses using ordered probit regressions and find results similar to those reported.

⁵ For example, in our data we observe that about 5% of respondents report 10% of financing from domestic banks, another 5% report 20% and less than 2% have answers in between 10% and 20%, most of them are equal to 15%.

Where i indexes firms and c indexes countries, X_{ij} is a vector of firm-level characteristics such as ownership, industry, size and years in business,⁶ $REGISTRY_c$ is a country-level indicator of the presence of a registry (either public or private or both) and M_c is a set of other country-level controls (level of development, rule of law etc.). The complete list of all the variables we use in this paper with their definitions and sources is given in the Appendix Table A1.

We also experiment with the interaction of two registries to test whether two registries are complimentary in their effect on financing constraints and reliance on bank financing, which is plausible because they play different roles (as discussed in the introduction). We estimate model (1) using probit procedure and model (2) using ordered probit procedure. In all regressions we adjust standard errors to allow for “clustering” on country level. The errors calculated in such a way are robust to unspecified correlation of firm-level errors within each country. All our results are stronger if estimated without this clustering option.

For information on credit registries we use results from two surveys conducted by the World Bank in 1999-2000 and described in Miller (2003). Since banks need time to integrate the credit registry into their credit risk management systems, we only take into account registries that have been established prior to 1998, which allows one year between the establishment of a registry and a circulation of the WBES survey in 1999. We create two dummy variables – one for a public registry and one for a private registry. In our sample of 52 countries 28 had a public credit registry and 27 countries have private

⁶ Our sample has 16% of firms with foreign ownership, 13% with government ownership, 35% in manufacturing and 47% in service industry. The average age of firms in the sample is 20 years.

registry. We also use the year of establishment of the registry to test whether registries that have been in operation for longer periods have more effect on financing constraints.

As is evident from Table 1, development of credit reporting has a regional aspect. In the developed world most countries have a private credit reporting system. Some developed countries also have a public registry operated at the central bank. Latin America is the region with the most widespread credit reporting systems in the developing world, and most countries have both public and private credit registries. Some countries had registries operating for decades, for example the largest credit registry in the developing world is SERASA which was established in Brazil in 1968. The oldest public registry in the region is in Mexico; it was established in 1964. At the same time many countries established registries in the 1990s, including PCRs in Brazil and Ecuador in 1997.

Eastern Europe and CIS have the least developed credit reporting. For the most part neither public nor private registries exist in the region. Public credit registries in Slovakia, Bulgaria and Romania started operations after 1998. Hungary and Poland established private credit registries in 1997. Most countries in the region are currently establishing credit registries in public or private sector.

IV. Results

We start our analysis in Table 2, Panel A with a cross-tabulation of the average financing constraints (measured on a scale 1-4) and the existence of private and public credit registries. We find the highest average constraints are observed in countries with no registries present and the lowest average constraints are in countries with only private

registries present. Thus, presence of a public registry in addition to a private registry is associated with higher average constraints, while presence of a public registry without a private registry seems to reduce the constraints. In terms of the magnitude of the effect, we see that the existence of a private registry has larger effect on reduction in constraints than the existence of a public registry. Thus, the average constraints are about 3.04 in countries with no private registry and 2.57 in countries with private registry; the difference is equal to about 40% of a one standard deviation in the general financing constraints variable. For public registries the difference is much smaller: average constraints of 2.91 relative to 2.69, which is only about 20% of a one standard deviation in the constraints responses. However, both differences are statistically significant at 1%. We find a very similar relationship in Panel B where we cross-tabulate the level of financial development, measured as a ratio of private credit to GDP and the existence of either registry. Again, all differences are significant at 1% level. The latter set of results is consistent with Jappelli and Pagano (2001) who find that the existence of credit registries is associated with higher lending, measured by private credit to GNP ratio. In panel C again, in countries where registries exist there is a higher probability that a firm will have bank financing. But unlike with previous indicators, the highest probability to have bank financing is in countries with both private and public credit registries, followed by countries with only private credit registries. The difference is significant at 1%. Cross tabulations point to the fact that while public registry has a positive effect on individual firm's share of bank financing, it does not have the same effect on perceived financing constraints or depth of credit market.

Our first set of regression results is presented in Table 3. Panel A includes regressions with dummy dependent variable DGCF measuring perceived financing constraints and Panel B provides the results of ordered probit regressions with the dependent variable BKF10 measuring reliance of a firm on bank financing. We use identical firm level control variables in the two sets of regressions. Results in panel A suggest that based on the perception based indicator DGCF, government owned and small or medium size firms are more likely to be financially constrained, while foreign owned firms, and firms in manufacturing and service industry (in comparison to agriculture) are likely to face less financing constraints. These coefficients are highly significant (at 1%) and are robust to changes in specifications. Panel B results are consistent with the results of Panel A only for small and medium firms – they have higher perceived financing constraints and significantly smaller portion of bank financing than the large firms. The result for small firms is stronger than for medium firms, as expected. We find that new firms have significantly smaller values of BKF10 while in Panel A coefficient was insignificant. Manufacturing firms, as expected, have significantly higher share of bank financing. Interestingly, neither the dummy variable for government owned firms (perceived high constraint) nor for foreign owned firms (perceived low constraint) had significant coefficients. This could indicate that government owned firms have higher financing needs that are not addressed. The fact that foreign firms do not view financing as a major constraint is plausible because they may rely on the finance provided by their foreign parent.

Studying the country level effects on the perceived financing constraints, we find (model A1) that when rule of law, private credit to GDP ratio, GNI per capita and real

interest rates are included all together, only the rule of law is significant and firms in countries with better rule of law have lower financing constraints. However, all these four country-level variables are highly correlated and they lose significance when included together because of the multicollinearity; they are significant when included individually and have their expected signs. We keep only rule of law variable for our baseline specification to further investigate the role of credit registries for perceived financing constraints

It is reasonable to expect that attitudes of individual managers may have effect on their assessment of financing constraints. We try to control for each manager's general perceptions of other (non-financial) constraints with the variable which we call "Pessimism". It is likely that a manager who answers most of questions on any type of constraint negatively (i.e. complaining of high constraints) will be more likely to report major financing constraints. Therefore we are concerned that our measure of financing constraints might simply pick up the manager's tendency to complain about other obstacles. We construct a variable "pessimism" by taking this manager's answers to several non-finance related questions such as quality of customs, courts, post office, education, and other aspects of public service provision that are ranked from 1 to 6 (1 meaning very good and 6 – very bad) and create a firm-average of these responses. The larger the index, the more pessimistic the manager. We then subtract the country-level mean of this pessimism index to capture the firm-specific component of the pessimism level (although without country differencing all the results are very similar). We find that this variable is highly significant and positive in all specifications with dependent variable DGCF, indicating that a manager who generally tends to complain of other

constraints is more likely to answer that his firm is financially constrained. At the same time this variable is never found to be significant in regressions with dependent variable DBKF10.

Baseline regression specification for reliance on bank finance includes GDP growth, as a proxy for expectations of future investment opportunities, and real interest rate⁷. GNI per capita, private credit to GDP ratio and rule of law are all insignificant when included together.

As for the main question of this paper – the relation of credit registries and availability of financing, we find that existence of a private credit registry is associated with lower incidence of severe financing constraints (i.e. lower probability of firms rating finance as a major obstacle) and higher average share of bank financing. The coefficients are strongly significant in almost all specifications. Public registry, however, is insignificant in both cases. Thus, we do not find any clear relation between perceived financing constraints or reliance on bank financing and the existence of a public registry. In model A3 we add the interaction of two registries dummies and it turns out positive and significant. The magnitude of the coefficients suggests that firms in countries with only private registry present have the lowest perceived constraints, on average. This means that firms in countries that have public registry in addition to private registry are more constrained than those that only have private registry. These results suggest that there is no additional complementary effect of public registry on self-reported financing constraints in countries with existing private registry. In similar regression in model B3 the coefficient of the interaction term is insignificant, indicating no complimentary

⁷ We have also experimented with other possible controls, but found that rule of law, GNI per capita, private credit to GDP, and “pessimism” have insignificant coefficients.

effects of the two types of registries on bank financing. These results do not imply that there is no role for public registries, but only that they have no effect on alleviation of a firm's self-reported financing constraints or their reliance on bank financing. There are clearly other potential benefits from public registries (such as aiding in bank regulation and supervision, preventing systematic bank failures etc) which we do not investigate in this paper and leave these issues for further research.

In models A4 and B4 we add the (log of the) age of the registry measured by the number of years since the establishment of the registry to test the hypothesis whether the advantage of the registries is increasing with the length of their operation. We find that age of private registry is positively associated with reduction in perceived financing constrained (although it is not significant at conventional levels, it is weakly significant at about 16%) and significantly correlated with the use of bank finance. Consistent with expectations, in countries where private credit registry existed for a longer period of time, there is more reliance on bank credit. These results should be treated with caution because our date of the registry establishment is a very noisy measure of the age of the registry. Plus the proper way to test whether registries become more effective with time would be to use the time-series data, which we cannot do here since our WBES data is only a cross-section of firms.

We next take a closer look at the effects of private and public registries on financing constraints and reliance on bank financing separately. Table 4 presents results of regressions with perceived financing constraints as a dependent variable. The private registry dummy always enters with the expected negative sign and usually is highly significant. Public credit registry dummy is insignificant in all specifications. Model 1

presents the baseline specification and in model 2 we add legal origin dummies. We find that firms in the French legal origin countries and transition countries⁸ have higher constraints relative to firms in countries with English legal origin even after controlling for the rule of law. The results on private and public registry are unchanged with the addition of the legal origin dummies.

In models 3, 4 and 5 we control for other aspects of the banking sector environment. We expect that in a country with many government owned banks financing constraints are likely to be higher. In addition, such countries are more likely to have a public registry. However, we find this variable to be insignificant (model 3).⁹ We also suspect that in a country with a highly concentrated banking system access to finance would be more restricted, but we do not find a significant relation (model 4). In model 5 we inspect whether use of international accounting standards or audited financial statements has an effect on self-reported financing constraints. Coefficients of both accounting information variables are insignificant. Although we are still unable to completely eliminate the concern that private registry is a proxy for some unobservable element of the institutional environment in a country, it is robust to inclusion of all the available institutional indicators as reported in the table and in additional regressions that are not reported.

In the remaining columns in table 4 we focus on interaction effects of registries and firm and environment characteristics. In model 6 we investigate the relationship

⁸ Strictly speaking “transition” is not a legal origin. There is a debate among international comparative law experts as to the classification of legal traditions in these countries, for example Czech Republic and Hungary are often identified as German legal origin. In our opinion, however, separating this subset set of countries and referring to them as “transition” or “socialist legal origin” is a useful proxy for the institutions and some elements of legal and regulatory structure that these countries inherited.

⁹ One should be careful interpreting this specification as this variable is not available for many countries and we lose about 1000 observations comparing to the baseline model.

between rule of law and effectiveness of credit registry. We hypothesize that in countries with better rule of law, credit registry should be more effective. For example, enforcement of consumer rights that would allow individuals and firms to question and correct data in the registry is likely to result in better quality of data, and subsequently better predictive power of future borrower behavior. Also better rule of law is likely to be associated with integrity of credit reporting system. As expected, we obtain a strong negative coefficient on the interaction dummy for rule of law and private credit registry. In other words, we find that private credit registries are more effective in reducing perceived financing constraints in countries with stronger rule of law.

In model 7 we examine whether existence of a credit bureau makes it easier for an older firm to obtain credit with an interaction of registry dummy and the new firm dummy. Several effects could be at play in determining the relationship between the effectiveness of the registry for older and newer firms. On the one hand, we would expect that as old firms have accumulated a credit history with a registry they should be able to benefit more from the presence of the registry than young firms which have no credit history. This would produce a positive coefficient indicating higher constraints for new firms in countries with a registry. Alternatively, when evaluating creditworthiness of a business, and especially small and medium businesses, bankers take into account personal credit history of the owner.¹⁰ This would mean, that in the countries with credit registry obtaining a loan for a new business should not be significantly more difficult than for an old one, if owner credit history is available. Results of regression in model 6 seem to support the latter hypothesis. We do not find significant difference for old and

¹⁰ Miller (2003)

new firms in the presence of credit registry regarding their perceived financing constraints.

Lastly, we study the effect of credit registries for financing constraints faced by small and medium firms. One hypothesis related to firm's size is that existence of a credit registry could help small and medium firms more than large firms. While lending to large companies requires detailed analysis of financial standing of the potential borrower and significant loan size justifies high costs of such analysis, payment history information alone is viewed to be a sufficiently good predictor of the probability of default for smaller loans. Use of such information in automated decision making systems, such as credit scoring, allows to cut processing costs and to increase lending volume significantly¹¹. In model 8, however, we get insignificant coefficients for small or medium enterprises, indicating that there is no difference in the effect that credit registry has on small or medium firms relative to large enterprises in terms of their perception of financing constraints.

Table 5 provides a similar set of regressions using reliance on bank financing as a dependent variable. We find that the coefficient for private credit registry is positive and significant in almost all specifications, while coefficients for public credit registry variable is of varying sign and never significantly different from zero. Results in model 2 suggest that transition economies have on average significantly lower percentage of bank financing. We do not find significant effects of government ownership of banks or banking industry concentration. But in model 5 we get significant positive coefficients for international accounting standards and audited financial statements variables. It is interesting, that while we did not detect any significant link between accounting

standards and self-reported financing constraints, we do find strong positive effects for the reliance of bank finance.

Old firms do not seem to be benefiting more than young ones from private credit registry (model 6). At the same time coefficient for public registry and firm age dummy interaction term is positive and significant, indicating that in countries with public credit registries there is a higher share of bank financing in new firms. We have tested alternative specifications, including using age of firm instead of a dummy variable for new firms and controlling for transition economies which have larger number of new firms than other countries, but obtained similar results. One potential explanation could be in the fact that most public registries only distribute information on the current status of the borrower, rather than borrower's history over a period of time. Moreover public registries mandate participation in the credit registry by all supervised institutions and collect both positive (information on borrowers who pay on time) and negative information (data on defaults and delinquencies), while information in private registries is fragmented and mostly negative¹². This may result in improved availability of financing for new firms since bank is mandated to report a borrower the moment loan is granted, while most private registry would report a borrower only if she was delinquent or defaulted on a payment. It is possible that new borrowers have lower delinquency and default incidence and thus more likely to appear in a public registry, than in a private one. Further research is needed to investigate the effect of public registries on bank financing reliance and in particular on the effect it has on new firms.

¹¹ Frame (2001)

¹² Miller(2003), World Bank (2003)

In the last column of Table 5 we investigate effect of the registry for small and medium firms. Existence of public registry does not seem to be affecting reliance on bank credit for small and medium firms differently than for large firms. But, existence of a private registry is associated with higher average percent of bank financing in small and medium enterprises. These results are consistent with the hypothesis presented above.

In sum, our empirical tests find that private credit registries are strongly correlated with lower perceived financing constraints and higher reliance on bank financing. These results support the view for the role such institutions may play in improving access to credit. At the same time, we fail to find systematic relation between existence of a public registry and firm-reported financing constraints or reliance on bank financing.

This finding is consistent with our proposition that the major goal for most public credit registries is banking supervision. In this case credit registry would mostly focus on monitoring performance of large loans that could potentially have systemic effects in the economy and provide only a small amount of information to a limited number of banking institutions, while major sources for firm financing could be among non-bank creditors. Several other factors may contribute to the low effectiveness of public registries in improving access to finance. Miller (2003) and “Doing Business in 2004” report, recently issued by the World Bank, compare the data available in public and private registries and find that credit information in public registries is more limited in scope and most public registries only provide information on the status of the borrower in the latest reporting period, rather than reporting the history of borrower’s payment behavior over several years. Both authors suggest that private registries are better suited to serve the

needs of lenders than the public ones. It is also likely that the data found in public registries is of poor quality and does not allow banks to use it effectively for assessment of creditworthiness of borrowers.¹³

More research is needed to clarify the role of public registries in the credit market. For example, the positive (though insignificant) coefficients we get indicate that public registries are associated with higher financing constraints. One potential explanation for such counter-intuitive result could be the fact that often public registries appear in the markets with very low credit penetration as an attempt by the government to stimulate and promote lending. To test this hypothesis some dynamic studies are required.

V. Conclusions

Using unique cross-country firm level data we study the effect of credit reporting institutions on financing constraints as they are perceived by a firm's managers and on firm's reliance on bank financing. We find that the existence of private credit registries is associated with lower financing constraints and higher share of bank borrowing in firm's financing structure, while public credit registries do not seem to have significant effect on availability of financing. We find that in countries that have a public registry in addition to a private registry the perceived constraints are higher than in countries with only private registries. Although this suggests that public registries are associated with higher financing constraints (even though we did not find similar effect regarding firms' reliance on bank financing), they might play an overall positive role in financial markets by performing other functions (for example aiding in regulation and supervision or

¹³ Miller(2003), World Bank(2003)

prevention of systemic crises). This suggests more research on the role of public credit registries.

An important finding is that private credit registries are positively related to availability of bank financing for small and medium firms. We also find that stronger rule of law is associated with more effective private credit registries. This finding has obvious policy implications and highlights the necessity of strong legal system for the operation of credit markets as a whole and credit registries in particular.

Although we believe that our study adds to the recent literature, it has some obvious limitations. The major limitation is a lack of evidence for causality between creation of the private registries and their consequent effect on financing constraints. It is plausible that in a country with greater use of bank finance, the establishment of credit registries is more likely. The reverse causality is less likely for the measures of firm's self-reported financing constraints. Nevertheless, the results in this paper should be taken with caution and interpreted only as correlations and not as casual effects. In addition, it is possible that other unobservable elements of financial markets are responsible for the relationship we attribute to private credit registries. Although we were not able to shake the significant of the private registry coefficients with any of the available proxies for other elements of financial development, this concern remains as in any cross-country study.

Finally, an additional hypothesis that we do not address here is whether public registries are responses of government to underdeveloped shallow financial markets and hence are associated with higher constrains, while private registries develop endogenously when markets are "ready" and access to finance is not as constrained. To

overcome these limitations further research would be needed to study dynamic relationships between events leading to the establishments of credit registries, their creation, and subsequent improvement in financial development and reduction in a firm's financing constraints.

Table 1. List of countries with public and private credit registries and their dates of establishment.

Public Registry exists	Private registry exists
Africa	
NIGERIA (1998) SENEGAL (1979) EGYPT, ARAB REPUBLIC (1957) TUNISIA (1958)	
Eastern Europe and Central Asia	
LITHUANIA (1995)	ESTONIA (1993) HUNGARY (1997) POLAND (1997) TURKEY (1995)
Asia	
INDONESIA (1988) MALAYSIA	MALAYSIA (1985)
Latin America and Caribbean	
ARGENTINA (1991) BOLIVIA (1988) BRAZIL (1997) CHILE (1977) COLOMBIA (1994) DOMINICAN REPUB (1994) ECUADOR (1997) EL SALVADOR (1994) GUATEMALA (1996) MEXICO (1964) PERU (1968) URUGUAY (1982) COSTA RICA (1996) NICARAGUA (1994) VENEZUELA (1975)	ARGENTINA (1957) BOLIVIA (1994) BRAZIL (1968) CHILE (1979) COLOMBIA (1982) DOMINICAN REPUB (1994) ECUADOR (1966) EL SALVADOR (1996) GUATEMALA (1976) MÉXICO (1995) PERU (1997) URUGUAY (1954) PANAMA (1956)
Developed countries	
GERMANY (1934) ITALY (1962) PORTUGAL (1978) SPAIN (1962) FRANCE (1946)	GERMANY (1927) ITALY (1989) PORTUGAL (1947) SPAIN (1992) CANADA (1919) SWEDEN (1977) UNITED KINGDOM (1980) UNITED STATES (1930)

Table 2. Cross tabulations for general financing constraints, private credit to GDP ratio, and bank finance.

Panel A. Cross tabulation of General Financing Constraint

Means (*Frequencies*)

Private bureau Public registry	No	Yes	Total
No	3.13 (2407)	2.42 (1127)	2.91 (3534)
Yes	2.75 (805)	2.67 (1808)	2.69 (2613)
Total	3.04 (3212)	2.57 (2935)	2.82 (6147)

Panel B. Cross-tabulation of Private Credit to GDP Ratio

Means (*Frequencies*)

Private bureau Public registry	No	Yes	Total
No	19.97 (2338)	57.78 (1141)	32.37 (3479)
Yes	33.58 (983)	48.69 (1835)	43.42 (2818)
Total	24.00 (3321)	52.17 (2976)	37.32 (6297)

Panel C. Cross-tabulation of Reliance on Bank Financing dummy

Means (*Frequencies*)

Private Bureau Public registry	No	Yes	Total
No	0.29 (2262)	0.50 (1036)	0.35 (3298)
Yes	0.39 (545)	0.57 (1655)	0.53 (2200)
Total	0.31 (2807)	0.54 (2691)	0.42 (5498)

Table 3. Effect of credit registries on financing constraints and bank financing.

Models A1-A4 are estimated using probit and models B1-B4 are estimated using ordered probit techniques. See Table A1 for variable definitions and sources. Standard errors are clustered by country. P-values are in parenthesis, ** indicates significance at 1% level and * at 5% level.

	Dependent variable: perceived financing constraints dummy				Dependent variable: reliance on bank financing			
	A1	A2	A3	A4	B1	B2	B3	B4
Government Ownership	0.376 (0.000)**	0.343 (0.000)**	0.25 (0.002)**	0.232 (0.005)**	-0.244 (0.000)**	-0.14 (0.056)	-0.143 (0.061)	-0.093 (0.184)
Foreign Ownership	-0.327 (0.000)**	-0.328 (0.000)**	-0.355 (0.000)**	-0.343 (0.000)**	0.029 (0.617)	0.017 (0.757)	0.02 (0.72)	0.002 (0.969)
New firm	-0.014 (0.809)	-0.029 (0.628)	-0.042 (0.421)	-0.035 (0.493)	-0.246 (0.000)**	-0.194 (0.001)**	-0.184 (0.002)**	-0.144 (0.012)*
Manufacturing	-0.086 (0.269)	-0.071 (0.361)	-0.01 (0.909)	-0.003 (0.975)	0.22 (0.000)**	0.186 (0.005)**	0.187 (0.004)**	0.165 (0.008)**
Services	-0.294 (0.000)**	-0.286 (0.000)**	-0.227 (0.010)**	-0.228 (0.010)**	0.041 (0.562)	0.002 (0.972)	-0.005 (0.937)	-0.01 (0.883)
Small firm	0.289 (0.002)**	0.238 (0.006)**	0.237 (0.005)**	0.202 (0.010)*	-0.629 (0.000)**	-0.561 (0.000)**	-0.566 (0.000)**	-0.533 (0.000)**
Medium firm	0.208 (0.002)**	0.183 (0.006)**	0.163 (0.015)*	0.17 (0.007)**	-0.21 (0.000)**	-0.172 (0.001)**	-0.174 (0.002)**	-0.173 (0.004)**
Public registry		0.091 (0.361)	-0.189 (0.134)	0.238 (0.18)		0.112 (0.185)	0.18 (0.131)	0.249 (0.141)
Private registry		-0.293 (0.014)*	-0.469 (0.007)**	-0.133 (0.45)		0.378 (0.000)**	0.415 (0.004)**	0.099 (0.328)
GNI per capita	-0.097 (0.178)	-0.048 (0.54)			0.089 (0.204)	-0.031 (0.651)		
Private Credit/GDP	0.002 (0.413)	0.002 (0.428)			0.001 (0.428)	0.001 (0.587)		
Real interest rate	0.001 (0.602)	0.002 (0.315)			0 (0.873)	-0.002 (0.368)	-0.002 (0.291)	-0.003 (0.239)
GDP growth	-0.039 (0.068)	-0.028 (0.262)			0.05 (0.000)**	0.023 (0.084)	0.028 (0.133)	0.025 (0.115)
Rule of Law	-0.336 (0.003)**	-0.288 (0.024)*	-0.285 (0.000)**	-0.276 (0.000)**	-0.058 (0.62)	0.018 (0.867)		
“Pessimism”	0.624 (0.000)**	0.64 (0.000)**	0.614 (0.000)**	0.61 (0.000)**	0.011 (0.903)	0.02 (0.836)		
Public *Private			0.447 (0.026)*				-0.117 (0.493)	
Log (age of public registry)				-0.07 (0.225)				-0.053 (0.365)
Log (age of private registry)				-0.076 (0.167)				0.119 (0.000)**
Constant	0.447 (0.43)	0.127 (0.845)	-0.167 (0.224)	-0.188 (0.141)				
Observations	4907	4830	5340	5340	4543	4468	4484	4484

Table 4. Effect of credit registries on perceived financing constraints

Dependent variable is general financing constraint (dummy), estimated by probit. See Table A1 for variable definitions and sources. Standard errors are clustered by country. P-values are in parenthesis, ** indicates significance at 1% level and * at 5% level.

	1	2	3	4	5	6	7	8
Government Ownership	0.255 (0.002)**	0.231 (0.004)**	0.326 (0.000)**	0.295 (0.000)**	0.27 (0.003)**	0.256 (0.001)**	0.254 (0.002)**	0.255 (0.003)**
Foreign Ownership	-0.35 (0.000)**	-0.348 (0.000)**	-0.298 (0.000)**	-0.326 (0.000)**	-0.319 (0.000)**	-0.358 (0.000)**	-0.35 (0.000)**	-0.346 (0.000)**
New firm	-0.029 (0.581)	-0.034 (0.503)	-0.033 (0.577)	-0.068 (0.214)	-0.05 (0.381)	-0.016 (0.775)	-0.038 (0.546)	-0.032 (0.519)
Manufacturing	-0.007 (0.939)	-0.005 (0.953)	-0.032 (0.751)	-0.055 (0.525)	0.017 (0.839)	-0.042 (0.609)	-0.007 (0.938)	-0.009 (0.921)
Services	-0.23 (0.009)**	-0.24 (0.006)**	-0.237 (0.016)*	-0.244 (0.005)**	-0.244 (0.002)**	-0.252 (0.003)**	-0.23 (0.009)**	-0.236 (0.006)**
Small firm	0.234 (0.005)**	0.219 (0.005)**	0.325 (0.000)**	0.257 (0.004)**	0.231 (0.013)*	0.248 (0.006)**	0.234 (0.006)**	0.229 (0.213)
Medium firm	0.177 (0.008)**	0.171 (0.006)**	0.218 (0.001)**	0.197 (0.005)**	0.173 (0.009)**	0.193 (0.004)**	0.176 (0.008)**	0.157 (0.295)
Public registry	0.052 (0.606)	-0.032 (0.822)	0.041 (0.72)	0.033 (0.756)	0.082 (0.427)	-0.032 (0.767)	0.052 (0.621)	-0.041 (0.791)
Private registry	-0.272 (0.020)*	-0.298 (0.017)*	-0.264 (0.049)*	-0.246 (0.031)*	-0.288 (0.021)*	-0.251 (0.037)*	-0.277 (0.022)*	-0.213 (0.212)
Rule of Law	-0.326 (0.000)**	-0.239 (0.002)**	-0.364 (0.000)**	-0.388 (0.000)**	-0.314 (0.000)**	-0.066 (0.000)**	-0.326 (0.000)**	-0.323 (0.000)**
“Pessimism” index	0.607 (0.000)**	0.609 (0.000)**	0.576 (0.000)**	0.537 (0.000)**	0.578 (0.000)**	0.612 (0.000)**	0.607 (0.000)**	0.605 (0.000)**
Transition country		0.31 (0.035)*						
Legal origin - French		0.39 (0.028)*						
Government ownership of banks			-0.048 (0.842)					
Banking concentration				0.154 (0.503)				
International Accounting Standards					-0.095 (0.115)			
Audited financial statements					-0.017 (0.796)			
(Public registry)* (rule of law)						0.049 (0.654)		
(Private registry)* (Rule of law)						-0.451 (0.001)**		
(Public registry)* (new firm)							-0.002 (0.993)	
(Private registry)* (New firm)							0.037 (0.772)	
(Public registry)* (Small)								0.083 (0.604)
(Public registry)* (Medium)								0.142 (0.238)
(Private registry)* (Small)								-0.077 (0.664)
(Private registry)* (Medium)								-0.085 (0.526)
Constant	-0.23 (0.085)	-0.476 (0.004)**	-0.241 (0.062)	-0.299 (0.089)	-0.191 (-0.166)	-0.129 (-0.382)	-0.227 (-0.094)	-0.21 (0.287)
Observations	5340	5340	4274	4728	4723	5340	5340	5340

Table 5. Effect of credit registries on availability of bank financing.

Dependent variable is reliance on bank financing, estimated by ordered probit. See Table A1 for variable definitions and sources. Standard errors are clustered by country. P-values are in parenthesis, ** indicates significance at 1% level and * at 5% level.

	1	2	3	4	5	6	7
Government Ownership	-0.144 (0.054)	-0.074 (0.275)	-0.147 (0.106)	-0.119 (0.123)	-0.144 (0.057)	-0.148 (0.047)*	-0.169 (0.044)*
Foreign Ownership	0.019 (0.74)	0.008 (0.891)	-0.032 (0.569)	-0.01 (0.85)	-0.047 (0.425)	0.014 (0.797)	0.016 (0.775)
New firm	-0.188 (0.001)**	-0.145 (0.011)*	-0.14 (0.044)*	-0.155 (0.005)**	-0.182 (0.001)**	-0.264 (0.001)**	-0.157 (0.005)**
Manufacturing	0.186 (0.004)**	0.161 (0.012)*	0.148 (0.036)*	0.166 (0.009)**	0.162 (0.017)*	0.187 (0.004)**	0.181 (0.005)**
Services	-0.002 (0.975)	-0.01 (0.884)	-0.03 (0.656)	-0.003 (0.964)	-0.037 (0.615)	-0.005 (0.945)	0.025 (0.717)
Small firm	-0.564 (0.000)**	-0.491 (0.000)**	-0.519 (0.000)**	-0.522 (0.000)**	-0.489 (0.000)**	-0.567 (0.000)**	-0.848 (0.000)**
Medium firm	-0.176 (0.002)**	-0.138 (0.020)*	-0.187 (0.004)**	-0.174 (0.004)**	-0.145 (0.029)*	-0.178 (0.002)**	-0.353 (0.001)**
Public registry	0.109 (0.167)	-0.201 (0.174)	0.119 (0.222)	0.094 (0.308)	0.089 (0.281)	0.062 (0.47)	0.157 (0.327)
Private registry	0.366 (0.000)**	0.277 (0.001)**	0.309 (0.009)**	0.33 (0.000)**	0.335 (0.000)**	0.382 (0.000)**	0.112 (0.483)
Real interest rate	-0.002 (0.191)	-0.002 (0.323)	-0.001 (0.462)	-0.001 (0.554)	-0.002 (0.363)	-0.002 (0.253)	-0.002 (0.327)
GDP growth	0.029 (0.114)	0.027 (0.059)	0.045 (0.073)	0.044 (0.021)*	0.025 (0.146)	0.028 (0.114)	0.02 (0.162)
Transition country		-0.314 (0.015)*					
Legal origin - French		0.181 (0.22)					
Government ownership of banks			0.071 (0.72)				
Banking concentration				0.105 (0.674)			
International Accounting Standards					0.154 (0.002)**		
Audited financial statements					0.159 (0.003)**		
(Public registry)* (new firm)						0.418 (0.003)**	
(Private registry)* (New firm)						-0.121 (0.346)	
(Public registry)* (Small)							0.111 (0.575)
(Public registry)* (Medium)							-0.197 (0.171)
(Private registry)* (Small)							0.387 (0.06)
(Private registry)* (Medium)							0.389 (0.030)*
Observations	4484	4484	3589	4036	3975	4484	4484

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Table A1. Variable Names and Sources

Variable Names	Description	Source
General Financing Constraint	A ranking of the severity of the financing constraints to the growth and operation of the business (this question was asked along with 11 other constraining factors). The respondents were asked to select only 3 factors as “major obstacles”. The ranking has a scale of 1 through 4: 1 is “no obstacle”, 2 is “minor obstacle”, 3 is “moderate obstacle” and 4 is “major obstacle”.	World Business Environment Survey (WBES)
General Financing Constraint (dummy)	Equals one if general financing constraint is cited as a “major obstacle”.	WBES
Reliance on Bank Financing	Variable takes values from 0 to 10 based on survey responses regarding the structure of firm financing. It is equal zero if cumulative share of commercial, development and foreign bank financing is 0, value of one if share of bank financing is less or equal to 10%, value of 2 if it is more than 10% but less or equal to 20%, and so on.	WBES
Reliance on Bank Financing	Dummy is equal zero if Reliance on Bank Finance is zero, one otherwise.	WBES
Government Ownership	Dummy is equal one if any government agency or state body has a financial stake in the ownership of the firm, zero otherwise.	WBES
Foreign Ownership	Dummy variable is equal one if any foreign company or individual has a financial stake in the ownership of the firm, zero otherwise.	WBES
New firm	Dummy variable is equal one if the age of firm is less than 5 years. The age of firms is calculated as a difference between 2000 and the year of the establishment of the firm	WBES
Manufacturing	Dummy variable that is equal one if firm is in the manufacturing industry, zero otherwise.	WBES
Services	Dummy variable is equal one if firm is in the service industry, zero otherwise.	WBES
Small	Dummy variable is equal one if the business employs less than 50 people, zero otherwise	WBES
Medium	Dummy variable is equal one if the business employs more than 50 and less than 200 people, zero otherwise	WBES
Log (GNI per capita)	Logarithm of the GNI per capita, average 1995-99	World Development Indicators
GDP growth	Logarithm of the average real GDP growth rate in 1995-1999	World Development Indicators
Real Interest rate	Average lending rate minus average inflation rate in 1999.	International Financial Statistics

Rule of law	Composite Rule of Law Indicator	Aggregate Governance Indicators, Kaufmann et al (1999)
Private Credit/GDP	Measure of private credit to GDP.	Beck et al. (2002)
Public registry (dummy)	Dummy variable is equal one if there is a public registry operating in a country prior to 1998, zero otherwise	Global Survey of Public Credit Registries
Private registry (dummy)	Dummy variable is equal one if there is a private registry operating in a country prior to 1998, zero otherwise.	Global Survey of Private Credit Registries
Log (age of public)	Logarithm of the age of public credit registry. The age of the public registry is calculated as a difference between 2000 and the year of establishment of the public registry. It equals to zero for countries without registries.	Global Survey of Public Credit Registries
Log (age of private)	Logarithm of the age of public credit registry. The age of the public registry is calculated as a difference between 2000 and the year of establishment of the earliest private registry. It equals to zero for countries without registries.	Global Survey of Private Credit Registries
Legal Origin – French	Dummy variable is equal one if legal origin is French, zero otherwise	La Porta et al (1998)
Transition country	Dummy variable is equal one if legal origin is Socialist, zero otherwise	La Porta et al (1998)
Pessimism	Index of a manager's "pessimism" equal to $(Q - \bar{Q})/Q$, where Q – the average of answers referring to the quality of public services (customs, courts, post office, etc.) given by each firm, higher values indicate lower quality. \bar{Q} - average of Q in a given country	WBES
Government ownership of banks	Proportion of assets of a country's top ten banking institutions that were held by the public banks	La Porta et al. (2002)
Banking concentration	Three largest banks assets	Database on Financial Development and Structure, Caprio et al. (2001)
International Accounting Standards	Dummy variable is equal one if the firm uses International Accounting Standards	WBES
Audited financial statements	Dummy variable is equal one if the firm uses audited financial statements	WBES