Information Sharing and Credit Market Performance: Firm-Level Evidence from Transition Countries

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Abstract

We investigate whether the diffusion of information sharing among banks has affected credit market performance in the transition countries of Eastern Europe and the former Soviet Union, using a large sample of firm-level data. Our estimates show that information sharing is associated with improved availability and lower cost of credit to firms, and that this correlation is stronger for opaque firms than transparent firms. In cross-sectional estimates, we control for variation in country-level aggregate variables that may affect credit, by examining the differential impact of information sharing across firm types. In panel estimates, we also control for the presence of unobserved heterogeneity at the country level and for changes in selected macroeconomic variables.

Keywords: information sharing, credit access, transition countries.

JEL classification numbers: D82, G21, G28, O16, P34.

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1 Introduction

When banks evaluate a request for credit, they can either collect information on the applicant first-hand or ask for such information from other lenders who already dealt with the applicant, in exchange for similar data about their own clients. Such information exchange, which can occur voluntarily via "private credit bureaus" or be enforced by regulation via "public credit registries", is arguably an important determinant of credit market performance. Theory suggests that information sharing may overcome adverse selection in the credit market (Pagano and Jappelli, 1993) and reduce moral hazard, by motivating borrowers to exert high effort in projects and repay loans (Padilla and Pagano, 2000). Empirical work has identified a positive correlation between measures of information sharing, aggregate credit and default risk (Jappelli and Pagano, 2002; Djankov, McLiesh and Shleifer, 2005).

Information sharing should be particularly relevant for credit market performance in countries with weak company law and creditor rights. A lack of transparency in corporate reporting, due to weak company law, increases information asymmetries in the borrower lender relationship, reducing incentives for banks to lend. Moreover, weak creditor rights make banks more reluctant to lend to risky firms, as contract enforcement is costly or impossible. The screening and incentive effects of information sharing may help mitigate both of these problems.

In this paper we examine the role of information sharing in countries characterized by weak company law and creditor rights. We analyze the impact of private credit bureaus and public credit registries on the availability and cost of credit to firms in 24 transition countries of Eastern Europe and the former Soviet Union.[1] Pistor, Raiser and Gelfer (2000) document that in these transition countries the legal environment is particularly unfavourable for lending. Moreover, transition countries are an interesting sample to study because some of them have recently experienced strong credit growth, although they still display huge

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[1] We examine data from 24 transition countries, which we classify into three groups: European Union (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia); Commonwealth of Independent States (Armenia, Azerbaijan, Belarus Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Ukraine); Other European Countries (Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia & Montenegro). We exclude the CIS countries Tajikistan, Turkmenistan and Uzbekistan due to lack of data.

differences in credit market development. Over the past five years, private sector credit as a share of GDP has on average climbed from just 15% in 1999 to 25% at the end of 2004.[2] The quality of lending in transition countries has also strongly improved, with the ratio of non-performing loans in banks' portfolios falling from more than 20% in 1999 to just 10% at the end of 2004. Despite these average improvements, a particularly large gap remains between the countries that joined the European Union (EU) and other transition countries. Between 2001 and 2004, the EU transition countries (except Lithuania) featured private sector credit above 20 percent of GDP, a level unparalleled by any of the countries of the Commonwealth of Independent States (CIS), while only Croatia outside the EU reached this level.

In this paper we investigate to which extent the diffusion of information sharing arrangements has improved credit access and lowered the cost of credit in these countries, by relating firm-level data on credit availability to country-level measures of information sharing between banks. The firm-level data are drawn from the EBRD/World Bank "Business Environment and Enterprise Performance Survey" (BEEPS), a representative and large sample of firms in our 24 transition countries. The country-level information sharing indicators are compiled from the "Doing Business" database of the World Bank / IFC.

There are two main benefits from investigating the impact of information sharing at the firm-level rather than at the aggregate level. First, aggregate data confound the effect that information sharing has on individual firms with that arising from changes in the composition of active affirms. Using firm-level data, instead, one can identify the firms that benefit more as a result of enhanced information sharing arrangements. For instance, firms that are opaque and costly to screen in the absence of information sharing may gain greater access to credit after its introduction.

The second reason for using the BEEPS data is methodological. They allow us to purge the empirical estimates from the correlation between information sharing activity and other country-level institutional characteristics. An analysis of aggregate credit market data would hardly be able to isolate the impact of information sharing on credit market performance from that of other macroeconomic variables that may also affect credit. By using firm-level data we can control for cross-country variation in such variables by examining the differential impact of information sharing across firm types.

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[2] All statistics in this paragraph are unweighted means across countries and are taken from the EBRD transition report (EBRD, 2003; EBRD, 2005).

Further, the BEEPS data set allows us to control for the presence of unobserved heterogeneity at the country level and for the change in other macroeconomic variables, using panel data constructed from the 2002 and 2005 surveys. As far as we are aware, this is the first study to use panel data to confirm the effect of information sharing on credit access. Previous country-level analysis (Jappelli and Pagano, 2002; Djankov et al., 2005) and firm-level analysis (Galindo and Miller, 2001; Love and Mylenko, 2003) are based only on cross-sectional data.

Our cross-sectional and panel estimates show that information sharing is associated with improved credit access for firms in countries with weak legal environments. This correlation is stronger for opaque firms than transparent firms, where transparency is defined as the reliance on external auditors and the adoption of international accounting standards. This result is consistent with the view that information sharing is particularly valuable in guiding banks to evaluate credit applicants with poor accounting information. These are the customers for whom adverse selection and incentive problems would otherwise be most severe.

The rest of the paper is organized as follows. Section 2 provides a literature review and presents the hypotheses to be tested. Section 3 describes the data and the specification to be estimated. Sections 4 and 5 present the results obtained with cross-sectional and panel data, respectively. Section 6 summarizes our findings.

2 Effects of Information Sharing

In this section we briefly overview the models proposed so far to capture the effects of information sharing on credit market performance, using them to draw testable predictions for our empirical analysis. We also set our work against the backdrop of existing empirical work in this area, to highlight the value added of our evidence and empirical strategy.

2.1   Theory

By exchanging information about their customers banks can improve their knowledge of applicants' characteristics and past behaviour. In principle, this reduction of informational asymmetries can reduce adverse selection problems in lending, as well as change borrowers' incentives to repay, both directly and by changing the competitiveness of the credit market.

The implied effects on lending, interest rates and default rates have been modelled in several ways.[3]

Pagano and Jappelli (1993) show that information sharing reduces adverse selection by improving bank's information on credit applicants. In their model, each bank has private information about local credit applicants, but has no information about non-local applicants. If banks exchange information about their client's credit worthiness, they can assess also the quality of non-local credit seekers, and lend to them as safely as they do with local clients. The impact of information sharing on aggregate lending in this model is ambiguous. When banks exchange information about borrowers' types, the increase in lending to safe borrowers may fail to compensate for an eventual reduction in lending to risky types.

Information sharing can also create incentives for borrowers to perform in line with banks' interests. Klein (1982) shows that information sharing can motivate borrowers to repay loans, when the legal environment makes it difficult for banks to enforce credit contracts. In this model borrowers repay their loans because they know that defaulters will be blacklisted, reducing external finance in future. Vercammen (1995) and Padilla and Pagano (2000) show that if banks exchange information on defaults, borrowers are motivated to exert more effort in their projects. In both models default is a signal of bad quality for outside banks and carries the penalty of higher interest rates, or no future access to credit. Padilla and Pagano (1997) show that information sharing can also mitigate hold-up problems in lending relationships, by eliciting more competition for borrowers and thereby reducing the informational rents that banks can extract. The reduced hold-up problems can elicit higher effort by borrowers and thereby make banks willing to lower lending rates and extend more credit.[4]

Given the variety of the informational problems considered in these models, it is not surprising that the predicted effects of information sharing on the volume of lending are not identical across models. For instance, in the adverse selection model of Pagano and Jappelli (1993) the effect on lending is ambiguous, while it is positive in the hold-up model of Padilla

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[3] See Jappelli and Pagano (2005) for a comprehensive overview of theory and evidence on information sharing.

[4] Gehrig and Stenbacka (2006) consider a similar model but assume that banks compete ex ante for clients and customers face switching costs. Under these assumptions, future informational rents foster banking competition. Since information sharing reduces these rents, in their model it reduces competition, in contrast with Padilla and Pagano (1997). This shows that under some assumptions, information sharing can act as an anti-competitive device.

and Pagano (1997). The effect on lending also depends on the type of information being shared: in the model by Padilla and Pagano (2000), sharing only default information increases lending above the level reached when banks also share their data about borrowers' characteristics. Therefore, whether information sharing is associated or not with increased lending is left to the empirical evidence.

In contrast, these models offer qualitatively similar predictions about the effect of information sharing on the probability of default and interest rates: they all predict that, in one form or another, communication among banks tends to reduce defaults and thereby equilibrium interest rates. But this prediction is unambiguous only if referred to the probability of default of an individual borrower. When one considers the average default rate, composition effects may overturn the prediction. Suppose that information sharing gives lower-grade borrowers access to credit. Even if each borrower's probability of default is reduced, the aggregate default rate may increase because the relative weight of lower-grade borrowers increases in the total pool. This biases the estimates against the models' prediction that information sharing reduces defaults and interest rates. Thus here is an instance where, in empirical research, borrower-level data may have an edge over aggregate measures. Being free of these composition effects, microeconomic data allow a sharper test of this prediction.

These stylized models offer no predictions about the differential impact that information sharing may have on credit availability and interest rates depending on observable borrowers' characteristics, such as firm size or age. However, such predictions can be generated by considering a bank's costs and benefits from acquiring information via direct screening or rather by communicating with other banks, as well as taking into account the coverage of information sharing systems.

If direct screening has fixed costs for banks, one can expect it to be more worthwhile for large firms. To the extent that screening provides more detailed data than information sharing, it can reduce the latter's impact on the availability and cost of credit to large firms. This suggests that information sharing should be more effective for small firms. In practice, however, these firms tend to rely more on trade and informal credit, which are not recorded by information sharing systems. This may reduce the impact of information sharing on lending to small firms, especially in transition countries where trade credit is widespread.

Also for firm's age, the effect of information sharing can cut both ways. Screening may be more worthwhile for older firms, since more data is available to be canvassed, suggesting that

information sharing is more valuable to evaluate the credit worthiness of young firms. However, to a certain extent the same argument applies also to information sharing systems: these should more valuable when evaluating applications by firms with longer credit histories.

Finally, the firm's informational transparency – as measured for instance by the presence of external auditors or reliance on international accounting standards – may also interact with information sharing activity. Direct screening will yield greater benefits to the bank when applied to firms with more transparent accounts, so that for these firms banks will need to rely less on information sharing systems. As a result, the effects of information sharing should be weaker for firms with more transparent accounting systems.

This discussion suggests that our company-level empirical analysis should not only investigate the average effect of information sharing on credit availability and on the cost of credit, in line with the theoretical literature, but also whether this effect varies with firm size, age and transparency. In our specification we shall capture these differential effects by interacting our measure of information sharing with firm-level characteristics. While the interaction effects of age and size with information sharing can be either positive or negative, we expect the interaction with accounting transparency to have a negative coefficient.

2.2   Empirical Evidence

A growing body of empirical evidence supports the hypothesis that information sharing enhances credit market performance. Analyses of credit bureau data confirm that credit reporting reduces the selection costs of lenders by allowing them to more accurately predict individual loan defaults (Chandler and Parker, 1989; Barron and Staten, 2003; Kallberg and Udell, 2003; Cowan and De Gregorio, 2003; Powell at al., 2004; Luoto et al. 2004). There is, so far, no field evidence confirming that information sharing disciplines borrowers into exerting high effort and repaying their loans. Brown and Zehnder (2006), however, provide experimental evidence that a public credit registry can motivate borrowers to repay loans, when they would otherwise default.

The impact of information sharing on aggregate credit market performance has been tested by two cross-country studies. Based on their own survey of credit reporting in 43 countries Jappelli and Pagano (2002) show that bank lending to the private sector is larger and default rates are lower in countries where information sharing is more solidly established and

extensive. These relations persist also controlling for other economic and institutional determinants of bank lending, such as country size, GDP, growth rate, and variables capturing respect for the law and protection of creditor rights. Djankov et al. (2006) confirm that private sector credit relative to GDP is positively correlated with information sharing in their recent study of credit market performance and institutional arrangements in 129 countries.

Firm-level data suggests that information sharing may indeed have a differential impact on credit availability for different firm types, in line with the discussion in the previous subsection. Love and Mylenko (2003) combine firm-level data from the 1999 World Bank Business Environment Survey with aggregate data on private and public registries collected in Miller (2003). They find that private credit bureaus are associated with lower perceived financing constraints and a higher share of bank financing, while public credit registries are not. They also find that small and young firms benefit particularly from information sharing.[5]

Our empirical strategy improves upon these studies by controlling for the correlation between information sharing activity and other country-level institutional characteristics. We do this in two ways: in cross-sectional estimates, we examine the differential impact of information sharing across firm types; in panel data estimates, we control for the presence of unobserved country-level heterogeneity and for the change in other macroeconomic variables.

3 Data

We draw our data from two main sources. Country level data on information sharing is taken from the World Bank / IFC "Doing Business" database. We relate this to firm-level information on credit availability taken from the EBRD/World Bank Business Environment and Enterprise Performance Survey (BEEPS).

3.1   Information Sharing

Since 1991 information sharing institutions have been established in 17 of the 27 transition countries in Eastern Europe and the former Soviet Union. Table 1 provides an overview of

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[5] Galindo and Miller (2001) also provide evidence that information sharing reduces credit constraints at firm-level. Examining balance sheet data of large companies in 23 countries they find a positive relation between credit access and an index of information sharing.

public credit registries (Panel A) and private credit bureaus (Panel B) in 24 transition countries. The main sources of these data are the "Doing Business" surveys, conducted by the World Bank/IFC (World Bank, 2006). We complement this data with information from our own internet research. Table 1 shows that public registries (PCRs) and private bureaus (PCBs) are much more frequent in EU transition countries than in CIS countries.[6] Indeed today all of the eight EU transition countries have an active PCR, PCB, or both. In contrast, only three of the nine covered CIS countries have an operating PCR or PCB. The situation is intermediate in other non-EU countries, where in 2004 five out of eight feature a PCR, a PCB or both.

[Table 1 here]

In transition countries it is more common to observe either a PCR or a PCB than both of them. In Table 1, thirteen countries have either a PCR or a PCB, and only four have both. Moreover, the two types of institutions tend to be complementary in borrowers' coverage. Public registries in transition countries tend to cover larger loans than private bureaus.[7] Panel A shows that seven of the twelve public credit registries only cover loans which exceed per capita GDP in their country. Further, while all public credit registries cover loans to firms, three do not cover loans to private individuals. In contrast, PCBs tend to focus on credit to private individuals and cover even smallest loans. Panel B shows that all nine private credit bureaus cover loans to private individuals, while four of them do not cover loans to firms.

Based on Table 1, we construct an information sharing index for each country and year between 1996 and 2004. The index measures the presence and structure of public credit registries and private credit bureaus on a scale of 1 to 5. It is constructed as the maximum of two scores, one for PCRs and one for PCBs.[8] The PCR score adds one point for fulfilling each of the following five criteria: (i) both firms and individuals are covered, (ii) positive and negative data is collected and distributed, (iii) the registry distributed data which is at least

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[6] The CIS countries in our sample are: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan and Ukraine. We exclude Turkmenistan and Uzbekistan due to lack of data.

[7] This confirms the findings of Miller (2003) for a predominantly Latin American sample.

[8] Computing the information sharing index as the sum of the two scores (instead of the maximum) does not change the qualitative results of the estimation.

two years old, (iv) the threshold for included loans is below per capita GDP, and (v) the registry has existed for more than 3 years.[9] The PCB score is computed in a similar way.

[Figure 1 here]

Figure 1 plots the average information index from 1996 to 2004, as well as the PCR and PCB scores. The figure highlights that the early years of transition were marked by slow emergence of information sharing institutions, driven by the creation of public registries: prior to 2000 only six PCR were set up, while only two private credit bureaus emerged.[10] Information sharing activity accelerated after 2001, and also private arrangements started to appear: five public credit registries and seven private credit bureaus were established. This fast development appears set to continue in the coming years, with private credit bureaus currently under construction in at least six more countries.[11]

3.2   Credit Access

We relate our information sharing index to firm-level data on credit access taken from the Business Environment and Enterprise Performance Survey (BEEPS). This survey was conducted jointly by the EBRD and the World Bank in 1999, 2002 and 2005. Our main analysis is based on data from BEEPS 2002, as this survey version contains the most detailed information about firm's access to credit. The BEEPS 2002 provides data on 6153 firms in 26 transition countries.[12] We drop all observations from Uzbekistan and Tajikistan, due to lack of institutional indicators for these countries. This leaves us with a sample of 5717 firms from 24 countries. The BEEPS covers a representative sample of firms for each of these countries. The

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[9] Our information sharing index is similar to the "Credit Information Index" reported in the "Doing Business" data of the World Bank / IFC, although differently from that index we do not consider the right of borrowers to access their credit record.

[10] In 1996 Belarus also introduced a public credit registry. However, the main purpose of this registry is to support bank supervision. We therefore do not list it as a public credit registry in our data.

[11] In Russia, Kazakhstan, Armenia, Croatia, Bulgaria, and Serbia projects to establish private credit bureaus have been initiated, but these were not operating by the end of 2005.

[12] The survey covers all countries in which the EBRD is operational, with the exception of Turkmenistan. See Fries et al. (2003) for a detailed description of the BEEPS 2002 survey.

BEEPS provides us also with a panel of firms from the 2002 and 2005 surveys, which allows us to perform fixed effect estimation on some of our specification.

We use three indicators of firms' credit access available from the BEEPS 2002 survey. Two indicators capture the extent to which access to loans and cost of credit constrain firm growth, while a third indicator captures firms' actual use of external finance.

In two separate questions, firms were asked how problematic the access to financing (as determined by collateral requirements and credit availability) and the costs of financing (interest rates and charges) are for the operation and growth of their business. We code answers to these questions on a scale from 1 to 4 (1=major obstacle, 2=moderate obstacle, 3=minor obstacles, 4=no obstacles) and form our dependent variables *Access to Finance* and *Cost of Finance*.[13] Therefore, higher values of these two variables indicate an improvement in the terms at which credit is available: easier access and lower cost.

Besides looking at how financing conditions affect firm performance, we also analyze firms' actual reliance on external finance. To this purpose, we rely on the variable *Firm Debt*, which measures a firm's actual debt as a percentage of its total assets. Table 2 provides summary statistics for our three dependent variables by country. Definitions and sources of all dependent variables are provided in the Appendix.

[Table 2 here]

3.3   Empirical Model

We start our empirical analysis with cross-sectional regressions using the BEEPS 2002 survey data. The baseline specification relates each of our three dependent variables for firm *i* in country *j* to the information sharing index in the firm's country, a vector of other country characteristics, and a vector of firm characteristics that may affect credit access. As our dependent variables were collected during 2002, information sharing is measured as the average value of the index prior to the survey, i.e. 1996-2000. The fact that we relate firm-

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[13] Our coding is opposite to that used in the BEEPS data set, where 4=major obstacle, 3=moderate obstacle, 2=minor obstacles, 1=no obstacles. This obviously affects only the sign of our coefficient estimates, not their absolute magnitude or precision.

level credit indicators to country-wide measures of information sharing and that information sharing is predetermined with respect to credit variables should address the potential endogeneity of information sharing with respect to credit market performance.

We include three country-level variables to control for differences in institutions and macroeconomic performance: an index of banking reform, the inflation rate, and per capita GDP.[14] Institutional developments in the banking sector are measured by the variable *Bank Reform*, which provides a composite index of banking sector reform in each country/year.[15] Higher values of this index reflect reforms such as the privatisation and liberalization of the sector and strengthening of bank supervision.

Including these variables is particularly important in transition countries where several reforms have coincided with the emergence of information sharing, and may also have affected credit market performance. Structural reforms of the banking sector (privatisation, liberalization, strengthening of bank supervision) have been undertaken in most countries, especially after the Russian crisis (Bonin and Wachtel, 2003). Legal reforms aimed at protecting creditor rights and improving corporate transparency have also been pursued (Pistor et al., 2000). Finally, macroeconomic policy has been stabilized, creating an environment more conducive to financial intermediation (Fries and Taci, 2002).

[Table 3 here]

Table 3 provides summary statistics for our country-level explanatory variables, including the information sharing index. Definitions and sources of all control variables are provided in the Appendix. The table shows a strong variation in institutional and macroeconomic indicators. The index of banking reform ranges from a minimum value of 1 for Belarus and Serbia to 3.8 in Hungary, close to the maximum value of 4. Macroeconomic conditions also range from low inflation (below 5% in Azerbaijan, Macedonia and Bosnia) to hyperinflation (Belarus and Bulgaria). As expected, most countries with well developed information sharing (e.g. Hungary, Czech Republic and Estonia) also display relatively high levels of the banking reform index and macroeconomic stability. This confirms that it is important to control for

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[14] For both macroeconomic variables we take the 2000 values to avoid using the extraordinary macroeconomic data from the 1998 and 1999 period in which the Russian crisis took place.

[15] In the estimation, we use the 1996-2000 average of the index of bank reform.

these country-level effects, in order to identify the impact of information sharing on credit market performance.

We include seven firm-level explanatory variables to control for the variation in credit risk across firms. It is customary to regard larger and older firms as less risky, other things equal. We measure *Age* as the number of years the firm has been operating in that country, and size by three dummies for the number of employees (*Small Firm* = 1–49, *Medium Firm* = 50–249, *Large Firm* ≥ 250).

Given the weak legal environment and lack of transparency in corporate governance, borrower-lender relationships in these countries are likely to suffer from severe adverse selection and moral hazard. As a consequence banks' lending decisions might also be affected by firm characteristics that improve the transparency of their activities. We capture firm transparency by a composite indicator of a firm's book-keeping and auditing procedures. The variable *Transparency* takes the value 0 if a firm does not use international accounting standards or external auditors. The variable takes the value 1 if a firm has either international accounting standards or an external auditor; while it takes the value 2 if both apply. Of course, in general transparency is determined by regulatory standards as well as by firms' choices, and therefore cannot be regarded as an entirely exogenous firm characteristic. For this reason, we shall also control for the potential endogeneity of firm-level transparency using instrumental variables estimation.

We include two further control variables for firm ownership. *State-owned Firm* is a dummy variable that equals one if the government holds a majority stake in the firm. The effect of this variable is ambiguous a priori. On the one hand, state ownership may reduce firm risk in the eye of a bank, due to the possible government bailout in case of default. On the other, state ownership may increase default risk, owing to the political pressures on management to diverge from profit-maximizing policies. Moreover, these firms may receive public funding, which reduces their reliance on credit for investment and therefore relieve their credit constraint to firm growth. The dummy variable *Privatised Firm* equals one for private firms which emerged as the result of a privatisation process, and zero for all de-novo private firms. A successfully privatized firm may be less risky than a de-novo firm, and therefore may have enhanced credit access. Furthermore, they may still have ties to the public sector that make them less dependent on bank finance. Finally, in all our regressions we include sector dummies, to control for different finance needs of firms.

[Table 4 here]

Table 4 provides summary statistics for our firm-level explanatory variables. Definitions and sources of all control variables are again provided in the Appendix. The table shows that our sample is dominated by small firms (67%), with the remainder split between medium and large firms. The sample includes mainly privately owned firms (86%). Of these privately owned firms in the sample, 83% are de-novo firms, while 17% are privatised companies. Our sample displays a low level of transparency on average, and this appears to be quite stable across countries.

4 Cross-sectional Estimates

Tables 5-7 report cross-sectional estimation results for our three dependent variables based on the 2002 BEEPS survey. Table 5 reports four specifications of our empirical model for the dependant variable *Access to finance*. Since this is a categorical variable, we estimate ordered probit regressions. In all specifications, the standard errors of our estimated coefficients adjusted for cluster effects at the country level. This adjustment of crucial importance when one estimates the impact of a country-level variable on microeconomic data clustered at the country level: ignoring the clusters leads to standard errors that are too small, and therefore to conclude that the country-level variable is correlated with the dependent variable, whereas in fact it is not.

[Table 5 here]

In the first column of the table we report our baseline specification. Here we regress credit access on our information sharing index, controlling for firm characteristics and country-level indicators of institutional and macroeconomic reform. The positive coefficient of *Information Sharing* suggests that, on average, credit access is less of a constraint on firm growth in countries where public credit registries or private credit bureaus are more developed. The relevant coefficient estimate is not only statistically significant but also economically sizeable: for instance, raising the information sharing index from the lowest (0) to the highest

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observed value (4.6) raises the credit access indicator by 0.57, which is about 30% of the sample mean.

The results in the first regression also show that larger and more transparent firms perceive credit access as less of a growth constraint. To give an idea of the economic impact of a change in firm-level transparency, consider that a firm with external auditors and international accounting standards has a credit access indicator that is about 15% higher than the sample mean. A potential criticism of this specification is that firm transparency is not exogenous, as firms can choose their accounting and auditing procedures, and may vary these in order to obtain credit. To control for this issue, we estimated instrumental variable regressions of this specification using a "family firm" indicator and the education and age of the manager as instruments for transparency. The IV estimates suggest, if anything, that the results reported in the first column of Table 5 underestimate the effect of transparency.

As for the macroeconomic variables, we find that in countries with a more stable macroeconomic environment perceived credit constraints are lower, but surprisingly firms in countries with more reformed banking sectors report tighter credit constraints. This may reflect the initial credit crunch induced by tougher banking regulations in transition countries following the Russian crisis of 1998-99.

In the second specification of Table 5 we add interaction terms of the firm-level characteristics with the information sharing index to our baseline specification. This allows us to capture also the differential impact of information sharing by firm size, age, ownership and transparency. The coefficients of the variables already included in the baseline specification – and in particular the direct effect of information sharing – are largely unaffected by the additional regressors, both in magnitude and significance. The new result is the negative and significant coefficient of *Transparency*IS*, which indicates that opaque firms benefit more from information sharing than transparent firms. This supports our conjecture that lenders find information sharing more valuable for firms where accounting information is poorer, and therefore adverse selection and incentive problems would otherwise be more severe. The effect of information sharing on credit access does not vary significantly across firms of different size, age and ownership.

The estimates of the first two specifications in Table 5 may confound the effect of information sharing with that of omitted country-level variables. To tackle this issue, we include country fixed effects in the third column of the table, so that we can no longer

estimate the direct effect of information sharing because it is perfectly collinear with the country effects. We can, however, still estimate the differential effect of information sharing across firm types, by including interactions between information sharing and firm characteristics.

The negative coefficient of *Transparency*IS* in the third column of the table confirms that opaque firms benefit more information sharing than transparent firms. Therefore, even including country dummies information sharing affects access to credit in transition countries. As in the previous specifications, the coefficients of the interactions with size and age are not precisely estimated.

As a further robustness check, we introduce also interaction terms of transparency with the other country-level indicators: bank reform, per-capita GDP and inflation. The results reported in the final column of the table show that including these additional interaction effects does not alter our findings. For brevity, the coefficients of these further interactions are not shown in the table.

Table 6 reports estimation results when the *Cost of finance* indicator is the dependent variable. As this variable is also categorical, the estimation method is again ordered probit regressions with standard errors adjusted for cluster effects at the country level. Table 6 reports the same four specifications as the previous table. The results generally parallel those of Table 5, albeit with some notable differences. The positive coefficient of *Information Sharing* in the first two columns suggests that, on average, the cost of credit is lower in countries where information sharing is more developed, which is consistent with the theoretical prediction discussed in Section 2. There are also some differences with Table 5, however. The direct effect of transparency and its interaction with information sharing have the same sign as in Table 5 but lower magnitude and precision. Moreover, the coefficients of firms' age and index of bank reform is negative but no longer statistically significant from zero. Finally, state-owned firms appear to face a lower cost of credit.

[Table 6 here]

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Table 7 reports Tobit estimates obtained using *Firm Debt* as this variable is censored at zero.[16] The positive coefficient of *Information Sharing* in the first and second columns of Table 7 indicate that firms are more levered in countries where information sharing is more developed: raising the information sharing index from the lowest to the highest observed value raises the leverage ratio by about 4 percentage points, which is about almost half of the sample mean (9.31%). Also transparency and size have a positive direct effect on leverage, with large and highly significant coefficients.

[Table 7 here]

The interactions of information sharing with age and firm size are significantly different from zero but differ in sign: information sharing has a larger impact on the leverage of young and large firms. The interaction of transparency with information sharing has a negative coefficient, as for the indicators of credit access and cost of credit, but is not precisely estimated. Finally, information sharing appears to affect leverage even controlling for country fixed effects in the final two specifications of the table.

5 Panel Estimates

The results reported so far are still subject to two potential econometric problems, since they may still be biased due to omitted firm-level variables. To tackle this issue we are able to repeat part of our analysis using a panel generated from the 2002 and 2005 BEEPS. Of the total 9655 firms covered by the BEEPS 2005, 1457 were also surveyed in 2002. Due to our exclusion of Uzbekistan and Tajikistan and missing data, our panel data set shrinks to 1218 firms. Unfortunately, the BEEPS 2005 does not contain information on firm's external debt, so that our regressions are limited to the dependent variables *Access to Finance* and *Cost of Finance.* As in the baseline specification of the previous tables, the explanatory variables are:

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[16] The coefficients reported in this table are not adjusted for cluster effects at country level. However, Heckman regressions with standard errors corrected for clustering at the country level yield similar results.

information sharing, firm size, transparency, per-capita GDP, bank reform and inflation. We include the changes in *Bank Reform, Inflation* and *GDP* as country level control variables. [17]

[Table 8 here]

Table 8 displays the fixed effects estimates of ordered probit regressions for this two-wave panel. Again, standard errors are adjusted for cluster effects at the country level. The table confirms that improvements in information sharing at the country level is associated with greater access to credit and better terms of credit. The coefficient of *Information Sharing* for *Access to Finance* is positive and significant at the 10% level, and that of *Cost of Finance* is also positive and significant at the 5% level. It is noteworthy that both are similar in size to the cross-sectional estimates, even though the sample is much smaller and we control for firm-level effects.

6 Conclusions

The transition countries of Eastern Europe and the former Soviet Union are a unique environment to test the effects of institutions on credit market performance, since recently they have featured wide variation in institutions both across countries and over time. In this paper we have investigated the effects of the variation in one such institution, that is, the information sharing arrangements among banks between 1996 and 2004, using a large sample of firm-level data. The effects of information sharing arrangements are of particular interest in the context of transition countries because such arrangements may mitigate the effects of the weak protection afforded to creditors in most of these jurisdictions.

Our estimates show that information sharing is associated with improved availability and lower cost of credit to firms in countries with weak legal environments. Moreover, firm-level accounting transparency has qualitatively similar effects on credit market performance.

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[17] For each country, information sharing for 2002 is measured as the 1996-2000 average (as in the cross-sectional estimates), and for 2005 as the 2001-2003 average. Similarly, bank reform is measured as the 1996-2000 for 2002 and as the 2001-2003 average for 2005. Inflation and per-capita GDP are the 2000 and 2003 values respectively.

Finally, information sharing and accounting transparency appear to be substitutes at the firm level: the correlation between information sharing and credit access (or the cost of credit) is stronger for opaque firms than for transparent ones. This result is consistent with the idea that information sharing is particularly valuable to guide banks in evaluating credit applicants with poor accounting information.

Our reliance on firm-level data allows us to make a methodological improvement over previous empirical studies on this issue, in the direction of purging the estimates of the correlation between information sharing and credit market performance from the effects of variation in other country-level institutional and macroeconomic variables. In cross-sectional estimates, we control for variation in country-level aggregate variables that may affect credit by examining the differential impact of information sharing across firm types. In panel estimates, we also control for the presence of unobserved heterogeneity at the country level and for changes in selected macroeconomic variables.

The use of firm-level data also allow us to test theoretical predictions without the biases that composition effects might introduce in tests conducted on aggregate data. For instance, existing models predict that at the individual level information sharing tends to reduce default rates and interest rates. However, more information sharing among banks may change the composition of the pool of active borrowers so as to bias tests on aggregate data against finding such a negative effect on defaults and interest rates.

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Appendix. Definition of variables

1. Country-level variables (1996-2005)

Information sharing index. For each year between 1996 and 2004 we compute an index for private credit bureaus and one for public credit registers: 1 point if it exists for more than 3 years; 1 point if individuals and firms are covered; 1 point if positive and negative data are collected; 1 point if PCR/PCB distributes data which is at least 2 years old; 1 point if threshold loan is below per capita GDP. We then take the maximum of the index for credit bureaus and public credit registers. Our main data source is Doing Business (2006).

Private credit. Definition: Outstanding bank credit to private households and enterprises in % of GDP, end of year. Source: EBRD transition report (EBRD, 2003; EBRD, 2005)

Non Performing Loans. Definition: non performing loans (in % of total outstanding loans), end of year. Source: EBRD transition report (EBRD, 2003; EBRD, 2005)

Per capita GDP. Definition: Per capita GDP in '000 US$. Source: IFS (line 99b, line ae, line 99z).

Inflation. Definition: average annual growth rate of CPI . Source: IFS (line

Index of Banking Reform. Definition: Index of banking sector reform (range 1 to 4, steps of 1/3). Source: EBRD transition report (EBRD, 2003, EBRD, 2005)

2. Firm-level variables (Business Environment and Enterprise Performance Survey - BEEPS)

Cross sectional analysis (BEEPS 2002): Our cross sectional analysis is based on responses by 5717 firms in 24 transition countries to the 2002 BEEPS questionnaire. By design this data set provides a similar sample of non-agricultural firms across all countries. The sample is dominated by small firms (67%) and private firms (86%). The sample includes firms from service and manufacturing sectors, with the majority of firms (54%) have their main activity in the service sector.

Panel Analysis (BEEPS 2002 & 2005): Our panel analysis is based on responses by 1218 firms which were interviewed for both the 2002 and 2005 BEEPS surveys. This represents 13% of the 9655 firms which were covered by the 2005 BEEPS survey. The sample structure for the 2005 survey resembles by design that of the 2002 survey.

Access to finance: Definition: "Can you tell me how problematic is access to finance (e.g. collateral requirement) or financing not available from banks for the operation and growth of your business?" (1=major obstacle, 2=moderate obstacle, 3=minor obstacle, 4=no obstacle). Source: q80a.

Cost of finance. Definition: How problematic is cost of financing (e.g. interest rates and charges) for the operation and growth of your business? (1=major obstacle, 2=moderate obstacle, 3=minor obstacle, 4=no obstacle). Source: q80b.

Firm debt. Definition: Ratio of total debt to total assets. Source: q84a1. Only available in the 2002 BEEPS.

Firm's Age. Definition: Current year minus year of establishment of the firm. Source: s1a.

Employment. Definition: Total number of full-time employees less then 50, between 50 and 250, greater than 250. Source: s4a2.

Privatized firm. Definition: privatized firm (yes/no). Source: q9aa.

State-owned firm. Definition: State controlled firm (yes/no). Source: s2b.

Transparency. Based on use of international accounting standards (Source: q73) and of external auditor (q74). Transparency equals 0 if the firm does not use international accounting standards or external auditors, 1 if it uses of of the two, 2 if it uses both.

Sector: Definition: Mining, Construction, Manufacturing transport and communication, Wholesale, retail and repairs, Real estate, renting and business service, Hotels and restaurants, Others. Source: q2.

Figure 1
Information Sharing in Transition countries over Time

Values reported in the figure are unweighted averages of the information sharing index and the PCR and PCB scores for the 24 transition countries listed in Table 1. In each country/year, the information sharing index is the maximum of the corresponding PCB and PCR scores.

Table 1. Panel A: Public Credit Registries in Transition Countries

Start of operations: year in which the public credit registry (PCR) started distributing credit records. Individuals: PCR covers private individuals. Firms: PCR covers firms. Negative: PCR collects and distributes negative information. Positive: PCR collects and distributes positive information. Threshold: Minimum Loan size covered by PCR as percentage of GDP per capita. History: Credit reports provide information for more than the most recent 2 years. Source: Doing Business 2006, International Financial Statistics, National Bank of Kazakhstan.

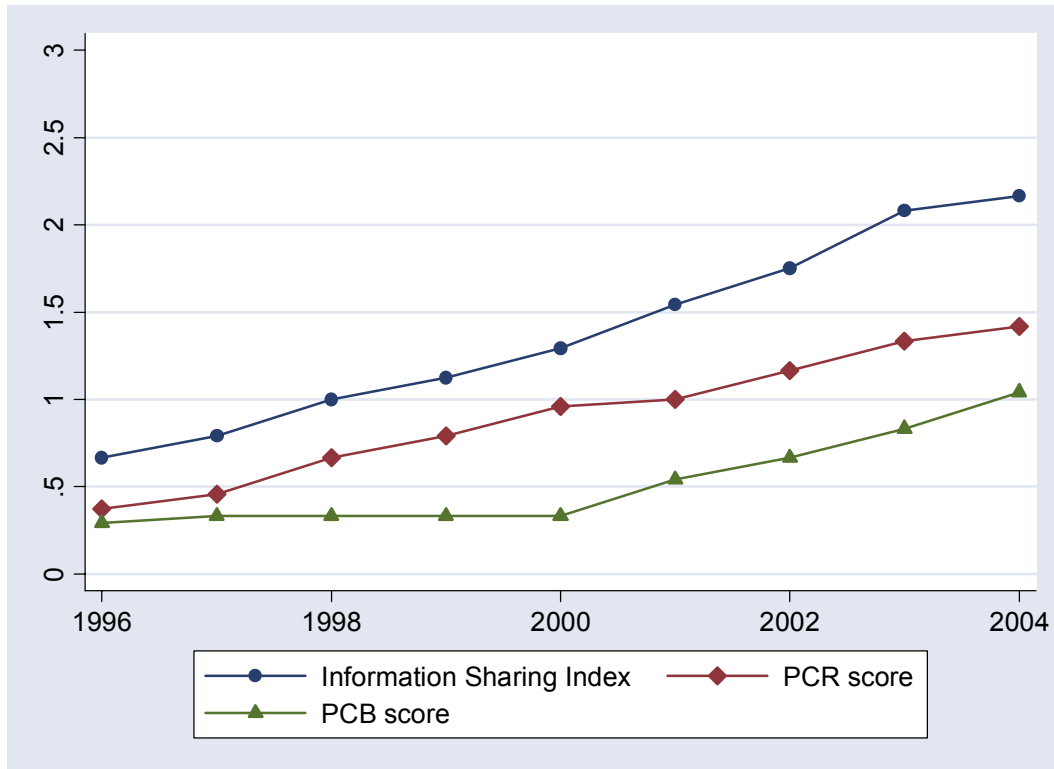|	Start of operations	Individuals covered	Firms covered	Negative information	Positive information	Threshold	History
Albania							
Armenia	2003	x	x	X	x	240	
Azerbaijan	2005	x	x	X	x	107	x
Belarus							
Bosnia							
Bulgaria	1999	x	x	X	x	208	
Croatia							
Czech Rep.	2002		x	X	x	0	x
Estonia							
Georgia							
Hungary							
Kazakhstan	1996	x	x	X	x	140	x
Kyrgyz Rep.							
Latvia	2003	x	x	X		0	x
Lithuania	1995	x	x	X	x	86	x
Macedonia	1998	x	x	X	x	118	x
Moldova							
Poland							
Romania	2000	x	x	X	x	187	x
Russia							
Serbia	2002	x	x		x	2995	
Slovak Rep.	1997		x	X	x	0	
Slovenia	1994		x	X	x	0	x
Ukraine							

Table 1. Panel B: Private Credit Bureaus in Transition Countries

Start of operations: year in which the private credit bureau (PCB) started distributing credit records. Individuals: PCB covers private individuals. Firms: PCB covers firms. Negative: PCB collects and distributes negative information. Positive: PCB collects and distributes positive information. Threshold: Minimum Loan size covered by PCB as percentage of GDP per capita. History: Credit reports provide information for more than the most recent 2 years. Source: Doing Business 2006, International Financial Statistics. Two stars indicates that a private credit bureau is under construction.

	Start of operations	Individuals covered	Firms covered	Negative information	Positive information	Threshold	History
Albania	**						
Armenia							
Azerbaijan							
Belarus	2001	x	x	x	x	0	x
Bosnia	**						
Bulgaria	**						
Croatia	2002	x	x	X	x	0	x
Czech Rep.	1993	x	x	X		1	x
Estonia							
Georgia	1995	x	x	X	x	0	x
Hungary	**						
Kazakhstan	2003	x		X	x	0	x
Kyrgyz Rep.							
Latvia	2004	x	x	X		0	
Lithuania							
Macedonia							
Moldova	2001	x		X	x	0	x
Poland	2004	x		X		0	x
Romania	**						
Russia	**						
Serbia	2004	x		X	x	0	x
Slovak Rep.	**						
Slovenia							
Ukraine							

Table 2. Access to Credit, Cost of Credit and Ratio of Debt to Total Assets.
Sample Means

Access to Credit: "How problematic is access to finance for the operation and growth of your business?" (1=major obstacle, 2=moderate obstacle, 3=minor obstacle, 4=no obstacle). Cost of Credit: "How problematic is the cost of finance (e.g. interest rates and charges) for the operation and growth of your business?" (1=major obstacle, 2=moderate obstacle, 3=minor obstacle, 4=no obstacle). Firm Debt: Debt as percentage of total assets in 2001. Source: 2002 BEEPS.

	Access to finance	Cost of finance	Firm Debt	Observations
Albania	1.93	1.41	19.84	170
Armenia	1.66	1.48	4.23	171
Azerbaijan	1.84	1.80	3.45	170
Belarus	1.53	1.22	7.94	250
Bosnia	1.48	1.21	12.95	182
Bulgaria	1.20	1.12	12.87	250
Croatia	1.82	1.73	14.75	187
Czech Rep.	1.55	1.47	8.37	268
Estonia	2.06	1.99	14.77	170
Georgia	1.79	1.47	6.76	174
Hungary	1.78	1.69	9.82	250
Kazakhstan	2.00	1.84	7.64	250
Kyrgyz Rep.	1.76	1.60	12.26	173
Latvia	2.15	1.99	10.33	176
Lituania	2.38	2.01	13.60	200
Macedonia	1.92	1.62	6.45	170
Moldova	1.51	1.05	6.84	174
Poland	1.35	0.83	7.76	500
Romania	1.45	1.20	10.86	255
Russia	1.69	1.76	5.03	506
Serbia	1.57	1.22	10.59	250
Slovak Rep.	1.50	1.42	15.35	170
Slovenia	2.18	1.80	12.95	188
Ukraine	1.56	1.38	4.53	463
Total	1.69	1.47	9.31	5717

Table 3. Country Level Explanatory Variables

The table reports the country-level explanatory variables used in our cross-sectional analysis. See appendix for detailed description of the variables.

	Information Sharing Index	Index of Bank Reforms	Inflation (%)	Per Capita GDP (1'000$)
Albania	0	2.06	13	0.99
Armenia	0	2.24	8	0.56
Azerbaijan	0	2	3	0.53
Belarus	0	1	130	0.95
Bosnia	0	2.2	-1	1.17
Bulgaria	0.8	2.62	242	1.28
Croatia	0	2.88	5	4.3
Czech Rep.	0	3.12	7	5.66
Estonia	4	3.4	10	3.72
Georgia	0	2.24	15	0.64
Hungary	3.8	3.8	15	4.31
Kazakhstan	3.6	2.24	24	1.21
Kyrgyz Rep.	0	2.28	17	0.28
Latvia	0	2.94	7	2.77
Lithuania	4.6	3	8	2.89
Macedonia	2	2.94	2	1.85
Moldova	0	2.18	23	0.33
Poland	0	3.18	13	3.91
Romania	0.6	2.68	69	1.38
Russia	0	1.94	39	1.79
Serbia	0	1	8	1.3
Slovak Rep.	1.2	2.76	49	3.76
Slovenia	2.8	3.12	8	9.92
Ukraine	0	2	32	0.71
Total	0.85	2.47	34	2.35

Table 4. Firm-level Control Variables.
Sample Means

The table reports the country averages of the firm-level control variables used in our cross-sectional analysis. See appendix for detailed description of the variables.

	Small firm	Medium firm	Large firm	Firm's age	Privatized company	State-owned firm	Transparency
Albania	0.71	0.18	0.11	1.41	0.11	0.08	0.71
Armenia	0.73	0.13	0.14	0.81	0.18	0.33	0.73
Azerbaijan	0.69	0.15	0.15	0.73	0.15	0.14	0.69
Belarus	0.69	0.16	0.15	0.68	0.18	0.05	0.69
Bosnia	0.6	0.23	0.17	1.05	0.13	0.23	0.60
Bulgaria	0.69	0.15	0.16	0.9	0.15	0.16	0.69
Croatia	0.67	0.18	0.16	1.03	0.15	0.13	0.67
Czech Rep.	0.66	0.17	0.17	0.57	0.13	0.10	0.66
Estonia	0.71	0.15	0.14	1.71	0.14	0.09	0.71
Georgia	0.75	0.15	0.1	1.32	0.16	0.2	0.75
Hungary	0.67	0.15	0.18	0.90	0.05	0.18	0.67
Kazakhstan	0.7	0.15	0.15	0.86	0.15	0.18	0.70
Kyrgyz Rep.	0.62	0.27	0.11	0.78	0.16	0.24	0.62
Latvia	0.7	0.15	0.15	1.20	0.17	0.11	0.70
Lithuania	0.67	0.20	0.14	0.97	0.16	0.17	0.67
Macedonia	0.7	0.15	0.15	0.49	0.04	0.14	0.70
Moldova	0.68	0.20	0.12	1.26	0.16	0.20	0.68
Poland	0.66	0.22	0.12	0.72	0.14	0.09	0.66
Romania	0.6	0.25	0.15	0.66	0.15	0.13	0.60
Russia	0.67	0.19	0.13	0.53	0.13	0.15	0.67
Serbia	0.61	0.20	0.19	0.59	0.17	0.10	0.61
Slovak Rep.	0.64	0.21	0.16	0.67	0.15	0.12	0.64
Slovenia	0.77	0.13	0.10	0.80	0.09	0.20	0.77
Ukraine	0.67	0.18	0.15	1.03	0.14	0.11	0.67
Total	0.67	0.18	0.14	0.86	0.14	0.14	0.67

Table 5. Access to Finance

The table reports ordered probit estimates for "How problematic is access to finance for the operation and growth of your business?" (1=major obstacle, 2=moderate obstacle, 3=minor obstacle, 4=no obstacle). Each regression includes sector dummies. The third and fourth regressions include a full set of country dummies. The last regression includes interaction terms of transparency and the macro variables (Per capita GDP; Inflation; Index of bank reform). Robust z statistics are reported in parentheses. Standard errors are adjusted for cluster effects at the country level. One star denotes significant at 5%; two stars significant at 1%.

	Baseline	Interactions	Country effects	Country effects and further interactions
Information sharing (IS)	0.125	0.144		
	(4.11)**	(4.96)**		
Firm's age	-0.002	-0.003	-0.002	-0.002
	(2.36)*	(2.50)*	(1.55)	(1.56)
Medium firm	0.129	0.115	0.141	0.140
	(3.35)**	(2.70)**	(3.21)**	(3.11)**
Large firm	0.176	0.135	0.154	0.151
	(4.28)**	(3.82)**	(4.27)**	(4.16)**
Privatized company	0.053	0.057	0.024	0.029
	(0.79)	(0.70)	(0.29)	(0.35)
State-owned firm	0.089	0.106	0.069	0.072
	(1.24)	(1.27)	(0.81)	(0.84)
Transparency	0.131	0.162	0.141	0.238
	(4.72)**	(5.51)**	(5.20)**	(2.91)**
Per capita GDP	0.040	0.041		
	(1.89)	(2.04)*		
Inflation	-0.231	-0.233		
	(2.37)*	(2.39)*		
Index of bank reform	-0.213	-0.218		
	(2.01)*	(2.10)*		
Firm's Age × IS		0.001	0.001	0.001
		(1.82)	(1.25)	(1.24)
Medium firm × IS		0.013	0.006	0.005
		(0.89)	(0.36)	(0.30)
Large firm × IS		0.046	0.048	0.049
		(1.25)	(1.25)	(1.27)
Privatized company × IS		-0.010	-0.002	-0.003
		(0.24)	(0.06)	(0.08)
State-owned firm × IS		-0.011	-0.006	-0.007
		(0.25)	(0.12)	(0.15)
Transparency × IS		-0.036	-0.029	-0.023
		(3.07)**	(2.38)*	(2.01)*
Country dummies	No	No	Yes	Yes
Observations	5392	5392	5392	5392

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Table 6. Cost of Finance

The table reports ordered probit estimates for: "How problematic is cost of financing (e.g. interest rates and charges) for the operation and growth of your business?" (1=major obstacle, 2=moderate obstacle, 3=minor obstacle, 4=no obstacle). Each regression includes sector dummies. The third and fourth regressions include a full set of country dummies. The last regression includes interaction terms of transparency and the macro variables (Per capita GDP; Inflation; Index of bank reform). Robust z statistics are reported in parentheses. Standard errors are adjusted for cluster effects at the country level. One star denotes significant at 5%; two stars significant at 1%.

	Baseline	Interactions	Country effects	Country effects and further interactions
Information sharing (IS)	0.139	0.146		
	(2.99)**	(2.86)**		
Firm's age	-0.002	-0.003	-0.001	-0.001
	(1.82)	(1.67)	(0.57)	(0.56)
Medium firm	0.055	0.051	0.075	0.072
	(1.28)	(1.02)	(1.28)	(1.21)
Large firm	0.126	0.108	0.099	0.092
	(1.81)	(1.46)	(1.39)	(1.30)
Privatized company	0.045	0.070	-0.003	0.001
	(0.73)	(0.87)	(0.03)	(0.02)
State-owned firm	0.175	0.210	0.160	0.162
	(2.69)**	(2.62)**	(2.06)*	(2.07)*
Transparency	0.054	0.060	0.068	0.126
	(1.89)	(1.70)	(2.68)**	(1.76)
Per capita GDP	0.019	0.020		
	(0.74)	(0.77)		
Inflation	-0.282	-0.282		
	(2.02)*	(2.01)*		
Index of bank reform	-0.196	-0.198		
	(1.12)	(1.13)		
Firm's Age × IS		0.000	-0.000	-0.000
		(0.41)	(0.24)	(0.24)
Medium firm × IS		0.004	-0.003	-0.004
		(0.15)	(0.09)	(0.13)
Large firm × IS		0.019	0.025	0.026
		(0.37)	(0.49)	(0.49)
Privatized company × IS		-0.026	-0.000	-0.001
		(0.98)	(0.01)	(0.04)
State-owned firm × IS		-0.040	-0.021	-0.022
		(1.15)	(0.69)	(0.72)
Transparency × IS		-0.006	-0.016	-0.017
		(0.40)	(1.10)	(1.19)
Country dummies	No	No	Yes	Yes
Observations	5450	5450	5450	5450

Table 7. Firm Debt

The table reports Tobit regression estimates for the ratio of total debt to total assets (expressed in percentage values). Each regression includes sector dummies. The third and fourth regressions include a full set of country dummies. The last regression includes interaction terms of transparency and the macro variables (Per capita GDP; Inflation; Index of bank reform). T-statistics are reported in parentheses. One star denotes significant at 5%; two stars significant at 1%.

	Baseline	Interactions	Country effects	Country effects and further interactions
Information sharing (IS)	0.890	1.705		
	(2.05)*	(2.39)*		
Firm's age	-0.007	0.078	0.074	0.073
	(0.19)	(1.96)	(1.87)	(1.84)
Medium firm	6.988	5.821	6.080	5.949
	(4.50)**	(3.29)**	(3.47)**	(3.39)**
Large firm	11.726	9.720	10.740	10.679
	(6.41)**	(4.64)**	(5.18)**	(5.14)**
Privatized company	1.602	0.979	2.439	2.269
	(0.90)	(0.47)	(1.17)	(1.09)
State-owned firm	3.222	0.325	1.398	1.257
	(1.68)	(0.15)	(0.66)	(0.59)
Transparency	4.165	4.867	2.606	-3.816
	(5.50)**	(5.51)**	(2.81)**	(0.97)
Per capita GDP	1.195	1.236		
	(3.15)**	(3.26)**		
Inflation	0.117	0.288		
	(0.06)	(0.15)		
Index of bank reform	0.527	0.499		
	(0.39)	(0.37)		
Firm's Age × IS		-0.106	-0.108	-0.107
		(3.87)**	(3.92)**	(3.90)**
Medium firm × IS		1.673	1.456	1.464
		(1.64)	(1.45)	(1.46)
Large firm × IS		3.706	3.827	3.770
		(3.17)**	(3.34)**	(3.29)**
Privatized company × IS		0.514	0.218	0.310
		(0.45)	(0.19)	(0.27)
State-owned firm × IS		1.010	0.230	0.310
		(0.81)	(0.19)	(0.25)
Transparency × IS		-0.596	-0.273	-0.782
		(1.21)	(0.51)	(1.30)
Country dummies	No	No	Yes	Yes
Observations	5717	5717	5717	5717

Table 8. Fixed Effects Panel Estimates

The table reports regression estimates with firm-level fixed effects using the panel component of the 2002 and 2005 BEEPS. The dependent variables are: "How problematic is access to finance for the operation and growth of your business?" and: "How problematic is cost of financing (e.g. interest rates and charges) for the operation and growth of your business?" (For both variables 1=major obstacle, 2=moderate obstacle, 3=minor obstacle, 4=no obstacle). Robust z statistics are reported in parentheses. Standard errors are adjusted for cluster effects at the country level. One star denotes significant at 5%; two stars significant at 1%.

	Access to finance	Cost of finance
Information sharing index (IS)	0.121	0.113
	(1.96)	(2.40)*
Medium firm	-0.154	-0.125
	(1.67)	(1.20)
Large firm	-0.103	-0.085
	(0.65)	(0.47)
Transparency	0.034	0.046
	(0.81)	(1.09)
Per capita GDP	0.009	0.037
	(0.37)	(1.58)
Index of bank reform	0.257	0.047
	(1.04)	(0.42)
Inflation	-0.001	-0.004
	(0.86)	(4.57)**
Observations	1208	1218