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Abstract

We examine the firm-level and country-level determinants of the currency denomination of small business loans. We introduce an information asymmetry between banks and firms in a model that also features the trade-off between the cost of debt and firm-level distress costs. Banks in our model don't know the currency in which firms have contracted their sales. When foreign currency funds come at a lower interest rate, all foreign currency earners and those local currency earners with low distress costs choose foreign currency loans. With imperfect information in the model concerning the currency in which the firms receive their earnings, even more local earners switch to foreign currency loans as they do not bear the full cost of the corresponding credit risk.

We test these implications of our model by using a 2005 survey with responses from 9,655 firms in 26 transition countries that contains reports on 3,105 recent bank loans. We find that firms with foreign currency earnings and lower distress costs borrow more in foreign currency, while opaque firms do not. Interest rate advantages on foreign currency funds do explain differences in loan dollarization across countries, but not within countries over time. The presence of foreign banks and reforms related to corporate governance also contribute to differences in foreign currency borrowing across countries. However, stronger foreign bank presence or corporate governance do not lead more local currency earners to choose foreign currency loans.

Our results suggest that while the cost and risk of debt do affect the propensity of small firms to take unhedged foreign currency loans, firm opaqueness does not. Hence, we cannot confirm that information asymmetries are a key driving force of the recently observed increase in loan dollarization in Eastern European transition countries.

Keywords: foreign currency borrowing, competition, banking sector, market structure.

JEL: G21, G30, F34, F37.

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I. Introduction

A large theoretical and empirical literature investigates the conditions on bank loans to small businesses, such as their loan rate, loan amount, collateral, and maturity for example (Petersen and Rajan (1994), Berger and Udell (1992), Jiménez, Salas and Saurina (2006), Berger, Espinosa-Vega, Frame and Miller (2005), respectively, among many others). The currency denomination of these loans has been somewhat overlooked however.

In many countries foreign currency borrowing seems quite common however. In Eastern European countries between one-fifth to three quarters of all corporate loans are currently denominated in foreign currency (European Central Bank (2006), p. 39). In East Asia corporate debt seems split about equally between domestic and foreign currencies (Allayannis, Brown and Klapper (2003)), while in more than a few Latin American countries the share of foreign currency debt exceeds 20 percent (Galindo, Panizza and Schiantarelli (2003)).

The expected introduction of the euro and increasing trade flows may well explain part of the loan currency choices made in Eastern Europe for example. But households and firms increasingly also take out mortgages or commercial loans in Swiss francs and Japanese Yen, rather than in the domestic currency, to take advantage of substantially lower interest rates on these foreign currencies (*Wall Street Journal*, May 29th, 2007). These "small men's carry-trades" could raise concerns about the resultant credit risks,[1] especially

[1] Carry trades, whereby investors borrow in a low-yielding currency and invest in a high-yielding one, are a widespread phenomenon. At the beginning of 2007 it was estimated that that as much as US$1 trillion was involved in the yen carry trade for example (*The Economist*, February 1st, 2007). Traditionally carry trades have been made by large financial institutions and leveraged institutions, such as hedge funds. Low exchange rate volatility and persistent interest rate differentials have fuelled the growth in cross-currency positions in recent years (Galati, Heath and McGuire (2007)).

in those situations where financiers are unable to assess the actual foreign currency needs of their borrowers.

This paper therefore more closely examines the currency denomination of loans to small businesses. Very little is known about the attraction and characteristics of borrowing in low-yielding currencies by this key segment of the economy. A number of recent theoretical papers however have started to model the choice of loan currency in a way that may also be relevant for small firms (Allayannis et al. (2003)). The tradeoff between management of currency risk and cost of debt may be shaped by firm financial constraints as in Cowan (2006) for example. Firms with more foreign income and firms in countries with a higher interest differential will have more foreign debt, but the match between income streams and denomination of debt is naturally tighter for more financially constrained firms.

Motivated by the aforementioned policy concerns, we introduce an information asymmetry between banks and firms in a framework that also features the trade-off between the risk and the cost of debt. We conjecture that banks don't know the currency in which firms have contracted their sales. In emerging economies for example – economies where many transactions are denominated in foreign currency and loan currency choice may be acute – small firms often borrow from banks without providing any audited statements, while cash management services that would allow banks to verify and analyze firm revenues are not commonly used. If the interest rate on foreign currency funds is lower, local currency earners with low distress costs vis-à-vis the interest rate differential choose foreign currency loans. Our model shows that if the banks are imperfectly informed about the currency in which the firms earn, more local earners switch to foreign currency loans, as firms do not bear the full cost of the corresponding default risk.

We test these implications of our theoretical model by investigating the currency denomination of individual bank loans granted to small firms. We use a 2005 survey of 9,655 firms from 26 transition countries that yields 3,105 actual bank loan observations in an synthetic panel that runs from January 2002:I to 2005:II. Motivated by our theoretical framework we focus on the interplay between firm-specific measures of firm distress costs and the informational asymmetry.

We find that small businesses that have export revenues or foreign owners are more likely to borrow in foreign currency. However, firms without foreign income (domestically-owned, non-exporting companies in non-dollarized economies) also take foreign currency loans. These firms are more likely to do so the lower their distress costs and the higher the interest rate differential between the local and foreign currency funds. Consequently, the trade off between debt risk and cost influences the choice of loan currency denomination by small firms in transition countries. In contrast, we do not find that our measures of financial opaqueness determine the likelihood firms take loans in foreign currency (that are most likely unhedged).

The rest of the paper is organized as follows. Section II discusses the theoretical and empirical literature. Section III introduces the main hypotheses, ingredients and specifics of our theoretical model. Section IV describes the data and the empirical model, while Section V discusses the firm- and country-specific empirical results. Section VI concludes.

II. Literature

A. Theory

A number of recent papers model the choice of the loan currency denomination by firms borrowing from financial institutions or investors (see Allayannis et al. (2003) for example for a pointed review). Managing the risk from economic exposure clearly matters for this choice: if the firm's cash flows are in foreign currency, borrowing in the same foreign currency will provide a straightforward natural hedge (Goswami and Shrikhande (2001)).[2]

Firms may choose for the lowest cost debt, as static capital structure trade-off theory suggests. The interest rate differential, i.e., deviations from the uncovered interest rate parity, is then the second main determinant of the choice of the loan currency denomination by the firm (Graham and Harvey (2001)).[3]

These two elements, i.e., the management of currency risk and the cost of debt, can be traded off as in Cowan (2006) for example. His model predicts that firms with more foreign income and firms in countries with a higher interest differential (foreign currency funds are cheaper) will have more foreign debt. His model further shows that firms that are more financially constrained (i.e., experience a higher risk premium when borrowing from a bank) are more likely to match the denomination of debt to income streams. These firms

[2] Mian (1996), Bodnar, Hayt and Marston (1998), Brown (2001) and Allayannis and Ofek (2001), among others, analyze the hedging of foreign currency exposure, using forward contracts and derivatives for example.

[3] Our theoretical framework and accompanying empirical analysis will focus on small firms in emerging economies. Consequently, we don't discuss: (1) International taxation issues such as tax loss carry forwards and limitations on foreign tax credits; (2) The possibilities for international income shifting; (3) The differential costs across countries of derivatives to create synthetic local debt; and (4) Clientele effects in issuing public bonds. These issues are clearly important when analyzing the debt structure of large corporations.

would have to borrow at higher costs if they become financially distressed due to the accumulated currency mismatches. If a bank knows a firm is mismatched it may pass on the corresponding expected default costs immediately.

The framework in Cowan (2006) is also relevant for small firms. Small firms that have foreign currency earnings can be expected to borrow in these foreign currencies. Very small and highly levered firms, on the other hand, may have less foreign currency debt because the potential for financial distress for these firms is higher. Our own theoretical model features not only the trade-off between the risk and the cost of debt, present in Cowan (2006), but introduces a very specific but relevant information asymmetry between banks and firms. We conjecture banks don't know the currency in which firms have contracted their sales. We motivate this conjecture further when we discuss our model.

The information asymmetry for the financiers in Jeanne (2000) concerns the effort level of the exporting entrepreneurs. Exporters borrow locally in domestic or foreign currency. But borrowing in foreign currency features as a commitment device: The entrepreneurs' incentives to produce effort are stronger under foreign currency debt, because a failure to achieve high returns is automatically sanctioned by termination. Consequently, lenders may require a lower interest rate on foreign currency loans, and entrepreneurs may choose to borrow in foreign currency in equilibrium if the expected cost of early termination is more than offset by the lower loan rate that they obtain on foreign currency debt.

In contrast to Jeanne (2000), in which firms have only foreign revenues, in our model firms have domestic or foreign currency earnings. In Jeanne (2000) entrepreneurial effort is unobservable to the financiers; in our model the currency in which sales are contracted and sales revenues are collected cannot be observed by the bank. Finally, Jeanne (2000) focuses

on the macro policy choices,[4] while our model focuses on firm decisions (which we can test as we have access to firm level data).

B. Empirical Work

A number of studies analyze the currency denomination of debt of large corporations within a single country. Kedia and Mozumdar (2003) for example study large US corporations. These firms match loan to sales currencies, they discover. But they find no evidence that tax arbitrage, market liquidity, or legal regime matters for the currency choice of these corporations. Keloharju and Niskanen (2001) study 44 large Finnish corporations and document not only currency matching, but also evidence of carry-trade (i.e., borrowing in the low interest rate currency). Large Chilean and Mexican corporations for example also currency match (Benavente, Johnson and Morande (2003), Cowan, Hansen and Herrera (2005), Gelos (2003)). Clark and Judge (2007) critically review these and other studies.

Not many studies have had access to firm level panel (country, time) data that is essential to investigate the link between loan currency denomination and firm characteristics, controlling for macro and institutional variables. A study by Allayannis et al. (2003) is an exception. Following Rajan and Zingales (1995) and Booth, Aivazian, Demirgüç-Kunt and Maksimovic (2001), Allayannis et al. (2003) investigate the capital

[4] Domestic currency debt allows the policymaker in the model to insure the productive sector against bad shocks. If returns are low, the policymaker avoids terminations by setting the exchange rate at the lowest possible level. Macro explanations for corporate foreign currency debt seem less relevant for our sample: (1) The domestic financial markets in the local currency may be underdeveloped in liquidity (Caballero and Krishnamurthy (2003)) and offering only short maturity debt. The small firms in our sample however borrow mostly from banks. Bank loans typically have a short maturity (Berger et al. (2005), Ortiz-Molina and Penas (2007)). (2) Government may give free insurance to foreign currency borrowers through the fixed exchange rate regime or bail out. Foreign firm debt may even act as disciplining device for local government as after devaluation borrowers in foreign currency will be worse off. Firms may not take into account such an externality (Calvo (2001), Tirole (2003)) and mostly flexible exchange rate regimes in our sample countries. (3) Lenders may refuse to lend in the local currency, as they fear devaluation by local government to decrease value of their sovereign debt (the "original sin").

structure of 327 of the largest East-Asian corporations, including foreign, local, and synthetic local (hedged) debt. They find that the ability to manage currency risk with risk management tools, interest rate differentials as well as asset type explain the use of foreign currency debt. A recent paper by Cowan (2006) investigating around 500 corporations in half a dozen Latin American countries arrives at similar findings.

Complementing these empirical studies, we investigate the currency denomination of recent individual bank loans granted to small firms, rather than the currency denomination of outstanding corporate debt of large corporations. Informational asymmetries may play a more important role for small firms. Motivated by our theoretical framework we focus on interplay between firm-specific measures of firm distress costs and informational asymmetry.

The dataset comprises survey data on 9,655 firms from 26 transition countries. While the transition in these countries may be interesting to study *per se*, more importantly for our purposes in transition countries small firms, informational asymmetries, and banks play a key role. In addition, the bank loans detailed in the dataset were granted during a period in which large changes in interest rate differentials, institutional arrangements, and banking sector characteristics (e.g., foreign ownership) took place across the countries that are covered. Consequently, this dataset may be well suited to study the decisions made by firms about the currency denomination of their bank loans, based on a theoretical framework that highlights firm distress costs and informational asymmetry. We develop this framework in the next section.

III. Theory

A. Introduction

Existing models demonstrate that the choice of loan denomination by firms is affected by the structure of firm revenues, interest rate differentials between local and foreign currency funds, and distress costs of firms when facing potential default (see Jeanne (2000), Allayannis et al. (2003), and Cowan (2006) for example). Missing in the theoretical literature so far is the modeling of the likely interplay between distress costs and the bank – firm informational asymmetry.

We believe that a lack of information about the currencies that are employed by the firms corresponds to a real situation for many banks, especially in transition and developing countries, and especially when they target small firms. In general the currency denomination of firms' current and future sales contracts is often negotiated,[5] and consequently may be a closely guarded secret. Moreover, banks may have difficulties or lack incentives to collect this detailed information,[6] depending on bank type, size or ownership and the degree of competition in the banking sector.[7] These costs of information acquisition are particularly high for small firms, who are less likely to have financial accounts (Berger and Udell (1998)).

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[5] Possibly as a consequence of firm risk aversion (Viaene and de Vries (1992)). Currency variability (Engel (2006) among others) and medium of exchange considerations (Rey (2001)) may also determine currency choice.

[6] Banks may similarly lack information on firm quality, project choice, or managerial effort for example incurring monitoring costs (Diamond (1984), Diamond (1991)) or forming relationships with the firms (Sharpe (1990), Rajan (1992), von Thadden (2004), Hauswald and Marquez (2006), Egli, Ongena and Smith (2006), or Black (2006), among others).

[7] Foreign banks may be less informed about the activities of local firms for example (Brown and Rueda Maurer (2005), Detragiache, Tressel and Gupta (2008) and Giannetti and Ongena (2008a)), while intense competition between banks may make relationship banking more or less beneficial (Petersen and Rajan (1995), Boot and Thakor (2000), Elsas (2005) and Degryse and Ongena (2007)).

This situation is aggravated in developing and transition countries (Detragiache et al. (2008)), where weak company law implies that it is hard for banks to assess the credibility of available firm-level financial information (Pistor, Raiser and Gelfer (2000), Brown, Jappelli and Pagano (2007)). As a result, firms in developing and transition countries often borrow without having any audited statements (e.g., Dollar and Hallward-Driemeier (2000)) and banks cannot verify firm sales information through advanced cash management services for example. Indeed, advanced cash management services are yet to be introduced in many of these countries either because banks don't offer (e.g., Tsamenyi and Skliarova (2005)) and/or firms don't require them (for example, in the survey we analyze one third of the firms report to receive less than one third of their income through their banks).

We construct a simple model that clarifies how the choice of loan currency is determined by a firm's distress costs and the bank's lack of information about the firm's revenue currency. Our model shows that if there is an interest rate differential in favor of foreign currency funds, local currency earners with low distress costs and all foreign currency earners will prefer foreign currency loans. In contrast, local currency earning firms with high distress costs will prefer local currency loans. If banks cannot identify the revenue currency of the firm, more local earners end up borrowing in foreign currency. Consequently, our model identifies the information asymmetry between lender and borrower as a so far overlooked driver of "dollarization" in credit markets.

B. Assumptions

Define e_t, the exchange rate at time t, to equal the amount of local currency per foreign currency, which is normalized at $t = 0$ to $e_0 = 1$. At $t = 1$ the local currency appreciates, $e_1 = 1 - \alpha \ \ (0 < \alpha < 1)$, with probability p. It depreciates $e_1 = 1 + \alpha$ with

probability $1-p$. For simplicity we assume that $p=.5$, so that the expected exchange rate at $t=1$ equals $e_1^*=1$ and the expected depreciation of the local currency is

$$\Delta e = \frac{e_1^* - e_0}{e_0} = 0.$$

Assume that each firm i needs to invest $I=1$ in local currency at $t=0$. At $t=1$ locally earning firms L have revenues in local currency R^L and foreign earning firms F have revenues in foreign currency R^F, with an expected value in local currency of $R^F e_1^* = R^F$.[8] For simplicity we assume that the expected earnings in local currency are identical for both firm types $R^L = R^F = R > 1$. Let both firm types be physically located in the domestic country. Their owners will spend their profits locally, so firms care about their expected payoff in local currency. Firms maximize expected income and have no other wealth (and are thus limited liable).[9]

Banks set prices simultaneously, charging a net interest rate r_j^i to a firm of type $i \in \{L,F\}$ on a loan in currency $j \in \{l,f\}$. Banks have no capacity limits on local or foreign currency funds. The unit cost of local currency funds is i_L while the cost of foreign currency funds is normalized to $i_f = 0$.

We assume that the uncovered interest parity condition (UIP) is not fulfilled, and that there is an interest rate advantage on foreign currency funding for the bank, i.e.

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[8] We assume that firms have either local or foreign currency revenues. The interpretation of our main results will not be qualitatively altered if firms sell in both currencies but in different proportions.

[9] While we assume that firms maximize expected income, their payoff is not linear in expected income due to our assumption of distress costs. The assumption of distress costs implies that firms care about income variance, as would be the case if we assumed firms were risk-averse.

$i_l \geq i_f + \Delta e = 0$. An extensive empirical research using a variety of methods typically finds that the uncovered interest rate parity condition rarely holds.[10]

All payments to the bank (loan repayment and interest payments) are made at $t = 1$.[11] We assume that firms' earnings are verifiable *ex post* so that payments are enforceable if a firm has sufficient earnings. As firms' earnings are certain in the respective currency, a firm i which takes a loan in the currency of its earnings, $j = i$, will not default as long as $1 + r_j^i \leq R$.

We assume, however, that exchange rate volatility is large enough so that a locally earning firm will always default if it takes a loan in foreign currency and the local currency depreciates: $R < 1 + \alpha$. Moreover, a foreign earning firm will always default if it takes a loan in the local currency and this currency appreciates: $(1 - \alpha)R < 1$.[12]

If firms default on a loan, they face costs of financial distress. For example, firms can find external financing henceforth only at penalty costs Cowan (2006). In this case distress costs C may be proportional to or convex in the default amount (though still homogenous across firms). Alternatively, these costs may involve the private value of the firm to the owner that is lost, if the firm goes bankrupt, in the case of family-owned small firms for example (Froot, Scharfstein and Stein (1993)).[13] In this case C will be independent of the default amount, but will be heterogeneous among firms. We assume this to be the case. For

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[10] For surveys of this literature, see Hodrick (1987), Froot and Thaler (1990), Lewis (1995), Engel (1996), and Isard (2006).

[11] Given our focus we do not derive the optimality of this debt contract (see Townsend (1979) for example).

[12] It is not uncommon following a deep depreciation of the local currency for small firms in developing countries to default on loans in foreign currency (e.g., Ziaul Hoque (2003)). Small firms and firms in developing countries rarely use derivatives to hedge their net currency exposure (see Briggs (2004), Børsum and Ødegaard (2005), and O'Connell (2005), among others).

[13] Corresponding to risk aversion of managers as in Stulz (1984) or of firms as in Conesa (1997) and Calvo (2001) for example.

simplicity we assume that distress costs in local currency units for both *L* and *F* firms are distributed uniformly on the range $C_i \in \left[\underline{C}, \overline{C}\right]$.

Given the above assumptions, the payoff v_j^i in local currency to a firm of type i taking a loan of type j equals:

$$[1] \qquad \begin{cases} v_l^L = R - (1 + r_l^L) \\ v_f^L = \frac{1}{2}\left[R - (1-\alpha)(1 + r_f^L)\right] - \frac{1}{2}C_i \\ v_f^F = R - (1 + r_f^F) \\ v_l^F = \frac{1}{2}\left[(1+\alpha)R - (1 + r_l^F)\right] - \frac{1}{2}C_i \end{cases}$$

C. Perfect Information

We first analyze bank and firm behavior when banks are perfectly informed about the revenue currency of each firm. Under this assumption each bank sets four interest rates: r_l^L for local earners taking a local currency loan, r_f^L for local earners taking a foreign currency loan, r_f^F for foreign earners taking a foreign currency loan, and r_f^F for foreign earners taking a local currency loan. The expected profits of banks in local currency from each loan type are:

$$[2] \qquad \begin{cases} \Pi_l^L = r_l^L - i_l \\ \Pi_f^L = \frac{1}{2}(1-\alpha)(1 + r_f^L) + \frac{1}{2}R - (1 + i_f) \\ \Pi_f^F = r_f^F - i_f \\ \Pi_l^F = \frac{1}{2}(1-\alpha)R + \frac{1}{2}(1 + r_l^F) - (1 + i_l) \end{cases}$$

Due to perfect price competition the expected profit on each loan type will be zero. Given that $i_f = 0$ this leads to the following equilibrium interest rates:

$$[3] \qquad \begin{cases} r_l^L = i_l \\ r_f^L = \dfrac{1+\alpha-R}{1-\alpha} \\ r_f^F = 0 \\ r_l^F = 2i_l + 1 - (1-\alpha)R \end{cases}$$

Local currency earners will choose a local currency loan if $v_l^L \geq v_f^L$, while foreign earners will choose a local currency loan if $v_l^F \geq v_f^F$. Inserting equilibrium interest rates from [3] into [1], we obtain the following conditions for borrowers *i* to choose loans in their own currency:

[4a] $C_i \geq 2i_l$ [local earners choose local currency loans]

[4b] $C_i \geq -2i_l$ [foreign earners choose foreign currency loans]

Hence with perfect information currency choice is as follows: Foreign earners always choose foreign currency loans. However, as there is an interest rate advantage on foreign currency funds, $i_l > i_f + \Delta e = 0$, not all local earners may choose local currency loans. Condition [4b] shows that the marginal local currency earner who will choose a local currency loan is the one with distress costs equal to:

[5] $C^{\text{perfect info}} = 2i_l$

All local currency earners with lower distress costs will choose foreign currency loans. We have assumed that distress costs are distributed uniformly on $C_i \in \left[\underline{C}, \overline{C}\right]$. As a

result we obtain the equilibrium share of local currency earners, which choose foreign currency loans, as:

$$[6] \qquad \delta^{\text{perfect info}} = \begin{cases} 0 & \text{if} \quad 2i_l < \underline{C} \\ \dfrac{2i_l - \underline{C}}{\overline{C} - \underline{C}} & \text{if} \quad \underline{C} \le 2i_l \le \overline{C} \\ 1 & \text{if} \quad 2i_l > \overline{C} \end{cases}.$$

D. Imperfect Information

We now introduce an information asymmetry between banks and firms about the revenue currency of the firm. We assume that banks know that a share $\lambda \in [0,1]$ of firms are local currency earners, but that they cannot identify which firms have local currency and which firms have foreign currency earnings. We further assume that firms cannot verifiably inform the banks about (or credibly commit to) a particular earnings currency. In general, the currency denomination of the future contracts for firms may also be uncertain,[14] an issue our simple framework however does not directly address.

All banks are equally affected by this information asymmetry in our model, irrespective of the currency they lend in. This assumption corresponds to the situation in the financial sector in Eastern Europe for example where most domestically located banks are observed to offer loans in both local and foreign currency. In contrast, in international renditions of the pecking order hypothesis,[15] or in models with costly monitoring and an agency cost of debt,[16] local and foreign financiers are different, in terms of monitoring cost

[14] Loderer and Pichler (2000) surprisingly find that not even large Swiss firms accurately know their current currency exposure.

[15] In the pecking order hypothesis local financiers could have better information about the firm than foreign financiers. If all financiers lend only in their own currency, firms will borrow first in the local then in the foreign currency after having exhausted internal funds.

[16] Firms with a high monitoring cost in Diamond (1984) for example should borrow more locally in the local currency. If borrowing abroad, in the foreign currency, entails more regulatory scrutiny hence distress costs,

or scrutiny for example, and likely to lend only in their own currency. Consequently, it is not clear that these arguments unequivocally apply to small firms in many countries. Indeed, the small firms in our sample borrow locally in local and foreign currencies from both domestically and foreign-owned banks.

We focus our analysis on equilibria in which a share of local currency earners $\delta \in [0,1]$ choose foreign currency loans, while foreign currency earners choose only foreign currency loans (at the end of the section we derive conditions under which foreign currency earners will in equilibrium not choose local currency loans). We show that, *ceteris paribus*, more local currency earners take foreign currency loans under imperfect information, than under perfect information. The intuition behind this result is that, due to imperfect information local currency earners do not bear the full cost of credit risk induced by their choice of a foreign currency loan.

With imperfect information concerning the currency in which firms earn their revenue, banks can no longer condition the interest rates on firm type. Banks thus only offer two rates: r_l for local currency loans and r_f for foreign currency loans. In this case the expected profits of banks in local currency from the two loan types are:

$$[7] \qquad \begin{cases} \Pi_l = r_l - i_l \\ \Pi_f = \dfrac{.5\lambda\delta\left[(1-\alpha)(1+r_f)+R\right]+(1-\lambda)(1+r_f)}{\lambda\delta+(1-\lambda)} - (1+i_f) \end{cases}$$

Consequently, in the equilibrium, and with zero expected profit, interest rates must equal:

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better firms in Ross (1977) will borrow in the foreign currency to signal their quality. In Jeanne (1999) and Besancenot and Vranceanu (2004) foreign debt is more expensive and firms signal that they are not fragile by

[8] $$\begin{cases} r_l = i_l \\ r_f = \dfrac{\delta\lambda(1+\alpha-R)}{2(1-\lambda)+\delta\lambda(1-\alpha)} > 0 \end{cases}$$

Local currency earners for which $v_f^L(r_f, C_i) \geq v_l^L(i_L, C_i)$ will choose foreign currency loans. From [1] and [8] we see that this will be the case for all local currency earners with distress costs not higher than:

[9] $$C^{\text{imperfect info}} = 2i_l + (1+\alpha-R)\frac{2(1-\lambda)}{2(1-\lambda)+\delta\lambda(1-\alpha)},$$

whereby the share of local currency earners taking foreign currency loans is determined in equilibrium by $\delta = \dfrac{C^{\text{imperfect info}} - \underline{C}}{\overline{C} - \underline{C}}$.

From [9] we can establish that the lowest interest rate i_l at which local currency earners will begin to choose foreign currency loans equals $i_l = \dfrac{\underline{C} - (1+\alpha-R)}{2}$. We assume from now on that:

[10] $$\underline{C} \geq 1 - R + \alpha R > 0.$$

This assumption ensures that unless there is a positive interest rate differential to the advantage of foreign currency funds, all local currency earners will choose local currency loans. The assumption prevents that local currency earners choose foreign currency loans due to limited liability even in the absence of an interest rate differential. We can further establish from [9] that for all interest rate levels, $i_l > \dfrac{\overline{C}}{2} - \dfrac{(1-\lambda)(1+\alpha-R)}{2-\lambda-\lambda\alpha}$, all local currency earners will choose foreign currency loans.

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engaging in 'excessive' borrowing in the foreign currency. In Titman and Trueman (1986) foreign lenders are

For interest rate levels in the range, $\frac{\underline{C}-(1+\alpha-R)}{2} \le i_l \le \frac{\overline{C}}{2} - \frac{(1-\lambda)(1+\alpha-R)}{2-\lambda-\lambda\alpha}$, a share $0 \le \delta \le 1$ of local currency earners will choose foreign currency loans under imperfect information. We can hereby establish that for each interest rate level the marginal firm that takes a foreign currency loan is characterized by higher distress costs under imperfect information than under perfect information. As the left hand side of [9] is increasing and the right hand side is decreasing in $C^{\text{imperfect info}}$, there is at most one level of $C^{\text{imperfect info}}$ for which condition [9] is met. Note further that at $C^{\text{imperfect info}} = 2i_l$ the left hand side is less than the right hand side. As a consequence a unique equilibrium $C^{\text{imperfect info}} > 2i_l$ exists, if for $C^{\text{imperfect info}} = \overline{C}$ (and $\delta = 1$) the right hand side of the condition is higher than the left hand side. This is the case as long as:

[11] $$\overline{C} > 2i_l + \frac{2(1-\lambda)(1+\alpha-R)}{2-\lambda-\alpha\lambda}.$$

If condition [11] is met we can characterize the share of local currency earners that take foreign currency loans as follows:

[12] $$\delta^{\text{imperfect info}} \begin{cases} = 0 & \text{if} \quad 2i_l < \underline{C} - (1+\alpha-R) \\ > \delta^{\text{perfect info}} & \text{if} \quad \underline{C} - (1+\alpha-R) \le 2i_l \le \overline{C} - \frac{2(1-\lambda)(1+\alpha-R)}{2-\lambda-\lambda\alpha} \\ = 1 & \text{if} \quad 2i_l > \overline{C} - \frac{2(1-\lambda)(1+\alpha-R)}{2-\lambda-\lambda\alpha} \end{cases}$$

Comparing conditions [12] and [6] we can conclude that *more local currency earners will choose foreign currency loans under imperfect information than under perfect information*. This main result of our model is illustrated by Figure 1 which depicts the distress costs of the marginal local currency firm which chooses a foreign currency loan

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of a higher quality.

depending on the interest rate differential under both perfect (blue line) and imperfect information (red line).

[Figure 1 here]

We have assumed throughout this section that all foreign currency earners choose foreign currency loans. It remains to be shown that this will be the case in equilibrium. A foreign currency earner will choose a foreign currency loan as long as $v_f^F(r_f, C_i) \geq v_l^F(i_l, C_i)$. From [1] one can derive that this will always be the case if:

[13] $\quad \underline{C} + i_l > (1 - R + aR) + 2r_f$.

Given our assumption [10] a sufficient condition for [13] to hold is:

[14] $\quad i_l > 2r_f$.

Note that for each interest rate level $i_l > \frac{\underline{C} - (1 + \alpha - R)}{2}$ local currency earners take foreign currency loans. As a consequence the interest rate charged on foreign currency loans r_f depends positively on the share of local currency earners in the population λ, on the share of these firms which choose foreign currency loans $\delta(i_l, \underline{C}, \overline{C})$, and banks potential credit risk from these unhedged foreign currency loans $(1 + \alpha - R)$. Thus, an equilibrium in which foreign currency firms always choose foreign currency loans will exists, as long as the following implicit condition holds for all interest rate levels i_l:

[15] $\quad i_l > 2r_f(\underset{+}{i_l}, \underset{+}{\lambda}, \underset{-}{\underline{C}}, \underset{+}{\overline{C}}, \underset{-}{\alpha}, \underset{-}{R})$.

E. Empirical Predictions

Our model above yields several testable hypotheses, regarding firm-level choice of loan denomination. As predicted by existing models (Jeanne (2000), Allayannis et al. (2003), and Cowan (2006) for example), the choice of a foreign currency loan (by local

currency earners) should be positively related to firm-level distress costs. This is illustrated in Figure 1, which shows that a higher interest rate differential is required to motivate firms with higher distress costs to take foreign currency loans.

Our model further predicts that the choice of a foreign currency loan is positively related to the share of income a firm earns in foreign currency. Under the assumptions of our model, all foreign currency earners choose foreign currency loans, irrespective of the interest rate differential and firm-level distress costs, so that the share of foreign earning firms taking foreign currency loans is always at least as high as that of local earning firms.

Our model also suggests that there are important interaction effects between income structure and distress costs. The impact of distress costs on loan denomination should be stronger the lower the share of income a firm receives in foreign currency.

A key prediction of our model is that the choice of a foreign currency loan by local currency earners should be positively related to the opaqueness of a firm's revenue structure. Under imperfect information more local currency earners firms choose foreign currency loans than under perfect information. This is illustrated in Figure 1 by the fact that the marginal distress costs for a firm to choose a foreign currency loan under imperfect information are higher those under perfect information. Note further, that the impact of information opaqueness is stronger for firms with higher shares of revenue in local currency. Our model suggests that imperfect information does not alter the currency choice for firms with foreign currency earnings only.

At the macroeconomic level, our model predicts that the choice of a foreign currency loan (by local currency earners) will be positively related to the interest rate advantage on foreign currency funds. The impact of the interest rate differential does however depend on firm characteristics. The reaction to an increase in the interest rate

differential should be stronger for firms with less income in foreign currency. Firms who earn all their income in foreign currency choose foreign currency loans, even if the interest rate differential is zero. Moreover we predict that the reaction to an increase in the interest rate differential is weaker for opaque firms than for transparent firms. This is illustrated by the weaker slope of the line depicting marginal distress costs under imperfect information in Figure 1. Note further, that we predict a negative interaction effect between interest rate differential and distress costs. Local currency earners with very high distress costs will always choose local currency loans, no matter how high the interest rate differential is.

IV. Data and Empirical Model

Firm-level loan information is obtained from the *Business Environment and Enterprise Performance Survey* (*BEEPS*). The European Bank for Reconstruction and Development (EBRD) and the World Bank jointly conducted this survey in 1999, 2002 and 2005. Our analysis is based on the 2005 version as it contains the most comprehensive information on the borrowing behavior of the firms.

In a first step we relate this information to firm-level indicators of revenue sources, distress costs and opaqueness taken from the same survey. In a second step we relate our firm-level loan information to country-level indicators of interest rate differentials, exchange rate volatility, and banking sector structure, taken from the *International Financial Statistics* (*IFS*) compiled by the International Monetary Fund (IMF), the *Transition Report* published by the EBRD, as well as from Basso, Calvo-Gonzalez and Jurgilas (2007). The definitions and data sources for all variables used in our empirical analysis are presented in Table 1.

[Table 1 here]

A. Firm-Level Borrowing Behavior

BEEPS 2005 provides data on 9,655 firms in 26 transition countries and covers a representative sample of firms for each of these countries.[17] In this sample, 4,062 firms report they obtained a loan from a financial institution. Firms with outstanding bank credit provide many details on their most recent loan. Most important for our analysis, the survey includes an indicator of the currency denomination of the loan. Each firm states whether its most recent loan was denominated in local or foreign currency. The answer to this question is our dependent variable *Forex loan* that takes the value of one if the most recent loan was denominated in a foreign currency and zero if the most recent loan was in local currency. The survey further lists the precise date the loan was received and information on collateralization, duration, and interest rate.

Table 2 provides summary statistics of loan characteristics for our sample by country. We exclude all observations for which the firm did not indicate the currency denomination (346 observations) and for which loans were received earlier than January 2002.[18] We are left with 3,105 observations. In this sample, 25% of the loans are denominated in foreign currency. However, the share of foreign currency loans varies significantly across countries, from less than 10% in the Czech Republic, the Slovak Republic, Bosnia, and Uzbekistan to more than 50% in Albania and Georgia.

[Table 2 here]

Average loan duration in our sample is 29 months, again with considerable variation across countries. The overwhelming majority of loans in most countries are collateralized,

[17] The survey covers all countries in which the EBRD is operational, with the exception of Turkmenistan. See http://www.ebrd.com/country/sector/econo/surveys/beeps.htm for detailed information on BEEPS 2005.

[18] Rejections of loan applications may create a selection issue that may vary across quarter. We cannot know the actual loans applications hence have to assume the choice of currency is unaffected.

with only four countries having collateralization rates of less than 80%. In contrast, the mean ratio of the amount of collateral to loan size varies substantially across countries from less than 100% in Slovenia and Uzbekistan to more than 200% in Bosnia. Not surprisingly for our sample of transition countries the cost of credit is substantial: the mean (nominal) interest rate exceeds 14% per annum. Pair wise correlations displayed in panel C of the table suggest that loan currency denomination is related to other loan characteristics. Foreign currency loans have a longer duration and, not surprisingly for the countries covered, lower interest rates than local currency loans.

B. Firm-Level Determinants of Loan Currency Denomination

We start our empirical analysis by studying the firm-level determinants of loan currency choice. In our empirical model, the dependent variable $\Pr(ForexLoan)_{i,j,t}$ is the probability that firm *i* in country *j* chooses a foreign currency denomination when receiving a loan at time *t*:

[15] $$\Pr(ForexLoan)_{i,j,t} = \alpha_{j,t} + \beta 1 \cdot F_i + \beta 2 \cdot L_{i,j,t} + \varepsilon_{i,j,t}.$$

Our theoretical section above suggests that a firm's choice of a foreign currency loan should be related to the currency denomination of its revenues, the expected distress costs if it were to default on the bank loan, and the financial transparency of its activities. Our empirical model therefore includes a vector of firm-level indicators F_i from BEEPS 2005 that captures corresponding firm-level characteristics.

1. Revenue Currency

We use four indicators of firm's revenue currency denomination. The dummy variable *Exporter*, equals one if the firm exports and zero if the firm only obtains revenues from domestic sales. In countries where domestic sales are conducted exclusively in domestic

currency, we believe that this dummy variable is a good indicator of whether a firm has foreign currency income or not.

However, many of the countries in our sample display a strong degree of "dollarization", i.e. many domestic transactions are also conducted in foreign currency. To take this into account we include two firm-level indicators of the extent of domestic sales in foreign currency. The variable *Sales to multinationals* equals one if the firm makes domestic sales to multinational or foreign owned companies. Such sales are more likely to be made in foreign currency.

In addition to current sales, assets in foreign currency could be an additional potential source of foreign currency cash flows. The BEEPS survey does not provide us with detailed information on the asset structure of firms. We therefore use foreign firm ownership as an indicator of whether firms have assets that yield foreign currency cash flow. The variable *Foreign firm* equals one if more than 50% of the firm's ownership is in foreign hands, and equals zero otherwise. Foreign owned firms are more likely to have foreign currency loans as they are more likely to have foreign currency income.

Our final indicator of revenue currency is the variable *International accounting which* equals one for all firms that apply international accounting standards (IAS or US GAAP), and equals zero otherwise. Our conjecture is that firms with stronger relations to foreign markets or investors are more likely to apply international accounting standards.

2. Distress Costs

We also include four indicators of distress costs that occur when firms default on their most recent bank loan. Theory suggests that distress costs related to foreign currency borrowing may be larger for small firms, at least in proportion to loan size (Froot et al. (1993)). We therefore include the variable *Small firm* that equals one for firms with less

than 50 employees and equals zero otherwise. This dummy is our first indicator of distress costs.

Theory further suggests that expected distress costs are higher for entrepreneurs deriving more private intangible value from their firm. This value may be lost if these firms default. Expecting that this private value is higher for sole proprietorships or family owned businesses, we include the variable *Family firm*. This dummy variable equals one if the firm is a sole proprietorship or a family owned business and equals zero otherwise.

A further indicator of private intangible value is the variable *Security costs*, which measures the percentage of annual sales which firms pay for security related services. We predict that the private value of running a business may be lower in a less secure environment, and thus where security costs are higher.

Theory finally suggests that highly leveraged firms have higher distress costs as they face higher costs of accessing additional external finance (Cowan (2006)). Our final indicator of distress costs, *Debt*, therefore relies on a measure of firm-leverage available from BEEPS 2005, i.e. the share of working capital financed by debt.

3. Opaqueness

Our theoretical model suggests that loan denomination may further be related to the degree of opaqueness about the firms' revenue sources. If banks cannot identify the revenue source of a firm, our theory suggests that some local currency earners may pretend to be foreign exchange earners in order to receive a cheaper foreign currency credit. As a result, firm opaqueness may lead to a higher probability of taking foreign currency loans if a corresponding interest rate advantage exists.

On the other hand, one may observe that foreign currency loans are made available only to firms for which banks have reliable revenue information. Though not explicitly

modeled, more severe information asymmetry for example could lead to a collapse of the foreign currency credit market, at least for a set of firms that would be identifiably opaque. In this case firm opaqueness may lead to a lower probability of taking foreign currency loans.

We include three firm-level indicators of opaqueness in our analysis. Our first indicator is based on firms' financial reporting standards. The variable *Audited firm* equals one for all firms with an external auditor and equals zero otherwise. Our conjecture is that firms with audited accounts are in the position to provide more credible information about their revenue sources to banks.

Our second indicator of firm opaqueness, *Income via bank*, measures the share of the firm's sales that are settled through a bank account. We expect that banks are better informed about the revenues sources of firms, the higher this share (*à la* Mester, Nakamura and Renault (2007) and Norden and Weber (2007)).

Our final indicator of firm opaqueness is firm *Age*, measured in 2005. We hereby follow a standard argument in the literature that information about a firm's activities becomes more accurate and credible, as the firm grows older and can provide a longer public track record.

In addition to the firm revenue, distress costs and opaqueness variables we also include sector dummies to control for any other differences in firm characteristics.[19] We further include two characteristics of each loan $L_{i,t}$. The variable *Duration* measures the duration of the loan in months at origination, while the variable *Collateralized* equals one if the loan is collateralized, and zero otherwise. We assume banks determine duration and

[19] We classify each firm into one of the following seven sectors based on where it obtains the largest percentage of its revenues: Mining; Construction; Manufacturing; Transport and communication; Wholesale, retain and repairs; Real estate; and Hotels and restaurants.

collateral prior to currency. Dropping both loan variables does not alter our findings however.

4. Summary Statistics

Table 3 provides summary statistics for our eleven firm-level explanatory variables (statistics for the two loan characteristics were already provided in Table 2). The table displays full sample means for each variable, and then compares means for the firms with local / foreign currency loans separately. The table suggests that firms with foreign currency loans differ systematically from those with local currency loans. As expected firms with foreign currency loans are much likely to have export income and sales to multinationals, foreign owners and international accounting standards.

[Table 3 here]

Note, though, that less than half of the firms with foreign currency loans have export income. This finding could suggest that many local currency earners are taking foreign currency loans that are most likely to be unhedged. Table 3 further shows that firms with foreign currency loans are less likely to be small firms, and make higher expenditures for security services, suggesting that their distress costs may lower. On the other hand, there seems to be little difference in family ownership and external debt between local currency and foreign currency borrowers.

Our summary statistics suggest an ambiguous relation between financial transparency and currency denomination. On the one hand, firms with foreign currency loans are more likely to be audited. On the other hand, these firms are younger and have a lower share of their income flowing through bank accounts, suggesting less financial transparency.

Panel B displays the pairwise correlations between the firm characteristics. While some of the revenue indicators are somewhat correlated – not unexpectedly – this is not the

case for the variables *Security costs* and *Debt* for example. Both variables are surprisingly uncorrelated with measures of currency revenue, both other distress cost indicators, and the three transparency variables.

C. Country-Level Determinants of Loan Currency Denomination

Our theoretical model predicts that the choice of loan denomination for a given firm will differ across countries according to the extent of the interest rate advantage on foreign currency funds. In addition, loan denomination may vary across countries due to differences in exchange rate volatility, banking sector structure, and the degree of dollarization. We control for these cross-country differences by introducing country-time fixed effects. As the country level determinants of loan denomination, especially the interest rate differentials and exchange rate volatility, may vary frequently, our analysis includes a separate intercept $a_{j,t}$ for each country j and quarter t during the period 2002:I to 2005:II.

However, in a second empirical step we want to examine to what extent country-specific characteristics help explain the variation in the choice of loan currency denomination across the countries in our sample. To do so we extend our empirical model with a vector of time varying country-level variables $C_{j,t}$:

$$[16] \qquad \Pr(Forexloan)_{i,j,t} = \alpha_j + \beta 1 \cdot F_i + \beta 2 \cdot L_{i,j,t} + \beta 3 \cdot C_{j,t} + \varepsilon_{i,j,t}.$$

As not all country-specific characteristics are available for all countries and all quarters, in this second step we will have to rely on varying subsamples.

1. Interest Rate Differentials

Our main country-level explanatory variable is an indicator of the interest rate differential on local currency and foreign currency funds. As elaborated in our theory section we are hereby interested in the interest rate differential after taking into account

expected changes in the exchange rate, i.e., in departures from uncovered interest parity which constitute a real differential on interest rates between local currency and foreign currency funds. This can be defined as:

[17] $$ID_{j,t} = i^{L}_{j,t} - i^{F}_{j,t} - \Delta e^{X}{}_{j,t},$$

where $i^{L}_{j,t}$ *and* $i^{F}_{j,t}$ are risk-adjusted interest rates on local currency and foreign currency loans in country *j* at time *t,* while $\Delta e^{X}_{j,t}$, is the expected depreciation by borrowers of the local currency in country *j* at time *t* vis-à-vis a reference currency *X*.

We use three indicators of this interest rate differential. Our first indicator of the interest rate differential is calculated using observed interest rates in the domestic and foreign financial sectors. Assuming free capital flows, the foreign currency lending rate in the domestic economy should be equal to the foreign currency lending rate abroad i^{X}_{t} plus the domestic risk premium $R_{j,t}$ so that the interest rate differential can be measured as:

[19] $$ID_{j,t} = i^{L}_{j,t} - (i^{X}_{t} + R_{j,t}) - \Delta e^{X}{}_{j,t}.$$

We label this measure the *Interest differential – USrate* indicator, because we calculate it using the domestic lending rate (quarterly average from IFS, line 60p), the interest rate on US treasury bills (IFS, line 60c), and the realized values of exchange rate depreciation vis-à-vis the dollar over the past 12 months prior to each quarter. As a measure of credit risk in country *X*, we use the yearly non-performing loan ratio per country (EBRD Transition report).

Our two further indicators of the interest rate differential are taken from Basso et al. (2007). They obtain actual interest rate differentials between local currency and foreign currency surveying central banks in transition economies. Their survey allows them to compile monthly information on interest rate differentials on loans and deposits for 24

transition countries over the period 2000-2006. Unfortunately their direct measures of interest rate differentials are not available for all countries throughout the whole observation period. We nevertheless use their indicators, we label, *Interest differential – loans* and *Interest differential – deposits* where possible.

2. *Monetary Volatility*

Our theory suggests that local currency earning firms will be less likely to take foreign currency loans when exchange rate volatility is high. We include the variable *Exchange rate volatility* that measures the variance of month on month changes per currency in the real exchange rate vis-à-vis the US Dollar (taken from IFS). Again assuming perfectly myopic agents we take the actual variance in exchange rate movements for the past 12 months prior to each quarter.

In our model we ignore uncertainty about domestic inflation. In reality, however, volatility in the domestic purchasing power of the local currency may affect borrowers loan choice. In a model of optimal portfolio choice Ize and Levy-Yeyati (2003) for example show that risk-averse borrowers will choose the currency composition of their liabilities taking into account the relative volatility of domestic inflation and the real exchange rate. As we predict above, foreign currency borrowing should decrease with volatility in the exchange rate. Ize and Levy-Yeyati (2003) however also show that foreign currency borrowing should increase with volatility of domestic inflation.

We account for this by including in our estimations the variable *Inflation volatility*, which measures the variance of month on month changes in the domestic consumer price index (also taken from IFS).

3. *Country Dollarization and Transparency*

We expect that the probability of a firm taking a foreign currency loan should be naturally related to the degree of real "dollarization" in its country. We therefore include a country-level explanatory variable that measures the degree to which the foreign currency is used in the local economy: the share of banking deposits that are held in foreign currency. This variable is obtained from Basso et al. (2007) and labeled *Forex deposits*.

Our model predicts further that the ability of firms to borrow in foreign currency will be affected by the information of banks on the firm's sources of revenues. However the information held by the banks may not only depend on the firm-level transparency, but also on the institutional and legal environment in which the banking sector operates. Foreign-owned banks may have less knowledge about the activities of local firms (see, Detragiache et al. (2008), Giannetti and Ongena (2008a) and Giannetti and Ongena (2008b) for example).

As one indicator of countrywide information asymmetries we therefore include two variables that capture the foreign presence in the banking sector. The variable *Foreign banks* measures the asset share of foreign controlled banks on a yearly basis per country, and is taken from the EBRD transition report. The variable *Foreign liabilities* measures the share of banks funding that is obtained abroad. This variable is again taken from Basso et al. (2007) who show that foreign funding of the banking sector has a significant positive effect on dollarization of lending in a country.

Finally, informational asymmetries in the banking sector may also be affected by the extent to which the domestic company law promotes good corporate governance. We therefore include the EBRD *Enterprise reform* index, which measures on a yearly basis the

degree to which corporate governance meets international standards in each transition country.

4. Summary Statistics

Table 4 displays summary statistics for our macroeconomic explanatory variables. Panel A displays means of our macroeconomic indicators by country. This table reveals positive values of the interest rate differential in almost all countries independent of the indicator considered. This implies a widespread interest rate advantage of taking foreign currency loans rather than local currency loans in our sample. This interest rate advantage does however vary substantially across countries.

[Table 4 here]

Panel B of Table 4 further shows that there are substantial changes in the interest rate differential over time, but that the observed pattern strongly depends on the measure being used. The indicator variable *Interest rate differential – USrate* for example increases in the beginning of 2002 and continues to rise until the middle of 2004, to fall thereafter. In contrast there is little time variation in the two interest rate differentials obtained from Basso et al. (2007). This may be due to the fact that their panel data is unbalanced. Finally, Panel C displays the pairwise correlations.

Table 5 displays summary statistics for our country-level indicators of the banking sector and institutional environment. The table shows that dollarization of the economy varies strongly across our sample. Half of the countries in the sample appear to be highly dollarized with shares of foreign currency deposits in the banking sector exceeding 50%. Foreign presence in the banking sector also varies strongly, with foreign banks controlling over 90% of assets in some countries (Croatia, Estonia, Lithuania, Slovak republic), and less than 10% in others (Azerbaijan, Russia, Tajikistan, Uzbekistan).

[Table 5 here]

Panel B of Table 5 shows that dollarization dropped between 2002 and 2005, while foreign bank influence increased. Panel C displays the pairwise correlations.

V. Results

A. Firm-Level Determinants of Loan Currency Denomination

1. Full Sample Results

Table 6 provides full sample estimates when *Forex loan* is regressed on firm and loan characteristics. Column (1) reports estimates without accounting for country fixed effects. The model in column (2) includes country fixed effects, column (3) country-year effects, and column (4) country-quarter effects. Each regression also includes sector dummies.

We report for all regressions the marginal effects at sample means based on probit estimations. Moreover, t-statistics reported in parentheses are based on standard errors clustered at the country-level.

[Table 6 here]

The estimates displayed in Table 6 suggest that the choice of loan denomination is systematically related to the currency in which firms yield revenue. We focus on the results of column (4), as the other models yield similar estimates but have fewer effects included. *Exporter*s, *Foreign firm*s and firms with *International accounting* standards obtain more foreign currency loans. All three coefficients are also economically relevant. At the means of the other variables, the percentage foreign loans increases from 22% for non-exporters to 31% for exporters (remember that around 25% of all loans in the sample were in foreign currency). Similarly, the percentage foreign loans increases from 22% for domestic

compared to 47% for foreign firms, and from 23% for firms which don't apply international accounting standards to 31% for those which do.

Full sample estimates for our indicators of firm distress costs and opaqueness are mixed. As predicted we find a significant positive correlation between *Security costs* and loan denomination. Firms with higher security costs, which we argue have a lower private value of doing business, are more likely to take a foreign currency loans. However, this relation is not confirmed by our other three measures of distress costs (*Small firm, Family firm, Debt*).

An interesting result is that in general firms with a longer public track record are less likely to take foreign loans. More than 27% of the loans of the new firms are in a foreign currency, while for firms of more than the mean age around 24% of loans are in the foreign currency. This result could indicate that in general more publicly available information about a firm decreases its possibilities to obtain bank loans in a foreign. However, this result is not confirmed by the coefficients obtained for *Audited firm* or *Income via bank* that are never statistically significant.

Finally, loans with a longer maturity are more likely to be in a foreign currency. Only 17% of one-month loans are denominated in a foreign currency, while 26% of three-years loans are. The coefficient on Collateralized on the other hand is not significant.

2. *Sample Splits*

The fact that our full sample results are mixed for indicators of distress costs and firm opaqueness is not too surprising. After all, our theoretical framework does not predict that these indicators should affect the loan denomination choice of all firms. We expect that distress costs and opaqueness should affect loan denomination only for firms who do not

have income in foreign currency. The fact that we grouping these firms with foreign currency earners in our full sample regressions, thus may explain why results are weak.

Consequently, we try to isolate the 'true' local earners by splitting the sample according to firm-level income structure and the country-level degree of real dollarization. More specifically we define *Non-forex firms* to be those firms that have no export sales, no sales to multinationals, at most a minority foreign owner, and do not use international accounting standards. *Forex firms* are then all other firms Moreover, we define a *Weakly dollarized economy* to have a mean share of foreign exchange deposits in the banking system that is below 25% for the observation period. *Moderate dollarized economies* are defined as those with a share of foreign exchange deposits between 25% and 50%, while *Strongly dollarized economies* are those with a share of foreign exchange deposits exceeding 50%.. We report the results for the six corresponding subsamples in Table 7. We are particularly interested in the estimates for *Nonforex firms* in *Weakly dollarized* economies as reported in column (1) of the table.

[Table 7 here]

The results of our sample splits suggest that for firms without foreign currency income potential distress costs may matter more than is suggested by our full sample results. For *Non-forex firms* in *Weakly dollarized* economies we find that not only firms with high *Security costs* but also firms with high levels of external *Debt* are more likely to borrow in a foreign currency. Moreover, firm *Debt* does not affect loan denomination in any of the other 5 subsamples. These results are in line with our model predictions that firms with higher distress costs are more likely to obtain a foreign currency loan.

In contrast our sample splits do not support the conjecture that firm-level opaqueness affects loan choice for local currency earners. None of our indicators of firm opaqueness

(*Audited firm*, *Income via bank*, *Age*) display a significant coefficient in column (1) of Table 7. Indeed, in contrast to our predictions, we find that firm *Age* affects loan choice for foreign currency earners, but not for local currency earners. These results suggest that a lack of financial transparency at the firm level is not a driver of foreign currency borrowing in transition countries.

B. Country-Level Determinants of Loan Currency Denomination

Next we investigate if the firms' decisions to borrow in a foreign currency are related to country-level determinants, such as the interest rate differential, exchange rate volatility and foreign bank presence.

1. Full Sample Results

In Table 8 we report a full sample analysis, including our three measures of the *Interest rate differential*, the *Exchange rate volatility*, *Inflation volatility*, *Forex deposits* (the degree of dollarization), *Foreign banks* and *liabilities*, and *Enterprise reform* (the latter three variables capturing the degree of transparency in the economy). As indicated before we expect the interest rate differential to have a positive effect, exchange rate volatility a negative, inflation volatility a positive, dollarization a positive, foreign banks and liabilities a positive, and reform a negative effect.

[Table 8 here]

Columns (1) – (3) report coefficients for estimations without country fixed effects for each of our three measures of the interest rate differential. We find that the estimated coefficient is positive for two measures: *Interest differential – Usrate* and *Interest differential – loans*. However, while the impact of these measures of the interest rate differential is statistically significant, its economic relevance is weak, compared to our

firm-level results. A ten percent difference in the lending rate differential increases the probability of a foreign currency loan by between 1 and 7 percent. The coefficient for our third indicator of the interest rate differential *Interest differential deposits* is not significant. An explanation for this finding may be that while our first two indicators are based on direct comparisons of lending rates, this indicator is based on a comparison of underlying funding costs. The presence of market imperfections, such as substantial market power or widespread banking relationships could imply that this latter indicator is not an accurate measure of lending rate differentials.

Columns (1)-(3) of table 8 show that only few of our other country-level explanatory variables yield significant results. As expected, *Enterprise reform* does seem to significantly reduce foreign currency borrowing. This result confirms our conjecture that improved corporate governance (at the country-level) reduces information asymmetries, and thus the ability of local currency earners to obtain foreign currency loans. Supporting this interpretation, we also find that Foreign banks, which may be less well informed than local banks, have a (weak) positive impact on foreign currency borrowing. This latter result may of course also be explained by the fact that foreign banks have better access to foreign currency funding. However, our results do not show that *Foreign liabilities* are positively related to foreign currency borrowing.

In columns (4)-(6) we repeat our full sample analysis including country fixed effects. This allows us to establish whether our country-level variables affect loan choice not only across countries, but also within countries over time. We find that none of our indicators of the interest rate differential has a significant impact on loan choice once we include country fixed effects. This result suggests that while interest rate differentials may explain cross-country differences in loan-dollarization, they cannot explain changes in dollarization

across time within a particular country. An alternative explanation is though, that firms may not that actively carry trade changes in interest rate differentials and that the differentials themselves may be correlated with other country-specific characteristics that determine currency choice. Our indicators of financial transparency (*Foreign banks, Foreign liabilities, Enterprise reform*) are also no longer significant, when we add the country fixed effects.

2. *Sample Splits*

We check the robustness of our country-level results by estimating coefficients for various subsamples. We expect that the impact of the interest rate differential on loan denomination choice should be stronger for local currency earners than for foreign currency earners. Moreover, if enterprise reform and foreign bank presence affect foreign currency borrowing by increasing (reducing) financial transparency, then their impact should also be stronger for local currency earners. In table 9 we again split our sample into Non-forex firms and Forex firms, as well by the degree of real dollarization for each country. Panel A of the table reports joint results for weakly and moderate dollarized countries, while panel B reports results for strongly dollarized countries.

The results in panel A of table 9 show that our indicators of the interest rate differential have a positive impact on foreign currency borrowing for Non-forex firms in weakly and moderate dollarized countries. In contrast the impact of the interest rate differential is much weaker and less significant for Forex firms (columns 4-6*).* This finding confirms our predictions that the relative cost of debt should affect loan denomination choice in particular for local currency earners. Moreover it is supported by the results in panel B of table 9, which show only a weak (if any) impact of the interest rate differential on loan denomination choice in strongly dollarized countries.

The coefficients for *Foreign banks* and *Enterprise reform* in panel A of table 9 do not however confirm our conjecture that country level determinants of financial transparency affect the possibilities of local currency earners to borrow in foreign currency. We find that neither variable has a significant impact on loan denomination for Non-forex firms. We do however find that *Foreign bank*s increases – and *Enterprise reform* decreases – foreign currency borrowing by Forex firms. This supports our full sample results that corporate governance and banking sector structure do affect loan dollarization. However, their impact is through making foreign currency loans more (less) available to firms who have foreign currency earnings, rather than affecting the possibilities of local currency earners to "imitate".

VI. Conclusion

Motivated by policy concerns about the credit risks resulting from unhedged foreign currency loans, especially in opaque financial environments, we investigate how an information asymmetry between banks and firms in a theoretical framework – that also features the trade-off between the risk and the cost of debt – may determine the currency denomination of bank loans to firms. Banks may not know the currency in which firms have contracted their sales. Foreign earners and local earners with distress costs that are small vis-à-vis the interest rate differential choose foreign currency loans if the foreign interest rate is lower. With imperfect information for the banks concerning the currency in which the firms earn, we show, more local earners switch to foreign currency loans.

We then test these implications of our theoretical model by using a 2005 survey of 9,655 firms from 26 transition countries. We find that firms with foreign currency earnings and lower distress costs borrow more in foreign currency. However, we find little evidence that opaque firms are more likely to borrow in foreign currency. At the country-level we

find that interest rate advantages on foreign currency funds do explain differences in loan dollarization across countries, but not within countries over time. Finally, we find that the presence of foreign banks and corporate governance reforms do explain differences in foreign currency borrowing across countries. However, in contrast to the predictions of our model, stronger foreign bank presence or corporate governance only affects borrowing by foreign currency earners, not the borrowing by local currency earners.

Overall then our evidence implies that the cost of debt and distress affect the currency denomination of small business loans, while firm opaqueness or short-term carry-trade motives do not. Hence, employing reasonable (though by no means perfect) firm and country proxies, we cannot confirm that information asymmetries or short-term speculation drive the recently observed increase in foreign currency borrowing by small firms in Eastern European economies. These findings may partly allay some concerns policymakers may have on foreign currency borrowing in these countries.

Table 1. Variable Definitions

Data Sources include: BCJ: Basso et al. (2007); BEEPS: Business Environment and Enterprise Performance Survey in 2005 by the European Bank for Reconstruction and Development and the World Bank; IFS: International Finance Statistics of the International Monetary Fund; IR: Index of reform by the European Bank for Reconstruction and Development; TR: Transition report by the European Bank for Reconstruction and Development.

Variable Name	Definition	Source
Forex loan	1= last loan of firm was in a foreign currency, 0= last loan of firm was in local currency.	BEEPS
Duration	Duration of the loan, in months.	BEEPS
Collateralized	1= yes, 0= no.	BEEPS
Collateral value	Measures the value of collateral posted by the firm in percentage of the loan size.	BEEPS
Interest rate	Interest rate per annum, in %.	
Exporter	1= firm has export revenues, 0= otherwise.	BEEPS
Sales to multinationals	1= firm has domestic sales to multinational companies, 0= otherwise.	BEEPS
Foreign firm	1= at least 50% of ownership in foreign hands, 0= otherwise.	BEEPS
International accounting	1= firm applies international accounting standards (IAS or USGAAP), 0= otherwise.	BEEPS
Small firm	1= less than 50 employees, 0= otherwise.	BEEPS
Family firm	1= firm is owned by sole proprietor or family, 0= otherwise.	BEEPS
Security costs	Expenses for security services in % of sales per year.	BEEPS
Debt	Share of short-term investment financed by debt, in %.	BEEPS
Audited firm	1= firm has an external auditor, 0= otherwise.	BEEPS
Income via bank	Share of firm revenues that are received through bank transfers.	BEEPS
Age	Age of firm in 2005, in years.	BEEPS
Interest diff.	*Interest rate differential between local currency and foreign currency funds per country, in %.*	
Interest diff. – *US rate*	Domestic lending rate minus US Tbill rate, domestic non-performing loan ratio and depreciation for same observation period.	IFS; TR
Interest diff. – *loans*	Difference in nominal interest rates on 1-year loans: local minus foreign currency rate.	BCJ
Interest diff. – *deposits*	Difference in nominal interest rates on 1-year deposits: local minus foreign currency rate.	BCJ
Exchange rate volatility	Variance of monthly changes in the exchange rate versus the US$ (in %) for 12 months prior to beginning of the quarter.	IFS
Inflation volatility	Variance of monthly changes in the consumer price index (in %) for 12 months prior to beginning of the quarter.	IFS
Forex deposits	Share of deposits in the banking sector denominated in foreign currency, in %.	BCJ
Foreign banks	Assets share of foreign controlled banks in domestic banking system, in %.	TR
Foreign liabilities	Foreign liabilities of the banking system, in %.	BCJ
Enterprise reform	EBRD index of Enterprise reform. Scale: 1 to 4.33	IR

Table 2. Loan characteristics: Summary statistics

Forex loan: 1= last loan of firm was in a foreign currency, 0= last loan of firm was in local currency. *Duration*: Duration of the loan, in months. *Collateralized*: 1= yes, 0= no. *Collateral value*: Measures the value of collateral posted by the firm in percentage of the loan size. *Interest rate*: Interest rate per annum, in %.

Panel A: Sample means by country

Country	Observations	Forex Loan	Duration	Collateralized	Collateral value	Interest rate
Albania	81	0.73	37.4	0.96	165	9.5
Armenia	140	0.29	22.3	0.74	133	14.8
Azerbaijan	4	0.25	59.0	1.00	163	15.0
Belarus	79	0.27	19.9	0.89	128	18.0
Bosnia	94	0.02	35.4	0.97	208	10.2
Bulgaria	102	0.29	37.6	0.88	144	11.1
Croatia	130	0.27	49.3	0.80	115	7.6
Czech Republic	84	0.07	33.3	0.82	108	9.3
Estonia	69	0.28	51.3	0.90	132	6.7
Georgia	53	0.66	24.7	0.92	174	18.4
Hungary	262	0.24	30.5	0.92	155	13.2
Kazakhstan	232	0.26	28.2	0.96	143	15.9
Kyrgyzstan	70	0.36	22.6	0.96	186	19.0
Latvia	84	0.23	40.1	0.92	128	6.8
Lithuania	69	0.25	32.1	0.84	114	5.7
Macedonia	35	0.46	20.4	0.94	199	10.9
Moldova	134	0.25	18.5	0.93	140	20.9
Poland	306	0.14	29.1	0.79	119	12.6
Romania	254	0.39	25.3	0.93	143	18.0
Russia	177	0.12	23.2	0.90	136	17.4
Serbia	114	0.19	21.0	0.90	174	13.3
Slovak Rep	64	0.06	39.7	0.83	103	7.6
Slovenia	125	0.25	40.7	0.60	89	6.3
Tajikistan	38	0.26	20.5	0.84	151	24.5
Ukraine	218	0.23	18.8	0.83	160	20.4
Uzbekistan	87	0.06	20.9	0.77	95	22.8
Total	3,105	0.25	29.0	0.87	140	14.2

Panel B: Sample means by period

Year:Quarter	Observations	Forex Loan	Duration	Collateralized	Collateral value	Interest
2002:I	92	0.24	40.94	0.89	142.67	15.36
2002:II	120	0.28	37.49	0.89	129.81	13.07
2002:III	56	0.27	34.57	0.88	130.98	15.13
2002:IV	67	0.25	41.16	0.87	132.06	13.06
2003:I	142	0.28	30.68	0.89	132.59	15.07
2003:II	166	0.25	28.16	0.84	142.24	14.26
2003:III	120	0.28	30.65	0.88	154.46	15.11
2003:IV	115	0.27	35.63	0.83	130.33	13.15
2004:I	354	0.21	24.86	0.86	140.87	14.75
2004:II	441	0.24	26.86	0.88	141.08	14.41
2004:III	399	0.31	30.39	0.85	144.11	13.83
2004:IV	489	0.22	27.93	0.88	144.26	14.16
2005:I	484	0.23	25.19	0.86	134.59	13.73
2005:II	60	0.22	27.55	0.88	134.04	13.25

Panel C: Pairwise correlations

	Forex Loan	Duration	Collateralized	Collateral value	Interest
Forex Loan	1.00				
Duration	0.15	1.00			
Collateralized	0.01	0.06	1.00		
Collateral value	0.04	0.00	0.63	1.00	
Interest	-0.13	-0.22	0.07	0.09	1.00

Table 3. Firm characteristics: Summary statistics

Exporter: 1= firm has export revenues, 0= otherwise. *Sales to multinationals*: 1= firm has domestic sales to multinational companies, 0= otherwise. *Foreign firm*: 1= at least 50% of ownership in foreign hands, 0= otherwise. *International accounting*: 1= firm applies international accounting standards (IAS or USGAAP), 0= otherwise. *Small firm*: 1= less than 50 employees, 0= otherwise. *Family firm*: 1= firm is owned by sole proprietor or family, 0= otherwise. *Security costs*: Expenses for security services in % of sales per year. *Debt*: Share of short-term investment financed by debt, in %. *Audited firm*: 1= firm has an external auditor, 0= otherwise. *Income via bank*: Share of firm revenues that are received through bank transfers. *Age*: Age of firm in 2005, in years.

Panel A: Sample Means by Choice of Loan Denomination

The reported difference tests are standard t-tests. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Total	Firms w/ local currency loan	Firms w/ foreign currency loan	Difference tests	
Exporter	0.34	0.31	0.43	t(3,101) = 6.25	***
Sales to multinationals	0.18	0.17	0.24	t(3,020) = 4.46	***
Foreign firm	0.11	0.08	0.20	t(3,105) = 9.03	***
International accounting	0.22	0.19	0.31	t(3,105) = 7.16	***
Small firm	0.61	0.62	0.57	t(3,105) = 2.49	**
Family firm	0.72	0.73	0.70	t(3,011) = 1.20	
Security costs	0.74	0.69	0.93	t(3,105) = 3.50	***
Debt	38.28	37.83	39.61	t(3,054) = 1.21	
Audited firm	0.53	0.51	0.59	t(3,071) = 4.20	***
Income via bank	57.17	57.94	54.82	t(3,099) = 1.94	*
Age	16.91	17.39	15.44	t(3,103) = 2.46	**

Panel B: Pairwise Correlations

	Exporter	Sales to multinationals	Foreign firm	International accounting	Small firm	Family firm	Security costs	Debt	Audited firm	Income via bank	Age
Exporter	1										
Sales to multinationals	.21	1									
Foreign firm	.21	.18	1								
International accounting	.18	.11	.16	1							
Small firm	-.29	-.07	-.18	-.23	1						
Family firm	-.15	-.06	-.27	-.13	.36	1					
Security costs	-.02	.04	.02	.03	-.08	-.04	1				
Debt	.08	.09	.04	.06	-.04	-.04	.00	1			
Audited firm	.19	.16	.18	.20	-.31	-.25	.00	.04	1		
Income via bank	.29	.12	.11	.06	-.18	-.16	-.01	.07	.17	1	
Age	.22	.01	-.02	.14	-.36	-.32	.00	-.01	.20	.11	1

Table 4. Macroeconomic explanatory variables: Summary statistics

The table displays three measures of the *Interest rate differential* between local currency and foreign currency funds per country, in %. *USrate*: Domestic lending rate minus US Tbill rate minus domestic non-performing loan ratio minus depreciation for same observation period. *Loans*: Interest rate differential on loans. *Deposits*: Interest rate differential on deposits. The table further displays our measures of monetary volatility: *Exchange rate volatility*: Standard deviation of month on month changes in the exchange rate vis-à-vis the US$ for 12 months prior to beginning of the quarter, in %. *Inflation volatility*: Standard deviation of month on month changes in the consumer price index for 12 months prior to beginning of the quarter, in %.

Panel A: Sample means by country, 2002 – 2005

Country	Interest diff. - USrate	- Loans	- Deposits	Exchange rate volatility	Inflation volatility
Albania	19.5	6.3	5.5	9.48	2.03
Armenia	19.1	0.7	2.4	5.66	5.05
Azerbaijan	-2.5	-2.8	-0.1	0.81	0.76
Belarus	9.7	7.2	18.4	1.09	1.19
Bosnia	15.5				
Bulgaria	12.0	3.5	1.0	7.79	1.20
Croatia	11.0	4.1	1.2	9.09	0.23
Czech Rep	11.9	1.0	0.0	18.29	0.23
Estonia	14.3	1.9	0.1	7.71	0.22
Georgia	25.5	3.4	-3.6	4.30	1.43
Hungary	16.6	6.8	5.5	9.41	0.32
Kazakhstan		3.8	1.2	0.93	0.16
Kyrgyzstan	21.5			6.59	1.05
Latvia	8.9	3.9	1.2	2.10	0.24
Lithuania	13.3	1.5	-0.2	7.01	0.21
Macedonia	-6.3	4.6	4.1	8.44	0.53
Moldova	15.2	9.6	10.1	2.97	1.05
Poland	-6.3	6.0	2.7	10.18	0.13
Romania		16.6	10.5	4.55	0.32
Russia	8.1	3.7		1.28	0.39
Serbia	-3.6			7.76	1.76
Slovak Rep	12.0	1.4	0.8	8.15	1.07
Slovenia	8.6	3.6	1.4	7.77	0.16
Tajikistan	-10.8	-0.3	0.0		
Ukraine	-4.5	7.8	1.6	0.92	0.84
Uzbekistan					

Panel B: Sample means by quarter

Year:Quarter	Interest diff. - USrate	Interest diff. - Loans	Interest diff. - Deposits	Exchange rate volatility	Inflation volatility
2002:I	0.8	4.7	4.5	3.40	1.10
2002:II	2.4	4.2	3.8	3.13	1.14
2002:III	8.9	4.3	3.7	3.56	0.95
2002:IV	5.6	4.5	2.8	3.87	1.05
2003:I	10.8	3.5	3.4	4.36	0.97
2003:II	12.4	4.8	3.3	4.50	1.01
2003:III	9.4	4.4	3.5	7.24	0.86
2003:IV	10.3	4.2	3.3	9.70	0.79
2004:I	13.4	4.4	3.2	10.14	0.93
2004:II	12.5	4.1	2.6	10.51	0.84
2004:III	8.7	4.1	2.5	8.01	0.86
2004:IV	9.4	4.0	2.4	5.24	0.72
2005:I	12.4	4.1	2.2	5.50	0.65
2005:II	9.4	3.4	1.8	6.69	0.67

Panel C: Pairwise correlations

	Interest diff. - USrate	Interest diff. - Loans	Interest diff. - Deposits	Exchange rate volatility	Inflation volatility
Interest diff. - USrate	1				
Interest diff. - Loans	0.13	1			
Interest diff. - Deposits	0.02	0.61	1		
Exchange rate volatility	0.14	-0.04	-0.16	1	
Inflation volatility	0.26	-0.05	0.12	-0.02	1

Table 5. Banking sector and institutional variables: Summary statistics

The table displays two measures of dollarization of the economy. *Forex deposits:* Share of deposits in the banking sector denominated in foreign currency, in %. The table further displays two measures of foreign presence in the banking system. *Foreign banks*: Assets share of foreign controlled banks in domestic banking system, in %. *Foreign liabilities*: Foreign liabilities of the banking system, in %. Finally, the table reports our measure of the legal environment, *Enterprise reform*: EBRD index of Enterprise reform.

Panel A: Sample means by Country, 2002 – 2005

Country	Forex deposits	Foreign banks	Foreign liabilities	Enterprise reform
Albania	0.31	66.4	0.34	2.0
Armenia	0.73	53.4	0.75	2.3
Azerbaijan	0.54	5.3	0.55	1.9
Belarus	0.55	16.2	0.52	1.0
Bosnia	0.51	80.8	0.78	1.9
Bulgaria	0.50	79.1	0.53	2.6
Croatia	0.66	90.9	0.73	2.8
Czech Republic	0.11	85.5	0.60	3.3
Estonia	0.28	97.9	0.81	3.4
Georgia	0.96	35.1	0.67	2.0
Hungary	0.16	77.9	0.49	3.4
Kazakhstan	0.51	28.7	0.79	2.0
Kyrgyzstan		62.5		2.0
Latvia	0.40	49.5	0.87	2.9
Lithuania	0.36	93.8	0.72	3.0
Macedonia	0.53	46.8	0.58	2.3
Moldova	0.51	32.9	0.51	1.8
Poland	0.17	71.6	0.56	3.4
Romania	0.44	55.9	0.60	2.0
Russia	0.37	7.8	0.59	2.3
Serbia	0.63	38.9	0.48	2.0
Slovak Rep	0.15	93.1	0.57	3.4
Slovenia	0.33	19.2	0.72	3.0
Tajikistan	0.56	4.6	0.87	1.7
Ukraine	0.33	13.5	0.53	2.0
Uzbekistan		4.0		1.7

Panel B: Sample means by quarter

Year:Quarter	Forex Deposits	Foreign banks	Foreign liabilities	Enterprise reform
2002:I	0.49	48.5	0.60	2.4
2002:II	0.48	48.5	0.61	2.4
2002:III	0.47	48.5	0.60	2.4
2002:IV	0.47	48.5	0.61	2.4
2003:I	0.45	53.3	0.62	2.4
2003:II	0.44	53.3	0.62	2.4
2003:III	0.44	53.3	0.62	2.4
2003:IV	0.43	53.3	0.64	2.4
2004:I	0.43	55.5	0.65	2.4
2004:II	0.43	55.5	0.64	2.4
2004:III	0.43	55.5	0.65	2.4
2004:IV	0.42	55.5	0.66	2.4
2005:I	0.43	58.2	0.65	2.5
2005:II	0.42	58.2	0.66	2.5

Panel C: Pairwise correlations

	Forex Deposits	Foreign banks	Foreign liabilities	Enterprise reform
Forex Deposits	1			
Foreign banks	-0.34	1		
Foreign liabilities	0.19	0.05	1	
Enterprise reform	-0.60	0.64	0.14	1

Table 6. Firm-level determinants of loan denomination

The table reports results of probit estimates. The dependent variable *Forex loan* equals one if the firm's last loan is denominated in foreign currency and zero if this loan is in local currency. All explanatory variables are defined in Table 1. Each regression includes six sector dummies. The table displays the marginal effects calculated at sample means. T-statistics are reported in parentheses. Standard errors are adjusted for cluster effects at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1) Baseline	(2) Country fixed effects	(3) Country-Year fixed effects	(4) Country-Quarter fixed effects
Exporter	0.075	0.082	0.086	0.094
	[4.18]***	[4.56]***	[4.75]***	[4.34]***
Sales to multinationals	0.044	0.054	0.045	0.040
	[1.59]	[1.83]*	[1.54]	[1.23]
Foreign firm	0.179	0.203	0.222	0.25
	[4.18]***	[4.97]***	[5.33]***	[6.03]***
International accounting	0.072	0.046	0.056	0.083
	[2.18]**	[1.59]	[1.83]*	[2.30]**
Small firm	-0.016	-0.028	-0.041	-0.032
	[0.58]	[0.93]	[1.29]	[0.84]
Family firm	0.027	0.028	0.037	0.038
	[1.00]	[1.15]	[1.65]*	[1.45]
Security costs	0.013	0.010	0.014	0.016
	[2.58]***	[2.55]**	[3.30]***	[3.71]***
Debt	0.000	0.000	0.000	0.000
	[0.14]	[0.62]	[1.31]	[1.29]
Audited firm	0.034	0.010	0.004	0.013
	[1.03]	[0.51]	[0.15]	[0.48]
Income via bank	-0.001	0.000	0.000	0.000
	[2.12]**	[0.39]	[1.12]	[1.53]
Age	-0.002	-0.001	-0.001	-0.002
	[3.09]***	[2.09]**	[2.00]**	[2.16]**
Duration	0.002	0.002	0.003	0.003
	[5.07]***	[5.08]***	[4.57]***	[4.75]***
Collateralized	0.022	-0.013	-0.015	-0.015
	[0.55]	[0.32]	[0.36]	[0.35]
Observations	2,858	2,858	2,732	2,416

Table 7. Firm-level determinants of loan denomination: Subsamples

The table reports results from probit estimates on subsamples. The dependent variable *Forex loan* equals one if the firm's last loan is denominated in foreign currency and zero if this loan is in local currency. *Non-forex firms* are firms that have no export sales, no sales to multinationals, at most a minority foreign owner, and do not adhere to international accounting standards. *Forex firms* are all other firms. *Weakly-dollarized* economies have a mean share of foreign exchange deposits in the banking system that is below 25% for the observation period. *Moderate- dollarized* economies have a mean share of foreign exchange deposits in the banking system that is between 25% and 50% for the observation period. *Strongly-dollarized* economies have a mean share of foreign exchange deposits in the banking system exceeding 50% for the observation period. are all other countries. All explanatory variables are defined in Table 1. Each regression includes six sector dummies. The table displays the marginal effects calculated at sample means. T-statistics are reported in parentheses. Standard errors are adjusted for cluster effects at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Weakly dollarized		Moderate dollarized		Strongly dollarized	
	Non-forex Firms	Forex firms	Non-forex Firms	Forex firms	Non-forex Firms	Forex firms
Small firm	-0.139	-0.014	-0.06	-0.144	0.11	-0.053
	[0.87]	[0.32]	[1.12]	[1.09]	[1.00]	[0.55]
Family firm	0.000	-0.020	0.072	0.053	0.089	-0.104
	[0.00]	[0.39]	[1.00]	[0.59]	[1.56]	[1.50]
Security costs	0.010	0.064	0.014	0.039	0.021	0.010
	[2.94]***	[3.30]***	[0.90]	[1.21]	[3.03]***	[0.76]
Debt	0.001	0.001	0.000	-0.001	0.001	0.001
	[2.93]***	[0.57]	[0.67]	[0.85]	[0.87]	[1.16]
Audited firm	-0.041	0.09	-0.007	0.049	0.038	0.072
	[0.66]	[1.03]	[0.10]	[0.94]	[0.34]	[1.37]
Income via bank	-0.001	0.001	-0.001	-0.001	0.000	-0.002
	[1.60]	[0.98]	[1.47]	[0.93]	[0.06]	[1.77]*
Age	0.003	-0.003	-0.004	-0.005	-0.004	-0.001
	[0.85]	[2.61]***	[1.33]	[2.59]***	[1.04]	[0.34]
Duration	0.003	0.004	0.002	0.006	0.005	0.001
	[14.52]***	[2.96]***	[2.44]**	[6.23]***	[7.55]***	[1.61]
Collateralized	0.033	-0.188	0.102	-0.031	-0.043	-0.054
	[0.58]	[1.35]	[1.00]	[0.31]	[0.25]	[0.68]
Observations	190	286	416	417	297	476

Table 8. Country-level determinants of loan denomination

The table reports results from probit estimates. The dependent variable *Forex loan* equals one if the firm's last loan is denominated in foreign currency and zero if this loan is in local currency. All explanatory variables are defined in Table 1. Each regression includes six sector dummies. The table displays the marginal effects calculated at sample means. T-statistics are reported in parentheses. Standard errors are adjusted for cluster effects at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Without fixed effects			With country fixed effects		
	(1)	(2)	(3)	(4)	(5)	(6)
Exporter	0.079	0.111	0.111	0.072	0.105	0.106
	[3.71]***	[4.29]***	[4.41]***	[3.56]***	[3.96]***	[3.89]***
Sales to multinationals	0.045	0.064	0.077	0.051	0.069	0.079
	[1.21]	[1.85]*	[2.22]**	[1.38]	[1.91]*	[2.18]**
Foreign firm	0.214	0.189	0.181	0.234	0.195	0.189
	[4.01]***	[3.95]***	[3.68]***	[4.64]***	[3.81]***	[3.59]***
International accounting	0.065	0.05	0.052	0.058	0.046	0.043
	[2.06]**	[1.39]	[1.47]	[2.08]**	[1.21]	[1.10]
Small firm	-0.021	-0.018	-0.019	-0.030	-0.026	-0.029
	[0.58]	[0.53]	[0.54]	[0.86]	[0.76]	[0.81]
Family firm	0.050	0.053	0.039	0.045	0.047	0.037
	[1.55]	[1.48]	[1.12]	[1.41]	[1.40]	[1.10]
Security costs	0.010	0.009	0.011	0.010	0.008	0.010
	[1.60]	[1.67]*	[2.14]**	[1.52]	[1.58]	[1.85]*
Debt	0.000	0.000	0.000	0.000	0.000	0.000
	[0.68]	[0.09]	[0.31]	[1.19]	[0.73]	[0.74]
Audited firm	0.072	0.079	0.075	0.033	0.046	0.047
	[3.25]***	[3.25]***	[3.40]***	[1.50]	[2.53]**	[2.49]**
Income via bank	0.000	-0.001	-0.001	0.000	0.000	0.000
	[0.10]	[1.39]	[2.30]**	[0.58]	[0.70]	[1.14]
Age	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	[1.87]*	[1.57]	[1.73]*	[1.65]*	[1.14]	[1.30]
Duration	0.003	0.003	0.003	0.003	0.003	0.003
	[5.45]***	[5.46]***	[5.30]***	[5.07]***	[5.37]***	[5.29]***
Collateralized	-0.015	0.024	0.035	-0.023	0.010	0.016
	[0.42]	[0.57]	[0.81]	[0.55]	[0.21]	[0.33]
Interest diff. – USrate	0.002			0.000		
	[2.21]**			[0.46]		
Interest diff. – loans		0.007			0.011	
		[2.33]**			[1.44]	
Interest diff. – deposits			0.001			0.007
			[0.22]			[1.24]
Exchange rate volatility	-0.003	-0.003	-0.002	-0.004	-0.005	-0.005
	[2.36]**	[1.17]	[1.06]	[1.44]	[1.24]	[1.30]
Inflation volatility	0.005	0.002	-0.001	0.004	0.004	0.005
	[1.17]	[0.55]	[0.21]	[0.65]	[0.57]	[0.65]
Forex deposits	0.193	0.15	0.111	-0.178	-0.006	-0.122
	[1.08]	[0.80]	[0.64]	[0.35]	[0.01]	[0.23]
Foreign banks	0.001	0.001	0.001	0.001	0.001	0.001
	[0.77]	[1.86]*	[1.96]*	[0.48]	[0.83]	[0.76]
Foreign liabilities	-0.505	-0.196	-0.234	-0.117	-0.095	-0.140
	[2.71]***	[1.33]	[1.41]	[0.52]	[0.30]	[0.45]
Enterprise reform	-0.052	-0.119	-0.132	-0.12	-0.228	-0.213
	[0.98]	[2.08]**	[2.46]**	[1.04]	[1.69]*	[1.60]
Observations	2,007	1,932	1,975	2,007	1,932	1,975

Table 9. Country-level determinants of loan denomination: Subsamples

Panel A reports probit estimates for firms in w*eakly*- or *moderate dollarized* economies, i.e. counties with a mean share of foreign exchange deposits in the banking system that is below 50% for the observation period. Panel B reports estimates including only country-periods with a positive interest rate differential between local currency and foreign currency funds. The dependent variable *Forex loan* equals one if the firm's last loan is denominated in foreign currency and zero if this loan is in local currency. *Non-forex firms* are firms that have no export sales, no sales to multinationals, at most a minority foreign owner, and do not adhere to international accounting standards. *Forex firms* are all other firms. All explanatory variables are defined in Table 1. Each regression includes six sector dummies. The table displays the marginal effects calculated at sample means. T-statistics are reported in parentheses. Standard errors are adjusted for cluster effects at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Weakly- or moderate dollarized economies

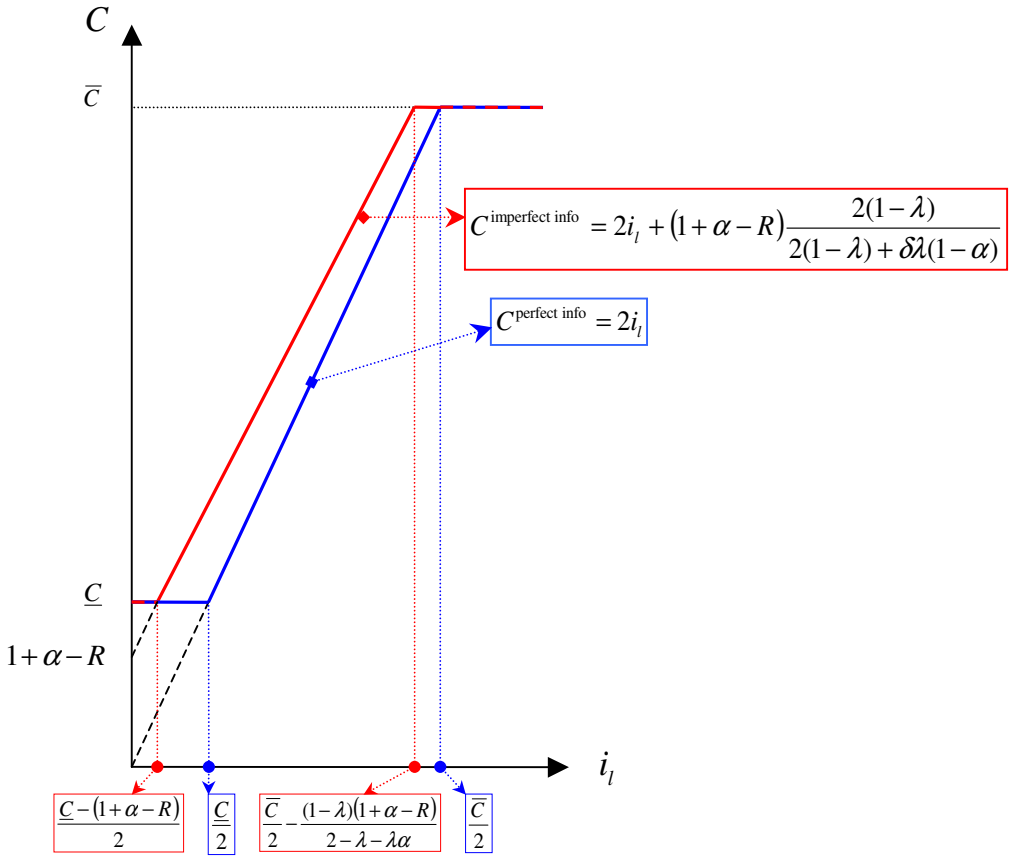
	Non-forex firms			Forex firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Small firm	-0.034	0.008	0.006	-0.097	-0.086	-0.086
	[0.74]	[0.22]	[0.16]	[2.33]**	[1.64]	[1.47]
Family firm	0.043	0.018	0.011	-0.026	-0.002	-0.008
	[0.98]	[0.40]	[0.23]	[0.62]	[0.06]	[0.20]
Security costs	0.010	0.007	0.011	0.005	0.019	0.040
	[1.05]	[0.51]	[0.88]	[0.24]	[0.88]	[1.73]*
Debt	0.000	0.000	0.000	0.001	0.000	0.000
	[0.73]	[0.67]	[0.98]	[0.90]	[0.57]	[0.58]
Audited firm	0.02	0.041	0.053	0.065	0.085	0.087
	[0.78]	[1.65]*	[2.00]**	[1.14]	[1.63]	[1.64]
Income via bank	0.000	0.000	-0.001	0.001	0.000	0.000
	[0.25]	[0.67]	[2.20]**	[1.30]	[0.15]	[0.09]
Age	0.000	-0.001	-0.001	-0.004	-0.002	-0.003
	[0.00]	[0.60]	[0.89]	[2.71]***	[1.91]*	[2.01]**
Duration	0.002	0.003	0.003	0.004	0.004	0.005
	[5.38]***	[3.46]***	[3.53]***	[4.88]***	[4.85]***	[5.35]***
Collateralized	0.037	0.065	0.094	-0.104	-0.068	-0.071
	[0.71]	[1.24]	[1.35]	[1.40]	[0.75]	[0.81]
Interest diff. – USrate	0.001			0.002		
	[1.62]			[1.70]*		
Interest diff. – loans		0.008			-0.002	
		[2.17]**			[0.42]	
Interest diff. – deposits			0.012			0.002
			[4.65]***			[0.38]
Exchange rate volatility	0.001	0.000	0.000	-0.003	0.002	0.002
	[0.25]	[0.00]	[0.12]	[1.00]	[0.65]	[0.58]
Inflation volatility	0.012	0.076	0.088	-0.029	0.078	0.075
	[0.20]	[1.34]	[2.01]**	[0.40]	[1.24]	[1.34]
Forex deposits	0.749	0.202	0.572	0.781	0.901	1.109
	[2.32]**	[0.42]	[0.96]	[2.49]**	[1.92]*	[2.57]**
Foreign banks	0.000	0.002	0.001	0.002	0.002	0.001
	[0.13]	[1.83]*	[0.67]	[3.27]***	[2.41]**	[2.26]**
Foreign liabilities	-0.735	0.024	-0.091	-0.654	-0.47	-0.607
	[2.71]***	[0.10]	[0.30]	[3.46]***	[1.94]*	[3.05]***
Enterprise reform	0.024	-0.119	-0.026	-0.141	-0.087	-0.031
	[0.31]	[1.37]	[0.28]	[2.16]**	[1.05]	[0.44]
Observations	641	578	555	716	616	594

Panel B: Strongly dollarized economies

	Non-forex firms			Forex firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Small firm	0.102	0.052	0.062	-0.045	-0.110	-0.119
	[1.30]	[0.66]	[0.78]	[0.51]	[1.67]*	[1.84]*
Family firm	0.057	0.033	0.027	-0.036	0.017	0.014
	[0.93]	[0.63]	[0.52]	[0.41]	[0.20]	[0.17]
Security costs	0.02	0.015	0.017	0.007	-0.002	-0.003
	[2.22]**	[2.65]***	[3.16]***	[0.63]	[0.35]	[0.35]
Debt	0.000	0.000	0.000	0.000	0.000	0.000
	[0.40]	[0.43]	[0.74]	[0.24]	[0.19]	[0.20]
Audited firm	0.053	0.045	0.018	0.116	0.144	0.128
	[1.23]	[0.97]	[0.46]	[2.45]**	[3.47]***	[3.08]***
Income via bank	0.000	0.000	0.000	-0.001	-0.001	-0.001
	[1.06]	[0.09]	[0.44]	[0.57]	[0.54]	[0.66]
Age	-0.004	-0.002	-0.002	0.000	0.000	0.000
	[1.24]	[0.92]	[0.88]	[0.27]	[0.07]	[0.05]
Duration	0.001	0.003	0.003	0.001	0.001	0.001
	[1.81]*	[3.62]***	[3.56]***	[1.15]	[1.26]	[1.26]
Collateralized	-0.006	0.015	0.013	-0.030	-0.008	-0.008
	[0.05]	[0.13]	[0.11]	[0.43]	[0.11]	[0.11]
Interest diff. – USrate	0.002			0.004		
	[0.79]			[1.93]*		
Interest diff. – loans		0.008			0.015	
		[1.24]			[1.48]	
Interest diff. – deposits			-0.008			-0.004
			[2.38]**			[0.70]
Exchange rate volatility	-0.022	-0.026	-0.027	0.002	-0.002	0.000
	[2.55]**	[2.32]**	[2.49]**	[0.33]	[0.19]	[0.03]
Inflation volatility	-0.039	-0.041	-0.038	0.019	0.028	0.024
	[2.29]**	[2.76]***	[3.00]***	[1.40]	[2.20]**	[1.82]*
Forex deposits	0.614	0.753	0.666	0.323	0.389	0.325
	[2.05]**	[2.49]**	[2.72]***	[1.21]	[1.86]*	[1.62]
Foreign banks	0.000	-0.002	-0.002	0.007	0.003	0.003
	[0.09]	[2.50]**	[4.14]***	[1.71]*	[1.62]	[1.35]
Foreign liabilities	-0.365	-0.342	-0.578	-0.177	0.050	-0.194
	[1.14]	[2.39]**	[4.27]***	[0.60]	[0.19]	[1.11]
Enterprise reform	0.070	0.164	0.131	-0.364	-0.234	-0.247
	[0.92]	[2.92]***	[2.17]**	[2.00]**	[2.11]**	[1.65]*
Observations	271	385	385	418	434	434

Figure 1. Loan Currency Choice by Local Currency Earning Firms (*L* Firms)

The figure displays the distress costs of the marginal local currency firm that chooses a foreign currency loan as a function of the interest rate differential. The blue line displays the distress costs of the marginal firm under perfect information. The red line displays the distress costs of the marginal firm under imperfect information.



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