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ABSTRACT

Foreign Currency Borrowing by Small Firms

We examine the firm- and country-level determinants of the currency denomination of small business loans. We first model the choice of loan currency in a framework which features a trade-off between lower cost of debt and the risk of firm-level distress costs, and also incorporates the impact of information asymmetry between banks and firms. When foreign currency funds come at a lower interest rate, all foreign currency earners as well as those local currency earners with high revenues and low distress costs choose foreign currency loans. When the banks have imperfect information on the currency and level of firm revenues, even more local earners switch to foreign currency loans, as they do not bear the full cost of the corresponding credit risk.

We then test the implications of our model by using a 2005 survey with responses from 9,098 firms in 26 transition countries. The survey contains details on 3,105 recent bank loans. At the firm level, our findings suggest that firms with foreign currency income and assets are more likely to borrow in a foreign currency. In contrast, firm-level distress costs and financial transparency affect the currency denomination only weakly. At the country level, the interest rate advantages of foreign currency funds and the exchange rate volatility do not explain the foreign currency borrowing in our sample. However, foreign bank presence, weak corporate governance and the absence of capital controls encourage foreign currency borrowing. All in all, we cannot confirm that "carry-trade behavior" is the key driver of foreign currency borrowing by small firms in transition economies. Our results do, however, support the conjecture that banking-sector structures and institutions that aggravate information asymmetries may facilitate foreign currency borrowing.

JEL Classification: F34, F37, G21 and G30
Keywords: banking structure, competition, foreign currency borrowing and market structure

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I. Introduction

A large proportion of firms and households in many countries borrow in foreign currency. In East Asia, corporate debt is split about equally between foreign and domestic currencies (Allayannis, Brown and Klapper (2003)) while in several Latin American countries the share of foreign currency debt exceeds 20 percent (Galindo, Panizza and Schiantarelli (2003)). Recently, foreign currency borrowing has also expanded rapidly in many Eastern European transition countries. Between 20 and 75 percent of all corporate loans in Eastern European countries are now denominated in a foreign currency (European Central Bank (2006), p. 39).

Foreign currency borrowing is widely alleged to be one of the major causes of the severe financial crisis that hit many Asian countries in the 1990's. Foreign currency borrowing in Eastern Europe could similarly lead to widespread credit default and the destabilization of the entire banking sector there if the current global financial crisis involves further sharp depreciations of local currencies (as was the case, for example, with the Hungarian forint and Polish zloty in the fall of 2008).

Indeed, there are fears that many small non-exporting firms and households in Eastern Europe may have taken out commercial loans and mortgages in euros − or even in Swiss francs and Japanese yen − in order to benefit from the substantially lower interest rate on the foreign currency (clearly the expected introduction of the euro and increasing trade flows also explain some of the loan currency choices).[1] These "small men's carry

[1] *Wall Street Journal*, May 29th, 2007. Carry trades, in which 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 fueled the growth in cross-currency positions in recent years (Galati, Heath and McGuire (2007)).

trades" have raised concerns about the resulting credit risks, especially in those situations where financiers are unable to assess the actual foreign currency needs of their borrowers. Indeed, a 2007 Report by the *International Monetary Fund* (Sorsa, Bakker, Duenwald, Maechler and Tiffin (2007)) warned that:

> "Corporate foreign currency debt in (emerging) Europe is at levels similar to pre-crisis Asia and Latin America [… and] currency risks are amplified because much of the corporate foreign currency exposure seems unhedged. […] The drive of [foreign] banks to complement limited earnings opportunities at home with high profits from emerging Europe may have led to risk under-pricing. […] This under-pricing may be compounded by limited data on creditworthiness and weak institutions." [2]

The recent increase in foreign currency borrowing in Eastern Europe and the resulting widespread policy concerns have drawn considerable interest from academics and policy makers alike. However, all studies so far (to the best of our knowledge) have analyzed foreign currency borrowing at either the aggregate or the bank level.[3] These studies therefore cannot determine the extent to which and why foreign currency borrowing is

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[2] Many developing country currencies have no forward markets; and even in those that do, there are substantial costs to hedging (Frankel (2004)). And even in developed countries small firms rarely use derivatives to hedge their net currency exposure (Briggs (2004), Børsum and Ødegaard (2005), and O'Connell (2005), among others). As expected therefore, small firms in developing countries not uncommonly default on loans in foreign currency following a deep depreciation of the local currency (Ziaul Hoque (2003)).

[3] Basso, Calvo-Gonzalez and Jurgilas (2007), for example, examine aggregate data across 24 countries for the period 2000-2006 and find that access to international funding, exchange rate volatility and domestic inflation affect loan dollarization. Interest rate differentials seem less important. Rosenberg and Tirpak (2008) confirm that international funding is a key determinant of loan dollarization, while Luca and Petrova (2008) suggest that domestic deposits in foreign currency are also an important driver. However, these supply side explanations of foreign currency borrowing are questioned by Haiss, Paulhart and Rainer (2008) who find that foreign bank entry does not explain loan dollarization in 16 transition countries.

carried out by firms or households. In contrast, this paper examines the currency denomination of *individual* retail loans in virtually all transition countries of Eastern Europe and the former Soviet Union. In particular, we focus on lending 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 model the choice of loan currency in a way that may also be relevant for small firms (Allayannis, Brown and Klapper (2003), Cowan (2006)). We introduce an information asymmetry between banks and firms in a framework that also features a trade-off between the cost and risk of debt. We conjecture that banks do not necessarily know the currency in which (small) firms have contracted their sales, and/or the firms' actual revenue levels.

Information asymmetries between banks and firms underpin our modern understanding of financial intermediation (Freixas and Rochet (2008)). Information asymmetries concerning currency and revenues may be aggravated in developing and transition countries. Corporate law is weak in these countries, and it may be hard for banks to assess the credibility of available firm-level financial information. Firms therefore often borrow without having audited statements. Banks also can not verify firm sales information through advanced cash management services, which are yet to be introduced in many firms. Consequently, "soft" information may be the only type of information that is available, but foreign banks – which are widely present in developing and transition countries – may struggle to collect and use it.

If the interest rate on foreign currency funds is lower, local currency earners with low distress costs vis-à-vis the interest rate will choose foreign currency loans. Our model shows that if the banks are imperfectly informed about the currency in which the firms

earn, then more local earners switch to foreign currency loans, as the 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, which yields 3,105 actual bank loan observations in a synthetic panel running from January 2002:I to 2005:II. At the firm level, we find that small businesses that have foreign currency income or assets are more likely to borrow in foreign currency. In contrast, we find hardly any evidence that firm-level distress costs or financial transparency affect the decision to borrow in foreign versus local currency. At the country level, we find that interest rate differentials and exchange rate movements hardly explain the differences in foreign currency borrowing. Instead, we find that foreign bank presence, weak corporate governance and the regulations on incoming international capital flows do help explain the large cross-country variation in foreign currency borrowing within our sample.

In sum, while we do find some evidence for the trade-off between debt risk and cost having an influence on loan currency denomination, we cannot confirm that information asymmetries at the firm level and currency speculation are key driving forces of the recently observed increase in the dollarization of small business loans in Eastern European transition countries. Our findings on the proxies for country-level asymmetries, however, suggest that transparency-enhancing policy innovations may reduce foreign currency borrowing.

The rest of the paper is organized as follows. Section II discusses the theoretical and empirical literature. Section III presents our theoretical model. Section IV describes the data and the empirical model, while Section V discusses our multivariate 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, Brown and Klapper (2003) for an overview). Managing the risk from economic exposure clearly matters in 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)).[4]

Firms may opt for the lowest cost debt, as static capital structure trade-off theory suggests. The interest rate differential, i.e., the deviations from the uncovered interest rate parity (UIP), is then the second main determinant of the firm's choice of loan currency denomination (Graham and Harvey (2001)).[5]

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

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[4] 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.

[5] Our theoretical framework and accompanying empirical analysis will focus on small firms in emerging economies. Consequently, we do not 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.

These firms 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.

The framework in Cowan (2006) is also relevant for small firms. Small firms that have earnings in foreign currencies can be expected to borrow in these foreign currencies. Very small and highly leveraged firms, on the other hand, may have less foreign currency debt because they have a higher risk of financial distress. 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 relevant information asymmetry between banks and firms. We conjecture that the banks may not know the level of income of firms or the currency in which the firms have contracted their sales. We motivate this conjecture further when we discuss our model.[6]

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, according to their results, match loan to sales currencies. But they find no evidence that tax arbitrage, market liquidity, or legal regime affects the currency choice of these corporations. Keloharju and Niskanen (2001) study 44 large

[6] 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 a foreign currency serves as a commitment device: The entrepreneurs have a stronger incentive for effort if they have foreign currency debt, because failure to achieve high returns is automatically sanctioned by termination. Consequently, lenders may require lower interest rates on foreign currency loans, and entrepreneurs may choose to borrow in foreign currency at equilibrium if the expected cost of early termination is more than offset by the lower interest rate that they obtain on foreign currency debt. In contrast to Jeanne (2000), in which firms have only foreign revenues firms in our model 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)

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 engage in currency-matching (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 the 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, Brown and Klapper (2003) is an exception. Following Rajan and Zingales (1995) and Booth, Aivazian, Demirgüç-Kunt and Maksimovic (2001), Allayannis, Brown and Klapper (2003) investigate the capital 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 and the interest rate differentials, as well as the asset type, explain the use of foreign currency debt. A paper by Cowan (2006) investigating around 500 corporations in half a dozen Latin American countries arrives at similar findings (see also for example Esho, Sharpe and Webster (2007)). Finally, recent work by Kamil (2008) − using a new database with annual accounting information for over 2,200 non-financial companies in seven Latin American countries − investigates the effect of various exchange rate regimes on firms' incentives to hedge currency risk (see also Kamil and Sutton (2008)).

Complementing these empirical studies, we investigate the currency denomination of recent individual bank loans granted to small firms, rather than the currency denomination of the outstanding corporate debt of large corporations. Informational asymmetries may

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focuses on the macro policy choices, while our model focuses on firm decisions (which we can test, as we

play a more important role in small firms. Motivated by our theoretical framework, we focus on the interplay between firm-specific measures of firm distress costs and informational asymmetries.

The dataset comprises survey data on 9,098 firms from 26 transition countries. While the transition in these countries may be interesting to study in its own right, what is more important for our purpose is that banks, small firms and the informational asymmetries between them play a key role there. 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 is 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 asymmetries. We develop this framework in the next section.

III. Theory

A. Introduction

Existing models demonstrate that firms' choice of loan denomination is affected by the structure of firm revenues, interest rate differentials between local and foreign currency funds, and the distress costs of firms facing potential default. Our model clarifies how the choice of loan currency is affected by the bank's lack of information about the currency denomination and level of the firm's revenues, an acute issue for many banks when dealing with small firms in transition and developing countries. The currency denomination of a

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have access to firm-level data).

firm's current and future sales contracts is often negotiated (and a closely guarded secret).[7] Depending on bank type, size or ownership and the degree of competition in the banking sector, banks may have difficulties or lack incentives to collect detailed information about firm revenues.[8] The costs of information acquisition are particularly high when dealing with small firms, which are less likely to have audited financial accounts,[9] and when dealing with firms that are located in developing and transition countries, where due to the weak corporate legal system it is hard for banks to assess the credibility of available firm-level financial information (Pistor, Raiser and Gelfer (2000), Brown, Jappelli and Pagano (2009)).[10] "Soft" information may be the only type of credible information that is available, but large and foreign banks that are widely present in developing and transition countries may have problems collecting and employing it (Stein (2002), Detragiache, Tressel and Gupta (2008)).

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[7] See Friberg and Wilander (2008). Firm risk aversion (Viaene and de Vries (1992)), currency variability (Engel (2006)) and medium of exchange considerations (Rey (2001)) may determine currency choice.

[8] In our model all banks are equally affected by the information asymmetry regardless of the currency in which they lend. We know that in Eastern Europe (and also in our sample) most domestic and foreign banks offer loans in both local and foreign currency to local firms. If financiers lend only in the own currency, existing models predict that: (1) Firms may borrow first in the local and then in the foreign currency, after having exhausted internal funds, if local financiers have better information about the firm than foreign financiers (pecking order hypothesis); (2) Firms with high monitoring costs may borrow more locally in the local currency (Diamond (1984)); and (3) Better firms may borrow in the foreign currency to signal their quality, if foreign currency debt is more expensive (Jeanne (1999), Besancenot and Vranceanu (2004)) or entails more regulatory scrutiny hence higher distress costs (Ross (1977)).

[9] See Berger and Udell (1998). Banks may 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 (2008), among others). Foreign banks may be less informed about the activities of local firms (Rueda Maurer (2008), Detragiache, Tressel and Gupta (2008), Giannetti and Ongena (2009) and Giannetti and Ongena (2008)), 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)).

[10] Firms in developing and transition countries often borrow without having any audited statements (e.g., Dollar and Hallward-Driemeier (2000)). In addition, banks often cannot verify firm sales information through advanced cash management services which are yet to be introduced there, either because banks do not offer these services (e.g., Tsamenyi and Skliarova (2005)) or firms do not demand them (for example, in the survey we analyze, one third of the firms report receiving less than one third of their income through their banks).

Our model first confirms that under perfect information if there is an interest rate differential in favor of foreign currency funds, all foreign currency earners will prefer foreign currency loans. In addition, all local currency earners with low distress costs and high revenues will also choose foreign currency loans. In contrast, local currency earning firms with high distress costs and low revenues will prefer local currency loans. Then our model shows that if banks cannot identify either the currency or the level of the revenues of the firm, more local earners will borrow in foreign currency. Consequently, our model identifies the information asymmetry between lending banks and borrowing firms as a so far overlooked potential driver of "dollarization" in the credit markets.

The rest of this theory Section is organized as follows. Our model assumptions are introduced in Part III.B, followed in Part III.C by the analysis of the model with perfect information. In Part III.D imperfect information is introduced. Part III.E concludes with a summary of all key firm- and country-level empirical predictions.

B. Assumptions

Define e_t, the exchange rate at time t, to equal the amount of local currency per unit of foreign currency, normalized at $t = 0$ to $e_0 = 1$. At $t = 1$, the local currency either appreciates to $e_A < 1$, with probability p, or it depreciates to $e_D > 1$, with probability $1 - p$. We assume that $pe_A + (1 - p)e_D = 1$, so that the expected exchange rate at $t = 1$ equals $e_1^* = 1$ and the expected depreciation of the local currency is $\Delta e = \frac{e_1^* - e_0}{e_0} = 0$.[11]

There is a continuum of firms and each firm needs to invest $I = 1$ in local currency at $t = 0$ to receive any revenues at $t = 1$. Firms differ in their revenue structure. There are

three types of firms, foreign (F), good local (LG) and bad local (LB) currency earners. Foreign currency earners have revenue R^F in foreign currency, which equals the expected revenue in local currency as the expected exchange rate equals one ($e_1^* = 1$, hence $R^F e_1^* = R^F$). The other two types of firms have local currency earnings. The good local currency earners have high earnings R^{LG} in local currency, while the bad local currency earners have low earnings in local currency, $R^{LB} < R^{LG}$. We abstract from the possibility that foreign currency earners may differ in their income levels and from exchange rate pass-through considerations, as neither issue alters the main insights of our model.[12]

Let all 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 their expected income and have no other wealth (and are thus limited liable).[13]

There are at least two identical banks that offer loans in both local and foreign currency and that are engaged in Bertrand competition setting prices simultaneously. When they can identify firm type, they charge a net interest rate r_k^j on a loan in foreign or local currency k , $k \in \{f; l\}$, to a firm of type $j \in \{F; LB; LG\}$.[14] Banks have no capacity limits on

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[11] As we assume that the level of firm revenues does not change with the exchange rate, the changes in the exchange rate in our model are assumed to be real.

[12] Under perfect information, all foreign currency earners would take foreign currency loans at the same interest rate independent of their revenue level. With asymmetric information about firm revenues this result also holds for reasonable assumptions on firm-level distress costs, we show in an earlier version of our model (Brown, Ongena and Yesin (2009)). See Goldberg and Knetter (1997) for example on exchange rate pass-through.

[13] While we assume that firms maximize expected income, their payoff is not linear in expected income when we assume 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.

[14] Firms in our model receive both their expected income and the loan in a singular – though not necessarily the same – currency. Without qualitatively affecting the main hypotheses our model is readily extendable to include firms with the expected income and loans in varying proportions in multiple currencies.

foreign or local currency funds. We normalize the cost of foreign currency funds to $i_f = 0$ and set the unit cost of local currency funds to i_l. We assume that the UIP is not fulfilled, and that there is an interest rate advantage to foreign currency funding for the bank, i.e. $i_l > i_f + \Delta e = 0$. Extensive empirical research, using a variety of methods, has found finds that the UIP rarely holds. Furthermore, the literature finds that the deviation from the UIP in emerging markets is systematic in nature and that a significant part of the excess return can be attributed to a risk premium.[15]

For simplicity we assume that interest payments are made upfront at $t = 0$, and the loan repayment is made at $t = 1$.[16] Firms' earnings are verifiable *ex post*, so that payments are enforceable if a firm has sufficient earnings.

We assume that the exchange rate volatility is such that bad local currency earners will always default if they take a loan in foreign currency and the local currency depreciates, i.e., $R^{LB} < e_D$. We also assume that all good local currency earners have sufficient revenues to pay back their loan regardless of the exchange rate movements, i.e. $R^{LG} > e_D$. Moreover, we assume that foreign currency earners have revenues that will enable them to fully repay a local currency loan even if the local currency appreciates, i.e., $R^F > \frac{1}{e_A}$.

If firms default on a loan, they face costs of financial distress. For example, defaulters can henceforth find external financing only at penalty costs, as in Cowan (2006). In this case, the distress costs C may be proportional to or convex in the default amount (though

[15] General reviews by Hodrick (1987), Froot and Thaler (1990), Lewis (1995), Engel (1996), and Isard (2006). For emerging markets see Francis, Hasan and Hunter (2002) and Alper, Ardic and Fendoglu (2009).

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

still homogenous across firms). Alternatively, these costs may involve the private value to its owner of a firm that is lost in bankruptcy (for example, in the case of small and family-owned firms (Froot, Scharfstein and Stein (1993))).[17] In this case, C will be independent of the default amount, but will be heterogeneous among firms. Given that our empirical analysis focuses on small and predominantly family-owned firms, we assume that distress costs (in local currency units) are constant per firm but distributed uniformly on the range $C_i \in \left[\underline{C}, \overline{C}\right]$ for all firms i of type $j \in \{F\,;\, LB;\, LG\}$.

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

$$[1] \qquad v_k^j = \begin{cases} R^j - (1 + r_k^j) & \text{if } j \in \{F;\, LG\} \text{ or } (j,k) = (LB, l) \\ p\left[R^{LB} - e_A\right] - (1-p)C_i - r_f^{LB} & \text{if } (j,k) = (LB,\, f) \end{cases}.$$

C. Perfect Information

When banks are perfectly informed about the type of each firm, each bank sets six interest rates. For each of the three firm types, $j \in \{LG;\, LB;\; F\}$, they set two interest rates, depending on whether a foreign or local currency loan is offered.

Proposition 1: Under perfect information, all F and LG firms take foreign currency loans. The equilibrium share of LB firms that choose foreign currency loans is given as:

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

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

Proof: See Appendix.

Proposition 1 shows that under perfect information foreign currency earners (F types) always choose foreign currency loans. They do so because there is an interest rate advantage to foreign currency loans and they do not run the risk of incurring distress costs when taking such a loan. For the same reason, all good local currency earning firms (LG types) also choose foreign currency loans. Bad local currency earning firms (LB types) face a trade-off: If they choose a foreign currency loan they benefit from an interest rate advantage, but they may incur distress costs if the local currency depreciates. As a consequence if distress costs for all firms are high we have a "separating" equilibrium in which all LB types take local currency loans. If distress costs are negligible we have a "pooling" equilibrium in which all firms take foreign currency loans. Otherwise we have a "partial pooling" equilibrium in which a positive share of LB firms take foreign currency loans.

D. Imperfect Information

We now introduce an information asymmetry between banks and firms about the revenues of the firms. Assume that banks can neither verify the currency denomination nor the level of revenues of a firm, i.e., banks cannot distinguish F from LG from LB type firms. Banks however know that a proportion $\lambda \in [0,1]$ of the total firm population are LB

firms, and that the remaining proportion $1-\lambda$ are either F or LG firms.[18] Banks can no longer condition their interest rates on firm types, and thus only offer two rates: r_l for local currency loans and r_f for foreign currency loans.

It is straightforward to see that, if distress costs are sufficiently high, a separating equilibrium exists under imperfect (and perfect) information in which all F and LG firms take foreign currency loans, while all LB firms take local currency loans. It is also obvious that under imperfect information equilibria exist in which no foreign currency loans are offered and all firms take local currency loans. This will be the case if the following conditions are met: (i) Distress costs are negligible so that all LB firms want to take foreign currency loans, (ii) the share of LB firms in the population λ is high, (iii) the expected default cost of LB firms when taking foreign currency loans, i.e., $(1-p)(e_D I - R^{LB})$, is high, and (iv) the revenue of F and LG firms, R^F and R^{LG}, is relatively low.

Proposition 2 characterizes (partial) pooling equilibria under imperfect information in which all F firms, all LG firms and a positive fraction of LB firms take foreign currency loans.

Proposition 2: If a (partial) pooling equilibrium exists under imperfect information in which all F firms, all LG firms and a positive share $\delta^{LB}_{\text{imperfect info}} \in (0,1]$ of LB firms take foreign currency loans, then: $\delta^{LB}_{\text{imperfect info}} \geq \delta^{LB}_{\text{perfect info}}$.

Proof: See Appendix.

[18] The bank does not need to separate *F* from *LG* firms, as from the previous section we know that these two types never default on any loan, and thus should both receive the same (risk-free) interest rate on either a local or foreign currency loan.

The proposition suggests that if (partial) pooling equilibrium exists, then the share of LB firms taking foreign currency loans is higher than it would be under perfect information. The intuition behind this result is straightforward: If the banks are imperfectly informed about the firms' revenues they cannot charge the LB types fully for the costs of potential default on foreign currency loans. As the F and LG types bear part of the risk premium for LB types, the latter firms get foreign currency loans cheaper and are thus more likely to take these loans.

E. Empirical Predictions

1. Firm Level

Our model yields several testable hypotheses regarding firm-level choice of loan denomination that are summarized in Table 1. We predict that the likelihood of choosing 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, so the proportion of foreign currency earners taking foreign currency loans is always at least as high as that of local currency earners.

[Table 1 here]

However, our model shows that not only the currency denomination of a firm's cash flow is important, but also the magnitude of its cash flows compared to its potential loan repayments. Among firms with local currency earnings, firms with large revenues compared to their credit obligations are more likely to take foreign currency loans.

As predicted by existing models, Cowan (2006) for example, the choice of a foreign currency loan should further be negatively related to the firm-level 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 and the lower the revenue.

A key prediction of our model is that the choice of a foreign currency loan by local currency earners may be positively related to the opaqueness of the firm's revenue structure. More local currency earners choose foreign currency loans under imperfect information than under perfect information. Note 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).

2. Country Level

At the macroeconomic level, our model predicts that the choice of a foreign currency loan will be positively related to the interest rate advantage on foreign currency funds which is given by nominal interest rate differential between local and foreign currencies minus the expected depreciation of the local currency.[19] The impact of the interest rate differential, however, does 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.

The choice of a foreign currency loan will further be negatively related to exchange rate volatility. If the local currency is more likely to depreciate, local currency earners

[19] In our model both the funding cost of foreign currency and the expected depreciation of the local currency equal zero. These variables therefore don't appear in the formulae of our propositions but are implicitly there.

(with low revenues) will be less likely to take a foreign currency loan. Moreover the impact of exchange rate volatility should be stronger for those firms with lower distress costs.

Finally, our model suggests that characteristics of the banking sector or of the legal environment that exacerbate information asymmetries between banks and firms may foster unhedged foreign currency borrowing.

IV. Data

Firm-level loan information was 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.

First, we relate this information to firm-level indicators of revenue sources, distress costs and financial opaqueness taken from the same survey. Then we relate our firm-level loan information to country-level indicators of macroeconomic conditions, as well as characteristics of the banking sector and institutional environment, taken from the *International Financial Statistics* (*IFS*) and *Annual Reports on Exchange Rate Arrangements and Exchange Rate Restrictions* (*AREAER*) compiled by the International Monetary Fund (IMF), the *Transition Report* published by the EBRD, and Basso, Calvo-Gonzalez and Jurgilas (2007). The definitions and data sources for all variables used in our empirical analysis are presented in Table 2.

[Table 2 here]

A. Firm-Level Borrowing Behavior

BEEPS 2005 provides data on 9,098 firms in 26 transition countries and covers a representative sample of firms for each of these countries.[20] In this sample, 3,105 firms report detailed information on their most recent loan.[21] 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*, which takes the value 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 date the loan was received and information on collateralization, duration, and interest rate.

Table 3 provides summary statistics on the characteristics of loans in our sample by country. In this sample, 25% of the loans are denominated in foreign currency. However, the percentage 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 3 here]

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

[20] 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.

[21] Of the 9,098 firms, 3,867 report that they have received a loan in the past. We drop those observations for which the most recent loan was received prior to 2002 (263 observations) or for which the date is not known (467 observations). We drop a further 32 observations for which the firm did not indicate whether its most recent loan was in local or foreign currency.

collateralized, 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. Pairwise correlations displayed in Panel C of the table suggest that the loan currency denomination is related to other loan characteristics. Foreign currency loans have a longer average 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 a firm of type *i* in country *j* has a foreign currency denomination when receiving a loan at time *t*:

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

Our theoretical model suggests that a firm's decision to take 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 the corresponding firm-level characteristics.[22]

[22] These characteristics are taken to be those prevailing at the time of the interview (in 2005) or for the 12 months prior to the interview. For most firms, this implies that our firm-level explanatory variables are elicited *after* their most recent choice of loan currency. However, our theory also suggests that it is the expected firm characteristics (in particular, income and its verifiability, and distress costs) at the time of loan repayment − and not necessarily at the time of the loan disbursement − which drive the currency choice. For a subset of 506 firms we have access to the firm-level characteristics from the 2002 BEEPS survey. We replicate our full-sample firm-level analysis using these 2002 values instead of the 2005 values. We find no significant correlations between the 2002 firm characteristics and their choice of loan currency.

1. Revenue Currency

We use three indicators of a firm's revenue currency denomination. The dummy variable *Exporter* equals one if the firm exports and zero if the firm obtains revenues only 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 a firm-level indicator 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.

Finally, 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 the 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 zero otherwise. Foreign-owned firms are more likely to have foreign currency loans, as they are more likely to have foreign currency income.

2. Distress Costs

We include two indicators of distress costs that occur when firms default on their most recent bank loan. 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 zero otherwise.

Theory also suggests that highly leveraged firms have higher distress costs, as they face higher costs of accessing additional external finance (Cowan (2006)). Our second indicator of distress costs, *Debt*, therefore relies on a measure of firm leverage available from BEEPS 2005, namely the share of working capital financed by debt in the 12 months prior to the interview.[23]

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 currency or level of firm revenues, our theory suggests that some local currency earners may pretend to be foreign exchange earners in order to receive cheaper foreign currency credit. As a result, firm opaqueness may lead to a higher probability of local currency earners taking foreign currency loans if a corresponding interest rate advantage exists. Note, however, that firm opaqueness may not lead to more foreign currency borrowing when we consider the full sample of firms. First, if in addition to firms with non-verifiable revenues there are some firms that have verifiable foreign currency earnings, then we could observe a positive relationship between foreign currency borrowing and financial transparency, as banks offer foreign currency loans to transparent firms at lower rates than to opaque firms. Furthermore, severe information asymmetry could lead to a collapse of the

[23] The BEEPS 2005 survey lacks an indicator of total firm leverage. Available indicators are the share of working capital or the share of recent investment financed by debt. We choose the former variable as it is available for a larger sample of firms. For those firms which reported both measures working capital debt and investment debt are highly correlated (pairwise correlation = 0.642).

foreign currency credit market for those firms with non-verifiable revenues. In this case only transparent firms with foreign currency income would receive foreign currency loans.

We include two 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 a position to provide more credible information about their revenues 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 the higher this share, the better banks are informed about the revenues of the firms (*à la* Mester, Nakamura and Renault (2007) and Norden and Weber (2007)).

4. Control Variables

In addition to our indicators of firm revenue, distress costs and opaqueness, we include four firm variables and sector fixed effects to control for other differences in firm characteristics.[24] The variable *International accounting* equals one for all firms that apply international accounting standards (IAS or US GAAP), and equals zero otherwise. Firms with stronger relations to foreign markets or investors are more likely to apply international accounting standards. At the same time, adhering to international accounting standards makes firms more transparent.

The variable *Small firm* equals one for firms with less than 50 employees and equals zero otherwise. Distress costs related to loan default may be larger for small firms, at least in proportion to loan size (Froot, Scharfstein and Stein (1993)). On the other hand, small firms may also be more opaque.

We include firm *Age*, measured at the time of disbursement of the most recent loan. The information about the firm's activities may become more accurate and credible as the firm grows older and can provide a longer public track record. On the other hand, because of the transition in the countries we consider, age may also proxy for export income, ownership and financial transparency.

Finally, the variable *Security costs* measures the percentage of annual sales that firms pay for security-related services. The private value of running a business may be lower in a less secure environment, and thus in an environment where security costs are higher. On the other hand, the fact that the entrepreneur chooses to operate in an insecure environment could indicate that his private value of the business is high. Further, higher security costs (in a given country) could indicate that a business is more sophisticated and therefore may be more likely to have foreign currency income.

We further include two characteristics of each loan ($L_{i,j,t}$). 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 collateral prior to currency. However, dropping both loan variables does not alter our findings.

5. Summary Statistics

Table 4 provides summary statistics for our firm-level explanatory variables (statistics for the two loan characteristics were already provided in Table 3). Panel A displays means for firms in our sample with local / foreign currency loans and compares

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[24] 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.

these to means for all 9,098 firms covered by the survey (i.e., including those firms without loans).

[Table 4 here]

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, sales to multinationals, and foreign owners. Note, however, that less than half (43 percent) of the firms with foreign currency loans have export income. This finding suggests that many firms that are taking foreign currency loans may be unhedged. There seems to be little difference in levels of family ownership and external debt between local currency and foreign currency borrowers, suggesting that levels of distress costs are similar. There is also 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 have a lower share of their income flowing through bank accounts, suggesting less financial transparency. Finally, firms taking foreign currency loans are more likely to adhere to international accounting standards, are smaller and younger, and have higher security expenditures.

Panel A also suggests that there are substantial differences between the firms in our sample and those firms in the survey who do not report having a local currency or foreign currency loan. Compared to the full sample of surveyed firms those which have a loan are more likely to export or sell to multinationals. Not surprisingly, firms with loans have higher average leverage ratios. Interestingly firms with loans seem to be more transparent, being more likely to have audited financial statements, to adhere to international

accounting standards and having a larger share of their income flowing through bank accounts. Firms with loans are also larger than the mean of all surveyed firms.

Panel B reports means of firm characteristics by the currency of firm income. We distinguish between *Local* from *Foreign currency earners* based on firm-level income structure and the country-level degree of real dollarization. Local currency earners are firms with no export sales, no sales to multinationals, no majority foreign owner, and which are located in a weakly dollarized country. Foreign currency earners are all other firms. We classify *Weakly dollarized countries* as those that have a mean share of foreign exchange deposits in the banking system of 50% or less for the observation period.[25]

The table shows that, due to widespread dollarization two-thirds of our sample are foreign currency earners according to the above classification. These firms seem to differ systematically from local currency earners, with lower distress costs and larger degrees of transparency. Foreign currency earners are less likely to be family businesses and are higher leveraged. At the same time they are more likely to be audited, have international accounting standards and have higher shares of income flowing through a bank account. Foreign currency earners are also larger and older than local currency earners. Panel C displays a full set of pairwise correlations for our firm characteristics.

Our theoretical model predicts that the choice of loan denomination for a given firm will differ across countries depending on the extent of the interest rate advantage of foreign currency funds and the exchange rate volatility. In addition, loan denomination may vary across countries due to differences in expectations of future macroeconomic conditions (domestic inflation volatility) as well as characteristics of the banking sector and the institutional environment (see the next section for a detailed discussion). In our analysis of

firm-level determinants of loan denomination, we control for these cross-country differences by introducing country-time fixed effects ($\alpha_{j,t}$).

C. Country-Level Determinants of Loan Currency Denomination

In a second empirical step, we examine the extent to which country-specific characteristics help explain the choice of loan currency in our sample. To do so we augment our empirical model with a vector of time-varying country-level variables ($C_{j,t}$):

$$[4] \qquad \Pr(Forexloan)_{i,j,t} = \alpha_j + \beta 1 \cdot F_i + \beta 2 \cdot L_{i,j,t} + \beta 3 \cdot C_{j,t} + \varepsilon_{i,j,t}.$$

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

1. Macroeconomic Determinants

Our main country-level explanatory variable is an indicator of the interest rate differential between local currency and foreign currency funds. We use four indicators of the nominal interest rate differential. Our first two indicators are calculated using benchmark interest rates in the domestic and foreign financial sectors. We label our first measure the *Interest differential – USD* indicator, because we calculate it using the domestic Treasury bill rate (taken from IFS, line 60c), and the interest rate on US Treasury bills (IFS, line 60c), for the past quarter.[26] The *Interest differential – Euro* indicator is similarly calculated as the domestic interest rate minus the Eurepo rate (also taken from IFS). Our two further indicators of the interest rate differential are taken from Basso, Calvo-Gonzalez and Jurgilas (2007). They obtain actual interest rate differentials between

[25] Table 7 shows that within our sample there are 13 weakly dollarized and 12 strongly dollarized countries. We cannot classify Uzbekistan due to a lack of data.

[26] Where a Treasury bill rate was not available, we used the central bank reference rate or money market rates which are available from IFS.

local currency and foreign currency, by 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, which we label *Interest differential – loans* and *Interest differential – deposits*, where possible.

As elaborated in our theory section, foreign currency borrowing should be driven by interest rate differentials after taking into account expected changes in the exchange rate. Firms should care about departures from UIP, which constitute real differentials in interest rates between local currency and foreign currency funds. Unfortunately, we have no measure of expected depreciation for our sample of countries. We therefore control for expected depreciation using the realized nominal depreciation of the local currency versus the US dollar (*Depreciation – USD*) or euro (*Depreciation – Euro*) during the past quarter (taken from IFS).

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 two variables that measure the actual variance of month on month changes per currency in the real exchange rate vis-à-vis the US dollar (*Depreciation volatility – USD*) and the euro (*Depreciation volatility –USD*) respectively (again taken from IFS). We take the actual variance in exchange rate movements for the past 12 months prior to each quarter.

In addition to our measure of actual exchange rate volatility, we include two measures of the exchange rate regime, which may affect agents' expectations. We distinguish countries with a fixed exchange rate (*Peg*), i.e. those with a currency board, fixed peg or crawling peg, from those with a floating exchange rate regime. Our classification of exchange rate regimes is based on the IMF's "Annual report on Exchange

Arrangements and Exchange Restrictions" (AREAER). Further, affiliation with the European Union may shape expectations about future currency arrangements, as new member states are automatically on track to join the Euro-zone. We therefore distinguish those countries that have completed negotiations to join the European Union (*EU*) from those that have not. A pegged exchange rate and expected EU accession may spur foreign currency borrowing.

In our model we ignore domestic inflation. In reality, however, volatility in the 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 both the level of domestic *Inflation*, which is the percentage change in the domestic consumer price index recorded by IFS, as well as the *Inflation volatility*, which is the variance of month on month changes in that index.

2. Banking Sector and Institutional Variables

Our model predicts that the ability of local currency earners to borrow in foreign currency will be affected by the information of banks on the firm's sources of revenues. This information will not only depend on the firm-level transparency, but also on bank characteristics and the institutional environment in which the bank operates.

As a first indicator of countrywide information asymmetries, we include a variable that captures the foreign presence in the banking sector. Foreign-owned banks may have

less knowledge about the activities of local firms (see, Detragiache, Tressel and Gupta (2008), Giannetti and Ongena (2009) and Giannetti and Ongena (2008) for example). 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. Informational asymmetries in the banking sector may also be affected by the extent to which domestic corporate 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.

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 include two country-level explanatory variables that measure the degree to which the foreign currency is used in the local economy. Our first indicator is the share of banking deposits that are held in foreign currency (*Forex deposits*), taken from Basso, Calvo-Gonzalez and Jurgilas (2007). Our second measure of real dollarization is the dummy variable *CIS*, which equals one for all countries that are members of the Commonwealth of Independent States from the former Soviet Union. Existing aggregate evidence by Basso, Calvo-Gonzalez and Jurgilas (2007) and Luca and Petrova (2008) suggests that real dollarization is substantially higher countries of the former Soviet Union than in other Eastern European transition countries.

The demand for foreign currency loans may further be influenced by firms' access to other currency hedging instruments. While we believe that the use of currency derivatives should be limited in our sample of firms, we nevertheless include a measure of the availability of such instruments. The dummy variable *Forward fx market* captures whether (or not) the forward currency market is well developed in a country, and is taken from the IMF's AREAER publication.

Regulations on capital flows may limit the supply of foreign currency loans by domestic banks. Basso, Calvo-Gonzalez and Jurgilas (2007) and Luca and Petrova (2008) find that banks' access to foreign funding is strongly correlated with aggregate levels of foreign currency lending in transition countries. Controls on international borrowing or foreign direct investment may limit the access of banks to such funding. We therefore include the variable *Capital controls* (taken from AREAER), which measures whether there are controls on foreign borrowing *by* or foreign direct investment *in* domestic firms (including banks) in a country.

Finally, the supply of foreign currency loans by domestic banks may be affected by regulatory limits on their open foreign currency positions. To capture this, we include the variable *Open fx position* (also taken from AREAER), which measures the maximum total open foreign currency position a bank in a country may have as a percentage of its capital.

3. Summary Statistics

Table 5 displays summary statistics for our macroeconomic explanatory variables. Panel A displays the means by country. This panel reveals positive values of the interest rate differential in almost all countries independent of the indicator considered. This implies a widespread interest rate advantage to taking foreign currency loans rather than local currency loans in our sample. This interest rate advantage does, however, vary substantially across countries.

[Table 5 here]

Panel B of Table 5 further shows that there is a substantial decline in the nominal interest rate differential over time. The variables *Interest rate differential – USD* and

Interest rate differential – Euro decline from more than 10% in 2002 to below 4% in 2005. The decline is more moderate in the two interest rate differentials obtained from Basso, Calvo-Gonzalez and Jurgilas (2007). This may be due to the fact that their panel data is unbalanced.

Table 5 confirms that the UIP did not hold (*ex post*) for the majority of countries in our sample during the observation period. Despite the substantial interest rate disadvantage vis-à-vis the US dollar, we find that the currencies of most countries appreciated (rather than depreciated) against the US dollar. Moreover, while the majority of currencies did depreciate against the euro, the magnitude of this depreciation was substantially lower than that of the nominal interest rate differential.[27]

Table 6 summarizes the exchange rate regime and political affiliation per country for our observation period of 2002:I to 2005:II. The majority of countries have a floating exchange rate regime. Several countries with plans to join the EU, however, adhere to a fixed rate regime in line with the Exchange Rate Mechanism II program.

[Table 6 here]

Table 7 displays summary statistics for our indicators of the banking sector and institutional environment. Foreign presence in the banking sector varies strongly, with foreign banks controlling over 90% of the assets in some countries (Croatia, Estonia, Lithuania, Slovak republic), and less than 10% in others (Azerbaijan, Russia, Tajikistan, Uzbekistan). The table further 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%. Panel B of Table 7 shows that dollarization dropped between 2002 and 2005, while foreign bank influence increased.

[Table 7 here]

Alternative foreign currency hedging instruments are limited in our sample, with forward currency markets underdeveloped in most countries. Furthermore, due to the existence of capital controls, banks in several countries have limited access to foreign funding. Panel B of Table 7 shows that the development of forward currency markets has only slightly improved between 2002 and 2005, while capital controls have been slightly reduced. Regulations on foreign currency positions are quite similar across countries in our sample, with open positions limited to 20%-30% of bank capital. The only notable exceptions are Kazakhstan and Macedonia, where banks can have open foreign currency positions up to 50% of their capital.

[27] During our observation period there were persistent deviations from the UIP for *all* transition countries in our sample.

V. Results

A. Firm-Level Determinants of Loan Currency Denomination

1. Full Sample Results

Table 8 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, and in Column (3) country-quarter effects. All three Columns (1) − (3) display the marginal effects at the sample means based on probit estimations. The T-statistics reported in parentheses are based on standard errors clustered at the country level.

[Table 8 here]

The estimates displayed in Table 8 suggest that the choice of loan denomination is systematically related to the currency in which firms yield revenue. *Exporter*s and *Foreign firm*s obtain more foreign currency loans. Both coefficients are also economically relevant. At the means of the other variables, the percentage of 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 of foreign loans increases from 22% for domestic to 47% for foreign firms.

Full sample estimates for our indicators of firm distress costs (*Family firm, Debt*) are insignificant. Estimates for indicators of firm opaqueness are mixed. Neither *Income via bank* nor *Audited firm* display the expected significant negative coefficient, suggesting that

opaqueness does not encourage foreign currency borrowing. Moreover, we find a significant positive correlation between international accounting standards and foreign currency borrowing. However, this result may be explained by the fact that firms that adhere to international standards are more likely to have foreign currency income. More in line with our prediction is the finding that 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 ability to obtain bank loans in a foreign currency.

We find a significant positive correlation between *Security costs* and loan denomination. Firms with higher security costs, which we argue may have a lower private value of doing business, are more likely to take a foreign currency loan. Finally, loans with a longer maturity are more likely to be in a foreign currency. Only 17% of the one-month loans are denominated in a foreign currency, while 26% of the three-year loans are. The coefficient on *Collateralized*, on the other hand, is not significant.

Our descriptive statistics in Table 4 suggest that firms in our sample, i.e., firms with a foreign currency or local currency loan, are more likely to have foreign currency income, are more leveraged and display a greater degree of financial transparency than firms which were surveyed but reported no loan. The results reported in Columns (1) – (3) may therefore be subject to a selection bias (Heckman (1979)), and thus not representative for "all" small firms in the transition countries we study. In Column (4) we therefore estimate a selection corrected model, in which following Cerqueiro (2009) we control for selection

both at the loan demand and the loan supply stage.[28] As in Ongena and Popov (2009) we note that the BEEPS dataset allows us to correct for selection at both stages because firms report if they (i) do not need credit, (ii) need credit but had a loan application rejected or were discouraged from applying in the first place, or (iii) have a loan.

Column (5) displays probit estimates for the probability that a firm needs credit, based on information for all 9,098 surveyed firms. Following Ongena and Popov (2009) we add the variable *State firm* to this model as state-owned firms may have lower demand for external finance. The results suggest that state-owned firm, and likewise foreign-owned firms are less likely to demand credit. Further, results indicate that exporters, firms with sales to multinationals, and larger firms are more likely to demand credit.

Column (6) displays probit estimates for the probability that a firm gets credit if it needs credit. As argued by Cerqueiro (2009) it is likely that those firm-level variables which affect loan supply also affect the terms of credit. As a consequence this loan supply model includes the same firm-level variables as our outcome regression. The results displayed in Column (6) show that banks are more likely to grant a firm credit if it has more foreign currency income (*Exporter, Sales to multinationals*), and in particular if displays a higher degree of financial transparency (*Audited firm, Income via bank, International accounting, Small firm*).

While there is substantial firm selection at the loan demand and loan supply stages, results in Column (4) suggests that this does not affect our results for loan currency denomination. Indeed both qualitatively and quantitatively the results in the uncorrected

[28] The coefficients presented in Column (4) are based on OLS estimates as the two-step Heckman selection model does not correct appropriately in the case of a probit estimation of the outcome regression. Estimating a probit model nevertheless leaves results unaltered. Adding both squared and cubed selection terms also leaves results unchanged. For maximum likelihood estimation of model with a single selection and with a probit outcome regression see Van de Ven and Van Pragg (1981) for example.

model (Column (3)) and the selection corrected model are almost identical. In the remaining empirical exercise we therefore focus on the uncorrected regression models.

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 that do not have income in foreign currency. In addition, we expect that distress costs should affect firms only when exchange rates are volatile, and thus the probability of defaulting on an unhedged foreign currency loan is high. The fact that we pool firms with and without foreign currency earnings in our full sample regressions, and assume that the impact of distress costs is similar for firms in countries with stable and volatile exchange rates, may explain why the results in Table 8 are weak.

In Table 9, we try to isolate the 'true' local earners by splitting the sample according to local and foreign currency earners (as in Table 4). We further split our sample depending on whether firms are located in a country with a pegged or floating exchange rate. Table 6 shows that there are 14 countries with floating regimes and 12 with pegged regimes (currency board, fixed peg or crawling peg). We report the results for the corresponding subsamples in Table 9.

[Table 9 here]

Our sample splits provide limited support for the conjecture that firm-level distress costs or opaqueness affect the loan choice for *Local currency earners*. None of our

indicators of firm distress cost (*Family firm*, *Debt*) or opaqueness (*Audited firm*, *Income via bank*) display a significant coefficient in Column (1) of Table 9.

However, comparing Columns (1) and (2) of Table 9 we do find that *Audited firm* displays the expected negative sign for local currency earners, while it has a positive sign for foreign currency earners. This finding suggests that there may be a two-sided effect of financial transparency on borrowing behavior. On the one-hand, financial transparency may help foreign currency earners to borrow in foreign currency. On the other hand, as suggested by our model, financial transparency lowers the ability of local currency earners to imitate foreign currency borrowers. This conjecture is partly supported by our analysis in Panel B of Table 9 where we interact all firm characteristics with *Local currency earner* (a dummy that equals one if the firm is a local currency earner and equals zero otherwise). In Column (2) the coefficient on the interactions with *Audited firm* is negative and significant, providing some qualified support for the opaqueness implications of our model.

Our sample splits provide little support for the conjecture that distress costs matter more for firms that are subject to more volatile exchange rates. In Panel A of Table 9 we find no significant results for our two measures of distress costs, *Family firm* and *Debt*.

B. Macroeconomic Determinants of Loan Currency Denomination

1. Full Sample Results

In Table 10 we report a full sample analysis, including our four measures of the *Interest rate differential*, as well as our measures of *Depreciation,* exchange rate volatility *(Depreciation volatility, Peg, EU)* , as well as domestic *Inflation* and *Inflation volatility*. We expect the interest rate differential, inflation and inflation volatility to have positive effects, and depreciation and exchange rate volatility to have negative effects.

[Table 10 here]

Panel A reports the coefficients for estimations excluding country fixed effects, with inference based on standard errors that are either adjusted or not adjusted for clustering at the country level. As expected, we find that the estimated coefficient is positive for all four indicators of the nominal interest rate differential. The significance of the coefficients holds for both clustered and non-clustered errors. However, while the impact of the interest rate differential is statistically significant, its economic relevance is weak. The coefficients in Columns (1) and (2) of the table suggest, for example, that (at the sample mean) a 1% increase in the interest rate differential to the US dollar or euro increases the share of foreign currency loans by 0.7%. This implies that raising the interest differential to the euro by its mean (7.6%) increases foreign currency borrowing by less than one-quarter of its mean (25%).

Our model predicts that firms should not consider the nominal interest rate differential alone, but instead the net interest rate differential, taking into account the expected depreciation. Indeed, we find that the coefficient of *Depreciation – Euro* is negative and of similar magnitude to the coefficient of the nominal interest rate differential.[29] Again this coefficient is significant for both clustered and non-clustered errors. However, our results also show that the coefficient of *Depreciation – USD* is not significant at all. These findings suggest that for those firms in our sample that are primarily motivated by interest rate differentials to take foreign currency loans, the euro may be the more relevant comparison currency.

Table 10 provides mixed results on the relevance of exchange rate volatility for firms' choices of loan denomination. Our results suggest that volatility of depreciation vis-à-vis the US dollar or euro does not affect firms' choices: The coefficients of *Depreciation volatility* are insignificant for both currencies. However, in line with our predictions, we do find that firms located in countries with fixed exchange rate regimes are more likely to take foreign currency loans. The coefficient of *Peg* is positive and significant in Columns (1) and (2). After controlling for the exchange rate regime we do not find that countries that are on track to join the European Union display higher levels of foreign currency borrowing. Finally, as predicted by Ize and Levy-Yeyati (2003), we find that higher levels of volatility of domestic inflation encourage foreign currency borrowing. This confirms the findings of Basso, Calvo-Gonzalez and Jurgilas (2007) and Luca and Petrova (2008) for aggregate credit dollarization. Contrary to our expectations we find that the level of domestic inflation has a negative impact on foreign currency borrowing.

In Panel B of Table 10 we examine the extent to which our results above could be driven by unobserved heterogeneity across countries. Table 5 shows that the macroeconomic conditions vary substantially across the countries in our sample. These differences may be correlated with institutional features of the banking sector or common characteristics of the firms within each country. To account for unobserved heterogeneity across countries, Panel B of Table 10 replicates our analysis including country fixed effects. The results show that the significance of most of our macroeconomic variables disappears when we control for country fixed effects. The coefficients of three of our measures of nominal interest rate differentials (*Interest diff. – USD*, *– Euro*, and *– Loans*) drop substantially and remain only marginally significance. The variable *Depreciation –*

[29] Indeed, a Wald test suggests that we cannot reject the hypothesis that the coefficients of *Interest differential*

Euro also falls in magnitude and loses significance. The only macroeconomic variable that consistently retains a significant coefficient after including country fixed effects is domestic *Inflation volatility*.

Note that despite our short observation period of three years, there is substantial time variation in our macroeconomic variables. For example, as shown in Table 5, nominal interest rate differentials drop on average from more than 10% in 2002:I to below 4% in 2005:II. Likewise, exchange rate movements against the euro vary from a depreciation of 8% in 2002:III to an appreciation of 2.8% in 2004:II. Thus our finding that the explanatory power of macroeconomic variables drops when we introduce country fixed effects cannot be accounted for by lack of variation in these variables. The results in Panel B of Table 10 therefore suggest that foreign currency borrowing by firms in our sample may be less related to variation in nominal interest rate differentials and exchange rate movements, than to differences in institutional settings across countries.

2. Sample Splits

We check the robustness of our macroeconomic results by estimating coefficients for various subsamples in Table 11. First, we expect that the impact of interest rate differentials and exchange rate movements on loan denomination choice should be stronger for local currency earners than for foreign currency earners. In Panel A of the table we therefore conduct OLS regressions interacting each macroeconomic explanatory variable with the dummy variable *Local currency earner*. We conduct this analysis both for USD-related macro variables (Columns (1)) and euro-related variables (Column (2)).

– *Euro* and *Depreciation – Euro* in Column (2) add up to zero.

[Table 11 here]

The results support our above findings that interest rate differentials and exchange rate movements do not drive foreign currency borrowing in our sample. Contrary to our expectations, we do not find that local currency earners react more strongly to changes in these macro variables than foreign currency earners. The interaction terms of *Local currency earner* with *Interest differential*, *Depreciation*, and *Depreciation volatility*, as well as with *Inflation* and *Inflation volatility,* are all insignificant. Interestingly, we find that local currency earners are less likely than foreign currency earners to take foreign currency loans in countries that are on track to join the European Union. This result suggests that those firms that have (some) foreign currency income, rather than those that have none at all, are more likely to take foreign currency loans when the exchange rate environment becomes more stable.

One reason for the weak impact of the macroeconomic variables in Table 10 may be that the relevant foreign currency for firms differs across countries. Our full sample analysis assumes that the US dollar and the euro are equally important as reference currencies in all countries. Existing evidence suggests, however, that the euro is the most relevant foreign currency in Eastern European transition countries (Rosenberg and Tirpak (2008)), while the US dollar is more relevant in countries of the Commonwealth of Independent States (Brown, Rueda Maurer, Pak and Tynaev (2009), Luca and Petrova (2008)).

In Panel A of Table 11 we therefore also repeat our full sample analysis, including the interaction terms of our macro variables with *EU* (Columns (2) and (3)) and *CIS* (Columns (3) and (4)) respectively. Contrary to our expectations, we do not find that firms in European Union accession countries react more strongly to interest rate differentials and

depreciation against the euro than firms in non-accession countries (Column (4)). Moreover, we do not find that the loan currency choice of firms in CIS countries is more strongly affected by interest rate differentials and depreciation vis-à-vis the US dollar (Column (5)).

The impact of changes in macroeconomic conditions on foreign currency borrowing within a country may depend strongly on the *level* of the macroeconomic parameters of that country. This is not accounted for in our full sample analysis in Table 10, which reports marginal effects at the sample means only. In Panel B of Table 11 we therefore replicate our analysis of macroeconomic determinants for each country separately. The results in this panel confirm that changes in macroeconomic conditions have little impact on foreign currency borrowing within countries. We find, for example, that *Interest differential – USD* is only significantly positive for 1 of 18 countries (Belarus), while *Depreciation – USD* is also only negative and significant for one country (Georgia). Likewise *Interest differential – Euro* is only significant for 4 countries (Albania, Belarus, Hungary, Serbia), while *Depreciation – Euro* is not significantly negative for any country.

C. Institutional Determinants of Loan Currency Denomination

If interest rate differentials and exchange rate movements hardly affect the loan currency choice of firms in our sample, how can we explain the strong cross-country variation in foreign currency borrowing observed in our data? In Table 12 we examine the extent to which institutional differences across countries may be responsible for this variation. Our theoretical model suggests that foreign currency borrowing may be positively associated with strong foreign bank presence and weak corporate governance, which may both aggravate information asymmetries between firms and banks. In addition, we expect more foreign currency borrowing in countries with a higher degree of

dollarization in the real economy. The demand for foreign currency loans could further be affected by the availability of alternative hedging instruments, such as forward contracts if these are available at all. Finally, the supply of foreign currency loans may be affected by regulations that limit the refinancing opportunities of banks abroad and their ability to hold open foreign currency positions.

[Table 12 here]

The results in Table 12 suggest that institutional characteristics do contribute to explaining cross-country differences in foreign currency borrowing. We find that in countries with a higher *Foreign bank* presence and lower indices of *Enterprise reform*, firms are more likely to take foreign currency loans. These results suggest that information asymmetries may indeed foster foreign currency borrowing in our sample. However, the positive effect of foreign bank presence could also be due to the fact that foreign banks have easier access to funding in foreign currency, which increases the supply of loans in these currencies. Supporting this interpretation, we find that countries that impose *Capital controls* display lower levels of foreign currency borrowing, suggesting that these controls limit the supply of foreign currency loans by banks. Thus in line with the aggregate evidence by Rosenberg and Tirpak (2008) and Luca and Petrova (2008), but in contrast to the bank-level evidence by Haiss, Paulhart and Rainer (2008), our results suggest that international funding is an important determinant of loan dollarization in transition countries.

The results in Table 12 further show that countries with more generous supervisory limits on open foreign currency positions of banks display higher shares of foreign

currency borrowing. This finding also supports the above results that supply-side constraints seem to be relevant in explaining the cross-country variation in our sample.

Our results do not confirm that foreign currency borrowing is more frequent in countries with higher degrees of real dollarization: The share of foreign currency deposits in a country (*Forex deposits*) does not bear the expected positive and significant coefficient. In addition, foreign currency loans are not more frequent in *CIS* countries, which are characterized by a higher degree of real dollarization. Further, in contrast to Luca and Petrova (2008), we do not find that the development of forward foreign currency markets affects foreign currency borrowing. This result supports our earlier conjecture that forward contracts are hardly relevant as alternative hedging instruments for our sample of small firms.

Finally, Table 12 confirms our previous results, that interest rate differentials and exchange rate movements cannot explain foreign currency borrowing in our sample. Controlling for institutional differences across countries, we find that our indicators of *Interest differentials*, *Depreciation*, and *Depreciation volatility* and *Inflation* yield insignificant coefficients. Confirming our earlier results, we do, however, find that greater domestic *Inflation volatility* encourages foreign currency borrowing.

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 cost and the risk 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 or the level of firm revenues. Foreign currency earners and local

currency 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 and level of firm revenues, we show that more local currency earners switch to foreign currency loans.

We then test these implications of our theoretical model by using a 2005 survey of 9,098 firms from 26 transition countries. We find strong evidence that firms with foreign currency earnings borrow more in foreign currency. However, we find only weak evidence that firms with lower distress costs and opaque firms are more likely to borrow in foreign currency.

At the country level, we find that neither interest rate advantages nor exchange rate movements explain foreign currency borrowing in our sample. We do however find that foreign bank presence, corporate governance and controls on incoming international capital flows explain cross-country differences in loan dollarization. Hence, employing reasonable firm and country proxies, we cannot confirm that "carry-trade behavior" is the key driver of the recently observed increase in foreign currency borrowing by small firms in transition economies. Our results do, however, support the conjecture that banking-sector structures and institutions that aggregate information asymmetries may be facilitating (unhedged) foreign currency borrowing. Thus, while our findings may partly allay some concerns of policymakers on foreign currency borrowing in these countries, policy innovations towards more transparency may still be called for.

Table 1. Model predictions

Effect of determinants of the choice of a foreign currency loan (+): positive effect, (-): negative effect	
Firm level determinants	
% Income in foreign currency	**(+)**
Distress costs	**(-)**
% Income in foreign currency * Distress costs	**(+)**
Opaqueness of revenues	**(+)**
% Income in foreign currency * Opaqueness of revenues	**(-)**
Country level determinants	
Interest rate differential (local minus foreign)	**(+)**
Expected depreciation of the local currency	**(-)**
% Income in foreign currency * Interest rate differential	**(-)**
Exchange rate volatility	**(-)**
Distress costs * Exchange rate volatility	**(-)**
Banking sector or legal impediments to transparency	**(+)**

Table 2. Variable definitions

Data Sources: AREAER: Annual report on Exchange Arrangements and Exchange Restrictions of the International Monetary Fund; BCJ: Basso, Calvo-Gonzalez and Jurgilas (2007); BEEPS: Business Environment and Enterprise Performance Survey in 2005 by the European Bank for Reconstruction and Development and the World Bank; CIAF: CIA Factbook; IFS: International Finance Statistics of the International Monetary Fund; 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	The value of collateral posted by the firm over loan size, in %.	BEEPS
Interest rate	Interest rate per annum, in %.	BEEPS
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
Family firm	1= firm is owned by sole proprietor or family, 0= otherwise.	BEEPS
Debt	Share of short-term investment financed by debt.	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
International accounting	1= firm applies international accounting standards (IAS or USGAAP), 0= otherwise.	BEEPS
Small firm	1= less than 50 employees, 0= otherwise.	BEEPS
Age	Age of firm at time of loan disbursement, in years.	BEEPS
Security costs	Expenses for security services over sales.	BEEPS
State firm	1= at least 50% of ownership in state hands, 0= otherwise.	BEEPS
Interest diff. - USD (- Euro)	Domestic Tbill / money market rate minus US Tbill rate (Eurepo rate), in the past quarter.	IFS
Interest diff. - loans (– deposits)	Difference in nominal interest rates on 1-year loans (deposits): local minus foreign currency rate, in the past quarter.	BCJ
Depreciation - USD (- Euro)	Depreciation of local currency versus the US$ (Euro), nominal, in %, during the past quarter.	IFS
Deprec. volatility - USD (- Euro)	Variance of monthly changes in the real exchange rate versus the US$ (Euro), in %, during the past 4 quarters.	IFS
Peg	1= country has crawling peg fixed peg or currency board exchange rate regime, 0= otherwise.	AREAER
EU	1= country is or has completed negotiations to become EU member, 0= otherwise.	CIAF
Inflation	Consumer price inflation, in the past quarter.	IFS
Inflation volatility	Variance of monthly changes in the consumer price index, in %, during the past 4 quarters.	IFS
Foreign banks	Assets share of foreign controlled banks in domestic banking system, in %.	TR
Enterprise reform	EBRD index of Enterprise reform. Scale: 1 to 4.33.	TR
Forex deposits	Share of deposits in the banking sector denominated in foreign currency, in %.	BCJ
CIS	1= country is member of commonwealth of independent states, 0= otherwise.	CIAF
Forward fx market	1= country has developed forward foreign exchange market, 0= otherwise.	AREAER
Capital controls	1= country has controls on foreign borrowing by or foreign direct investment in domestic firms, 0= otherwise.	AREAER
Open fx position	Maximum total open foreign exchange position of banks over capital, in %.	AREAER

Table 3. 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*: The value of collateral posted by the firm over loan size, in %. *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 Rep.	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 4. 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. *Family firm*: 1= firm is owned by sole proprietor or family, 0= otherwise. *Debt*: Share of short-term investment financed by debt. *Audited firm*: 1= firm has an external auditor, 0= otherwise. *Income via bank*: Share of firm revenues that are received through bank transfers. *International accounting*: 1= firm applies international accounting standards (IAS or USGAAP), 0= otherwise. *Small firm*: 1= less than 50 employees, 0= otherwise. *Age*: Age of firm at loan disbursement, in years. *Security costs*: Expenses for security services over sales, in %.

Panel A: Sample means by loan currency

This panel reports means of firm characteristics for firms in our sample as well as for all firms covered by the survey (i.e. including those firms who report having no loan, for which the most recent loan was received prior to 2002, or firms which did not indicate the currency of their most recent loan). The reported difference tests between firms with local currency loans and foreign currency loans are standard t-tests. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

		Firms in sample			
	All firms	with local currency loan	with foreign currency loan	Difference tests	
Observations	*9,098*	*2,335*	*770*		
Exporter	0.25	0.31	0.43	t(3,101) = 6.25	***
Sales to multinationals	0.14	0.17	0.24	t(3,020) = 4.46	***
Foreign firm	0.10	0.08	0.20	t(3,105) = 9.03	***
Family firm	0.73	0.73	0.70	t(3,011) = 1.20	
Debt	0.23	0.38	0.40	t(3,054) = 1.21	
Audited firm	0.46	0.51	0.59	t(3,071) = 4.20	***
Income via bank	0.50	0.58	0.55	t(3,099) = 1.94	*
International accounting	0.16	0.19	0.31	t(3,105) = 7.16	***
Small firm	0.71	0.62	0.57	t(3,105) = 2.49	**
Age	15.36	16.19	14.19	t(3103) = 2.52	**
Security costs	0.83	0.69	0.93	t(3,105) = 3.50	***

Panel B: Sample means by firm earnings

This panel contrasts means for subsamples of firms, whereby our sample is split based on the income structure of firms and the dollarization level of the country the firms is situated in. *Local currency earners* are firms that have no export sales, no sales to multinationals, and no majority foreign owner and are situated in weakly dollarized countries. *Foreign currency earners* are all other firms. *Weakly dollarized* countries have a mean share of foreign currency deposits in the banking system of 50% or less for the observation period. The reported difference tests between groups are standard t-tests. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Total	Local currency earners	Foreign currency earners	Difference tests	
Observations	*2,937*	*1,024*	*1913*		
Family firm	0.73	0.78	0.70	t(2848) = 4.75	***
Debt	0.39	0.34	0.42	t(2887) = 5.79	***
Audited firm	0.52	0.46	0.55	t(2901) = 4.46	***
Income via bank	0.56	0.49	0.60	t(2929) = 7.80	***
International accounting	0.22	0.12	0.28	t(2935) = 10.28	***
Small firm	0.61	0.72	0.55	t(2935) = 8.92	***
Age	15.56	13.42	16.71	t(2933) = 4.48	***
Security costs	0.75	0.70	0.78	t(2935)= 1.13	

Panel C: Pairwise correlations

This panel reports pairwise correlations for our full sample of 3,105 of firms.

	Exporter	Sales to multinationals	Foreign firm	Family firm	Debt	Audited firm	Income via bank	International accounting	Small firm	Age	Security costs
Exporter	1										
Sales to multinationals	.206	1									
Foreign firm	.205	.178	1								
Family firm	-.152	-.058	-.266	1							
Debt	.078	.094	.037	-.039	1						
Audited firm	.189	.157	.179	-.248	.041	1					
Income via bank	.290	.119	.107	-.157	.065	.167	1				
International accounting	.183	.115	.162	-.134	.058	.202	.055	1			
Small firm	-.286	-.068	-.183	.364	-.039	-.314	-.182	-.231	1		
Age	.217	.008	-.019	-.320	-.009	.197	.108	.138	-.362	1	
Security costs	-.025	.037	.024	-.039	.004	.003	-.009	.026	-.075	.001	1

Table 5. Macroeconomic explanatory variables: Summary statistics

The table displays four measures of the nominal *Interest rate differential* between local currency and foreign currency funds per country, in %. *USD*: Domestic Tbill rate minus US Tbill rate. *Euro*: Domestic Tbill rate minus Eurepo rate. *Loans*: Interest rate differential on loans. *Deposits*: Interest rate differential on deposits. The table further displays the *Depreciation* in % of the local currency against the US dollar (Euro). Finally, the table displays our measures of monetary volatility: *Depreciation volatility*: Variance of month on month changes in the real exchange rate vis-à-vis the USD (Euro). *Inflation*: Change in the consumer price index per quarter. *Inflation volatility*: Variance of month on month changes in the consumer price index.

Panel A: Sample means by country, 2002 – 2005

	Interest rate differential				Depreciation				Inflation	
					level		volatility			
Country	- USD	- Euro	- Loans	- Deposits	-USD	-Euro	-USD	-Euro	level	volatility
Albania	6.7	5.5	6.4	5.6	-2.6	-0.1	9.3	6.8	1.1	2.0
Armenia	9.2	8.0	0.8	2.6	-1.3	1.3	5.7	8.4	1.5	5.1
Azerbaijan	7.7	6.5	-2.6	-0.2	0.2	2.9	0.8	7.3	1.9	0.8
Belarus	31.8	30.7	9.0	20.2	2.8	5.5	1.1	8.7	6.1	1.2
Bosnia										
Bulgaria	1.8	0.7	3.6	1.0	-2.3	0.0	7.7	1.2	1.3	1.2
Croatia	1.9	0.8	4.1	1.3	-2.4	0.0	8.9	3.4	0.6	0.2
Czech Rep.	1.4	0.3	1.1	0.0	-3.1	-0.8	17.9	5.5	0.4	0.2
Estonia	1.7	0.5	1.7	0.1	-2.3	0.0	7.5	0.3	0.7	0.2
Georgia	32.1	31.0	3.0	-3.8	-0.8	1.8	4.3	8.4	1.9	1.4
Hungary	8.0	6.8	7.4	6.1	-2.6	-0.2	9.5	3.4	1.3	0.3
Kazakhstan	3.6	2.5	3.7	1.2	-0.8	1.9	0.9	8.3	1.7	0.2
Kyrgyzstan	6.2	5.0	8.2	5.6	-1.0	1.7	6.6	12.8	1.0	1.1
Latvia	1.7	0.6	4.0	1.2	-0.9	1.6	2.1	3.3	1.1	0.2
Lithuania	1.1	-0.1	1.5	-0.2	-2.8	-0.4	6.9	2.3	0.1	0.2
Macedonia	6.8	5.6	4.6	4.0	-2.3	0.1	8.3	1.4	0.3	0.5
Moldova	8.9	7.8	10.0	10.6	-0.1	2.7	2.9	10.4	2.9	1.1
Poland	5.9	4.7	6.1	2.7	-1.9	0.5	10.1	8.6	0.5	0.1
Romania	20.6	19.5	17.2	11.2	-0.4	2.2	4.5	5.1	3.5	0.3
Russia	5.4	4.3	4.0		-0.4	2.3	1.3	8.4	3.3	0.4
Serbia	15.4	14.3			-0.2	2.4	7.7	2.5	2.9	1.8
Slovak Rep.	4.7	3.6	1.7	0.9	-3.1	-0.7	8.0	3.8	1.5	1.1
Slovenia	5.0	3.9	3.7	1.6	-1.7	0.7	7.7	1.2	1.2	0.2
Tajikistan	15.9	14.7	-0.7	0.0	1.8	4.4				
Ukraine	5.6	4.5	8.8	1.8	-0.1	2.6	0.9	7.3	1.9	0.8
Uzbekistan									1.1	2.0

Panel B: Sample means by Year:Quarter

	Interest rate differential				Depreciation				Inflation	
					level		volatility			
	- USD	- Euro	- Loans	- Deposits	-USD	-Euro	-USD	-Euro	level	volatility
2002:I	12.0	10.5	6.7	4.9	1.7	-1.9	3.4	6.1	2.8	1.1
2002:II	11.6	10.0	5.0	4.6	2.1	1.1	3.2	5.8	2.5	1.1
2002:III	10.6	8.9	4.5	3.8	-5.3	8.2	3.5	7.0	0.8	1.0
2002:IV	10.5	8.9	4.6	3.7	1.0	-0.2	3.8	5.8	-0.2	1.1
2003:I	10.1	8.3	4.8	2.8	-2.8	3.4	4.3	4.7	2.4	1.0
2003:II	9.1	7.6	3.7	3.4	-0.5	3.4	4.4	4.5	2.4	1.0
2003:III	9.6	8.3	4.9	3.2	-3.6	1.1	7.1	4.7	1.0	0.9
2003:IV	9.4	8.2	4.4	3.4	-0.3	1.7	9.6	6.2	0.2	0.8
2004:I	9.6	8.4	4.3	3.2	-4.4	3.7	10.0	6.5	2.9	0.9
2004:II	8.0	6.9	4.4	3.1	0.4	-2.8	10.4	7.8	2.2	0.8
2004:III	7.0	6.0	4.2	2.6	-0.3	-0.9	7.9	6.4	1.1	0.9
2004:IV	5.9	5.3	4.1	2.4	-1.2	0.9	5.2	4.9	0.3	0.7
2005:I	4.9	4.7	4.1	2.3	-6.4	2.8	5.4	4.2	2.8	0.7
2005:II	3.5	3.9	4.1	2.1	2.6	-2.4	6.6	4.6	2.5	0.7

Panel C: Pairwise correlations

	Interest rate differential				Depreciation				Inflation	
					level		volatility			
	- USD	- Euro	- Loans	- Deposits	-USD	-Euro	-USD	-Euro	level	volatility
Int. – USD	1									
Int. – Euro	.998	1								
Int. – Loans	.227	.227	1							
Int. – Dep.	.437	.438	.642	1						
Dep. – USD	.260	.264	.063	.213	1					
Dep. – Euro	.288	.276	.025	.188	.327	1				
Vol. – USD	-.220	-.215	-.058	-.174	-.106	-.165	1			
Vol. – Euro	.234	.231	.177	.222	.153	.142	.003	1		
Infl.	.401	.411	.245	.479	.258	.250	-.192	.139	1	
Infl. vol.	.172	.168	-.059	.120	.054	.055	-.023	.260	.121	1

Table 6. Exchange rate regime and political affiliation

The table summarizes the exchange rate regime and political affiliation per country for our observation period of 2002:1 to 2005:2. All entries are denoted in Year:Quarter. *Float*: exchange rate regime is independently floating or managed float. *Crawling Peg*: exchange rate regime is a crawling peg or crawling band arrangement. *Fixed peg:* exchange rate regime is a conventional peg or currency board arrangement. *EU*: Country has completed negotiations to become EU member. *CIS*: Country is member of the Commonwealth of Independent States.

Country	Float	Crawl Peg	Fixed Peg	EU	CIS
Albania	2002:I-2005:II				
Armenia	2002:I-2005:II				from 1992:I
Azerbaijan	2002:I-2005:II				from 1993:III
Belarus		2002:I-2005:II			from 1992:I
Bosnia			2002:I-2005:II		
Bulgaria			2002:I-2005:II	from 2005:I	
Croatia	2002:I-2005:II				
Czech Rep.	2002:I-2005:II			from 2003:I	
Estonia			2002:I-2005:II	from 2003:I	
Georgia	2002:I-2005:II				from 1994:I
Hungary			2002:I-2005:II	from 2003:I	
Kazakhstan	2002:I-2005:II				from 1992:I
Kyrgyzstan	2002:I-2005:II				from 1992:I
Latvia			2002:I-2005:II	from 2003:I	
Lithuania			2002:I-2005:II	from 2003:I	
Macedonia			2002:I-2005:II		
Moldova	2002:I-2005:II				from 1992:I
Poland	2002:I-2005:II			from 2003:I	
Romania		2002:I-2005:II		from 2005:I	
Russia	2002:I-2005:II				from 1992:I
Serbia	from 2003:I				
Slovak Rep.	2002:I-2005:II			from 2003:I	
Slovenia		2002:I-2004:II	from 2004:III	from 2003:I	
Tajikistan	2002:I-2005:II				from 1992:I
Ukraine			2002:I-2005:II		from 1992:I
Uzbekistan	2002:I-2005:II				from 1992:I

Table 7. Banking sector and institutional variables: Summary statistics

The table displays summary statistics for our banking sector and institutional level explanatory variables. *Foreign banks*: Assets share of foreign controlled banks in domestic banking system, in %. *Enterprise reform*: EBRD index of Enterprise reform. *Forex deposits:* Share of deposits in the banking sector denominated in foreign currency, in %. *Forward fx market:* 1= country has developed forward foreign exchange market, 0= otherwise. *Capital controls:* 1= country has controls on foreign borrowing by or foreign direct investment in domestic firms, 0= otherwise. *Open fx position*: Maximal open foreign exchange position of banks over capital, in %.

Panel A: Sample means by country, 2002 – 2005

Country	Foreign banks	Enterprise reform	Forex deposits	Forward fx market	Capital controls	Open fx position
Albania	66.4	2	31.2	0	0	30
Armenia	53.4	2.3	73.6	0	0	24
Azerbaijan	5.3	1.91	49.5	0.71	1	20
Belarus	16.2	1	57.1	0	1	20
Bosnia	80.8	1.91	51.2	0	0.71	
Bulgaria	79.1	2.59	50.1	0	1	30
Croatia	90.9	2.83	66.4	0	0.43	20
Czech Rep.	85.5	3.3	10.8	1	1	20
Estonia	97.9	3.36	28.6	1	1	30
Georgia	35.1	2.04	95.6	0	0	
Hungary	77.9	3.36	16.4	1	0	30
Kazakhstan	28.7	2	52.4	1	0	47
Kyrgyzstan	62.5	2	0.6	0	0	20
Latvia	49.5	2.91	40.1	1	0	20
Lithuania	93.8	3	37.1	1	0	30
Macedonia	46.8	2.3	52.6	0.71	0	50
Moldova	32.9	1.83	50.7	0	0.57	20
Poland	71.6	3.36	17.1	1	1	
Romania	55.9	2.04	44.9	0	0.29	20
Russia	7.8	2.3	38.5	1	1	20
Serbia	38.9	2.04	62.1	0	0.29	30
Slovak Rep.	93.1	3.36	15.3	0	0	18
Slovenia	19.2	3	32.8	1	0	20
Tajikistan	4.6	1.7	55.6	0	1	23
Ukraine	13.5	2	32.9	0	0	30
Uzbekistan	4.0	1.7		0	1	

Panel B: Sample means by quarter

Year:Quarter	Foreign banks	Enterprise reform	Forex deposits	Forward fx market	Capital controls	Open fx position
2002:I	46.8	2.34	45.7	0.35	0.46	27
2002:II	46.8	2.34	46.6	0.35	0.46	27
2002:III	46.8	2.34	45.6	0.35	0.46	27
2002:IV	46.8	2.34	45.1	0.35	0.46	27
2003:I	51.4	2.38	44.8	0.42	0.42	26
2003:II	51.4	2.38	42.7	0.42	0.42	26
2003:III	51.4	2.38	41.8	0.42	0.42	26
2003:IV	51.4	2.38	42.1	0.42	0.42	26
2004:I	53.5	2.39	41.7	0.42	0.42	27
2004:II	53.5	2.39	41.0	0.42	0.42	27
2004:III	53.5	2.39	40.8	0.42	0.42	27
2004:IV	53.5	2.39	41.0	0.42	0.42	27
2005:I	58.2	2.5	40.6	0.42	0.42	25
2005:II	58.2	2.5	41.2	0.42	0.42	25

Panel C: Pairwise correlations

	Foreign banks	Enterprise reform	Forex deposits	Forward fx market	Capital controls	Open fx position
Foreign banks	1					
Enterprise reform	0.66	1				
Forex deposits	-0.34	-0.49	1			
Forward fx market	0.15	0.59	-0.42	1		
Capital controls	-0.14	-0.14	-0.04	0.03	1	
Open fx position	0.02	-0.05	0.15	0.23	-0.36	1

Table 8. Firm-level determinants of foreign currency borrowing

The dependent variable in Columns (1) − (4) is *Forex loan* which equals one if the firm's last loan is denominated in foreign currency and zero if this loan is in local currency. The dependent variable in Column (5) is *Loan demand* which equals one if the firm applied for a loan or was discouraged from doing so. The dependent variable in Column (6) is *Loan granted* which equals one if the firm received a loan. The two selection terms included as explanatory variables in Column (4) are those estimated in Columns (5) and (6) respectively. All explanatory variables are defined in Table 2. Each regression includes six sector dummies. The table displays the marginal effects calculated at the 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) No fixed effects (Probit)	(2) Country Effects (Probit)	(3) Country-quarter effects (Probit)	(4) Double selection model (OLS)	(5) Selection 1 Loan demand (Probit)	(6) Selection 2 Loan granted (Probit)
Exporter	0.077	0.081	0.091	0.085	0.048	0.074
	[4.10]***	[4.46]***	[3.99]***	[3.58]***	[2.47]**	[3.97]***
Sales to multinationals	0.050	0.054	0.040	0.038	0.038	0.070
	[1.76]*	[1.93]*	[1.27]	[1.16]	[2.71]***	[2.78]***
Foreign firm	0.173	0.200	0.246	0.21	-0.142	0.024
	[4.38]***	[5.54]***	[6.63]***	[4.84]***	[5.18]***	[0.67]
Family firm	0.033	0.030	0.040	0.034	0.011	0.033
	[1.19]	[1.28]	[1.47]	[1.33]	[0.72]	[1.18]
Debt	0.011	0.024	0.046	0.016	0.395	0.427
	[0.48]	[1.21]	[1.76]*	[3.77]***	[12.80]***	[9.14]***
Audited firm	0.034	0.012	0.018	0.073	0.016	0.085
	[0.97]	[0.57]	[0.71]	[1.53]	[0.94]	[3.78]***
Income via bank	-0.089	-0.021	-0.047	0.025	0.019	0.084
	[2.58]***	[0.74]	[1.46]	[0.99]	[1.14]	[3.82]***
International accounting	0.081	0.053	0.079	-0.045	-0.003	0.060
	[2.50]**	[1.95]*	[2.17]**	[1.49]	[0.15]	[2.10]**
Small firm	-0.008	-0.022	-0.027	0.073	-0.047	-0.174
	[0.33]	[0.79]	[0.79]	[2.02]*	[2.99]***	[9.37]***
Age	-0.002	-0.001	-0.002	-0.029	0.000	-0.001
	[3.16]***	[2.01]**	[2.18]**	[0.88]	[0.06]	[1.35]
Security costs	0.014	0.010	0.016	-0.002	0.000	0.012
	[3.04]***	[2.78]***	[4.09]***	[2.40]**	[0.00]	[2.00]**
Duration	0.002	0.002	0.003	0.003		
	[5.29]***	[5.05]***	[4.75]***	[4.27]***		
Collateralized	0.031	-0.006	-0.009	-0.008		
	[0.78]	[0.16]	[0.21]	[0.23]		
State firm					-0.188	
					[5.45]***	
Selection term 1 (Loan demand)				-0.003		
				[0.59]		
Selection term 2 (Loan granted)				-0.001		
				[1.08]		
Observations	2,779	2,779	2,381	2,381	8,052	5,703
Sector effects	yes	yes	yes	yes	yes	yes
Country effects	no	yes	no	no	yes	yes
Country-quarter effects	no	no	yes	yes	no	no

Table 9. Firm-level determinants: 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. *Local currency earners* and *Foreign currency earners* are as defined in Table 4. *Floating exchange rate* are those firms situated in a country which has a floating exchange rate. *Pegged exchange rate* are those firms situated in countries with a currency board, fixed peg or crawling peg regime. Each regression includes country fixed effects and six sector dummies. 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: Probit estimates for subsamples

Panel A reports probit estimates for subsamples as defined above. The table displays the marginal effects calculated at sample means. Observations from Uzbekistan are omitted from Columns (1) and (2) due to lack of data on dollarization.

	(1) Local currency earners	(2) Foreign currency earners	(3) Floating exchange rate	(4) Pegged exchange rate
Exporter			0.074	0.097
			[3.37]***	[2.77]***
Sales to multinationals			0.093	0.013
			[2.62]***	[0.56]
Foreign firm			0.123	0.280
			[4.18]***	[5.72]***
Family firm	0.034	-0.008	0.029	0.032
	[0.75]	[0.28]	[0.83]	[0.92]
Debt	0.015	0.033	0.019	0.034
	[0.48]	[1.16]	[0.57]	[1.55]
Audited firm	-0.029	0.052	0.011	0.020
	[1.37]	[1.82]*	[0.38]	[0.76]
Income via bank	-0.024	-0.009	-0.040	0.007
	[0.71]	[0.19]	[0.93]	[0.19]
International accounting	0.001	0.092	0.072	0.010
	[0.02]	[3.41]***	[2.57]**	[0.22]
Small firm	-0.059	-0.010	-0.027	-0.026
	[1.62]	[0.27]	[0.73]	[0.58]
Age	-0.002	-0.002	-0.001	-0.002
	[1.34]	[2.23]**	[0.88]	[1.93]*
Security costs	0.009	0.011	0.009	0.010
	[0.96]	[2.07]**	[2.67]***	[1.17]
Duration	0.002	0.003	0.001	0.004
	[2.93]***	[5.76]***	[3.60]***	[7.93]***
Collateralized	0.064	-0.052	-0.079	0.091
	[1.28]	[1.00]	[1.80]*	[1.71]*
Observations	844	1,791	1,557	1,221
Sector fixed effects	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes
Clustered errors	yes	yes	yes	yes

Panel B: OLS estimates with interaction terms

Panel B reports results from OLS estimates for our full sample. Observations from Uzbekistan are omitted from Column (2) due to lack of data on dollarization.

	(1)	(2)	(3)
Exporter	0.074	0.063	0.092
	[4.01]***	[2.69]**	[2.94]***
Sales to multinationals	0.049	0.033	0.007
	[1.75]*	[1.02]	[0.26]
Foreign firm	0.184	0.177	0.256
	[4.89]***	[4.55]***	[5.17]***
Family firm	0.027	0.016	0.021
	[1.22]	[0.64]	[0.69]
Debt	0.022	0.014	0.026
	[1.10]	[0.51]	[1.28]
Audited firm	0.013	0.028	0.013
	[0.66]	[1.14]	[0.51]
Income via bank	-0.019	-0.025	0.001
	[0.71]	[0.62]	[0.03]
International accounting	0.052	0.062	0.013
	[1.86]*	[2.42]**	[0.32]
Small firm	-0.019	0.000	-0.024
	[0.75]	[0.01]	[0.59]
Age	-0.001	-0.001	-0.002
	[2.04]*	[1.98]*	[2.07]**
Security costs	0.010	0.010	0.010
	[2.45]**	[2.06]*	[1.16]
Duration	0.002	0.002	0.002
	[4.67]***	[4.63]***	[4.70]***
Collateralized	-0.005	-0.005	-0.002
	[0.15]	[0.12]	[0.06]

Interaction terms:		**Local currency earner X**	**Pegged exchange rate X**
Exporter			0.035
			[0.97]
Sales to multinationals			-0.078
			[1.67]
Foreign firm			0.139
			[2.44]**
Family firm		0.025	-0.012
		[0.77]	[0.26]
Debt		0.012	0.009
		[0.29]	[0.25]
Audited firm		-0.044	0.003
		[2.09]**	[0.08]
Income via bank		0.013	0.043
		[0.30]	[0.84]
International accounting		-0.053	-0.072
		[1.03]	[1.41]
Small firm		-0.056	-0.003
		[1.53]	[0.06]
Age		0.000	-0.001
		[0.10]	[1.17]
Security costs		-0.001	0.000
		[0.05]	[0.01]
Observations	2,779	2,697	2,778
R-squared	0.16	0.16	0.17
Sector & country fixed effects	yes	yes	yes
Clustered errors	yes	yes	yes

Table 10. Macroeconomic determinants of foreign currency borrowing

The table reports results from probit estimates for our full sample. 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. Each regression includes the firm-specific explanatory variables *Exporter*, *Sales to multinationals*, *Foreign firm*, *Family firm*, *Debt*, *Audited firm*, *Income via bank*, *International accounting*, *Small firm*, *Age*, *Security costs*, *Duration* and *Collateralized*, as well as six sector dummies. All explanatory variables are defined in Table 2.The table displays the marginal effects calculated at sample means. The table omits observations for Bosnia, Tajikistan and Uzbekistan due to lack of data.

Panel A: Without country fixed effects

T-statistics reported in parentheses are based on standard errors [not adjusted] resp. (adjusted) for clustering at the country level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Interest diff. – USD	0.007			
	[5.39]***			
	(4.34)***			
Interest diff. – Euro		0.007		
		[5.52]***		
		(4.65)***		
Interest diff. – loans			0.011	
			[4.38]***	
			(4.13)***	
Interest diff. – deposits				0.008
				[3.23]***
				(1.67)*
Depreciation – USD	-0.002		0.000	0.001
	[0.67]		[0.02]	[0.37]
	(0.53)		(0.02)	(0.38)
Depreciation volatility – USD	0.001		0.001	0.001
	[0.70]		[0.58]	[0.30]
	(0.38)		(0.32)	(0.18)
Depreciation – Euro		-0.002	-0.002	-0.005
		[1.01]	[0.90]	[1.56]
		(1.02)	(1.03)	(2.39)**
Depreciation volatility – Euro		0.003	0.001	0.002
		[1.26]	[0.25]	[0.77]
		(0.87)	(0.21)	(0.71)
Inflation	-0.016	-0.016	-0.009	-0.006
	[3.40]***	[3.09]***	[1.56]	[1.04]
	(2.07)**	(1.93)*	(1.12)	(0.63)
Inflation volatility	0.019	0.020	0.026	0.015
	[2.76]***	[2.89]***	[3.33]***	[1.95]*
	(1.62)	(1.73)*	(2.10)**	(1.27)
Peg	0.064	0.070	0.029	0.030
	[3.28]***	[3.44]***	[1.12]	[1.14]
	(2.20)**	(2.03)**	(0.73)	(0.86)
EU	-0.098	-0.086	-0.090	-0.106
	[3.89]***	[3.92]***	[2.98]***	[3.31]***
	(2.33)**	(3.08)***	(1.69)*	(1.75)*
Observations	2,584	2,584	2,058	1,868
Firm-level explanatory variables	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes
Country fixed effects	no	no	no	no

Panel B: With country fixed effects

T-statistics reported in parentheses are based on standard errors [not adjusted] resp. (adjusted) for clustering at country-level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Interest diff. – USD	0.004			
	[1.69]*			
	(1.85)*			
Interest diff. – Euro		0.004		
		[1.67]*		
		(1.90)*		
Interest diff. – loans			0.001	
			[0.11]	
			(0.14)	
Interest diff. – deposits				0.013
				[1.98]**
				(4.07)***
Depreciation – USD	0.004		0.005	0.007
	[1.48]		[1.60]	[2.10]**
	(1.69)*		(1.61)	(2.42)**
Depreciation. volatility – USD	-0.004		-0.005	-0.005
	[1.30]		[1.19]	[1.16]
	(1.36)		(1.11)	(1.09)
Depreciation – Euro		0.000	-0.002	-0.003
		[0.02]	[0.55]	[0.89]
		(0.04)	(0.69)	(1.41)
Depreciation volatility – Euro		0.002	0.004	0.004
		[0.74]	[1.10]	[0.97]
		(1.07)	(1.68)*	(1.44)
Inflation	-0.010	-0.010	-0.007	-0.010
	[1.94]*	[1.84]*	[1.09]	[1.45]
	[1.50]	[1.55]	[0.95]	[1.05]
Inflation volatility	0.038	0.037	0.034	0.034
	[2.14]**	[2.10]**	[1.81]*	[1.73]*
	[2.48]**	[2.59]***	[1.95]*	[1.86]*
EU	0.051	0.015	0.044	0.077
	[1.19]	[0.39]	[0.78]	[1.38]
	(1.04)	(0.34)	(0.63)	(1.30)
Observations	2,584	2,584	2,057	1,866
Firm-level explanatory variables	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes
Country fixed effects	no	no	no	no

Table 11. Macroeconomic determinants: subsample results

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. Each regression includes the firm-specific explanatory variables *Exporter*, *Sales to multinationals*, *Foreign firm*, *Family firm*, *Debt*, *Audited firm*, *Income via bank*, *International accounting*, *Small firm*, *Age*, *Security costs*, *Duration* and *Collateralized*. All explanatory variables are defined in Table 2. Standard errors are adjusted for cluster effects at the country level. T-statistics are reported in parentheses. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The table omits observations for Bosnia, Tajikistan and Uzbekistan due to lack of data.

Panel A. Interaction effects

The table reports results from OLS estimates of the interaction effects of our macroeconomic explanatory variables with *Local currency earner*, *EU* and *CIS* respectively for our full sample. *Local currency earners* and *Foreign currency earners* are as defined in Table 4. *EU*: firms located in countries which have completed negotiations to join the European Union. *Non-EU*: all other firms. CIS: firms located in countries which are members of the Commonwealth of Independent States. *Non-CIS*: all other firms. Each regression also includes the main effects of each macroeconomic variable, as well as firm-level explanatory variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Interaction term with	***Local currency earner***		***EU***		***CIS***	
Interest diff. – USD	0.000		-0.006		0.002	
	[0.15]		[1.26]		[0.46]	
Depreciation – USD	0.001		-0.001		-0.006	
	[0.23]		[0.18]		[0.91]	
Deprec. volatility – USD	0.004		0.002		0.005	
	[0.88]		[0.35]		[0.85]	
Interest diff. – Euro		0.002		-0.005		-0.001
		[1.02]		[1.62]		[0.16]
Depreciation – Euro		-0.002		0.005		-0.003
		[0.45]		[1.90]*		[1.67]
Deprec. volatility – Euro		-0.009		-0.002		-0.002
		[2.43]**		[0.35]		[0.41]
Inflation	-0.010	-0.006	0.008	0.006	-0.002	0.001
	[1.10]	[0.68]	[0.66]	[0.55]	[0.17]	[0.13]
Inflation volatility	-0.057	0.001	0.088	0.098	0.013	0.010
	[1.19]	[0.04]	[0.96]	[0.96]	[0.18]	[0.14]
EU	-0.076	-0.040				
	[1.65]	[1.74]*				
Observations	2,584	2,584	2,584	2,584	2,584	2,584
R squared	0.16	0.16	0.16	0.16	0.16	0.16
Firm-level variables	yes	yes	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes	yes	yes
Country fixed effects	yes	yes	yes	yes	yes	yes
Clustered errors	yes	yes	yes	yes	yes	yes

Panel B: Country-specific regressions

Panel C replicates the regressions from Column (1) (USD) and Column (2) (Euro) of Panel A in Table 10 for each country separately. Regressions for Azerbaijan, Bosnia, Czech Republic, Estonia, FYR Macedonia, Slovak Republic, Tajikistan and Uzbekistan could not be carried out due to lack of country-level explanatory variables or insufficient variation in firm-level data. All regressions omit sector dummies.

		USD			Euro		
Country (Observations)		Interest Diff.	Deprec.	Deprec. Volatility	Interest Diff.	Deprec.	Deprec. Volatility
Albania	(70)	0.000	0.000	0.000	0.000	0.000	0.000
		[0.56]	[0.79]	[2.45]**	[1.84]*	[2.09]**	[1.76]*
Armenia	(135)	-0.010	0.043	0.017	0.010	0.002	0.026
		[0.49]	[1.20]	[0.18]	[0.69]	[0.11]	[0.60]
Belarus	(69)	0.038	-0.030	-0.056	0.041	-0.002	0.003
		[2.25]**	[0.43]	[0.15]	[2.09]**	[0.14]	[0.14]
Bulgaria	(90)	0.090	-0.020	-0.017	0.162	-0.048	-0.285
		[0.97]	[0.84]	[0.93]	[0.76]	[0.66]	[0.97]
Croatia	(101)	0.039	0.038	0.034	0.049	0.025	-0.014
		[1.22]	[2.70]***	[0.68]	[1.32]	[1.25]	[0.33]
Georgia	(45)	-0.010	-0.220	-0.554	0.005	0.010	0.050
		[1.01]	[2.57]**	[2.60]***	[0.51]	[0.41]	[0.89]
Hungary	(220)	0.058	0.002	-0.024	0.071	-0.017	-0.117
		[1.41]	[0.16]	[1.56]	[2.24]**	[1.00]	[2.34]**
Kazakhstan	(227)	0.050	0.011	-0.042	-0.078	0.001	0.006
		[0.55]	[0.42]	[0.51]	[0.56]	[0.08]	[0.43]
Kyrgyzstan	(63)	0.037	-0.020	-0.006	-0.045	0.031	-0.019
		[0.58]	[0.53]	[0.16]	[0.38]	[1.34]	[0.51]
Latvia	(65)	-0.09	0.012	-0.091	-0.021	0.016	-0.101
		[1.85]*	[1.01]	[1.97]**	[0.42]	[0.85]	[1.93]*
Lithuania	(63)	-0.090	0.004	-0.004	-0.004	-0.002	-0.047
		[1.71]*	[0.74]	[0.78]	[0.15]	[0.18]	[0.92]
Moldova	(122)	0.012	0.015	-0.027	0.006	0.002	-0.003
		[0.82]	[0.85]	[0.57]	[0.44]	[0.30]	[0.13]
Poland	(280)	0.009	0.005	0.006	0.008	0.004	0.002
		[0.77]	[1.25]	[0.38]	[0.24]	[0.56]	[0.13]
Romania	(224)	0.004	0.009	0.005	0.006	0.010	0.002
		[0.33]	[0.90]	[0.32]	[0.50]	[0.79]	[0.07]
Russia	(162)	0.010	-0.000	0.017	0.010	0.017	0.011
		[0.67]	[0.36]	[0.32]	[0.75]	[1.87]*	[0.83]
Serbia	(106)	0.095	-0.010	-0.003	0.101	0.020	0.063
		[1.44]	[0.34]	[0.19]	[2.11]**	[0.62]	[0.88]
Slovenia	(112)	-0.050	0.000	0.037	0.019	-0.086	0.023
		[0.52]	[0.02]	[0.70]	[0.37]	[1.62]	[0.21]
Ukraine	(209)	-0.000	0.03	0.216	-0.002	-0.004	-0.012
		[0.29]	[0.11]	[1.01]	[0.18]	[0.56]	[0.64]

Table 12. Institutional determinants of foreign currency borrowing

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. Each regression includes the firm-specific explanatory variables *Exporter*, *Sales to multinationals*, *Foreign firm*, *Family firm*, *Security costs*, *Debt*, *Audited firm*, *Income via bank*, *International accounting*, *Small firm*, *Age*, *Duration* and *Collateralized*, as well as six sector dummies. All explanatory variables are defined in Table 2. The table displays the marginal effects calculated at the sample means. T-statistics are reported in parentheses. **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The table omits observations for Bosnia, Tajikistan and Uzbekistan due to lack of data.

	(1)	(2)	(3)	(4)
Interest diff. – USD	-0.001	-0.001		
	[0.26]	[0.20]		
Depreciation – USD	0.002	0.002		
	[0.49]	[0.59]		
Depreciation volatility – USD	-0.004	-0.004		
	[1.06]	[1.29]		
Interest diff. – Euro			-0.001	-0.001
			[0.47]	[0.38]
Depreciation – Euro			-0.003	-0.003
			[0.82]	[1.49]
Depreciation volatility – Euro			0.005	0.005
			[1.11]	[1.24]
Inflation	-0.003	-0.003	0.000	0.000
	[0.40]	[0.35]	[0.00]	[0.00]
Inflation volatility	0.024	0.024	0.022	0.022
	[2.10]**	[1.73]*	[1.98]**	[1.70]*
Peg	0.018	0.018	0.040	0.040
	[0.51]	[0.34]	[1.22]	[0.93]
EU	0.001	0.001	-0.031	-0.031
	[0.01]	[0.01]	[0.65]	[0.54]
Foreign banks	0.002	0.002	0.002	0.002
	[2.76]***	[4.31]***	[2.82]***	[4.71]***
Enterprise reform	-0.254	-0.254	-0.265	-0.265
	[4.31]***	[3.63]***	[4.44]***	[3.89]***
Forex deposits	-0.003	-0.003	-0.003	-0.003
	[2.79]***	[1.98]**	[2.11]**	[1.68]*
CIS	-0.074	-0.074	-0.082	-0.082
	[1.18]	[0.91]	[1.27]	[1.02]
Forward fx market	-0.072	-0.072	-0.044	-0.044
	[1.18]	[1.20]	[0.72]	[0.75]
Capital controls	-0.056	-0.056	-0.067	-0.067
	[1.66]*	[2.07]**	[2.04]**	[2.49]**
Open fx position	0.005	0.005	0.004	0.004
	[2.49]**	[2.94]***	[1.96]**	[2.31]**
Observations	1,493	1,493	1,493	1,493
Firm-level variables	yes	yes	yes	yes
Sector fixed effects	yes	yes	yes	yes
Country fixed effects	no	no	no	no
Clustered errors	no	yes	no	yes

Appendix

Proof of Proposition 1

The payoff v_k^j in local currency to a firm of type j taking a loan of type k equals:

$$[A1] \qquad v_k^j = \begin{cases} R^j - (1+r_k^j) & \text{if } j \in \{F;\ LG\} \text{ or } (j,k) = (LB,l) \\ p\left[R^{LB} - e_A\right] - (1-p)C_i - r_f^{LB} & \text{if } (j,k) = (LB,\ f) \end{cases}.$$

The expected profits of banks in local currency from each loan type are:

$$\Pi_k^j = \begin{cases} r_k^j - i_k & \text{if } j \in \{F;\ LG\} \text{ or } (j,k) = (LB;l) \\ pe_A + (1-p)R^{LB} - (1+i_f) + r_f^{LB} & \text{if } (j,k) = (LB;\ f) \end{cases}.$$

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

$$[A2] \qquad r_k^j = \begin{cases} i_l & \text{if } j \in \{F;LG;LB\} \text{ and } k = l \\ 0 & \text{if } j \in \{F;LG\} \text{ and } k = f \\ (1-p)\left(e_D - R^{LB}\right) & \text{if } (j,k) = (LB\ ,\ f) \end{cases}.$$

Inserting the equilibrium interest rates from [A2] into [A1], we obtain the following results: (i) Foreign currency earners (F types) as well as good local currency earning firms (LG types) always choose foreign currency loans. (ii) The condition for LB firms to choose a local currency loan is:

$$[A3] \qquad (1-p)C_i \geq i_l.$$

From condition [A3], we can derive that the marginal LB firm that will choose a local currency loan is the one with distress costs equal to:

[A4] $$C^{LB}_{\text{perfect info}} = \frac{i_l}{1-p}.$$

We assumed that the distress costs are distributed uniformly on $C_i \in \left[\underline{C}, \overline{C}\right]$. As a result we obtain the equilibrium share of LB firms that choose foreign currency loans as:

$$\delta^{LB}_{\text{perfect info}} = \begin{cases} 0 & \text{if} \quad \dfrac{i_l}{1-p} < \underline{C} \\ \dfrac{\dfrac{i_l}{1-p} - \underline{C}}{\overline{C} - \underline{C}} & \text{if} \quad \underline{C} \le \dfrac{i_l}{1-p} \le \overline{C} \\ 1 & \text{if} \quad \dfrac{i_l}{1-p} > \overline{C} \end{cases}.$$

Proof of Proposition 2

With imperfect information concerning the currency and level of revenues, banks 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:

$$[A5] \qquad \Pi_k = \begin{cases} r_l - i_l & \text{if } k = l \\ \dfrac{\delta\lambda\left[pe_A + (1-p)R^{LB}\right] + (1-\lambda)}{\delta\lambda + (1-\lambda)} - (1+i_f) + r_f & \text{if } k = f \end{cases},$$

where $\delta \in [0,1]$ is the equilibrium share of LB firms taking foreign currency loans. In equilibrium, and with zero expected profit, interest rates must equal:

$$[A6] \qquad r_k = \begin{cases} i_l & \text{if } k = l \\ \dfrac{\delta\lambda}{\delta\lambda + (1-\lambda)}(1-p)\left(e_D - R^{LB}\right) > 0 & \text{if } k = f \end{cases}.$$

The interest rate charged on foreign currency loans covers the expected losses due to default on such loans. Under imperfect information, this depends on the share of LB firms taking such loans relative to F and LG firms. Note that the interest rate that lenders charge on foreign currency loans lies between the rates it charges for such loans under perfect information to F and LG firms, i.e. 0, and LB firms, i.e. $r_f \in \left[0, r_f^{LB}\right]$.

Bad local currency earners for which $v_f^{LB}(r_f, C_i) \geq v_l^{LB}(i_l, C_i)$ will choose foreign currency loans. From [A1] and [A6] we see that this will be the case for all LB firms with distress costs not higher than:

[A7] $$C^{LB}_{\text{imperfect info}} = \frac{i_l}{1-p} + \frac{(1-\lambda)}{\delta\lambda + (1-\lambda)}\left(e_D - R^{LB}\right),$$

where the share of bad local currency earning firms taking foreign currency loans is determined in equilibrium by:

$$\delta^{LB}_{\text{imperfect info}} = \frac{C^{LB}_{\text{imperfect info}} - \underline{C}}{\overline{C} - \underline{C}}.$$

Note that: $C^{LB}_{\text{imperfect info}} > C^{LB}_{\text{perfect info}}$. From [A7], we can establish that the lowest interest rate i_l at which LB firms opt for foreign currency loans is $i_l = (1-p)\left(\underline{C} + R^{LB} - e_D\right)$. We assume from now on that:

[A8] $$\underline{C} \geq e_D - R^{LB} > 0.$$

This assumption ensures that unless there is a positive interest rate differential to the advantage of foreign currency funds, all LB firms will choose local currency loans. This assumption negates the possibility that some LB firms choose foreign currency loans due to their limited liability even in the absence of an interest rate differential. We can further establish from [A7] that for all interest rate levels $i_l \geq (1-p)\left[\overline{C} - (1-\lambda)\left(e_D - R^{LB}\right)\right]$, all LB firms will choose foreign currency loans. For interest rate levels in the range $(1-p)\left(\underline{C} + R^{LB} - e_D\right) < i_l < (1-p)\left[\overline{C} - (1-\lambda)\left(e_D - R^{LB}\right)\right]$, a certain proportion $0 < \delta < 1$ of LB firms will choose foreign currency loans under imperfect information.

We now establish that for each interest rate level in this range, there is a unique marginal firm that takes a foreign currency loan, and that this firm is characterized by higher distress costs under imperfect information than under perfect information:

$$C^{LB}_{\text{imperfect info}} > \frac{i_l}{1-p} = C^{LB}_{\text{perfect info}}.$$

As the left hand side of [A7] is increasing and continuous in $C^{LB}_{\text{imperfect info}}$ and the right hand side is decreasing and continuous in $C^{LB}_{\text{imperfect info}}$, there is at most one level of $C^{LB}_{\text{imperfect info}}$ for which condition [A7] can be met. Note further that at $C^{LB}_{\text{imperfect info}} = \frac{i_l}{1-p}$, the left hand side is less than the right hand side. As a consequence, a unique equilibrium exists, $C^{LB}_{\text{imperfect info}} > \frac{i_l}{1-p} = C^{LB}_{\text{perfect info}}$, if for $C^{LB}_{\text{imperfect info}} = \overline{C}$ (and $\delta = 1$) the right hand side of the condition is smaller than the left hand side. This is the case for all $i_l < (1-p)\left[\overline{C} - (1-\lambda)\left(e_D - R^{LB}\right)\right]$, and thus for the range of interest rates under consideration.

We can now characterize the share of LB firms that take foreign currency loans under imperfect information as follows:

[A9]

$$\delta^{LB}_{\text{imperfect info}} \begin{cases} = 0 & \text{if} \quad i_l \le (1-p)\left(\underline{C} + R^{LB} - e_D\right) \\ > \delta^{LB}_{\text{perfect info}} & \text{if} \quad (1-p)\left(\underline{C} + R^{LB} - e_D\right) < i_l < (1-p)\left[\overline{C} - (1-\lambda)\left(e_D - R^{LB}\right)\right] \\ = 1 & \text{if} \quad i_l \ge (1-p)\left[\overline{C} - (1-\lambda)\left(e_D - R^{LB}\right)\right] \end{cases}.$$

Comparing conditions [2] and [A9] we can conclude that *more local currency earners will choose foreign currency loans under imperfect information than under perfect information*.

Note that in [A5] and [A6] we assume that in equilibrium all F and LG firms take foreign currency loans under imperfect information. From [A1] we know that this will be the case as long as the equilibrium interest rate on foreign currency loans is lower than that on local currency loans, i.e., $r_f < r_l$. From [A6] we see that this will be the case as long as the interest rate differential to the advantage of foreign currency funds is:

$$i_l \geq (1-p)\left(e_D - R^{LB}\right).$$

Due to our assumption in [A8], this condition is met in any equilibrium under imperfect information where LB firms choose foreign currency loans.

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