Exchange Rate Exposure and the Cost of Debt: Evidence from Bank Loans

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Abstract

The puzzling weak empirical evidence of the impact of exchange rate exposure on firm operations may be because empiricists have focused attention on the wrong aspect of firm operations. Using data on more than 6,000 loans issued to U.S. firms between 1990 and 2006 we examine whether firms' exchange rate exposure matters to their cost of bank debt. The answer is yes it does. Utilizing three different exchange rate indices to obtain a measure of exposure, we find that exposure has a statistically significant and economically meaningful impact on loan spreads. This impact is asymmetric, depending on whether the firm is positively (similar to net importers) or negatively (similar to net exporters) exposed to exchange rate risk. A one standard deviation increase in positive exposure increases loan spreads by as much as 39 basis points for firms exposed to the currencies of the emerging economies and up to 27 basis points for exposure to the currencies of developed countries. Conversely, a one standard deviation increase in the magnitude of negative exposure results in a decrease in spreads of more than 15 basis points. These results are robust for firms that hedge exchange rate risk and for firms with and without foreign income and hold when we account for potential endogeneity between loan rates and exposure.

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But not mentioned enough is how the falling dollar turns lending at low rates of interest into a form of gambling. Indeed, in offering up funds, banks must account for the opportunity cost of long-term loans along with the value of dollars that will be returned to them over time. And with the … Treasury … encouraging currency weakness, it's hard for banks to loan out dollars of indeterminate value. Negative Symptoms: The Result Of A Weak Dollar, John Tamny, 08.02.10, http://www.forbes.com/2010/08/01/finance-dollar-economy-opinions-columnists-john-tamny.html

I. Introduction

Does exchange rate risk impact the borrowing cost of bank loans?[1] U.S. firms, supported by credit from domestic banks, engage in a range of business activities that expose them to exchange rate risk. In some cases, the exposure is direct, such as by importing or exporting activities or ownership of foreign operations. In other cases, exposure arises indirectly, for example, from competitors, suppliers, or clients with exchange rate exposure. Economic intuition suggests that in determining the cost of loans to firms, banks should consider these firms exposure to exchange rate risk. Surprisingly, to date, the voluminous empirical literature on exchange rate risk has ignored this aspect of the effect of exchange rate changes on firms' operations.[2] The purpose of this paper is to examine if exchange rate risk affects bank loan pricing. In particular, we wish to ascertain if and how banks vary the price of business loans conditional on firms' exchange rate exposure.

There are several reasons why bank loan terms should be sensitive to clients' exchange rate risk. Banks are informed agents, possessing information on current clients that is not known to the market (Diamond (1984)). Because of their access to private information, banks are able to provide cheap "informed" loans relative to the "uninformed" loans from the public debt market where asymmetric information plays a more significant role (James (1987)). An important subset of banks' private information is their clients' potential exposure to exchange rate risk. It is straightforward to make the argument that given that banks can be considered quasi-insiders, a bank is likely to be aware of whether or not, and the extent to which a client engages in foreign trade, whether or not a client hedges currency risk, the internal capacity of the

[1] See Santomero (1984), Green (1998), and Lim (2000) for models of how banks set loan rates. In this paper we do not use instruments that are specific to international trade financing, which by their very nature would be priced to reflect their exposure to exchange rate risk. Further, the loans in the sample are not those typically benefiting from guarantees by the Small Business Administration (SBA) or the EXIM bank.

[2] There is generally weak empirical evidence that exchange rate changes affect firms' cash flows (e.g., Jorion (1990), Bartov and Bodnar (1994), Bartov, Bodnar, and Kaul (1996), Allayannis and Ihrig (2002)), although He and Ng (1998), Williamson (2001), and Doidge et al. (2006) find stronger results.

client to quickly adopt to deal with exchange-rate related challenges, and whether the client is contemplating a strategy shift in response to expected (or realized) changes in exchange rates. As such, not only should firms' exchange rate exposure be reflected in the pricing of bank loans, but also the effect of the exposure on loan pricing should vary across firms, reflecting the varying nature of their particular exposures.

For instance, suppose that a firm has an exchange rate exposure similar to that of a net importing firm. Banks could be negatively affected by domestic currency depreciation because of their loans to this or similar firms as the probability of timely loan repayment decreases with domestic currency depreciation.[3] In effect, for the bank, a loan to such a firm is akin to a long position in the dollar relative to the currencies of the firm's foreign trading partners. As such, the bank should rationally reflect this risk in the firm's loan rate unless the bank is able to costlessly eliminate this risk. It is the recognition of this indirect exchange rate exposure of banks that prompted the Bank for International Settlement to vary their approach to determining banks' exchange rate exposure, and in the process allowing banks to employ in-house methods that capture more than just the net of banks' foreign currency assets and liabilities (Popper (1996)).

Banks' indirect exposure to exchange rate risk can result from the lending process for other reasons. Frenkel and Razin (1987, 1989) show theoretically that, under some circumstances, exchange rate policy can be regarded as equivalent to a lump-sum tax policy. An implication of this is that depreciation of the domestic currency reduces the expected return on bank loans because the tax diminishes firms' collateral value. Hence, if there is an expected depreciation of the domestic currency domestic banks could, in the short term, increase their loan interest rate on firms with exchange rate exposure similar to that of a net importing firm.

Further, Krugman and Taylor (1978) develop a theoretical model in which devaluation, in the presence of an existing trade deficit, has the immediate effect of reducing domestic output. They further show that devaluation has an effect broadly similar to the lump sum tax of Frenkel and Razin (1987, 1989). The effect of this is that an expected devaluation increases firms' probability of default (because their output is expected to be lower) leading banks, in the short

[3] Banks could hedge their exposure. However, we assume that banks cannot or do not engage in wholesale hedging of the exchange rate risk of their loan portfolios. Note also that (fully) hedging exchange rate risk might not be optimal (see, e.g., Black (1990)).

run, to increase the spread being charged on loans.[4] Banks may be overly sensitive to expected changes in the probability of default because they are aware that, in equilibrium, riskier firms have a preference for bank loans, as shown theoretically by Bolton and Freixas (2000).

Exchange rate changes could also affect firms' cost of debt owing to the conflict of interests between shareholders and debtholders. Several standard texts in international finance (e.g., Butler (2000)) point out that exchange rate risk increases the conflict of interests between shareholders and debtholders.[5] This arises because, given that shareholders hold a call option on the value of a leveraged firm, shareholders have an incentive to increase the risk of highly leveraged firms, knowing that if the option expires in the money it increases the equity value, whereas if it expires out of the money debtholders bear the major part of the cost (Jensen and Meckling (1976)). Therefore, shareholders of leveraged firms may choose not to hedge exchange rate risk in order to increase the value of their option. Failing to hedge could lead to high cash flow volatility that increases the probability of financial distress.

An implication of the above is that unhedged exchange rate risk reduces the expected value of *existing* debt. Therefore, if firms with exposure to exchange rate risk commit to hedging at the time of entering a loan agreement, this lowers the agency costs of debt and debtholders can avoid the costs of contracting to prevent asset substitution. If firms do not commit to hedging at the inception of a loan, or if hedging has not been part of their risk management strategy, debtholders will require a rate of return high enough to compensate them for the risk of asset substitution (see, e.g., Ericsson (2000)) and will also demand more restrictions in the form of debt covenants. In addition, if shareholders engage in asset substitution, then debtholders will price future debts to reflect this higher risk. The result is that the cost of debt increases with exchange rate risk. This is consistent with the finding by Leland (1998) that hedging lowers the cost of debt and lowers the payment to stakeholders, which is consistent with the arguments of Smith and Stulz (1985). It is also consistent with the argument that hedging (more broadly, risk management) increases a company's debt capacity and, as such, can be regarded as a substitute for equity capital because it allows management to substitute debt for equity (Stulz (1996)).

[4] We bear in mind that under the market-driven exchange rate regime in the United States, this might not hold as depreciation, rather than devaluation, of the domestic currency could lead to greater output driven by increased demand for exports.

[5] This argument is usually made in relation to the frictions (costs of financial distress, convexity in the tax code, and agency costs) that create the conditions for corporate currency hedging to add value.

Finally, while depreciation should lead to higher loan prices for firms that have exchange rate exposure similar to that of a net importing firm, firms with exchange rate exposure similar to that of a net exporter should obtain better loan terms due to depreciation of the domestic currency as the international trade literature regards exporting as a positive net present value endeavor (see Greenaway, Guariglia, and Kneller (2007) and references therein).

To provide evidence on the effect of firms' exchange rate exposure on bank loan pricing, we proceed as follows. First, using data from Loan Pricing Corporation, we identify firms that obtained bank loans. We then estimate their exchange rate exposure over a 48-month window ending a quarter prior to the loan date.[6] To measure exposure, we follow the standard approach in the literature and regress each firm's stock market return on changes in a real exchange rate index (see, e.g., Adler and Dumas (1984)).[7] As such, we interpret exposure as the sensitivity of the firm's cash flows to exchange rate changes. In a second step, we estimate cross-sectional regressions of individual loan prices, while controlling for firm and loan characteristics, on the estimates of exchange rate exposure.

We find that firms' exchange rate exposure has an economically material and statistically significant impact on their cost of debt. However, this is not immediately obvious as the net effect of exposure on loan pricing is not significantly different from zero across firms when we do not account for the sign of the exchange rate exposure. We then examine the loan pricing/exposure relationship separately for firms with positive and negative exposures, where firms with a positive exposure are those whose cash flows are expected to increase when the domestic currency appreciates in value relative to the currency of other trading partners, akin to the exposure of a net importer and vice versa for firms with negative exposure. We find that a one standard deviation increase in the magnitude of positive exposure to an index of emerging market currencies and an index which combines the currencies of both developed and emerging economies is associated with more than 39 and 37 basis points higher lending rates, respectively. On the other hand, a one standard deviation increase in the magnitude of negative exposures to the index of industrialized countries' currencies leads to a more than 15 basis points lower loan spread. These results are robust to adjusting the standard error of exposure coefficient for the generated-regressor problem and to accounting for potential outliers in the estimated exposures.

[6] We experimented with different windows; however, our results remain qualitatively unchanged.
[7] Note that the exchange rate index used is expressed as foreign currency per US$ and so an increase in the index indicates that the U.S. dollar has appreciated.

Some firms have significant international operations, as reflected by the percentage of their revenue obtained from foreign operations. As such, the sensitivity of loan spreads to exchange rate exposure may be driven by foreign income, which once accounted for could eliminate the above results. Restricting the sample to only those firms that report foreign income, we find that in contrast to the evidence that higher domestic income reduces loan spreads, loan spreads are increasing in foreign income as a proportion of total revenue. This implies that the impact of exchange rate exposure on the firm is of greater concern to banks than the potential benefit of foreign income that is imperfectly correlated with domestic income. More important, we find that all three measures of currency exposure remain economically meaningful and statistically significant. When we separate the sample into those firms with positive and negative exposures, respectively, we find that all three measures of exposures are significant, with positive exposures having a much larger impact on loan pricing than negative exposures. As an additional experiment we also examined the extent to which the exposures of firms that did not report any foreign income impact loan pricing. We find that loan spreads are statistically significantly impacted by exchange rate exposure for firms that are positively exposed and the economic effect is not immaterial. In contrast, for firms that are negatively exposed the impact is insignificant. Together, these results indicate that that our finding of a significant sensitivity of loan spreads to the proxy for exchange rate exposure reflects much more than the extent to which firms engage in foreign operations.

We also examine if loan spread sensitivity to exposure was different during the 1997 Asian crisis relative to the non-crisis period. Moreover, the crisis period could have resulted in a spurious-regression form of endogeneity bias. We find that for the full sample, influenced primarily by firms with negative exposure, borrowers within the United States received significantly lower loan spreads than in non-crisis periods. This is in contrast to the results in Bae and Goyal (2008) who find that, for an international sample of loans, spreads increased during the crisis. More directly related to the main goal of this paper, while we find that both positive and negative exposures continue to have a statistically significant impact on loan spreads during the Asian crisis, the crisis had no significant incremental effect on the sensitivity of loan spreads to exchange rate exposure. These results suggest no evidence of endogeneity.

Finally, we examine if the impact of exchange rate exposure on bank loan spreads is moderated by the hedging of exchange rate risk. This is motivated by both theoretical and

empirical work (see, e.g., Allayannis and Ofek, 2001; and Allayannis, Ihrig and Weston, 2001) that currency hedging reduces firms' exchange rate exposure and, as such, loan spreads should be less sensitive to exchange rate exposure. We find that for firms that are negatively exposed, hedging does not directly impact loan spreads but does moderate the effect of the exposure to emerging market currencies on loan pricing. For firms that are positively exposed, hedging significantly reduces loan spreads for two of the three model specifications. However, hedging has an incremental, rather than a moderating, effect on loan price sensitivity to the exposure arising from the currencies of emerging and industrialized economies. Note that the finding that hedging reduces loan spreads is broadly supportive of the finding by Brown et al. (2010) who, using an international sample, find that derivatives use reduces currency exposure by more than 40%.

These results contribute to two distinct strands of literature. First, they contribute to the growing literature on exchange rate risk. As far as we are aware, this is the first paper to provide empirical evidence that exchange rate exposure affects firms' cost of debt. As such, it affirms the importance of exchange rate risk in firms' cost of capital, complementing recent evidence of a large exchange rate risk premium in the cost of equity (see, e.g., De Santis and Gerard (1998), Carrieri, Errunza, and Majerbi (2006), and Francis, Hasan, and Hunter (2008)).

Second, it contributes to the recent and growing literature on loan pricing (Sufi (2007), Graham, Li, and Qui (2008), Bae and Goyal (2009), and others). What is new in this paper is evidence of the recognition by banks that exchange rate risk can accentuate credit risk and, therefore, that banks utilize information on firms' exchange rate exposure in loan pricing.

The paper proceeds as follows. In Section I, we review the literature on exchange rate risk in order to position our research in this large literature. In Section II, we discuss the methodology, data, and preliminary results. Section III contains the main empirical results and robustness tests are in Section IV. The paper's summary and conclusions are in Section V.

II. Literature Review

The usual approach taken by researchers examining exchange rate exposure of firms is to regress stock returns on exchange rate changes. The extent of the exposure is reflected in the magnitude and significance of the coefficient, whereas the economic importance of exchange rate movement is gauged from the size of the adjusted R^2. In a second step, the estimated

(absolute) betas are regressed on firm- or industry-specific characteristics to determine the factors that explain the cross-sectional variation in exposure. The results from these studies have generally been disappointing. At the firm level, Jorion (1990) finds that only 5% of 287 U.S. multinational corporations are significantly exposed. The results of Amihud (1994) and Bartov and Bodnar (1994) are quite similar. Doidge, Griffin, and Williamson (2006) find that only about 8% of U.S. firms are significantly exposed to exchange rate changes. Similarly, Starks and Wei (2006) find that from their sample of 737 U.S. manufacturing firms, only about 12% are significantly exposed to exchange rate movements.

At the industry level, Bodnar and Gentry (1993) find that 11 of 39 industries are significantly exposed and Williamson (2001) finds evidence that the U.S. automobile industry is statistically significantly exposed to the yen and the deutschemark. Griffin and Stulz (2001) find that, of 58 industries examined, no industry had a coefficient above 0.10 or an adjusted R^2 above 0.007. Allayannis and Ihrig (2001) find significant exposure for four of 18 industries, while the results of Bodnar et al. (2002) are inconclusive in that they find that exposure is either too low or too high, relative to the level of pass-through. Starks and Wei (2006) find that up to 12 out of the 19 industry portfolios in their sample are significantly exposed, depending on whether they use an equally- or value-weighted portfolio.

Another strand of empirical work is based on the international asset pricing models of Solnik (1974a), Stulz (1981), Adler and Dumas (1983), and others. This approach argues that even if firms exhibit significant exchange rate exposure (as measured by a regression beta) exchange rate risk may not be a significantly priced risk factor for which investors expect to be compensated. The importance of this line of reasoning is that it implies that significant exposure does not necessarily translate to an economically meaningful impact on the cost of capital. Similarly, while high R^2s indicate that exchange rate movements have economically important explanatory power for the variation of equity return, R^2s do not reveal the incremental cost of capital attributable to currency risk. Unconditional specifications of these models are equally disappointing, as Solnik (1974), Stehle (1977), and Jorion (1991) produce inconclusive results. Conditional models (that allow for time variation in the price of currency risk) have had more success. Dumas and Solnik (1995), De Santis and Gerard (1998), Carririeri et al. (2005), and

Francis et al. (2008) find that exchange rate risk is priced and currency risk premium is an economically large component of the cost of capital.

III. Methodology and Data

The objective of this paper is to examine if, in the cross-section, firms' exposure to exchange rate risk affects their cost of bank loans. It is necessary, therefore, to obtain a measure of exchange rate exposure. In the first subsection we outline our approach to obtaining the measure of exposure and executing our main tests. In the next subsection, we describe the data and their summary statistics.

A. Methodology

To obtain a measure of a firm's exchange rate exposure, we follow the standard Adler and Dumas (1984) approach and estimate individual firms' exchange rate exposure over a 48-month window from *t*-51 to *t*-3 relative to the bank loan date, *t*. Hence, we assume that the bank has an estimate of the firm's exchange rate exposure one quarter prior to the loan date:

$$R_{it} = \alpha_i + \beta_{FXi} * R_{FXt} + \nu_{it}. \quad (1)$$

R_{it} is the one-month continuously compounded return on firm *i* and R_{FXt} is the one-month continuously compounded change in a real exchange rate index. The coefficient estimate $\hat{\beta}_{FXi}$ is the proxy for the firm's exchange rate exposure. We follow the large literature and assume that $\hat{\beta}_{FXi}$ measures the sensitivity of the firm's cash flows to changes in exchange rate movements. As is now well documented (see, e.g., Bodnar and Wong (2003)), this approach has at least two shortcomings. First, ideally we would like a measure that captures the sensitivity of firms' cash flows to exchange rate risk because, as the theory in the introduction suggests, loan terms will be sensitive to exchange rate risk to the extent that exchange rate changes affect the firms' cash flows. However, given that cash flows are not easily observed, equation (1) assumes that the firm's cash flows are positively and linearly related to its returns. Second, the use of an index of exchange rates might understate the firm's sensitivity to exchange rate risk. Fortunately, both

cases bias against us finding a strong relationship between loan prices and exchange rate exposure.

In a second step, using our estimate of exchange rate exposure, we estimate a cross-sectional regression of loan spread on the measure of exchange rate exposure:

$$Loan\,spread_i = \delta_0 + \delta_1 * \hat{\beta}_{FXi} + C'Controls + \varepsilon_i . \quad (2)$$

This two-step approach raises an econometric issue, as the variable of interest $\hat{\beta}_{FXi}$ in equation (2) is a generated regressor. Because we are interested in its significance, we have to account for the fact that this biases the standard errors downward and therefore, overstates the significance of the coefficient estimate, $\hat{\delta}_1$ (Pagan (1984)). We, therefore, adjust its standard error to account for this bias.[8]

B. Data

B.1. Sample selection

To compute exchange rate exposure, we use the monthly returns on each firm's stock over the 48-month period *t*-51 to *t*-3 prior to the firm's loan date, *t*. The data are from the Center for Research in Securities Prices (CRSP) database. The exchange rate indices are trade-weighted indices of the real bilateral exchange rates between the U.S. dollar and (i) 16 major currencies that trade freely outside of their country of issue (*Major*); (ii) the currencies of 19 developing economies comprising the "other important trading partners" of the U.S. (*OITP*); and (iii) the currencies of the countries in both the Major and the OITP indices (*Broad*). All exchange rates are quoted as foreign currency per U.S. dollar. Hence, an increase in the index represents an appreciation of the U.S. dollar. Real indices provide the advantage that even if the nominal exchange rate is fixed or experiences only discrete changes we can still obtain variation in the

[8] We follow the procedure by Hole (2006) outlined in Stata. It should be noted that we do not expect that our results will be significantly impacted by the generated regressor. This is the case because the bias is a decreasing function of the sample size and the number of observations in our sample is over 6000.

real index driven by changes in inflation. Moreover, changes in the real index reflect changes in the competitive position of a currency. The data are obtained from the Federal Reserve database available at: http://www.federalreserve.gov/releases/h10/summary/.

Bank loan information is obtained from the LPC Dealscan database which contains historical bank loan data that are compiled from the SEC fillings and self reporting by banks. The database includes detailed deal terms and conditions on loans, such as interest rates, loan size, maturities, covenants, performance pricing, and whether a loan is secured. Beyond those loan contract terms, Dealscan also includes information on the types of loans and the purposes of loans, as well as the structure of syndicated loans, such as the names of each leader bank and participant banks in a syndicated loan.[9]

To assess the importance of exchange rate exposure in the pricing of bank loans we control for other factors that have been shown in the recent literature to impact the cost of bank loans. These include borrower and loan characteristics, business conditions, and industry and year effects. We obtain firm-specific information from the Compustat database. Borrower characteristics that we use as control variables are (i) *Total assets* which are in millions of 1984 U.S. dollars; (ii) *Market-to-book* which is the market value of equity plus the book value of debt divided by total assets; (iii) *Leverage*, which is the sum of long term debt and debt in current liabilities divided by total assets; (iv) *Profitability*, defined as EBITDA divided by total assets; (v) *Tangibility* is net property, plant, and equipment divided by total assets; (vi) *Z-score* which is a Modified Altman's Z-score (= (1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales) / total assets); and (vii) *Cash flow volatility* which is defined as the standard deviation of the previous four years' cash flows. In addition, we obtain, when available, firms foreign income. This information is obtained from the segment data and includes both export sales as well as income from foreign subsidiaries. Finally, we also include a variable *hedge* which is a dummy that takes the value of one if the firm hedges its exchange rate risk, and zero otherwise. Information on a firm's hedging practices is hand-collected from the Edgar database.

We include four loan-specific variables. These are (i) *Loan maturity* which is the length of the loan measured in months; (ii) *Loan size* which is given in millions of 1984 USD; (iii) *Loan*

[9] In a syndicated loan, a group of lenders make a loan jointly to a single borrower. Typically, one or several lead arranger(s) establishes a lending relationship with the borrower, negotiates terms of the contract, and guarantees an amount for a price range. The lead arranger(s) then find participant lenders to fund part of the loan. In our sample, 88% of loans are syndicated.

performance which is a dummy variable set equal to one if the loan uses performance pricing; and (iv) *Collateral*, a dummy variable set equal to one if the loan is collateralized.

Finally, we include two business-condition variables that have been shown to capture possible business-cycle effects (see, e.g., (Fama and French (1989)), that might affect loan terms. These are *credit spread*, defined as the difference between the yields on Baa- and AAA-rated corporate bonds at the loan date and the *term spread*, defined as the difference in the 10-year Treasury yield and the one-year Treasury yield. These data are obtained from the Federal Reserve database.

We merge all data by ticker symbols. Because ticker symbols are recycled in practice, we manually checked all of the company names after merging. The final sample comprises 6216 loan facility level observations.

B.2. Descriptive statistics for borrowers and loans

Table 1 provides means and standard deviations for firms' accounting and loan characteristics. Columns 1-3 contain data for the full sample; Columns 4-6 contain data on firms with foreign subsidiaries; Columns 7-9 represent firms that reported foreign net income; and Columns 10-12 represent firms for which information on currency hedging is available. It should be noted that the LPC database mainly covers loans larger than $1,000,000, thus our sample includes relatively large public firms. This is evidenced by the fact that for the full sample, the average firm has assets of $1.58 billion with an average loan size is $248 million. The mean maturity of the loans is 43.85 months, which is consistent with other studies that have used these data (e.g., Sufi, (2007)). The average loan spread is about 196 basis points. The standard deviation of loan spread is about 135 basis points, ranging (not shown) from about 15 basis points to 600 basis points. On average, there are around eight lenders per loan. We also find that about 50% of loans use covenants and about 44% require collateral. Examining the remaining columns we see that spread on loans to firms with geographic segments and foreign income is lower (177 and 169 basis points, respectively) than the spread to the average firm. These loans are also larger, have longer maturities, are more likely to have a performance pricing covenant and are slightly less likely to be securitized. With regard to firms that hedge currency

risk, it is apparent that their average loan spread is marginally larger than that for firms with geographic segments but significantly smaller than the loans of firms that have foreign income. Interestingly, these loans are more likely to have performance pricing covenants and more likely to be securitized compared to the average loan in our sample.

B.3. Summary statistics for currency exposure

Table II presents summary statistics of the currency exposures for the full sample for each of the three indices, Broad, Major, and OITP, obtained from the estimation of Equation (1), over a 48-month period ending three months prior to the loan date. Consistent with our expectations, Panel A shows that the exposure from the Major index is the smallest (absolute) average exposure (-0.145) and has the lowest standard deviation (1.453) while the OITP index has the largest (absolute) average exposure (1.342) and the largest standard deviation (2.869).

A noticeable result is that the average exchange rate exposure for each of the three exchange rate indices is negative. This suggests that the average firm in the sample at the time of the loan was exposed as though it was a net exporting firm. That is, an increase in the exchange rate index (which is an appreciation of the dollar) is associated with a reduction in the average firm's cash flows. Given that the sample includes all firms that have the requisite loan data and that these data do not allow us to distinguish net exporters from net importers, it cannot be determine with certainty that the average firm or, for that matter, a firm with a negative exposure, is a net exporter. This is because a "purely domestic" firm that does not directly engage in exports or imports could also have a negative exposure if, for instance, when the dollar strengthens its competitors import cheaper inputs on account of the strong dollar. The increased competition against the purely domestic firm could lead to a decline in its cash flows, leading to the same sensitivity as a firm that is a net exporter. Similarly, a positive exposure does not necessarily mean that the firm is a net importer. If dollar appreciation occurs when domestic demand is strong, prompting the Federal Reserve to increase interest rates, then a purely domestic firm could experience an increase in its cash flows arising from the generally strong demand.

Panel B of Table III provides a further breakdown of the currency exposures. Columns 2 and 3 show the percentage of exposures that are negative and positive. The currency exposures related to the currencies of the industrialized countries (Major index) is about evenly distributed between negative (exporters) and positive (importers) exposures (47.8% and 52.2%, respectively). In contrast, the exposures to the emerging market currencies (OITP index) are negatively skewed, with only 28.4% of the exposures being positive and 71.6% being negative.

The percentages of exposures that are significant are reported in Column 4. Consistent with most of the prior literature, the percentage of significant exposures is relatively small irrespective of the index. Specifically, the results show that 2.8% (4.0%) of the exposures of the Major index are positive (negative) and significant. For the Broad index the percentages are 2.4 and 5.6 respectively and for the OITP index the percentages are 0.9 and 10.8. A possible explanation for this relatively low level of significance could be due to the preponderance of hedging. Within our sample more than half the loans are to firms that use currency hedges. Given that these are large firms, this is consistent with existing knowledge about the use of currency hedges by large firms (see, e.g., Bodnar, Hayt, and Marston (1998) and Allayannis and Weston (2001)).[10] We believe that this is a conservative estimate of the number of loans to firms that actually hedge currency risk because we are only accounting for financial hedging, which ignores the impact of operational hedges.

IV. Empirical Results

In this section we report the results of tests of the sensitivity of loan spreads to exchange rate exposure. Section A presents the main results and Section B reports several robustness tests.

A.1. Base model

The baseline empirical model that we use to assess the impact of exchange rate exposure on loan pricing is:

[10] It needs be borne in mind that Guay and Kothari (2003) find that hedging-related cash flows are small relative to firm size and to operating or investing cash flows. Similarly, Hentschel and Kothari (2001) find no difference in risk between firms that hedge with derivatives and those that do not. Therefore, how to interpret the evidence of only limited significant exposure is not clear.

$$Ln(Loan\ spread_i) = \delta_0 + \delta_1 * \hat{\beta}_{FXi} + C'Controls + \varepsilon_i . \quad (2)$$

In this model $\hat{\beta}_{FXi}$ is the exchange rate exposure estimated from Equation (1) and controls are as defined above. There are several outliers in the exposures and, therefore, to ensure that the results are not driven by outliers we winsorize the estimated exposures at the 5th and 95th percentiles. All estimations are done with robust standard errors to account for possible heteroscedasticity. In addition, because the analysis is done at the facility level and some firms have multiple facilities, we also adjust the standard errors for clustering at the firm level. Further, all reported models are estimated with year dummies, which are not reported.

Table III reports regression results for the full sample. We present two sets of results for the exposure corresponding to each of the three indices. In the first set of results the exposure variable is the only independent variable and in the second set of results we control for firm and loan characteristics, and macroeconomic conditions. Columns 1 and 2 contain results for the currency exposure (broad_beta) corresponding to the BROAD index. Columns 3 and 4 contain results for the exposure corresponding to the major index (major_beta). The results for the exposure from the OITP index are reported in Columns 5 and 6. The results where the exposure variables are entered individually are statistically significant for two of three cases (broad_beta and oitp_beta) indicating that exchange rate exposure to these two indices has a statistically significant effect on loan spreads. It is worth noticing that all three exposures are negatively correlated with loan spreads, indicating that on average, firms obtain lower loan rates as a result of their exposure to exchange rate risk. On average, a one standard deviation increase in exposure to the BROAD index is associated with about a 6.3% decrease in loan spread or about 12.3 basis points. For the OITP index there is a 10.62% decrease in loan spread or about 21 basis points.[11]

The results for the models in which we control for firm and loan characteristics are provided in Columns 2, 4, and 6. In all cases the magnitude of the exposure coefficient is reduced and all exposures are statistically insignificantly different from zero. On the other hand,

[11] The percentage change (increase or decrease) in the spread is calculated as the signed coefficient estimate from equation (2) times the standard deviation of the corresponding exposure betas from equation (1): $\hat{\delta} \times \sigma_{\hat{\beta}_{FXi}}$. For instance, the percentage change in spread for the BROAD index is (-.030*2.0985) -6.3% or (-0.063*195.86) 12.3 basis points, given that the mean spread is 195.86 basis points.

the control variables are generally statistically significant with signs and magnitudes in keeping with prior research. We find that across the three indices, larger borrowers, more profitable firms, firms with higher market-to-book values, and firms with more tangible assets are associated with lower loan spreads. Conversely, firms with higher leverage, higher cash flow volatility, and loans that are securitized and have a performance pricing benchmark are associated with higher spreads.

At first glance, these results seem to indicate that once we control for firm and loan characteristics bank managers do not take into account foreign exchange rate exposure when determining loan spreads. However, we should be cautious with this interpretation given that these results are for the overall sample which contains both positive and negative exposures and, as a result, it is quite likely that they cancel out each other thereby resulting in statistical and economic insignificance. We turn to this issue next.

A.2. Positive and negative exchange rate exposure and loan spreads

The results so far indicate that there is some weak statistical and economic evidence that lenders take the currency exposure of firms into consideration when pricing bank loans. However, as pointed out above, the weak evidence could be deceptive because it masks the offsetting effects of positive and negative exposures. Therefore, we re-estimate the models with positive and negative exposures entered as separate variables. Specifically, we create two dummy variables, *pos* (*neg*), that take the value of one when the exchange rate exposure is positive (negative), and zero otherwise. These are then interacted with the three foreign exchange rate exposures to ascertain if the relatively weak results are due to the fact that we did not account for the differences in the signs of the exposures. As is the case with Table III, we enter each exchange rate exposure coefficient separately and then re-estimate the models with the full set of controls.

Table IV reports the results. They are dramatically different from those obtained when the differences in the signs of exposure coefficients are not accounted for. Both positive and negative exposures to all three indices have a statistically significant and economically meaningful impact on loan spreads. For instance, a one standard deviation increase in the

positive exchange rate exposure to the BROAD index increases the average loan spread by 36%, or approximately 70 basis points. Similarly for the negative exposure a one standard deviation increase results in a decrease in the average loan spread of about 25%, or over 48 basis points. The results obtained when we include borrower and loan characteristics as control variables are also dramatically different from those reported in Table III. Although, as expected the size of the coefficients are reduced, for both positive and negative exposures they still remain statistically significant and economically meaningful. For instance, for firms with a positive exposure to the BROAD index a one standard deviation increase in the exposure increases the average loan spread by 14.27%, or about 28 basis points.

Looking at positive and negative exposures corresponding to the other indices we obtain similar results. Focusing on the results that include the controls, they indicate that for positive (Column 4) exposures to the MAJOR index an increase of one standard deviation increases the average loan spread by about 9%. For negative exposures the increase is about 5.4%. The results for exposure to the OITP index are reported in column 6. They indicate that a one standard deviation increase in the positive exposure to the OITP index leads to an increase in the average loan spread of about 12% while for negative exposure there is a decrease of about 5.5%.

These results lead to the following conclusions. First, and most important for our work, is that exchange rate exposure has a statistically significant and economically meaningful impact on loan pricing. Stated differently, the evidence indicates that lenders take into account a firm's exchange rate exposure when setting loan rates. Second, the impact of exposure on loan spreads is asymmetric. That is, in general, a one unit increase in positive exchange rate exposures has a larger impact on loan spreads than a similar increase in the magnitude of negative exposures. If in fact firms with positive exposure are net importers and firms with negative exposure are net exporters, then the asymmetric sensitivity of loan spread to exchange rate exposure is consistent with the notion that lenders are more concerned with the implications that exchange rate exposure has for the cost side than for the revenue side. Finally, purely as a methodological contribution, these results point to the need to separate exchange rate exposures into negative and positive in studies designed to determine if exposure has an impact on other aspects of firm operations. Failure to do so will, in all likelihood, lead to erroneous conclusions.

A.3. Additional results for positive and negative exposures

In the previous sub-section we presented strong evidence that foreign exchange rate exposure has a statistical significant and economically meaningful impact on loan spreads, indicating that banks take firms exchange rate exposure into account when setting loan rates. Nevertheless some caution should be exercised in accepting these results. This is the case for two reasons. First, as pointed out earlier, the exchange rate exposure used in the previous regressions to assess the relationship between loan spreads and exposure is a generated regressor. That is, it is a coefficient from a previous regression. Pagan (1984), in his seminal paper, pointed out that when a generated regressor is used in regressions the standard errors could be incorrect. This problem is particularly acute if the sample size is small. In the current paper the sample size is large (more than 6000 observations), suggesting that the effect of the generated-regressor problem would not be material. Nevertheless, we obtain bootstrapped standard errors to see the extent to which our results are affected, if at all, by the generated-regressor problem.

Second, in estimating the regression equations where we accounted for positive and negative betas we made the simplifying assumption that the firm and loan characteristics and business condition variables have the same effect on loan spreads for firms with positive and negative exchange rate exposures. That is, we have constrained the coefficients to be the same for firms that are positively exposed and those that are negatively exposed. However, this need not be the case. In fact, it is highly unlikely that this is the case. The implication of this is that the estimated coefficients for the interaction variables could be incorrect, thus leading to incorrect inferences about the sensitivity of loan spreads to exchange rate exposure.

To address these two concerns we proceed as follows. First, we separate the sample into positive and negative foreign exchange rate exposures and run separate regressions for the two sub-samples. We then use the bootstrap re-sampling procedure to account for the generated-regressor problem.

We present the results for the regressions separated by positive and negative exchange rate exposures and corrected for the generated-regressor problem in Table V. Panel A contains the results for firms with positive exchange rate exposure while the results for those with negative exposures are reported in Panel B. From Panel A, the evidence is that the results are

significantly different from the previous results which use the pooled sample. To be specific, the coefficient on the exposure to the BROAD index increases from 0.068 to 0.090, an increase of over 32%. As a result, a one standard deviation increase in the positive currency exposure increases the average loan spread by approximately 19% or 37 basis points compared to 14.21% or 28 basis points. Bootstrapped standard errors are reported below the robust standard errors. These standard errors are virtually identical to the clustered standard errors, indicating that the generated-regressor problem is not a concern for our results. This latter result is not surprising given that our sample is relatively large.

The results are even more dramatic for the positive exposures to the other two exchange rate indices. For the exposures to the MAJOR index, the estimated coefficient increases from 0.061 to 0.096, an increase of over 57%. Consequently, a one standard deviation increase in exposure leads to a 14% increase in the average loan spread or 27.4 basis points. This increase is remarkable given that for the pooled sample the increase was 9% or 17.3 basis points. The impact on the coefficient and, therefore, on the loan spread is even more impressive for the positive exposure to the OITP index. The coefficient increases from 0.041 to 0.069, an increase of over 68%. This implies that a one standard deviation increase in this exposure will increase average loan spread by 20% or 39 basis points. Similar to the results for the exposures to the BROAD index the bootstrapped standard errors of the coefficient on the exposures to both the MAJOR and the OITP are indistinguishable from the clustered standard errors.

The results for the negative exposures although not quite as dramatic as those for positive exposures are nonetheless still impressive and, therefore, equally revealing. In all three regressions (Columns 2, 4, 6) there is an increase in the magnitude of the coefficient on the exchange rate exposure. This increase ranges from 10.53% for the exposure to the OITP index to 45% and 46% for the BROAD and MAJOR indices. These correspond to a decrease in the average loan spread of 6% or 12.4 basis points for the exposure to the OITP, 10.24% or approximately 20 basis points for the exposure to the BROAD, and 7.83% or 15.33 basis points for exposure to the MAJOR index. As is the case for the positive exposure, the bootstrapped standard errors in all three cases are essentially the same as the clustered standard errors.

In sum, a one standard deviation increase in positive exposure increases loan spreads by as much as 39 basis points. Similarly, a one standard deviation increase in negative exposure

leads to a decrease in loan spreads by as much as 20 basis points. These results indicate that accounting for negative and positive exposures using interaction variables dramatically understate the sensitivity of loan spreads to exchange rate exposure. Separating the sample into positive and negative exposures and estimating separate regressions provides a clearer picture of the relationship between loan spreads and exchange rate exposure.

B. Robustness Tests

B.1. Foreign income, exchange rate exposure, and loan spreads

In order to ensure the validity of the foregoing results, we conduct a battery of robustness tests, the first of which is to re-estimate the models after accounting for firms' international operations. It is possible that our results are driven by the fact that some firms in the sample have international operations or engage in exports, as reflected in their foreign income. To address this issue we collect data on firms that report foreign income and re-estimate the regressions for these firms to determine if and to what extent currency exposure still impacts loan spreads. Specifically, we separate the sample of firms that report foreign income into firms with positive and negative exposures, respectively, and re-estimate our baseline specifications augmented with the foreign income variable. Foreign income is defined as foreign pretax income/total income. As shown in the previous section, pooling the sample and using interaction dummy variables to account for positive and negative exposures significantly underestimates the sensitivity of bank loan pricing to exchange rate exposure. Therefore, we do not estimate regressions for the pooled sample.

Panel A of Table VI reports the results for the sample of firms with foreign income and positive exchange rate exposure. Row 1 contains the coefficients for the foreign income variable. The evidence indicates that loan spreads increase with foreign income for the positive exposure sample in the model containing the exposure to the BROAD index. This finding indicates that for firms with a positive exposure, such as net importers, that have significant foreign income lenders perceive this as particularly risky and charges a higher spread when extending loans to these firms.

Despite the presence and significance of foreign income in the regressions the evidence indicates that lending rates increase significantly as a result of each of the measures of exposure. In fact, the coefficients are substantially larger than those obtained in the previous results – 0.117 for exposure to the BROAD index, 0.097 for the MAJOR index, and 0.146 for the OITP index. The increase in the coefficient on the exposure to the OITP index is especially striking, given that in the previous results the largest value was 0.069. To appreciate the economic significance of these results note that a one standard deviation increase in the exposure to the BROAD index results in an increase in the average loan spread of 23.16% or 39.24 basis points. For exposure to the MAJOR index the increase in average loan spread would be 13% or 22 basis points and for the OITP index the increase would be 40% or 68 basis points, in response to a one standard deviation increase exposure.

The results for firms with negative exchange rate exposures are reported in Panel B. These results are dramatically different from those reported for the positive exposures. First, in all specifications foreign income is statistically significant. Similar to the results in Panel A, the coefficients are positive, indicating that irrespective of whether the firm is exposed akin to a net importer or exporter, lenders charge an additional premium when offering loans to firms with international operations. Second, except for the coefficient on the exposure to the OITP index, which increased from 0.021 to 0.33, the exposure coefficients are essentially unchanged.

In sum our results indicate that, in general, banks take into account a firm's sources of income when extending loans and adjust the spreads accordingly. Specifically, the results indicate that firms that receive a significant portion of their total income from foreign sources are charged an additional premium by banks when they extend loans to these firms. Additionally, the results also indicate that lenders are very sensitive to firms that have positive exposures, such as net importers, in that loan spreads increase significantly with exposure. This is particularly the case for firms with high exposure to the OITP index. In contrast, for firms that are negatively exposed, such as net exporters, it appears that although lenders do pay attention to the fact that some of their income is from foreign sources, except for exposure to the OITP index where there was a relatively small absolute increase, they are generally not treated differently than firms that do not report foreign income as a significant portion of their total income. The overall finding that lenders charge relatively higher rates on loans to firms that have positive exposure to the

OITP index is not surprising given that the countries that comprise this index are primarily developing and emerging markets, where the risk of doing business is perceived to be high.

B.2. Exchange rate exposure and bank loan spreads for purely domestic firms

In this sub-section we examine the impact of exposure on the pricing of bank loans for firms that do not report foreign income. We conduct this analysis for two reasons. First, if this analysis provides evidence that the loan spreads of firms that do not report foreign income are affected by exposure then this would indicate that the evidence thus far of the sensitivity of loan spreads to exposure is not merely an artifact of firms' involvement in international operations as defined above.[12] Second, because it is generally believed in the extant exchange rate exposure literature that even firms that are purely domestic are also exposed to exchange rate risk, by focusing on firms that do not report foreign income we are able to ascertain if the behavior of lenders to these firms is consistent with this argument.

The results are reported in Table VII. Panel A contains the results for firms with positive exchange rate exposure while results for firms with negative currency exposure are reported in Panel B. Focusing on the models that include the control variables (Columns 2, 4, and 6), in all cases the coefficient estimates on exposure are positive and statistically significant. Although the coefficients are not as large as those reported for the sample of firms with foreign income, they are still economically large. For example, the coefficients are 0.075, 0.95, and 0.60 for exposure to the BROAD, MAJOR, and OITP indices, respectively. This translates to an increase in the average loan spread of 14.85% (or an extra 32.61 basis points), 12.65% (26.89), and 16.46% (35.04). Given that this subsample of firms does not report foreign income it implies that they are primarily importers or firms that do not engage in foreign trade but otherwise benefit from a strong dollar. Thus, our findings do not support the argument that the sensitivity of loan rates to exchange rate exposure is restricted only to firms that have a significant amount of foreign income.

[12] We are assuming that firms that do not report foreign income do not in fact engage in international operations or, at least, that even if some of these firms have foreign income it is not a significant portion of their total income. As such, this subsample is not contaminated by the underreporting of involvement in international operations.

The results for firms with negative exposures (such as purely domestic firms, with competitors that import their inputs, that sell products to exporters, or whose products are compliments to those of firms that have negative exposure) are significantly different from those for firms with positive exposures. We find that for the models that include the control variables the coefficient on each measure of exchange rate exposure is economically small and statistically insignificant. These findings are consistent with our overall results that lenders are substantially more concerned with firms that have positive exposures than those that have negative exposures.

B.3. Hedging, exchange rate exposure, and loan spreads

In this section we examine whether bank managers, in determining loan spreads, take into account whether firms hedge exchange rate risk. More important, we provide evidence as to whether and how currency hedging affects the sensitivity of bank loan spreads to exchange rate exposure. As noted earlier, one of the puzzling aspects of the extant exchange rate exposure literature is that although the theoretical literature predicts that firms in general should be impacted significantly by exchange rate exposure (e.g., Bodnar et al. (2002)), by and large, the empirical evidence is weak, especially at the firm level. One possible explanation for this lack of evidence is that managers successfully hedge exchange rate risk, hence dampening the effect of exchange rate risk on firm returns making it unlikely to be detected by empiricists.

In carrying out this analysis we obtained the sample of firms that both obtained loans and hedged currency risk over our sample period. Specifically, among the sample of firms with loans we searched the financial statements in the year prior to the loan for keywords "hedge," "forward," "derivative," "futures," and "swap." Once a keyword is identified, we read the surrounding paragraphs to ensure that these keywords are specific to the hedging of exchange rate risk. Therefore, even if a firm hedged other types of risk they were not counted as a hedger in our analysis. It should be noted that because our objective was to determine whether or not firms hedged exchange rate risk we did not gather information on the notional amount of foreign exchange hedges. Once identified as having hedged exchange rate risk a firm is counted as a hedger. Otherwise, if the firm does not indicate that it hedges currency risk or if it states explicitly that it does not, then the firm is included in the non-hedging group. That is, we define

a dummy variable (*hedge*) as one if the firm is identified as a hedger and zero otherwise, but include in this subsample only the subset of firms for which we are certain, based on information from their financial statements that they either hedged their foreign exchange rate exposure or did not.

Table VIII contains results on the effects of hedging on loan spreads using the subset of firms that we were able to ascertain either hedged or did not hedge their exchange rate risk. Specifically, in our baseline model we include the *hedge* dummy individually and also interacted with the exchange rate exposure variable. As done previously, we separate this subsample of firms into those that are positively exposed and those that are negatively exposed.

The results in Panel A for firms with positive exposure reveal that lenders do take into account whether firms hedge their exchange rate risk in determining loan rates. We find that the coefficient on the hedge dummy is negative, statistically significant, and economically large (about 15 basis points lower for hedgers) for firms that are exposed to the BROAD and OITP indices, but not to the MAJOR. The fact that it is not significant for the specification that includes exposure to the MAJOR index suggests that the significance of the variable for firms faced with exposure to the BROAD index is being driven by firms' exposure to the OITP index.

However, the currency exposure coefficients in all three regressions are now statistically insignificant. Further, the coefficients of the interaction of the hedge dummy with the currency exposures are also insignificant with the exception of the positive coefficient on the interaction with the BROAD index. Despite this latter finding, the evidence indicates that, for the average firm that hedges (*hedge* = 1) and that has a positive BROAD exposure coefficient of reasonable magnitude, say $\hat{\beta}_{FXi} = 1$, hedging has a net negative impact on loan spreads. Similarly, for firms that hedge, a positive exposure to the BROAD index has a positive impact on loan spreads.[13]

The results for the negative exposures, which are presented in Panel B, indicate that for all three specifications the coefficient on the hedge dummy is insignificant once we include the control variables. To the extent that firms with negative currency exposures can be thought of as net exporters, these results indicate that lenders do not take into account hedging by net exporters. This finding is surprising given that in general exporters tend to have a significant

[13] From $Ln(loanspread_i) = \delta_0 + \delta_1 * hedge_i + \delta_2 * \hat{\beta}_{FXi} + \delta_3 * hedge_i \times \hat{\beta}_{FXi} + \ldots$ the impact of hedging on loan spread is $\hat{\delta}_1 + \hat{\delta}_3 * \hat{\beta}_{FXi}$ and that of exposure is $\hat{\delta}_2 + \hat{\delta}_3$.

part of their total income as foreign income, which bears directly on their ability to repay loans. One possibility is that although these firms hedge, banks are concerned that they do not allocate sufficient resources to this activity relative to their exposure, consistent with the finding by Guay and Kothari (2003)). We continue to find that loan spreads are lower for firms with negative exposure to the BROAD and MAJOR indices, though not for firms with negative exposure to the OITP index. Interestingly, there is only limited evidence (from exposure to the OITP index) that hedging significantly and beneficially changes the sensitivity of loan spreads to negative exposure.

In sum, our results provide evidence that lenders value firm hedging behavior. However, this is the case only for firms that have positive exposures as manifested by the fact that when these firms hedge exchange rate exposure by itself tends not to have an independent impact on loan rates. In contrast, for firms with negative exposure, hedging by itself does not have the effect of materially lowering loan spreads, it only influences the loan spread exposure sensitivity for firms with exposure to the emerging market currencies, and exposure continues to have a direct impact on loan rates. These findings are to some extent consistent with those reported by Bartram et al. (2008), and others, that hedging reduces exchange rate exposure.

B.4. Exposure and loan spreads around the Asian financial crisis

In this sub-section we examine the impact of the 1997 Asian crisis on the sensitivity of loan spreads to exchange rate exposure. We purse this issue for two reasons. First, the crisis significantly increased the volatility of several currencies from the emerging markets and, as such, could have changed the perception of loan officers about the likely impact of exchange rate risk on client firms relative to the non-crisis period. This could have changed the impact of exposure on loan spreads. Second, it is possible that our results are a manifestation of spurious regression, a form of endogeneity resulting from both loan spreads and exchange rate exposure being simultaneously determined. While it is possible that this simultaneity can arise from several unobserved factors one possibility for this phenomenon arises from the response of both variables to currency crises, such as the 1997 Asian crisis. Bae and Goyal (2009) and others,

find that loan spreads were higher during the crisis and, as stated before, the crisis caused substantial changes in currency values and volatility.

The consensus is that the Asian financial crisis covered the time period July 1997 through August 1998 (see, e.g., Johnson et al. (2000), Lemmon and Lins (2003), and Bae and Goyal (2009)). We, therefore, create a dummy variable, *crisis*, that takes a value of one during the crisis period and zero otherwise and add it both as a standalone variable and as an interaction term with the three measures of exchange rate exposure to our baseline regressions.

The results are reported in Table IX. In Panel A, where the results for firms with positive exposures are reported, they show that across all specifications, those that include controls and those that do not, the coefficient on the crisis dummy is insignificant. This indicates that, at least for firms that are positively exposed to exchange rate risk the crisis did not affect the pricing of their loans. Similarly, given that the coefficient on each interaction variable is statistically insignificant, the crisis did not change the sensitivity of loan spreads to exchange rate exposure. However, the impact of exchange rate exposure on loan spreads continues to be statistically significant and economically meaningful.

Results in Panel B show that banks reacted differently during the crisis for firms that are negatively exposed to exchange rate risk; i.e., similar to net exporters. Across all specifications, both those with and without controls, the coefficient on the crisis dummy is negative and statistically significant, indicating that lenders reduced the interest rate on bank loans to these firms. However, the sensitivity of loan spreads to exchange rate exposure was not affected by the crisis. Similar to the results for firms that are positively exposed, the coefficient on each measure of exchange rate exposure is statistically significant as loan spreads continue to be affected by exchange rate exposure.

The evidence that during the crisis a subset of U.S. firms obtained lower loan rates is inconsistent with the evidence in Bae and Goyal (2009) that an international sample of firms had higher loan spreads in the said period. Given this evidence, we re-estimated the above model applied to the full sample of (positive and negative exposure) firms. The results (not reported) indicate that, on average, U.S. firms obtained significantly lower loan rates during the crisis.

In summary, these results indicate that the crisis period only had a marginal effect on loan spreads and this was restricted to firms with negative exposure. More important for our study, the crisis period did not impact the sensitivity of loan spreads to foreign exchange rate exposure. This suggests that our results, which indicate that currency exposure has both a statistically significant and economical large effect on the pricing of bank loans, are not driven by the crisis period and are not significantly impacted by endogeneity.

B. 5. Additional evidence on for endogeneity

The previously established relationship between firm borrowing rates and their exchange rate exposure could be driven by a second form of endogeneity. That is, while we find that firms' exchange rate exposure influences their cost of debt, it is also possible that the cost and availability of bank debt influences firms' exchange rate exposure. This is consistent with previous results that the magnitude of firms' exchange rate exposure is influenced by the level of short-term liquid funds (Starks and Wei (2006), He and Ng (1998)). Given that firms enter into banking arrangements to obtain access to short-term liquidity (Sufi (2009)) it is likely that loan rates affect exposure. It is unlikely that our results are significantly influenced by this reverse causality. This is because in estimating firms' exchange rate exposure the latter uses data that precedes the loan by at least three months. This effectively employs the "lagged-endogenous variable" approach to resolve the issue of endogeneity. [In the next version we intend to address this issue using a two-stage estimation approach.]

V. Conclusions

The issue of the impact of exchange rate exposure on firm value has received a significant amount of attention over the years starting with the work of Adler and Dumas (1984). These papers have typically focused on either its effect on cash flows or discount rates and have produced mixed results. In focusing on the firm's discount rate the papers have generally relied on stock returns and the risk premium embedded therein, and have ignored an important component of the firms cost of capital, namely the borrowing costs for bank loans. This is surprising on several accounts. First, bank loans are the largest component of firms' external

financing. Therefore, if exchange rate exposure does impact the firm's cost of capital bank loans would be a prime candidate where this effect would be present. Second, one of the explanations that are usually offered for the lack of overwhelming evidence is that researchers (who typically use stock market data) are hampered by the lack of data to ascertain the extent to which firms are exposed to foreign exchange rate risk. Although using bank loans to investigate the impact does not completely circumvent this issue, it nevertheless allows stronger inferences to be made given that bank managers are "quasi" insiders and as a result should be cognizant of the extent to which firms are exposed to exchange rate risk. Using this intuition we examine the extent to which exchange rate exposure impacts the pricing of loans.

Our results indicate that exchange rate exposure is an important factor in the determination of loan spreads and is, therefore, one of the most important component in the firm's cost of capital. That is, bank managers in pricing loans take into account the exchange rate exposure of the borrower. To the best of our knowledge this is new to the exchange rate exposure literature. We find that the effect is asymmetric with the impact depending on whether the exposure is positive or negative. Specifically, we find that firms that are positively exposed to exchange rate risk can experience as much as a 39% increase in loan spreads following a one standard deviation increase in their exchange rate exposure. In contrast, firms that are negatively exposed experience a decrease of as much as 15.33% following a one standard deviation increase in the magnitude of exposure. The results also show that this significant economic impact is not relegated to firms that are exposed to the emerging markets. They show that the impact on firms that are exposed to exchange rate risk from developed countries is quite frequently significantly higher than the impact from exposure to the emerging markets.

Our results also show that the impact of exchange rate exposure on loan pricing is not only for firms that receive a significant portion of their total income from foreign activities. We find that the impact is also present for firms that do not report foreign income and this impact is economically meaningful. Interestingly, we find that this only holds for firms that have positive exposure.

An explanation that has been offered for the relatively disappointing results in terms of the lack of evidence for the importance of exchange rate exposure on firm value is that firms

hedge away their exchange rate risk; hence, it is unlikely for researchers to find significance. In this paper we use a hand-collected sample of firms that hedge exchange rate risk and find that although the impact is mitigated loan pricing is still significantly impacted by exchange rate exposure. Finally, we also examine whether the relationship between currency exposure and loan spreads are affected by a financial crisis. This not only serves the purpose of allowing us to see how bank managers react to foreign exchange rate risk during an international financial crisis, but it allows us to overcome any endogeneity concerns that may be present in our results. Using the 1997 Asian financial crisis as our experiment, our results demonstrate that although financial crisis had a significant impact on loan spreads, for firms with negative exposure, exchange rate exposure is still a statistically significant and economically important determinant of firms' borrowing costs. Importantly, we find that the sensitivity of loan spreads to both negative and positive foreign exchange rate exposures did not change, thus alleviating any endogeneity concerns.

Given the significant increase in globalization over the past decade our results have important implications for corporate managers and institutional investors given that the latter have recently become important participants, both as syndicate members and also as investors, in the syndicated loan market. Specifically, our results show that exchange rate exposure is of first-order importance in determining the firm's cost of capital and therefore on its investment decisions. Recently, several papers have used bank loans as the medium to examine which factors determine financial contracts. In future work we plan to examine how exchange rate exposure impacts firms' financial contracts.

In future drafts there are several issues that we will address. The most important of these is whether the lending bank's foreign exchange rate exposure is an important determinant of the spread that is offered to borrowers. That is do banks use loans to firms with exchange rate exposure as a method to hedge their own foreign exchange rate exposure and if they do what impact does it have on the cost to borrowers? We are currently collecting data on the lender's exposure. Additionally, we will also address the possibility of endogeneity using a two-stage methodology. Finally, we have not controlled for the effect of an existing relationship between the borrower and lender. We should point out that since the previous drafts we have conducted

estimations in which the relationship between the lender and borrower is accounted for and our results continue to hold. We will tabulate these results in future drafts.

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Table 1
Descriptive Statistics

This table presents the descriptive statistics for the variables used in the main results. *Spread* is the all-in spread drawn in the Dealscan data. *Total assets* is given in millions of 1984 USD. Market-to-book is market value of equity plus the book value of debt divided by total assets. *Leverage* is the sum of long term debt and debt in current liabilities divided by total assets. *Profitability* is EBITDA divided by total assets. *Tangibility* is net property, plant, and equipment divided by total assets. *Z-score* is defined as a Modified Altman's Z-score is ((1.2*working capital + 1.4*retained earnings + 3.3*EBIT + 0.999*sales) / total assets). *Cash flow volatility* is defined as the standard deviation of the previous four year's cash flows. *Loan maturity* is given in months. *Loan size* is given in millions of 1984 USD. *Loan performance* is a dummy variable set equal to one if the loan uses performance pricing. *Credit spread* is the difference between the AAA corporate bond yield and the BAA corporate bond yield from the Federal Reserve. *Term spread* is the difference between the 10-yer Treasury yield and the 2-year Treasury yield from the Federal Reserve. *Collateral* is a dummy variable set equal to one if the loan is collateralized. Columns 1-3 contain data for the full sample; Columns 4-6 contain data on firms with foreign subsidiaries; Columns 7-9 represent firms that reported foreign net income; and Columns 10-12 represent firms for which information on currency hedging is available.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variable	N	Mean	Std. Dev	N	Mean	Std. Dev	N	Mean	Std. Dev	N	Mean	Std. Dev
Spread	6216	195.86	134.22	1255	176.45	138.36	2431	169.43	134.05	3140	177.18	125.46
Firm size (millions)	6216	1578.07	3700.81	1255	2499.32	5023.86	2431	1931.99	3676.04	3140	1887.044	3955.92
Market-to-book	6216	1.63	0.99	1255	1.72	0.90	2431	1.68	0.87	3140	1.69	1.05
Leverage	6216	0.31	0.18	1255	0.28	0.18	2431	0.284	0.1673	3140	0.3111	0.18
Profitability	6216	0.12	0.15	1255	0.13	0.08	2431	0.127	0.09	3140	0.13	0.09
Tangibility	6216	0.32	0.23	1255	0.31	0.22	2431	0.2754	0.190	3140	0.3305	0.22
Z-score	6216	1.67	1.78	1255	1.67	1.47	2431	1.715	1.839	3140	1.7410	1.37
Cash flow volatility	6216	0.01	0.05	1255	0.004	0.012	2431	0.0046	0.0177	3140	0.005	0.017
Loan maturity (months)	6216	43.85	24.31	1255	47.35	19.53	2431	44.66	24.24	3140	43.11	23.47
Loan size (dollars)	6216	2.5E+08	5.15E+08	1255	3.11E+08	5.70E+08	2431	3.16E+08	5.59E+08	3140	2.88E+08	5.50E+08
Performance pricing	6216	0.57	0.50	1255	0.75	0.44	2431	0.64	0.48	3140	0.67	0.47
Securitized	6216	0.69	0.45	1255	0.62	0.49	2431	0.61	0.49	3140	0.62	0.49
Credit spread	6216	0.01	0.002	1255	0.01	0.002	2431	0.009	0.002	3140	0.01	0.002
Term spread	6216	0.009	0.009	1255	0.014	0.009	2431	0.01	0.009	3140	0.011	0.009
Geo. segment	1051	1	0	1051	1	0	471	1	0	505	1	0
Total foreign sales	1255	514.97	1543.08	1255	514.9654	1543.08	637	914.85	1997.876	617	596.48	1429.83
Foreign sales/ total sales	1255	21.234	23.40134	1255	21.2344	23.401	637	36.33616	21.04396	617	22.39154	23.69281
Foreign pretax inc	2431	50.33511	169.1903	637	88.19029	233.7161	2431	50.33511	169.1903	1354	58.61863	163.9922
Foreign pretax income/tot Inc	2431	0.3902546	9.56388	637	0.1968578	0.6482087	2431	0.3902546	9.56388	1354	0.6320057	12.75961

Table II

Foreign Exchange Rate Exposures

This table reports results of regressions of returns on the three exchange rate indexes. The sample covers 1987 to 2006. The foreign exchange exposure variables are defined as β from the following regression:

$$R_{it} = \alpha_i + \beta_{FXi} * R_{FXt} + \nu_{it}.$$

Where, $R_{i,t}$ is the stock return for firm *I* in month *t*, α is a constant, R_{FXt} is the return on the foreign exchange index, and ε is the error term. The foreign exchange indexes are the Broad, Major, and OITP indexes from the Federal Reserve. The equation is estimated using OLS for each firm using monthly data for a 48 month period ending three months prior to the loan date. broad_beta is the coefficient from the Broad index, major_beta is the coefficient from the Major index and oitp_beta is the coefficient from the OITP index. N is the number of observations. P1 represents the 1st percentile, P5 the 5th percentile, P25 the 25th percentile, P50 the 50th percentile, P75 is the 75th percentile and P99 is the 99th percentile.

Panel A: Summary Statistics for full sample betas from each of our three currency indices

Variable	N	Mean	Stdv	P1	P25	P50	P75	P99
broad_beta	6216	-0.55292	2.098513	-6.79119	-1.63444	-0.45946	0.675817	4.481129
major_beta	6216	-0.14447	1.453311	-4.07932	-0.88796	-0.06816	0.687664	3.359697
oitp_beta	6216	-1.34147	2.86956	-10.9235	-2.49574	-0.95299	0.175562	5.199645

Panel B: Summary Statistics for betas from each of our three currency indices for firms that report foreign income

broad_beta	2431	-0.59546	1.979258	-6.38428	-1.62255	-0.48317	0.562468	4.35211
major_beta	2431	-0.16496	1.331071	-4.01607	-0.83281	-0.07047	0.604919	2.912461
oitp_beta	2431	-1.45549	2.7426	-10.3874	-2.51874	-1.10219	0.005717	4.546868

Panel C: Summary Statistics for betas from each of our three currency indices for firms which there was hedging information

broad_beta	3140	-0.76150	2.077357	-6.56887	-1.82950	-0.63370	0.44659	4.423158
major_beta	3140	-0.26239	1.442689	-4.03823	-1.00029	-0.15884	0.58732	3.337764
oitp_beta	3140	-1.42751	2.6644	-10.6891	-2.35604	-0.94505	-0.02424	3.646821

Panel D: Distribution of Positive and Negative Foreign Exchange Rate Exposures

Variable	N	N > 0	N < 0	N signif	N insignif	N > 0 and signif	N < 0 and signif	N > 0 and insignif	N < 0 and insignif
broad_beta	6216	38.8%	61.2%	8.0%	92.0%	2.4%	5.6%	36.4%	55.6%
major_beta	6216	47.8%	52.2%	6.8%	93.2%	2.8%	4.0%	45.0%	48.3%
oitp_beta	6216	28.4%	71.6%	11.7%	88.3%	0.9%	10.8%	27.5%	60.8%

Table III
Regression of Loan Spread on Exchange Rate Exposure

BROAD, MAJOR, and OITP are the exchange rate exposures relative to the respective exchange rate indices. Exchange rates are expressed as foreign currency/$US, hence an increase in the index represents an appreciation of the U.S. dollar. Therefore, firms with negative exposures are exposed as if they were net importers and vice-versa for firms with positive exposures. The dependent variable is the natural logarithm of loan spread for an individual loan where loan spread is the all in drawn spread in basis points. Definitions of all other variables included in the regressions are contained in Table I. Year dummies are included in all the regressions but are not reported. Robust standard errors that correct for clustering are below the coefficients. Significance at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
broad_beta	-0.030***	-0.002				
	(0.010)	(0.006)				
major_beta			-0.019	-0.003		
			(0.013)	(0.007)		
oitp_beta					-0.037***	-0.008
					(0.008)	(0.005)
assets		-0.145***		-0.145***		-0.147***
		(0.014)		(0.014)		(0.014)
mb		-0.071***		-0.071***		-0.071***
		(0.011)		(0.011)		(0.011)
lev		0.819***		0.818***		0.821***
		(0.062)		(0.062)		(0.063)
profit		-0.716***		-0.717***		-0.708***
		(0.136)		(0.136)		(0.136)
tang		-0.153***		-0.153***		-0.153***
		(0.054)		(0.054)		(0.054)
zscore		-0.008		-0.009		-0.008
		(0.011)		(0.011)		(0.011)

cfvol		0.140**		0.140**		0.136**
		(0.070)		(0.070)		(0.069)
loan_mat		-0.003		-0.003		-0.003
		(0.013)		(0.013)		(0.013)
loan_size		-0.012		-0.012		-0.011
		(0.014)		(0.014)		(0.014)
loan_perf		-0.178***		-0.178***		-0.177***
		(0.022)		(0.022)		(0.022)
loan_collateral		0.734***		0.734***		0.731***
macro_cs		9.715		9.744		9.419
		(6.950)		(6.949)		(6.945)
macro_ts		4.350*		4.358*		4.292*
		(2.232)		(2.233)		(2.234)
Constant	3.456***	4.353***	3.435***	4.353***	3.430***	4.341***
	(0.440)	(0.245)	(0.439)	(0.245)	(0.449)	(0.245)
Observations	6216	6216	6216	6216	6216	6216
Adj. R-squared	0.086	0.618	0.084	0.618	0.091	0.618

Table IV

Loan Spreads and Positive and Negative Foreign Exchange Rate Exposure

This Table presents results when we take into account the impact of positive and negative foreign exchange rate exposures for each of our three measures of exposures on loan spreads. Specifically, it contains regression results when we interact each of the currency exposure measures with a dummy variable representing positive and negative exposures. broad_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the BROAD index. major_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the MAJOR index. pos (neg) is a dummy variable that takes the value of one if the currency exposure is positive, zero otherwise. oitp_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the OITP index. The other variables are as described in Table I. Robust standard errors that correct for clustering are below the coefficients. Significance at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
pos*broad_beta	0.170***	0.068***				
	(0.020)	(0.013)				
neg*broad_beta	-0.118***	-0.034***				
	(0.012)	(0.007)				
pos*major_beta			0.199***	0.061***		
			(0.022)	(0.015)		
neg*major_beta			-0.135***	-0.037***		
			(0.016)	(0.010)		
pos*oitp_beta					0.175***	0.041**
					(0.028)	(0.020)
neg*oitp_beta					-0.082***	-0.019***
					(0.009)	(0.006)
assets		-0.143***		-0.143***		-0.146***
		(0.014)		(0.014)		(0.014)
Mb		-0.073***		-0.071***		-0.072***
		(0.011)		(0.011)		(0.011)
Lev		0.814***		0.811***		0.820***
		(0.062)		(0.062)		(0.062)
Profit		-0.711***		-0.713***		-0.708***
		(0.133)		(0.134)		(0.133)
Tang		-0.153***		-0.146***		-0.147***
		(0.053)		(0.053)		(0.053)
zscore		-0.006		-0.007		-0.007
		(0.010)		(0.010)		(0.010)
Cfvol		0.077		0.092		0.139**
		(0.069)		(0.070)		(0.069)
loan_mat		-0.002		-0.002		-0.002
		(0.013)		(0.013)		(0.013)

loan_size		-0.01		-0.011		-0.01
		(0.014)		(0.014)		(0.014)
loan_perf		-0.178***		-0.178***		-0.173***
		(0.022)		(0.022)		(0.022)
loan_collateral		0.721***		0.726***		0.724***
		(0.029)		(0.029)		(0.028)
macro_cs		10.067		10.055		9.626
		(6.986)		(6.968)		(6.934)
macro_ts		4.582**		4.787**		4.033*
		(2.230)		(2.232)		(2.237)
Constant	3.064***	4.165***	3.116***	4.210***	3.051***	4.234***
	(0.443)	(0.244)	(0.440)	(0.245)	(0.470)	(0.253)
Observations	6216	6216	6216	6216	6216	6216
Adj. R-squared	0.125	0.623	0.119	0.621	0.114	0.62

Table V

Bootstrapped Standard Errors and Signed Exchange Rate Exposures

This Table presents results when we run separate regressions for positive and negative foreign exchange rate exposures for each of our three measures of exposures. broad_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the BROAD index. major_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the MAJOR index. oitp_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the OITP index. The other variables are as described in Table I. Panel A contains the results for the positive exposures and Panel B the results for the negative exposures. Robust standard errors are below the coefficients. Bootstrapped standard errors are below the robust standard errors for the currency exposures coefficients. Significance at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

Panel A: Results for Positive Currency Exposure

Variables	(1)	(2)	(3)	(4)	(5)	(6)
broad_beta	0.231***	0.090***				
	(0.03)	(0.02)				
		(0.01)				
major_beta			0.296***	0.096***		
			(0.03)	(0.02)		
				(0.02)		
oitp_beta					0.206***	0.069**
					(0.04)	(0.03)
						(0.02)
assets		-0.138***		-0.137***		-0.154***
		(0.02)		(0.02)		(0.03)
mb		-0.095***		-0.083***		-0.082***
		(0.02)		(0.02)		(0.02)
lev		0.665***		0.758***		0.870***
		(0.10)		(0.09)		(0.12)
profit		-0.423**		-0.532***		-0.327
		(0.19)		(0.18)		(0.20)
tang		-0.318***		-0.217***		-0.258**
		(0.08)		(0.07)		(0.10)
Z-score		-0.053***		-0.036**		-0.040**
		(0.02)		(0.02)		(0.02)
cfvol		0.132*		0.142*		0.196***
		(0.07)		(0.07)		(0.06)
loan_mat		-0.015		-0.013		-0.059**
		(0.02)		(0.02)		(0.02)
loan_size		-0.022		-0.013		-0.032
		(0.02)		(0.02)		(0.03)
loan_perf		-0.160***		-0.184***		-0.136***

		(0.04)		(0.03)		(0.04)
loan_collateral		0.684***		0.707***		0.644***
		(0.04)		(0.04)		(0.06)
macro_cs		25.499**		22.793**		11.666
		(12.47)		(9.62)		(15.07)
macro_ts		2.139		4.799		7.37
		(4.00)		(3.27)		(4.62)
Constant	3.039***	4.745***	3.083***	4.491***	3.498***	4.847***
	(0.53)	(0.45)	(0.52)	(0.42)	(0.33)	(0.46)
Observations	2411	2411	2970	2970	1768	1768
Adj. R-squared	0.158	0.612	0.158	0.623	0.138	0.612

Panel B: Results for Negative Currency Exposure

Variables	(1)	(2)	(3)	(4)	(5)	(6)
broad_beta	-0.165***	-0.049***				
	(0.02)	(0.01)				
		(0.01)				
major_beta			-0.229***	-0.054***		
			(0.02)	(0.02)		
				(0.01)		
oitp_beta					-0.112***	-0.021***
					(0.01)	(0.01)
						(0.01)
assets		-0.148***		-0.148***		-0.146***
		(0.02)		(0.02)		(0.02)
mb		-0.061***		-0.064***		-0.071***
		(0.01)		(0.01)		(0.02)
lev		0.871***		0.825***		0.778***
		(0.07)		(0.08)		(0.07)
profit		-0.860***		-0.821***		-0.851***
		(0.15)		(0.17)		(0.15)
tang		-0.073		-0.08		-0.101*
		(0.06)		(0.07)		(0.06)
Z-score		0.004		0.003		-0.001
		(0.01)		(0.01)		(0.01)
cfvol		-0.803		-0.736		-0.189
		(0.51)		(0.50)		(0.45)
loan_mat		0.007		0.009		0.016
		(0.02)		(0.02)		(0.02)
loan_size		-0.001		-0.011		0.003
		(0.02)		(0.02)		(0.02)
loan_perf		-0.180***		-0.170***		-0.183***

		(0.03)		(0.03)		(0.02)
loan_collateral		0.726***		0.724***		0.750***
		(0.03)		(0.04)		(0.03)
macro_cs		2.413		-0.62		9.494
		(8.38)		(9.87)		(7.40)
macro_ts		5.864**		5.361*		2.874
		(2.65)		(2.98)		(2.56)
Constant	4.522***	5.154***	4.698***	5.210***	4.737***	5.061***
	(0.59)	(0.26)	(0.57)	(0.29)	(0.48)	(0.25)
Observations	3805	3805	3246	3246	4448	4448
Adj. R-squared	0.148	0.64	0.138	0.629	0.132	0.635

Table VI
Foreign Income and the Effect of Foreign Exchange Rate Exposure on Loan Spreads

This Table presents results when we run separate regressions for positive and negative foreign exchange rate exposures for firms that report foreign income as a proportion of their total Income for each of our three measures of exposures. broad_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the BROAD index. major_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the MAJOR index. oitp_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the OITP index. fdincome is the reported foreign income divided by total income. The other variables are as described in Table I. Panel A contains the results for the positive exposures and Panel B the results for the negative exposures. Robust standard errors are below the coefficients. Significance at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

Panel A: Positive Exposures

Variables	(1)	(2)	(3)	(4)	(5)	(6)
fdincome	-0.011	0.052**	-0.041	0.014	-0.013	0.04
	(0.05)	(0.03)	(0.04)	(0.02)	(0.06)	(0.03)
wbroad_beta	0.251***	0.117***				
	(0.05)	(0.03)				
wmajor_beta			0.329***	0.097***		
			(0.06)	(0.04)		
woitp_beta					0.288***	0.146***
					(0.09)	(0.05)
assets		-0.139***		-0.139***		-0.151***
		(0.03)		(0.03)		(0.04)
mb		-0.235***		-0.207***		-0.147***
		(0.04)		(0.04)		(0.05)
lev		0.883***		0.936***		1.265***
		(0.20)		(0.17)		(0.23)
profit		-0.297		-0.425		-1.065*
		(0.34)		(0.34)		(0.55)
tang		-0.376**		-0.227*		-0.403**
		(0.15)		(0.14)		(0.20)
zscore		-0.086***		-0.056**		-0.024
		(0.03)		(0.03)		(0.03)
cfvol		1.068		1.429		0.36
		(1.89)		(1.70)		(1.10)
loan_mat		-0.018		-0.02		-0.077**
		(0.03)		(0.03)		(0.04)
loan_size		-0.060*		-0.038		-0.061
		(0.03)		(0.03)		(0.04)
loan_perf		-0.082		-0.148***		-0.075

		(0.06)		(0.05)		(0.08)
loan_collateral		0.638***		0.711***		0.648***
		(0.06)		(0.06)		(0.08)
macro_cs		17.409		8.702		14.427
		(17.75)		(13.96)		(25.96)
macro_ts		-1.912		4.323		8.899
		(6.20)		(4.95)		(7.66)
Constant	3.989***	7.272***	4.061***	6.826***	4.571***	7.008***
	(0.67)	(0.62)	(0.41)	(0.52)	(0.46)	(0.76)
Observations	919.00	919.00	1150.00	1150.00	608.00	608.00
R-squared	0.143	0.673	0.156	0.681	0.159	0.685

Panel B: Negative Exposures

Variables	(1)	(2)	(3)	(4)	(5)	(6)
fdincome	0.001**	0.003***	0.001**	0.003***	0.002***	0.003***
	0.00	0.00	0.00	0.00	0.00	0.00
wbroad_beta	-0.180***	-0.050***				
	(0.03)	(0.01)				
wmajor_beta			-0.201***	-0.050*		
			(0.04)	(0.03)		
woitp_beta					-0.122***	-0.033***
					(0.02)	(0.01)
assets		-0.208***		-0.211***		-0.199***
		(0.03)		(0.03)		(0.03)
mb		-0.085***		-0.078***		-0.117***
		(0.03)		(0.03)		(0.03)
lev		1.044***		1.047***		0.927***
		(0.13)		(0.15)		(0.12)
profit		-1.590***		-1.752***		-1.261***
		(0.29)		(0.31)		(0.27)
tang		-0.133		-0.131		-0.138
		(0.14)		(0.14)		(0.12)
zscore		0.019**		0.021***		0.007
		(0.01)		(0.01)		(0.01)
cfvol		-0.82		-0.603		0.44
		(0.82)		(0.85)		(0.95)
loan_mat		0.024		0.031		0.032
		(0.02)		(0.03)		(0.03)
loan_size		0.045		0.033		0.035
		(0.03)		(0.03)		(0.03)
loan_perf		-0.195***		-0.181***		-0.178***
		(0.05)		(0.05)		(0.04)

loan_collateral		0.741***		0.713***		0.730***
		(0.05)		(0.06)		(0.05)
macro_cs		3.982		8.757		6.58
		(13.73)		(16.10)		(12.54)
macro_ts		6.864*		4.39		3.195
		(3.97)		(4.20)		(3.67)
Constant	3.566***	4.930***	3.347***	4.979***	3.863***	5.038***
	(0.19)	(0.45)	(0.13)	(0.49)	(0.25)	(0.37)
Observations	1512.00	1512.00	1281.00	1281.00	1823.00	1823.00
R-squared	0.204	0.699	0.168	0.687	0.176	0.688

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table VII
Foreign Exchange Rate Exposure for Firms that do not report Foreign Income

This Table presents results when we run separate regressions for positive and negative foreign exchange rate exposures for each of our three measures of exposures for firms that do not report foreign income. broad_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the BROAD index. major_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the MAJOR index. oitp_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the OITP index. The other variables are as described in Table I. Panel A contains the results for the positive exposures and Panel B the results for the negative exposures. Robust standard errors are below the coefficients. Significance at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

Panel A: Positive Exposures

Variables	(1)	(2)	(3)	(4)	(5)	(6)
broad_beta	0.200***	0.075***				
	(0.03)	(0.02)				
major_beta			0.253***	0.095***		
			(0.04)	(0.03)		
oitp_beta					0.178***	0.060**
					(0.04)	(0.03)
assets		-0.138***		-0.133***		-0.154***
		(0.03)		(0.02)		(0.03)
mb		-0.050***		-0.043***		-0.055***
		(0.02)		(0.02)		(0.02)
lev		0.551***		0.652***		0.749***
		(0.12)		(0.10)		(0.12)
profit		-0.405*		-0.476**		-0.099
		(0.21)		(0.20)		(0.21)
tang		-0.302***		-0.221***		-0.221**
		(0.09)		(0.08)		(0.11)
zscore		-0.039*		-0.030*		-0.045*
		(0.02)		(0.02)		(0.02)
cfvol		0.074		0.076		0.149***
		(0.05)		(0.05)		(0.06)
loan_mat		-0.011		-0.008		-0.045
		(0.02)		(0.02)		(0.03)
loan_size		0.006		0.008		-0.017
		(0.03)		(0.02)		(0.03)
loan_perf		-0.192***		-0.200***		-0.143***
		(0.04)		(0.04)		(0.04)
loan_collateral		0.677***		0.677***		0.587***
		(0.06)		(0.05)		(0.06)

macro_cs		31.391**		27.184**		10.251
		(15.69)		(12.35)		(17.62)
macro_ts		0.117		2.882		3.16
		(4.90)		(4.03)		(5.05)
Constant	3.165***	4.146***	3.186***	4.016***	3.896***	5.055***
	(0.73)	(0.59)	(0.73)	(0.56)	(0.15)	(0.47)
Observations	1492	1492	1820	1820	1160	1160
R-squared	0.193	0.581	0.175	0.58	0.185	0.585

Panel B: Negative Exposures

Variables	(1)	(2)	(3)	(4)	(5)	(6)
broad_beta	-0.030***	0.001				
	(0.01)	(0.01)				
major_beta			-0.025*	-0.002		
			(0.02)	(0.01)		
oitp_beta					-0.029***	-0.006
					(0.01)	(0.01)
assets		-0.131***		-0.131***		-0.132***
		(0.02)		(0.02)		(0.02)
mb		-0.044***		-0.044***		-0.044***
		(0.01)		(0.01)		(0.01)
lev		0.712***		0.712***		0.715***
		(0.07)		(0.07)		(0.07)
profit		-0.438***		-0.440***		-0.435***
		(0.13)		(0.13)		(0.12)
tang		-0.177***		-0.177***		-0.178***
		(0.06)		(0.06)		(0.06)
zscore		-0.023**		-0.022**		-0.022**
		(0.01)		(0.01)		(0.01)
cfvol		0.089		0.09		0.088
		(0.06)		(0.06)		(0.06)
loan_mat		-0.011		-0.011		-0.011
		(0.02)		(0.02)		(0.02)
loan_size		-0.007		-0.007		-0.006
		(0.02)		(0.02)		(0.02)
loan_perf		-0.182***		-0.182***		-0.181***
		(0.02)		(0.02)		(0.02)
loan_collateral		0.699***		0.698***		0.696***
		(0.04)		(0.04)		(0.04)
macro_cs		9.188		9.291		9.101
		(8.40)		(8.39)		(8.39)
macro_ts		3.119		3.091		3.1

		(2.85)		(2.85)		(2.86)
Constant	4.036***	4.446***	4.017***	4.446***	4.019***	4.441***
	(0.46)	(0.31)	(0.46)	(0.31)	(0.47)	(0.31)
Observations	2293	2293	2293	2293	2293	2293
R-squared	0.092	0.572	0.089	0.572	0.094	0.572

Table VIII
Hedging effects on the impact of Exchange rate Exposure on Loan Spreads

This Table presents results of the effect of hedging on the relationship between positive and negative foreign exchange rate exposure on loan spreads when we run separate regressions. broad_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the BROAD index. major_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the MAJOR index. oitp_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the OITP index. hedge is a dummy variable that takes the value of one for firms that identified that they hedged their foreign exchange rate risk, zero otherwise. The other variables are as described in Table I. Panel A contains the results for the positive exposures and Panel B the results for the negative exposures. Robust standard errors are below the coefficients. Significance at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

Panel A

Variables	(14)	(15)	(16)	(17)	(18)	(19)
hedge	-0.343***	-0.135*	-0.228**	-0.014	-0.394***	-0.147*
	(0.13)	(0.08)	(0.11)	(0.07)	(0.15)	(0.09)
broad_beta	0.150**	0.006				
	(0.06)	(0.04)				
broad_beta*hedge	0.130*	0.099**				
	(0.08)	(0.05)				
major_beta			0.217***	0.021		
			(0.06)	(0.04)		
major_beta*hedge			0.107	0.052		
			(0.09)	(0.06)		
oitp_beta					0.275***	0.057
					(0.08)	(0.06)
oitp_beta*hedge					0.109	0.093
					(0.11)	(0.07)
assets		-0.138***		-0.143***		-0.133***
		(0.03)		(0.03)		(0.03)
mb		-0.092**		-0.085***		-0.084***
		(0.04)		(0.03)		(0.03)
lev		0.645***		0.775***		0.925***
		(0.13)		(0.13)		(0.15)
profit		-0.076		-0.427		0.137
		(0.27)		(0.26)		(0.25)
tang		-0.317**		-0.196*		-0.194
		(0.13)		(0.11)		(0.15)
zscore		-0.079***		-0.047*		-0.055**
		(0.03)		(0.02)		(0.02)
cfvol		0.755		1.187		2.023

		(0.91)		(0.78)		(1.59)
loan_mat		0.062**		0.056**		-0.001
		(0.03)		(0.03)		(0.03)
loan_size		-0.024		-0.01		-0.078**
		(0.03)		(0.03)		(0.03)
loan_perf		-0.165***		-0.209***		-0.069
		(0.04)		(0.04)		(0.05)
loan_collateral		0.720***		0.727***		0.704***
		(0.06)		(0.06)		(0.07)
macro_cs		44.773***		42.123***		61.616***
		(11.21)		(9.27)		(13.67)
macro_ts		6.759**		8.479***		6.04
		(3.08)		(2.58)		(3.92)
Constant	4.590***	5.394***	5.257***	5.096***	4.991***	5.691***
	-0.276	-0.508	-0.113	-0.378	-0.143	-0.583
Observations	1082	1082	1413	1413	764	764
R-squared	0.118	0.639	0.086	0.638	0.185	0.685

Panel B: Negative exposures

Variables	(14)	(15)	(16)	(17)	(18)	(19)
hedge	-0.229*	0.024	-0.219*	0.02	-0.264***	-0.01
	(0.12)	(0.06)	(0.13)	(0.07)	(0.10)	(0.06)
broad_beta	-0.140***	-0.048**				
	(0.03)	(0.02)				
broad_beta*hedge	-0.065	-0.022				
	(0.04)	(0.02)				
major_beta			-0.190***	-0.069**		
			(0.06)	(0.03)		
major_beta*hedge			-0.066	-0.011		
			(0.07)	(0.04)		
oitp_beta					-0.081***	-0.011
					(0.02)	(0.01)
oitp_beta*hedge					-0.056**	-0.036**
					(0.03)	(0.02)
assets		-0.131***		-0.126***		-0.146***
		(0.03)		(0.03)		(0.02)
mb		-0.064***		-0.065***		-0.072***
		(0.02)		(0.02)		(0.02)
lev		0.935***		0.856***		0.795***
		(0.10)		(0.11)		(0.10)
profit		-0.878***		-0.711***		-0.892***
		(0.22)		(0.24)		(0.21)

tang		-0.094		-0.118		-0.104
		(0.09)		(0.10)		(0.09)
zscore		-0.023		-0.043***		-0.037**
		(0.01)		(0.01)		(0.02)
cfvol		-0.032		0.002		0.044
		(0.89)		(0.84)		(0.68)
loan_mat		0.057***		0.061***		0.061***
		(0.02)		(0.02)		(0.02)
loan_size		-0.026		-0.039		0.001
		(0.03)		(0.03)		(0.02)
loan_perf		-0.150***		-0.119***		-0.157***
		(0.04)		(0.04)		(0.03)
loan_collateral		0.761***		0.782***		0.759***
		(0.05)		(0.05)		(0.04)
macro_cs		29.027***		30.853***		32.019***
		(8.00)		(9.07)		(6.95)
macro_ts		8.676***		8.762***		4.148**
		(1.98)		(2.29)		(1.79)
Constant	5.012***	5.257***	5.027***	5.312***	5.210***	5.060***
	(0.13)	(0.363)	(0.145)	(0.396)	(0.12)	(0.315)
Observations	2058	2058	1727	1727	2376	2376
Adj. R-squared	0.102	0.666	0.089	0.661	0.087	0.655

Table IX
The Impact of Foreign Exchange Rate Exposure on Loan Spreads during the Asian Crisis

This Table presents results of the effect of the Asian financial crisis on loan spreads and whether the effect of foreign exchange rate exposure on loan spreads changed during this period. broad_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the BROAD index. major_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the MAJOR index. oitp_beta is the currency exposure obtained from the regression of the firm's stock return on the percentage change of the OITP index. asian is a dummy variable that takes the value of one during the crisis period, zero otherwise. The other variables are as described in Table I. Panel A contains the results for the positive exposures and Panel B the results for the negative exposures. Robust standard errors are below the coefficients. Significance at the 1%, 5% and 10% level is indicated by ***, ** and *, respectively.

Panel A: Positive Exposures

Variables	(14)	(15)	(16)	(17)	(18)	(19)
asian	0.017	0.057	-0.039	-0.058	-0.118	-0.011
	(0.12)	(0.10)	(0.11)	(0.07)	(0.13)	(0.11)
broad_beta	0.232***	0.080***				
	(0.03)	(0.02)				
broad_beta*asian	-0.004	-0.033				
	(0.08)	(0.06)				
major_beta			0.319***	0.083***		
			(0.03)	(0.02)		
major_beta*asian			0.006	-0.002		
			(0.09)	(0.06)		
oitp_beta					0.218***	0.045
					(0.04)	(0.03)
oitp_beta*asian					0.051	0.018
					(0.10)	(0.08)
assets		-0.137***		-0.135***		-0.157***
		(0.02)		(0.02)		(0.02)
mb		-0.092***		-0.080***		-0.079***
		(0.02)		(0.02)		(0.02)
lev		0.617***		0.714***		0.813***
		(0.10)		(0.09)		(0.12)
profit		-0.435**		-0.584***		-0.322
		(0.19)		(0.18)		(0.21)
tang		-0.346***		-0.224***		-0.315***
		(0.08)		(0.07)		(0.11)
zscore		-0.056***		-0.039**		-0.045**
		(0.02)		(0.02)		(0.02)
cfvol		0.107		0.12		0.129**

		(0.08)		(0.08)		(0.06)
loan_mat		-0.016		-0.012		-0.057**
		(0.02)		(0.02)		(0.02)
loan_size		-0.018		-0.01		-0.023
		(0.02)		(0.02)		(0.03)
loan_perf		-0.109***		-0.140***		-0.065
		(0.03)		(0.03)		(0.04)
loan_collateral		0.695***		0.713***		0.656***
		(0.05)		(0.04)		(0.06)
macro_cs		31.730***		27.361***		30.083***
		(7.58)		(6.52)		(9.99)
macro_ts		8.598***		9.575***		6.803***
		(1.78)		(1.54)		(2.53)
Constant	3.215***	4.468***	3.231***	4.249***	3.313***	4.799***
	(0.064)	(0.314)	(0.054)	(0.277)	(0.077)	(0.412)
Observations	2411	2411	2970	2970	1768	1768
Adj. R-squared	0.091	0.601	0.089	0.611	0.088	0.591

Panel B: Negative Exposures

Variables	(14)	(15)	(16)	(17)	(18)	(19)
asian	-0.265***	-0.220***	-0.310***	-0.175**	-0.182**	-0.208***
	(0.10)	(0.06)	(0.12)	(0.07)	(0.09)	(0.05)
wbroad_beta	-0.169***	-0.069***				
	(0.02)	(0.01)				
wbroad_betaXasian	0.025	0.019				
	(0.05)	(0.03)				
wmajor_beta			-0.227***	-0.086***		
			(0.02)	(0.02)		
wmajor_betaXasian			0.035	0.05		
			(0.07)	(0.05)		
woitp_beta					-0.092***	-0.019***
					(0.01)	(0.01)
woitp_betaXasian					-0.064	-0.009
					(0.05)	(0.03)
assets		-0.147***		-0.145***		-0.146***
		(0.02)		(0.02)		(0.02)
mb		-0.059***		-0.062***		-0.065***
		(0.01)		(0.01)		(0.01)
lev		0.861***		0.802***		0.768***
		(0.07)		(0.08)		(0.07)
profit		-0.880***		-0.847***		-0.895***
		(0.15)		(0.16)		(0.15)

tang		-0.072		-0.103		-0.097
		(0.06)		(0.07)		(0.06)
zscore		0.001		-0.002		-0.004
		(0.01)		(0.01)		(0.01)
cfvol		-0.673		-0.52		-0.043
		(0.51)		(0.49)		(0.46)
loan_mat		0.002		0.006		0.003
		(0.02)		(0.02)		(0.02)
loan_size		0.008		0		0.01
		(0.02)		(0.02)		(0.02)
loan_perf		-0.139***		-0.116***		-0.136***
		(0.03)		(0.03)		(0.02)
loan_collateral		0.741***		0.744***		0.769***
		(0.03)		(0.04)		(0.03)
macro_cs		4.265		2.416		10.146*
		(6.29)		(7.31)		(5.47)
macro_ts		8.723***		8.912***		8.246***
		(1.41)		(1.58)		(1.24)
Constant	4.772***	5.356***	5.022***	5.320***	5.067***	5.197***
	(0.169)	(0.247)	(0.07)	(0.265)	(0.062)	(0.213)
Observations	3805	3805	3246	3246	4448	4448
Adj. R-squared	0.097	0.629	0.093	0.616	0.065	0.621

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1