

Foreign Exposure, Corporate Financial Policies and the Exchange Rate Regime in Emerging Markets: Evidence from Brazil

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Abstract

This paper studies the relationship between the choice of the exchange rate regime, companies' exchange rate exposure and corporate financial policies for a sample of non-financial Brazilian companies during the period from 1996 to 2002. I find that about 40% of the companies in the sample are exposed to fluctuations of the exchange rate during the whole period. Moreover, the results show that, foreign currency denominated debt, exports and hedging activities are the main determinants of companies' exchange rate exposure, and that, on average, Brazilian companies do not benefit from depreciations of the home currency. I also find that companies' exchange exposure varies considerably across the exchange rate regime. The number of companies exposed to fluctuations of the exchange rate regime is much lower under the floating regime than under the fixed one. The paper gives evidence that this reduction in the number of companies exposed to fluctuations of the exchange rate comes from the fact that under the floating exchange rate regime, not only do companies use currency derivatives more extensively, but they also reduce the currency mismatch in their balance sheets. The paper also shows that, independently of the exchange rate regime, larger firms and exporters are more likely to hold foreign denominated debt and to keep unhedged positions and that the use of currency derivatives is mainly determined by companies' desire to reduce the exchange rate exposure of the liability side of their balance sheets.

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1 Introduction

A stylized fact with respect to emerging countries is that these countries are much more vulnerable to swings in the international capital flows than developed ones. Periods of relative tranquility with substantial inflow of capitals and real GDP growth, are followed by periods when capital flows abroad, and output plummets¹. In some countries, such crises led not only to economic downturns but also to social unrest. Although there is a consensus among economists that these countries should adopt policies to alleviate this problem, there is no agreement about the role of the choice of the exchange rate regime on this matter. This paper takes a systematic look at the relationship between the choice of the exchange rate regime, country's financial vulnerability and corporate financial policies in emerging markets. Among other questions, it asks whether the choice of the exchange rate regime is able to mitigate country vulnerability to external shocks and if so what is the mechanism through which the choice of the exchange rate regime affects country vulnerability. I draw on a sample of non-financial Brazilian companies during the period from 1996 to 2002. Brazil provides a perfect natural experiment for analyzing the relationship between countries' vulnerability and the choice of exchange rate regime in emerging markets, since Brazil had a (quasi-) fixed exchange rate regime from 1995 to January 1999, and after that the currency was allowed to float freely².

At the center of the debate about the importance of the choice of the exchange rate regime in reducing countries' vulnerability is the fact that besides the traditional expenditure-switching effect, movements of the exchange rate due to the widespread dollarization of liabilities³ in emerging markets could cause a collapse in companies' balance sheets, leading to a fall in output. Therefore, the interaction between corporate balance sheets and fluctuations of the exchange rate might lead to undesirable outcomes⁴. The question levied by the literature is whether or not the choice of the exchange rate regime has any influence on corporate financial policies, more specifically on corporate borrowing and hedging policies.

One hypothesis in the international finance literature is that fixed exchange rate regimes would increase countries' vulnerability by leading companies to disregard the exchange rate risk, biasing their borrowing towards foreign currency denominated debt, and/or reducing their hedging activities. According to this hypothesis, floating regimes would help to reduce countries' vulnerability by in-

¹This is usually called in the international finance literature as the sudden stop problem.

²Besides, Brazil is one of the largest emerging countries, data for the currency denomination of the debt, the use of derivatives and exports are available for the whole period.

³I use the term dollarization for any asset or liability denominated in foreign currency. This term is used because most of liabilities in Latin American are expressed in American dollars.

⁴Even among politicians, there is a strong concern that the high levels of foreign denominated debt led the country to be vulnerable to external shocks. "It is very important to everybody to realize that Brazil is still a vulnerable economy. We are vulnerable because we owe a lot, and a fraction of this debt is expressed in dollars." Luis Inacio Lula da Silva, Brazilian President, 03/30/2004, O Globo.

ducing creditors and debtors to take seriously their exchange rate exposure⁵. On the other hand, the so-called 'original sin' theory⁶ argues that, independently of the exchange rate regime, emerging countries will always be vulnerable to external shocks. There will always be a currency mismatch on companies' balance sheets, since domestic companies would never be allowed to borrow in the domestic currency, and most of their revenues come from domestic activities⁷. In a similar way, Calvo and Mishkin (2003) argue that the construction of healthy macroeconomic institutions would be the key to countries' macroeconomic stability, and the choice of the exchange rate regime would likely be of second order importance to alleviate countries' external vulnerability .

Since the theoretical literature has not reached a consensus, at the end of the day, the answer for this question should be empirical, as pointed out by Eichengreen and Hausmann (1999), "...gathering survey (and other) data on hedged and unhedged exposures and analyzing their determinants should be a high priority for academics" . This paper sheds light on this question by studying the behavior of a sample of non-financial Brazilian companies from 1996 to 2002.

The main results can be summarized as follows. Fluctuations of the exchange rate can indeed be problematic for emerging markets like Brazil; about 40% of Brazilian companies are exposed to changes in the exchange rate over the whole period, and, unlike those in the US, Brazilian companies do not on average benefit from devaluations of the home currency. A 1% change in the exchange rate leads to a 0.22% fall in the average company's stock market returns. This paper also shows that the floating exchange rate regime has been able to reduce such exposure. Under the fixed exchange rate regime about 60% of the companies are exposed to fluctuations on the real exchange rate; this proportion drops to 23% under the floating exchange rate regime. The results confirm that foreign currency denominated debt is the main source of risk for Brazilian companies, and that exports and hedging activities are able to mitigate the negative exposure that comes from the impact of the fluctuations of the exchange rate on companies' foreign liabilities.

The paper shows that not only the proportion of companies that hold foreign currency denominated debt but also the ratio of total foreign debt to total debt is stable during the period. There is no indication that the ratio of total foreign debt to total debt varies across the different exchange rate regimes. The results also show that the solely use of the liability side might be misleading in analyzing the exposure of corporate sector to fluctuations of exchange rate. Although the ratio of total foreign debt to total debt is stable, the data shows that the adoption of a floating exchange rate regime is able to reduce the currency mismatches on companies' balance sheets. This reduction in companies'

⁵Examples are Dooley (1997), Burnside et al (1999), Schneider and Tornell (2003), Corsetti (1999), among others.

⁶Eichengreen, Hausmann and Panizza (2003)

⁷According the 'original sin' theory, this inability for borrowing in domestic currency would be related to the way international financial markets work and not with domestic policies like the choice of the exchange rate.

currency mismatches took place due to the fact that hedging activities by corporate sector vary substantially during the period. Our data shows that not only the number of users of derivatives but also the extent of hedging activities represent by the ratios of the amount of derivatives to total assets, the amount of derivatives to total foreign debt and the ratio of the amount of foreign assets to total assets increased during the period. The results also show that, independent of the exchange rate regime, larger firms and exporters are more likely to hold foreign debt and to keep unhedged positions and the use of currency derivatives is mainly determined by companies' desire to reduce the exchange rate exposure of the liability side of their balance sheets.

The paper proceeds as follows. In section 2, I review the literature about the relationship between the exchange rate regime, countries' vulnerability and corporate financial policies. In section 3, I analyze the Brazilian experience, and describe the data that will be used throughout the text. In section 4, I estimate companies' exchange rate exposure during the whole period and under the two exchange rate regimes. Then, I estimate the main determinants of companies' exchange rate exposure. Section 5 reports the results about the main determinants of corporate financial policies and their relationship with the choice of the exchange rate regime. Section 6 concludes.

2 Literature Review

The theoretical literature gives some guidance about the relationship between companies' capital structure and the choice of the exchange rate regime. The implicit guarantees theory argue that due to the existence of implicit government guarantees related to the choice of the exchange rate regime, corporate borrowing might be biased towards foreign currency denominated debt. Dooley (1997), in the spirit of the first generation models of currency crises, identifies financial crises as being caused by a policy conflict between the government's desire to insure financial liabilities of citizens and its desire to hold reserve assets as a form of self-insurance. According to the author, a fixed exchange rate regime would be an easy way to insure investors against losses, serving as an implicit guarantee. Burnside et al (1999) build a model in which implicit guarantees induce firms and financial intermediaries to borrow from abroad but do not completely hedge against exchange rate risk. According to the authors, a bank has no incentive to hedge since the expected value of this strategy is nil. In case of no devaluation, buying forward to hedge would generate losses to the bank, and, in case of devaluation, the government would seize profits derived from these hedging activities. Moreover, they show that absent government guarantees, it would be optimal for firms to hedge their exchange rate risk completely. They show that as a result of these guarantees, banks lower their interest rates, causing a boom in the economy, but this boom leads to a more fragile banking system and, consequently, to a financial crisis. Government guarantees are also present in Corsetti et al (1999). In their model, these guarantees lead to over-borrowing, translated as an unsustainable path for the current account deficit.

Since government bailouts are costly, speculators foresee the use of seigniorage by the government, causing the collapse of the currency.

Schneider and Tornell (2003) and Bris and Koskinen (2002) emphasize the role of government guarantees and asymmetries in sectoral behavior. Schneider and Tornell (2003) highlight the dichotomy between tradables and non-tradables. In their model, given the presence of bailout guarantees and the inability of the non-tradable sector to make a clear commitment to the repayment of its debt, currency mismatches arise endogenously, since foreign creditors would extend credit to the non-tradable sector. This currency mismatch would lead to a self-fulfilling crisis. Again, if there were no guarantees, managers would have no incentive to create currency mismatches. In the presence of bankruptcy costs, they would prefer to hedge the exchange rate risk. The authors show that under the fixed regime, firms in the non-tradable sector can grow faster by relaxing their borrowing constraints, but in the event of a depreciation, these companies will suffer heavily from balance sheet problems⁸.

Bris and Koskinen (2002) view the crisis as an attempt by the government to rescue exporters, given their high leverage and low profitability under the fixed exchange rate regime. Their argument rests on the fact that it is optimal for the government to save exports by allowing the currency to float since it wants to boost investment in the economy. The depreciation would increase the profitability of the exporter sector by increasing their revenues in foreign currency and lowering their costs in domestic currency.

Jeanne (2002) shows that foreign debt would be the result of optimal risk management by firms, given the lack of credibility of monetary authority. In a similar way, Goh and Olivier (2004) argue that the currency choice of the debt results from the interaction between the decisions of the firms and the central bank. When firms use foreign debt, they raise the cost of devaluation to the central bank, which in turn would make foreign borrowing more attractive.

Although slim, the literature on the relationship between the choice of the exchange rate regime and countries' vulnerability shows mixed results. Martinez and Werner (2002) found evidence that the fixed exchange rate regime in Mexico biased corporate behavior towards foreign debt. Arteta (2002) found in a cross-country sample that deposit dollarization is greater under floating regimes, while credit dollarization does not appear to differ across regimes; therefore he found little support for the view that flexible exchange rate regimes reduce currency mismatches.

3 Data and Macroeconomic Background

3.1 Macroeconomic Background

The Brazilian economy offers a perfect natural experiment in which to analyze the role of the exchange rate regime in determining corporate financial poli-

⁸The authors claim that this fact would explain the observed boom in the non-tradable sector before the recent currency crises.

cies. From 1995 to 1998, Brazil adopted a crawling-peg exchange rate regime⁹. During this period, Brazil suffered from several speculative attacks, especially during the Asian and Russian crises. The Central Bank reacted promptly to such attacks by raising interest rates in order to maintain the regime, demonstrating clearly its commitment to the exchange rate regime even at the cost of maintaining high interest rates, increasing the public debt, and causing an economic recession. Figure 1 shows the response of the Central Bank to these speculative attacks, and the behavior of some macroeconomic variables during the period. Table 1 shows that this first period is characterized by a low volatility of the nominal exchange rate and by a high volatility of the nominal interest rate, and domestic stock-market returns (Ibovespa).

After a speculative attack in January 1999, the currency was allowed to float, and an inflation-target system was adopted. After tightening monetary and fiscal policies, Brazil succeeded in stabilizing inflation and the exchange rate, and the economy recovered quickly from the crisis. Table 1 shows that under the floating regime the interest rate and stock-market volatilities were much lower than in the previous period, and the exchange rate volatility increased considerably, suggesting that 'fear of floating'¹⁰ was not a characteristic of the new regime. In 2002, due to the possibility that a new president not aligned with the current policies would be elected, a reversal of capital flow took place, and the exchange rate depreciated more than 50% during the year with a consequent rise in inflation. This caused the Central Bank to react by raising the interest rates.

3.2 Data

I gather data from two main sources: Economatica, and companies' annual reports. Economatica gives stock market returns and accounting data for all publicly traded companies in Brazil. I also gather data directly from companies' annual reports, if information is not available, or to confirm the quality of the data. I use data from a sample of Brazilian non-financial companies from 1996 to 2002. The description of all variables used throughout the text is shown in the appendix. The period from 1996 to 2002 was chosen not only because it is possible to compare the behavior of the companies under different exchange rate regimes, but also because the use of derivatives was required to be reported only after 1995¹¹. I use data for all the companies that were in the database in 1996 and stayed until 2002, a total of 165 companies. This is a subset of all available companies, but I use this procedure in order to give a better comparison of companies' behavior under the two different exchange rate regimes.

I use the index from Sao Paulo stock exchange (IBOVESPA) as my domestic market return. I use the 30-day SELIC interest rate as my risk-free rate. All variables are deflated by the general index of prices (IGP). As observed by

⁹Strictly speaking a system of bands was adopted with the top and bottom of the band being devalued at a fixed rate.

¹⁰Calvo and Reinhardt (2001).

¹¹Securities and Exchange commission of Brazil - CVM instruction Nr. 235/1995

Dahlquist and Robertsson (2001), and Dominguez and Tesar (2001) the use of a trade-weighted exchange rate might lead the researcher to reject the hypothesis that companies are exposed since fluctuations on different exchange rates might cancel out, resulting in a rejection of the hypothesis that the company is exposed. In order to avoid this problem, and since most of Brazilian trade is in American dollars and almost all foreign debt is issued in this currency, I develop the analysis of companies' exchange rate exposure by using the exchange rate Real/Dollar. Therefore, I adopt the convention that companies with positive (negative) exposure benefit (suffer) from depreciations of the home currency. This definition will be carried throughout the text.

There is no systematic information about foreign sales. Sometimes it is reported together with gross sales, sometimes under the comments from the managers to shareholders, or in the explanatory notes. Some companies mentioned being exporters, but did not report the amount of sales; in this case, I contacted the companies directly through electronic mail. In the end, I had to discard seven companies that mentioned being exporters but neither reported the amount of their foreign sales nor answered my mails.

Hedge and foreign currency debt variables are available in the annual reports under the explanatory notes. The amount of foreign debt is located under the item loans and financing. Hedge activity is registered under the item financial instruments. I use two measures for foreign currency denominated debt. The first one is the total amount of foreign debt borrowed by the company. The second is the total amount of foreign debt that is left unhedged. The amount hedged is defined as the sum of the total amount of currency derivatives used, and the total amount of foreign assets hold by the company. I group foreign assets as any asset the company holds that earn the variation in the nominal exchange rate plus a premium during the period. These can be Treasury bonds (NTN-E), Central Bank bonds (NBC-E), assets invested in foreign banks, and cash in foreign currency.

This division between total and unhedged debt has the objective to shed light on the debate about the difference between original sin and currency mismatches. The 'original sin' is defined by Eichengreen et al (2003) as the inability of some countries to borrow abroad in domestic currency¹², they argue that the original sin is linked to the way international financial markets work and it cannot be alleviate by domestic policies like the choice of the exchange rate regime or development of domestic financial markets. In opposition, Goldstein and Turner (2004) argue that measures of currency mismatches would be better indicators of countries' financial vulnerability, and that might not be a direct relationship between original sin and currency mismatches. They also argue that healthy macroeconomic policies might alleviate the problem of currency mismatches.

¹²In a previous paper, Eichengreen and Hausmann (1999) gave a broader definition of original sin as not only the inability to borrow from abroad in domestic currency, but also the inability to finance long-term projects with loans of the same maturity. Here we will analyze only the later definition, since the authors seem to disregard now the former definition.

Table 2 shows the summary statistics for the main variables in this paper. Table 2 reports that although the number of exporters is stable during the period from 1996 to 2002, the ratio of foreign sales to total sales increased. Yet, two different patterns arise. During the fixed exchange rate regime, there was a reduction in the ratio of foreign sales to total sales; this path is inverted after the currency was let to float, when the ratio increased steadily.

Table 2 also shows the behavior of corporate foreign borrowing during the period. Table 2 reports that not only the proportion of companies that hold foreign currency denominated debt but also the ratio of foreign debt to total debt is stable during the period. There is no indication that the ratio of foreign debt to total debt varies across the exchange rate regime or it depends on the credibility of the monetary authority¹³. Table 2 also shows that exporters and companies in the tradable sector hold a higher proportion of foreign debt to total debt than non-exporters or non-tradable companies, but there is no evidence of different behavior between sectors during the time period. Both sectors had similar behavior, with the ratio of foreign debt to total debt stable during the period.

Table 2 shows how might be misleading by considering only the liability side of companies' balance sheets in analyzing their exposure to the exchange rate. Although the ratio of total foreign debt to total debt is stable during the period, the ratio of foreign unhedged debt varies substantially. The ratio reaches a peak in 1997, and decreases steadily after that. Moreover, again exporters hold higher levels of unhedged positions than non-exporters and their behavior is similar across time with both sectors trying to reduce their unhedged positions. Yet, different patterns arise when we analyze sectoral differences between the behavior of tradable and non-tradable sectors. The ratio of foreign unhedged debt to total debt reaches a peak in 1997 for the non-tradable sector, and it decreases steadily afterwards. In opposition, for the non-tradable sector, the ratio of foreign unhedged debt to total debt reaches a peak in 1998 right before the currency crisis, and afterwards it reduces steadily and in 2002 it is almost a half of the ratio right before the crisis, a more acute reduction than in the tradable sector.

Table 2 reports that hedging activities were the main responsible for the changes that occur in companies' financial policies during the period. It shows that companies' hedging activities vary considerably from 1996 to 2002. Table 2 shows that not only the number of users of derivatives and the number of companies that hold foreign assets but also the extent of hedging activities represent by the ratios of the amount of derivatives to total assets, the amount of derivatives to total foreign debt and the ratio of the amount of foreign assets to total assets increased from 1996 to 2002. This facts contradicts Eichengreen and Hausmann (1999) that assert the possibility that an increasing in the volatility of the exchange rate would lead to higher costs of hedging, therefore one could observe less, not more hedging when exchange rates are less stable. The results

¹³From 1996 to 2002, besides two different exchange rate regimes, the Central Bank had several Governors.

are partially confirmed by the BIS triennial survey of foreign exchange and derivatives market activity in 1998 and 2001. The data shows that the daily foreign exchange turnover - the sum of spot, forward and swap markets - in Brazil increased from US\$3,418millions in 1998 to US\$4,612millions in 2001.

Table 3 reports summary statistics for the main cross-section determinants of companies' choice of the currency composition of the debt. Size seems to matter for companies' choice between domestic and foreign debt. Larger firms hold higher levels of foreign debt. Risk management variables are also important determinants of the currency composition of the debt. Companies with higher ratio of foreign sales to total sales and companies with foreign subsidiaries hold higher levels of foreign currency denominated debt. It corroborates with Caballero and Krishnamurthy (1999) where unconstrained firms (exporters) hold higher leverage ratios. Investment opportunities represented by the market-to-book ratio appears not to be important to the determination of the currency composition of the debt. There is a (weak) relationship between asset tangibility and the choice of the debt. Debtors have higher ratio of asset tangibility; therefore, there is a (weak) role for collateral in the choice of debt¹⁴. Profitability proxied by companies' gross margin is not statistically different between debtors and non-debtors. This contradicts Jeanne (1999) where more profitable firms would use foreign debt to signal their types. The same happens with respect to ownership, there is no significant difference between domestic and foreign firms with respect to their choice between domestic and foreign debt. Companies that have equities listed abroad represent by a dummy variable that assumes the value of 1 if the company issued ADR- American Depository Receipts hold higher levels of foreign debt. It would be possible that these companies would be more likely to have better access to borrow from abroad, since there will be easier to lenders to acquire information about them.

Table 4 reports summary statistics for companies hedging activities. Table 4 shows that the number of companies that use currency derivatives and those that use foreign assets increased steadily during the period from 1996 to 2002. Table 4 also shows that companies prefer to use currency derivatives rather than foreign assets to hedge their exposure. During the whole period, more than half of the hedgers preferred currency derivatives to foreign assets. Table 5 reports the results for the choice among currency derivatives. It shows that currency swaps are the most preferred among all possible derivatives. This can be viewed as evidence that the hedging activities of Brazilian companies are linked to their attempt to reduce their foreign currency exposure, and are not for speculative purposes, since swaps are usually preferred when the sources of exposure extend for multiple periods but are predetermined. This is the case when liabilities are denominated in foreign currency. By contrast, forward contracts are preferred when the main source of exposure is related to short-term transactions that are characterized by uncertainty. This is the case of foreign revenues derived from exports. These practices are completely different from those found in

¹⁴Booth et al (2001) argue that the fragility of the judiciary system in emerging markets leave a weak role for domestic collateral since it would be difficult to the lender to enforce the contracts.

previous studies of developed countries. Geczy et al (1997) show for a sample of U.S. companies that forward contracts, or a combination between forwards and options contracts, were the most preferred instruments. Judge (2002) finds similar results for a sample of British companies. He finds that forwards were the most frequently used instruments, followed by swaps and options. The preference for swaps is stable across periods and is therefore independent of the exchange rate regime. It might be evidence that the main concern of Brazilian hedgers was the possibility that fluctuations of the exchange rate could affect their liabilities. This fact will be tested in next section.

Table 6 reports summary statistics for the comparison between users and non-users of currency derivatives. Although Table 6 like table 3 does not show any causal relationship, it helps to clarify the differences between foreign currency derivative users and non-users. Companies can use foreign assets as substitutes for or complements to the use of derivatives. Table 6 suggests that Brazilian companies see foreign assets as a complement to the use of derivatives; derivatives users have higher ratios of foreign assets to total assets than non-users. The corporate finance literature states that the relationship between the use of derivatives and size of the company is ambiguous. If fixed costs of hedging are important, one would expect large companies to hedge more than small firms. In opposition, if small firms are more constrained, therefore more dependent on their internal funds, they would hedge more in order to avoid fluctuations in their cash flow. Table 6 shows that under the floating exchange rate regime users of currency derivatives are larger than non-users, and that this relationship is weaker under the fixed exchange rate regime. This might be an indicator that larger firms that were exposed during the fixed regime try, with the adoption of the floating regime, to reduce their exposure by increasing their hedging activities. Table 6 also supports the idea that companies use currency derivatives to reduce their foreign exposure. Companies with higher ratios of foreign sales to total sales, firms that have foreign operations, and those with higher levels of foreign debt to total debt are more likely to use currency derivatives. If firms want to hedge in order to mitigate the underinvestment problem, theory says that firms with higher growth opportunities would hedge more. Table 6 shows that this pattern does not appear in the data. There is no systematic relationship between investment opportunities measured by the market-to-book ratio and the use of derivatives. Only for 2000 does the t-test not reject the hypothesis that the mean of the market-to-book ratio is higher for users of currency derivatives. Finally, there is evidence that companies hedge as a way to signal to investors. Derivative users issue more ADRs than non-users. Hedging would signal to investors that a firm is trying to minimize fluctuations of its cash flow and thus maximize the value of the company. Table 6 corroborates with this hypothesis, indicating a positive relationship between the use of currency derivatives and the issuance of ADRs. In addition, there is a (weak) relationship between ownership and the use of derivatives. Foreign companies seem to use more intensively currency derivatives. Nance et al. (1993) argue the probability that more profitable firms make less intense use of currency derivatives, since they will be more able to offset variation in their cash flow. Yet, the data shows

no statistical difference between users and not users of currency derivatives with respect to their profitability.

4 Exchange Rate Exposure

The international finance literature characterizes the impact on companies' cash flow as the channel through which companies would be exposed to fluctuations of the exchange rate¹⁵. Therefore, the determination of the relationship between fluctuations in companies' cash flow and changes in the exchange rate is the central question for a better understanding of companies' foreign exposure. Yet, as argued by Bodnar and Wong (2000), the use of cash flow variables is not easily applicable for cross-firm comparisons, since it would make the analysis extremely complex¹⁶.

Adler and Dumas (1984) show that assuming that company's value is the present value of future cash flows, a company's exposure to fluctuations in the exchange rate could be determined by the elasticity of the firm value with respect changes on the exchange rate. This approach has been extensively used in the corporate finance literature, and it is used in this paper in order to determine companies' vulnerability to fluctuations in the exchange rate, and the relationship with the exchange rate regime.

4.1 Methodology

I follow a two-step procedure in order to estimate companies' exchange rate exposure¹⁷. In the first step, I regress the market portfolio on the changes in the exchange rate, estimating the following regression,

$$R_{market,t} = \gamma_0 + \gamma_1 \cdot \Delta s_t + \varepsilon_t \quad (1)$$

Then, I get the component of the market portfolio return that is orthogonal to the change in the exchange rate by calculating $F_{market,t} = R_{market,t} - (\hat{\gamma}_0 + \hat{\gamma}_1 \cdot \Delta s_t)$. Finally, I estimate the following equation,

$$R_{j,t} = \beta_j + \beta_{j,market} \cdot F_{market,t} + \beta_{j,exposure} \cdot \Delta s_t + \nu_{j,t} \quad (2)$$

where $R_{j,t}$ is the monthly excess stock return of firm j , $F_{market,t}$ is the estimated orthogonal component of the market portfolio (Ibovespa), and Δs_t is the percentage change in the real exchange rate over the same period.

This approach has several advantages with respect to the other procedures in the literature. First, it allows measuring the exchange rate exposure in absolute terms, and not relative to the market portfolio exposure. Second, it circumvents the critiques made by Bodnar and Wong (2000). They show that if one regress

¹⁵Shapiro (1974), Hodder (1982), Levi (1983), and Flood and Lessard (1986)

¹⁶See Marston (1998) for more details about the difficulties that arise from the use of cash flow variables.

¹⁷Bris et al. (2002) use a similar procedure.

a firm's stock market return on changes in the exchange rate as presented by Adler and Dumas (1984), the estimated exchange rate exposure captures not only the sensitivity of a firm's value to changes in the exchange rate, but also the relation between exchange rate changes and macroeconomic factors that affect the market value of the firm.

They also show that a possible solution to this problem would be to add a market portfolio return in the estimation in order to control for macroeconomic variables. They show that this specification also has some drawbacks. They argue that if the researcher uses a value-weighted portfolio return as the market portfolio return, the coefficient of the changes in the exchange rate cannot be interpreted as a 'total' exposure, but should be interpreted as the difference between the firm's total exposure elasticity and the market exposure adjusted by the firm's market beta. Therefore, if the market portfolio is exposed to the exchange rate, the distribution of the firm's exposure will be shifted. They also argue that because large firms have more weight in value-weighted portfolios, and these firms are more likely to be exposed to fluctuations in the exchange rate (since they usually are multinational corporations) the estimates of the firm's exposure would be biased.

Since in our method, given I orthogonalize the domestic market returns, I am able to measure the exchange rate exposure in absolute terms and control for macroeconomic changes over the period. Yet, I show the results without the orthogonalization to show the clear advantages of the method.

4.2 Results

Table 7 shows that some interesting results arise from the estimation of companies' exchange rate exposure. First, table 7 shows the destabilizing potential of fluctuations of the exchange rate. On average, Brazilian companies do not benefit from a depreciation of the domestic currency. According model (2) with orthogonalized market returns, a one-percent depreciation of the home currency leads to a 0.22 percent fall in stock market returns. This result confirms the hypothesis that in relatively closed and high indebted emerging countries like Brazil, depreciations of the home currency are more likely to cause a fall in asset prices¹⁸.

Table 7 also reinforces the significance of the fluctuations of the exchange rate. In both models, about 40% of the companies are exposed to fluctuations of the exchange rate; this result is well above a random choice model, showing that these estimates are not the result of a spurious relationship between two high volatile variables.

Table 7 also confirms the importance of orthogonalizing the market returns. Using the market portfolio as the control variable, the number of companies with positive and negative significant exposure is almost the same. Once we

¹⁸Similar results are found by Dominguez and Tesar (2001) for Thailand. They find that most of significant exposures are negative. Using aggregate data, Berganza et al. (2003) found that an unexpected real depreciation, significantly raise country's risk premium.

orthogonalize the market returns, the number of companies with negative exposure increases considerably. Since in Brazil larger firms dominate market portfolio, and these companies, as shown in Rossi (2003), are more likely to hold debt denominated in foreign currency, the market portfolio is likely to be negatively affected by changes in the exchange rate¹⁹. Because market portfolio is negatively exposed to fluctuations of the exchange rate, it is expected that when controlling using the market portfolio, a higher number of companies with significant positive exposure and a lower number of companies with negative exposure show up, since these estimated exposures are relative to the market portfolio. Yet, once market portfolio is orthogonalized, there is a reduction in the number of companies with positive exposure, and an increase in those with negative exposure, since we now have absolute exposures, which are not relative to the market portfolio.

4.2.1 Exchange Rate Exposure and the Exchange Rate Regime

The results in table 7 can be interpreted as companies' average exposure over the period between 1996 and 2002. As argued by Dumas and Solnik (1995), and de Santis and Gerard (1998), the assumption that companies' exposure does not vary with time is too strong, especially during our period of estimation, when Brazil changed its exchange rate regime from a fixed exchange rate regime to a floating one. Table 8 sheds light on this subject. I divide the sample into the fixed exchange rate period from January 1996 to October 1998, and a flexible exchange rate period from April 1999 to December 2002. I discard the data from November 1998 to March 1999, since it corresponds to the period of the currency crises.

Table 8 shows that the floating exchange rate regime indeed helps to alleviate the problem of companies' exposure to fluctuations in exchange rate. Under the floating exchange rate regime, only 23% of the companies are exposed to fluctuations in the exchange rate; however, under the fixed exchange rate regime more than 60% of the companies are exposed to fluctuations in the exchange rate.

Table 8 also shows that independent of the exchange rate regime, the median of the companies' exchange rate exposure has a negative value, implying that although the adoption of a flexible exchange rate regime is able to reduce the number of companies significantly exposed, fluctuations in the exchange rate are still problematic for a reasonable number of companies.

4.3 The Determinants of Companies' Exchange Rate Exposure

The result found in the previous section, that the floating exchange rate regime was able to reduce the number of companies with a significant exchange rate exposure, might be driven by different factors, since the exchange exposure

¹⁹Indeed, the result of the estimation of the first step shows that ; confirming the hypothesis that market portfolio is negatively exposed.

of a company is related to multiple factors. In order to discriminate among these different factors, in this section I analyze the different determinants of companies' exchange rate exposure.

The literature identifies two types of exchange rate exposure: Economic and Translation exposure. Economic exposure represents the impact of changes in the exchange rate on companies' cash flow; this is the type of exposure we are concerned with, since it will affect the market value of the firm. Economic exposure can be divided into transaction and operating exposures. Transaction exposure takes place when a company has a contract denominated in foreign currency which is to be settled at a future date. Companies that sell products, that buy inputs from abroad, and that have foreign currency denominated debt are all subject to transaction exposure. The ratio of foreign sales to total sales is expected to be positively correlated with companies' exchange exposure since exporters benefit from depreciations of the home currency. The opposite is true for importers and foreign currency debtors.

Operating exposure reflects the effects of changes in the exchange rate on companies' financial or operational contracts. This type of exposure is directly related to the degree of competition that the company has. Depreciations of the domestic currency reduce the competitiveness of the foreign companies, since it raises the price of imported goods in domestic currency, leading to an improvement in domestic companies' cash flow ; therefore, domestic companies that compete more fiercely with foreign ones are expected to be more exposed to fluctuations in the exchange rate.

Translation exposure refers to the effect of changes in the exchange rate on companies' financial accounting statements; companies that have foreign subsidiaries are subject to translation exposure, since the value of their foreign assets varies with changes in the exchange rate. It is important to realize that this type of exposure does not affect companies' cash flow, only their financial statements.

Companies would reduce their exposure to fluctuations of the exchange rate by making use of hedging instruments. The literature identifies two types of hedge: Operational hedges, and financial hedges.

Operational hedges pertain to companies with foreign subsidiaries, since these companies will be protected from fluctuations of the home currency by having a fraction of their revenue coming from abroad. The literature identifies operational hedges as being more effective for long-term fluctuations of the exchange rate.

Financial hedges stand for the use of currency derivatives - swaps, futures, forwards, and options - to mitigate companies' foreign exposure. This type of hedging is usually associated with short-term fluctuations of the exchange rate.

None of the many previous studies analyzes the determinants of foreign exposure for emerging markets; they primarily focus on developed countries. Jorion (1990) finds for a sample of American companies a positive relationship between the ratio of foreign sales and foreign exposure. Bodnar and Gentry (1993) find for a sample of U.S., Canadian and Japanese companies that non-traded industries and industries with higher import ratios gain from appreciations of the

domestic currency, the opposite with respect to industries with higher export ratios. Moreover, they find that except for the U.S., industries with a higher level of the use of internationally-priced inputs benefit from appreciations, and companies with foreign assets have positive exposures. He and Ng (1998), for a sample of Japanese multinational companies, are able to link foreign exchange exposure with export ratio and variables that might explain the use of currency derivatives. Guay (1999) found that firm risk declines following derivatives use. Carter et. al. (2001) finds evidence that operational hedges (foreign operations) and financial hedges (use of derivatives) effectively reduce foreign currency exposure. Allayannis and Ofek (2001) find a positive relation between exchange rate exposure and the ratio of foreign sales to total sales and a negative relationship between the use of currency derivatives and foreign exposure, showing that foreign currency derivatives are effective in reducing companies' foreign exposure. Similar results are found by Hagelin and Pramborg (2004) for a sample of Swedish companies.

4.3.1 Results

In order to perform a more formal analysis of the main determinants of companies' exchange rate exposure, I estimate the following equation:

$$\begin{aligned} \beta_j = & a_0 + a_1.(\text{Foreign Sales} / \text{Total Sales}) \\ & + a_2.(\text{Foreign Debt} / \text{Total Debt}) \\ & + a_3.(\text{Derivatives} / \text{Total Assets}) \\ & + a_4.(\text{controls}) + \varepsilon_j \end{aligned} \quad (3)$$

where are the foreign currency exposures estimated in table 7. The independent variables are the average of the variables during the sample period. The results are shown in Table 9.

The results in Table 9 indicate that there is a positive relationship between size and exchange rate exposure. Larger companies may be able to better manage fluctuations of the exchange rate, leading to a positive relationship between exposure and the size of the company.

As expected, the ratio of foreign sales to total sales is positively related to companies' exchange rate exposure. According to the model (2), a one percent change in the ratio of foreign sales to total sales has a positive effect on the exposure of the companies by 1.41 percent. Agreeing with our predictions, the ratio of foreign debt to total debt negatively affects companies' exchange rate exposure. A one percent increase in the ratio of foreign denominated debt to total debt negatively impacts companies' foreign exposure by 1.15percent. This result indicates the importance of the negative balance sheet effects on companies' value. Foreign denominated debt is the main source of risk for Brazilian companies, and the results show that the negative effect of the interaction between foreign debt and fluctuations of the exchange rate is not negligible.

Results in Table 9 show that the use of currency derivatives does alleviate companies' exposure to fluctuations in the exchange rate. If the ratio of the amount of derivatives to total assets increases by one percent, companies' exposure changes by 0.42. This positive effective of the use of currency derivatives on companies' foreign exposure is also robust with respect to the model used in the estimation, and with respect to the inclusion of control variables.

The results do not confirm the hypothesis that operational hedges have positive effects on companies' exchange rate exposure. A dummy that assumes the value 1 if the firm has foreign subsidiaries is not statistically significant in all specifications, and it has the opposite sign from what was expected. Therefore, it seems that markets do not care whether companies have operations abroad.

Endogeneity Issues Results in table 9 may suffer from endogeneity problems. Foreign borrowing and hedging activities may be, respectively, able to boost or mitigate companies' exchange rate exposure, but the causation may run in the opposite direction. Companies whose exchange rate exposure is higher may have restricted their access to international capital markets, reducing their capacity to borrow from abroad, besides these companies would be more willing to use currency derivatives in order to reduce their exposure. Therefore, a higher level of exposure may cause low levels of foreign borrowing and a more extensive use of currency derivatives, leading to a negative correlation between exchange rate exposure and the ratio of foreign debt to total debt and a positive correlation between exposure and the use of currency derivatives. Usually this problem is not analyzed in the empirical literature; I move one step further by trying to solve this problem.

It is necessary to find instrumental variables to solve this simultaneity and endogeneity problem. The optimal capital structure and hedging literature shed light on possible instruments for the estimation of (3).

In a survey of the empirical literature, Harris and Raviv (1991) found that, among other factors, leverage is negatively related to growth opportunities, and profitability, and positively related to fixed assets. Companies with greater growth opportunities are expected to use less debt in order to avoid underinvestment costs related to debt overhang problems (Jensen and Meckling 1976). In addition, firms with lower investment opportunities, debt would serve to limit the agency costs (Jensen 1986, Stulz 1990). Moreover, Froot et al. (1993) argue that given capital market imperfections, firms would hedge in order to mitigate their underinvestment problem. Therefore firms with higher growth opportunities are more likely to use currency derivatives. I define companies' growth opportunities as the ratio of capital expenses to total sales and I use this variable in my baseline instrumental variable estimation.

The more tangible the firms' assets, the greater its ability to issue secured debt. Since foreign debtors are more likely to demand collateral, companies with higher tangible assets, will be more likely to borrow from abroad. These companies would be more likely to keep unhedged positions, therefore I expect a negative relationship between tangibility and the use of currency derivatives.

Table 10 shows the results of the instrumental variable estimation. First, it is possible to see that endogeneity is indeed a problem in our estimation. A standard Hausmann test rejects the hypothesis that the coefficients are the same in the weighted least squares and in the instrumental variables estimation. Yet, the main results are robust to this problem. Size positively affects companies' exchange rate exposure. The same with respect to exports, an increase in one percent in the ratio of foreign sales to total sales increases the exposure by 1.92 percent.

Once we control for endogeneity, the role of foreign denominated debt on companies' risk is even more pronounced. An increase of one percent in the ratio of foreign debt to total debt leads to a negative effect on companies' exposure by 4.45 percent. Therefore, there is much ado about this problem. The incapacity of emerging markets of borrowing in domestic currency is a severe source of risk to these countries.

Yet, The use of derivatives is indeed effective to reduce companies' exchange rate exposure. An increase of one percent in the ratio of derivatives to total assets is able to raise the companies' exposure by 3.10 percent.

One possible problem of the IV estimation is that if our instruments are weak, our 2SLS estimates may be biased. The joint F tests on the instrumental variables showed in table 10 are above the critical values computed by the econometric literature (Staiger and Stock 1997, Stock and Yogo 2003). Therefore, according to these tests, our instruments are not weak.

Moreover, in order to test the quality of the baseline instruments, I perform a test for the validity of the instruments by considering two other possible instruments. Jeanne (1999) argues that more profitable firms would use foreign debt as a way to sign their types to foreign investors. Therefore, more profitable firms would borrow more from abroad. In addition, the pecking order theory (Myers and Majluf 1984) point out that in the presence of informational asymmetries high quality firms would prefer finance through internal funds if they perceive foreign debt as being less costly, more profitable companies would have higher levels of foreign debt to total debt. This leads to a positive relationship between foreign debt and profitability. Moreover, Nance et al.(1993) argues that companies might use their profits as a substitute to the use of currency derivatives. Therefore, more profitable companies would be less likely to use currency derivatives. I define the companies' gross margin as my measure of profitability.

Other possible instruments would be companies' ownership. Foreign owned companies would be more willing to borrow from abroad, and there will be more opportunities to use currency derivatives. It indicates a positive relationship between foreign ownership and foreign borrowing, and a negative relationship with hedging.

Then, I add to the baseline regression additional instruments and perform a Hausmann test for overidentification. The results reported in table 11 show that our instruments are good. The Hausmann test fails to reject the overidentification in all cases, strong indicating the validity of the results.

5 The Determinants of Corporate Financial Policies

In this section, I analyze empirically the main determinants of companies' currency choice of the debt, currency mismatches and hedging activities during the period from 1996 to 2002. I use the following empirical specification:

$$dependent_{j,t} = (\alpha_j + \alpha_t) + \alpha_{\text{explanatory}} \cdot X_{j,t} + \varepsilon_{j,t} \quad (4)$$

Where *dependent* are the dependent variables: The ratio of total foreign debt to total debt, the ratio of total foreign unhedged debt to total debt designed mismatch since it is a better proxy for companies' exposure to fluctuations of the exchange rate and the ratio of total amount of currency derivatives to total assets²⁰. α_j and α_t represent, respectively, firm and time effects and $X_{j,t}$ is the set of explanatory variables.

This specification allows me to control not only for differences across firms that are not captured by the explanatory variables but also the effect of the change on the macroeconomic environment that took place during the period.

Equation (4) is estimated using a fixed (within) estimator²¹. In addition to this fixed-time effects specification, I also utilize a second specification in order to control for a possible endogeneity of the explanatory variables. Decisions of hedging and borrowing might be taking simultaneously by the firms; therefore, a simultaneous equation framework is estimated in order to control for this problem²². I use a two-stage estimation method. In the first-stage, OLS regressions are estimated for the foreign debt and hedging equations, than equation (4) is estimated by replacing the endogenous variables with the fitted values from the first stage.

5.1 Results

The results for estimation of (4) over the whole period are in Tables 12 and 13. Table 12 shows that there is a positive statistically significant effect between size represented by the logarithm of companies' total sales and companies' currency choice of the debt. Larger firms hold more foreign currency denominated debt.

²⁰Similar results were found using the ratio of total amount of derivatives to total foreign debt.

²¹The fixed-effects estimator might give poor estimators if measurement error exists in the data. Then, I also estimate a pooled ordinary least squares and the results showed here were unchanged. I also run a Hausman specification test in order to choose between a fixed and random effects specification. The results lead us to choose the fixed effects specification. Another possible concern would be the possibility of selection bias. In order to deal with this problem, I also perform two-stage Heckman estimation. Again, the results were unchanged. Given the characteristics of the dependent variables, a Tobit panel estimation can also be performed, the results are also robust to the use of this specification. Since all specifications suffer from some problem, and the statistical tests are in favor of the fixed effects estimation, I use this as my baseline specification. All results are available upon request.

²²Note that only the ratio of foreign debt to total debt and the ratio of derivatives to total assets are considered as endogenous.

Allayannis et al (2003) argue that this result can be viewed as evidence in favor of the market depth hypothesis. If domestic financial markets are not deep enough to satisfy companies' demand for funds, and if size is a good proxy for the probability of companies exhaust lending in domestic markets, one should expect larger firms to borrow more from abroad. This possibility is confirmed by the results.

The ratio of foreign sales to total sales is also a significant determinant of companies' foreign borrowing; it is showed by the positive coefficient of the ratio of foreign sales to total sales. Exporters can afford to borrow more in foreign currency since they are perceived to be less propense to suffer from unexpected devaluations of the home currency, given a proportion of their revenues are in the same currency²³.

The evidence that more profitable firms borrow more in foreign currency in order to signal their types as argued by Jeanne (2000) is provided by the positive coefficient on the gross margin variable. More profitable companies would borrow more in foreign currency than less profitable companies. We find that the use of currency derivatives alleviate companies' financial situation by allowing them to borrow more from abroad. It is showed by the positive relationship between the ratio of foreign debt to total debt and the use of currency derivatives.

Although all variables appear with their expected signs, table 6 shows that there is no statistically significant relationship between the ratio of foreign debt to total debt and if the company has foreign subsidiaries, its growth opportunities, its ratio of asset tangibility, its ownership and if the firm has issued ADRs.

Table 12 also shows the coefficient on the proxy for size is positive and significant in the estimation of the determinants of companies hedging activities. This result is consistent with the existence of fixed costs of hedging during the period. Table 6 reports that the ratio of foreign debt to total debt is a significant determinant of the extent of companies' hedging activities. Adding the fact that the swap is the most used currency derivative it is possible to conclude that Brazilian companies use currency derivatives in order to reduce the exposure of their balance sheets to fluctuations in the exchange rate.

Different than in previous works, Table 6 reports that neither the ratio of foreign sales to total sales nor the foreign operations dummy are statistically significant determinants of companies' hedging activities. Moreover, there is no evidence that Brazilian companies use currency derivatives to alleviate the underinvestment problem. The market-to-book ratio is not statistically significant in any of the specifications.

Finally, I find that companies that issue ADRs are more likely to hedge. These firms would try to send a signal to foreign investors that they are trying to maximize the value of the company by avoiding disruptions on their cash flow. Therefore, there is a positive relationship between the dummy for ADR,

²³Same result found by Aguiar (2002) and Gelos (2003) for Mexico, and Bleakley and Cowan (2002) for a panel of Latin-American companies.

and the extent of the use of derivatives.

As discussed above, it might be the case that our estimation suffers from a simultaneity bias between foreign borrowing and hedging. Table 13 controls for this problem by using a simultaneous equation estimation. The qualitative results for the determinants of companies' total foreign debt are robust with respect to the simultaneity problem. Yet, the results for the determinants of hedging activities are quite different. Now, size is not a significant determinant of companies' hedging activities. In addition, defying expectations, there is a negative relationship between the extent of hedging and the ratio of foreign sales to total sales²⁴. Brazilian exporters might see their foreign sales as a 'natural' hedge to the exposure that comes from their foreign currency liabilities. Moreover, exporters give low probability to the possibility of an appreciation of the domestic currency; therefore they do not expect a loss of revenues due to fluctuations in the exchange rate. Given the costs of hedging, they prefer not to hedge.

Table 13 also reports that there is a negative relationship between asset tangibility and hedging activities. If foreign debt is the main risk factor for these companies, companies with more tangible assets will be more willing to have enough collateral to keep unhedged positions, implying a negative relationship between asset tangibility and hedging activities. Under the simultaneity equations estimation, ownership is also statistically significant. Domestic firms are less willing to use currency derivatives, a possible indication that domestic firms have less expertise in managing currency derivatives.

Table 13 also reports there is a positive and significant relationship between size and companies' unhedged positions. It might be an indication of the existence of bailout guarantees during the period. Larger companies would be more likely to receive any bailout in case of a crisis; therefore, these companies do not hedge their foreign exposure, keeping more foreign unhedged debt. Note that size is not a statistically significant determinant of companies hedging activities. Exporters can also afford to be exposed to fluctuations of the exchange rate, since they have a 'natural' hedge to offset any fluctuation of the exchange rate on their liability side.

5.2 Corporate Financial Policies and the exchange rate regime

Tables 13 and 13 were estimated over the whole period between 1996 and 2002. Yet, as argued above, it might be the case that there is an interaction between the choice of the exchange rate regime and corporate financial policies. In order

²⁴I give anecdotal evidence by quoting a Brazilian journalist. "Brazilian exporters should have avoided the complaints about the appreciation of the Real if they have considered that a floating exchange rate regime does not mean a movement towards a higher devaluation of the currency. As proved in recent times, the real can appreciate with respect to the dollar...Exporters could have avoided the losses caused by the volatility of the exchange rate by hedging their exposures, but they didn't do it, because they expected the Real to depreciate even more, and by hedging they would limit the value of their revenues". Sonia Racy, O Estado de São Paulo, 08/12/2003.

to analyze this possibility, I perform the same estimation than in the previous section, but now a split the sample in two periods according the choice of the exchange rate regime . Tables 14 and 15 show the results for the simultaneous equation approach since the previous results indicate that there is simultaneity in companies' borrowing and hedging activities²⁵.

Tables 14 and 15 show a very similar pattern under both exchange rate regimes with respect to the determinants of currency choice of the debt. Under both regimes, larger firms and companies with higher ratio of foreign sales to total sales are more able to borrow in foreign currency. The ratio of asset tangibility and the use of derivatives seem to only matter under the fixed exchange rate regime with respect to the determination of the ratio of foreign debt to total debt.

Hedging activities of large firms seem to be main difference with respect to the use of currency derivatives under both regimes. Under the fixed regime, there is a negative relationship between size and the ratio of the use of currency derivatives to total assets. In opposition, under the flexible regime, there is a positive (not significant) relationship between size and the extent of hedging. It reinforces the possibility that if larger companies are more able to receive government bailouts, the implicit guarantees theory would assert that these companies would lead more unhedged positions and they would make hedge less under the fixed exchange rate regime, in opposition, these companies would hedge more under the flexible exchange rate regime.

Another difference between the two regimes with respect to the use of derivatives is that under the fixed regime companies with higher ratio of tangible assets use less currency derivatives. Moreover, under the flexible regime, companies with ADRs make a more extensive use of currency derivatives, implying that the signaling motive to hedge is more important under the flexible regime.

Following the same pattern under the whole period, companies under both exchange rate regimes use currency derivatives to reduce their foreign exposure coming from foreign debt. In all specifications, there is a positive relationship between the use of currency derivative and the ratio of foreign debt to total debt. Similarly, it seems that under both regimes, companies with higher ratio of foreign sales to total sales make a less extensive use of currency derivatives

Under both exchange rate regimes, larger companies and exporters are more able to keep unhedged positions. Tables 14 and 15 also report that there is a positive relationship between companies' asset tangibility and the ratio of foreign unhedged debt under both regimes, implying that collateral plays a role under both regimes. Moreover, under the flexible exchange rate regime, companies that have issued ADRs keep lower levels of unhedged positions, a way to sign to foreign investor their superior management of their foreign exposure.

Overall, the results show that the main determinants of companies' financial policies are robust with respect to the exchange rate regime. Variables linked to companies' size and foreign exposure are the main determinants of companies'

²⁵I estimate from 1996 to 1998 for the fixed exchange rate regime and from 2000 to 2002 to the floating regime; therefore, I skip 1999 since this was the year of the crisis.

foreign borrowing, currency mismatches and hedging activities. It seems that the adoption of a flexible exchange rate regime gives less weight to companies' size, and more in the risk management variables.

6 Conclusion

This paper analyzes the relationship between the choice of the exchange rate regime, countries' financial vulnerability and corporate financial policies for a sample of non-financial Brazilian companies. Some interesting patterns arise from the analysis. First, the paper shows that the number of companies vulnerable to fluctuations of the exchange rate in an emerging country like Brazil is much higher than the number in developed countries. In the period between 1996 and 2002, around 40% of companies were exposed to fluctuations on the exchange rate Real against Dollar. Second, I show that this exposure varies according to the exchange rate regime. The number of companies exposed during the floating exchange rate regime is much lower than under the fixed one. I estimate that the ratio of foreign sales to total sales, the ratio of foreign debt to total debt, and the extent of companies' hedging activities are the main determinants of companies' exchange rate exposure.

Moreover, The paper shows that companies' foreign currency borrowing does not vary with the choice of the exchange rate. The ratio of foreign debt to total debt is quite stable during the period, indicating that the choice of the exchange rate does not seem to alleviate companies' financial situation. Yet, the paper shows that the exclusive use of foreign debt as a risk variable might be misleading. The paper shows that companies' currency mismatch reduces steadily after the adoption of the floating exchange rate regime. This reduction took place due to the fact that under the floating regime not only more companies use currency derivatives, but also they use more extensively this financial instruments. The paper also gives evidence that size and foreign exposure are the main determinants of companies' financial policies, and that the adoption of a flexible exchange rate regime gives less weight to companies' size, and more in the risk management variables.

Eichengreen and Hausmann (1999) define the "original sin" as the difficulty for domestic firms in emerging markets to borrow in local currency. According to them, it is not the case that these companies do not want to hedge their exposure, but that they are not allowed to do it, since hedging would mean these companies could borrow in local currency. As a result, both fixed and floating regimes would be problematic for these countries. I show that, at least with respect to Brazil, this is not completely true. I provide some evidence that the floating regime can mitigate the problem of the 'original sin'. I show that not only does the floating regime induce more firms to hedge, but also that these companies hedge more their currency exposure, leading them to reduce the currency mismatch on their balance sheets. Therefore, there is a clear relationship between the choice of the exchange rate, and countries' vulnerability. Under the floating exchange rate regime, countries are less vulnerable. Being

less vulnerable does not mean that the floating exchange rate regime completely insulates countries from external shocks. Fluctuations in the exchange rate are still problematic for the country, but the floating exchange rate regime leads companies to be more aware of the risk of keeping unhedged positions, thus reducing the possibility of huge economic downturns. Brazil is a clear example of such a situation. In 2002, under the floating regime, the Real depreciated more than 50% and months later the Brazilian economy was back on track, showing that the floating regime induced companies to be prepared for sudden swings in the behavior of the exchange rate. Therefore, even if the choice of the exchange rate might not be the primary solution for the reduction of countries' external vulnerability, it is clearly an important piece of the puzzle.

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Appendix

Description of Variables

- Foreign Equity Listing - Dummy variable assumes the value of 1 if the company issues American depositary receipts.
- Total Foreign Debt - Total foreign currency denominated debt reported by companies' reports under the item loans and financing.
- Foreign Unhedged Debt - Total Foreign Debt minus the notational amount of currency Derivatives minus the total amount of foreign assets.
- Foreign Assets - The total amount of assets the company holds that earn the variation in the nominal exchange rate plus a premium during the period. These can be Treasury bonds (NTN-E), Central Bank bonds (NBC-E), assets invested in foreign banks, and cash in foreign currency.
- Foreign Debt / Total Debt - Total Foreign debt in US\$ converted to Reais by the exchange rate at the end of the year divided by the total debt expressed in Reais.
- Mismatch - Total Foreign unhedged debt in US\$ converted to Reais by the exchange rate at the end of the year divided by the total debt expressed in Reais.
- Foreign Sales / Total sales - Foreign sales in US\$ converted to Reais by the exchange rate at the end of the year divided by the total sales expressed in Reais.
- Foreign Operations - dummy variable assumes the value 1 if the company has foreign production subsidiaries.
- Gross Margin - Total calculated EBIT divided by sales.
- Tangibility - Total Assets minus Current Assets divided by Total Assets.
- Market-to-Book - Market Value of Equity divided by net worth.
- Size - The logarithm of Total gross Sales in Reais converted to US\$ by the exchange rate at the end of the year.
- Ownership - Dummy variable that assumes the value 1 if the firm is owned by domestic agents and 0 otherwise.
- Derivatives / Total assets - Total notational amount of currency derivatives divided by total assets. The amount of derivatives is reported in companies' annual reports under the item financial instruments.

Figure 1
Macroeconomic Performance

Figure 1 shows Brazilian macroeconomic performance from 1996 to 2002. Interest rate is SELIC basic rate, Exchange rate is Real versus US\$ dollar, and inflation is calculated using IGP-DI. Source: Central Bank of Brazil.

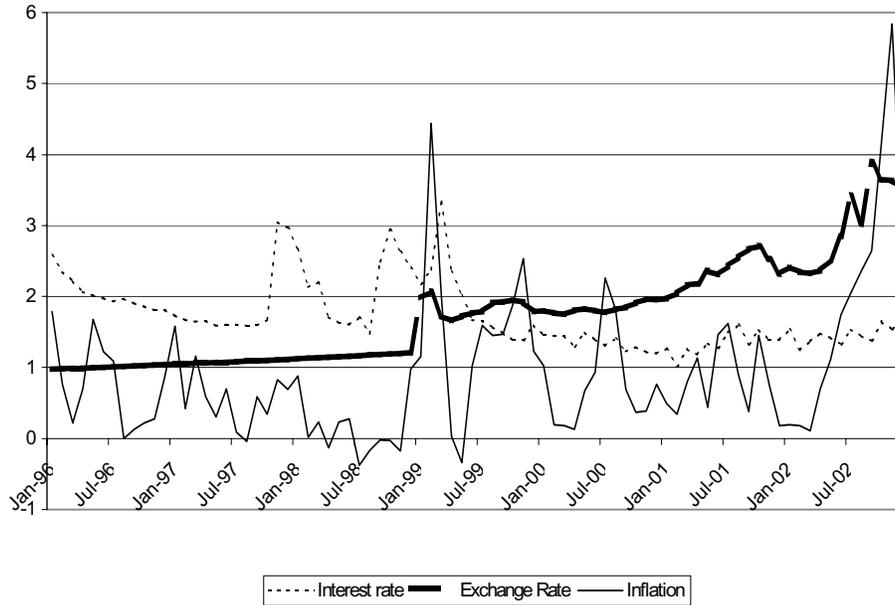


Table 1
Interest rate and Exchange Rate Volatility

Table 1 reports the standard deviation of monthly percent changes in the SELIC interest rate, the nominal exchange rate Real versus Dollar, and domestic stock market returns (Ibovespa) in Reais. Source: Central Bank of Brazil, and Economática.

Year	Interest Rate	Exchange Rate	Ibovespa(in Reais)
1996	3.11%	0.08%	6.04%
1997	24.07%	0.11%	12.16%
1998	24.26%	0.17%	16.99%
1999	17.70%	19.73%	10.29%
2000	8.23%	2.00%	8.89%
2001	13.95%	5.04%	9.90%
2002	11.56%	11.60%	10.50%

Table 2
Summary Statistics

Table 2 reports summary statistics for the variables used in the analysis.

	1996	1997	1998	1999	2000	2001	2002
Number of firms	165	165	165	165	165	165	165
Exporters (%)	61.0	61.2	62.7	63.0	63.4	63.0	63.4
Foreign Sales / Total Sales (%)	14.8	14.4	14.3	16.1	16.1	16.5	18.0
Debtors (%)	84.1	82.4	86.1	82.4	80.5	80.6	81.1
Total Foreign Debt / total debt (%)	47.9	49.5	48.1	50.0	48.5	47.8	49.4
Exporters	57.7	59.7	56.6	59.4	58.8	57.3	59.1
Non-Exporters	31.9	33.6	33.8	34.0	30.7	31.6	32.0
Tradable	51.3	52.3	50.9	53.6	51.5	50.3	53.3
Non-Tradable	34.3	32.7	35.8	33.8	34.7	36.8	33.7
Foreign unhedged Debt / Total Debt (%)	45.9	46.3	41.4	41.4	37.8	32.6	31.3
Exporters	55.1	56.2	49.5	50.6	46.9	41.5	39.8
Non-Exporters	30.6	30.1	27.8	25.9	22.0	17.4	16.6
Tradable	48.4	49.9	44.1	45.1	40.8	35.8	35.0
Non-Tradable	28.6	26.7	29.5	25.3	24.0	17.6	14.9
Users of Currency Derivatives (%)	7.92	9.70	14.5	19.4	25.0	34.5	40.2
Holder of Foreign Assets (%)	3.63	4.84	9.64	14.5	18.3	24.2	26.9
Derivatives / Total Assets	0.64	0.67	1.15	1.41	1.78	3.29	4.73
Derivatives / Total Foreign Debt	5.02	3.25	6.52	7.78	11.8	18.9	24.9
Foreign Assets / Total Assets	0.39	0.47	0.94	1.37	1.72	2.14	2.10

Table 3
Summary Statistics

Table 3 shows the results for two-samples t-test of equality of means between companies that hold foreign currency denominated debt and non-holders. Tests assume equal variances unless the null-hypothesis of equal variances is rejected at a 5% level of significance. Asterisks (*,**) denote statistical significance at 5%, and 10% level of significance.

Variable/Year	Debtor	1996	1997	1998	1999	2000	2001	2002
Foreign Debt / Total Debt	No	0	0	0	0	0	0	0
	Yes	56.8	60.1	55.8	60.6	60.3	59.3	60.9
Size (Total Sales) in US\$ millions	No	445	412	458	316	321	336	281
	Yes	961**	1,015**	962**	827*	1,023*	1,018*	785*
Foreign Sales / Total Sales (%)	No	2.80	2.65	2.67	5.35	3.03	3.56	3.49
	Yes	17.4*	16.9*	16.2*	18.4*	19.3*	19.7*	21.4*
Foreign Operations Dummy	No	0.038	0.034	0.043	0.039	0.033	0.031	0.031
	Yes	0.195*	0.198*	0.188*	0.191*	0.197*	0.203*	0.203*
Market-to-Book ratio	No	1.16	0.98	1.03	3.32	1.05	1.41	1.47
	Yes	1.56	1.71	1.37	2.38	1.27	1.32	2.90
Tangibility	No	0.49	0.53	0.57	0.59	0.57	0.59	0.60
	Yes	0.65*	0.64*	0.63	0.62	0.60	0.60	0.56
Gross margin	No	0.26	0.25	0.24	0.21	0.25	0.26	0.23
	Yes	0.23	0.24	0.24	0.28	0.28	0.28	0.29
ownership	No	0.96	0.96	0.96	0.97	0.94	0.94	0.94
	Yes	0.92	0.91	0.91	0.90	0.90	0.89	0.89
Foreign Equity Listing	No	0	0	0	0	0	0	0
	Yes	0.17*	0.17*	0.17*	0.18*	0.18*	0.18*	0.18*

Table 4

Summary Statistics for Companies' Hedging Activities

Table 4 reports firms' choice of hedging and the extent of their hedging activities from 1996 to 2002 to all firms in the sample. Foreign Assets include government bonds, and investment abroad. Currency Derivatives include the use of swaps, futures, and options.

	1996	1997	1998	1999	2000	2001	2002
Number of firms	165	165	165	165	165	165	165
Only Foreign Currency Derivatives	10	12	18	22	27	35	41
Only Foreign Assets	3	4	10	14	16	18	19
Both	3	4	6	10	14	22	25
Total	16	20	34	46	57	75	85

Table 5
The Choice of Currency Derivatives

Table 5 shows the choice of currency derivatives among Brazilian companies reported in their annual reports from 1996 to 2002.

Year / Type	1996	1997	1998	1999	2000	2001	2002
Swap	8	8	17	24	27	39	49
Swap+Forwards	2	3	2	4	7	10	10
Swap+Options	0	0	0	0	0	0	0
Swap+Options+Forward	0	0	0	0	2	3	3
Forward	3	3	3	2	4	4	3
Options	0	1	1	1	1	1	1
Options+Forward	0	1	1	1	0	0	0
Total	13	16	24	32	41	57	66

Table 6
Summary Statistics

Table 6 shows the results for two-samples t-test of equality of means between users and non-users of foreign currency derivatives. Tests assume equal variances unless the null-hypothesis of equal variances is rejected at a 5% level of significance. Asterisks (*,**) denote statistical significance at 5%, and 10% level of significance.

Variable/Year		1996	1997	1998	1999	2000	2001	2002
Number	No	152	149	141	133	124	108	99
	User	13	16	24	32	41	57	66
Foreign Assets / Total Assets (%)	No	0.27	0.30	0.53	0.96	1.00	1.22	1.16
	User	1.81**	2.05**	3.41*	3.12**	3.85*	3.89*	3.49*
Total Sales (US\$ Millions)	No	838	860	860	676	497	483	373
	User	1,364	1,360	1,081	992	2,050**	1,687**	1,156**
Foreign Sales / Total Sales	No	0.13	0.13	0.13	0.14	0.14	0.13	0.14
	User	0.34*	0.30*	0.24**	0.25**	0.23**	0.23*	0.24*
Foreign Operations Dummy	No	0.16	0.15	0.15	0.15	0.14	0.12	0.11
	User	0.31	0.38**	0.29	0.25	0.27**	0.26*	0.26*
Foreign Debt / Total Debt	No	0.46	0.47	0.44	0.44	0.41	0.40	0.39
	User	0.72*	0.75*	0.72*	0.74*	0.71*	0.64*	0.66*
Market-to-book Ratio	No	0.76	0.91	0.70	1.28	0.40	0.69	1.32
	User	0.87	0.76	0.47	1.25	1.25*	0.63	1.30
Foreign Equity Listing	No	0.13	0.13	0.11	0.09	0.08	0.07	0.08
	User	0.38**	0.38**	0.38*	0.38*	0.34*	0.28*	0.24*
Ownership	No	0.93	0.93	0.92	0.92	0.93**	0.94**	0.93
	User	0.92	0.88	0.88	0.88	0.80	0.82	0.85
Gross Margin	No	0.24	0.24	0.24	0.27	0.27	0.27	0.27
	User	0.22	0.24	0.24	0.29	0.29	0.30	0.30

Table 7
Exchange Rate Exposure for Brazilian Companies 1996-2002

Table 7 reports the mean, median, maximum, and minimum of companies' exchange rate exposure. Model 1 stands for the estimation of the equation: $R_{jt} = \alpha_j + \beta_{market,j} \cdot R_{market,t} + \beta_j \cdot \Delta s_t + \varepsilon_{jt}$. Where R_{jt} is the monthly excess stock return of firm j , $R_{market,t}$ is the market portfolio excess

return (Ibovespa) and Δs_t is the percentage change in the real exchange rate over the same period. Model 2 stands for the estimation of $R_{jt} = \alpha_j + \beta_{market,j} \cdot F_{market,t} + \delta_j \cdot \Delta s_t + \varepsilon_{jt}$. Where R_{jt} is the monthly stock return of firm j, $F_{market,t}$ is the estimated orthogonal component of the market portfolio, and Δs_t is the percentage change in the real exchange rate over the same period. Table 2 reports the number of firms with positive and negative significant exposure at 10% level of significance. Newey-West consistent covariance matrix is estimated.

Model	(1)	(2)
Mean	-0.032	-0.22
Median	-0.10	-0.24
Maximum	2.97	2.33
Minimum	-1.48	-1.68
Negative	27	55
Positive	24	9
Number of Companies	165	165

Table 8
Exchange Rate Exposure for Brazilian Companies and the Exchange rate regime

Table 8 reports the mean, median, maximum, and minimum of companies' foreign exposure for two different periods. Fixed stands for the fixed exchange rate period from Jan.1996 to Oct. 1998. Flexible stands for the floating exchange rate regime from April.1999 to December 2002. Model 1 stands for the estimation of the equation: $R_{jt} = \alpha_j + \beta_{market,j} \cdot R_{market,t} + \beta_j \cdot \Delta s_t + \varepsilon_{jt}$. Where R_{jt} is the monthly excess stock return of firm j, $R_{market,t}$ is the market portfolio excess return (Ibovespa)

and Δs_t is the percentage change in the real exchange rate over the same period. Model 2 stands for the estimation of $R_{jt} = \alpha_j + \beta_{market,j} \cdot F_{market,t} + \beta_j \cdot \Delta s_t + \varepsilon_{jt}$ Where R_{jt} is the monthly stock return of firm j , $F_{market,t}$ is the estimated orthogonal component of the market portfolio, and Δs_t is the percentage change in the real exchange rate over the same period. Table 3 reports the number of firms with positive and negative significant exposure at 10% level of significance. Newey-West consistent covariance matrix is estimated.

	Model 1		Model 2	
	Fixed	Flexible	Fixed	Flexible
Mean	0.009	-0.066	-0.18	-0.25
Median	-0.13	-0.041	-0.27	-0.23
Maximum	5.34	2.30	4.98	1.66
Minimum	-2.64	-2.21	-2.85	-2.32
Negative	64	13	72	31
Positive	39	14	29	7
Number of Companies	165	165	165	165

Table 9
The Determinants of foreign currency exposure

Table 9 shows the results of the estimation of the determinants of foreign currency exposure by weight least squares with the weight equals to the standard deviation of companies' exchange rate exposure estimated in the first step. The following equation was used in the estimation:

$$\beta_i = \text{const} + a_1 \cdot (\text{Foreign Sales} / \text{Total Sales}) + a_2 \cdot (\text{Derivatives} / \text{Total Assets}) + a_3 \cdot (\text{Foreign Debt} / \text{Total Debt}) + a_4 \cdot \text{controls} + \varepsilon_i$$

Where β_i are the foreign currency exposures estimated in table 2 . *,** means significance at 5, and 10% . Standard errors are in parenthesis. Both models are estimated by weighted least squares.

Variable	Model (1)	Model (2)
Constant	-3.01(0.49)*	-2.99(0.45)*
Size (log Total Sales)	0.29(0.05)*	0.27(0.04)*
Foreign Sales / Total sales	1.68(0.28)*	1.41(0.26)*

Derivatives / Total assets	0.59(0.23)*	0.47(0.22)*
Foreign Debt / Total debt	-1.26(0.22)*	-1.15(0.21)*
Foreign Operations	-0.38(0.25)	-0.33(0.22)
R^2	0.43	0.45

Table 10
The Determinants of foreign currency exposure – Instrumental Variables Estimation

Table 10 shows the results of the estimation of the determinants of foreign currency exposure by instrumental variables. The following equation was used in the estimation:

$$\beta_i = \text{const} + a_1 \cdot (\text{Foreign Sales} / \text{Total Sales}) + a_2 \cdot (\text{Derivatives} / \text{Total Assets}) + a_3 \cdot (\text{Foreign Debt} / \text{Total Debt}) + a_4 \cdot \text{controls} + \varepsilon_i$$

Where β_i are the foreign currency exposures estimated in table 2 using the orthogonalized returns.

*,** means significance at 5, and 10% . Standard errors are in parenthesis.

Variable	IV-2SLS	First Stage Foreign Debt / Total Debt	First Stage Derivatives / Total Assets
Constant	-1.50(1.63)	-0.54(0.19)*	-0.77(0.18)*
Size (log Total Sales)	0.31(0.14)*	0.09(0.01)*	0.08(0.01)*
Foreign Sales / Total sales	1.92(0.59)*	0.41(0.10)*	0.25(0.10)*
Derivatives / Total assets	3.10(1.71)**	-	-
Foreign Debt / Total debt	-4.45(1.28)*	-	-
Foreign Operations	-0.62(0.44)	-0.002(0.06)	0.002(0.7)
Capital Expenses to Sales		-0.28(0.16)**	0.17(0.05)*
Tangibility		0.24(0.13)**	-0.23(0.12)**

F (instruments)		14.99	10.29
R^2	0.27	0.32	0.24

Table 11
Test for the validity of the instruments

Table 11 shows the results of the estimation of equation (3) by using a different set of instruments. *, ** means significance at 5, and 10% . Standard errors are in parenthesis.

Variable	Baseline	Add Gross Margin	Add Ownership
Derivatives / Total assets	3.10(1.71)**	3.12(1.64)**	1.86(1.04)**
Foreign Debt / Total debt	-4.45(1.28)*	-4.44(1.26)*	-4.06(1.02)*
χ^2		0.0012	0.895
P-value		1	0.98

Table 12
Results for the determinants of Corporate Financial policies

Table 12 reports the results for the determinants of the companies' financial policies during the period from 1996 to 2002. Total Foreign debt stands for the total amount of foreign currency denominated debt. Derivatives stands for the ratio of total amount of currency derivatives to total assets. Results are from a fixed effects estimation. Time dummies are included. Asterisks (*, **) denote 5%, and 10% level of significance.

Variable	Total Foreign Debt		Derivatives		Mismatch	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Size	0.064*	0.008	0.005*	0.001	0.040*	0.009
Foreign Sales / Total Sales	0.22*	0.07	-0.004	0.011	0.15*	0.074
Foreign Debt / Total debt	-	-	0.025*	0.006	-	-
Foreign Operations Dummy	0.039	0.049	-0.005	0.007	0.070	0.052
Market-to-book ratio	0.001	0.001	-0.001	0.001	0.001	0.001
Tangibility	0.055	0.057	-0.029*	0.011	0.20*	0.06
Gross Margin	0.14*	0.06	-0.009	0.011	0.091	0.066

Ownership	0.035	0.041	-0.04	0.07	0.032	0.046
Foreign Equity Listing	0.029	0.054	0.012**	0.06	-0.080	0.057
Derivatives / Total Assets	0.55*	0.13	-	-	-	-
Foreign Assets / Total assets	-	-	0.018	0.039	-	-
N	1150		1150		1150	

Table 13
Results for the determinants of Corporate Financial policies – Simultaneous Equation

Table 13 reports the results for the determinants of companies' financial policies during the period from 1996 to 2002. Total Foreign debt stands for the total amount of foreign currency denominated debt. Mismatch stands for the ratio of the total amount of foreign debt left unhedged to total debt. Derivatives stands for the ratio of total amount of currency derivatives to total assets. Results are from a simultaneous equation estimation. Time dummies are included. Asterisks (*,**) denote 5%, and 10% level of significance.

Variable	Total Foreign Debt		Derivatives		Mismatch	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Size	0.062*	0.0093	0.0016	0.0022	0.040*	0.009
Foreign Sales / Total Sales	0.25*	0.064	-0.021**	0.011	0.15*	0.074
Foreign Debt / Total debt	-	-	0.049*	0.024	-	-
Foreign Operations Dummy	0.043	0.044	-0.0011	0.0044	0.070	0.052
Market-to-book ratio	0.001	0.008	0.002	0.002	0.001	0.001
Tangibility	0.087	0.059	-0.027*	0.0077	0.20*	0.06
Gross Margin	0.14*	0.058	-0.002	0.011	0.091	0.066
Ownership	0.033	0.040	-0.0099**	0.0053	0.032	0.046

Foreign Equity Listing	0.020	0.049	0.018*	0.0048	-0.080	0.057
Derivatives / Total Assets	1.24**	0.71	-	-	-	-
Foreign Assets / Total assets	-	-	0.042	0.035	-	-
N	1150		1150		1150	

Table 14

Results for the determinants of the determinants of corporate financial policies – Fixed regime

Table 14 reports the results for the determinants of companies' financial policies during the period from 1996 to 1998. Total Foreign debt stands for the total amount of foreign currency denominated debt. Mismatch stands for the ratio of the total amount of foreign debt left unhedged to total debt. Derivatives stands for the ratio of total amount of currency derivatives to total assets. Results for the total foreign debt and the ratio of derivatives to total assets are from a simultaneous equation estimation, for the ratio of total unhedged debt (mismatch) to total debt are from a fixed effects estimation. Time dummies are included. Asterisks (*,**) denote 5%, and 10% level of significance.

Variable	Total Foreign Debt		Derivatives		Mismatch	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Size	0.073*	0.010	-0.097*	0.038	0.045*	0.0128
Foreign Sales / Total Sales	0.30*	0.064	-0.049*	0.020	0.26*	0.095
Foreign Debt / Total debt	-	-	0.18*	0.043	-	-
Foreign Operations Dummy	0.016	0.037	-0.0111	0.0090	0.087	0.059
Market-to-book ratio	0.0029	0.0035	-0.0005	0.0006	0.0033	0.0023
Tangibility	0.16*	0.073	-0.057*	0.015	0.23*	0.0085
Gross Margin	-0.021	0.099	0.0031	0.019	-0.013	0.092
Ownership	-0.017	0.049	0.009	0.011	-0.040	0.066
Foreign Equity Listing	0.013	0.043	-0.0038	0.0104	-0.061	0.065

Derivatives / Total Assets	1.83**	1.07	-	-	-	-
Foreign Assets / Total assets	-	-	0.116	0.092	-	-
N	492		492		492	

Table 15

Results for the determinants of the determinants of corporate financial policies – Floating Regime

Table 15 reports the results for the determinants of companies' financial policies during the period from 2000 to 2002. Total Foreign debt stands for the total amount of foreign currency denominated debt. Mismatch stands for the ratio of the total amount of foreign debt left unhedged to total debt. Derivatives stands for the ratio of total amount of currency derivatives to total assets. Results for the total foreign debt and the ratio of derivatives to total assets are from a simultaneous equation estimation, for the ratio of total unhedged debt (mismatch) to total debt are from a fixed effects estimation. Time dummies are included. Asterisks (*,**) denote 5%, and 10% level of significance.

Variable	Total Foreign Debt		Derivatives		Mismatch	
	Coeff.	Std. Error	Coeff.	Std. Error	Coeff.	Std. Error
Size	0.049*	0.023	0.0016	0.0047	0.041*	0.011
Foreign Sales / Total Sales	0.41*	0.13	-0.057*	0.028	0.40*	0.094
Foreign Debt / Total debt	-	-	0.089**	0.050	-	-
Foreign Operations Dummy	0.052	0.098	0.0024	0.012	-0.029	0.061
Market-to-book ratio	-0.007	0.007	-0.0004	0.002	-0.009	0.009
Tangibility	0.060	0.16	-0.032	0.020	0.20*	0.095
Gross Margin	-0.012	0.098	0.009	0.024	0.029	0.10
Ownership	-0.026	0.094	-0.013	0.014	0.048	0.068
Foreign Equity Listing	0.056	0.120	0.032*	0.014	-0.18*	0.068
Derivatives / Total Assets	0.38	1.64	-	-	-	-
Foreign Assets / Total	-	-	0.0063	0.066	-	-

assets						
N	492	492	492			