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in Emerging Markets: the case of Brazil in 2002**

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# Pessimistic Foreign Investors and Turmoil in Emerging Markets: the case of Brazil in 2002\*

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## Abstract

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Using survey data, we document that foreign-owned institutions became more pessimistic than locally owned institutions about the strength of the Brazilian currency around the 2002 presidential elections. As a result of their relative pessimism, foreign-owned institutions made larger forecast errors. Consistent with the emergence of their relative pessimism, foreign investors heavily sold Brazilian stocks and the Brazilian currency in futures markets ahead of the 2002 elections. Periods of stronger foreign sell-off were associated with larger equity price declines and larger depreciation of the Brazilian Real in spot and futures markets. These results are consistent with foreign investors' relative lack of knowledge of Brazilian institutions contributing to the sharp depreciation of the Brazilian currency and stock market ahead of the 2002 presidential elections.

**Keywords:** currency crisis, elections, difference of opinions, portfolio flows  
**JEL Classification:** F31, F36, G15

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## 1. Introduction

The crises of the 90's engendered a substantial change of perspective in the analysis of emerging market crises. Before, crises were quickly attributed to macroeconomic mismanagement, particularly to unsustainable fiscal imbalances. After, economists began to seriously consider that some crises may be precipitated by self-fulfilling pessimistic expectations of foreign lenders. For example, a number of prominent economists blamed foreign investors for their role in the 1997 East Asian emerging market crisis (Bhagwati, 1998; Stiglitz, 1998; Rodrik, 1998; Radelet and Sachs, 1998). Self-fulfilling, lenders-led crises can be rationalized by a variety of models, all of them exhibiting multiple equilibria. These models include Obstfeld (1986, 1996), Sachs, Tornell, and Velasco (1995), Cole and Kehoe (1996, 2000), Calvo and Mendoza (2000a, 2000b), Chang and Velasco (2001), and Chang (2007).<sup>1</sup>

Along with a new generation of theoretical models, the crises of the 90's stimulated a spurt of empirical research on the behavior of foreign investors in emerging markets, especially during crises. Papers in this literature includes Choe, Kho, and Stulz (1999), Kim and Wei (2002a,b), Borensztein and Gelos (2003), Kaminsky, Lyons, and Schmukler (2004), Dvorak (2005), Broner, Gelos, and Reinhart (2006), and Froot and Ramadorai (2008). Two questions that permeate this line of research are whether foreign investors' trading is less information-based than that of locals, and whether trading by foreigners exacerbates emerging markets crises. As we later discuss, evidence is mixed. Our study adds one data point to this literature. A novel feature of our work is the use of surveys of expectations of financial market participants. These surveys are conducted by the Central Bank of Brazil and include the major players in local financial markets. More specifically, we use surveys to compare the exchange rate expectations of locally- and foreign-owned institutions around the 2002 Brazilian presidential elections.<sup>2</sup> Reports from then reveal that expectations were heavily influenced by the potential victory of Luís Inácio "Lula" da Silva, a left-wing opposition

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<sup>1</sup> See Masson (1999), Calvo (2005, chapter 12), and Kaminsky (2006) for discussion.

<sup>2</sup> Brazilian presidential elections occur in two rounds. All candidates participated in the first round, on October 6, 2002. The two top candidates from the first round, Jose Serra, from the incumbent centrist coalition, and Lula from the leftist Workers' Party, faced off in the October 27, 2002 second round. Lula was elected president, and his government would not break off from the conservative macroeconomic policies of the previous administrations.

candidate who emerged victorious from the elections.<sup>3</sup> We document that during that time period foreign-owned institutions were more pessimistic than locally-owned ones about the strength of the Brazilian currency, and made considerably larger forecast errors accordingly. For example, between August 2002 and February 2003, foreigners' estimates for the USD/BRL exchange rate at the end of 2004 were on average 0.186 (BRL) cents above locals' estimates, with the difference being statistically significant at the 5% level. Using the average USD/BRL spot exchange rate in the forecasting period (3.498), the 0.186 difference means that, relative to locally-owned institutions, foreign-owned institutions on average forecasted a  $0.186/3.498=0.053$  larger depreciation of the Brazilian Real.

We also document that foreigners' trading activity in financial markets was consistent with their expectations becoming more pessimistic than those of locals. Trading imbalance data show that foreign investors substantially sold Brazilian equity and Brazilian currency (in the futures market) to local investors around the 2002 presidential election. Furthermore, we show that 10-day periods with stronger foreign sales (i.e., local purchases) of equity were associated with larger concurrent equity price reductions and larger depreciations of the Brazilian currency in the spot market; and days with stronger foreign sales of BRL in futures markets were associated with larger depreciation of the Brazilian currency in the futures market. When coupled with survey evidence, these results indicate that the foreign sell-off likely exacerbated the depreciation of Brazilian equity and the Brazilian Real ahead of the elections.<sup>4</sup>

**Relation to the literature.** In this paper, evidence that foreigners' had "worse" expectations than locals during the Brazilian 2002 crisis comes from survey data. In contrast, many studies address the ultimate question of whether foreign trading during crisis is less information-based than that of locals by testing whether foreign investors

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<sup>3</sup> On June 6, 2002 Goldman Sachs announced the Lulameter, which "quantifies the probability of a Lula victory that is currently being priced in by currency markets" (Tenengauzer, 2002). The report concludes that "the market is being over-optimistic regarding the exchange rate in the event of a Lula victory" and recommends that "investors should protect against BRL exposure into the elections period." Martinez and Santiso (2003) present a thorough and enjoyable discussion of the Brazilian 2002 pre-electoral period.

<sup>4</sup> A dollar invested in the Brazilian IBOVESPA Stock Index in January 1, 2002 was worth 38 cents in September 30, 2002. Value was lost both because the IBOVESPA index lost 36% of its value in BRL, and because the Brazilian Real lost 40% of its value relative to the dollar.

engage in "momentum trading" or "herding behavior". These would be mechanical ways of trading that disregard economic fundamentals.<sup>5</sup>

For example, Kim and Wei (2002a) and Cho, Kho, and Stulz (1999) use different datasets to test whether foreign investors in Korea tended to herd and follow momentum-like strategies in the period around the 1997 East Asian crisis. The former find evidence of herding and momentum-trading like strategies before and during the crisis, whereas Cho, Kho, and Stulz (1999) find that foreigners engaged in momentum trading and herding prior to the crisis, but during the crisis herding was somewhat reduced and momentum trading disappeared. Cho, Kho, and Stulz (1999) also document a strong foreign sell-off and large price declines during the crisis. Authors of both articles conclude that foreign trading probably did not exacerbate the crisis either because foreigners held a relatively small part of the Korean stock market capitalization (Kim and Wei, 2002a), or because, within the crisis period, days with large foreign net selling were not associated with more negative returns (Cho, Kho, and Stulz, 1999).<sup>6</sup> On the other hand, Borensztein and Gelos (2003) use holdings data of mutual funds investing in emerging markets to conclude that foreign investors engage in momentum trading and herding behavior. Kaminsky, Lyons, and Schmukler (2004) also document momentum trading by U.S. mutual funds investing in emerging markets, and show that this behavior is due both to customer flows and portfolio decisions by mutual fund managers.

Other than checking whether foreign investors follow seemingly mechanistic trading strategies, there are three alternative ways to assess the informational content of foreign trading. First, Frankel and Schmukler (1996, 2000) propose comparing the prices of closed-end country funds trading in the U.S. to the underlying emerging

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<sup>5</sup> One difficulty with this approach is that the statistical results used to identify herding and momentum are also consistent with fully-rational trading strategies that use information efficiently. "Herding" could be due to investors responding to the same information. "Momentum-trading" could be due to investors following dynamic trading strategies that create convex payoff patterns (i.e., portfolio insurance a la Leland, 1980); or to foreign investors and market prices responding to a gradual build up of credibility regarding a government commitment not to expropriate foreigners (Cherian and Perotti, 2001); or to informed investors breaking up orders to minimize the price impact of their trades (Kyle, 1985).

<sup>6</sup> In contrast, Richards (2004) and Wang (2007) use East Asian data after the crisis and document large returns in days of strong foreign trading, suggesting that price pressure from foreign trading can create potentially large price dislocations.

market prices of their stocks. They conclude that locals are better informed than foreigners because emerging market prices lead closed-end fund prices.

Second, several authors investigate the relation between foreign trading flows and future returns. Evidence is mixed. Using daily flows from developed countries institutional investors in and out of 44 different countries, Froot, O'Connell, and Seasholes (2001) find evidence consistent with momentum trading, but, because foreign purchases forecast future returns, conclude that foreigners are likely to trade based on information not possessed by locals. In a follow-up paper, Froot and Ramadorai (2008) study the relation between and cross-border equity flows and domestic and foreign equity returns and reach the same conclusion. However, other authors use different datasets and statistical techniques to address the same ultimate question and reach the opposite conclusion, namely, that local investors are better informed than foreigners (e.g., Hau, 2001; Griffin, Nardari, and Stulz, 2004; Cho, Kho, and Stulz, 2005; Dvorak, 2005; Menkhoff and Schmeling, 2008). In an attempt to reconcile the conflicting evidence, Froot and Ramadorai (2008) conjecture that foreigners have better information about macro fundamentals in emerging markets, whereas locals have better information about how individual firms relate to each other.

The third way to verify whether foreigners trade on the basis of "worse" information sets than locals is to use survey data to directly compare the expectations of locals and foreigners. Once again, evidence is mixed. In an early contribution, MacDonald and Marsh (1996) use survey data to compare G7 exchange rate forecasts made financial institutions located in different countries. While documenting substantial heterogeneity among individual forecasts, Macdonald and Marsh (1996) find negligible differences among forecasts averaged across different forecasting locations.<sup>7</sup> In contrast, Berger, Ehrmann, and Fratzscher (2009) find that forecasters from Frankfurt (where the European Central Bank is located) perform substantially better than other European forecasters when predicting monetary policy in the Euro area. Using data from the Institutional Brokers Estimate System (I/B/E/S), Bae, Stulz, and Tan (2008) show that local analysts tend to make smaller forecast errors than foreign analysts when predicting firm-specific earnings. In contrast, Bacmann and Bolliger (2001) use a subset of the

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<sup>7</sup> Other studies using exchange rate expectations surveys include Frankel and Froot (1987), Ito (1990), Cavaglia, Verschoor, and Wolff (1993, 1994), Chinn and Frankel (1994), Koedijk and Wolff (1996), Elliott and Ito (1999), and Bacchetta, Mertens, and van Wincoop (2009).



I/B/E/S data and find that foreign analysts outperform local ones when forecasting earnings of Latin American firms, with the foreign outperformance being statistically significant for Mexico and Colombia.

To the best of our knowledge, ours is the first study using survey data to document local informational advantage when it comes to forecasting a macroeconomic variable (the exchange rate).<sup>8</sup> Moreover, the fact that the divergence of expectations between locals and foreigners happened around presidential elections (but not in other times), and that foreign outperformance is due to their relative pessimism, helps us narrow down the source of the local advantage. To wit, foreigners were over-pessimistic regarding the Brazilian economy following a potential victory by Lula in the elections. This links our paper to the literature examining the effect of political uncertainty on emerging financial markets. This literature includes Alesina and Tabellini (1989), Martinez and Santiso (2003), Block and Vaaler (2004), Bonomo and Terra (2005), Chang (2006, 2007, forthcoming), Leblang and Satyanath (2008), and Andrade (2009).

## **2. Exchange Rate Forecasts**

We rely on exchange rate forecasts obtained from monthly surveys conducted by Central Bank of Brazil. Practically all major players in the Brazilian fixed income currency markets participate in the survey. Since November 2001 the forecasts are sent to the Central Bank via an electronic system. The identity of the five best forecasting institutions over the recent past is made public on a regular basis to incentivize institutions to deliver their best forecasts. Reflecting the survey's high-profile, aggregate statistics of the forecasts are widely reported by the Central Bank and the national press. The forecasts of individual institutions, to which we have access under a non-disclosure agreement with the Central Bank of Brazil, are kept confidential. A detailed description of the survey can be found in Marques, Fachada and Cavalcanti (2003).

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<sup>8</sup> Kaufmann, Mehrez, Schmukler (2005) show that expectations of managers of local firms can help improve exchange rate forecasts based on macroeconomic variables.

The Central Bank of Brazil asks survey participating institutions to, every month, forecast the future BRL price of one dollar at different target dates. We study surveys from January 2002 to June 2003, focusing on forecasts for the exchange rate 12 months ahead, and at the end of 2003, 2004, and 2005. The survey data consists of an unbalanced panel because not all institutions input answers for all target dates at all times. The average number of months in the January 2002 to June 2003 (18 months) in which a forecaster submit at least one forecast (for some target date) is 12.4, while the median is 16.

There are 103 different forecasting institutions in our sample period. Most of these (88) are financial institutions, including banks and asset management firms. The remaining institutions are either economic consulting firms (9), or large non-financial firms (6). We classify each forecasting institution as being locally-owned or foreign-owned. There are 60 locally-owned institutions, and 43 foreign-owned ones. Foreign-owned institutions include banks such as Citibank, Bank Tokyo-Mitsubishi, Deutsche Bank, and JP Morgan; economic consulting firms such as IDEA Global; and non-financial firms such as Telefónica.

## **2.1 Forecast Heterogeneity and its Likely Source**

We begin by documenting a large increase in the dispersion of exchange rate forecasts around Brazil's 2002 presidential election, after pooling locally- and foreign-owned institutions. Figure 1 shows that the coefficient of variation of exchange rate forecasts peaks at the election period for all forecast horizons. For all horizons, the coefficient of variation is about 2.5 times larger around October 2002 than at the beginning (January 2002) or at the end (June 2003) of the sample period. This confirms that uncertainties stemming from the presidential election were the driving force of the heterogeneity of beliefs during our sample period. The basic uncertainties were whether Lula would be elected president, and, if elected president, whether he would retain the basic macroeconomic framework of his predecessors.

## FIGURE 1

We observe expectations, but not information sets. Therefore, we cannot unequivocally tell whether the heterogeneity we document is mostly due to different private information, or mostly due to agents interpreting public information in different ways. However, given the nature of the basic uncertainties bedeviling Brazilian markets at the time (regarding the outcome of the presidential election, or regarding Lula's macroeconomic framework if elected), we are more sympathetic to the view that agents at the time had access to essentially the same information but "agreed to disagree" on its interpretation.<sup>9</sup> As Harris and Raviv (1993) state on page 474: "[...] People often share common information yet disagree as to the meaning of this information, not only in the evaluation of risky assets but also in the evaluation of political candidates, economic policies, and the outcome of horse races. One example of this is the variety of opinions among financial analysts and macroeconomists regarding future movements of interest rates, exchange rates, gross national product, and stock prices despite the fact that all these analysts have access to the same economic data."<sup>10</sup>

### 2.2 Divergence of Forecasts Between Locally- and Foreign-Owned Institutions

The pooled dispersion statistics discussed above mask an important divergence of forecasts between groups of investors taking place around the 2002 presidential elections. In fact, there is plenty of anecdotal evidence that foreigners had more pessimistic economic scenarios for the Brazilian economy than locals. Two weeks ahead of the runoff election between Lula and the incumbent coalition's candidate, The New York Times reported: "Wall Street investors, stung by recent losses in Argentina and wary of the outcome of presidential elections in Brazil, are once again diverging from their Brazilian counterparts in their outlook on the nation's ability to avoid a crippling financial crisis. The differences in opinion [...] have become more striking

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<sup>9</sup> In the context of the U.S. presidential election of 2008, Moretti and Lee (2009) study the relation between public released poll information and prices in prediction markets. The authors show that, rather than anticipating how the forthcoming polling numbers might be, prices in prediction markets used the changes in polls to update their forecasts of the final election outcome. Their evidence suggests that there was no private information regarding the outcome of the election.

<sup>10</sup> See also Kandel and Peason (1995).

since Luiz Inácio Lula da Silva, the presidential candidate of the left-leaning Workers' Party, was forced on Sunday into a second round of voting with José Serra, the candidate of the centrist governing party." (Romero, 2002)

In Figures 2 through 5 we use the Central Bank surveys to verify whether the anecdotal difference of opinions between local and foreigners was indeed of systematic nature. Each month we compute the average forecast from locally- and foreign-owned institutions for our four target dates, and plot both of them against the future realized exchange rate. At any point in time, the distance between each average forecast and the future realized exchange rate is the forecast error. Figures 2, 3, 4, and 5 show that locally-owned institutions made smaller forecast errors for all the four target dates.

### **FIGURES 2 to 5**

For all the target dates, the major factor behind the forecasting underperformance of foreign-owned institutions was their relative pessimism in the August 2002 to February 2003 period (i.e., higher forecasts for future BRL price of 1 USD.)<sup>11</sup> It seems that, relative to local institutions, foreign ones overreacted to the prospect of a Lula's victory, which became increasingly likely after national broadcasting of campaign advertisements (and thus the official campaigning period) started in July 2002.<sup>12</sup>

Table 1 reports the results of tests of whether the differences between forecasts of locally- and foreign-owned institutions in the August 2002 to February 2003 period are statistically significant. For each of the four target dates, we regressed the individual exchange rate forecasts against a foreign-owned institution dummy variable. We include month effects, i.e., a different dummy variable for each month in which the forecast was made. This controls for the fact that we pool together forecasts made at different

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<sup>11</sup> The figure for 12-month ahead forecasts suggests that locally-owned institutions became more bearish than foreign-owned ones a few months before August 2002, and made smaller forecasting errors accordingly. However, apart from end of 2003 and end of 2004 forecasts made during July 2002, the figures for the other target dates do not show notable differences between local and foreign forecasts prior to August 2002.

<sup>12</sup> Based on the sticky-information model of Mankiw and Reis (2002) and the findings of Borensztein and Gelos (2003), one could be tempted to conclude that the forecast divergence between locals and foreigners might be attributed to greater rational inattention on part of foreign forecasters. This view however is not warranted: while individual foreign forecasters changed their forecast in 77.5% of the months, locals did so in 78.3%.

months. We report standard errors that are robust to heteroskedasticity and clustered by forecasting institution.

### TABLE 1

The OLS regressions in Panel A show that the divergence of forecasts between local- and foreign-owned institutions illustrated by Figures 2 through 5 was indeed statistically significant. The foreign dummy is statistically significant for all target dates. Panel A results also indicate that the divergence of expectations is economically significant. For example, foreigners' estimates for the BRL price of 1 USD at the end of 2004 were on average 0.186 (BRL) cents above locals' estimates. Using the average USD/BRL spot exchange rate in the forecasting period (3.498), the 0.186 difference means that, relative to locals, foreigners on average forecasted a  $0.186/3.498=0.053$  larger depreciation of the Brazilian Real.<sup>13</sup>

The median regressions in Panel B confirm results of the OLS regressions in Panel A, since Foreign Dummy remains statistically significant for all target dates. This shows that Panel A results is not driven by a few outliers. In untabulated OLS regressions, we perform three additional robustness checks. First, we regress the log of the exchange rate forecasts and verify that Foreign Dummy remains statistically significant for all the four forecasting target dates. Second, we add a dummy variable equal to 1 if the forecasting institution is a financial one, and equal to 0 otherwise. Results are unchanged: the foreign dummy remains statistically significant for all the four forecasting target dates, and the financial institution dummy variable is insignificant for all the target dates. Third, we remove institutions with less than 6 forecasts in the January 2002 to June 2003 period from the sample, and verify that results are unchanged: the foreign-owned dummy remains statistically significant for all the target dates.

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<sup>13</sup> Given their "Lulameter", it is interesting to check Goldman Sachs forecasts for the BRL/USD exchange rate in October 2002. In both the October 8, 2002 and the November 12, 2002 editions of their *The Global FX Analyst*, Goldman forecasts for the BRL price of 1 USD 12 months in the future were 4.40. The average local and foreign forecasts were respectively 3.51 and 3.66 (October 2002) and 3.60 and 3.74 (November 2002).

### 3. Foreign Trading Imbalances and Market Prices

It seems natural that the divergence of expectations between locally- and foreign-owned institutions would generate trading activity in financial markets. In this Section we document that financial market data is consistent with the foreigners becoming relatively more pessimistic than locals ahead of the 2002 elections. Using trading imbalance data from both the Brazilian stock exchange (BOVESPA) and the Brazilian exchange rate futures market (BM&F), we document that foreigners were net sellers of Brazilian stocks and the Brazilian currency ahead of the elections (i.e., locals were net buyers).

Did the foreign sell-off exacerbate the depreciation of Brazilian equity and currency values? Admittedly, it is very hard to provide an unequivocal empirical answer to this question. In this section we test whether periods of stronger foreign sell-off (i.e., local buys) are associated with larger equity and currency declines. If foreign sales were unrelated to returns, the case for a worsening of price declines caused by foreign selling would be much weaker.<sup>14</sup> We, however, find that periods of stronger foreign sell-off were indeed associated with larger equity price declines and larger depreciation of the Brazilian Real in spot and futures markets. Coupled with the survey results, this suggests that foreign trading exacerbated the decline on Brazilian equity and currency values during the crisis.

#### 3.1 Stock Market

The BOVESPA Stock Exchange classifies each participant in a stock trade as a domestic or a foreign trader. The exchange divulges aggregate data including the total BRL amount of each transacted by each type of trader in both stock buys and sells separately. The data is aggregated over all stocks and all trades in non-overlapping 10-day periods adding up to 36 periods per year.<sup>15</sup> We construct a Foreign Buys-Sells

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<sup>14</sup> This is what Choe, Kho, and Stulz (1999) report. They state on page 231: "During the last three months of 1997 [the crisis period]. days with large foreign net selling do not have significant market-adjusted returns; even raw returns on these days are not significantly negative. There is therefore no convincing evidence that foreign investors play a destabilizing role."

<sup>15</sup> Naturally, the total BRL volume of buys aggregated across all investors types in a given period is equal to the total BRL volume of sells aggregated all investors types in the same period.

trading imbalance variable by subtracting the total BRL volume of sells by foreigners from the total BRL volume of buys by foreign investors in a given 10-day period (in billions of BRL). Figure 6 plots Foreign Buys-Sells and the corresponding level of the IBOVESPA Stock Index from January 2002 to December 2003.

### **FIGURE 6**

Figure 6 shows that, on average, Foreign Buys-Sells is negative during the sample period. In particular, there was a sequence of large net foreign sales from mid-May to early October 2002, coinciding with a steep decline of the IBOVESPA Stock Index from about 12,500 to about 8,500. Using the total BRL volume of trade in the exchange in that period, we calculate that, on average in that period, foreign sells and foreign buys represented respectively 29.9% and 24.8% of all trades respectively. Thus, foreign excess sales accounted for 5.1% of total trading volume at BOVESPA from mid-May to early October 2002. The foreign sell-off of Brazilian equity is consistent with foreigners becoming relatively more pessimistic than locals about the Brazilian economy, as indicated by survey data.

Table 2 below examines the relation between Foreign Buys-Sells and contemporaneous stock returns and percent changes in the USD price of 1 BRL. We label these variables IBOVESPA Returns and BRL Appreciation, respectively. We study the relation between these variables both in 2002, a period in which markets were influenced by the presidential elections, as well as in the more tranquil period of 2003/2004.

### **TABLE 2**

The first two columns of Table 2 show that, during 2002, periods of high foreign sales of equity to locals were associated with larger declines of Brazilian stock prices and the Brazilian currency. The  $R^2$ s of the univariate regressions are 0.47 and 0.30 respectively. These results are consistent with the emergence of the relative pessimism of foreigners prompting them to sell Brazilian equity to locals, thus exerting downward pressure on stock prices. Moreover, in order repatriate the proceeds of the stock sales, foreigners need to buy USD in the local spot market. Large repatriation trades following stock sales, plus possibly other, correlated, foreign purchases of dollars, may have

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exerted downward pressure on the Brazilian Real. This is consistent with the positive correlation between Foreign Buys-Sells and BRL Appreciation shown in Table 2.

Admittedly, the results on Table 2 in isolation do not allow us to conclude that foreign selling exacerbated equity depreciation during the 2002 Brazilian crisis. It is possible that bad public news about the Brazilian economy drive both equity declines and foreign sales (i.e., local buys). In this case, equity declines would have been the same had foreigners not sold equity, because price changes would only reflect the incorporation of public information into prices. For example, Brennan and Cao (1997) propose an elegant model with foreign investors that receive less precise information than local investors, and in which Foreign Buys-Sells can be either positively or negatively correlated with contemporaneous returns. The sign of the correlation critically depends on whether the foreign information disadvantage arises from less precise signals received in the current period, or from less precise signals received in the past. In the latter case, Brennan and Cao's theory can explain the positive contemporaneous correlation between Foreign Buys-Sells and IBOVESPA returns documented by us without our contention that the foreign sell-off contributed to the sharp decline of Brazilian asset values.

However, our evidence includes not only the regressions in Table 2 but also the survey data previously discussed, and perhaps the anecdotal evidence provided by The New York Times article (Romero 2002). Survey data shows that foreigners became relatively more pessimistic than locals ahead of the 2002 elections. This relative change in beliefs is consistent with the overall foreign sales documented here, and the correlation between Foreign Buys-Sells and IBOVESPA returns shown in Table 2. Integrating the survey and regression results, the evidence suggests that foreign sales during the crisis exacerbated equity declines, i.e., equity declines would have been smaller had foreigners not become more pessimistic than locals and sold equity accordingly.<sup>16</sup>

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<sup>16</sup> Note that the survey results are inconsistent with Brennan and Cao's (1997) theory. In their model, noise in signals is uncorrelated across investors. Therefore, expectations averaged across (large) groups of investors are identical because noise cancels out. That is, even though foreigners in Brennan and Cao's (1997) model have larger confidence intervals around their expectations, on average they hold the same point estimates as locals. See Rubinstein (1974) and Dunne, Hau, and Moore (forthcoming) for models in which (exogenous) relative changes in beliefs drive trading and asset prices.



In the last two columns of Table 2 we provide additional evidence that the 2002 period, marked by the emergence of foreign pessimism, was indeed different from other, less turbulent, periods. The table shows that, in the non-crisis 2003/2004 period, Foreign Buys-Sells was much less contemporaneously correlated with both IBOVESPA Returns and BRL Appreciation than during 2002. The  $R^2$ s of the univariate regressions drop from 0.47 and 0.30 to 0.08 and 0.01, respectively. More importantly, the slope coefficient in the non-crisis period (0.039) is five times smaller than the slope coefficient during 2002 (0.183), meaning that, for a foreign net sale of a given BRL size, contemporaneous stock price declines were much more modest in 2003/2004 compared to 2002. This suggests that the mechanism by which foreign imbalances are correlated with stock returns was different in 2002 compared to other, more tranquil, periods.

### 3.2 Futures Exchange

In this section we repeat the analysis of the previous section using data from the BRL/USD market at the Brazilian BM&F futures exchange rather than stock market data.<sup>17</sup> The exchange classifies each position (long or short) as being held by a local or a foreign trader. For each future contract type, the exchange divulges the total number of long positions and the total number of short positions for each type of trader each day.<sup>18</sup> We add the foreign net (long BRL) position across all BRL/USD future contracts in a given day. In Figure 7 we plot the time evolution of the resulting Foreign Net BRL position (in USD billion), and compare it to the evolution of BRL price of 1 USD according to the future contract of the nearest maturity. Note that foreigners held a negative net long position in BRL during 2002, i.e., they were short BRL in the BM&F futures market. This is consistent with a structural desire to hedge the exchange rate exposure of investments in Brazil.

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<sup>17</sup> As Ventura and Garcia (2009) explain, the Brazilian exchange rate futures market is particularly important because regulatory restrictions prevent many agents from trading on the spot market. As a result, the futures market, especially the nearest maturity contract, has higher trading volume and narrower bid-ask spreads than the spot market. Moreover, Ventura and Garcia (2009) provide evidence that price discovery tends to happen in the futures market and then be transmitted to the spot market by arbitrage.

<sup>18</sup> Naturally, for each futures contract type at time, the total number of long positions is equal to the total number of short contracts.

## **FIGURE 7**

Figure 7 shows that foreigners increased their short BRL position throughout 2002, reaching a peak of about \$1.7 USD billion by October 2002. The increase in foreign short positions coincides with a sharp depreciation of the Brazilian currency in the future market, and is consistent with the emergence of foreign pessimism found in survey data.

Table 3 reports results of our investigation of the relation between changes in the foreign net BRL long position, labeled Changes in Net Foreign BRL Position, and changes in the future price USD-denominated price of 1 BRL for the nearest maturity future contract, labeled BRL Appreciation. Apart from month-ends when the nearest maturity future contract expires and thus both long and short positions in that contract expire, Changes in Net Foreign BRL Position is positive in days in which foreigners buy more than sell BRL in the futures market. We add a New Month Dummy variable to the right-hand side of the regression equation to account for the expiration of the nearest maturity future contract, which changes the future contract used in the calculation of BRL Appreciation.

## **TABLE 3**

The first column of Table 3 shows that Changes in Net Foreign BRL Position is positively associated with BRL Appreciation in the futures market in 2002. This is consistent with the foreign sell-off of Brazilian currency in the futures market, driven by the emergence of foreign pessimism, exerting downward pressure on the Brazilian Real. Once again, the trading and price change data alone do not allow us to unequivocally state that foreign trading exacerbated the depreciation of the Brazilian currency in the futures market. However, this seems to be the most reasonable explanation given survey data evidence.

The second column of Table 3 examines the relation between Changes in Net Foreign BRL Position and BRL Appreciation in the more tranquil 2003/2004 period. The table shows that both are still positively correlated. However, similarly to stock market evidence, the slope coefficient in 2003/2004 is much smaller in 2003/2004 compared to 2002. Thus, exchange rate futures data also suggest that the mechanism by which foreign imbalances are correlated with price changes was different in 2002

compared to less turbulent periods. Our contention is that the emergence of foreign pessimism shown in survey data caused excess foreign sales to locals, which caused equity and currency values to depreciate beyond what would obtain had foreigners held the same expectations as locals.

#### **4. Concluding Remarks**

Particularly in young democracies, political factors can dominate economic scenarios during election times. If political preferences of parties and leaders are not common knowledge, expectations of market participants may diverge. In particular, foreign investors may be prone to forming excessively pessimistic expectations when faced with uncertain political preferences. To the extent that short-term capital inflows finance a large portion of local long term investment projects, these pessimistic expectations may become self-fulfilling and precipitate a financial crisis.

We use survey data on exchange rate expectations of major players in the Brazilian market to show that, relative to locally-owned institutions, foreign-owned institutions became excessively pessimistic ahead of the 2002 presidential elections. Foreign pessimism led to larger forecast errors. Consistent with the emergence of foreign pessimism, foreign investors heavily sold Brazilian equity and Brazilian currency ahead of the elections, likely contributing to the sharp depreciation of equity and currency values in that period. While our results do not settle the debate concerning the relative importance of local macroeconomic fragilities versus foreign investors' panic in explaining emerging market crises, the additional data point we provide helps to strengthen the latter factor vis-à-vis the former one.

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**Table 1: Local vs. Foreign Forecasts of the BRL price of 1 USD**

Table has results of regressions of forecasts of the BRL price of 1 USD 12- months ahead, or at the end of 2003, 2004, or 2005. Forecasts were made in the August/2002 to February/2003 period. Panel A has OLS regressions and Panel B has median regressions. *Foreign Dummy* is equal to 1 if the forecasting institution is foreign-owned, and 0 if it is locally owned. *Month Effects* represent a dummy variable for each of the 7 months in the sample period. OLS standard errors are robust to heteroskedasticity and clustered at the forecasting institution level. Median regression standard errors are bootstrapped 10,000 times with clustering at the forecasting institution level. \*, \*\*, and \*\*\* represent significance at the 1%, 5%, and 10% level respectively.

**Panel A. OLS Regressions**

	12 months ahead	End of 2003	End of 2004	End of 2005
Foreign Dummy	0.100 * (1.84)	0.092 * (1.80)	0.186 ** (2.20)	0.243 ** (2.16)
Month Effects	yes	yes	yes	yes
Number of Forecasts	367	448	338	279
Number of Forecasters	82	85	67	54
R <sup>2</sup>	0.49	0.46	0.39	0.33

**Panel B. Median Regressions**

	12 months ahead	End of 2003	End of 2004	End of 2005
Foreign Dummy	0.128 ** (2.56)	0.100 ** (1.97)	0.200 ** (1.97)	0.250 * (1.91)
Month Effects	yes	yes	yes	yes
Number of Forecasts	367	448	338	279
Number of Forecasters	82	85	67	54
Pseudo-R <sup>2</sup>	0.31	0.32	0.27	0.24



**Table 2: Foreign Trading Imbalances at BOVESPA and Changes in Market Prices**

Table has results of regressions of changes in market prices on contemporaneous trading imbalances at the BOVESPA Stock Exchange. Imbalances and market price changes are for non-overlapping 10-day periods. Percent changes in the IBOVESPA Stock Level are labeled *IBOVESPA Returns* and percent changes in the USD price of 1 BRL are labeled changes *Brazilian Real Appreciation*. *Foreign Buys-Sells*, the foreign trading imbalance at BOVESPA, is denominated in BRL billions. Standard errors are robust to heteroskedasticity. There is no evidence of autocorrelation of residuals. \*, \*\*, and \*\*\* represent significance at the 1%, 5%, and 10% level respectively.

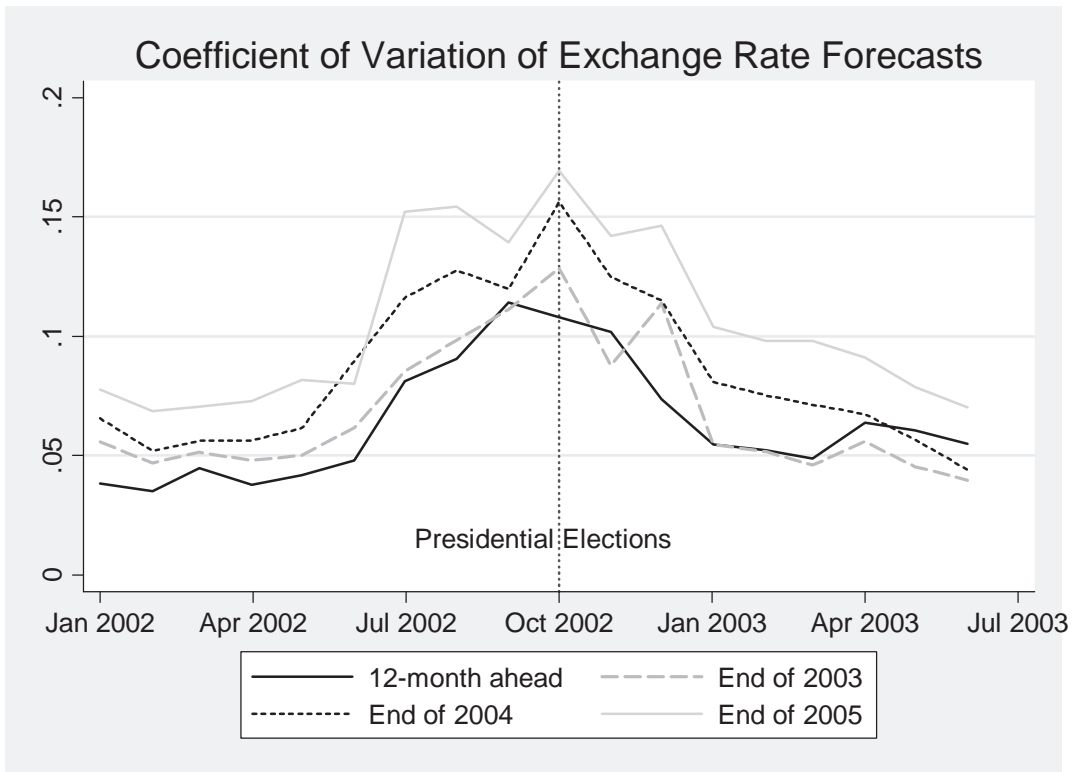
	Jan/2002 - Dec/2002		Jan/2003 - Dec/2005	
	IBOVESPA returns	BRL Appreciation	IBOVESPA returns	BRL Appreciation
Foreign Buys-Sells	0.183 *** (5.54)	0.135 *** (3.23)	0.039 ** (2.17)	0.007 (1.00)
Constant	0.004 (0.54)	-0.005 (-0.66)	0.008 (1.33)	0.003 (1.18)
N	0.47	0.30	0.08	0.01
R <sup>2</sup>	36	36	72	72

**Table 3: Changes in Foreign Net USD Position at BM&F and Changes in Market Prices**

Table has results of regressions of daily percent changes in the USD price of 1 BRL. The price is the end-of-day settlement price for the nearest maturity future contract at the BM&F futures exchange. *Change in Foreign Net USD Position* is denominated in USD billion, and includes exchange rate futures contracts of all maturities. *New Month Dummy* is equal to 1 at the first trading day of each month, when the contract defined as the “nearest” changes. Standard errors are robust to heteroskedasticity. There is no evidence of autocorrelation of residuals. \*, \*\*, and \*\*\* represent significance at the 1%, 5%, and 10% level respectively.

	Jan/2002 - Dec/2002	Jan/2003 - Dec/2005
	BRL appreciation (nearest future contract)	BRL Appreciation (nearest future contract)
Change in Foreign Net BRL Position	0.046 *** (6.21)	0.017 *** (9.69)
New Month Dummy	0.011 (0.74)	-0.011 *** (-4.11)
Constant	-0.002 ** (-2.19)	0.001 ** (3.17)
N	248	499
R <sup>2</sup>	0.16	0.26

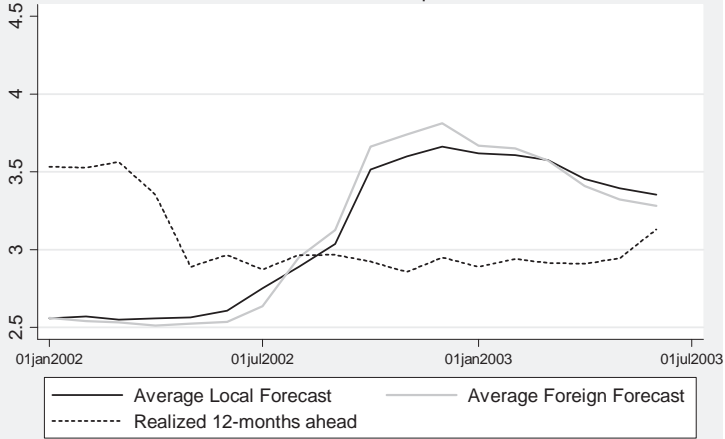
**Figure 1. Coefficient of Variation of Exchange Rate Forecasts for several target dates  
(from January/2002 to June/2003)**



**Figures 2 to 5. Local vs. Foreign Forecasts of BRL price of 1 USD**  
 (from January/2002 to June/2003)

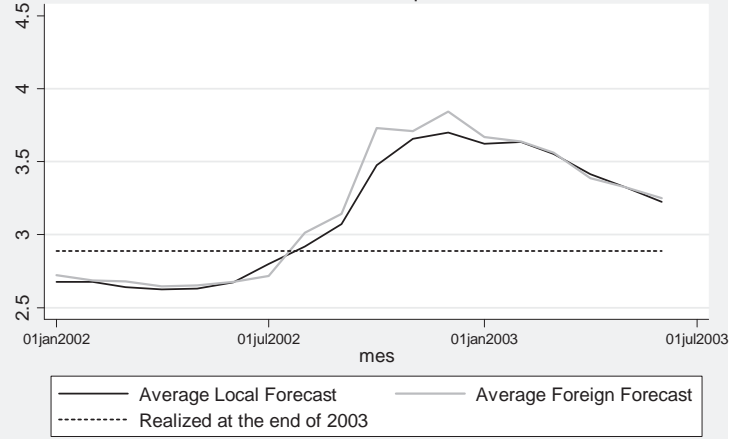
**12-months ahead**

Forecasts of BRL price of 1 USD  
 12-month ahead prices



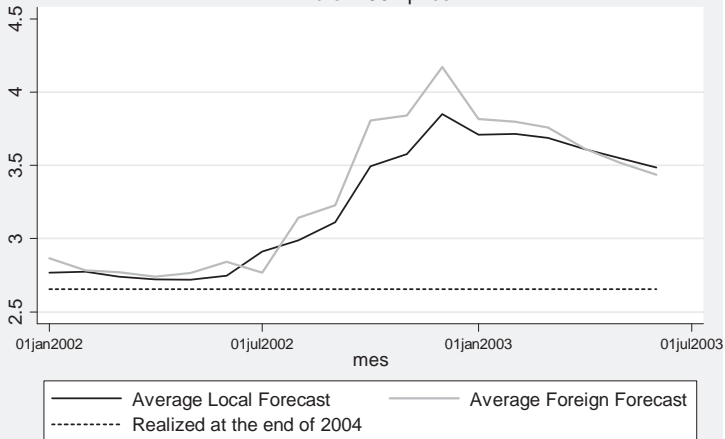
**End of 2003**

Forecasts of BRL price of 1 USD  
 End of 2003 price



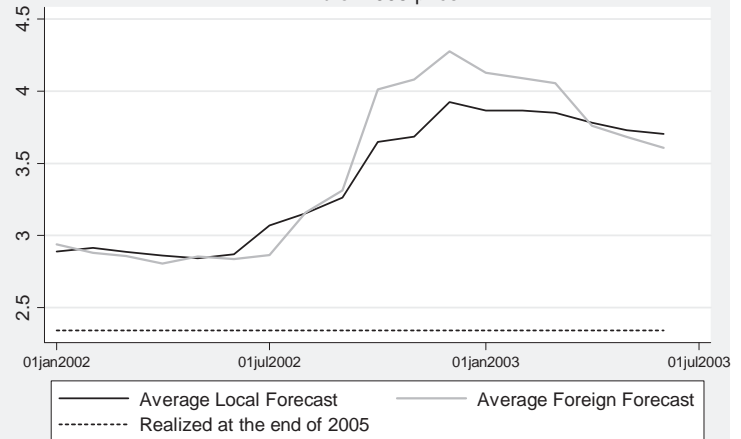
**End of 2004**

Forecasts of BRL price of 1 USD  
 End of 2004 price

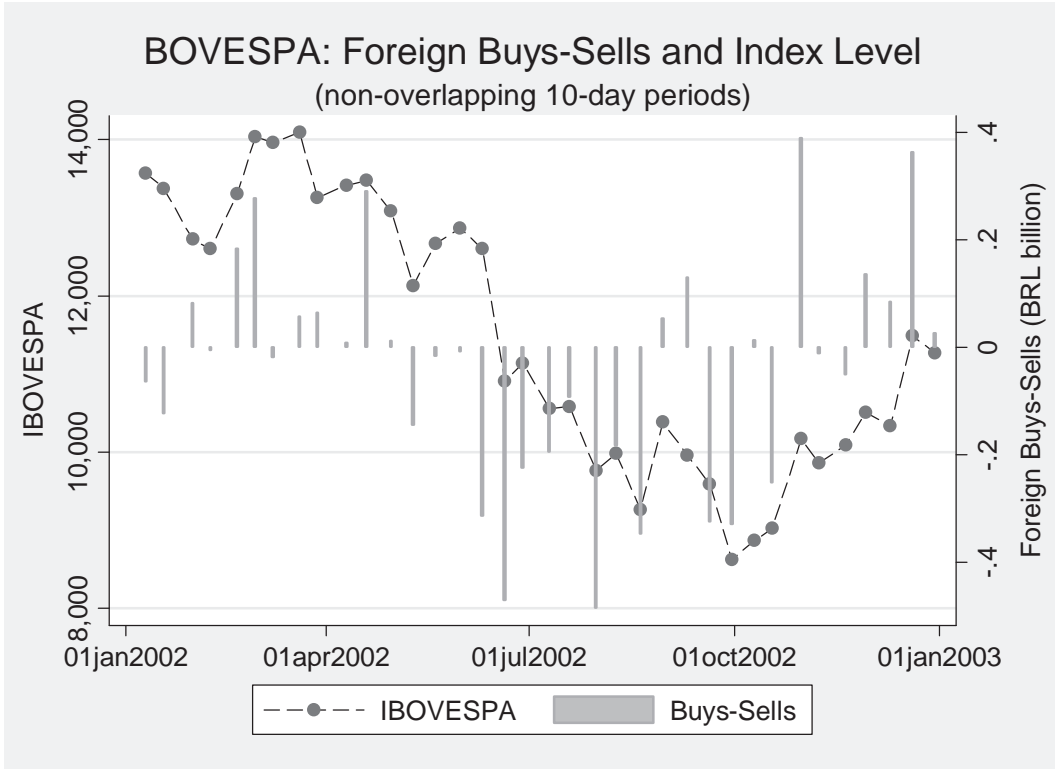


**End of 2005**

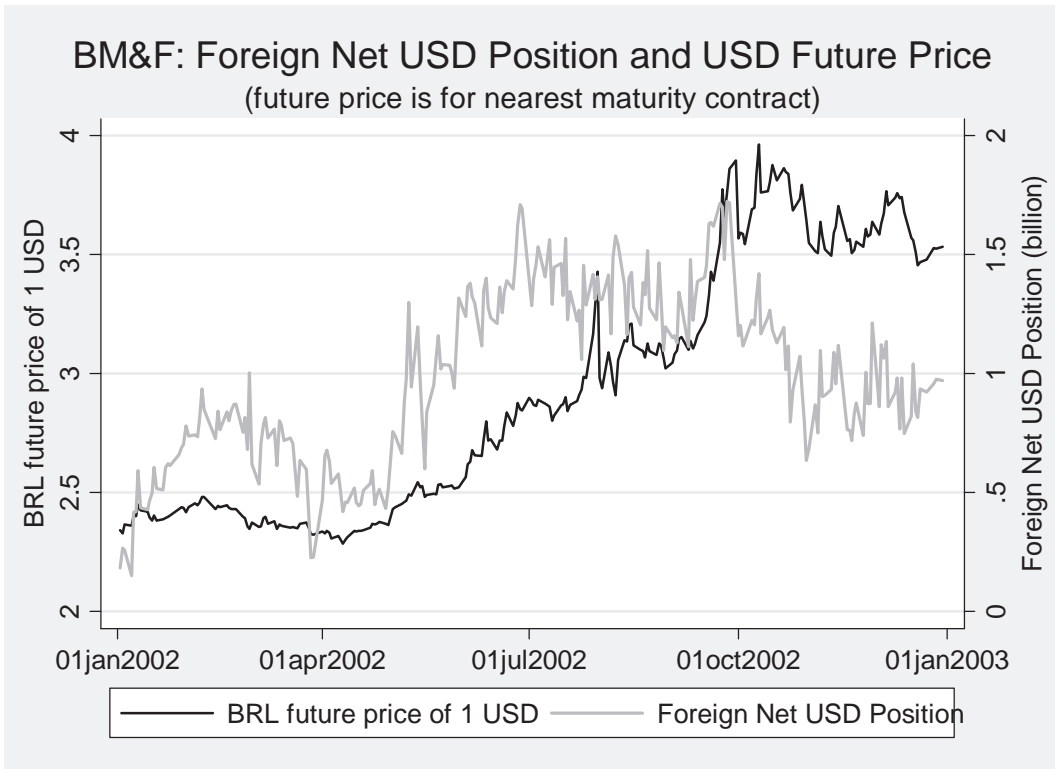
Forecasts of BRL price of 1 USD  
 End of 2005 price



**Figure 6. Foreign Trading Imbalances at BOVESPA**



**Figure 7. Foreign Net BRL Position at BM&F's Exchange Rate Futures Market**



# Banco Central do Brasil

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