Predicting currency fluctuations and crises: Do resident firms have an informational advantage?

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Abstract

This paper investigates whether resident enterprises’ managers have an informational advantage about the countries where they work. We test this informational advantage hypothesis by using a unique dataset, the Global Competitiveness Survey. The findings suggest that local managers do have valuable information about the country where they reside. Local managers’ responses improve conventional estimates of future volatility and changes in the exchange rate, which are based on economic fundamentals. These findings provide support to the theories that claim that asymmetric information is present in international financial markets and is important to understand financial crises.

JEL classification: F3; F4; G1

Keywords: Expectations; Asymmetric information; Local investors; Financial crises; Exchange rates fluctuations; Prediction; Survey

1. Introduction

Several of the 1990s financial crises as well as their global spillover effects caught many economists, policymakers, and financial markets by surprise. Mexico devalued
its currency shortly after joining the Organization for Economic Cooperation and Development (OECD). East Asian countries, with highly regarded policies and a long history of rapid growth and stability, suddenly suffered balance of payments crises. Russia was abruptly cut off from international credit, having to restructure its sovereign debt. While the crisis in Brazil was expected, the economic recovery following the devaluation of the real has been, however, surprisingly fast. The recovery in Ecuador after adopting dollarization has also been unanticipated. Though the crisis in Argentina was expected, the deep economic meltdown and the more recent recovery have surprised many analysts.

Information is a key element in understanding financial crises. The recent theoretical literature has stressed the importance of imperfect information in triggering crises not only in one country, but also across borders. Among others, Calvo and Mendoza (2000a,b), Kodres and Pritsker (2002), Mishkin (1991), and Rigobon (1998) show that costly information about international investments can produce herding and contagion effects. Mishkin argues that, from a historical perspective, the nature of financial crises can be understood through the literature on asymmetric information. He claims that the asymmetric information approach explains the patterns in the data and many features of financial crises that are hard to explain otherwise. Calvo and Mendoza argue that as investment opportunities grow, investors diversify their portfolio, holding assets in countries on which they have little information. A crisis in one country prompts uninformed investors to revise their expectations with respect to other countries. Thus, when informed investors sell assets from one market, uninformed investors pull out from several markets. Common to many models is that uninformed investors try to extract information from the action of informed market participants. This signal extraction may generate overreaction and contagion effects across countries.

Asymmetric information is not only relevant to comprehending financial crises, it is also important to understanding the functioning of financial markets in general, and foreign exchange markets in particular. In a seminal paper, Stiglitz and Weiss (1981) show that information asymmetry can lead to credit rationing. Mishkin (1999) argues that asymmetric information can explain financial instability and international capital movements. Moreover, the new literature on exchange rates shows that microstructure models based on asymmetric information can do well in explaining exchange rate movements. For example, Lyons (2002) argues that price variation in spot currency markets is driven primarily by dispersed information, contrasting with the orthodox view under which exchange rates are determined by public information. Ito et al. (1998) provide evidence of the existence of private information on the foreign exchange markets. Cai et al. (2001) and Evans and Lyons (2002) argue that order flow can play a significant role in the revelation of private information and associated exchange rate shifts.¹

¹ Other papers on this literature that highlight the role of asymmetric information are Bollerslev and Melvin (1994), Cao et al. (2002), Cheung and Chinn (2001), Covrig and Melvin (2002), and Melvin and Yin (2000).
The theories of asymmetric information are consistent with several empirical findings in international finance. Brennan and Cao (1997) examine U.S. purchases of foreign equity. They show that these purchases tend to be positively associated with the concurrent return in foreign markets; that is, consistent with U.S. investors being less informed than local investors. Frankel and Schmukler (1996, 2000) show cases in which local investors exited their markets before international investors during recent crises, concluding that local investors were better informed. Choe et al. (1999) and Kim and Wei (2002) analyze data from South Korea to study trading patterns of resident and international investors. The evidence shows that international investors outside the country engage in positive feedback trading (selling past losers and buying past winners) to a larger extent than do foreign investors inside the country. This has been interpreted as traders outside the country having less information about the South Korean economy relative to resident investors, given that foreign investors rely more on observable price changes to trade. Seasholes (2000), on the other hand, argues that foreign investors earn economically significant profits when trading emerging market equities, what he interprets as foreigners being better informed than local investors.

The present paper takes advantage of a unique dataset of local managers’ expectations to investigate whether local managers have useful private information, not captured by available macro data or by other market indicators. This dataset, the Global Competitiveness Survey (GCS), asks local managers their perspectives about the countries where they reside. Thus, we can compare the managers’ perceptions vis-à-vis the market perception.2

The GCS is a questionnaire answered by managers located in countries around the world. The survey is collected for the Global Competitiveness Report, produced by the World Economic Forum of Davos and the former Harvard Institute for International Development. The survey gathers each manager’s perspective and expectations about the economic, political, and institutional situation of the country where the manager resides. The data comprise responses from surveys conducted at the end of 1995, 1996, and 1997. Fortunately for our paper, this timing precedes the crises in East Asia, Russia, and Brazil. Hence, we are able to test not only whether local managers have superior information but also whether managers foresaw the recent crises in advance.

The data used here give us an advantage relative to existing papers because, in the absence of direct information on expectations of local and international investors, the existing empirical studies of asymmetric information need to rely on indirect evidence. The international finance literature analyzes mostly aggregate data (such as prices and capital flows) to test for asymmetric information, assuming that investors only have access to their segmented markets. The microstructure literature focuses mostly on order flows to test for asymmetric information. Furthermore, the type of

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2 In a separate literature, a different type of survey data has been used to explain the behavior of foreign exchange markets. See, for example, Dominguez (1986), Frankel and Froot (1987, 1989), Ito (1990), and MacDonald and Marsh (1996).
data we obtained gives us an opportunity to discuss different methods to analyze the information available to local managers, but unknown to investors, which can be used to improve forecasts of future exchange rate fluctuations or financial crises. This discussion is useful because, although one can observe managers’ expectations, it is still difficult to test the value of the information that is not common knowledge. This can help in future applications in which the significance of private information wants to be evaluated.

The paper is organized as follows. Section 2 introduces the econometric technique used to test the value of the managers’ information. Section 3 describes the dataset. Section 4 shows the econometric results. Section 5 presents some evidence from the East Asian crisis. Section 6 concludes.

2. Methodology

In this section, we explain how to test whether managers have valuable information using their beliefs and expectations. The test is not a straightforward one since managers are not asked about their private information but rather about their general beliefs and expectations. Here we are interested only in their private information, for three reasons. First, to capture the importance of asymmetric information we want to understand how much managers know, besides what is known by everybody else in the economy. Second, it is possible that managers have the wrong “model” of the economy and hence their expectations may be wrong although their information is correct. Third, managers’ views may be affected by individual characteristics such as the size of the firm or their links to the international investors’ community, and we are interested in isolating those factors.

We use a maximum likelihood procedure to estimate the value of the managers’ information. We next present this method and discuss its advantages and disadvantages vis-à-vis other alternative methods. We then explain how we address the potential problem of omitted variables.

2.1. System estimation

Let $y_{i,j}^{t}$ be the expectation of manager $i$ at time $t$ with respect to country $j$. One can model this expectation as a function of three sets of variables. The first set is the publicly available information on country $j$ at time $t$, $X_{j}^{t}$. The second set involves the

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3 It is likely that even asking managers about their private information would not yield any meaningful results, as managers would not be able to distinguish between their private information and the public information.

4 For example, suppose that managers form expectations on exchange rate volatility based only on GDP per capita, in addition to their private information. That is, managers in countries with high income expect a stable currency, while managers in countries with low income expect a volatile currency. Managers’ response by itself, in this case, does not reveal any information about future volatility. But their private information may still be very valuable.
manager/company characteristics, $M'_i$, namely, the size of the firm and whether the firm is a multinational corporation. The third set is the managers’ private information with respect to country $j$, $p^j_i$. The first two elements are observed, while the third is not.

Even though expectations are unobserved, our data consist of the managers’ responses to the survey. These responses are categorical. They are as follows:

$$ p^j_i = \begin{cases} 
1 & \text{if } y^j_i \leq \mu^1 \\
2 & \text{if } \mu^1 < y^j_i \leq \mu^2 \\
\vdots & \vdots \\
K & \text{if } \mu^{K-1} \leq y^j_i \\
\end{cases} \tag{1} $$

where $\mu^1, \mu^2, \ldots, \mu^K$ are a set of unknown constants and $K$ is the number of possible responses. A response with a higher number means better expectations, i.e., the exchange rate is expected to be more stable. Note that the assumption that the parameters $\mu^1, \mu^2, \ldots, \mu^K$ are the same for all individual forecasters is necessary for identification, but if different forecasters had different ways of mapping forecasts to the responses this assumption would be introducing an extra source of variation (or measurement error).\footnote{We thank one of the referees for raising this point.}

One could measure the value of the managers’ responses in a one-step calculation, by estimating the following equation:

$$ \text{ERV}^j_{t+1} = \beta'X^j_t + \delta\tilde{r}^j_t + u^j_{t+1}, \tag{2} $$

where $\text{ERV}^j_{t+1}$ is the exchange rate volatility in country $j$ at time $t+1$, calculated as the standard deviation of monthly exchange rate changes versus the U.S. dollar over each year. The set of macroeconomic and financial variables at time $t$ is represented by $X^j_t$. $\tilde{r}^j_t$ is the average response of managers from country $j$ at time $t$ based on their expectations for period $t+1$. After controlling for macroeconomic and financial factors that are public knowledge, if managers’ responses are still valuable at predicting exchange rate volatility the estimated $\delta$ should be negative. That is, a high response means low volatility, a low value of $\text{ERV}^j_{t+1}$.

This type of equation can be estimated by least squares. The main advantage of this method is that it is computationally simple. The disadvantages are that this method ignores the fact that the responses are categorical and that managers have specific characteristics. To overcome these drawbacks, we need to test a more complex model using a system estimator, to which we now turn.

The system estimation has two parts. The first part models explicitly the managers’ responses by taking into consideration the fact that the responses are categorical and that managers have specific characteristics. To do this, we model the value of the estimated private information.
The first part models the managers’ responses, $r_{i,t}^{j}$, as a function of all available information and the manager’s individual characteristics. The average managers’ private information for country $j$ at time $t$, $p_{j}^{t}$, is estimated as a coefficient of a country-year dummy, $d_{j}^{t}$, in an ordered probit model. The probability of each response is given by

\begin{align}
\text{Prob}(r_{i,t}^{j} = 1) &= \Phi(-\alpha'X_{i}^{t} - \beta'M_{i}^{j} - \bar{p}_{i}^{j}d_{i}^{t}), \\
\text{Prob}(r_{i,t}^{j} = 2) &= \Phi(\mu_{1} - \alpha'X_{i}^{t} - \beta'M_{i}^{j} - \bar{p}_{i}^{j}d_{i}^{t}) - \Phi(-\alpha'X_{i}^{t} - \beta'M_{i}^{j} - \bar{p}_{i}^{j}d_{i}^{t}), \\
\vdots \\
\text{Prob}(r_{i,t}^{j} = K) &= 1 - \Phi(\mu_{K-1} - \alpha'X_{i}^{t} - \beta'M_{i}^{j} - \bar{p}_{i}^{j}d_{i}^{t}).
\end{align}

In words, the response of manager $i$ at time $t$ with respect to country $j$ at time $t + 1$ is a function of the available information, the manager’s characteristics, and the managers’ private information.

To test whether managers have valuable private information, the second part estimates the exchange rate volatility as a function of all available information in the previous period and on our estimate of the managers’ private information. More specifically, the second part estimates the relation between the exchange rate volatility in country $j$ in period $t$ as a function of macroeconomic variables of country $j$ in period $t$ and the managers’ information about country $j$ in period $t$, which refers to the managers’ expectations about period $t + 1$. This function has the following form:

\begin{align}
\text{ERV}_{t+1}^{j} = \beta'X_{i}^{t} + \delta\bar{p}_{i}^{t} + u_{t+1}^{j}.
\end{align}

One alternative would be to estimate these two parts in two steps. The first step would extract the managers’ private information, for example, using the residual of an ordered probit model, which would take into account the managers’ characteristics. The second step would estimate via least squares Eq. (4). This type of approach has already been used to estimate similar problems. For example, De Young et al. (2001) use it to calculate the information content of bank monitors. Svensson (2003) works with this kind of approach to estimate a model of international financial aid. Though the two-step procedure has some advantages vis-à-vis the one-step estimator, such as taking into account the managers’ characteristics and the non-linearity of the problem, this approach also presents disadvantages. First, the ordered probit model cannot perfectly predict the variation of the dependent variables and, as a result, the unexplained part enters as the residual (the manager’s private information). Second, the residual from the first step can be heteroskedastic. Third, since the second step uses the residual as a regressor, the standard errors tend to be biased upward, as shown by Pagan (1984, 1986).

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6 See Oxley and McAleer (1993) for an earlier survey on papers using generated regressors from two-step estimators.
Fourth, any potentially omitted variables in the first stage could also bias the estimates in the second stage.⁷

Part of these problems can be addressed by estimating the ordered probit model (3) and Eq. (4) simultaneously via full-information maximum likelihood (FIML), as suggested by Pagan (1984). Although computationally difficult, this approach obtains efficient estimates of the parameters of interest, using all available information. Thus, in this paper we estimate the system jointly. The working paper version of this paper, Kaufmann et al. (2002), shows the results using the one-step and two-step estimators; those results are similar to the ones reported here.

The log likelihood function we estimate is the following:

\[
\ln L = \sum_i \sum_j \sum_l \sum_k \frac{w_j}{2} \left( \ln 2\pi + \ln \sigma^2 + \frac{(ERV_i^j - \beta' X_i^j - \delta \bar{p}_i^j)^2}{\sigma^2} \right) + I(k) \ln \text{Prob}(\rho_i^j = k). \tag{5}
\]

\(I(k)\) is an indicator variable that takes the value of one if the manager’s response is \(k\) and zero otherwise. \(w_j\) is a weight variable equal to the average number of managers divided by the number of managers in country \(j\). This weighting is done to assign the same weight to every country.

2.2. Omitted variables

The maximum likelihood estimator solves some problems, but it does not solve the issue of omitted variables. To address this problem, we try to control for different combinations of all the relevant variables identified by the literature, as explained below. However, we can only control up to the set of variables observed by the econometrician. Thus, one has to be careful when interpreting the results, as the private information part can be capturing the effect of relevant omitted variables.

One way to try to address the problem of omitted variables is to test whether the managers’ information can still help explain future exchange rate fluctuations, when one uses market expectations rather than forecasts based on macroeconomic and financial data. Therefore, we use the expectations of changes in the exchange rate — as captured by the difference between local and U.S. nominal interest rates — as a market measure that might incorporate all public information about exchange rate movements.⁸ In other words, we substitute \(X_i^j\) for \((i_i^j - i_i^{US})\), where \(i_i^j\) is the local interest rate and \(i_i^{US}\) is the U.S. interest rate. In this alternative specification we ask: do managers have private information that can improve the market forecast of exchange rate fluctuations? If financial markets are efficient, the interest rate

⁷ We thank one of the referees for raising these points.

⁸ The interest rate differential entails different components, including the expected devaluation, the exchange rate risk premium, and the country premium. A higher interest rate differential is typically associated with higher exchange rate volatility.
differential should capture all public information. So if managers help predict the future evolution of exchange rates, one can argue either that markets are not efficient or that managers have private information.

In addition to the interest rate differential, we also incorporate the country ratings, as they might provide a summary of the market or the international analysts’ expectations about each country’s prospects. More specifically, we include the ratings of Standard and Poor’s (S&P’s hereafter), one of the leading rating agencies. We then can compare whether managers have an informational advantage also over rating agencies in predicting exchange rate volatility. In principle, one would expect that the S&P’s ratings capture, at least, the publicly available information and, perhaps, private information as well.\(^9\)

3. Data

This section details the data used in our estimations. The novel dataset obtained for this paper is the GCS survey. The first GCS survey took place between December 1995 and January 1996. The second and third surveys were conducted over the period December 1996–January 1997 and December 1997–January 1998, respectively. Each questionnaire consists of about 150 questions with answers ranked from one to seven for the 1997–1998 surveys and one to six for the 1996 survey. We focus the analysis on a specific question, which captures local managers’ expectations regarding the exchange rate volatility of the local currency.

The dataset includes 58 countries (49 in 1996, 58 in 1997, and 54 in 1998).\(^{10}\) The average number of respondents from each country is 41; the dataset includes 7169 observations (1524 in 1996, 2795 in 1997, and 2850 in 1998). The questions/statements for 1996 are slightly different from the questions for 1997 and 1998.

In 1996, managers were asked to rank their agreement (disagreement) with the following statement (asked in Question 2.05) on a scale of one (disagree) to six (agree):

“The exchange rate of your country is expected to be very stable in the next 2 years.”

\(^9\) Due to data limitations, we use the rating on long-term debt, denominated in foreign currency, as a proxy for S&P’s expectations of exchange rate volatility. Debt ratings range from AAA to B, with a total of 15 ratings in our sample. The rating AAA means that the country has extremely strong capacity to meet its financial commitments; it is the highest rating assigned by S&P’s. Rating B is the lowest in our sample and is defined as “more vulnerable,” but the debtor currently has the capacity to meet its financial commitments. Note that these ratings are not of exchange rate volatility, but of the country’s capacity to meet its financial commitments. However, we expect these two variables to be correlated.

\(^{10}\) The countries in the sample are: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Egypt, El Salvador, Finland, France, Germany, Great Britain, Greece, Guatemala, Hong Kong, Honduras, Hungary, Indonesia, India, Ireland, Island, Israel, Italy, Japan, Jordan, Korea (South), Luxembourg, Malaysia, Mexico, Netherlands, Nicaragua, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Russia, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, United States of America, Venezuela, Vietnam, and Zimbabwe.
Similarly, in 1997 and 1998 managers were asked to rank their agreement (disagreement) with the following statement (asked in Question 1.08) on a scale of one (disagree) to seven (agree):

“The exchange rate of your country is not expected to be very volatile in the next year.”

A low (high) value means that the managers expect the exchange rate to be very volatile (stable). The mean of responses by country and year ranges from 6.53 (Argentina in 1998) to 1.53 (Venezuela in 1996).

To capture managers’ expectations based on public information we use available macro and financial variables, known at the time of the survey. We choose the variables identified in the literature as important in predicting financial crises and exchange rate fluctuations. Specifically, we work with the following variables: the current account surplus as a percentage of gross domestic product (GDP), the ratio of reserves to monthly import values, the change in reserves to credit ratio, the inflation rate, and the growth rate of domestic credit. We also examine several other variables in alternative specifications. These variables are the change in terms of trade, the government budget surplus as a percentage of GDP, the GDP growth, the reserves to deposits ratio, the short-term debt to reserves ratio, broad money (M2) to reserves ratio, and lagged volatility of the exchange rate. The sources of the data are the International Financial Statistics of the International Monetary Fund and the World Development Indicators of the World Bank.

As discussed above, managers’ responses might be affected also by their characteristics. We have data on managers’ characteristics only for 1997 and 1998. The two characteristics are the location of its headquarters – international or domestic – and whether the company’s sales are primarily international or domestic. In 1997, 13.1% of the firms in our sample had an international headquarter and 34.4% had mostly international sales. In 1998, 18.2% of the firms in our sample had an international headquarter and 26.0% had mostly international sales. The dummy variable for the headquarters’ location is equal to one if the headquarter is located outside of the country and equal to zero if it is located domestically. The dummy variable for the sales orientation is equal to one if sales are primarily international and equal to zero if sales are primarily within the country.

4. Results

Tables 1—5 show the results from the FIML estimation displayed in Eq. (5). The table reports the results from estimating the ordered probit model (3) and Eq. (4) simultaneously. We separately estimate the ordered probit part for 1996 and

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11 We used the following papers to select the relevant variables: Frankel and Rose (1996), Esquivel and Larrain (1998), Furman and Stiglitz (1998), Kaminsky and Reinhart (1999), Martinez Peria (2002), and Sachs et al. (1996).
Table 1
Full-information maximum likelihood estimation

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>Managers’ responses</th>
<th>Exchange rate volatility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1996</td>
<td>1997 and 1998</td>
</tr>
<tr>
<td>Managers’ private information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current account surplus/GDP</td>
<td>−0.01 (−0.60)</td>
<td>0.02*** (3.18)</td>
</tr>
<tr>
<td>Reserves/imports</td>
<td>0.70*** (2.77)</td>
<td>0.54*** (3.85)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>−0.44 (−0.75)</td>
<td>1.19*** (3.89)</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>−0.29 (−1.53)</td>
<td>0.00* (1.64)</td>
</tr>
<tr>
<td>Growth of domestic credit</td>
<td>−2.18*** (−7.59)</td>
<td>−1.10*** (−4.31)</td>
</tr>
<tr>
<td>International headquarters dummy</td>
<td>−0.12*** (−3.25)</td>
<td></td>
</tr>
<tr>
<td>International sales dummy</td>
<td>0.02 (0.97)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td>−0.01*** (−3.45)</td>
</tr>
<tr>
<td>Number of observations</td>
<td></td>
<td>6132</td>
</tr>
<tr>
<td>Log likelihood</td>
<td></td>
<td>−7957</td>
</tr>
</tbody>
</table>

The table reports full-information maximum likelihood estimates of Eq. (5). This method jointly estimates the managers’ responses, with different coefficients for 1996 and 1997 and 1998, and the value of the managers’ private information. The three columns report the estimates of each equation, with different dependent variables. *-Statistics are in parentheses. *, **, and *** mean statistically significant at 10, 5, and 1 percent level, respectively.

1997–1998 for three reasons. First, the responses in 1996 are on a scale of one to six while the responses in 1997 and 1998 are on a scale of one to seven. Second, the questions in 1996 and in 1997–1998 are not identical. Third, managers’ characteristics are not available in the 1996 survey.

Table 2
Full-information maximum likelihood estimation

<table>
<thead>
<tr>
<th>Explanatory variables</th>
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<th>Exchange rate volatility</th>
</tr>
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<td>1997 and 1998</td>
</tr>
<tr>
<td>Managers’ private information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current account surplus/GDP</td>
<td>−0.06** (−4.58)</td>
<td>0.08*** (8.01)</td>
</tr>
<tr>
<td>Reserves/imports</td>
<td>0.32 (0.74)</td>
<td>0.60** (2.19)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>1.50* (1.81)</td>
<td>−0.08 (−0.26)</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>0.02*** (8.15)</td>
<td>0.02 (0.46)</td>
</tr>
<tr>
<td>Growth of domestic credit</td>
<td>−3.37*** (−8.26)</td>
<td>−0.16*** (−0.53)</td>
</tr>
<tr>
<td>Change in terms of trade</td>
<td>−0.05*** (−2.98)</td>
<td>0.01 (1.17)</td>
</tr>
<tr>
<td>Government budget surplus/GDP</td>
<td>9.66*** (4.85)</td>
<td>−3.83*** (−1.98)</td>
</tr>
<tr>
<td>GDP growth</td>
<td>−0.01 (−0.65)</td>
<td>0.08*** (5.79)</td>
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<tr>
<td>International headquarters dummy</td>
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<tr>
<td>International sales dummy</td>
<td>−0.05*** (−0.89)</td>
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</tr>
<tr>
<td>Constant</td>
<td></td>
<td>0.11*** (8.91)</td>
</tr>
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<td>Number of observations</td>
<td></td>
<td>3130</td>
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<td>Log likelihood</td>
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The table reports full-information maximum likelihood estimates of Eq. (5). This method jointly estimates the managers’ responses, with different coefficients for 1996 and 1997 and 1998, and the value of the managers’ private information. The three columns report the estimates of each equation, with different dependent variables. *-Statistics are in parentheses. *, **, and *** mean statistically significant at 10, 5, and 1 percent level, respectively.
### Table 3
Full-information maximum likelihood estimation

<table>
<thead>
<tr>
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<tr>
<td>Manag</td>
<td>ers’ private information</td>
<td>-0.16*** (-6.63)</td>
<td>-0.01 (-0.88)</td>
</tr>
<tr>
<td>Current account surplus/GDP</td>
<td>0.00 (0.01)</td>
<td>-0.03 (-0.17)</td>
<td>-0.06*** (-3.93)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>0.78 (0.83)</td>
<td>1.10*** (4.28)</td>
<td>-0.01 (-0.54)</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>0.02*** (4.87)</td>
<td>-0.00*** (-0.11)</td>
<td>-0.00** (-2.31)</td>
</tr>
<tr>
<td>Growth of domestic credit</td>
<td>-2.34*** (-5.48)</td>
<td>-1.05*** (-5.72)</td>
<td>-0.32 (-0.16)</td>
</tr>
<tr>
<td>Reserves/deposits</td>
<td>-0.34** (-2.10)</td>
<td>0.18*** (3.25)</td>
<td>-0.02*** (-3.16)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>0.80 (1.09)</td>
<td>-2.02*** (-3.91)</td>
<td>0.02 (0.50)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>0.04*** (4.11)</td>
<td>0.65*** (4.70)</td>
<td>-0.04*** (-4.11)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-0.30 (-0.50)</td>
<td>1.00*** (4.18)</td>
<td>-0.17*** (-8.03)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-0.01 (-0.06)</td>
<td>0.00 (0.89)</td>
<td>0.00*** (8.12)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-2.00*** (-6.67)</td>
<td>-1.44*** (-6.34)</td>
<td>0.34*** (39.15)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-7.04*** (-4.69)</td>
<td>-4.74 (-6.34)</td>
<td>0.25*** (6.05)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-0.17*** (-3.75)</td>
<td>0.03 (0.52)</td>
<td>-0.00*** (-2.64)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-0.21*** (-3.59)</td>
<td>0.00** (-0.14)</td>
<td>0.19*** (12.69)</td>
</tr>
<tr>
<td>Number of observations</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-1513</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table reports full-information maximum likelihood estimates of Eq. (5). This method jointly estimates the managers’ responses, with different coefficients for 1996 and 1997 and 1998, and the value of the managers’ private information. The three columns report the estimates of each equation, with different dependent variables. t-Statistics are in parentheses. *, **, and *** mean statistically significant at 10, 5, and 1 percent level, respectively.

### Table 4
Full-information maximum likelihood estimation

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Current account surplus/GDP</td>
<td>0.01 (0.96)</td>
<td>0.03*** (6.22)</td>
<td>-0.02*** (-13.97)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>0.47** (1.89)</td>
<td>0.65*** (4.70)</td>
<td>-0.00*** (-5.80)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-0.30 (-0.50)</td>
<td>1.00*** (4.18)</td>
<td>-0.17*** (-8.03)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
<td>-0.01 (-0.06)</td>
<td>0.00 (0.89)</td>
<td>0.00*** (8.12)</td>
</tr>
<tr>
<td>Change in reserves/credit</td>
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<td></td>
</tr>
<tr>
<td>Number of observations</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Log likelihood</td>
<td>-7203</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table reports full-information maximum likelihood estimates of Eq. (5). This method jointly estimates the managers’ responses, with different coefficients for 1996 and 1997 and 1998, and the value of the managers’ private information. The three columns report the estimates of each equation, with different dependent variables. t-Statistics are in parentheses. *, **, and *** mean statistically significant at 10, 5, and 1 percent level, respectively.
Tables 1–4 correspond to alternative sets of independent macroeconomic and financial variables. In each table, three columns of results are reported. The first two columns show the estimates of the ordered probit model, for 1996 in the first column and for 1997–1998 in the second column. The dependent variable is the managers’ responses and the independent variables are the macroeconomic variables, financial variables, and managers’ characteristics described above. The third column reports the estimates of Eq. (4) that tests the value of the managers’ private information.

Across Tables 1–4, the estimates of the ordered probit part show that most of the variables are statistically significant and have the expected sign. The ratio of reserves to imports and the change in reserves to credit are positive and statistically significant, implying that higher values of these variables lead managers to believe that the exchange rate would be more stable. The coefficient on growth of domestic credit is negative and significant, implying that higher values of these variables increase managers’ expectations of exchange rate volatility. The coefficients on the current account surplus and inflation change sign according to the specification. As shown in Table 2, an improvement in terms of trade is associated with lower expected exchange rate volatility. Also, GDP growth has a positive sign, so managers believe that higher growth is associated with lower volatility. The results in Tables 3 and 4 imply that managers perceive that a higher M2 to reserves ratio, a higher level of short-term debt, and a higher lagged volatility lead to a higher variation in the exchange rate, as the associated coefficients take the negative sign. In sum, these results suggest that overall managers form expectations consistent with economic theory.

The dummy variable for international headquarters is statistically significant and negative in all specifications, while the dummy for international sales is statistically significant and negative only in Table 2. These results indicate that managers in firms with international headquarters, and to some extent exporters, expect the exchange rate to be more volatile.
The estimates of Eq. (4) show that in all specifications the variable that captures the managers’ private information is statistically significant at the one percent level and has the expected negative sign. Namely, a higher response is associated with lower exchange rate volatility. This suggests that managers’ private information is useful in predicting exchange rate volatility. The point estimates range from \(-0.01\) to \(-0.06\). (For comparison, the mean volatility is 0.03 and the standard deviation is 0.05.) Thus, if the managers’ response is one below a response based on the macro variables and managers’ characteristics, the exchange rate volatility is expected to be between 0.01 and 0.06 higher.

Regarding the other variables, the current account surplus, reserves over imports, change in reserves over credit, GDP growth, short-term debt over reserves, and M2 over reserves are statistically significant and negatively related to the exchange rate volatility. The reverse occurs for growth of domestic credit, change in terms of trade, and lagged volatility; they have a positive and significant sign in the volatility equation.

As mentioned above, the results so far support the hypothesis that local managers have valuable private information. However, the macroeconomic and financial variables used may not capture all the information available to markets. Thus, Table 5 shows results using the interest rate differential and the S&P’s ratings, instead of the macroeconomic and financial variables, as explanatory variables of future exchange rate volatility.\(^{12}\) Managers’ characteristics also enter in the estimation.

The results in Table 5 suggest that the managers’ responses are consistent with market expectations. Large interest rate differentials are associated with managers forecasting high exchange rate volatility. Moreover, higher ratings from S&P’s are associated with more optimistic responses. The results of regressing the exchange rate volatility on the interest rate differential, the S&P’s rating, and the managers’ private information from the previous period are reported in the third column. The managers’ private information is significant and has the right sign. This suggests again that local managers have private information that is unknown to market participants. The interest rate differential is not significant. Meanwhile, the S&P’s rating is significant and has the negative sign; that is, a higher rating is associated with lower exchange rate volatility. In sum, managers’ private information can help predict exchange rate volatility after controlling for market expectations — as captured by the interest rate differential and public ratings.

5. The case of the East Asian crisis

Before concluding, we turn our attention to the East Asian crisis, as a case study of informational advantage of local investors. We concentrate on four countries affected by the 1997–1998 crisis: Indonesia, Korea, Malaysia, and Thailand. The evidence from the recent literature suggests that many crises took foreign investors,\(^{12}\) Data on interest rate differential are taken from IFS, line 60.
but not local investors, by surprise. To some degree this also seems to be the case for the East Asian crisis.\textsuperscript{13}

Though not formally tested, the survey used in this paper suggests that local managers expected the crisis in Thailand and Korea, but not in Indonesia and Malaysia. Fig. 1 displays the managers’ expectations about exchange rate stability over the next year. The data show that in Korea and Thailand expectations worsened between 1996 and 1997 (prior to the crisis). The most striking change occurred in Thailand. For comparison, in Latin American, other South East Asian, and developed countries, expectations improved during the same period.

Table 6 presents similar evidence, but from a different perspective. It shows the average managers’ responses about exchange rate volatility and compares them with the actual volatility and depreciation.\textsuperscript{14} The table suggests that managers in Korea and Thailand increased their expectations of a crisis before the crisis occurred. Note the decrease in the value of the managers’ responses in Korea from 3.63 to 3.29

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\textsuperscript{13} The evidence is based on market indicators, such as changes in country fund prices and net asset values, mutual fund flows to emerging markets, and bank flows to emerging markets. (See Frankel and Schmukler, 2000; Kaminsky et al., 2004; Bank for International Settlements, 1998.) There is also evidence from forecasts of market analysts and rating agencies as a proxy for foreign investors’ expectations. (See Ferri et al., 1999; Goldfajn and Valdes, 1998.)

\textsuperscript{14} The exchange rate is defined as local currency per dollars.
comparing January 1996 with January 1997), before the exchange rate volatility increased from 0.01 to 0.14 (comparing the volatility in 1996 with that in 1997). A similar phenomenon occurred in Thailand, where the average response decreased from 5.06 to 4.17, before the exchange rate volatility increased from less than 0.01 to 0.08. In Indonesia and Malaysia, however, managers adjusted their expectations only in 1998, after the Asian crisis became evident.

6. Conclusions

The issue of asymmetric information has become central to understanding the nature and spillover of financial crises, as well as the overall functioning of international financial markets. Many papers have tested the presence of asymmetric information, but most of them had to rely on aggregate prices, capital flows, or order flows. This paper tested the hypothesis of asymmetric information by using a unique dataset that compiles local managers’ perspectives on the country where they reside.

We tested whether managers have valuable private information. We calculated whether the managers’ responses help predict exchange rate fluctuations after controlling for other factors that have been shown to explain the exchange rate volatility. We compared the value of the managers’ information not only with respect to macroeconomic and financial variables, but also with respect to the interest rate differential and with analysts’ ratings.

We found that managers seem to have valuable private information, which helps predict exchange rate fluctuations. The results are robust to the different sets of variables included in the tests and, although not reported here, to the estimation
method. The descriptive evidence from the Asian crisis supports to some degree these findings. The data suggest that local residents in Thailand and Korea were aware of deteriorating local conditions in those countries, while markets and international investors were not.

Though our results are very suggestive of managers having an informational advantage, one needs to be careful when interpreting our evidence as a full proof of asymmetric information. First, despite the fact that we used a wide array of independent variables, it is possible that managers also consider other variables that are not identified by the economic literature or that were not included in our estimations, generating a problem of omitted variables. One could interpret the results, in that case, as a combination of private information and knowledge (on the importance of specific variables) that is unknown to others. Second, to the extent that markets are efficient and incorporate all available information, the inclusion of the interest rate differential and analysts’ ratings should provide evidence that managers do have private information. However, it is also possible that markets are not efficient.

There are several directions for future research. First, an important question is, why do foreign investors not try to capture local managers’ private information? After all, if this information is valuable, one could use it to make profits. Perhaps the fact that banks set up local offices and hire nationals to monitor countries is an indication that foreign investors value this type of information. Second, although some groups seem to be better informed, they do not predict every crisis, as shown in the case of Indonesia. Some crises seem to surprise all market participants equally. Future research should investigate why local residents are able to predict some crisis, but not others. Is it, perhaps, because they do not have all the information, or is it because they interpret the information incorrectly?

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