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Abstract

We introduce a novel currency risk measure based on American Depositary Receipts (ADRs). Using a multifactor pricing model, we exploit ADR investors' exposure to potential devaluation losses to derive an indicator of currency risk. Using weekly data for a sample of 831 ADRs located in 23 emerging markets over the 1994-2014 period, we find that a deterioration in the fiscal and current account balance, as well as higher inflation, increases currency risk. Interaction models reveal that these macroeconomic fundamentals drive currency risk, particularly in countries with managed exchange rates, low levels of foreign exchange reserves and a poor sovereign credit rating.

Keywords: currency risk; currency crises; American depositary receipts; emerging markets

JEL Classification: F31, F37, G12, G15

1. Introduction

We present a novel approach to measuring and explaining currency risk using data on American Depositary Receipts (ADRs). While the ADR is denominated in U.S. dollars, the underlying share is denominated in the local currency of the emerging market. Since the devaluation of the emerging market currency against the U.S. dollar causes losses to ADR investors, ADR returns should contain a currency risk factor when substantial currency risk is perceived.

Using a multifactor ADR pricing model, we exploit ADR investors' exposure to potential losses resulting from devaluation in order to derive a market-based indicator of currency risk. Using a weekly macroeconomic stress index based on principal component analysis, we conclude that ADR investors perceive significant currency risk when macroeconomic stress is priced as a systematic risk factor in ADR returns. Based on a panel of 831 ADRs located in 23 emerging markets over the 1994-2014 period, we derive a forward looking currency risk measure that is indicative for future currency devaluation. Our findings suggest that our ADR based currency risk measure not only reflects current devaluation episodes, but also indicates currency depreciation in the following year. In a second step, we employ a panel framework to study the sources of currency risk, finding that a lower fiscal balance, as well as a lower current account balance and higher inflation, lead to higher currency risk as perceived by ADR investors. Interaction models suggest that these macroeconomic fundamentals drive currency risk, particularly in countries with a managed exchange rate, low foreign exchange reserves, and a poor sovereign credit rating.

Our paper contributes to two strands of the literature. First, it adds to the literature on the determinants of currency risk. Several interesting papers employ logit or probit models (e.g. Eichengreen et al. (1995); Frankel and Rose (1996); Bussiere and Fratzscher (2006)) or early warning signal approaches (Kaminsky et al. (1998); Kaminsky and Reinhart (1999); Kaminsky (2006)) to derive and explain the sources of currency risk. While these contributions offer

interesting insights into the determination of past devaluation episodes, they have the natural drawback that devaluation signals are based on macroeconomic data which are backward looking, infrequent, and only available with a substantial publication lag.

The second strand of papers studies the relationship between exchange rates and the pricing of ADRs. A number of papers documents that ADRs exhibit negative abnormal returns during periods of currency crisis (e.g. Bailey et al. (2000); Bin et al. (2004); Pasquariello (2008); Esqueda and Jackson (2012)). Since ADR investors are exposed to losses in the event of devaluation, they should closely monitor sources of currency risk when pricing ADRs.

A few papers use price spreads between ADRs and their underlying stocks to study exchange rate expectations. Arquette et al. (2008) study Chinese ADRs and H-shares and find that exchange rate expectations drawn from forward rates are significant drivers of the price spread between cross-listed stocks and their domestic underlyings. Eichler (2011) shows that price discounts on Chinese cross-listed stocks have predictive power for the expected exchange rate of the yuan vs. the U.S. dollar. Several interesting studies consider the capital control episode in Argentina 2001/02 and find that prior to the devaluation of the peso, ADRs were traded at a price discount relative to their corresponding underlying stocks (e.g. Melvin (2003); Kadiyala (2004); Levy Yeyati et al. (2004); Auguste et al. (2006); Eichler et al. (2009)).

Melvin (2003), Levy Yeyati et al. (2004) and Auguste et al. (2006) attribute this finding to the fact that Argentinians were willing to pay a premium on domestic stocks in order to convert them into ADRs and then cash them into U.S. dollars – a legal way to circumvent the capital controls. Kadiyala (2004) and Eichler et al. (2009), on the other hand, argue that this relative discount reflects the market expectations of the true exchange rate that would result after the breakdown of the peg. Moreover, Eichler et al. (2009) find that falling commodity prices and currency overvaluation, as well as rising sovereign default risk, drive ADR investors' currency crisis expectations.

To summarize, existing literature has shown that ADR returns fall after a devaluation of the underlying currency and ADR investors are thus exposed to capital losses during currency crisis episodes. A few papers use the relative prices of ADRs and their underlying stocks in order to derive currency (crisis) risk measures.

We contribute to these strands of the literature in several ways. First, we introduce a currency risk indicator based on ADR returns. This approach enables us to examine the sources of currency risk as assessed by ADR investors. Our currency risk indicator therefore has the advantage of reflecting forward looking currency risk assessments that are available at a high frequency and in real time. Second, in contrast to existing approaches in the ADR literature that use relative price levels (Melvin (2003); Kadiyala (2004); Levy Yeyati et al. (2004); Auguste et al. (2006); Arquette et al. (2008); Eichler et al. (2009)), our measure is not restricted to capital control episodes. We consider the currency risk factor priced in ADR *returns*, which can also be derived for periods without restrictions on capital flows. Our approach therefore enables us to derive a currency risk indicator for a broad sample of countries and periods. Third, our two-step approach allows us to study a broad range of currency risk drivers. Existing studies solely consider the direct effect of financial instability indicators on relative ADR prices. Instead, we derive a currency risk factor priced in ADR returns in the first step, subsequently investigating the sources of currency risk as perceived by ADR investors in the second. Fourth, using interaction models we investigate how currency risk emerges in different regimes (high vs. low sovereign risk country; high vs. low debt country; central bank intervention in foreign exchange markets vs. freely floating exchange rates).

The remainder of the paper is organized as follows. Section 2 describes the methodology and data. Section 3 presents the results. Section 4 concludes.

2. Currency risk and the pricing of American Depositary Receipts

An American Depositary Receipt (ADR) represents ownership of a specific number of underlying shares in the home market on which the ADR is written. Both types of stocks of the same company provide the same rights to the owner such as dividend claims and voting rights. While the underlying stock is traded on the stock exchange of the home/emerging market and is denominated in the currency of the emerging market, the ADR trades in the United States and is denominated in U.S. dollars. ADRs can be converted into underlying shares at a fixed conversion ratio at any point in time.

Since the ADR and its underlying share represent ownership of the same company and one can be converted into the other at a fixed conversion ratio, the exchange rate adjusted prices of both stocks should be equal to:

$$P_{ADR_{i,t}} = \frac{P_{UND_{i,t}} * \gamma_i}{S_{j,t}}, \quad (1)$$

with $P_{ADR_{i,t}}$ and $P_{UND_{i,t}}$ depicting the prices of the ADR and its corresponding underlying stock, respectively, γ_i a fixed conversion parameter and $S_{j,t}$ the exchange rate of the emerging market currency against the U.S. dollar.

In an empirical model, ADR returns should be governed by the returns of the underlying stock and the exchange rate:

$$ret_{i,t}^{ADR} = \alpha_i + \beta_1 ret_{i,t}^{UND} + \beta_2 ret_{j,t}^{S} + \varepsilon_{i,t}. \quad (2)$$

From the fundamental pricing equation of ADRs, it is clear that ADR investors are exposed to losses after a depreciation of the domestic currency against the U.S. dollar. While current ADR prices account for the current exchange rate, the risk of large depreciations of the domestic currency in the future (*currency risk*) cannot be reflected by today's exchange rate

return ret_{jt}^{S}. For example, if the central bank of the emerging market manages the exchange rate using foreign exchange market interventions, ADR investors may expect that the fundamental value of the domestic currency is not fully reflected by the (manipulated) official exchange rate. Thus, if ADR investors perceive currency risk (i.e., a sizable risk that the overvalued domestic currency may depreciate against the dollar), ADR investors will append the ADR pricing equation with a systematic risk factor accounting for currency risk:

$$ret_{i,t}^{ADR} = \alpha_i + \beta_1 ret_{i,t}^{UND} + \beta_2 ret_{j,t}^{S} + \beta^{currency\ risk} macroeconomic\ stress_{j,t} + \varepsilon_{i,t}. \quad (3)$$

Macroeconomic stress measures country specific factors that account for the misalignment of the official exchange rate. If the official exchange rate is managed and therefore does not fully account for a change in the fundamental value of the domestic currency, ADR investors may fear future devaluation and thus price currency risk in ADR returns. Accordingly, we account for currency risk which is not reflected in the official exchange rate.

Macroeconomic stress captures three sources of currency risk: export commodity prices, banking sector stability, and sovereign default risk. As will be explained below, each of these factors has a theoretically justified causal connection to currency risk and can be monitored by ADR investors on a real-time basis using market data.

If ADR investors perceive higher levels of macroeconomic stress associated with currency risk, they will consider this as a systematic risk factor in the ADR pricing equation – resulting in a negative and significant $\beta^{currency\ risk}$. If ADR investors see insignificant currency risk, *macroeconomic stress* would not affect the pricing of ADR returns, leading to an insignificant $\beta^{currency\ risk}$. Thus, a negative and significant $\beta^{currency\ risk}$ is an indication of the presence of currency risk.

2.1 Macroeconomic stress indicator

For our macroeconomic stress measure, we consider three country-specific currency risk drivers: export commodity prices, bank stock prices and sovereign bond yield spreads. Each of these indicators is based on market data and can thus be monitored by ADR investors on a high frequency and in real time.

First, the weekly return of the country's export price index intends to capture the change in the country's capability to generate foreign reserves and therefore enhance its ability to support its local currency in times of foreign exchange market pressure or speculative attack. Consequently, we would expect a rising export price index to reduce the country's currency risk.

The weekly return of the country's export price index $(\Delta EPI_{j,t,a})$ is computed by weighting the weekly return of commodity k ($\Delta P_{k,t,a}$) with the commodity's share of total exports of country j in the year a ($\frac{x_{j,k,a}}{\sum_{k=0}^{K} x_{j,k,a}}$):

$$\Delta EPI_{j,t,a} = \Delta P_{k,t,a} * \frac{x_{j,k,a}}{\sum_{k=0}^{K} x_{j,k,a}} \quad (4)$$

We use Bloomberg Commodity Indices taken from DATASTREAM. A commodity's share of total exports of the respective country is calculated using trade data from the UN COMTRADE database.[1]

As a second indicator of macroeconomic stress associated with currency risk, we consider bank stability. Several papers have shown that banking sector instability can lead to currency devaluation. In times of banking crisis, the domestic central bank may rescue troubled banks by printing money, which, in turn, is associated with inflationary pressure and currency

[1] Of course, it is not possible to perfectly match every export of any commodity reported to a Bloomberg Commodity Index. However, since the correlation between prices of close substitutes is very high, the potential bias here should be rather negligible.

devaluation (Diaz-Alejandro (1985); Velasco (1987); Calvo (1995); Kaminsky and Reinhart (1999); Miller (2000)). Weekly returns of the domestic bank stock index drawn from DATASTREAM are used to measure domestic banking sector stability. Lower returns of the country's banking index are assumed to lead to higher levels of currency risk.

As a third dimension of macroeconomic stress, we consider weekly changes in sovereign bond yield spreads (relative to U.S. Treasury bonds) using JP Morgan's EMBI Global Index.[2] Higher sovereign yield spreads indicate higher levels of sovereign default risk. Several papers find that both sovereign debt and currency crises occur together (see, for example, Reinhart (2002); Dreher et al. (2006); Herz and Tong (2008)), particularly because inflationary monetary policies are used by the domestic central bank in order to help the government reduce the real value of sovereign debt.[3] Thus, we expect higher levels of sovereign bond yield spreads to increase currency risk.

These three factors represent important drivers of currency risk: risk resulting from the real sector as identified by our export price index, risk stemming from the banking system, and sovereign risk. Since the aim of this paper is to investigate how ADR returns respond to innovations in macroeconomic stress associated with currency risk in the home country of the underlying stock, we use principal component analysis (PCA) to derive a single factor from the three factors described above. A possible advantage of using one factor derived from principal component analysis (as opposed to three different, but potentially highly correlated single indicators) is to limit the potential problem of multicollinearity. We conduct the PCA at the country level, i.e., we allow the principal component to have different eigenvectors for each of the countries in our panel. This approach seems reasonable as one might expect the relative

[2] For countries which are not included in the EMBI, we use sovereign yield spreads drawn from JP Morgan's Global Bond Index or comparable indices.
[3] Della Corte et al. (2015) present empirical evidence that the domestic currency devaluates as domestic sovereign default risk increases.

importance of each of the three risk dimensions to be different for every single country. Table 1 gives an overview of the resulting eigenvectors from our PCA.

<INSERT TABLE 1 ABOUT HERE>

In line with our expectations, the eigenvectors of the weekly return of the export price index and the weekly return of the bank index are negative, while the eigenvector of the change in the sovereign yield spread is positive.

For each country and week, we calculate *macroeconomic stress* by multiplying the eigenvectors derived from the PCA with the corresponding values of each indicator.

$$\Delta macroeconomic\ stress_{j,t,a} = \lambda_{\Delta EPI_j} * \Delta EPI_{j,t,a} + \lambda_{\Delta BI_j} * \Delta Bank_{j,t,a} + \lambda_{\Delta SYS_j} * \Delta Sov_{j,t,a} \quad (5)$$

Thus, higher values of the principal component are assumed to be associated with higher macroeconomic stress.

2.2 First-stage regression approach

In order to derive a currency risk indicator based on ADR data, we run panel regressions with ADR-underlying pair fixed effects for each country and year separately. We estimate the following equation using OLS with Huber-White-standard errors, controlling for heteroscedasticity and autocorrelation in the error term:

$$ret^{ADR}_{ij,t,a} = \alpha_{i,j,a} + \beta_{1,j,a}\, ret^{UND}_{i,j,t,a} + \beta_{2,j,a}\, ret^{S}_{j,t,a} + \beta^{currency\ risk}_{j,a} \Delta macroeconomic\ stress_{j,t,a} + \sum_{l=1}^{L} \beta_{l,j,a} * X_{l,t,a} + \varepsilon_{i,j,t,a} \quad (6)$$

where i is an index for the pair of a specific ADR and its corresponding underlying stock, j represents the country in which the underlying stock is traded, and t denotes the week of the specific observation in year a. $\sum_{l=1}^{L} X_{l,t,a}$ describes a number of control variables that are neither company nor country specific and $\alpha_{i,j,a}$ the ADR-underlying pair fixed effect. Control variables include the return of the S&P 500, controlling for factors that simultaneously drive the U.S. stock market and the ADRs in our sample, and the Fama & French factors *Mkt_RF*, *SMB* and *HML*. Table 2 in the appendix gives an overview of the variables and their sources used in the first-stage regression.

The panel model is estimated for each country j and year a using weekly data. This provides an annual country panel dataset of currency risk parameters $\beta_{j,a}^{currency\ risk}$. In years and countries where we obtain a significant negative $\beta_{j,a}^{currency\ risk}$, i.e., when ADR returns are negatively affected by increases in *macroeconomic stress*, we interpret this as currency risk being priced in ADR returns. We then use a second-stage regression approach where we identify the determinants of currency risk as perceived by ADR investors.

Our panel consists of 831 ADRs from 23 emerging markets[4] over the 1994-2014 period. The pairs of ADRs and their corresponding underlying stocks were identified using the ADR databases of JP Morgan and the Bank of New York Mellon, as well as additional information from DATASTREAM. We consider Level I, II, and III ADRs. We apply rigorous filters for liquidity in order to ensure higher quality price data. We also consider liquid OTC traded Level I ADRs, which significantly increases the number of countries and years included in our sample. We kept only those weekly observations of ADRs for which we either observed trading volumes for a given week, or – in case this information was not available – a non-zero weekly return.

[4] Argentina, Brazil, Chile, China, Colombia, Egypt, Hong Kong, Hungary, India, Indonesia, Israel, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Singapore, South Korea, South Africa, Thailand, Turkey and Venezuela.

One major problem with the use of daily ADR data results from the issue of non-synchronous trading hours. While trading hours of Latin American stock exchanges (at least partly) overlap with the trading hours of U.S. stock markets, the trading hours of the stock exchanges of the Asian countries in our sample do not overlap at all. In order to deal with this caveat, we follow Bae et al. (2008), among others, and use weekly returns on Friday's closing prices, thus reducing the potential bias from non-synchronous trading.[5]

We conduct several checks to ensure that we have identified the correct pairs of ADRs and underlying stocks, e.g., by regressing each ADR's weekly return on the weekly return of its underlying stock and the exchange rate, and checking whether the coefficients obtained are significant. We drop extreme outliers where ADR and underlying stock data do not match or where we suspect errors in the data. Table 3 in the appendix gives an overview of the number of different ADR-underlying pairs, the number of observations, and the time period covered for each country in our sample.

2.3 Descriptive Evidence

Figures 1 to 23 in the appendix illustrate the evolution of the macroeconomic stress index derived by cumulating the principal components and the exchange rate for each country of our sample over time. Areas shaded in grey indicate years with significant currency risk (i.e., years where a negative and significant currency risk beta is estimated in this first stage). The results show that major devaluation events are preceded by negative and significant currency risk betas, indicating that ADR investors' currency risk expectations performed well.

Out of the 358 country year observations for which we estimate the coefficient of our currency risk indicator in the first-stage regressions, we obtain significant negative coefficients

[5] An alternative approach to deal with this caveat would be to use intraday prices in order to obtain the closest time match (see, e.g., Gagnon and Karolyi (2010). However, for some risk factors in our sample, we did not have access to suitable intraday data. Moreover, even with intraday data, no perfect time match can be achieved for many Asian stocks.

in 69 cases (19.27%). Table 4 summarizes the results. The number of years where ADR returns respond significantly to macroeconomic stress differs significantly from country to country: while for Egypt, Hungary, the Philippines and Thailand, we did not obtain a significant negative currency risk beta coefficient for any year in our sample, we obtained a high number of significant betas from the first-stage regressions for Brazil (11 out of 21 estimates), Mexico (9 out of 17 estimates) and South Africa (7 out of 15 estimates). Regarding the differences related to the years in our sample, we find a higher proportion of significant negative coefficients for the early years in our sample, i.e., from 1994-2001, while less currency risk was perceived by ADR investors in the 2002-2014 period. This result resembles findings in other strands of the literature that emerging market economies benefited from a relatively robust macroeconomic environment during the Great Moderation. Although financial stress emerged in commodity, banking and sovereign sectors over the course of the Global Financial Crisis, full blown currency crises were rare. Thus, although the macroeconomic stress index spiked in several countries in the second half of our sample, ADR investors did not necessarily anticipate higher levels of currency risk – possibly because massive hoarding of foreign exchange reserves shielded those countries from currency risk.

<INSERT TABLE 4 ABOUT HERE>

For many of the currency crisis periods contained in our sample, we find that ADR returns respond significantly to changes in the macroeconomic stress index, e.g., Argentina in 2001, Brazil in 2000, Malaysia in 1997, Russia in 1998/99, and Turkey in 2001/02. We interpret these findings such that ADR investors anticipate future devaluations and therefore price currency risk into ADR returns beforehand.

<INSERT TABLE 5 ABOUT HERE>

Table 5 reports descriptive statistics on currency risk. We report separate statistics for periods when ADR investors perceive currency risk (significant and negative currency risk beta) and periods when no currency risk is perceived (insignificant currency risk beta). On average, currencies devaluate by 14.41% against the U.S. dollar in years when ADR investors consider currency risk to be a relevant pricing factor, in contrast to only 6.04% in years when they do not. We also find that during the year following an anticipated currency risk by ADR investors, currencies devaluate by 11.53%, on average, against the U.S. dollar, compared to an average devaluation of only 3.67% for years when no currency risk signal can be derived from ADR returns. Also, the probability of a currency crisis, indicated by a devaluation of the home country currency against the U.S. dollar of more than 15 % following Reinhart and Rogoff (2010), is significantly higher for those years after ADR investors had perceived currency risk. Overall, the results indicate a relatively solid currency risk assessment is made by ADR investors.

The average aggregate level of macroeconomic stress is higher for years in which ADR investors perceive currency risk, although the difference when compared to tranquil periods is not statistically significant. This suggests that it is not the level of macroeconomic stress *per se* that determines currency risk, but rather ADR investors' perception of the relevance of stress (in the banking, sovereign debt and commodity sectors) to the fundamental value of the currency. Massive hoarding of foreign exchange reserves after the Asian crisis, for example, may have made exchange rates of several countries much more resilient to commodity price shocks since the central bank can more easily absorb reserve losses.

3. Determinants of currency risk

In order to identify the economic fundamentals that drive the currency risk perceptions of ADR investors, we create a binary variable which takes the value 1 for years and

countries where we obtained a significant negative estimate of the currency risk coefficient in our first-stage regression, and 0 otherwise. We then run logit panel regressions using year and country fixed effects.

As explanatory variables, we test a large set of fiscal, monetary policy, macroeconomic, external, and political variables found to be relevant in the currency risk literature (see, for example, Frankel and Rose (1996); Kaminsky et al. (1998); Burkart and Coudert (2002); Kaminsky et al. (1998); Bussiere and Fratzscher (2006)). Table 6 in the appendix gives a detailed description of the explanatory variables used for the second-stage regressions and their sources. Table 7 reports summary statistics.

A deterioration in fiscal solvency should be associated with higher currency risk as perceived by ADR investors. Several papers find that both sovereign debt and currency crises occur together (see, for example, Reinhart (2002); Dreher et al. (2006); Herz and Tong (2008)). In periods of fiscal stress, the central bank may implement inflationary monetary policies in order to reduce the real burden of public debt or stimulate the real economy. High inflation (expectations) should, in turn, increase currency risk. We use the fiscal balance to GDP, sovereign credit ratings, and sovereign default dummies in order to measure sovereign solvency.

We also account for the availability and accumulation of foreign exchange reserves. A higher stock of foreign exchange reserves (in months of imports) or a higher accumulation of reserves via current account surpluses help the domestic central bank to fend off speculative attacks and should therefore reduce currency risk[6].

We account for a number of monetary policy variables. Purchasing power parity predicts that inflationary monetary policy should increase currency risk. First, we include the inflation rate. Second, we consider the institutional set up of the central bank by accounting for

[6] Several studies find that reserve accumulation generally make countries more resilient to shocks (e.g., Dominguez (2012); Dominguez et al. (2012); Bussiere et al. (2015)).

the (irregular) turnover of central bank governors. Third, we test for differences in currency risk between pegged and floating exchange rate regimes.

GDP growth is considered as a measure of the health of the domestic economy. We control for capital account openness, as measured by the Chinn-Ito Index, where higher values indicate less restricted capital flows (Chinn and Ito (2006)). Moreover, we also consider a number of political variables that measure political business cycles, power and ideology of the government.

3.1 Results from the second-stage regressions

Table 8 and Table 9 report the results investigating the determinants of currency risk as perceived by ADR investors. For the interpretation of the statistical and economic significance, we focus on the average marginal effects of the tested variable on the probability that ADR investors perceive significant currency risk.[7] The number of countries considered in the fixed effects logit regressions is reduced to 19 as we do not detect significant currency risk for four out of 23 countries in any of the years considered.[8] Each logit model includes country and year fixed effects.

<INSERT TABLE 8 – TABLE 9 ABOUT HERE>

We find robust evidence that currency risk perceived by ADR investors is driven by three major factors: fiscal balance, inflation, and the current account balance.

[7] Since within a panel logit model, a linear relation between the log odds ratio and the explanatory variables is assumed and this is not intuitively interpretable, we report the average marginal effects on the probability of the explanatory variables together with the test statistics for the logit model we estimate throughout the paper. The estimates of the coefficients from the logit model are available upon request.

[8] For specification 11, where we also test for the influence of political variables, our sample is reduced to 18 countries since we do not have information on the political variables from the Database of Political Institutions for Hong Kong.

We find that a higher fiscal deficit (i.e., a lower fiscal balance) is associated with higher currency risk. The marginal effect of the fiscal balance ranges between -0.023 and -0.029. That is, a one percentage point decrease in the fiscal balance to GDP increases the probability that ADR investors perceive currency risk by about 2.3 - 2.9 percentage points. The fiscal balance in our sample ranges from a minimum of -14.4% of GDP (Turkey in 2002) to a maximum of 11.8% of GDP (Singapore in 2007). Therefore, the probability that ADR investors perceived significant currency risk in Turkey in 2002 would have been about 60 percentage points higher than for Singapore in 2007, ceteris paribus. This highlights the economic importance of the fiscal balance, given that currency risk is detected for 19.27% of our observations. While almost all countries in our sample run persistent fiscal deficits, South Korea and Singapore managed to generate surpluses in almost all the years in our sample. Thus, consistent with the predictions of first generation currency crisis models, reducing fiscal deficits can contribute to fighting currency risk.

Another important fundamental variable which drives the currency risk perception of ADR investors is the current account balance. The average marginal effect ranges between -0.025 and -0.029, i.e., a one percentage point increase in the current account balance to GDP decreases currency risk by between 2.5 and 2.9 percentage points. Again, as these numbers suggest, the effect is not only statistically but also economically significant. In our sample, some Asian countries like Malaysia, the Philippines, South Korea and Thailand – probably inspired by the tremendous consequences following the Asian crisis – managed to escape from running persistent trade deficits during the 1990s, to now generate continuous current account surpluses. Our results suggest that policies fostering the generation of current account surpluses may contribute to lower currency risk.

The third fundamental variable that has explanatory power for currency risk is inflation. Our findings suggest that, on average, a one percentage point increase in inflation will increase currency risk by between 1.2 and 2.2 percentage points. In line with purchasing power

parity, our findings suggest that pursuing a disinflationary monetary policy can contribute to lower currency risk expectations.

Other potentially relevant variables for currency risk like real GDP growth, capital openness and the change in the amount of official reserve assets relative to monthly nominal imports, do not prove to be statistically significant for our sample.

We also test for a set of variables measuring financial crises and the political environment. At first, we follow the twin crisis literature approach and test for the impact of sovereign debt or banking crises on currency risk. Banking crises are measured using a dummy variable that equals 1 for years when the annual return of the country's banking index (expressed in U.S. dollars) is below the 15th percentile of the distribution of all countries and years in our sample. This procedure was chosen to update indices of banking crises frequently used in the literature (compare, for example, von Hagen and Ho (2007); Reinhart and Rogoff (2010); Laeven and Valencia (2012)) and subsequently ensure the maximum of consistency with these indicators. Our findings suggest that ADR investors do not consider banking crises as significant determinants of currency risk. This finding is robust to using alternative banking crisis dummies such as those provided by von Hagen and Ho (2007); Reinhart and Rogoff (2010) or Laeven and Valencia (2012).

Next, we address the question whether a sovereign default has an impact on currency risk. We use a dummy variable *sovereign default*, indicating years when at least one of the three major rating agencies, i.e., Moody's, S&P or Fitch, assigns a default rating to a country's foreign currency denominated bonds. In our sample, this is the case for Argentina (since 2001), Brazil (1994 and 2002), Peru (1997), Russia (1998 – 2000), Turkey (2001) and Venezuela (1995 –1998 and 2004/05). We do not find significant evidence that a sovereign default increases currency risk perceived by ADR investors. This might be partly driven by the fact that countries like Argentina and Venezuela are "serial defaulters", i.e., our default dummy takes the value 1 for many of the years in the sample and this effect might be captured by the

country fixed effects we include in our model instead. To tackle this issue, we test whether the first year a country defaults on its debt is the only one which has a significant effect on currency risk. Nonetheless, we do not obtain significant effects for *sovereign default first* either.

Alternatively, ADR investors may monitor changes in the ratings of sovereign solvency when forming their currency risk expectations. We follow the approach of Afonso et al. (2012) by coding the ratings from the three major rating agencies with a linear indicator ranging from 1 (state of default) to 17 (highest rating), always considering only the worst rating of the three agencies. We find that the change in the rating, Δ*sovereign rating*, does not have a significant effect on currency risk. We also test whether a downgrade might have an asymmetric effect but find no significant evidence for *sovereign rating downgrade* either.

Overall, the results indicate that there is no significant impact of sovereign default risk on currency risk. Currency risk is neither affected by the mere declaration of default on sovereign debt, nor is it driven by any news on the ratings of one of the three major rating agencies. A possible explanation for these results may be that forward looking investors would rather monitor fiscal deficits. Typically, before a country defaults, it has run persistent fiscal deficits in the years that ultimately led to the sovereign default. Our findings, as presented above, suggest that investors do perceive higher currency risk in years when countries run fiscal deficits – potentially in expectation of an upcoming default on the country's debt. Accordingly, changes in the rating of sovereign creditworthiness do not provide any source of news to investors, since these changes in the ratings are based on the evaluation of other fundamental indicators that ADR investors have already taken into consideration.

The institutional set up of domestic monetary policy may also affect currency risk. Countries with an independent monetary policy should suffer less from currency risk as the domestic central bank can better refute political pressure to monetize fiscal deficits or implement other inflationary policies. In order to quantify central bank independence, we focus on central bank turnover data provided by Dreher et al. (2010). In general, we expect that a

higher rate of turnover of the central bank president increases currency risk by increasing ADR investors' uncertainty concerning the new president's preference towards inflation stabilization. We include dummy variables for years when a new central bank president is installed (*CB president turnover*). Moreover, we distinguish between *CB president regular turnover* and *CB president irregular turnover*.[9] The results here do not yield a significant impact on currency risk. Possibly, ADR investors monitor the actual level of inflation rather than inflation risk produced by (irregular) turnover of the central bank president.

We also test for the relevance of different exchange rate regimes on currency risk. We use the Ilzetzki et al. (2008) coarse classification of de facto exchange rate regimes reported in the IMF's AREAER reports, which groups the different exchange rate regimes into six different categories.[10] In our empirical analysis, we include a *freely floating regime* dummy, which tests against all types of regimes where the central bank intervenes in the foreign exchange market (such as currency boards, conventional pegs, crawling pegs, or managed floating). The results suggest that ADR investors do not distinguish between freely floating regimes and regimes with foreign exchange interventions when assessing currency risk. A possible explanation may be that the pros and cons of foreign exchange market intervention for currency risk cancel each other out. On the one hand, currency risk may be rather moderate in managed regimes since the central bank can prevent spikes in the exchange rate by intervening in the foreign exchange market. On the other hand, prolonged manipulation of the exchange rate through foreign exchange market intervention can lead to persistent overvaluation of the domestic currency, thereby increasing currency risk. The insignificant estimates of the floating

[9] Regular turnover occurs when there has been a change in the central bank presidency within a given year and his/her official term has ended at the same time, while irregular turnover occurs before his/her official term has ended.

[10] The Ilzetzki et al. (2008) coarse classification distinguishes between six types of regimes. While no country in our sample is classified as either 5 or 6, about 15 % are classified as peg regimes (Argentina before the breakdown of its peg in 2001, Hong Kong, Israel between 2004 and 2010, Malaysia in the years following the Asian crisis, South Korea from 2004 to 2010, and Venezuela from 2003 onwards). About one third are of the countries are classified as freely floating regimes (in most years Brazil, Chile, Colombia, Mexico, Poland, Singapore, South Africa, with some interruptions due to central bank intervention in the foreign exchange market). The majority of regimes are classified as crawling pegs or managed floating arrangements.

regime dummy may also result from the fact that exchange rate regimes are rather persistent for many countries, thus their effect might be captured by the country fixed effect.

Finally, we address the issue as to whether currency risk perception is driven by political factors. Here, we use four different indicators taken from the Database of Political Institutions (DPI) based on Beck (2001), which we have updated using information from the Election Guide of the International Foundation for Electoral Systems. The dummy variable *left government* is a dummy variable that equals 1 if the government party is classified as "left" in the "left"/"centre"/"right" classification of the DPI. *Majority* describes the share of the number of seats held by the government party in parliament relative to the number of total seats. *Election year* takes the value 1 if a presidential or general government election is scheduled for a given year. The *ideology change* dummy indicates whether the ideological affiliation of the government changes after elections in accordance with the "left"/"centre"/"right" classification of the DPI.

Our results do not reveal a significant impact of political factors on currency risk. ADR investors do not appear to perceive political risk around elections. Possibly, ADR investors form their currency risk expectations over the electoral cycle and may anticipate that expansionary policies before elections will be reversed after elections. ADR investors also anticipate no significant role of political party preferences with respect to exchange rate policies, providing evidence against the partisan theory of politics. A possible explanation here may be that political preferences to weaken the domestic currency may vary between the right and left-wing parties in the emerging market economies considered, making it hard to interpret for ADR investors. Another argument could be that it is not the current political environment that matters for ADR investors' perceived currency risk but rather a country's political culture, which is very persistent over time and would therefore be captured by the fixed effects in our panel regression.

As robustness checks, we re-estimate our model by dropping single countries and years. Overall, our findings are robust with respect to these changes, indicating that they are not driven by single countries or years in the sample. In addition, we test another specification where we employ robust standard errors clustered at the country level. Again, this yields results which are very similar to those presented, indicating that heteroscedasticity and autocorrelation in the error term do not seem to be major issues in our sample.

3.2 Interaction models

The baseline regressions discussed in the previous section reveal that the fiscal balance, inflation, and the current account balance are the main drivers of ADR investors' currency risk perception. In this section, we aim to investigate through which channels these effects are driven using interaction models. These models are based on specification (1) (see Table 8) with country and year fixed effects, where the explanatory variables are interacted with a dummy that aims to distinguish between country sets. Table 10 reports the results of the marginal effects for countries with: low vs. high external sovereign debt to GDP; low vs. high foreign exchange reserves to imports; poor vs. good sovereign credit rating. For each conditioning variable, the country sample is split at the median. We also report marginal effects for freely floating vs. managed exchange regimes.

<INSERT TABLE 10 ABOUT HERE>

For the interaction with the level of external debt to GDP, we find that inflation only increases currency risk for low debt countries, while fiscal balance only seems to be relevant for high debt countries.[11] This is an interesting finding which could be explained by the concept

[11] For current account balance to GDP, we find similar results for both country sets.

of Herz and Tong (2008), who model sovereign default and inflation/currency crises as substitutes. They find that, rather than using inflation, high debt countries choose to default on sovereign debt when they aim to reduce their real debt obligation. Our findings point in the same direction, suggesting that for low debt countries, investors tend to consider inflation as a driving factor for currency risk. For high debt countries, on the other hand, the fiscal balance is more relevant as it serves as an indicator of the future stock of debt and therefore an increased currency risk in relation to a higher probability of future sovereign default.

The second interaction model distinguishes between countries with low and high levels of foreign exchange reserves to imports. In general, reserves act as insurance against currency risk. If the domestic central bank can rely on large amounts of reserves to fend off speculative attacks, currency risk may be less dependent on fundamental variables as a result. In line with first generation currency crisis models, we find that the contingency of ADR investors' currency risk perception on fundamental variables depends on the level of reserves. Fiscal deficits only affect currency risk in low reserve regimes, while no significant effect is detected for high reserve regimes. Inflation has a larger impact on currency risk for low reserve regimes than for high reserve regimes. Obviously, ADR investors consider a deterioration in macroeconomic fundamentals a greater threat to currency stability in countries with low amounts of reserves, while central banks with large reserves can contain currency risk, even in periods of stress.

A third interaction model distinguishes between countries with poor and good sovereign credit ratings, again splitting the sample at the median (at the BBB rating of S&P and Fitch and Baa2 for Moody's, respectively). In line with expectations, currency risk is more dependent on fiscal deficits and inflation when sovereign solvency is poor.

With regards to the implementation of exchange rate regimes, our results suggest that in regimes with foreign exchange market interventions, currency risk is much more dependent on macroeconomic factors than in floating regimes. In managed regimes, central

banks typically intervene for prolonged periods and can drive a wedge between the official and market based value of the exchange rate. Since an overvaluation of the official exchange rate can lead to a sharp devaluation of the domestic currency, ADR investors may monitor macroeconomic fundamentals closely in order to estimate a market based shadow exchange rate and thereby overall currency risk. For floating regimes, such misalignment of the official exchange rate is not as likely and ADR investors are therefore less inclined to monitor these fundamental variables.

4. Conclusion

Based on American Depositary Receipts (ADRs), we introduce a novel market-based measure that is capable of indicating currency risk at a high frequency and in real time, as well as being applicable to a broad set of emerging market economies. In order to derive the currency risk indicator, we exploit the fact that ADR investors are exposed to capital losses when the underlying stock's currency devalues against the U.S. dollar. Using a multifactor pricing model, we conclude that ADR investors perceive significant currency risk when macroeconomic stress is priced as a systematic risk factor in ADR returns.

For a sample of 831 ADRs located in 23 emerging market countries over the1994-2014 period, we find that the ADR-based measure provides a strong signal of current and future currency risk. Using a panel regression approach, we find that deteriorations in both the current account and fiscal balance, as well as higher inflation, increase currency risk as anticipated by ADR investors. Within interaction models, we find that these fundamental variables have a significant impact on currency risk, particularly in countries with managed exchange rates, low levels of foreign exchange reserves, and poor sovereign credit ratings.

Policymakers may therefore isolate currency risk from these macroeconomic fundamentals by holding sufficient amounts of foreign exchange reserves, improving their sovereign creditworthiness, and floating their exchange rate.

Appendix

Table 1: Resulting eigenvectors from the principal component analysis

Country	$\lambda_{\Delta EPI_j}$	$\lambda_{\Delta BI_j}$	$\lambda_{\Delta SYS_j}$
Argentina	-0.48	-0.62	0.62
Brazil	-0.44	-0.66	0.61
Chile	-0.58	-0.61	0.54
China	-0.61	-0.47	0.64
Colombia	-0.48	-0.63	0.62
Egypt	-0.54	-0.63	0.56
Hong Kong	-0.56	-0.71	0.42
Hungary	-0.57	-0.63	0.53
India	-0.46	-0.71	0.54
Indonesia	-0.54	-0.57	0.62
Israel	-0.66	-0.72	0.21
Malaysia	-0.55	-0.60	0.58
Mexico	-0.47	-0.61	0.64
Peru	-0.52	-0.60	0.61
Philippines	-0.53	-0.59	0.61
Poland	-0.56	-0.64	0.53
Russia	-0.49	-0.67	0.55
Singapore	-0.64	-0.66	0.38
South Africa	-0.54	-0.59	0.60
South Korea	-0.68	-0.71	0.17
Thailand	-0.64	-0.71	0.28
Turkey	-0.43	-0.63	0.64
Venezuela	-0.62	-0.35	0.70

Table 2: Variables used in the first-stage regressions and their sources

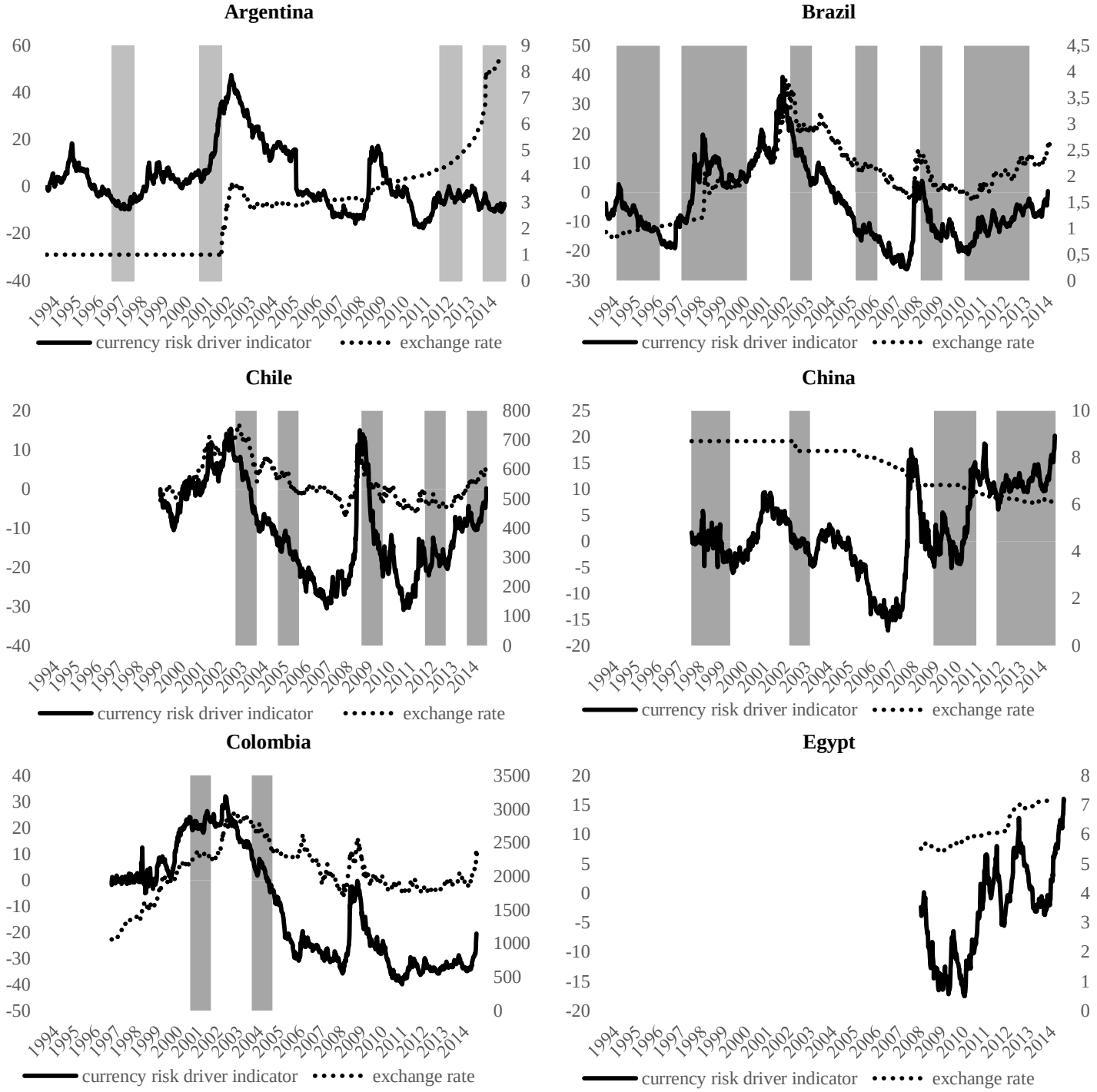
Variable	Description	Source
$return_{i,j,t,a}^{ADR}$	Weekly log return of American Depositary Receipt	DATASTREAM
$return_{i,j,t,a}^{UND}$	Weekly log return of the underlying stock	DATASTREAM
$return_{j,t,a}^{S}$	Weekly log return of the exchange rate; exchange rate quoted as domestic currency units per U.S. dollar	DATASTREAM
$macroeconomic\ stress_{j,t,a}$	Country-specific macroeconomic stress indicator derived from principal component analysis.	own calculation
$return_{t,a}^{S\&P\ 500}$	Weekly log return of the S&P 500.	DATASTREAM
$Mkt\_RF_{t,a}$	Excess market return (Fama & French)	http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
$SMB_{t,a}$	Small minus big (Fama & French)	
$HML_{t,a}$	High minus low (Fama & French)	

Table 3: Number of ADRs, weekly observations, and years covered in our sample by country

Country	Number of ADRs	Number of weekly observations	Years included in the sample
Argentina	28	10,804	1994 – 2014
Brazil	104	32,096	1994 – 2014
Chile	30	11,889	1999 – 2014
China	25	6,720	1998 – 2014
Colombia	12	1,799	1997 – 2014
Egypt	3	447	2009 – 2014
Hong Kong	212	51,902	1996 – 2014
Hungary	6	1,665	1999 – 2014
India	12	6,127	2002 – 2014
Indonesia	34	3,835	2004 – 2014
Israel	8	2,773	2002 – 2014
Malaysia	8	1,474	1996 – 2014
Mexico	69	20,448	1998 – 2014
Peru	9	2,013	1997 – 2014
Philippines	21	2,767	1998 – 2014
Poland	10	490	1999 – 2014
Russia	25	8,301	1998 – 2014
Singapore	58	10,233	2000 – 2014
South Africa	86	19,995	2000 – 2014
South Korea	14	5,885	2001 – 2014
Thailand	19	2,076	2002 – 2014
Turkey	24	3,607	1996 – 2014
Venezuela	14	2,059	1994 – 2006
Total	831	209,405	

Figures 1 – 23: Evolution of the currency risk driver indicator and the exchange rate over time, by country

Grey shaded areas represent years with significant negative beta coefficients from the first-stage regressions



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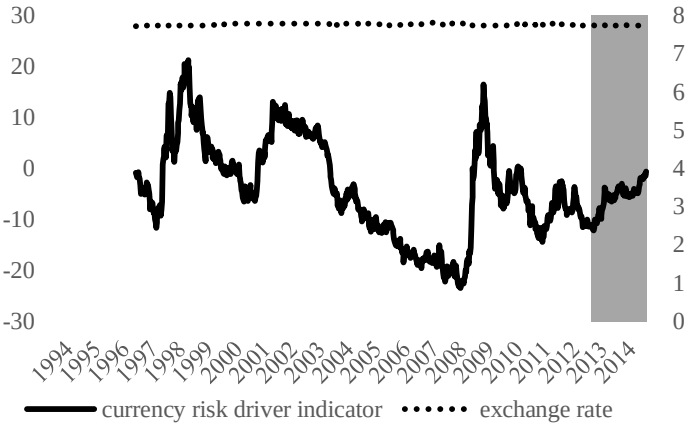

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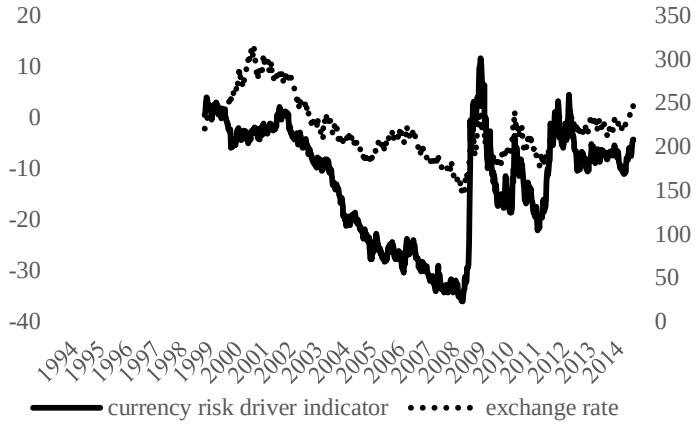

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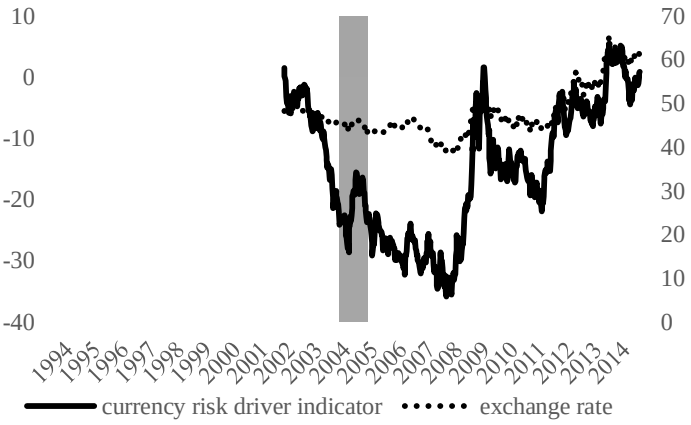

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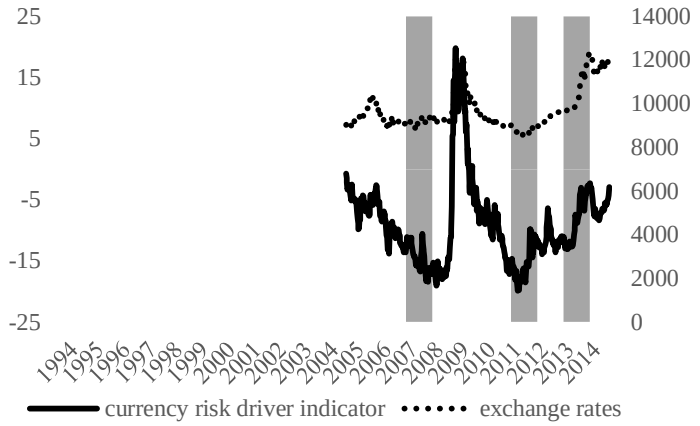

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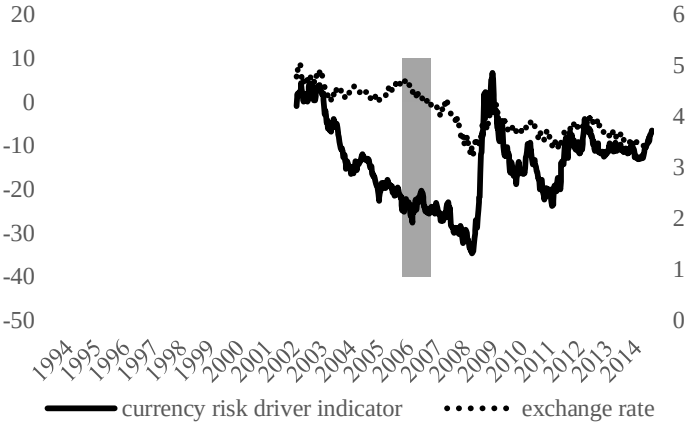

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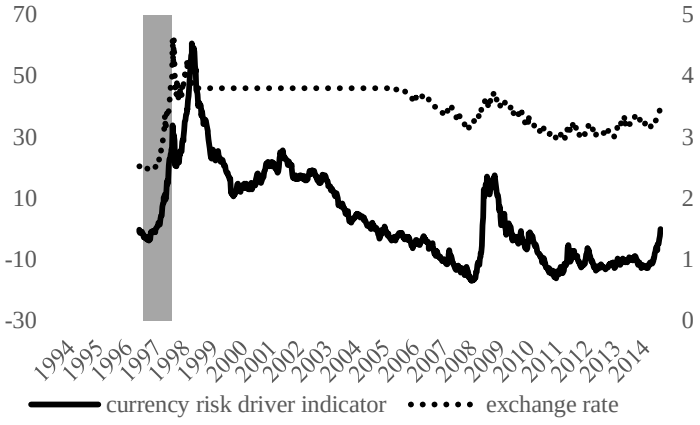

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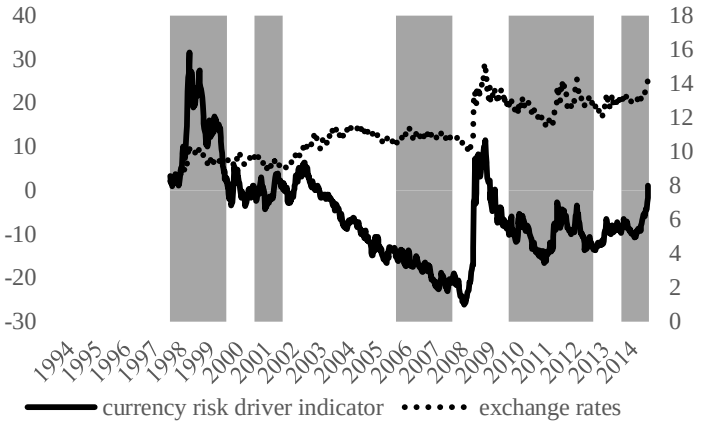

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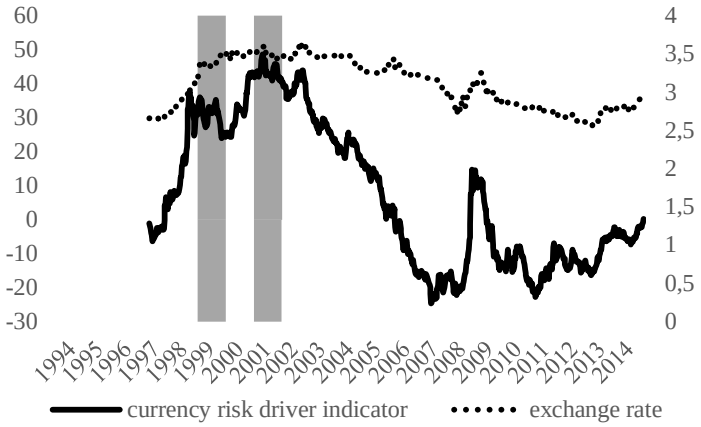

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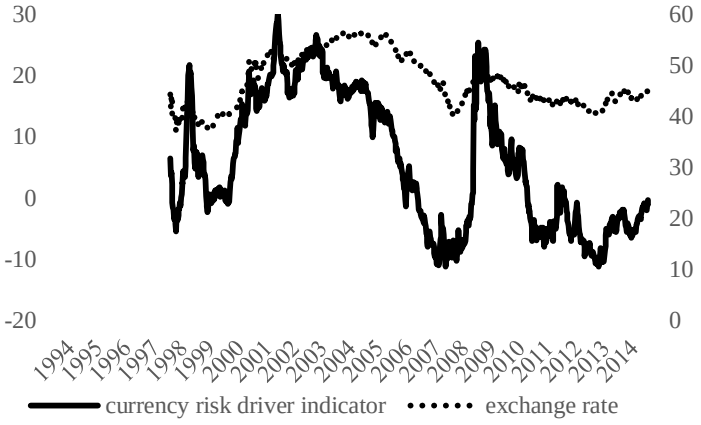

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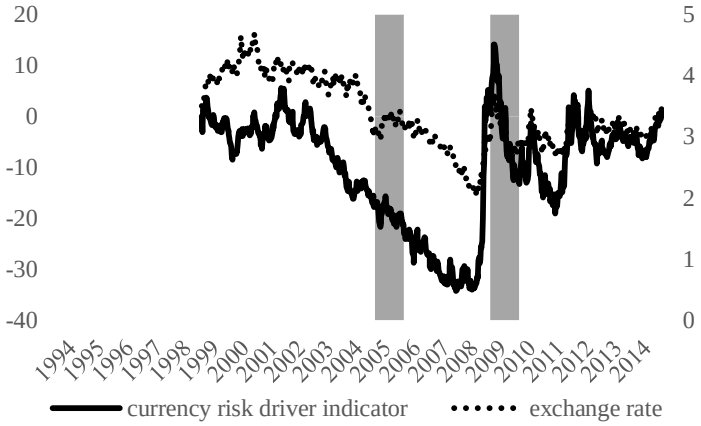

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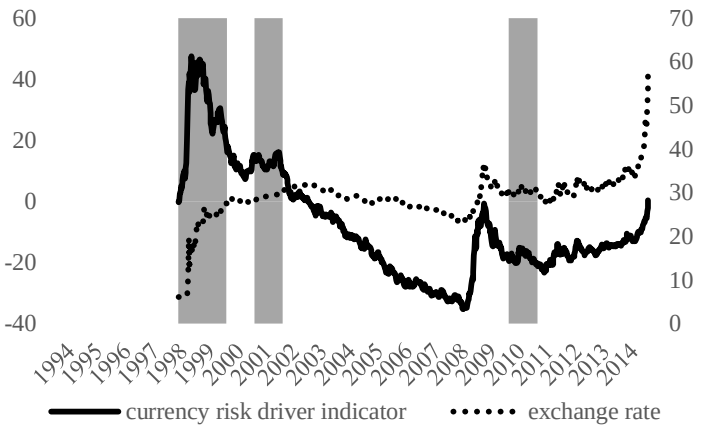

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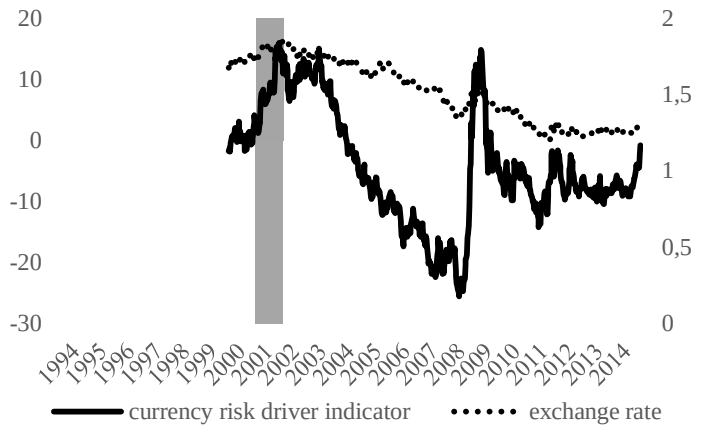

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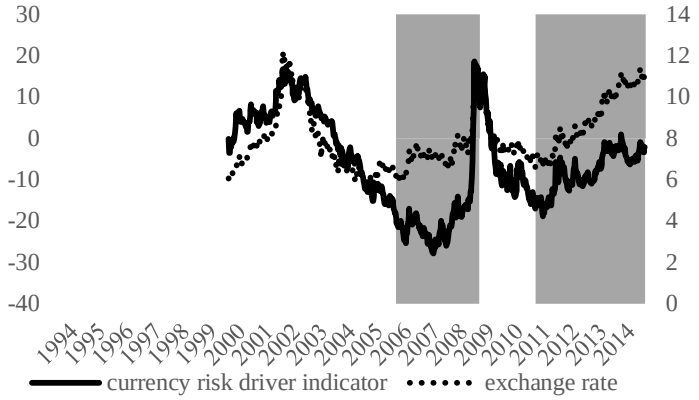

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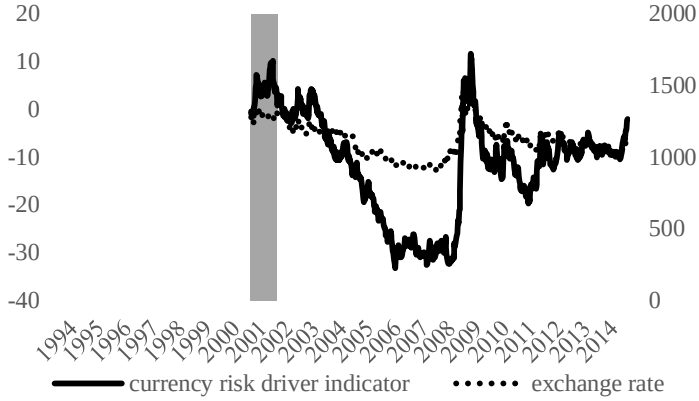

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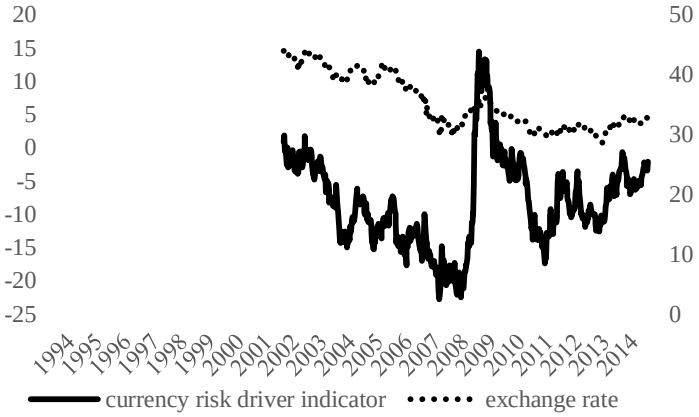

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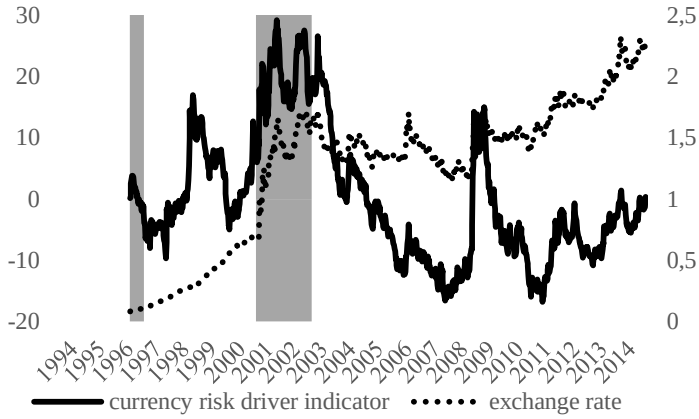

Venezuela

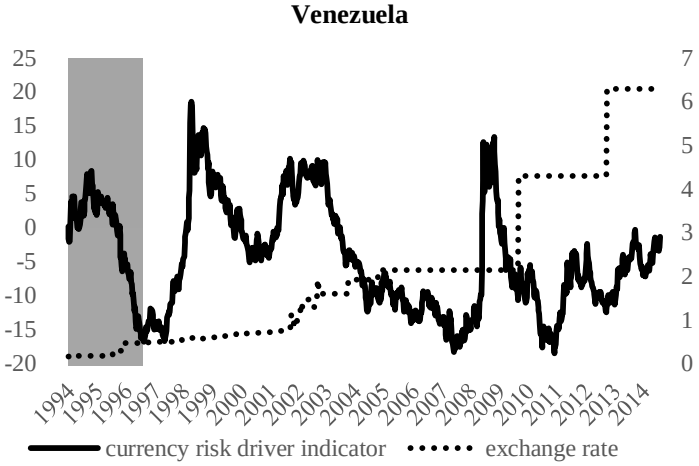

Table 4: Years with significant currency risk by country

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	sig. neg. betas/ total estimates
Argentina	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	4/21
Brazil	0	1	1	0	1	1	1	0	0	1	0	0	1	0	0	1	0	1	1	1	0	11/21
Chile	-	-	-	-	-	0	0	0	0	1	0	1	0	0	0	1	0	0	1	0	1	5/16
China	-	-	-	-	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	1	1	7/17
Colombia	-	-	-	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2/18
Egypt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0/6
Hong Kong	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2/19
Hungary	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0/16
India	-	-	-	-	-	-	-	-	-	-	1	0	0	0	0	0	0	0	0	0	0	1/13
Indonesia	-	-	-	-	-	-	-	-	-	-	0	0	0	1	0	0	0	1	0	1	0	3/11
Israel	-	-	-	-	-	-	-	-	0	0	0	0	1	0	0	0	0	0	0	0	0	1/13
Malaysia	-	-	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1/14
Mexico	-	-	-	-	1	1	0	1	0	0	0	0	1	1	0	0	1	1	1	0	1	9/17
Peru	-	-	-	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2/18
Philippines	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0/17
Poland	-	-	-	-	-	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2/15
Russia	-	-	-	-	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	4/17
Singapore	-	-	-	-	-	-	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1/15

Table 4: (continued)

Country	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	sig. neg. betas/ total estimates
South Africa	-	-	-	-	-	-	0	0	0	0	0	0	1	1	1	0	0	1	1	1	1	7/15
South Korea	-	-	-	-	-	-	-	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1/14
Thailand	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0/13
Turkey	-	-	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3/19
Venezuela	1	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	3/13
sig. neg. betas	1	2	3	2	4	5	1	8	1	3	2	2	4	3	1	3	3	5	5	5	6	69/358
estimates	3	3	6	8	12	15	17	18	20	20	22	22	22	21	21	22	22	22	22	22	22	358

Notes: According to the methodology introduced in Section 2, ADR investors perceive currency risk when macroeconomic stress is priced as a systematic risk factor in ADR returns.

Table 5: Descriptive statistics of the ADR based currency risk measure

	All years in our sample	Years with significant currency risk	Years without significant currency risk
Average Currency devaluation same year (%)	7.59	14.41 *	6.04
Average Currency devaluation next year (%)	5.12	11.53 **	3.67
Relative frequency of a devaluation in the next year (%)	55.35	65.22 **	53.11
Relative frequency of a currency crisis[12] in the next year (%)	15.51	21.74 *	14.10
Average level of macroeconomic stress indicator (annual means)	-3.92	-2.08	-4.34
Average level of macroeconomic stress indicator (end of year values)	-3.35	-1.65	-3.74

*** p<0.01, ** p<0.05, * p<0.1
p-values are obtained from running a t-test on differences in sample means

[12] Defined as a devaluation of more than 15 % against the U.S. dollar, following Reinhart and Rogoff (2010).

Table 6: Description of explanatory variables used in the second-stage regressions

Variable	Definition	Source
Fiscal solvency		
Fiscal balance (% of GDP)	General government revenue minus general government expenditure relative to nominal GDP.	World Economic Outlook (2015), WEOSubjectcode: BCA_NGDPD GGXCNL_NGDP
Sovereign default (dummy)	Dummy variable =1 if at least one of the ratings of Fitch, Moody's or Standard & Poor's indicate state of default on the foreign currency denominated sovereign bonds, 0 otherwise.	websites of Fitch, Moody's & Standard & Poor's
Sovereign default first (dummy)	Dummy variable =1 if at least one of the ratings of Fitch, Moody's or Standard & Poor's indicate state of default on the foreign currency denominated sovereign bonds and this has not been the case in the previous year, 0 otherwise.	websites of Fitch, Moody's & Standard & Poor's
Δ Sovereign rating	YOY change in the Afonso et al. (2012) classification of foreign currency denominated sovereign bonds.	Afonso et al. (2012), websites of Fitch, Moody's & Standard & Poor's
Sovereign rating down (dummy)	Dummy variable =1 if the worst credit rating of the foreign currency denominated sovereign bonds by Fitch, Moody's or Standard & Poor's scores less in the Afonso et al. (2012) classification than in the previous year, 0 otherwise.	Afonso et al. (2012), websites of Fitch, Moody's & Standard & Poor's
External and economic variables		
Capital openness	Chinn-Ito (2006) indicator of financial openness, ranging between 0 and 1 (highest financial openness).	Chinn and Ito (2006)
Current account balance (% of GDP)	Current account balance relative to nominal GDP.	World Economic Outlook (2015), WEOSubjectcode: BCA_NGDPD
Real GDP Growth (%)	%YOY change of real GDP (GDP in constant LCU)	Worldbank (2015) Indicatorcode: NY.GDP.MKTP.KN
Δ Reserves to imports (month)	YOY change in the amount of official reserve assets relative to the imports in current USD	IFS (2015), code: RAFA_USD/ TMG_CIF_USD
Monetary policy and financial system		
Banking crisis (dummy)	Dummy-variable = 1 if annual return of the country's bank index falls within the 15 % quantile of the distribution of all annual bank index returns in the whole country sample, 0 otherwise.	own calculation, Bank index data: DATASTREAM
Inflation (%)	%YOY change in end of period consumer prices	World Economic Outlook (2015), WEOSubjectCode: PCPIEPCH
CB president irregular turnover (dummy)	Dummy-variable = 1 if central bank president of the respective country is replaced in that year although his official term has not ended, 0 otherwise.	Dreher et al. (2010)
CB president regular turnover (dummy)	Dummy-variable = 1 if central bank president of the respective country is replaced in that year and his official term has ended, 0 otherwise.	Dreher et al. (2010)
CB president turnover (dummy)	Dummy-variable = 1 if central bank president of the respective country is replaced in that year, 0 otherwise.	Dreher et al. (2010)

Table 6: (continued)

Freely floating regime (dummy)	Dummy variable equalling 1 if Ilzetzki et al. (2008) classify this country year observation as "4" in their coarse classification of the de facto IMF classification of exchange rate regimes, 0 otherwise.	following Ilzetzki et al. (2008), updated from IMF AREAER reports
Political variables		
Election year (dummy)	Dummy-variable = 1 if presidential/general government election (in the case of a non-presidential regime) in the respective year, 0 otherwise.	Database of Political Institutions Beck (2001), updated with information taken from the IFES election guide for years after 2012.
Ideology change	Dummy-variable =1 if after presidential/general government election a new president/governing party introduced a different ideology (left/center/right) to the one before, 0 otherwise.	Database of Political Institutions Beck (2001), updated with information taken from the IFES election guide for years after 2012.
Left government (dummy)	Dummy-variable = 1 if a left party president/government (in the case of a presidential/non presidential-regime), 0 otherwise.	Database of Political Institutions Beck (2001), updated with information taken from the IFES election guide for years after 2012.
Majority (%)	Number of seats of the biggest government party to total seats in parliament.	Database of Political Institutions Beck (2001), updated with information taken from the IFES election guide for years after 2012.

Table 7: Descriptive statistics of the explanatory variables used in the second-stage regressions

Variable	Mean	Std. Dev.	Min	Max
Fiscal balance (% of GDP)	-1.67	3.97	-14.44	11.84
Sovereign default (dummy)	0.06	0.24	0	1
Sovereign default first (dummy)	0.02	0.12	0	1
Δ Sovereign rating	0.07	0.98	-10	3
Sovereign rating down (dummy)	0.09	0.29	0	1
Capital openness	0.54	0.32	0	1
Current account balance (% of GDP)	1.49	6.29	-9.68	25.97
Real GDP growth (%)	4.26	3.75	-10.89	18.29
Δ Reserves to imports	0.12	1.57	-6.83	7.97
Banking crisis (dummy)	0.15	0.36	0	1
Inflation (%)	10.14	49.77	-4.11	916.43
CB irregular turnover (dummy)	0.1	0.3	0	1
CB regular turnover (dummy)	0.07	0.26	0	1
CB turnover (dummy)	0.18	0.38	0	1
Freely floating regime (dummy)	0.30	0.46	0	1
Election year (dummy)	0.21	0.41	0	1
Ideology change (dummy)	0.06	0.24	0	1
Left (dummy)	0.32	0.47	0	1
Majority (%)	47.94	23.31	10.22	100

Table 8: Marginal effects from the estimated logit coefficients: Sovereign creditworthiness and the financial system

	(1)	(2)	(3)	(4)	(5)
Fiscal balance	-0.027**	-0.027**	-0.023**	-0.026**	-0.027**
	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)
Current account balance	-0.027***	-0.027**	-0.025**	-0.027**	-0.025**
	(0.010)	(0.011)	(0.010)	(0.011)	(0.011)
Inflation	0.019***	0.019***	0.019***	0.020***	0.019***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Real GDP growth	0.003	0.002	0.006	0.004	0.007
	(0.011)	(0.011)	(0.011)	(0.012)	(0.012)
Δ Reserves to imports	-0.020	-0.022	-0.022	-0.021	-0.022
	(0.019)	(0.012)	(0.019)	(0.020)	(0.020)
Capital openness	0.119	0.131	0.191	0.139	0.150
	(0.145)	(0.147)	(0.129)	(0.147)	(0.136)
Banking crisis		-0.039	-0.055	-0.047	-0.084
		(0.101)	(0.095)	(0.102)	(0.101)
Sovereign default		0.027			
		(0.157)			
Sovereign default first			0.305		
			(0.194)		
Δ Sovereign rating				-0.019	
				(0.025)	
Sovereign rating down					0.205
					(0.129)
Observations	292	292	292	292	292
Number of Countries	19	19	19	19	19
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Pseudo R^2	0.25	0.25	0.27	0.25	0.27
Log Likelihood	-80.55	-80.47	-78.95	-80.18	-78.85
Chi ^{2}	53.83	53.99	57.03	54.58	57.24
P > Chi ^{2}	0.00	0.00	0.00	0.00	0.00

Notes: Panel logit regressions analyzing the determinants of currency risk. Dependent variable: 0/1 indicator of the presence of no currency risk/currency risk as assessed by ADR investors. Average marginal effects reported. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Marginal effects from the estimated logit coefficients: Monetary policy and political variables

	(6)	**(7)**	**(8)**	**(9)**	**(10)**
Fiscal balance	-0.027**	-0.028**	-0.026**	-0.029**	-0.029**
	(0.011)	(0.012)	(0.011)	(0.012)	(0.013)
Current account balance	-0.027***	-0.029***	-0.027**	-0.026**	-0.025**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.013)
Inflation	0.019***	0.020***	0.019***	0.012***	0.017***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Real GDP growth	0.003	0.003	0.003	0.003	0.002
	(0.011)	(0.012)	(0.011)	(0.013)	(0.012)
Δ Reserves to imports	-0.012	-0.023	-0.021	-0.023	-0.018
	(0.019)	(0.020)	(0.019)	(0.021)	(0.020)
Capital openness	0.117	0.096	0.103	0.100	0.063
	(0.147)	(0.161)	(0.145)	(0.168)	(0.153)
CB president turnover	-0.017				
	(0.069)				
CB president regular turnover		-0.128			
		(0.141)			
CB president irregular turnover			-0.001		
			(0.084)		
Free floating regime				0.060	
				(0.089)	
Left government					-0.022
					(0.095)
Majority					-0.001
					(0.003)
Ideology change					0.164
					(0.138)
Election year					-0.025
					(0.074)
Observations	292	289	288	276	267
Number of Countries	19	19	19	18	18
Country FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Pseudo R^2	0.25	0.26	0.25	0.24	0.27
Log Likelihood	-80.52	-78.81	-78.7	-79.45	-72.83
Chi ^{2}	53.89	54.43	52.32	50.47	54.64
P > Chi ^{2}	0.00	0.00	0.00	0.00	0.00

Notes: Panel logit regressions analyzing the determinants of currency risk. Dependent variable: 0/1 indicator of the presence of no currency risk/currency risk as assessed by ADR investors. Average marginal effects reported. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 10: Marginal effects from the estimated logit coefficients: Interaction models with dummy variables dividing selected explanatory variables into two categories each

	external debt to GDP		reserves to imports		sovereign rating		exchange rate regime	
	p1 - p50	p51 – p100	p1 - p50	p51 - p100	p1 - p50	p51 - p100	free floating regime	other
Fiscal balance	-0.016	-0.063***	-0.032**	-0.008	-0.067***	-0.009	-0.029	-0.013
	(0.019)	(0.022)	(0.014)	(0.017)	(0.019)	(0.013)	(0.022)	(0.023)
Current account balance	-0.038***	-0.039**	-0.018	-0.028	0.008	-0.027*	-0.033*	-0.023**
	(0.013)	(0.015)	(0.011)	(0.018)	(0.014)	(0.016)	(0.018)	(0.015)
Inflation	0.018***	0.005	0.017**	0.013*	0.014***	0.001	0.009	0.020***
	(0.006)	(0.008)	(0.008)	(0.007)	(0.004)	(0.011)	(0.011)	(0.006)
Real GDP growth	-0.012	0.022	0.0207	-0.007	0.004	0.005	-0.012	-0.005
	(0.021)	(0.0120)	(0.015)	(0.013)	(0.013)	(0.011)	(0.027)	(0.019)
Δ Reserves to imports	-0.010	-0.051			0.015	-0.052	-0.001	-0.037
	(0.023)	(0.040)			(0.022)	(0.032)	(0.036)	(0.029)
Capital openness	-0.060	0.077	0.085	-0.006	0.076	0.005	0.352	-0.001
	(0.286)	(0.223)	(0.158)	(0.162)	(0.159)	(0.159)	(0.299)	(0.251)
Number of observations	265		294		292		97	225
Number of countries	19		19		19		16	22
Country FE	YES		YES		YES		YES	
Year FE	YES		YES		YES		YES	
Pseudo R^2	0.29		0.27		0.34		0.26	
Log Likelihood	-67.28		-79.2		-71.16		-77.77	
Chi ^{2}	55.42		59.2		72.61		53.81	
P > Chi ^{2}	0.01		0.00		0.00		0.01	

Notes: Panel logit regressions analyzing the determinants of currency risk. Dependent variable: 0/1 indicator of the presence of no currency risk/currency risk as assessed by ADR investors. Average marginal effects reported. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

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