The Puzzling Peso

Abstract: In the past decade, some observers have noted an unusual aspect of the Mexican peso's behavior: During periods when the U.S. dollar has risen (fallen) against other major currencies such as the euro, the peso has risen (fallen) against the dollar. Very few other currencies display this behavior. In this paper, we attempt to explain the unusual pattern of the peso's correlation with the dollar by developing some general empirical models of exchange rate correlations. Based on a study of 29 currencies, we find that most of the cross-country variation in exchange rate correlations with the dollar and the euro can be explained by just a few variables. First, a country's currency is more likely to rise against the dollar as the dollar rises against the euro, the closer it is to the United States and the farther it is from the euro area. In this result, distance likely proxies for the role of economic integration in affecting exchange rate correlations. Second, a country's currency is more likely to exhibit this unusual pattern when its sovereign credit rating is more risky. This may reflect that currencies of riskier countries are less substitutable in investor portfolios than those of better-rated countries. All told, these factors well explain the peso's unusual behavior, as Mexico both is very close to the United States and has a lower credit rating than most industrial economies.

Keywords: Mexico, peso, dollar, exchange rates, interest rate differentials, inflation, output gap, output growth differentials

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1. Introduction

The Mexican peso has been floating since shortly after the country's financial crisis at the end of 1994. Since then, some observers have noted an unusual aspect of the peso's behavior: During periods when the U.S. dollar has risen (fallen) against other major currencies such as the euro, the peso has risen (fallen) against the dollar.[1] This pattern implies that when the dollar rises (falls) against other major currencies, the peso rises (falls) against those other currencies by an even greater extent.

Figure 1 illustrates this behavior, plotting the level of the nominal peso/dollar exchange rate against the level of the dollar/euro rate during the period 1997 through mid-2008; the correlation between the two series is 0.56.[2] (The dollar/euro exchange rate is represented by the ECU, or European Currency Unit, for dates prior to the euro's inception in 1999; see Appendix for additional detail.) The relationship between the two exchange rates is also apparent in Figure 2, which plots monthly percent changes; the correlation is 0.18.

[Insert Figures 1 and 2 about here]

Figure 3 puts the correlation between the monthly percent changes in the peso/dollar and dollar/euro exchange rates in perspective, comparing it with correlations of changes in other nominal exchange rates against the dollar with the dollar/euro rate. Figure 3 makes clear that the peso/dollar exchange rate's response to movements in dollar/euro is unusual. Of the 29 currencies shown, only 4 exhibit a positive correlation, with that of the peso/dollar rate being the highest.

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[1] See Banco de Mexico (2003).

[2] Throughout this paper, we focus on the period from 1997 through mid-2008 in order to avoid complications associated with both the aftermath of the Tequila crisis in 1995-96 and the deepening of the global financial crisis in the fall of 2008.

Because Mexico has long experienced inflation rates that have exceeded rates in the United States, focusing on nominal exchange rates could be misleading. Figure 4 replicates the analysis shown in Figure 3, but based on percent changes in bilateral *real* exchange rates—in which nominal exchange rates are deflated by relative CPIs—rather than *nominal* exchange rates. The results are very similar to those in Figure 3: Only a few real exchange rates exhibit a positive correlation with the real dollar/euro rate, with the correlation for the peso/dollar rate being the highest.

[Insert Figures 3 and 4 about here]

Figure 5 addresses these correlations from a slightly different angle. It plots the response of different countries' real exchange rates against the dollar to the real dollar/euro exchange rate (in monthly percent changes), estimated using OLS regressions; the diamond for each country is the coefficient on the real dollar/euro exchange rate, while the vertical lines represent two-standard-error bands. The coefficient on the dollar/euro rate is positive and significantly different from zero only in the regression for the peso/dollar rate. For the most part, the pattern of coefficients across countries—most negative for Europeans, most positive for Mexico and certain other emerging markets—is similar to that for the correlations shown in Figure 4.

[Insert Figure 5 about here]

Finally, the unusual correlation between peso/dollar and dollar/euro is not an artifact of outsized movements in these exchange rates during a select, limited time period. Figure 6 plots rolling 90-day correlations of daily percent changes in the peso/dollar and dollar/euro exchange rates. Although these correlations are volatile and appear to have diminished in recent years, they were strongly positive on balance for long periods of time, and especially through 2003. To provide some perspective on this, Figure 7 presents analogous calculations for the correlation between the Canadian dollar/U.S. dollar exchange rate and dollar/euro: This correlation has been negative for most of the past decade.

[Insert Figures 6 and 7 about here]

What accounts for the unusual positive correlation of the Mexican peso with the dollar's value against other major currencies such as the euro? The factor that comes most readily to mind is Mexico's proximity to, and thus close integration with, the United States. The United States is the major market for Mexican manufactures, and the manufacturing sector is playing an increasingly important role in overall Mexican economic activity. Possibly, the types of shocks that boost U.S. output, interest rates, and exchange rates relative to the euro area—for example, a shock to U.S. investment spending—might boost Mexican output, interest rates, and exchange rates to an even greater extent. Even so, this cannot be the whole story. Canada is also next door to and highly integrated with the United States, and yet the exchange rate of the Canadian dollar against the U.S. dollar exhibits the more normal negative correlation with the dollar/euro rate.

In the remainder of this paper, we attempt to explain the unusual pattern of the peso's correlation with the dollar. Section 2 briefly addresses a body of related research. Section 3 lays out the standard uncovered interest parity relationship between exchange rates and interest rate differentials, and assesses whether correlations among bilateral interest rate differentials can explain correlations among bilateral exchange rates. Section

4 drills down a bit further, examining the explanatory power of the factors underlying correlations in interest rate differentials: output and inflation. Section 5 examines the possible role of a range of measures of trade and financial integration. Section 6 examines the robustness of our findings, while Section 7 concludes.

2. Previous related research

We are not aware of any previous analyses of the unusual behavior of the peso/dollar exchange rate. However, this topic is similar in various respects to an issue that attracted some attention in previous decades: the response of European exchange rates to movements in the deutschemark/dollar rate. (See Frankel, 1985, Giavazzi and Giovannini, 1989, and Galati, 1999.) In particular, it was observed that appreciations of the mark against the dollar tended to be associated with increases in the other European currencies' value against the dollar as well, albeit generally to a less extent; this was described as the "dollar-mark axis" or "dollar-mark polarity". Galati (1999) found that this pattern could be explained by participation in the ERM, the close trade links between the European countries, and a measure of portfolio bias in international investments.

Unlike in the case of the "dollar-mark axis", however, the focus of this paper is not to explain why a group of currencies move together with respect to other currencies, but to explain why one particular currency—the peso—moves by an outsized amount when its "anchor currency"—the dollar—moves against other major currencies. In this sense, the peso's relation to the dollar is similar to the Swiss franc's relation to the mark in the pre-EMU period; alone among the European currencies, when the mark appreciated against the dollar, the Swiss franc tended to appreciate against the mark. Giavazzi and Giovannini (1989) and Galati (1999) suggest this pattern may have owed to portfolio shifts: a high share of the portfolios of international investors may have been allocated to Switzerland, so that shifts in portfolio allocations that tended to boost the mark against the dollar may have boosted the Swiss franc even more.

It is difficult to believe this portfolio allocation story, by itself, explains the puzzling behavior of the peso/ dollar exchange rate, however. Unlike the case of the deutschemark and the Swiss franc, the dollar and the peso likely offer very different attributes to investors and are placed by them in distinct baskets. The dollar is the world's preeminent reserve currency and offers maximum liquidity and safety; as we will discuss further below, the peso is more likely to be grouped by investors with other emerging market currencies.

The research that comes closest to bearing on the unusual behavior of the Mexican peso is Fratzscher (2008). This paper evaluates the impact of shocks to U.S. monetary policy and economic performances on the values of different currencies. It finds that shocks tending to lower the value of the dollar (for example, a higher-than-expected employment report) tend to lower the dollar most against the euro and Swiss franc and least against emerging market countries. But most interesting for our purposes is that such shocks would actually *boost* the value of the dollar against a few currencies: in ascending order, Hong Kong, Argentina, Venezuela, Chile, and most of all, *Mexico*! Thus, the pattern of correlations we have documented corresponds closely to the pattern of response to shocks documented in Fratzscher (2008).

3. Exploiting the uncovered interest parity relationship

Equation (1) presents the standard uncovered interest parity (UIP) relationship:

$$i_t^{\,p} = i_t^{\,\$} + e_{t+1}^{\,p/\$} - e_t^{\,p/\$} + \varepsilon_t \qquad (1)$$

i_t^{p} : peso interest rate

$i_t^{\$}$: dollar interest rate

$e_t^{p/\$}$: log exchange rate, pesos per dollar

Re-arranging terms, the current exchange rate can be expressed as a function of the interest rate differential and the expected future exchange rate:

$$e_t^{p/\$} = i_t^{\$} - i_t^{p} + e_{t+1}^{p/\$} + \varepsilon_t \tag{2}$$

If the future exchange rate is expected to revert to some constant equilibrium rate $\overline{e^{p/\$}}$, then the exchange rate essentially becomes a function of the interest rate differential alone:

$$e_t^{p/\$} = i_t^{\$} - i_t^{p} + \overline{e^{p/\$}} + \varepsilon_t \tag{3}$$

It then follows that the correlation of the peso/dollar exchange rate with the dollar/euro exchange rate will reflect the correlation of the peso/dollar interest rate differential with the dollar/euro interest rate differential:[3]

$$corr(e_t^{p/\$}, e_t^{\$/eu}) = corr(i_t^{\$} - i_t^{p}, i_t^{eu} - i_t^{\$}) \tag{4}$$

To what extent do correlations in bilateral interest rate differentials match up with correlations in bilateral exchange rates, and does this relationship help explain the positive correlation between peso/dollar and dollar/euro? Figure 8 presents a scatterplot where each point represents correlations for a single country, computed using 12-month changes in monthly data for the period 1997 through mid-2008. The x-axis plots the correlation between changes in that country's interest rate differential with the United

[3] This assumes that expected future values of the peso/dollar and dollar/euro exchange rates remain constant, and that the error terms in the UIP equations for peso/dollar and dollar/euro are uncorrelated.

States (for Mexico, $\Delta\,[i_t^{\$} - i_t^{p}]$) and changes in the U.S. interest rate differential with the euro area ($\Delta\,[i_t^{eu} - i_t^{\$}]$). The y-axis plots the correlation between changes in that country's exchange rate against the dollar (for Mexico, $\%\Delta e_t^{p/\$}$) and changes in the dollar/euro exchange rate ($\%\Delta e_t^{\$/eu}$). All interest rates are money market rates.[4] For the euro area, we use the interbank rate, which is available for the entire sample period.

[Insert Figure 8 about here]

The scatter plot reveals the expected positive relationship between the two sets of correlations: (1) the correlation of the interest rate differential between a given country and the United States with the interest rate differential between the U.S. and the euro area, and (2) the correlation of that country's exchange rate against the dollar with the dollar/euro exchange rate. The slope of the regression line is significantly different from zero at the 5 percent level. Mexico exhibits both one of the highest correlations of exchange rates and one of the highest correlations of interest rate differentials in the sample.

So far, we have referred to nominal variables in our summary of UIP and in our correlation analysis. However, the assumption that the future expected exchange rate is constant makes more sense if the analysis is re-cast in terms of real exchange rates rather than nominal rates. Starting with the nominal UIP equation (1), above, it is straightforward to derive a version of equation (3) that expresses the current real exchange rate as a function of the real interest rate differential and a constant equilibrium real exchange rate:

[4] Except for Chile, Hungary, and Israel, for which we use the discount rate.

$$rer_t^{p/\$} = r_t^{\$} - r_t^{p} + \overline{rer^{p/\$}} + \varepsilon_t \quad (5)$$

r_t^{p} : real peso interest rate = $i_t^{p} - (p_{t+1}^{p} - p_t^{p})$

p_t^{p} : Mexican price level

$r_t^{\$}$: real dollar interest rate = $i_t^{\$} - (p_{t+1}^{\$} - p_t^{\$})$

$p_t^{\$}$: U.S. price level

$rer_t^{p/\$}$: log real exchange rate, pesos per dollar = $e_t^{\$/eu} + p_t^{\$} - p_t^{p}$

Based on equation (5), Figure 9 repeats the analysis shown in Figure 8, but showing correlations of 12-month changes in *real* interest rate differentials and *real* exchange rates. As with the nominal variables shown in Figure 8, the relationship between correlations of real interest rate differentials and correlations of real exchange rates is positive and statistically significant.[5] Even so, Mexico is a substantial outlier: Whereas the correlation of its real exchange rate movements against the dollar with dollar movements against the euro (the y-axis) is the highest in the sample, the correlation of Mexico-U.S. real interest rate differentials with U.S.-euro differentials (the x-axis) is in the middle of the pack. This may reflect that our calculations of *ex post* real interest rates are poor proxies for the *ex ante* real interest rates that influence exchange rate

[5] We should note that the uncovered interest parity relationship described in equation (1) is an equilibrium condition, and it does not indicate whether causality runs from interest rate differentials to exchange rates or vice-versa. Accordingly, it is possible that the relationships shown in Figures 8 and 9 actually depict the impact of exchange rate correlations on interest rate correlations. We do not place a lot of weight on this "reverse causality" scenario, however, and it leaves unresolved what led to the pattern of exchange rate correlations in the first place.

movements. Alternatively, other factors besides interest rate differentials may be influencing exchange rates.[6]

[Insert Figure 9 about here]

4. Drilling down below interest rate differentials

In this section, we drill down a little deeper to assess what factors may explain the pattern of correlations of interest-rate differentials that, in turn, appear to influence the pattern of exchange rate correlations. We start by assuming that interest rates in a given country j are set accordingly to the Taylor-rule type relation shown in equation (6) below:

$$i_t^j = \overline{i_t^j} + \beta(\pi_t^j - \overline{\pi^j}) + \delta(y^j{}_t - \overline{y^j{}_t}) + \eta^j{}_t \qquad (6)$$

$\overline{i^j}$: equilibrium nominal interest rate = $\overline{r^j} + \overline{\pi^j}$

$\overline{r^j}$: equilibrium real interest rate

π_t^j : inflation rate = $p_t^j - p_{t-1}^j$

$\overline{\pi^j}$: target inflation rate

y_t^j : log real output

$\overline{y_t^j}$: log real potential output

Define the inflation and output gaps:

$$\pi gap_t^j = \pi_t^j - \overline{\pi^j}$$

$$ygap_t^j = y_t^j - \overline{y_t^j}$$

6 For reasons of space, we do not present scatterplots of the relationship between correlations of the *levels* of interest rates and exchange rates, but they are quite similar to the scatterplots of correlations based on 12-month *changes* shown in Figures 8 and 9.

Accordingly, the interest rate differential between Mexico and the United States, for example, is expressed as:[7]

$$i_t^{p} - i_t^{\$} = \overline{i^{\ p}} - \overline{i^{\ \$}} + \beta(\pi gap_t^{\ p} - \pi gap_t^{\ \$}) \\ + \delta(ygap^{p}{}_t - ygap^{\$}{}_t) + \eta^{p}{}_t - \eta^{\$}{}_t \tag{7}$$

With the interest rate differential between the United States and the euro area expressed similarly, it is apparent that the correlation between the Mexico/U.S. and U.S./euro area interest rate differentials—that is, $corr(i_t^{p} - i_t^{\$}, i_t^{\$} - i_t^{eu})$ --will depend on the correlations and cross correlations between inflation gap differentials—e.g., correlations of $(\pi gap_t^{\ p} - \pi gap_t^{\ \$})$ with $(\pi gap_t^{\ \$} - \pi gap_t^{\ eu})$—and output gap differentials—e.g., correlations of $(ygap^{p}{}_t - ygap^{\$}{}_t)$ with $(ygap^{\$}{}_t - ygap^{eu}{}_t)$.

Previous research supports the view that arguments in the Taylor-rule relation influence exchange rates. Clarida and Waldman (2007) show that positive inflation surprises tend to lead a country's currency to appreciate, and especially so for countries with explicit inflation targets. See also Mark (2005), Engel and West (2006), and Molodtsova and Papell (2008), among others.

To what extent can correlations in inflation gap differentials and output gap differentials empirically explain the cross-country pattern of correlations in interest rate differentials and, ultimately, exchange rates? To answer this question, we depart from the bivariate scatterplot approach utilized above and instead estimate multivariate regressions.

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[7] We assume for simplicity that the coefficients on the inflation and output gap terms are the same across countries. This is almost certainly a substantial simplification.

4.1. Explaining patterns of correlations of interest rate differentials

Table 1 presents the results of estimates of equations explaining correlations of interest rate differentials as a function of correlations of output gap differentials and correlations of inflation gap differentials. Output gaps are calculated as the percent difference between industrial production (IP) and a trend measure of IP calculated using an HP filter; we denote them IPgap. Inflation gaps (πgap) are calculated analogously, as 12-month CPI inflation minus an HP filter of inflation.[8] The data are analyzed in 12-month changes, indicated by Δ. Accordingly, correlations of 12-month changes in interest rate differentials for a given country X – Corr[$\Delta(i^{\$} - i^{X})$, Δ $(i^{eu} - i^{\$})$] – are related to correlations of changes in IPgap differentials—Corr[$\Delta(IPgap^{\$} - IPgap^{X})$, Δ $(IPgap^{eu} - IPgap^{\$})$]–and correlations of changes in inflation gap differentials—Corr[$\Delta(\pi gap^{\$} - \pi gap^{X})$, Δ $(\pi gap^{eu} - \pi gap^{\$})$]. The data are also analyzed in both nominal and real terms.

[Insert Table 1 about here]

Two results are worth highlighting. First, correlations of inflation gap differentials are significant and robust explainers of correlations in interest rate differentials. This means that if increases in a country's inflation gap relative to that of the United States are associated with increases in the U.S. inflation gap relative to that of the euro area, it is more likely that increases in a country's interest rate relative to the U.S. rate will be associated with increases in the U.S. interest rate relative to the euro area rate.

Second, correlations in IP gap differentials appear to be less robust explainers of correlations in interest rate differentials: they are not significant in the regression for

[8] For the United States, core CPI inflation, which excludes prices of food and energy, is used instead of total CPI inflation.

nominal interest rates (column 1) but they are significant in the regression for real rates (column 3). It is possible that the output gaps are being mis-measured, or that they are not the best measure of economic slack. To explore this possibility, we estimated another set of regressions, using correlations of the differentials in 12-month percent changes in IP rather than correlations of the differentials in IP gaps. Because these equations are estimated in 12-month changes, with the 12-month percent change in IP denoted Δip, the explanatory variable becomes $Corr[\Delta(\Delta ip^{\$} - \Delta ip^{X}), \Delta(\Delta ip^{eu} - \Delta ip^{\$})]$.[9] However, as indicated in columns (2) and (4), this variable did not improve the results.

How much of the cross-country pattern in correlations of interest rate differentials is explained by the output and inflation correlations? The low R^2s for the equations in columns (1) and (2), at around .25, suggest nominal interest rate correlations are not well explained by inflation and output correlations. However, with R^2s of about .50, the regressions for real interest rate correlations in columns (3) and (4) suggest that inflation and output correlations have a reasonable amount of explanatory power.

4.2. Explaining patterns of correlations of exchange rates

Table 2 presents estimation results for equations explaining exchange rate correlations as a function of correlations of IP gap differentials, inflation gap differentials, and interest rate differentials. If output and inflation affected exchange rates exclusively through their effect on interest rates, of course, we would expect them to have little measured effect, once interest rates were added to the equation. The estimation results, however, suggest otherwise. Although the coefficients on correlations of IP gap

[9] To provide an example, consider the 2002.07 observation for Mexico. To compute the first argument in the correlation, Mexican IP growth between 2001.07 and 2002.07 is subtracted from U.S. IP growth over the same period. From this calculation is then subtracted the difference between U.S. and Mexico IP growth during the preceding year, of 2000.07 to 2001.07. The analogous computations are then made for the second argument of the correlation, the change in IP growth differential between U.S. and euro area.

differentials are small and insignificant, the coefficients on correlations of IP *growth* differentials are significantly different from zero. In contrast, the coefficients on correlations of inflation gaps differentials, as well as interest rate differentials, are not consistently significant. Accordingly, correlations of output growth emerge as the single most consistent influence on patterns of exchange rate correlations, and this influence appears to go beyond their effects on interest rates.[10]

[Insert Table 2 about here]

How well do the set of output, inflation, and interest rate correlations explain the cross-country pattern of exchange rate correlations? Figure 10 plots the fitted values from equation (6) in Table 2—based on changes in real exchange rates—against their actual values. This model correctly predicts Mexico to have a positive exchange rate correlation, and the highest in the sample. Moving to the other side of the rankings, the model successfully predicts close-to-negative-one correlations for several European currencies. However, the fit of this model is obviously poor, as evidenced by the wide dispersion of actual correlations for given levels of fitted values.[11]

[Insert Figure 10 about here]

5. Other Factors Influencing the Pattern of Exchange Rate Correlations

The evidence summarized in Figure 10 suggests that, although correlations of output, inflation, and interest rates explain some of the country-country pattern of exchange rate correlations, much of this pattern remains unexplained. In this section, we

[10] This is not implausible, as exchange rates ultimately should be influenced by expected rates of return, and output growth may be a more robust indicator of such returns than short-term interest rates alone. Additionally, the uncovered interest parity relationship may be more applicable to long rates than the short rates used in our research (mainly reflecting data availability). To the extent that output and inflation affect long rates as well as short rates, they may influence exchange rates even if short rates are held constant.

[11] A plot of actual and fitted values for nominal exchange rate correlations based on equation 3, not shown for reasons of space, would provide a similar picture.

assess a broad set of additional factors that might help further explain why the correlation of a country's exchange rate against the dollar with the dollar/euro rate might be high or low. Following on work by Fratzscher (2008), we focus on the extent to which a country is integrated with the United States through either trade or finance, along with more general measures of financial integration and maturity. Accordingly, we consider the effect of the following measures:

1. Log of Distance from the United States, and Log of Distance from the euro area (specifically, Germany): Measured as the Great Circle log distance between country centers.

2. Trade Share: Measured as the sum of a country's bilateral imports from and exports to the United States, divided by the country's GDP.

3. Stock Return Correlation: Measured as the correlation of monthly log changes in a country's stock market index vis-à-vis the S&P 500 index.

4. U.S. Portfolio Integration: Measured as the sum of a country's claims on and liabilities to the United States, divided by the country's GDP.

5. International Financial Integration: Measured as the sum of a country's total external assets and liabilities, divided by the country's GDP.

6. International Financial Size: Measured as the sum of a country's total external assets and liabilities in absolute dollar terms.

7. Credit Rating: Based on Moody's and S&P sovereign credit ratings and converted to a numerical system, with the safest rating indicated by 1 and the riskiest rating indicated by 27.

Tables 3 and 4 present estimates of regressions in which measures of the correlation of a country's exchange rate against the dollar with the dollar/euro rate are related to (1) the output, inflation, and interest rate correlations discussed in the previous section, and (2) the additional factors described above. In Table 3, the dependent variable is the correlation of 12-month changes in nominal exchange rates; in Table 4, the dependent variable is based on correlations of changes in real exchange rates. Columns

(2) through (8) include the additional factors separately, while Column (9) includes them jointly. Column (10) represents a reduced version of Column (9), where we progressively remove explanatory variables with the smallest t-statistics. Because the distance variables may be well-correlated with other measures of integration between countries, the equation shown in Column (11) represents the outcome of the same exercise, but with the distance variables removed at the outset.

[Insert Tables 3 and 4 about here]

All told, a number of variables are robustly significant determinants of exchange rate correlations. These include, first, the distance variables. The closer a country is to the United States, the higher is its exchange rate correlation—that is, the greater the likelihood that its currency will rise against the dollar when the dollar rises against the euro. Conversely, the closer a country is to the euro area, the lower (more negative) its exchange rate correlation. We interpret these distance variables as proxies for the degree of economic integration between a country and the United States/euro area, and, in fact, they appear to be rather good proxies. Other measures of economic integration—the correlation of IP growth differentials, the correlation of inflation gap differentials, the correlation of interest rate differentials, and the trade share—are only sporadically significant in the regressions, and mainly when the distance variables are not included.

The second robustly significant variable in the regressions shown in Tables 3 and 4 is the credit rating. The coefficient on the credit rating variable is positive and significantly different from zero in all regressions, suggesting that currencies of riskier countries are more likely to rise against the dollar when the dollar rises against the euro. Generally speaking, less developed countries have lower credit ratings. However, the coefficient on credit rating remains positive and significant even after including the country's per capita income as a control variable. Accordingly, it appears to be a country's perceived riskiness that is affecting the exchange rate correlations rather than its level of development *per se*. It is not clear what accounts for this result. One possibility is that the credit rating variable serves to distinguish the currencies of major financial centers—which may be most substitutable in global investor portfolios—from the currencies of other countries. Accordingly, when a shock renders U.S. investments more attractive, investors may shift their portfolios more out of other low-risk currencies (generally in industrial economies) than out of higher-risk currencies (generally in emerging market economies). Another possibility is that, given the centrality of the United States in the world economy, shocks which boost the U.S. economy and the dollar relative to the euro area are regarded by the market as favorable for reduction of risk around the world.

Finally, measures of a country's financial integration do not appear to have much effect, one way or the other, on exchange rate correlations. The coefficients on Stock Return Correlation, International Financial Integration, and U.S. Portfolio Integration are all insignificantly different from zero, while that on International Financial Size is usually insignificant as well. Perhaps the economies in our sample all have financial systems that are sufficiently linked to world capital markets that variations in integration among them have little bearing on the responsiveness of their currencies to economic conditions.

How much of the cross-country pattern of exchange rate correlations is explained by the augmented models shown in Tables 3 and 4? We replicate the exercise described in Section 4, focusing on the regression shown in Table 4, column (10), which combines high explanatory power with a parsimonious specification. Figure 11 plots the fitted values from this regression—based on changes in real exchange rates—against their actual values. (A scatterplot of actual and fitted values associated with the regression based on changes in nominal exchange rates in Table 3, column (10), not shown for reasons of space, would present a similar picture.) The figure suggests that the factors considered explain much of the pattern of exchange rate correlations. In particular, Mexico's high exchange rate correlation is well-predicted by the model.

[Insert Figure 11 about here]

Of the explanatory variables in the model, which of them account most for Mexico's unusually high correlation? To address this question, we decompose the fitted values for each country's exchange rate correlation into the respective contributions of the explanatory variables—in practice, this means multiplying the explanatory variables by their coefficients. For ease of interpretation, we combine the constant with the contributions of the two distance variables. Figure 12 presents the estimated contributions the explanatory variables to the real exchange rate correlations. The dashed black lines indicate the fitted values themselves, while the solid grey lines indicate the actual value of the exchange rate correlations.

[Insert Figure 12 about here]

It is apparent that distance to the United States and the euro area accounts for most of the variation in predicted and actual exchange rate correlations. For Mexico, the combination of the constant and the two distance variables makes a small positive contribution to the exchange rate correlation, whereas for countries close to the euro area, the contribution is large and negative. Accordingly, to the extent that distance proxies for economic integration, Figure 12 lends support to our initial hypothesis that the peso's unusual behavior reflects Mexico's close economic relationship with the United States.

Yet, Canada is almost equally close to the United States in both geographical and economic terms, but it exhibits a negative exchange rate correlation. Figure 12 highlights several factors that differentiate Canada from Mexico. First, although Canada's IP is relatively well correlated with U.S. IP, the correlation of the Canada/U.S. IP-growth differential with the U.S./euro area IP-growth differential is negative, whereas that of Mexico is positive. Second, Canada has a much safer credit rating than Mexico. Accordingly, investors may view Canadian dollars as more substitutable for U.S. dollars in their portfolio (compared with pesos and dollars), or they may view U.S. shocks as having different implications for risk in Canada compared with in Mexico. Finally, Canada's exchange rate correlation is lower than the model prediction, whereas Mexico's is higher, introducing a third, unexplained factor distinguishing the two countries.

6. Robustness[12]

In this section, we evaluate the robustness of our results to alternative specifications of the data.

6.1. Correlations with dollar/yen and dollar/major-currencies

First, the work we have presented thus far focuses on the correlation of countries' exchange rates against the dollar with the dollar's rate against the euro. Do our results, including the exceptionality of the Mexican peso, hold up when we consider correlations with other exchange rates besides dollar/euro?

[12] We are indebted to our referee for suggesting the robustness tests described in this section.

Figure 13 reprises Figure 4, plotting correlations of each country's exchange rate against the dollar (measured in real monthly percent changes) with the dollar's value against the yen. Figure 14 plots correlations of countries' exchange rates against the dollar with the Federal Reserve's calculation of the multilateral effective exchange rate of the dollar against 7 major currencies.[13] The results are broadly similar to those in which dollar/euro is the benchmark, with the Mexican peso still showing the greatest tendency to rise against the dollar when the dollar rises against either the yen or a weighted average of major currencies.

[Insert Figures 13 and 14 about here]

Table 5 assesses whether the results of the cross-sectional regressions shown in Table 3, which explain correlations of 12-month percent changes in *nominal* exchange rates, hold up when dollar/yen or dollar/major-currencies is substituted for dollar/euro in the calculations of exchange rate correlations. For ease of comparison, the first two columns repeat the findings shown columns (1) and (10) of Table 3; the next two columns show the results for those equations when dollar/yen is used instead of dollar/euro, and the two columns after that for when the dollar/major-currencies is substituted for dollar/euro.

[Insert Table 5 about here]

By and large, the results of the cross-sectional regressions using dollar/yen and dollar/major-currencies are quite similar to the original regressions using dollar/euro. In particular, distance from the United States and credit ratings remain statistically significant determinants of exchange rate correlations, and the explanatory power of these

[13] These include the euro, yen, sterling, Canadian dollar, Swiss franc, Swedish kronor, and Australian dollar.

equations remains fairly high. The same holds true, as shown in Table 6, when we consider equations for correlations in *real* exchange rates.

[Insert Table 6 about here]

6.2. Controlling for the origin of shocks

Our findings that the Mexico peso is most likely to rise against the dollar when the dollar rises against the euro, and that this behavior appears to reflect the strength of the economic relationship between the two countries, seems most applicable to a scenario where changes in the dollar/euro exchange rate reflect shocks to the U.S. economy. By contrast, a shock to the euro-area economy might cause currencies to move against the euro to different degrees and thus lead them to move against the dollar to different degrees, but not necessarily in a manner explainable by the strength of their linkages to the U.S. economy.

Accordingly, if our analysis is correct, we should see different patterns of exchange rate correlations, and different determinants of those patterns, depending on whether the shocks moving exchange rates originate in the U.S. economy or somewhere else. One way to distinguish between different shocks would be to conduct an event-study analysis such as Fratscher (2008), but this was based on high-frequency data and would go beyond the scope of the current paper. Instead, we propose that shocks to the U.S. economy are likely to cause the dollar to move in the same direction against most major currencies, whereas in response to shocks to other economies, the dollar is likely to exhibit a more balanced number of increases and decreases against other currencies. Therefore, we recalculate the exchange rate correlations by taking the original sample of exchange rate changes and focusing on two sub-samples: periods when the dollar moved in the same direction against six or seven of the seven currencies in the Federal Reserve's major currency index of the dollar, and periods when the dollar moved in the same direction against only three or four of the major foreign currencies.

Figure 15 presents the exchange rate correlations for the periods when the dollar moved uniformly against most or all major currencies, while Figure 16 focuses on the periods when the dollar rose against about as many major currencies as it fell. The results are consistent with what we would expect. In Figure 15, which is intended to capture instances where the U.S. economy receives the precipitating shock, only two currencies—Mexico's and Venezuela's—exhibit a positive correlation with dollar/euro. Conversely, in Figure 16, which is intended to reflect cases where the precipitating shock is to other economies, many other currencies exhibit positive correlations, with the Mexican peso only in the middle of the pack.

[Insert Figures 15 and 16 about here]

The proposition that the strength of the linkage to the U.S. economy is most important in the case of U.S. shocks is further supported by the cross-sectional regressions shown in the last four columns of Tables 5 and 6. Column 8 of both tables indicates that when the dollar moves in the same direction against other major currencies, consistent with the shock being to the United States, the "distance from the United States" variable is sizeable and statistically significant, as are most of the other explanatory variables. Conversely, in column 10 of both tables, where movements of the dollar against other major currencies are mixed, only the "distance from the euro area" variable remains statistically significant, and its coefficient is much larger than in the previous case, suggesting that shocks to the euro area may have played a large role driving exchange rates in this sub-sample.

7. Concluding Remarks

This paper is, to our knowledge, the first attempt to systematically document and account for a puzzling and unusual feature of the Mexican peso: when the dollar rises (falls) against the euro, the peso tends to rise (fall) against the dollar. The correlation between changes in the peso/dollar and dollar/euro exchange rates during 1997-2008 has been among the highest of a broad set of currencies, whether measured in nominal or real terms, and is one of only a few positive currency correlations.

What explains the peso's unusual behavior? Our starting hypothesis was that the Mexican economy is unusually reliant upon the U.S. economy. Accordingly, shocks that boost U.S. demand relative to euro-area demand will tend to boost Mexican demand even more. Therefore, even as the shocks to U.S. output raise U.S. interest rates relative to euro rates—and thus boost the dollar against the euro—they raise Mexican interest rates relative to U.S. rates—and thus boost the peso against the dollar.

To evaluate this hypothesis, we focused on explaining the cross-country variation in exchange rate correlations, starting with models based on the uncovered interest parity (UIP) condition. We confirmed that exchange rate correlations are related to correlations in interest rate differentials: countries whose interest rates rise relative to U.S. rates when U.S. rates rise relative to euro rates are also likely to have currencies that rise against the dollar when the dollar rises against the euro. Correlations in interest rate differentials, in turn, are likely (through the Taylor rule) to reflect correlations of differentials in output growth and inflation, and these, too, helped explain correlations in exchange rates.

Even so, these models do not explain a great deal of the cross-country variation in exchange rate correlations. However, their explanatory power is boosted significantly by a number of additional variables intended to proxy for countries' integration with the United States, the euro area, and the global financial system. In particular, we found that the closer a country is to the United States, and the farther from the euro area, the more likely a country's currency will rise against the dollar when the dollar rises against the euro. Clearly, distance represents a proxy for a range of economic and financial ties that are too diverse to be captured by just a few economic or financial statistics.

Additionally, we found that the safer a country's sovereign credit rating, the less likely that a country's currency will rise against the dollar when the dollar rises against the euro. Most likely, investors consider the dollar and the currencies of other highly rated countries to be most substitutable with each other. Accordingly, when some shock enhances the attractiveness of U.S. assets, investors are more likely to shift out of the euro and other highly-rated currencies (mainly of industrial countries) than out of lower-rated currencies (mainly of emerging markets).

These results remain strong when we examine the response of countries' exchange rates not only to dollar/euro rates, but also to the dollar/yen rate and to the dollar's value against a weighted average of major foreign currencies. And, consistent with our original hypothesis, the results hold up better when the dollar moves in the same direction against most major currencies—suggestive of a shock to the U.S. economy—than when the dollar's moves against different currencies are more mixed.

Finally, returning to the original motivation for this paper, our estimated models based on these variables correctly predict Mexico to be one of very few countries to have a positive correlation of its currency against the dollar with the dollar/euro exchange rate. Consistent with our starting hypothesis, this reflects Mexico's proximity to the United States—which proxies for the close economic integration of the two countries—as well as its relatively riskier credit rating. Thus, the peso is not so puzzling after all.

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Data Appendix

Industrial Production

Seasonally adjusted industrial production.

Source: Haver Analytics for Argentina, Chile, Colombia, India, Indonesia, Russia, Taiwan, and Venezuela; CEIC for Thailand; IFS line 66..b/c for Brazil, Canada, Czech Republic, Denmark, Hungary, Israel, Japan, Korea, Mexico, Norway, Poland, Sweden, Turkey, United Kingdom, and United States. IFS line 66ey (Manufacturing production, not seasonally adjusted) was manually seasonally adjusted for Pakistan and South Africa. Missing Pakistan data is filled by Manufacturing Production series in EMERGEPR of Haver Analytics.

Interest Rates

Nominal short-term interest rate.

Source: IFS line 60b (Money Market Rate). For Chile, Hungary, India, Norway, and Sweden, IFS line 60 (Discount Rate) was used. For Israel, IFS line 60c (Treasury Bill Rate) was used. For Argentina, IFS line 60l (Deposit Rate) was used.

Inflation

12-month percent change in seasonally adjusted consumer price index.

Source: Haver Analytics; CEIC for China, Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand. IFS line 64 for Pakistan, Peru, and South Africa. Seasonally adjustments were done manually when unavailable.

Exchange Rates

Nominal bilateral exchange rate with the United States (end of period).

Source: IFS line ae. Before January 1999, the EU uses United States line ea (the $/ECU rate).

Equity Prices

Major stock market index.

Source: Bloomberg.

GDP

Gross Domestic Product in current USD.

Source: IFS line 99b(.c).

Trade Levels

Imports and Exports to the United States in current USD.

Source: IMF Direction of Trade Statistics.

Trade Share

Sum of imports and exports to the United States as a percent of GDP

Distance to the United States
Great Circle distance to the United States based on longitude and latitude given by CIA Factbook.
Source: Andrew Rose's Webpage.

International Investment Position
Assets and liabilities in USD.
Source: IFS line 79aad and 79lad.

Portfolio Claims
Portfolio investment from the Coordinated Portfolio Investment Survey.
Source: IMF.

Credit Ratings
Average of S&P and Moody's ratings over the sample period.
Source: Bloomberg.

Real Interest Rate
Calculated by subtracting 12-month inflation rate from the nominal interest rate.

Real Exchange Rate
Calculated by scaling nominal exchange rate changes by US and local inflation.

Interest Rate Differential
Calculated by subtracting local interest rate from the US rate.

Inflation Gap
Calculated by subtracting inflation from an HP-filtered trend of inflation.

Industrial Production Gap
Calculated as the percent deviation of industrial production from an HP-filtered trend measure of industrial production.

Figure 1 - Monthly Exchange Rates: Peso/Dollar and Dollar/Euro

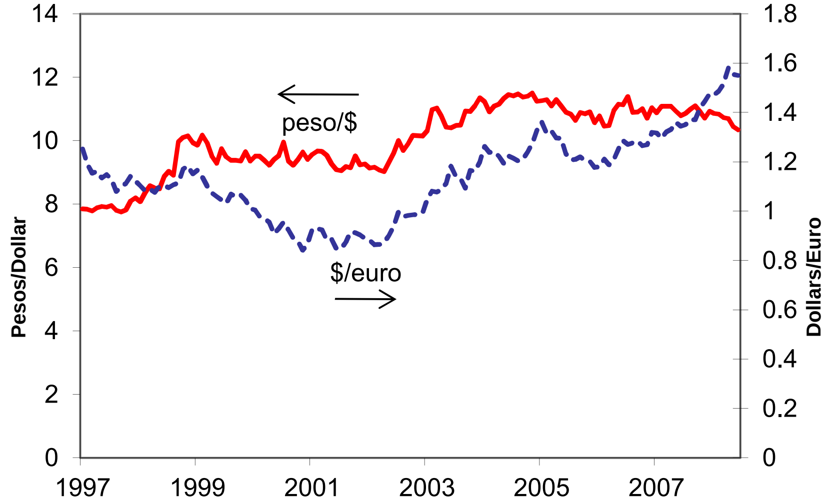


Figure 2 - Month-to-Month Percent Change of Peso/Dollar, Dollar/Euro Exchange Rates

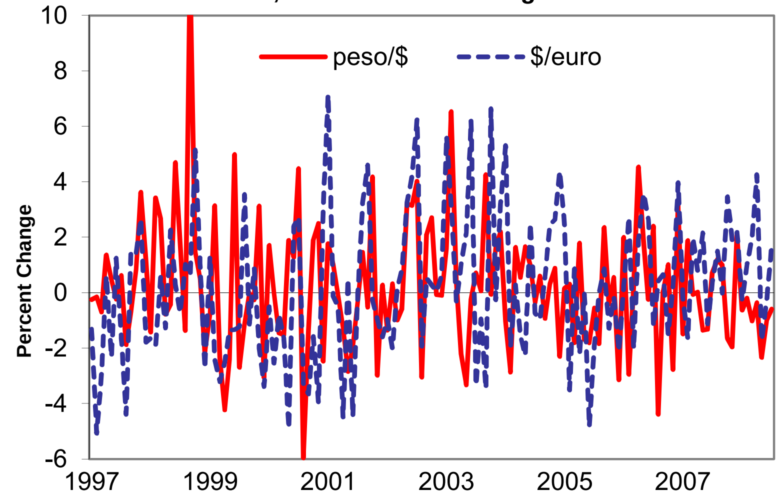
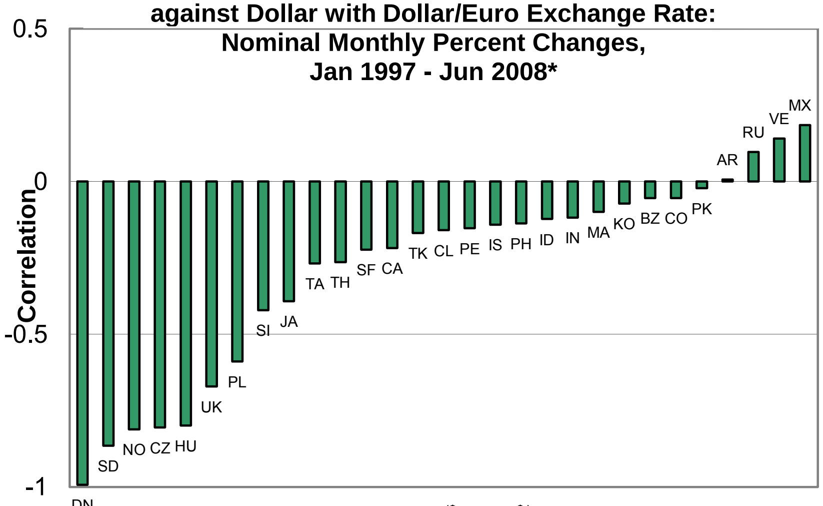
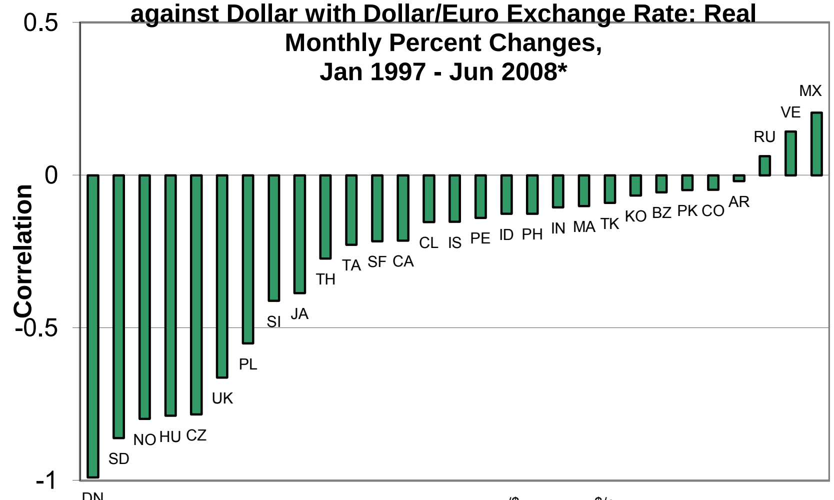


Figure 3 - Correlation of Country X's Exchange Rate against Dollar with Dollar/Euro Exchange Rate: Nominal Monthly Percent Changes, Jan 1997 - Jun 2008*



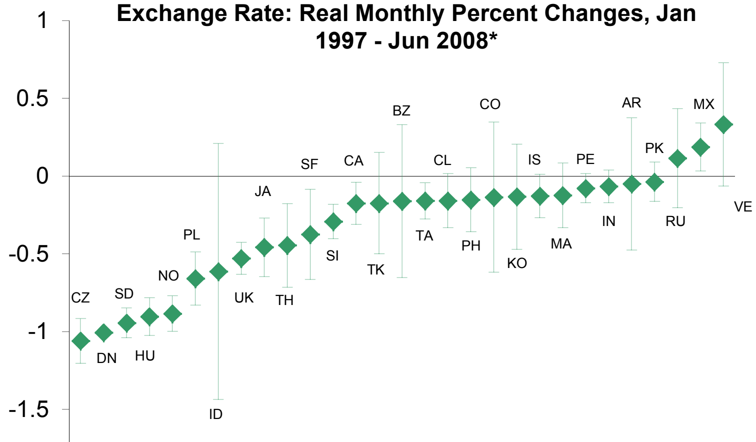
*Correlation(%Δe$^{x/\$}$, %Δe$^{\$/eu}$).

Figure 4 - Correlation of Country X's Exchange Rate against Dollar with Dollar/Euro Exchange Rate: Real Monthly Percent Changes, Jan 1997 - Jun 2008*



*Correlation(%Δrer$^{x/\$}$, %Δrer$^{\$/eu}$).

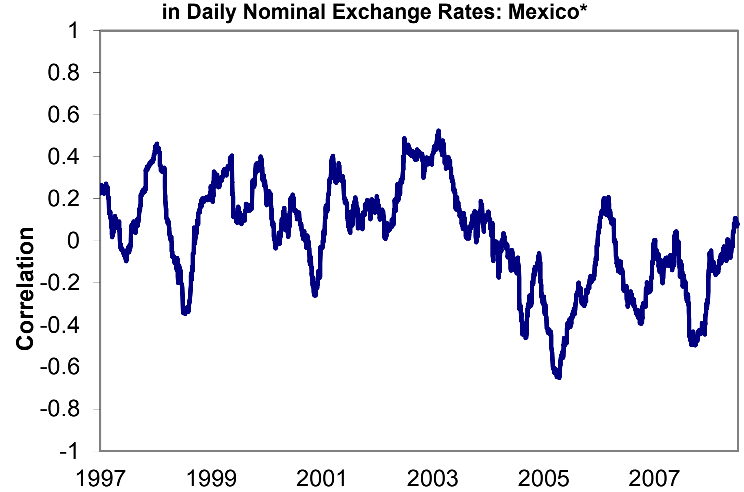
Figure 5 - Regression Coefficients of Country X's Exchange Rate against Dollar with Dollar/Euro Exchange Rate: Real Monthly Percent Changes, Jan 1997 - Jun 2008*



*β is estimated from equation:

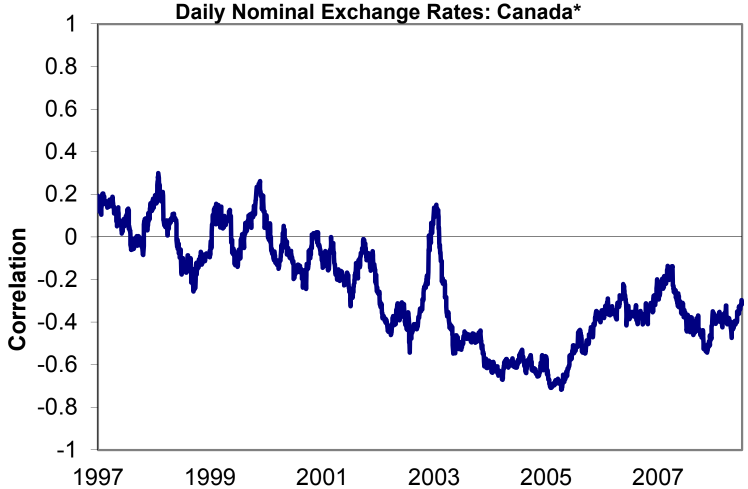
$\%\Delta rer^{x/\$} = \alpha + \beta \ \%\Delta rer^{\$/eu} + error$

Figure 6 - Rolling 90-day Correlation of Percent Changes in Daily Nominal Exchange Rates: Mexico*



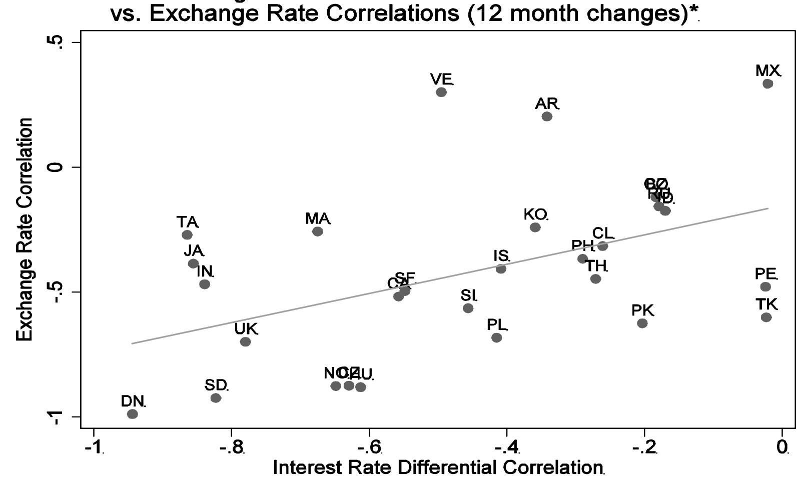
*90 day rolling correlation($\%\Delta e^{Mex/\$}$, $\%\Delta e\%^{\$/eu}$).

Figure 7 - Rolling 90-day Correlation of Percent Changes in Daily Nominal Exchange Rates: Canada*



*90 day rolling correlation($\%\Delta e^{Can/\$}$, $\%\Delta e\%^{\$/eu}$).

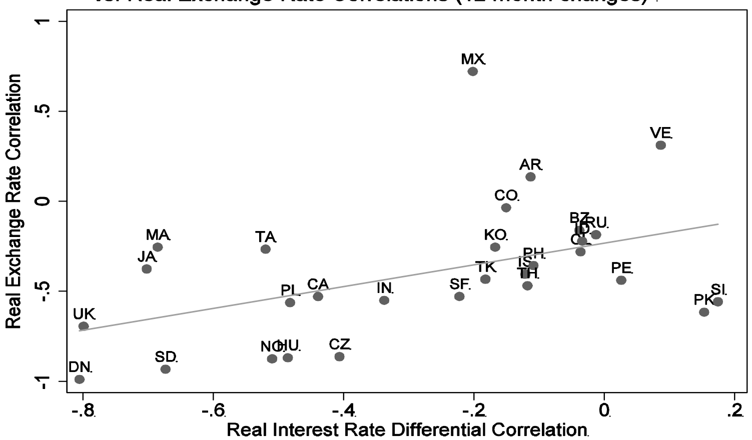
Figure 8 - Interest Rate Differential vs. Exchange Rate Correlations (12 month changes)*



***Interest rate differential correlation: corr[$\Delta(i^{\$} - i^{x})$, $\Delta(i^{eu} - i^{\$})$]**

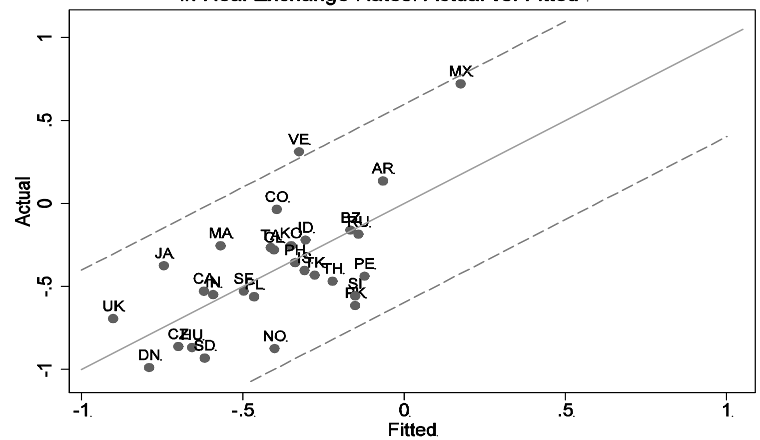
Exchange rate correlation: corr($\%\Delta e^{x/\$}$, $\%\Delta e^{\$/eu}$)

Figure 9 - Real Interest Rate Differential
vs. Real Exchange Rate Correlations (12 month changes)*



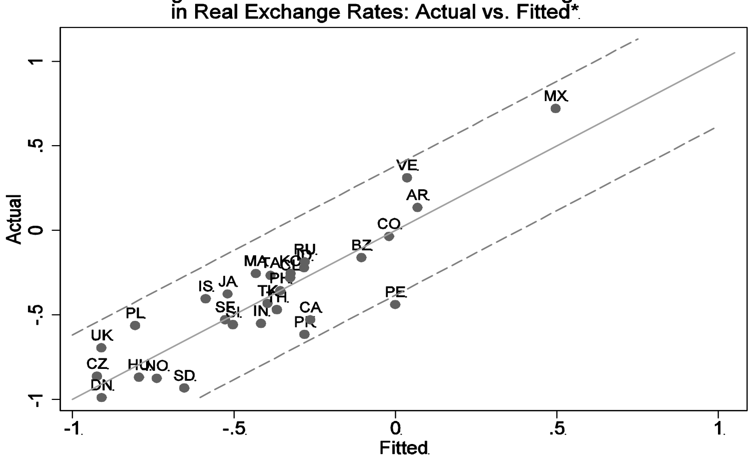
***Interest rate differential correlation: corr[$\Delta(r^{\$} - r^{x})$, $\Delta(r^{eu} - r^{\$})$]**
Exchange rate correlation: corr($\Delta rer^{/\$}$, $\Delta rer^{\$/eu}$)

Figure - 10 Correlations of 12-Month Changes
in Real Exchange Rates: Actual vs. Fitted*



***Fitted value based on Table 2, equation (6); actual correlations = corr(%$\Delta rer^{x/\$}$, %$\Delta rer^{\$/eu}$).**

Figure - 11 Correlations of 12-Month Changes
in Real Exchange Rates: Actual vs. Fitted*



***Fitted value based on Table 4, equation (10); actual correlations = corr(%$\Delta rer^{x/\$}$, %$\Delta rer^{\$/eu}$).**

Chart 12 - Contribution of Explanatory Variables to Predict Real Exchange Rate Correlations
(Based on Equation in Table 4, Column 10)

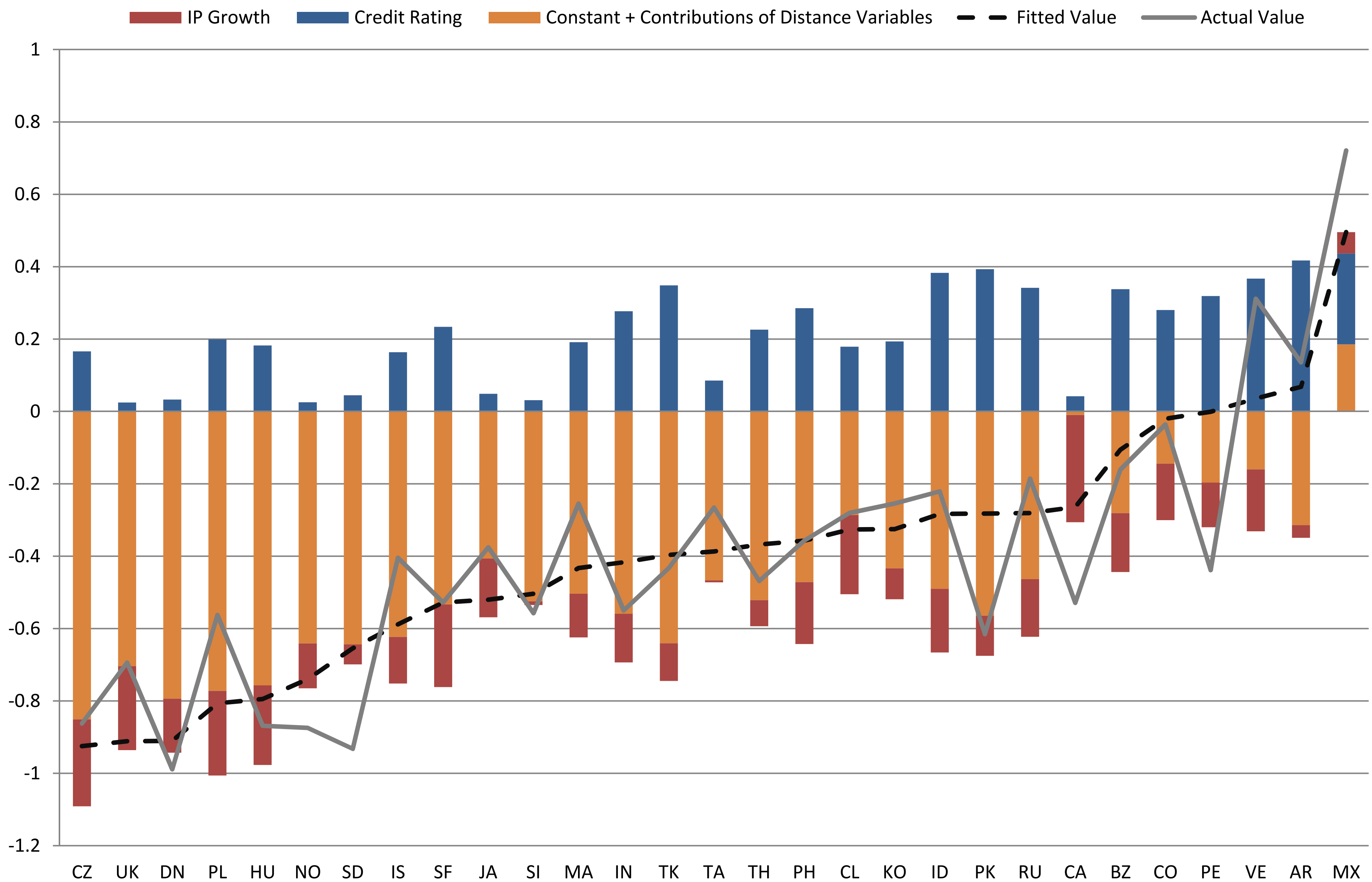
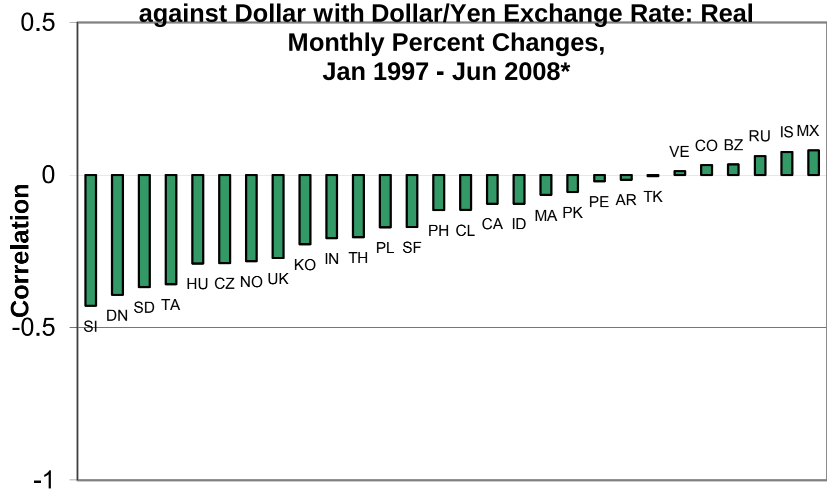
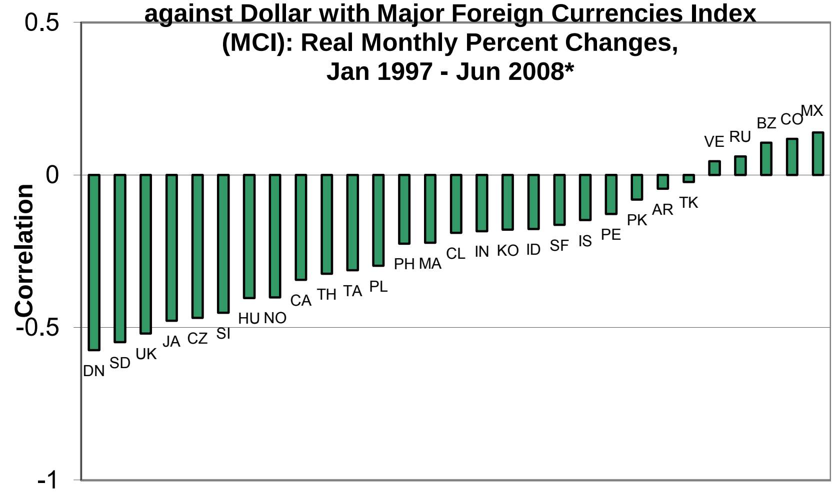


Figure 13 - Correlation of Country X's Exchange Rate against Dollar with Dollar/Yen Exchange Rate: Real Monthly Percent Changes, Jan 1997 - Jun 2008*



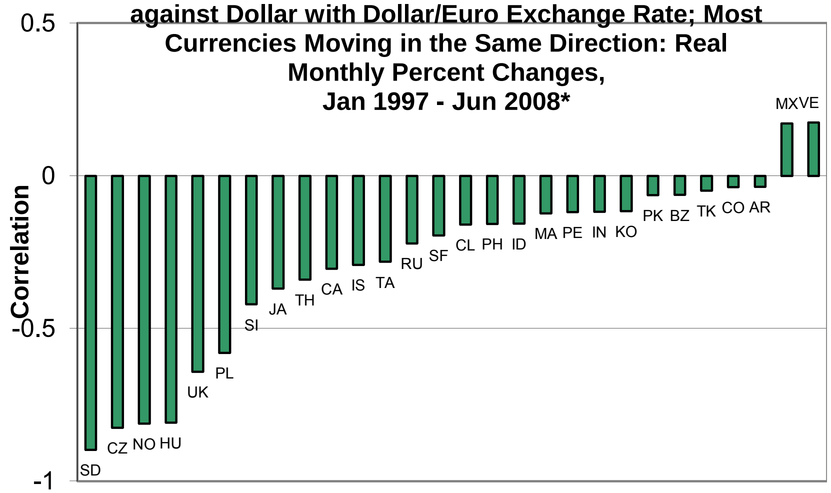
*Correlation(%Δrer$^{x/\$}$, %Δrer$^{\$/yen}$).

Figure 14 - Correlation of Country X's Exchange Rate against Dollar with Major Foreign Currencies Index (MCI): Real Monthly Percent Changes, Jan 1997 - Jun 2008*



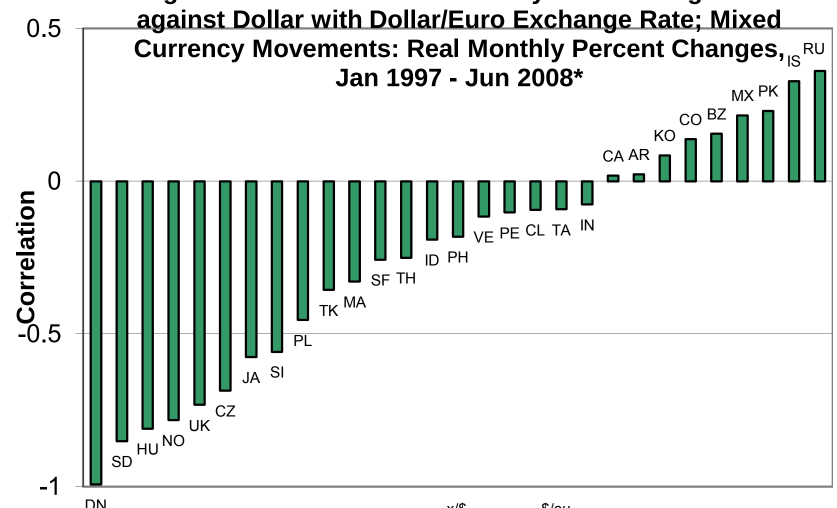
*Correlation(%Δrer$^{x/\$}$, %Δrer$^{\$/mci}$).

Figure 15 - Correlation of Country X's Exchange Rate against Dollar with Dollar/Euro Exchange Rate; Most Currencies Moving in the Same Direction: Real Monthly Percent Changes, Jan 1997 - Jun 2008*



*Correlation(%Δrer$^{x/\$}$, %Δrer$^{\$/eu}$).

Figure 16 - Correlation of Country X's Exchange Rate against Dollar with Dollar/Euro Exchange Rate; Mixed Currency Movements: Real Monthly Percent Changes, Jan 1997 - Jun 2008*



*Correlation(%Δrer$^{x/\$}$, %Δrer$^{\$/eu}$).

Table 1: Cross-Country Regressions for Correlations of Interest Rate Differentials

Dependent Variable: Correlation(interest rate differential between country X and US, interest rate differential between US and Euro Area

	Nominal Interest Rate Changes[1]		Real Interest Rate Changes[2]	
	(1)	(2)	(3)	(4)
corr(Δ πgap differentials)[3]	0.64	0.64	0.88	0.89
	(3.27)	(3.32)	(5.88)	(5.50)
corr(Δ IPgap differentials)[4]	0.17		0.61	
	(0.54)		(2.56)	
corr(Δ IP growth differentials)[5]		0.27		0.34
		(0.97)		(1.49)
Adjusted R^2	0.24	0.26	0.58	0.52

t-statistics in parentheses, n = 29

1. $corr[\Delta(i^{\$} - i^{x}) , \Delta(i^{eu} - \Delta i^{\$})]$
2. $corr[\Delta(r^{\$} - r^{x}) , \Delta(r^{eu} - \Delta r^{\$})]$
3. $corr[\Delta(\pi gap^{\$} - \pi gap^{x}) , \Delta(\pi gap^{eu} - \pi gap^{\$})]$
4. $corr[\Delta(IPgap^{\$} - IPgap^{x}) , \Delta(IPgap^{eu} - IPgap^{\$})]$
5. $corr[\Delta(\Delta ip^{\$} - \Delta ip^{x}) , \Delta(\Delta ip^{eu} - \Delta ip^{\$})]$

Table 2: Cross-Country Regressions for Correlations of Exchange Rates

Dependent Variable: Correlation(exchange rate of country X against the dollar, exchange rate of dollar against the euro

	Nominal Exchange Rate Changes[1]			Real Exchange Rate Changes[2]		
	(1)	(2)	(3)	(4)	(5)	(6)
corr(Δ πgap differentials)[3]		0.53	0.57		0.40	0.45
		(1.82)	(2.08)		(1.26)	(1.56)
corr(Δ IPgap differentials)[4]		0.30			0.19	
		(0.76)			(0.44)	
corr(Δ interest differentials)[5]	0.59	0.33	0.27	0.71	0.52	0.44
	(2.77)	(1.36)	(1.15)	(3.24)	(1.99)	(1.78)
corr(Δ IP growth differentials)[6]			0.65			0.77
			(1.94)			(2.20)
Adjusted R^2	0.19	0.24	0.33	0.25	0.25	0.36

t-statistics in parentheses, n = 29

1. corr($\Delta e^{x/\$}$, $\Delta e^{\$/eu}$)
2. corr($\Delta re^{x/\$}$, $\Delta re^{\$/eu}$)
3. corr[$\Delta(\pi gap^{\$} - \pi gap^{x})$, $\Delta(\pi gap^{eu} - \pi gap^{\$})$]
4. corr[$\Delta(IPgap^{\$} - IPgap^{x})$, $\Delta(IPgap^{eu} - IPgap^{\$})$]
5. corr[$\Delta(i^{\$} - i^{x})$, $\Delta(i^{eu} - i^{\$})$]
6. corr[$\Delta(\Delta ip^{\$} - \Delta ip^{x})$, $\Delta(\Delta ip^{eu} - \Delta ip^{\$})$]

Table 3: Cross-Country Regressions for Correlations of Nominal Exchange Rates with Additional Regressors

Dependent variable: Correlation(12-month change in nominal exchange rate of country x against dollar, 12-month change in nominal exchange rate of dollar against euro)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
corr(Δ πgap differentials)	0.57	0.24	0.53	0.52	0.65	0.43	0.69	0.38	0.079		0.53
	(2.08)	(1.12)	(1.88)	(1.90)	(2.19)	(1.46)	(2.29)	(1.43)	(0.40)		(2.14)
corr(Δ IP growth differentials)	0.65	0.28	0.49	0.61	0.71	0.70	0.64	0.55	0.40		0.59
	(1.94)	(1.06)	(1.31)	(1.84)	(2.04)	(1.85)	(1.74)	(1.71)	(1.53)		(1.92)
corr(Δ interest differentials)	0.27	0.035	0.34	0.23	0.27	0.16	0.36	-0.052	-0.42		
	(1.15)	(0.20)	(1.35)	(0.97)	(1.13)	(0.58)	(1.41)	(-0.20)	(-2.02)		
Distance From the United States		-0.21							-0.21	-0.18	
		(-2.60)							(-2.30)	(-2.81)	
Distance From the Euro Area		0.21							0.20	0.21	
		(4.57)							(4.11)	(6.36)	
Trade Share			0.0049						0.00047		0.0077
			(1.12)						(0.12)		(2.05)
Correlation of Stock Market Returns				-0.41					0.17		
				(-1.33)					(0.66)		
U.S. Portfolio Integration					0.00013				0.00034		
					(0.75)				(1.19)		
International Financial Integration						-0.051			-0.048		
						(-1.31)			(-1.50)		
International Financial Size							3.1e-08		-1.5e-08		4.8e-08
							(1.23)		(-0.36)		(2.19)
Credit Rating								0.050	0.053	0.043	0.039
								(2.43)	(3.67)	(3.97)	(3.43)
GDP per Capita								0.10	0.10	0.11	
								(1.50)	(1.94)	(2.55)	
Adjusted R^2	0.33	0.64	0.33	0.35	0.31	0.35	0.34	0.42	0.78	0.77	0.54

t-statistics in parentheses, n = 28 in regressions (3), (5), (6), (9), (11), n = 29 in all others

Table 4: Cross-Country Regressions for Correlations of Real Exchange Rates with Additional Regressors

Dependent variable: Correlation(12-month change in real exchange rate of country x against dollar, 12-month change in real exchange rate of dollar against euro)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
corr(Δ πgap differentials)	0.45	0.14	0.40	0.42	0.53	0.30	0.58	0.29	-0.0050		
	(1.56)	(0.61)	(1.37)	(1.42)	(1.71)	(0.97)	(1.83)	(1.00)	(-0.022)		
corr(Δ IP growth differentials)	0.77	0.45	0.58	0.75	0.84	0.83	0.77	0.66	0.66	0.49	
	(2.20)	(1.64)	(1.52)	(2.11)	(2.30)	(2.10)	(1.98)	(1.90)	(2.16)	(2.09)	
corr(Δ interest differentials)	0.44	0.19	0.52	0.41	0.43	0.32	0.53	0.19	-0.26		
	(1.78)	(1.01)	(1.99)	(1.64)	(1.76)	(1.10)	(2.00)	(0.65)	(-1.07)		
Distance From the United States		-0.29							-0.29	-0.33	
		(-3.45)							(-2.72)	(-4.75)	
Distance From the Euro Area		0.19							0.17	0.17	
		(3.92)							(2.94)	(4.32)	
Trade Share			0.0066						0.0012		0.0099
			(1.45)						(0.27)		(2.34)
Correlation of Stock Market Returns				-0.27					0.26		
				(-0.81)					(0.85)		
U.S. Portfolio Integration					0.00013				0.00029		
					(0.74)				(0.86)		
International Financial Integration						-0.056			-0.067		
						(-1.35)			(-1.79)		
International Financial Size							3.3e-08		-1.9e-09		
							(1.27)		(-0.038)		
Credit Rating								0.044	0.048	0.024	0.074
								(1.97)	(2.86)	(3.13)	(4.34)
GDP per Capita								0.11	0.079		0.15
								(1.44)	(1.30)		(2.14)
Adjusted R^2	0.36	0.65	0.39	0.35	0.35	0.39	0.38	0.41	0.74	0.74	0.47

t-statistics in parentheses, n = 28 in regressions (3), (5), (6), (9), (11), n = 29 in all others

Table 5: Robustness Check for Regressions for Correlations of Nominal Exchange Rates

Dependent variable: Correlation(12-month change in nominal exchange rate of country x against dollar, 12-month change in nominal exchange rate of dollar against different currencies)

	Original equations from Table 3: dollar vs. euro		Re-estimated from Table 3: dollar vs. yen		Re-estimated from Table 3: dollar vs. major foreign currencies		Re-estimated from Table 3: most currencies move in same direction		Re-estimated from Table 3: mixed currency movement	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
corr(Δ πgap differentials)	0.57		0.44		0.55		0.37		0.30	
	(2.08)		(1.66)		(3.48)		(1.32)		(0.95)	
corr(Δ IP growth differentials)	0.65		0.18		-0.14		-0.10		-0.35	
	(1.94)		(0.86)		(-0.57)		(-0.27)		(-1.26)	
corr(Δ interest differentials)	0.27		0.22		0.31		0.51		0.11	
	(1.15)		(1.33)		(1.98)		(1.92)		(0.34)	
Distance From the United States		-0.18		-0.16		-0.19		-0.26		0.05
		(-2.81)		(-2.28)		(-2.92)		(-3.21)		(0.40)
Distance From the Euro Area/ Japan		0.21		0.12		0.089		0.17		0.39
		(6.36)		(2.10)		(2.77)		(4.13)		(6.42)
Credit Rating		0.043		0.027		0.048		0.05		-0.03
		(3.97)		(2.50)		(4.49)		(3.73)		(-1.32)
GDP per Capita		0.11		0.016		0.097		0.12		0.02
		(2.55)		(0.35)		(2.27)		(2.12)		(0.21)
Adjusted R^2	0.33	0.77	0.17	0.55	0.39	0.67	0.19	0.69	-0.03	0.58

t-statistics in parentheses, n = 28 in regressions (3), (5), (6), (9), (11), n = 29 in all others

Table 6: Robustness Check for Regressions for Correlations of Real Exchange Rates

Dependent variable: Correlation(12-month change in real exchange rate of country x against dollar, 12-month change in real exchange rate of dollar against different currencies)

	Original equations from Table 4:dollar vs. euro		Re-estimated from Table 4: dollar vs. yen		Re-estimated from Table 4: dollar vs. major foreign currencies		Re-estimated from Table 4: most currencies move in same direction		Re-estimated from Table 4: mixed currency movement	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
corr(Δ πgap differentials)	0.45		0.42		0.57		0.28		0.46	
	(1.56)		(1.60)		(3.23)		(0.95)		(1.41)	
corr(Δ IP growth differentials)	0.77	0.49	0.18	-0.15	-0.13	-0.020	-0.18	-0.13	-0.29	-0.15
	(2.20)	(2.09)	(0.90)	(-0.86)	(-0.47)	(-0.098)	(-0.48)	(-0.37)	(-1.01)	(-0.66)
corr(Δ interest differentials)	0.44		0.24		0.40		0.66		0.20	
	(1.78)		(1.47)		(2.28)		(2.38)		(0.63)	
Distance From the United States		-0.33		-0.19		-0.33		-0.37		-0.13
		(-4.75)		(-2.88)		(-4.66)		(-3.68)		(-0.88)
Distance From the Euro Area/ Japan		0.17		0.12		0.084		0.17		0.40
		(4.32)		(2.15)		(2.18)		(3.25)		(5.94)
Credit Rating		0.024		0.022		0.032		0.03		-0.03
		(3.13)		(3.28)		(3.91)		(3.19)		(-1.72)
Adjusted R^2	0.36	0.74	0.19	0.57	0.39	0.64	0.21	0.65	0.02	0.54

t-statistics in parentheses, n = 28 in regressions (3), (5), (6), (9), (11), n = 29 in all others