EXCHANGE RATE REGIMES AND THE CROSS-COUNTRY DISTRIBUTION OF THE 1997 FINANCIAL CRISIS

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We study variations in the severity of the 1997 financial crisis in a sample of 25 developing countries. We use both currency depreciation and stock market returns as crisis measures. Our key findings are that countries that started 1997 with an exchange rate peg experienced significantly greater currency depreciation and significantly lower stock returns than would be predicted from the levels of various macroeconomic indicators. (*JEL* F3, F4)

I. INTRODUCTION

The Asian financial crisis of 1997 is still a very hot topic. A recent search of EconLit turned up 243 articles in the system with "Asian Crisis" in the subject field.[1] Several recent articles attempt to explain variations in the severity of the crisis across developing countries using macroeconomic and financial variables and show that the distribution of the crisis is somewhat predictable. Our article extends this literature in two directions. First, we examine whether the initial exchange rate regime in place at the beginning of 1997 had any effect on the distribution of the financial crisis once the relevant macro and financial indicators are included in the model. Second, given that a real crisis followed on the heels of the financial one, we study the relationship between exchange rate regime, currency depreciation, and stock market performance in 1997.

Our sample consists of 25 developing countries in 1997.[2] Though a cross-sectional approach limits the generality of our results, we believe we can ask and answer two interesting questions about the average performance of different exchange rate regimes in 1997. The first question is: Controlling for economic indicators, what was the average effect of having an initially pegged exchange rate on currency depreciation? There are theoretical arguments (presented in section II) that can justify either positive, negative, or zero effects. We find that, on average, countries with a pegged regime at the beginning of the year experienced *more* depreciation than what was predicted by their macro indicators.

The second question we study is: What was the average effect of currency depreciation on stock market performance in 1997? Again, there are arguments (presented in section III) supporting either a positive, neg-

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1. Search conducted January 18, 2000.

2. In these 25 countries there are 13 who began 1997 with some type of fixed exchange rate regime. Eight of these countries devalued during the year, and five did not. The sample also includes 12 countries who began 1997 with some type of floating exchange rate regime. Of course, it can be difficult to classify countries as fixed or floating. In practice, we examined their exchange rate movements in the first two months of the year. If the exchange rate was flat, or moved in a predetermined pattern (e.g. Brazil's crawling peg) we classified it as a fixed regime. If it moved in a nonpredetermined pattern, we classified it as a floating regime. However, we do show, by means of various robustness tests, that our results do not crucially depend on the identification of any one country as a pegger or floater.

ABBREVIATIONS

CPR: Corsetti, Pesenti, and Roubini (1999)
IFS: International Financial Statistics
IMF: International Monetary Fund
M2: Broad Monetary Aggregate

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ative, or neutral relationship. We find that, on average, depreciation has a marginally significant negative impact on stock returns. However, in the 12 countries that began 1997 with a floating exchange rate, currency depreciation had a significantly *positive* effect on stock returns, whereas the effect of depreciation on stock returns was *negative* and significant for the 13 countries that started the year with a pegged currency. This relationship holds for stock returns measured either in U.S. dollars or in local currencies.

The papers most similar to ours in the literature are Tornell and Velasco (1995), Edwards (1993), Corsetti et al. (1999) (hereafter CPR), and Tornell (1999). Tornell and Velasco and Edwards study whether or not the choice of exchange rate regime affects economic outcomes.[3] CPR and Tornell study the Asian financial crisis of 1997 in the broader context of developing country performance. They create a crisis index and estimate several regressions using macro and financial indicators to predict the extent of the crisis in a sample of developing countries. Our article applies the idea that the choice of exchange rate regime can affect macroeconomic and financial outcomes to the study of the determinants of the severity of the 1997 crisis in a model similar to those of CPR and Tornell.

In what follows below, section II studies the relationship between macro and financial indicators, the initial exchange rate regime and currency depreciation in 1997. Section III considers the depreciation–exchange rate regime–stock market connection in 1997. Section IV presents our conclusions.

II. MACRO INDICATORS, CURRENCY DEPRECIATION, AND EXCHANGE RATE REGIME IN 1997

The question of what exactly determines the value of the exchange rate is an important unsolved issue in open economy macroeconomics, and we are not going to settle it here.[4] Our strategy is to estimate a model of currency depreciation based on macroeconomic indicators widely used in the empirical literature and see whether or not the initial exchange rate regime in place at the beginning 1997 had any incremental predictive power for the degree of currency depreciation.

A. Exchange Rate Regime and Currency Depreciation in a Crisis: Theory

Given an empirical model of the determinants of depreciation in 1997, we are interested in whether the initial choice of exchange rate regime influences overall depreciation rates. That is, on average, did the pegging countries in the sample experience more, less, or exactly the same degree of currency depreciation predicted by our macro indicator model?

One possibility is that the initial exchange rate regime is unrelated to the degree of currency depreciation. This would happen if regime announcements have no bite and officials never try to enforce an inappropriate peg, or if pegged countries keep their macro indicators completely consistent with the chosen fixed value of their exchange rate. In either case, we would expect a coefficient of zero on a pegging country dummy in our depreciation equation.

Alternatively, given that one major reason to elect a pegged regime is to insulate the economy from short-run exchange rate volatility, an exchange rate peg may eliminate or mitigate the short-run relationship between macro indicators and currency fluctuations. If, on average, this occurred in 1997, we would expect to find a negative and significant coefficient on the pegging country dummy in our depreciation equation, indicating that pegging countries experienced less average depreciation than would have been predicted from their macroeconomic indicators.[5]

3. For example, Tornell and Velasco (1995) show that in a sample of African countries, those with fixed exchange rates reacted to adverse terms of trade shocks with less fiscal discipline than did floating rate countries. Willett (1998a) surveys several papers that study whether exchange rate based or money based stabilizations are more successful.

4. Probably the most famous statement of the problems in predicting exchange rates is Meese and Rogoff (1983).

5. In our sample, eight pegging countries devalue and five do not. However, we are interested in the average performance of pegged regimes in the year, so we do not distinguish between these two groups. Note that it is possible even with the eight devaluers in the sample to have a negative coefficient on the peg dummy. It could be the case that the devaluations were less than what

The final possibility is that when a pegged regime breaks down, investors tend to panic or overreact in the short run and the subsequent depreciation is greater than what would be predicted by the macro indicators. International Monetary Fund (IMF) officials have stated that they believed this to be the case in the 1997 crisis. Michel Camdessuss, who was at that time managing director of the IMF, said in reference to the crisis, "In our view currencies have depreciated far more than is warranted."[6]

If we find a positive and significant coefficient on the pegging country dummy in the macro indicator regression, we can argue that, on average, pegged countries in 1997 suffered greater devaluations than their macro indicators warranted.

B. What Are the Relevant Macro Indicators?

There is a large and growing literature modeling the empirical determinants of currency crises. Kaminsky et al. (1998) survey 28 papers that use a total of 105 explanatory variables. Their overall conclusions are that crises are difficult to predict and that there is not a single best indicator of future problems. According to their count, the variables used most often in the literature are: real exchange rates (14 times), international reserves (12), real GDP growth (9), current account balance (7), and credit growth (7).

The papers most relevant for our work are CPR and Tornell (1999). Like us, CPR study the cross-sectional distribution of the 1997 crisis, arguing that financial variables work together to affect the severity of a crisis. They create a current account index variable that is equal to the actual current account variable if there has been a recent real currency appreciation in the country and is equal to zero in the absence of such an appreciation. They also create a financial fragility index variable that is equal to the stock of nonperforming loans as a share of total assets if the country has experienced a positive recent lending boom, but is equal to zero in the absence of a lending boom. These index variables are further interacted with dummies for low reserves and weak fundamentals.

Tornell studies both the 1994–5 and 1997 crises. He also creates dummy variables for high reserves, defined as a ratio of the broad monetary aggregate (M2) to reserves of greater than 1.8, and strong fundamentals, defined as a combination of no recent lending boom and a recent real exchange rate appreciation of less than 5%. He then explains the severity of the crises with a regression using the growth of lending and real appreciation and interactions of each of these variables with the two dummy variables described above.[7]

Although these papers differ in the details of their models, both emphasize real appreciation, reserve adequacy, recent lending growth, and the current account as important factors for explaining the extent of the 1997 crisis. In addition, other recent work, such as Radelet and Sachs (1998) and Furman and Stiglitz (1998), has emphasized external debt as an important determinant of the 1997 crisis.

We use the above articles to help determine the macro indicators employed in our empirical work. Specifically, we study the importance of the current account, external debt, reserve adequacy, appreciation of the real exchange rate, and a lending boom variable in explaining currency depreciation in 25 countries in 1997. However, our empirical work differs in three respects from that of Tornell and CPR. First, we focus on the role of the initial exchange rate regime in the development of the crisis. Second, Tornell and CPR each create a crisis index variable to use as their dependent variable, whereas we directly study currency depreciation. Third, we present evidence on the effects of currency depreciation and initial exchange rate regime on the real economy as proxied by national stock market returns in 1997.

C. Results

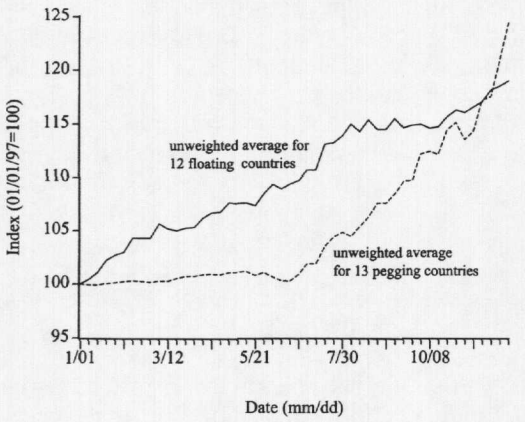
We study a sample of 25 developing countries in 1997. We classify each country as either a pegger or floater, fully realizing

the macro indicators would have predicted, or that the negative effect of the five successful pegging countries outweighed the non-negative effect of the devaluers.

6. Quoted in Willett (1998b), who provides similar quotes from other officials and goes on to argue that international financial markets caused excessive currency depreciation in 1997.

7. We compare our results with those of CPR and Tornell at the end of the empirical section.

FIGURE 1
Average Exchange Rate Index by Initial Exchange Rate Regime



(as discussed in note 2) that these are sometimes ambiguous choices.[8] Appendix 1 lists the countries in the sample, their initial exchange rate regime choice, and sources and summary statistics for the variables.

Figure 1 depicts the average evolution of the exchange rate for the floating and pegging countries during 1997. The countries in the sample that began the year with a pegged exchange rate maintained their currency pegs until Thailand devalued the baht in July, after which seven more of the pegged currency countries were forced to abandon their pegs and devalue their currencies. By the end of the 1997, the average depreciation of the pegging group (28.2%) is actually higher than the average depreciation of the floating group (20.7%). However, this does not answer the question of how the pegging countries performed relative to what their economic indicators predict.

To investigate this issue, we regress depreciation in 1997 on depreciation in 1996, the current account as a percentage of GDP in 1996, external debt as a percentage of GDP in 1996, a lending boom variable derived by CPR, the ratio of M2 to reserves in 1996, real exchange rate appreciation from 1990 through 1996, and a peg dummy for the 13 countries who began the year with some form of an exchange rate peg.

We believe it is important to include lagged depreciation as an independent variable because not all large currency depreciations indicate a crisis. As CPR point out, some countries (most notably Turkey and Venezuela in our sample) have histories of significant depreciation. Although CPR adjust their dependent variable to account for country-specific trends in depreciation, we prefer to include lagged depreciation as a regressor to account for any country specific trends.

Table 1 presents our results. Equation 1 shows that 1996 depreciation is a positive and significant determinant of 1997 depreciation. The debt-to-GDP ratio is also a positive and significant factor for determining the degree of currency depreciation. The 1996 current account surplus has a negative but insignificant effect on depreciation (t-statistic of 1.18), while the other financial variables are completely insignificant (t-statistics of 0.80 or less). The most interesting result here is the positive and significant (at the 10% level) coefficient on the peg dummy. The regression indicates that, on average, the 13 pegging countries experienced around 20 additional percentage points of currency depreciation than what their macroeconomic indicators would predict.

In equation 2 we drop the three variables with t-statistics below 1.00 and reestimate the model. The adjusted R^2 rises 23%, from .229 to .329, and the overall R^2 is .441. All the variables still included in the regression retain their initial signs, and the peg dummy is now significant at the 0.05 level, while the t-statistic on the current account rises to 1.41.[9]

To investigate the robustness of our results, we conduct a jackknife experiment where 25 different versions of equation 2 are estimated, each with one observation excluded. The average of the 25 estimated coefficients for the variable Current

8. Although Russia suffered a currency devaluation in 1998, it was actually a floater in 1997 and is thus classified as such. The currency was reset at six rubles to the dollar in mid-January and held at that rate until July 1998. The only other controversial country is the Czech Republic, which we classify as a floater rather than a pegger. We do so because the currency moves broadly and in a seemingly random fashion during 1997. Later we show that changing its classification to a pegger actually strengthens rather than hurts our results.

9. Retaining any combination of the three dropped variables does not affect our main results.

TABLE 1
Currency Depreciation, Macro Indicators, and Exchange Rate Regime for 25 Developing Countries in 1997

Variable	Equation 1	Equation 2	Equation 3
Constant	−16.41 (0.89)	−17.22 (1.81)	−13.22 (1.40)
Depreciation, 1996	0.97 (2.82)	0.97 (2.69)	0.94 (2.64)
Peg dummy	20.09 (1.67)	22.08 (2.21)	22.64 (2.26)
Current account, 1996	−1.47 (1.18)	−1.67 (1.41)	−1.76 (1.53)
External debt as a % of GDP	0.88 (2.17)	0.93 (2.96)	0.81 (2.71)
M2/reserves	0.02 (0.01)	—	—
Lending boom	0.08 (0.82)	—	—
Real appreciation	−0.01 (0.33)	—	—
Dummy for strong fundamentals	—	—	−14.25 (1.80)
R^2	0.454	0.441	0.468
Adjusted R^2	0.229	0.329	0.328

Note: Numbers in parentheses are heteroskedasticity consistent *t*-statistics.

Account–1996 is −1.68 and their standard deviation is .47, and the average coefficient for external debt was 0.938, with a standard deviation of .10. The average estimated coefficient of the peg dummy was 22.05, with a standard deviation of 2.29.[10] Though the current account coefficient does change some with the sample, the coefficients on external debt and the peg dummy are very tightly distributed, with a ratio of average coefficient to standard deviation between nine and ten.

We find that external debt and the current account deficit at the end of 1996 help predict currency depreciation in 1997 for our sample of 25 countries, while real exchange rate appreciation, reserve adequacy, and lending booms do not. Furthermore, we find significant evidence of overshooting for the pegging countries, in the sense that their average devaluation in 1997 was around 20 percentage points more than what their macro indicators predicted. Our results support the claims made that currency depreciations were excessive, at least on average, in the countries that devalued during the crisis.

10. As we noted previously, the most controversial classification we make is the Czech Republic as a floating rather than pegging country. As equation 1 in Appendix 2 demonstrates, changing the classification of this country from a floater to a pegger if anything strengthens our results.

D. Comparison with CPR and Tornell

Consistent with CPR and Tornell, our results show that the 1997 crisis was partly predictable using available macroeconomic indicators. However, the specific indicators we find important are external debt and the current account deficit. CPR and Tornell emphasize that the effects of macro indicators will vary in countries with strong or weak *ex ante* fundamentals or in countries with high or low *ex ante* reserves. Although any direct comparison of their results with ours must be tempered by the realization that each article uses a different dependent variable and set of countries in the sample, we do not find significant interaction effects in our data. That is, the insignificance of reserves, real appreciation, and lending

reported above does not change if these variables are interacted with strong fundamentals or high reserve dummies.

The one specific variable from CPR and Tornell that we find to be significant is Tornell's dummy variable for strong fundamentals, defined as nonpositive lending growth and a real appreciation of less than 5%. Equation 3 of Table 1 reports the results of adding this dummy to our model. The strong fundamentals dummy has a coefficient of −14 and is significant at the 0.10 level, indicating that, *ceteris paribus*, countries that began 1997 with strong fundamentals experienced significantly less currency depreciation on average. For our purposes, it is also important to note that our peg dummy is still positive (coefficient of over 22) and significant (*t*-statistic of 2.26) and that the other variables retain their signs and significance levels.

III. DEPRECIATION, EXCHANGE RATE REGIME, AND STOCK MARKET PERFORMANCE IN 1997

We have seen that, on average, the 13 pegging countries suffered significantly higher currency depreciation than predicted by a regression using some common macroeconomic and financial indicator variables. In this section we study the 1997 relationship between depreciation, initial exchange rate regime, and stock market performance.

A. The Stock Market–Currency Depreciation Link: Theory

We assume that stock market performance is a leading indicator of overall economic performance in that changes in stock prices reflect to some extent changes in the expected future profitability of the firms in an economy.[11] We are not arguing that these national stock markets are fully efficient; in the short run, swings in investor confidence can have big effects in the market as can unhedged currency risk.

11. Stock returns are often used as leading indicators of GDP growth. For three recent examples, see Leigh (1997), Poterba and Samwick (1995), and Gallinger (1994). We use stock returns in 1997 to proxy for the real effects of the crisis because, as of this date, there are not sufficient data available for 1998 GDP growth to allow us to use that as our dependent variable in this section.

Thus the effect of currency depreciation on stock market performance depends on the effect of currency depreciation both on future expected profits and on investor confidence. The depreciation–stock return relationship could theoretically be nonexistent. If all firms are hedged against currency fluctuations, then the impact of depreciation on future profits would be zero. Further, gradual, partly market-determined depreciations may have little impact on investor confidence.

The traditional textbook view argues that the relationship between currency depreciation and stock market performance is positive because a depreciation lowers the price of a country's exports. This is the idea behind so-called competitive devaluations. From a financial market point of view, though, currency depreciation could have a negative effect on stock market performance if it adversely affects investors' confidence, leading to capital flight, or if firms in the country were largely unhedged. That would be the case if most firms' revenues come in local currency but their costs have a component that is paid in dollars.

We argue that the positive effect of depreciation on stock market performance is more likely to appear in countries with some type of managed float. There are two reasons for this belief. First, the depreciation is likely to happen gradually and at least partly at the behest of market forces. Depreciation is not likely to undermine confidence in government policies. Second, firms are more likely to exercise caution in their use of borrowing in dollars to finance projects that pay in local currency if they know that currency fluctuations can occur at any time.

Conversely, unscheduled depreciations that occur under a fixed-rate regime (i.e., official devaluations) often cause a crisis. Devaluations mean that the government's announced policy of a fixed rate has been suddenly abrogated, which can cause a loss of investor confidence in the country. Also, to the extent that firms relied on the government to protect them from exchange rate risk, their expected future profits may be compromised. In the empirical application that follows we investigate whether the effect of depreciation on stock market performance is mediated by the exchange rate regime in place.

B. The Stock Market–Currency Depreciation Link: Evidence from 1997

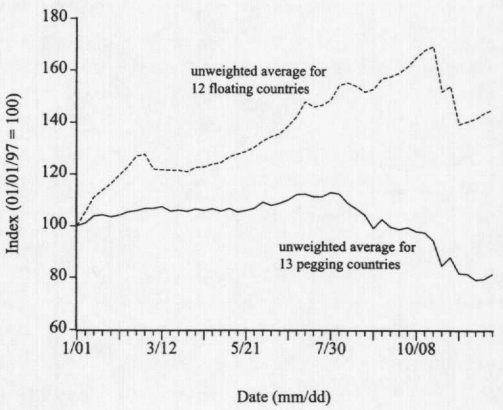
We use the same 25-country sample as in section II and consider stock market performance as measured both in U.S. dollars and in local currencies. Figure 2 presents the unweighted average stock market returns in dollars for the two groups of countries over 1997 and shows that the pegging countries suffered average losses of almost 25%, whereas the floaters enjoyed an average positive return of almost 30%. Given that the two groups had a generally similar level of currency depreciation on average, this large difference cannot be entirely due to greater depreciation in the pegging countries, but rather may be attributable to the method in which the currency was depreciated.[12]

In equation 1 of Table 2 we regress dollar-valued stock market returns in 1997 on dollar-valued stock returns in 1996, average currency depreciation in 1997, and a dummy for the 13 initially pegging countries in the sample. Lagged returns are included to allow for country-specific trends in performance, and they are positive and significant at the 0.05 level. Currency depreciation is negative, but the coefficient is only significant at the 0.10 level. The peg dummy has a large negative and significant coefficient, indicating that the 13 pegging countries suffered stock market losses over and above what would be associated with their levels of currency depreciation.

We now consider allowing the effect of currency depreciation on stock market returns to vary according to how the depreciation occurred, either gradually through a partly market-determined process or abruptly through a devaluation. Specifically, we create a new variable that is the product of currency depreciation and our peg dummy variable. The coefficient on this interaction term measures the difference between the effect of depreciation in the 12 floating countries and its effect in the pegging countries. We expect the variable to have a negative coefficient, indicating that depreciation is more harmful when it occurs abruptly and indicates a failure of government policies.

12. If the returns are measured in local currencies, the average for the floaters is almost 57%, while the average for the peggers is −12%.

FIGURE 2
Average Stock Returns by Initial Exchange Rate Regime



Equation 2 of Table 2 presents the results. Now the depreciation variable is positive and significant at the .05 level, while the interaction term (depreciation × peg) is negative and significant at the 0.01 level. Lagged returns continue to be positive and significant. These results show that in the *ex ante* floating countries, each percentage point of depreciation is associated with around a .45 percentage point increase in dollar-valued stock returns. In contrast, each percentage point of depreciation in the *ex ante* pegging countries is associated with around a 1 percentage point decline in dollar-valued stock returns.

Equations 3 and 4 in Table 2 repeat the regressions reported in equations 1 and 2, with the difference that stock returns are measured in local currencies. Equation 3 shows that here, lagged returns are positive and significant predictors of current returns. Currency depreciation has a very small and completely insignificant coefficient, whereas the peg dummy is large, negative, and significant at the 0.01 level. In equation 4 we again use the depreciation × peg interaction term. Just as was the case with dollar-valued returns, depreciation significantly raises stock market returns in local currency in the floating countries and significantly lowers returns in the *ex ante* pegging countries.

We again investigate the robustness of our results with the use of a jackknife experiment, where 25 different versions of

TABLE 2
Stock Market Returns, Currency Depreciation, and Exchange Rate Regime for 25 Developing Countries in 1997

	Returns in US$		Returns in Local Currency	
Variable	**Equation 1**	**Equation 2**	**Equation 3**	**Equation 4**
Constant	27.75	3.78	31.36	3.91
	(2.53)	(0.52)	(1.94)	(0.47)
Stock market returns, 1996	0.30	0.28	0.34	0.22
	(2.09)	(1.95)	(1.59)	(1.61)
Depreciation, 1997	−0.51	0.46	0.11	1.75
	(1.71)	(2.06)	(0.23)	(4.69)
Peg dummy	−41.60	—	−51.86	—
	(3.10)		(3.11)	
Depreciation 97 × peg dummy	—	−1.43	—	−2.38
		(5.18)		(5.57)
R^2	0.588	0.661	0.497	0.727
Adjusted R^2	0.529	0.612	0.426	0.688

Note: Numbers in parentheses are heteroskedasticity consistent t-statistics.

equation 2 are estimated, each with one observation excluded. The average of the 25 estimated depreciation coefficients is 0.445 and their standard deviation is .096. The average of the 25 estimated depreciation × peg interaction coefficients is −1.42 with a standard deviation of .098.[13]

IV. CONCLUSION

The purpose of this article is not to argue that floating exchange rate regimes inevitably produce economic outcomes superior to fixed-rate regimes. Indeed, in earlier years, many of the East Asian pegging countries were lauded as paragons of economic growth and development. Our point is simply that, in a crisis year, a fixed exchange rate can stand out as a target and worsen an already bad situation. We demonstrate that if anyone wants to understand the distribution of the 1997 crisis either in currencies or stock markets, knowledge of the initial exchange rate regime is extremely helpful.

Our work shows two striking regularities about the 1997 crisis. First, the countries that began 1997 with some form of exchange rate peg suffered significantly more depreciation than what was predicted by their macro indicators. Second, in these initially pegging countries the partial correlation between currency depreciation and stock market performance is negative and significant, while it is positive and significant in the floating country subsample.

Although fixed exchange rates have historically been part of successful stabilization programs and are not intrinsically problematic, neither are they a get-out-of-jail-free card for developing countries. A fixed peg may initially be in line with underlying macroeconomic and financial conditions, but these factors change over time, and the longer a peg is in place, the more likely that conditions inimical to its survival will arise. Thus, any country that adopts a fixed exchange rate for stabilization reasons needs to have a well-thought-out exit strategy. In the crisis year of 1997, the widely held implicit strategy of waiting until a speculative attack forced a devaluation caused an overshooting of currency depreciation and significantly lowered stock returns.

13. Once again, equation 2 of Appendix 2 shows that making the Czech Republic a pegger instead of a floater strengthens our results.

APPENDIX 1

COUNTRIES IN THE SAMPLE AND EXCHANGE RATE CLASSIFICATION

Thailand	Peg
Malaysia	Peg
Poland	Float

Czech Republic	Float
South Korea	Peg
Turkey	Float
Greece	Float
Hungary	Float
Indonesia	Peg
Brazil	Peg
Phillippines	Peg
Chile	Peg
Colombia	Float
Israel	Float
Hong Kong	Peg
Argentina	Peg
India	Peg
China	Peg
South Africa	Float
Mexico	Float
Portugal	Float
Russia	Float
Taiwan	Peg
Venezuela	Float
Singapore	Peg

SUMMARY STATISTICS

Variable	Mean	Standard Deviation
Current account, 1996	−1.58	5.43
External debt (as a % of GDP)	20.4	11.0
M2 (as a % of reserves)	4.30	2.22
Depreciation 1997	24.62	27.48
Depreciation 1996	9.05	15.42
Stock market returns, 1997 (in US$)	1.34	44.35
Stock market returns, 1996 (in US$)	26.08	43.13
Stock market returns, 1997 (in local currency)	20.99	56.81
Stock market returns, 1996 (in local currency)	40.54	62.02
Lending boom	18.39	40.39
Real currency appreciation	21.01	58.34

APPENDIX 2

DATA DEFINITIONS AND SOURCES

Current Account. We use current account in 1996 as a percentage of GDP. The data are from the World Bank (www.worldbank.org/html/extdr/data.htm), except for Greece, Portugal, and Singapore, whose data are from the IMF. Israeli data are from the Central Bureau of Statistics (www.cbs.gov.il) and Taiwanese data from the Central Bank of China (www.cbc.gov.tw).

External Debt. Our debt variable is total external debt in December 1996 as a percentage of 1996 GDP. The debt variable comes from the Bank for International Settlements (1999). GDP data comes from the World Bank, except for Israel and Taiwan, which are from the Central Bureau of Statistics (www.cbs.gov.il) and Taiwanese data from their central bank Web site. (www.cbc.gov.tw)

Reserve Adequacy. To measure reserve adequacy, we use the ratio of M2 to total reserves (minus gold) in December 1996. All data, except for Taiwan, are from the IMF International Financial Statistics (IFS) CD-ROM. Taiwanese data comes from their central bank.

Currency Values. For all of the countries in the sample, we use currency values relative to the U.S. dollar, as reported in the Emerging Markets section of the *Economist*. For 1997, annual depreciation is calculated from January 1 to December 10.

Stock Market Returns. For all of the countries in the sample, we use stock market values, both in U.S. dollar values and in local currencies, as reported in the Emerging Markets section of the *Economist*. For 1997, returns are calculated from January 1 to December 10.

Real Exchange Rate Appreciation. Most of the real exchange rate values are from J. P. Morgan & Co. The appreciation is calculated from 1990 through 1996. The following countries were not available from J. P. Morgan: Poland, Czech Republic, Hungary, Israel, China, and Russia. For these countries, we calculated the bilateral real exchange rate with the U.S. dollar using data from the IMF IFS CD-ROM. In the case of Russia, real appreciation is calculated from June 1992 through 1996.

Lending Boom. Like CPR, we use the growth rate of the ratio of the claims on the private sector of the deposit money banks and nominal GDP between the years of 1990 and 1996 to measure lending booms. All data except Taiwan are from the IMF IFS CD-ROM. Taiwanese data again comes from their central bank.

APPENDIX 3

APPENDIX TABLE A1
Regressions with the Czech Republic Classified as a "Pegger"

Equation 1 Dependent Variable: Depreciation, 1997		**Equation 2 Dependent Variable: Stock Market Returns, 1997 ($)**	
Constant	−20.01	Constant	5.64
	(1.92)		(0.84)
Depreciation, 1996	0.99	Returns, 1996	0.25
	(2.69)		(1.80)
Debt ratio	0.98	Depreciation, 1997	0.59
	(3.02)		(4.10)
Current account, 1996	−1.44	Depreciation × peg dummy	−1.61
	(1.28)		(7.88)
Peg dummy	23.18		
	(2.36)		
R^2	0.447	R^2	0.722
Adjusted R^2	0.336	Adjusted R^2	0.682

Note: Numbers in parentheses are heteroskedasticity consistent t-statistics.

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