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POLICY: A STUDY ON ADVANCED
AND EMERGING ECONOMIES**

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ABSTRACT

Currency Crises and Monetary Policy: A Study on Advanced and Emerging Economies*

Currency crisis literature offers a broad area of research regarding the causes and impacts of the phenomenon. The literature recently focuses on the appropriate policy measures in the aftermath of a currency crisis; however the studies do not gather around a robust answer regarding the appropriate monetary policy response in defending the domestic currency. This study tries to emphasize the notion that there is no single policy applicable for all currency crises happened and happening in the global world. The approach of the study is presenting empirical evidence by focusing separately on the advanced and emerging economies and proving that the monetary policy response for the emerging economies should be different from the advanced economies, depending mainly on the vulnerabilities of these economies preceding and during the crisis periods. The study includes twenty four economies, in which fifteen of them are emerging and nine of them are advanced, for the crisis periods between 1986 and 2009. The main finding of the study is that the tight monetary policy is effective in the advanced economies and detrimental in the emerging economies. Advanced economies besides having more independent central banking, lower country riskiness and almost no default history; mainly have second generation model weaknesses which cause the increased interest rates to be successful in stabilizing the exchange rates. For the emerging economies the third generation models play a major role together with the first generation models' vulnerabilities. Thus the major policy implication follows that the policy makers should take into account the economic fragilities during the crisis in defending the currency.

JEL Classification: E52 and F31

Keywords: currency crises, interest rate defense and monetary policy

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1. Introduction

Currency crisis which can be defined as “an episode in which the exchange rate depreciates substantially during a short period of time” (Burnside et al., 2007:1) never loses its popularity in the academic research. The recent global crisis brings the argument if the economic literature needs a new group of models for the crisis explanation. On the other hand, the monetary policy responses to the currency crisis nevertheless attract less attention in the literature. The accurate policy response to the crisis can stimulate rapid recovery of the economy. However, with the inaccurate policy, the economy can struggle with the crisis for years. Therefore implementing the appropriate monetary policy in defending the currency is one of the crucial goals for the policy makers.

The currency crisis literature gathers around three major theoretical models. First generation models, introduced by Krugman (1979) stem from the crises in Latin America in the 70's and 80's. These models focus on the policy inconsistency between holding the pegged exchange rate regime and monetary financing of government deficits in terms of either borrowing or exhausting the reserves. The crisis is predictable in these models; fundamental factors, such as a fall in the foreign exchange reserves below critical level, signal the crisis. The second generation models arose following the European Monetary System crisis. First developed by Obstfeld (1994), in these models the government faces a trade off between the goal of fixed exchange rate and other policy goals, as output growth, unemployment and inflation. The market players' anticipation of the depreciation of currency can be self-fulfilling since the expectations increase the costs of defending the currency for the policy makers, consequently leading to the abandoning of the fixed exchange rate regime. In these models crises are not predictable and can occur even if no obvious trends in the fundamentals are observed. Third generation models, following the Asian crisis in the late 1990s, put forward the close connection between the fragilities in the balance sheets of private sector and banking system and the currency crises. Various types of third generation models exist. Moral hazard problem, studied by Corsetti et al. (1998) focuses on the over investment because of the hidden guarantees of the government. Another variety of models are introduced first by Krugman (1999) with the focus on the vulnerabilities of corporate balance sheets. The study on this field by Eijffinger and Goderis (2007) suggests that the decision of abandoning the fixed exchange rate regime depends on the pressure of the movements in the interest rates and the exchange rates on the fragilities of the corporate sector balance sheets. Lastly, some models focus on the fragile financial system. Chang and Velasco (1999) emphasize that in an economy with fixed exchange rates the bank failures caused by the international illiquidity of the domestic financial sector can lead to currency crisis. The likeliness of the crisis is higher in the liberalized financial system with banks having currency and maturity mismatches.

The diverse nature of the currency crises complicates the monetary policy response in defending the exchange rates. “Conventional wisdom” explains the behavior of the exchange rates with a stable money demand function with various interest parity conditions for relating the expected returns from foreign and domestic financial assets. According to these models tighter monetary policy followed today, leads to a stronger currency today. However, the critics have argued that mainly, during crisis, the fall of the investors’ confidence to the economy decreases the attractiveness of the market. Although interest rates are high enough to cover the probability of default, since the increase is temporary; the expected future return is lower. If combined with the adversely affected economy, the expectation of lower return in the future leads to a depreciation of the expected future exchange rate which consequently weakens today’s currency. These opposing views have motivated various empirical studies. However, the studies point to different conclusions on the effectiveness of the monetary policy in defending the currency. The study conducted by Kraay (2003) indicates that there is little evidence that monetary policy has any positive or negative effect on the exchange rate. Another study carried out by Eijffinger and Goderis (2008) points out that the increased interest rates depreciate the currency in the aftermath of a currency crisis.

Inspired from the conflicting findings, this study does a separate analysis on the interest rate response on exchange rates following a currency crisis for the emerging and advanced economies. The paper tries to prove that the monetary policy responses should be different depending on the causes of the crisis and the vulnerabilities of the economies. An empirical analysis is performed based on the recent empirical article by Eijffinger and Goderis (2008) on 24 economies – 15 emerging, and 9 advanced - for the crisis periods between the years 1986 and 2009. The effect of the tight monetary policy on the domestic currency (nominal and real exchange rates) during currency crisis is investigated by including major indicators of the crises literature: deviation of the GDP growth, current account position, overvalued real exchange rates, domestic corporate short-term obligations, institutional risk of the country, foreign currency denominated short-term obligations, changes in the stock prices, fiscal position, capital account openness, the transparency of central banking and the interaction terms of these indicators with the monetary policy. The interaction terms are included for distinguishing the non-linear effects of monetary policy on the exchange rates for different levels of indicators. The main finding of the study is that tight monetary policy is effective on the advanced economies’ exchange rate stabilization. However, for the emerging economies the increased interest rates lead to further weakening of the domestic currency. For the advanced economies the slowdown in GDP growth, a second generation model indicator, precedes the crisis. The emerging economies suffer from fiscal imbalances, collapsing stock prices, current account deficits and non-transparent central banking. For both advanced and emerging economies institutional quality and exchange rate

misalignment are signals for a possible currency crisis. The interaction terms specify that in the aftermath of the crisis, for emerging economies the deteriorating impact of monetary policy increases if the economy has higher corporate short term debt, liberalized financial markets, higher fiscal deficit levels and lower transparency of the monetary policy. For the advanced economies, tight monetary policy is more effective if the economy has a balanced current account, lower capital account openness and a balanced fiscal position. The results provide insights for the policy makers in preferring the appropriate policy following the crisis depending on the weaknesses of the economies.

The rest of the paper is as follows; section 2 presents the data and the methodology of the analysis, section 3 presents the result of the estimations for emerging and advanced economies, section 4 presents the results of the System GMM estimation and section 5 concludes.

2. Data and Methodology

The empirical study covers twenty four economies, with nine advanced economies – Australia, Canada, Germany, Euro Area, Japan, New Zealand, Sweden, Switzerland, United Kingdom – and fifteen emerging economies – Argentina, Brazil, Chile, China, Colombia, India, Indonesia, Korea, Malaysia, Mexico, Philippines, Russia, Thailand, Turkey and Venezuela. The crisis episodes are investigated for these economies between the years 1986 and 2009 following the methodology used by Ejjfinger and Goderis (2008).

The starting month of the crisis periods is defined as large depreciations of the nominal exchange rates following the period of moderately stable exchange rates. Identified with the following inequality¹:

$$(1) \quad (i,t) \left| de_{i,t} > k_i \text{ and } \overline{de}_{i,t} < \overline{k}_i \right.$$

where,

i : Economy

t : Starting month of the crisis

$de_{i,t}$: The monthly percentage change, between time t and $t - 1$, in the nominal exchange rate defined as the domestic currency price of the US dollar

k_i : Minimum size of the acceptable depreciation: 5% for the advanced and 10% for the emerging economies

$\overline{de}_{i,t}$: Average absolute percentage change in the economy's exchange rate in 12 months before the beginning of the crisis, t

\overline{k}_i : Threshold for the maximum volatility of exchange rates before the depreciation: 1% for the advanced and 2.5% for the emerging economies

¹ The crisis periods are defined following Kraay, A. 2003. Kraay uses OECD definition to distinguish developed and developing countries in order to identify country specific thresholds which reflects country specific exchange rate volatility. The volatility of exchange rates in developing countries are higher than the ones in developed economies. Following this explanation, this study distinguishes the thresholds according to the definitions from the World Economic Outlook of IMF(2009) for the emerging and the advanced economies.

The ending month of the currency crisis, at time $t + s$, is defined according to the inequality:

$$(2) \quad s_{i,t+s+j} < \bar{s}_{i,t} + 0.25 * (s_{i,t}^{\max} - \bar{s}_{i,t}) \quad \text{and } j = 0,1,2$$

where,

- $s_{i,t+s+j}$: The spread of the nominal money market interest rate over the US Federal Funds Rate in economy i and month $t + s + j$, where s represents the duration of the crisis
- $\bar{s}_{i,t}$: Average spread of the interest rates for the 24 months before month t
- $s_{i,t}^{\max}$: Average of the maximum three spreads in month t and five following months

This methodology yields 35 crisis episodes. The list of countries (and currency area) and crisis episodes are presented in Table A1 in Appendix A.

The regression equation to determine the relation between the interest rates and the exchange rates is defined as:

$$(3) \quad Y_{i,t} = \beta_0 + \beta_1 X_{i,t-1} + \beta_2 Z_{i,t-k} + \beta_3 X'_{i,t-1} Z_{i,t-k} + \varepsilon_{i,t} \quad \text{and } k = 1, \dots, n$$

where,

- $Y_{i,t}$: Change in the exchange rate
- $X_{i,t-1}$: Stance of the monetary policy
- $Z_{i,t-k}$: Episode-specific fundamentals
- $X'_{i,t-1} Z_{i,t-k}$: Interaction term that searches the influence of the monetary policy for different levels of episode-specific fundamentals²

The detailed description, construction and sources of the data used in the analyses are presented in Appendix B of the study.

The dependent variable, change in the exchange rate is captured by using two different definitions: nominal and real exchange rates. The monetary policy affects nominal exchange rates directly; thus a stronger influence of the interest rate policy on the nominal exchange rates is anticipated relative to the real exchange rates.

The main regressor of the study is the stance of the monetary policy. Central banks have various channels for the monetary policy response to the exchange rate movements. The underlying analysis employs the widely used response: boost in the policy interest rates. Identifying the appropriate policy interest rate as the stance of the monetary policy is essential in

² This term implies that there is an interaction effect between monetary policy and each episode-specific fundamental. The partial effect of monetary policy is $\beta_1 + \beta_3 Z_{i,t-k}$, therefore it is linearly dependent on the episode-specific fundamentals.

discovering the relation between the monetary policy and the exchange rates. The policy interest rates used in the analysis of this study are summarized in Table A2 in Appendix A. The interest rates are monthly averages of the daily country specific policy rates expressed as spreads over the US Federal Funds Rate because especially for the emerging economies, monthly variations in domestic interest rates “feature very large changes that are reversed in the following month, many of which are not obviously associated with known episodes of speculative pressure”³.

The episode-specific fundamentals are the economic fundamentals that are expected to change the direction of the exchange rates. In this study, the main indicators from different crisis models are included in the analyses for the exchange rate movements. The first fundamental, deviation of the real per capita GDP tries to capture the second generation models’ effect on the exchange rates. If the costs of lower growth are higher than abandoning the fixed exchange rate regime, the depreciation occurs. The current account position divided by the foreign exchange reserves of the economy is included as another fundamental. The ratio captures the link between the increase in the current account deficit and the decrease in the foreign exchange reserves leaving the economy vulnerable to a crisis in case of an increase in the demand for the foreign currency. Furman and Stiglitz (1998) state that the probability of crisis is higher in the economies with extensively overvalued real exchange rates. This is an indicator of the over-borrowing behavior of the market participants. In order to capture the significance of that effect on the crisis, the exchange rate overvaluation variable is included as another fundamental.

Several indicators from the third generation crisis models are included as episode specific-fundamentals to the analyses. Eijffinger and Goderis (2007) underline the importance of the corporate balance sheet fragilities in connection with the currency crises. The debt burden of an economy’s non-financial companies is captured with the variable ratio of corporate short term debt to total assets. Higher indebtedness of the private sector discourages foreign investment and consequently depreciates the domestic currency and also it is expected that it decreases the effectiveness of the monetary policy. The ratio of the short-term external debt to the foreign exchange reserves is defined by Kaminsky (2006) as one of the indicators of sovereign debt which plays a major part in the third generation crisis models. A high ratio indicates that the short term external debt is increasing more than the foreign exchange reserves. This leaves the economy vulnerable to a balance of payments crisis if the loans from foreign creditors are not rolled over. Another fundamental focuses on the institutional quality which is taken from the International Country Risk Guide rating. This rating tries to capture whether or not the economy’s intuitions are in good shape. A number of financial crises are preceded by the bursting of asset price bubbles, which indicates the loss of appetite of the market players on the domestic assets. Therefore the stock prices are included as another fundamental for capturing the influence of the fall in the stock

³ Kraay, A. 2003:302.

prices on the currency crash. Additionally, the degree of the openness of a country's financial markets is added to the analyses. Higher value of this variable represents more open capital accounts which relates to higher outflows during crisis periods leading to higher depreciation of the currency.

Mainly in the first generation models, the devaluation is preceded by the expansionary fiscal policies of the government. The variable fiscal position which is the ratio of fiscal deficit/surplus to GDP is included to analyze the role of the budget deficit in the crisis episodes. In defending the currency, central banks have to maintain the trust of the public to the economy. The variable central bank transparency seeks the connection between the effectiveness of the monetary policy and the higher transparency of central banking. The variable is taken from the Transparency of the Monetary Policy Index which is developed by Eijffinger and Geraats (2006). Higher transparency is expected to increase the efficiency of the monetary policy in preventing and defending the currency depreciation.

Lastly, since the pressure to the currency is the largest at the month before the currency crisis, the initial level of spread between domestic and foreign monetary policy taken at time $t - 1$ is included in the estimations as a control variable.

The statistics of the variables used in the estimations are summarized in Table A3 in Appendix A. The means of nominal and real exchange rates represent that for the episodes used in the analyses, the average nominal and real exchange rates depreciated. During the episodes in the sample the interest rates on average increased.⁴

3. Results

In the search for the appropriate method in conducting the estimations; random effects, fixed effects (to check if the country specific effects play a significant role), and pooled OLS estimation methods have been used. Hausman tests and Breush-Pagan Lagrange Multiplier tests concluded that the appropriate method for the regressions is pooled OLS.

The regressions are conducted first with using the whole sample with the available data. These benchmark regressions are followed by the regressions with subsamples of the emerging and advanced economies.

The benchmark regressions with the whole data are represented in Table 1. First three columns represent the regressions with the nominal exchange rates. Column 1 is the estimation with market interest rates, deviation of the GDP growth, current account position, and initial level of spread, and the interaction of monetary policy with GDP growth and with current account position. Column 2 and column 3 check the robustness of the regression by including lagged

⁴ Observation August 1992 for Japan is dropped from the sample, since the change in the monetary policy (-40.13%) is an outlier.

dependent variable and time trend, respectively. The last three columns are the regressions with the real exchange rates. The regression in column 4 is the same regression as column 1 with the real exchange rates as the dependent variable. The last two columns check the robustness of the results with the real exchange rates.

Table 1. The Benchmark Regressions

	1	2	3	4	5	6
Lagged Dependent Variable		0.218*** (0.042)			0.459*** (0.129)	
Time Trend			-0.171** (0.082)			-0.084 (0.078)
Monetary Policy	0.013 (0.011)	0.013 (0.009)	0.011 (0.009)	0.024 (0.014)	0.017 (0.011)	0.023* (0.013)
GDP	-0.055** (0.024)	-0.069*** (0.019)	-0.090** (0.034)	<i>0.001</i> (0.082)	-0.039 (0.057)	-0.016 (0.083)
Current Account	-0.125 (0.076)	-0.132* (0.067)	-0.079 (0.075)	-0.674* (0.334)	-0.417** (0.165)	-0.652* (0.336)
Initial Level of Spread	0.088*** (0.010)	0.062*** (0.010)	0.077*** (0.013)	0.127*** (0.046)	0.062*** (0.021)	0.121** (0.046)
MP X GDP	-0.295** (0.117)	-0.225** (0.095)	-0.247** (0.100)	-0.364** (0.158)	-0.207* (0.117)	-0.341** (0.150)
MP X Current Account	<i>0.274***</i> (0.075)	<i>0.189***</i> (0.059)	<i>0.237***</i> (0.067)	<i>0.240</i> (0.153)	<i>0.111</i> (0.078)	<i>0.222</i> (0.149)
R-Squared	0.113	0.183	0.134	0.264	0.450	0.267
Number of Observations	340	340	340	317	317	317

*Note: The dependent variables in columns (1), (2) and (3) are the nominal exchange rates and in columns (4), (5) and (6) are the real exchange rates. The interaction terms are represented as "MP X Episode-Specific Fundamental". The values in parenthesis represent the robust standard errors which are clustered by episode. The significance level of the variables are indicated by * (10%), ** (5%) and *** (1%). Counter intuitively-signed coefficients are represented in italics. The (1%) significant coefficients having anticipated signs are represented in bold.*

The regression results present a positive coefficient for the monetary policy, showing that tight monetary policy leads to further depreciation of the currency; however the coefficient is not significant, except last column. The coefficient of the GDP growth which enters significant in the regressions with the nominal exchange rates indicates that lower growth rate of the GDP prior to the crisis, leads to depreciation of the currency. The regressions with the real exchange rates represent a significant current account position indicating that the worsening of the current account position is one of the causes of the currency crash. Initial level of spread indicates the widening of the difference between domestic and foreign interest rates is followed by the depreciation of the domestic currency. The interaction term of monetary policy with GDP growth specifies that increased interest rates lead to more depreciation of the currency if the GDP growth becomes sluggish. Positive and significant lagged dependent variable in columns 2 and 5 indicates that the past behavior determines the current behavior of the exchange rates. The higher goodness of fit of the estimations with the real exchange rates compared to those with the nominal exchange rates designates that the model represents a better explanation for the movements in the real exchange rates.

Following these results, the analyses are done with using the emerging economy subsample. Table 2 represents the regression results performed with the nominal exchange rates for the emerging economies. Column 1 points the results of the regression of the subsample having the available data for GDP growth, current account position, the exchange rate overvaluation, ratio of corporate debt to total assets, institutional quality, short term external debt, capital account openness, fiscal position and stock prices, the interaction terms of these variables with the monetary policy and initial level of spread. The second estimation aims to capture the impact of the transparency of central banks on the domestic currency. The rest of the columns in Table 2 are devoted to the sensitivity analysis of the results in the first two columns. The robustness checks of column 1 are represented in columns 3 and 4; and columns 5 and 6 show the robustness checks of column 2. The robustness checks involve inclusion of the lagged exchange rates and the time trend in the regressions.

In column 1 of Table 2 the coefficient of the monetary policy is negative; indicating an increase in the interest rates appreciates the currency in the aftermath of the crisis. The inclusion of the central bank transparency, in column 2, changes the coefficient of monetary policy into positive suggesting that tight monetary policy leads to further depreciation of the currency instead of appreciating it for that sample. In the first column the variables do not have the desired effects on the exchange rates. However in column 2 and in the robustness checks in columns 5 and 6 some variables have high explanatory power. Exchange rate overvaluation designates that the over-borrowing of the economic agents precedes the currency crises. The institutional quality shows that higher country riskiness leads to the depreciation of the currency. Additionally, a fall in the stock prices contributes to the currency crisis. The transparency of the central banking is crucial in stabilizing the exchange rates and the highly significant coefficient indicates that crisis can be caused by the non-transparent monetary policy, among other indicators. The interaction of monetary policy with the capital account openness is highly significant and positive throughout the table. The term points that the liberalized financial markets caused by mostly decreased regulations, deters the effect of the tight monetary policy leading to depreciation of the domestic currency following the crisis. The coefficient of the interaction term with the fiscal position represents that the fiscal deficit causes the tight monetary policy to weaken the currency instead of recovering it. The significance of the lagged exchange rates in columns 3 and 5 denotes a depreciated currency in the previous month leads to more depreciation in the current month. In columns 4 and 6, the coefficient of time trend shows that during first months of the crisis periods, the depreciation of the currency is much higher relative to the depreciation in the last months of the crisis period.

Table 2. Regression Results of the Emerging Economies with the Nominal Exchange Rates

Lagged Dependent Variable	1 ^a	2 ^b	3 ^a	4 ^a	5 ^b	6 ^b
			0.268***		0.322***	
			(0.067)		(0.092)	
Time Trend				-1.138*		-4.453***
				(0.534)		(1.269)
Monetary Policy	-1.137**	0.303**	-0.757*	-1.044**	0.330**	-0.049
	(0.410)	(0.112)	(0.402)	(0.409)	(0.133)	(0.115)
GDP	<i>0.017</i>	<i>0.365</i>	<i>0.008</i>	-0.150*	<i>0.349</i>	<i>0.238</i>
	(0.099)	(0.200)	(0.101)	(0.083)	(0.251)	(0.170)
Current Account	-0.328	-0.257	-0.213	-0.190	-0.006	<i>0.474</i>
	(0.227)	(0.446)	(0.206)	(0.230)	(0.426)	(0.365)
Exchange Rate Overvaluation	-0.440	-2.466***	-0.894	-0.792	-2.928***	-4.813***
	(0.553)	(0.257)	(0.670)	(0.672)	(0.739)	(0.339)
Debt to Total Assets	<i>-0.185</i>	<i>-0.108</i>	<i>-0.171</i>	<i>-0.013</i>	<i>-0.107</i>	1.324***
	(0.179)	(0.392)	(0.146)	(0.113)	(0.363)	(0.273)
Institutional Quality	-0.158	-1.141***	-0.175	-0.277	-1.071***	-1.985***
	(0.259)	(0.178)	(0.257)	(0.295)	(0.290)	(0.227)
Short Term External Debt	<i>-0.009</i>	<i>-0.024</i>	<i>-0.009</i>	<i>-0.042</i>	<i>-0.020</i>	<i>-0.121***</i>
	(0.036)	(0.067)	(0.036)	(0.049)	(0.076)	(0.015)
Capital Account Openness	<i>-0.003</i>	<i>-0.079***</i>	<i>-0.004</i>	0.015	<i>-0.070**</i>	<i>-0.024</i>
	(0.015)	(0.016)	(0.012)	(0.015)	(0.023)	(0.019)
Fiscal Position	-0.169	<i>0.495</i>	<i>0.021</i>	-0.011	<i>0.624*</i>	<i>1.509***</i>
	(0.248)	(0.305)	(0.273)	(0.253)	(0.272)	(0.291)
Stock Prices	-0.138	-0.201*	-0.136	-0.117	-0.223**	-0.262**
	(0.081)	(0.097)	(0.091)	(0.080)	(0.079)	(0.095)
Central Bank Transparency		-0.018***			-0.019**	-0.048***
		(0.004)			(0.006)	(0.006)
Initial Level of Spread	0.039	<i>-0.040</i>	0.030	0.027	<i>-0.053</i>	<i>-0.052</i>
	(0.034)	(0.094)	(0.025)	(0.034)	(0.083)	(0.049)
MP X GDP	<i>0.544**</i>	<i>1.359</i>	<i>0.234</i>	-0.027	<i>0.830</i>	<i>0.042</i>
	(0.229)	(1.812)	(0.292)	(0.341)	(1.563)	(1.367)
MP X Exch. Rate Overvaluation	<i>5.620***</i>		<i>4.860**</i>	<i>4.747***</i>		
	(1.595)		(1.659)	(1.506)		
MP X Debt to Total Assets	0.505		0.564	0.525		
	(0.285)		(0.342)	(0.327)		
MP X Institutional Quality	<i>1.458**</i>		<i>0.809</i>	<i>1.260**</i>		
	(0.507)		(0.491)	(0.483)		
MP X Short Term External Debt	<i>-0.216**</i>	0.173	<i>-0.192*</i>	<i>-0.296**</i>	0.262	<i>-0.911*</i>
	(0.092)	(0.201)	(0.095)	(0.110)	(0.440)	(0.454)
MP X Capital Account Openness	0.070**	0.074**	0.093***	0.065**	0.113**	0.110***
	(0.026)	(0.030)	(0.030)	(0.026)	(0.048)	(0.026)
MP X Fiscal Position	-1.568**	<i>1.648</i>	-1.477**	-2.037**	<i>1.433</i>	-4.488*
	(0.623)	(0.900)	(0.617)	(0.778)	(1.929)	(2.057)
MP X Stock Prices	-0.333	-1.373	-0.197	-0.380*	-1.235	-0.897
	(0.200)	(0.877)	(0.174)	(0.187)	(0.803)	(0.550)
MP X Central Bank Transparency		-0.037			-0.056	<i>0.005</i>
		(0.028)			(0.032)	(0.033)
R-Squared	0.187	0.351	0.249	0.268	0.440	0.577
Number of Observations	131	70	131	131	70	70

Notes: The interaction terms are represented as "MP X Episode-Specific Fundamental". The values in parenthesis represent the robust standard errors which are clustered by episode. The significance level of the variables are indicated by * (10%), ** (5%) and *** (1%). Counter intuitively-signed coefficients are represented in italics. (1%) significant coefficients having anticipated signs are represented in bold.

^a The interaction of monetary policy with current account position is discarded from the regression due to high multicollinearity.

^b The interaction of monetary policy with current account position, overvalued exchange rates, corporate short term debt, and institutional quality do not appear due to multicollinearity.

The regressions in Table 2 are carried out with using the real exchange rates as the dependent variable. The purpose of conducting these regressions is to find the effectiveness of the monetary policy, control variables and the interaction terms on the real exchange rates. The regression results are presented in Table A4 in Appendix A. The regressions perform similar to the ones with the nominal exchange rates, except that the negative coefficients of the monetary policy become insignificant, the influence of the current account deficit is significant leading to depreciation of the real exchange rates, fiscal position has more explanatory power. Regarding the interaction terms, the significance of the one with the fiscal position is lower and the significance of the one with the stock prices is higher. The interaction term with stock prices points that in case of a stock market crash, the tight monetary policy is ineffective in defending the domestic currency. The higher goodness of fit of the estimations with the real exchange rates represents that compared to the estimations with the nominal exchange rates; the model explains the movements of the real exchange rates better.

The effect of an increase in the interest rates can have a different impact on the advanced economies, since the vulnerabilities of the advanced economies are different than the emerging economies preceding and during a crisis period. In order to capture this difference, an analysis has been conducted with the advanced economy subsample. As in the case of emerging economies, the regressions and robustness checks are done with using nominal and real exchange rates. In the regressions with the advanced economy subsample, the interaction of monetary policy with institutional quality is not included since the term leads to multicollinearity.

Table 3 represents the regression results with the nominal exchange rates as the dependent variable. In column 1, the regression is done with the sample having the available data for GDP growth, current account position, the exchange rate overvaluation, debt to total assets, institutional quality, fiscal position and stock prices, the interaction terms of these variables with the monetary policy, and initial level of spread. Column 2 represents the regressions for the sample which has the available data for the capital account openness. The rest of the table shows the robustness checks of the estimations in columns 1 and 2. The robustness checks of the regression in column 1 are represented in columns 3 and 4. Columns 5 and 6 represent the sensitivity analyses of the second regression of Table 3. The robustness checks are conducted with the inclusion of the lagged exchange rates and time trend, respectively.

Table 3. Regression Results of the Advanced Economies with the Nominal Exchange Rates

Lagged Dependent Variable	1	2 ^a	3	4	5 ^a	6 ^a
			0.356** (0.060)		0.363** (0.094)	
Time Trend				-0.109* (0.044)		-0.108 (0.050)
Monetary Policy	-0.139*** (0.021)	-0.721* (0.246)	-0.110*** (0.018)	-0.141*** (0.013)	-0.488* (0.175)	-0.695** (0.137)
GDP	-0.122 (0.066)	-0.419 (0.343)	-0.141** (0.030)	-0.311* (0.115)	-0.259 (0.177)	-0.481 (0.227)
Current Account	-0.118 (0.356)	-0.134 (0.136)	-0.101 (0.238)	<i>0.049</i> (0.280)	-0.058 (0.087)	-0.017 (0.072)
Exchange Rate Overvaluation	-0.432 (0.325)	<i>0.532*</i> (0.206)	-0.857*** (0.134)	-0.304 (0.211)	<i>0.030</i> (0.298)	<i>0.625***</i> (0.071)
Debt to Total Assets	<i>-0.149</i> (0.158)	<i>0.731</i> (0.516)	<i>-0.254**</i> (0.065)	<i>-0.264*</i> (0.096)	<i>0.346</i> (0.293)	<i>0.388*</i> (0.148)
Institutional Quality	-0.355 (0.283)		-0.346** (0.102)	-0.461 (0.208)		
Capital Account Openness		0.020 (0.018)			0.024 (0.011)	0.034 (0.018)
Fiscal Position	<i>0.516</i> (0.242)		<i>0.444*</i> (0.177)	<i>0.188</i> (0.147)		
Stock Prices	<i>0.201**</i> (0.050)	<i>0.029</i> (0.075)	<i>0.134</i> (0.081)	<i>0.190**</i> (0.040)	<i>0.003</i> (0.041)	<i>0.024</i> (0.085)
Initial Level of Spread	0.172 (0.356)	1.164 (0.619)	0.001 (0.167)	0.061 (0.348)	0.632 (0.361)	0.792** (0.165)
MP X GDP	<i>0.791**</i> (0.215)	-0.314 (0.262)	<i>0.756***</i> (0.082)	<i>0.633***</i> (0.104)	-0.068 (0.158)	-0.278* (0.110)
MP X Current Account	-0.285* (0.119)		-0.475*** (0.052)	-0.085 (0.111)		
MP X Exchange Rate Overvaluation	<i>1.739</i> (1.465)	<i>0.564*</i> (0.198)	<i>2.096*</i> (0.831)	<i>0.712</i> (0.969)	<i>0.976***</i> (0.132)	<i>0.377</i> (0.300)
MP X Debt to Total Assets		0.293 (0.698)			-0.183 (0.418)	0.215 (0.314)
MP X Capital Account Openness		0.253*** (0.035)			0.230*** (0.028)	0.254*** (0.033)
MP X Fiscal Position	-4.165* (1.498)		-3.933*** (0.397)	-4.477** (1.337)		
MP X Stock Prices	-0.008 (0.061)	-0.033 (0.028)	<i>0.046</i> (0.050)	<i>0.009</i> (0.066)	-0.043 (0.020)	-0.036 (0.035)
R-Squared	0.222	0.284	0.332	0.251	0.379	0.322
Number of Observations	72	62	72	72	62	62

Note: The interaction terms are represented as "MP X Episode-Specific Fundamental". The values in parenthesis represent the robust standard errors which are clustered by episode. The significance level of the variables are indicated by * (10%), ** (5%) and *** (1%). Counter intuitively-signed coefficients are represented in italics. (1%) significant coefficients having anticipated signs are represented in bold.

^a The variables institutional quality and fiscal position and the interaction of the monetary policy with the fiscal position and current account position are excluded due to high multicollinearity.

The estimation results in Table 3 represent highly significant and negative monetary policy coefficient indicating that for the advanced economies the boost in the policy interest rates reaches success in stabilizing the exchange rates following the crisis. GDP growth enters significant in the robustness checks in columns 3 and 4, indicating the slowdown of the GDP growth precedes the crises. Overvalued real exchange rates and institutional quality explains the movements in the exchange rates in column 3, meaning crisis happens in the economies with

appreciated real exchange rates and higher country risk. The interaction terms with the current account position and with the fiscal position show that the deterioration of current account and the fiscal position worsens the monetary policy's effect on the exchange rate. The interaction of the monetary policy with capital account openness enters with a 1% significant and positive coefficient, meaning in an open economy the tight monetary policy leads to the flight of capital from the country leading to a depreciation of the currency in the aftermath of the crisis.

The regressions in Table 3 are re-conducted with using the real exchange rates. The regression results can be seen in Table A5 in Appendix A. The results are similar to the ones with the nominal exchange rates; monetary policy enters highly significant and negative defending the currency in the crisis periods and the rest of the variables have similar coefficients as in the estimations with the nominal exchange rates.

4. System Generalized Method of Moments Estimation

The results of the pooled OLS regressions can be biased, because monetary policy is possibly endogenous to the fundamentals used in the regressions. This part of the study uses "System Generalized Method of Moments Estimation" introduced by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). As pointed out by Roodman (2006), this estimation method is aimed for panels having fewer time periods compared to many individuals, linear functional relationship, a single dependent variable which is dynamic and depends on its past values, no exogenous independent variables and fixed individual effects. The method used in this study is constructed following Eijffinger and Goderis (2008); the right-hand variables are instrumented with the lags of their levels and in the levels with the lags of their own differences. Sargan test might encounter an over-fitting problem, because number of columns in the instrument matrix can be very high. In order to overcome this problem, only one lag of the instruments is used and the other lags are removed. Additionally, to limit the number of instruments, for every regressor and lag distance one instrument is created. This method is used for the regressions with the lagged dependent variable for the emerging and advanced economies.

Table 4 provides the System GMM estimation results of the emerging economy subsample for the regressions in Table 2 and A4. The first column shows the regression results with the nominal exchange rates in column 3 of Table 2 and the second regression in Table 4 is the same regression with using the real exchange rates as the dependent variable (column 3 of Table A4). Third column in Table 4 is the System GMM estimation of the regression in column 5 of Table 2 and the last regression is the System GMM estimation of the same regression with the real exchange rates as the dependent variable (column 5 of Table A4).

Table 4. System GMM Estimation Results for the Emerging Economy Subsample

	1	2	3 ^a	4 ^a
Lagged Dependent Variable	0.269*** (0.058)	0.244*** (0.041)	0.401** (0.168)	0.314* (0.171)
Monetary Policy	-0.909 (0.809)	-0.971 (0.609)	0.764** (0.363)	0.680** (0.340)
GDP	<i>0.137</i> (0.292)	<i>0.137</i> (0.252)	<i>1.494</i> (1.286)	<i>1.856</i> (1.171)
Current Account	-0.091 (0.445)	-0.245 (0.344)	<i>0.505</i> (2.127)	<i>0.004</i> (1.990)
Exchange Rate Overvaluation	-2.028 (1.230)	-1.806* (1.075)	-3.415 (2.369)	-3.142 (2.187)
Debt to Total Assets	<i>-0.760***</i> (0.271)	<i>-0.856***</i> (0.146)	0.559 (0.747)	0.932 (0.700)
Institutional Quality	-0.182 (0.551)	<i>0.017</i> (0.474)	-1.065 (0.786)	-0.957 (0.730)
Short Term External Debt	0.146 (0.129)	0.445*** (0.127)	<i>-0.200</i> (0.202)	<i>-0.109</i> (0.184)
Capital Account Openness	<i>-0.096***</i> (0.025)	<i>-0.094***</i> (0.016)	<i>-0.122</i> (0.082)	<i>-0.145**</i> (0.078)
Fiscal Position	<i>1.151**</i> (0.535)	-0.063 (0.663)	<i>1.129</i> (1.034)	-0.374 (1.101)
Stock Prices	-0.115 (0.080)	-0.113 (0.077)	-0.681** (0.268)	-0.648** (0.278)
Central Bank Transparency			-0.011 (0.037)	-0.016 (0.036)
Initial Level of Spread	0.012 (0.046)	0.008 (0.032)	0.059 (0.073)	0.045 (0.072)
MP X GDP	-0.192 (0.574)	<i>0.091</i> (0.366)	<i>2.601</i> (2.735)	<i>2.352</i> (2.434)
MP X Exchange Rate Overvaluation	5.035 (3.442)	<i>5.443**</i> (2.590)		
MP X Debt to Total Assets	1.097*** (0.351)	1.016*** (0.295)		
MP X Institutional Quality	<i>0.847</i> (1.048)	<i>0.976</i> (0.777)		
MP X Short Term External Debt	<i>-0.167</i> (0.193)	<i>-0.245**</i> (0.100)	1.036 (1.035)	0.799 (0.903)
MP X Capital Account Openness	0.078 (0.053)	0.095*** (0.035)	<i>-0.008</i> (0.052)	0.014 (0.053)
MP X Fiscal Position	-1.104 (1.499)	-1.500 (0.934)	<i>5.613</i> (4.431)	<i>4.587</i> (3.953)
MP X Stock Prices	-0.079 (0.157)	-0.123 (0.131)	-0.796 (0.576)	-0.848* (0.476)
MP X Central Bank Transparency			-0.147* (0.078)	-0.125* (0.071)
Number of Observations	131	131	70	70
Number of Instruments	41	41	35	35
Sargan Test P-Value	0.969	0.987	0.625	0.557
AR (1)	-1.29	-1.34	-1.32	-1.23
AR (2)	0.35	0.12	0.79	0.63

Notes: Dependent variables in Columns (1) and (3) are the nominal exchange rates and in Columns (2) and (4) are the real exchange rates. Following Eijffinger & Goderis (2008), forward orthogonal deviation transformation is used to eliminate fixed effects. The interaction terms are represented as "MP X Episode-Specific Fundamental". The values in parenthesis represent the robust standard errors which are clustered by episode. The significance level of the variables are indicated by * (10%), ** (5%) and *** (1%). Counter intuitively-signed coefficients are represented in italics. (1%) significant coefficients having anticipated signs are represented in bold.

^a The instruments for fiscal position, stock prices and central bank transparency are not created in the orthogonal deviations equation since they cause Sargan test to reject the null of instrumental validity.

In the first two regressions, monetary policy does not enter significantly both for the nominal and the real exchange rates. It can be observed that lagged exchange rates have strong explanatory power for the dependent variable. Short-term external debt and overvalued real exchange rates explain the depreciation of the real exchange rates. The interaction of the monetary policy and corporate short term debt indicate that tight monetary policy depreciates the currency of the economy with high domestic short term debt. Furthermore, the interaction term with the capital account openness indicates that increased openness of capital accounts causes monetary policy to be ineffective in stabilizing the real exchange rates. In the second half of Table 4, monetary policy has significant and positive coefficient, proving the findings of the pooled OLS results. In these analyses, different from the pooled OLS results, the overvalued exchange rates, central bank transparency and institutional quality do not have significance. The fall in the stock prices precedes the currency crash as in the results of the pooled OLS regressions. The significant interaction of the monetary policy with the central bank transparency specifies that the economy having more transparent central banking has a relatively more successful monetary policy in stabilizing the exchange rates. The p-values of the Sargan tests for the estimations in Table 4 are insignificant indicating that the population moment conditions are valid. However, the p-values in the first two estimations are close to 1.000 which could mean that the models have over-fitting problem. The tests for correlation, AR (1) and AR (2) are both not significant for the regressions in Table 4 leading to the conclusion that the models and instruments are acceptable.

The System GMM estimation results for the advanced economy subsample are presented in Table 5. The first column provides the estimation results with the nominal exchange rates in column 3 of Table 3 and the second regression in Table 5 is the same regression equation with using the real exchange rates as the dependent variable (column 3 of Table A5). Third regression in Table 5 is the System GMM estimation of the regression in column 5 of Table 3 and the last regression is the System GMM estimation of column 3 with real exchange rates as the dependent variable (column 5 of Table A5).

Table 5. System GMM Estimation Results for the Advanced Economy Subsample

	1	2	3	4
Lagged Dependent Variable	0.351*** (0.037)	0.358*** (0.041)	0.309*** (0.047)	0.288*** (0.053)
Monetary Policy	-0.106*** (0.013)	-0.089*** (0.013)	-0.353*** (0.107)	-0.284** (0.117)
GDP	-0.118*** (0.016)	-0.101*** (0.012)	-0.033* (0.020)	-0.040* (0.022)
Current Account	<i>0.004</i> (0.216)	-0.053 (0.247)	<i>0.063</i> (0.104)	<i>0.012</i> (0.110)
Exchange Rate Overvaluation	-0.876*** (0.110)	-0.991*** (0.116)	<i>0.217*</i> (0.113)	<i>0.144</i> (0.155)
Debt to Total Assets	-0.179** (0.076)	-0.108 (0.089)	0.186** (0.081)	0.216*** (0.042)
Institutional Quality	-0.264*** (0.074)	-0.257*** (0.064)		
Capital Account Openness			0.072 (0.107)	0.051 (0.084)
Fiscal Position	<i>0.649***</i> (0.196)	<i>0.631***</i> (0.178)		
Stock Prices	<i>0.143*</i> (0.078)	<i>0.134*</i> (0.080)	-0.007 (0.034)	<i>0.002</i> (0.038)
Initial Level of Spread	-0.102 (0.119)	-0.170* (0.088)	0.183*** (0.051)	0.172 (0.112)
MP X GDP	<i>0.678***</i> (0.123)	<i>0.517***</i> (0.081)	<i>0.156</i> (0.096)	<i>0.110</i> (0.102)
MP X Current Account	-0.499*** (0.163)	-0.356*** (0.134)	<i>0.028</i> (0.020)	<i>0.040*</i> (0.021)
MP X Exchange Rate Overvaluation	<i>1.969*</i> (1.018)	<i>1.429*</i> (0.857)	<i>0.759***</i> (0.106)	<i>0.793***</i> (0.177)
MP X Debt to Total Assets			-0.760*** (0.186)	-0.585*** (0.190)
MP X Capital Account Openness			0.262*** (0.017)	0.207*** (0.020)
MP X Fiscal Position	-4.511*** (0.927)	-3.908*** (0.880)		
MP X Stock Prices	<i>0.048</i> (0.043)	<i>0.065*</i> (0.036)	-0.030 (0.021)	-0.038 (0.024)
Number of Observations	72	72	62	62
Number of Instruments	31	31	30	30
Sargan Test P-Value	0.791	0.849	0.765	0.579
AR (1)	-1.34	-1.32	-1.35	-1.37
AR (2)	-1.26	-1.37	0.40	0.28

Notes: Dependent variables in Columns (1) and (3) are the nominal exchange rates and in Columns (2) and (4) are the real exchange rates Following Eijffinger & Goderis (2008), forward orthogonal deviation transformation is used to eliminate fixed effects. The interaction terms are represented as "MP X Episode-Specific Fundamental". The values in parenthesis represent the robust standard errors which are clustered by episode. The significance level of the variables are indicated by * (10%), ** (5%) and *** (1%). Counter intuitively-signed coefficients are represented in italics. (1%) significant coefficients having anticipated signs are represented in bold.

Confirming the OLS results the estimation results represent highly significant and negative monetary policy. The coefficient of the lagged dependent variable again is positive and significant. The similar results appear in the pooled OLS regression representing the robustness of the estimation results. GDP growth, appreciated real exchange rates and institutional quality play

important role in the currency crises in advanced economies, indicated by the highly significant coefficients of these variables in the first two columns. The significance of the interaction with the current account position and fiscal position confirms the OLS results. The last two columns of Table 5 represent the System GMM results of the regressions with the inclusion of capital account openness. The variable debt to total assets is significant and positive in both regressions. Additionally, the coefficient of GDP growth enters 10% significant with the correct sign. In both regressions, the interaction term with capital account openness enters highly significant and positive, as in the pooled OLS regressions. The other terms in the regressions of Table 5 do not have the anticipated effects on the exchange rates. The p-values of the Sargan tests in the estimations show that the instruments are acceptable. The tests for correlation for the estimations are insignificant. Thus there are no misspecifications in the models.

5. Conclusion

This paper has studied the effectiveness of the monetary policy following currency crises. In this context, the underlying causes of the crises have been studied and the effectiveness of the monetary policy responses according to the various economic vulnerabilities is addressed. The paper contributes to the literature by conducting separate analyses on the emerging and advanced economies with pointing out the disparities of the economic weaknesses between two groups of economies.

The study concludes that for the advanced economies, tight monetary policy is effective on the exchange rate stabilization. However, for the emerging economies, the boost in the interest rates further worsens the domestic currency. In general, for both emerging and advanced economies, the appreciated real exchange rates and the institutional quality invite the currency crisis possibility, having stronger effect on the emerging economies. Since in the pegged exchange rate regime, applied by most of the emerging economies in the sample, the over-borrowing behavior of agents reflects itself in the misaligned exchange rates and since most of the emerging economies have high country risk, these results are justifiable. Emerging economies suffer from the worsening of the current account position, high fiscal deficit, a burst in the stock prices and low central bank transparency prior to the crisis. In the aftermath of the crisis, for the emerging economies the monetary policy negatively influence the exchange rates if the private sector suffers from high domestic short term debt, the financial markets are liberalized, government engages in elevated deficit levels and the monetary policy has lower transparency. For the advanced economies; however, other than the overvalued real exchange rates and country riskiness, the major cause of the crises is the slowdown in the GDP growth rate, an indicator of the second generation crisis models. The tight monetary policy in these economies is more effective if the economies do not suffer from current account deficits, higher exposure to international

markets and fiscal deficits. The analyses enlighten the unclear results regarding the empirical research on this area by underlining that the tight monetary policy's ineffectiveness in exchange rate stabilization is an emerging economy problem and that the transparency of central banking and the influence of the increased interest rates on the indebtedness and the riskiness of the country are important determinants of the effectiveness of the monetary policy. In that sense, the analyses in this study support the recent theoretical considerations regarding the contrarian view of the interest rate response on the exchange rates.

The results of this study give point to some policy implications. One recipe does not work for all patients: a boost in the interest rates does not promise recovery for every crashed currency and economy. The economic vulnerabilities should be taken into account in designing the monetary policy. If the third generation indicators cause the crisis, the expansionary monetary policy strengthens the corporate and financial sectors' balance sheets and accelerates the economic recovery. For the emerging economies currency is more emotional to the perception of the foreigners. Especially high country risk jeopardizes the financing of the debts of the financial system and the corporate sector. Therefore easy reach to the external funding is crucial. In preventing third generation type crises, stronger financial institutions and a gradual liberalization of the financial system are vital. Flexible exchange rate management is essential for successful monetary policy implementation. In order to reduce the quick debt growth and the asset-liability mismatches of the private sector, precautions have to be taken.

In most of the first and second generation crises, if a strong financial system and private sector exist, tightening the monetary policy is successful in balancing the exchange rates. In preventing the first generation crises, focusing on a tighter fiscal policy, running a balanced budget is a preferred strategy. Although in the short run this policy suppresses economic activity, in the long run it does not impair growth potential of the output. As for the second generation crisis, the prevention of the crisis can be through reliable policies to prevent the currency from the attack of the speculators. In these types of crises, the market perception of the domestic policies is much more crucial than the policy makers' intentions. Thus even the policy implemented by the central bank is the correct policy, speculative attack can still occur. Krugman (1997:14-15) states that "the only absolutely sure-fire way not to have one's currency speculated against, however is not to have an independent currency. True monetary union is one answer to the problem of currency crisis."

Appendix A: Tables and Estimation Results

Table A1. Crisis Episodes

Country	Period	Episode
Argentina	2002:01 - 2002:10	1
Brazil	1999:01 - 1999:05	2
	2002:10 - 2003:12	3
	2008:09 - 2009:05	4
Chile	2008:10 - 2009:03	5
China	1994:01 - 1994:11	6
Colombia	2008:10 - 2009:05	7
India	1991:07 - 1991:12	8
Indonesia	1986:09 - 1989:02	9
	1997:08 - 1999:06	10
	2008:11 - 2009:04	11
Korea	1997:11 - 1998:07	12
	2008:10 - 2009:04	13
Malaysia	1997:12 - 1998:09	14
Mexico	1994:12 - 1996:08	15
	1998:09 - 1999:04	16
	2008:10 - 2009:05	17
Philippines	1997:09 - 1997:12	18
Russia	1998:09 - 1998:11	19
	2009:01 - 2009:04	20
Thailand	1997:07 - 1998:07	21
Turkey	2001:02 - 2001:06	22
	2008:10 - 2009:01	23
Venezuela	1995:12 - 1996:06	24
	2002:02 - 2003:07	25
Australia	2007:10 - 2009:05	26
Canada	2008:10 - 2009:04	27
Germany	1991:04 - 1994:09	28
Euro Area	2008:10 - 2009:05	29
New Zealand	2008:08 - 2009:02	30
Japan	1991:03 - 1993:09	31
Sweden	1991:03 - 1991:06	32
Switzerland	1991:07 - 1994:03	33
UK	1992:10 - 1992:12	34
	2008:08 - 2009:01	35

Note: Korea 2000 is not included, since the difference $s_{i,t}^{\max} - \bar{s}_{i,t}$ does not exceed three percentage points.

Table A2. Money Market Interest Rates

Country	Money Market Interest Rates	Source
Argentina	Interbank 7 Day-Middle Rate	Datastream
Australia	Cash Rate Call-Middle Rate	Datastream
Brazil	Financing Overnight-Middle Rate	Datastream
Canada	Bank Rate as Wed-Middle Rate	Datastream
Chile	DISCTB Promissory Notes-90 Day-Middle Rate	Datastream
China ^a	Bank Rate (Monthly, End of Month)	IFS
Colombia	Interbank Overnight-Middle Rate	Datastream
Euro Area	EURIBOR 3 Month-Offered Rate	Datastream
Germany	Lombard-Middle Rate	Datastream
Japan	Uncollateralized Call-Middle Rate	Datastream
India	Call Money-Middle Rate	Datastream
Indonesia	SBI 90 Day-Middle Rate	Datastream
Korea	Call Overnight-Middle Rate	Datastream
Malaysia	Base Lending-Middle Rate	Datastream
Mexico, Episode 15	Cetes 28 Day Min. Auction-Middle Rate	Datastream
Mexico, Episode 16&17	Cetes 28 Day Avrg. Auction-Middle Rate	Datastream
New Zealand	Official Cash Rate-Middle Rate	Datastream
Philippines	Interbank Call Loan Rate-Middle Rate	Datastream
Russia	Discount (Refinancing)-Middle Rate	Datastream
Sweden	Repo-Middle Rate	Datastream
Switzerland	Three Month Libor (SNB) - Middle Rate	Datastream
Thailand	Repo 14 Day-Middle Rate	Datastream
Turkey	Interbank Overnight Average-Middle Rate	Datastream
Venezuela ^a	Discount Rate (Monthly, End of Month)	IFS
United Kingdom	Base Rate	Datastream
United States	Federal Funds Rate (Monthly)	IFS

Identification: Taken from Goderis & Iannidou (2008) except for Australia, Chile, China, Euro Area, Germany, India, Japan, Malaysia, New Zealand and Switzerland. The listed economies' money market interest rates are taken from the Central Bank websites. The US Federal Funds Rates are used as foreign monetary policy.

^aFor these economies the spreads of interest rates are taken using monthly interest rate data.

Table A3. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Nominal Exchange rates	340	0.021	0.097	-0.236	0.968
Real Exchange Rates	317	0.024	0.130	-0.232	0.845
Monetary Policy	340	0.024	0.769	-4.500	8.927
GDP	340	0.048	0.086	-0.199	0.310
Current Account	340	0.034	0.074	-0.347	0.334
Exchange Rate Overvaluation	308	0.019	0.027	-0.038	0.141
Debt to Total Assets	312	0.276	0.100	0.039	0.448
Institutional Quality	266	0.686	0.159	0.410	0.915
Short Term External Debt	176	0.206	0.258	0.015	1.286
Capital Account Openness	237	1.168	1.345	-1.131	2.532
Fiscal Position	260	-0.021	0.057	-0.367	0.080
Stock Prices	297	0.006	0.139	-0.559	1.352
Central Bank Transparency	71	4.746	2.432	1.500	9.000
Initial Level of Spread	340	0.158	0.385	-0.006	4.604

Table A4. Regression Results of the Emerging Economies with the Real Exchange Rates

Lagged Dependent Variable	1 ^a	2 ^b	3 ^a	4 ^a	5 ^b	6 ^b
			0.320***		0.269**	
			(0.065)		(0.096)	
Time Trend				-0.804		-3.610**
				(0.672)		(1.383)
Monetary Policy	-0.624	0.217**	-0.288	-0.558	0.267*	-0.069
	(0.385)	(0.092)	(0.372)	(0.367)	(0.130)	(0.110)
GDP	-0.078	<i>0.678**</i>	-0.067	-0.197	<i>0.590**</i>	<i>0.575***</i>
	(0.134)	(0.212)	(0.121)	(0.112)	(0.242)	(0.167)
Current Account	-0.724**	-0.770*	-0.484**	-0.627**	-0.450	-0.177
	(0.250)	(0.403)	(0.201)	(0.265)	(0.426)	(0.378)
Exchange Rate Overvaluation	-0.083	-2.405***	-0.671	-0.331	-2.701***	-4.308***
	(0.791)	(0.328)	(0.806)	(0.964)	(0.711)	(0.603)
Debt to Total Assets	<i>-0.120</i>	0.182	<i>-0.118</i>	0.002	0.123	1.343***
	(0.166)	(0.377)	(0.127)	(0.121)	(0.363)	(0.302)
Institutional Quality	-0.003	-1.047***	-0.055	-0.086	-0.984***	-1.732***
	(0.328)	(0.200)	(0.299)	(0.389)	(0.279)	(0.329)
Short Term External Debt	0.176*	0.024	0.131*	0.153	0.017	<i>-0.055**</i>
	(0.090)	(0.062)	(0.073)	(0.100)	(0.070)	(0.023)
Capital Account Openness	<i>-0.017</i>	<i>-0.110***</i>	<i>-0.015</i>	<i>-0.005</i>	<i>-0.094***</i>	<i>-0.066***</i>
	(0.018)	(0.013)	(0.015)	(0.021)	(0.017)	(0.017)
Fiscal Position	-0.962*	-1.228***	-0.555	-0.851	-0.793**	-0.407
	(0.497)	(0.271)	(0.424)	(0.566)	(0.311)	(0.361)
Stock Prices	-0.162*	-0.174**	-0.152	-0.147	-0.200**	-0.224**
	(0.091)	(0.072)	(0.100)	(0.090)	(0.071)	(0.087)
Central Bank Transparency		-0.012**			-0.014*	-0.036***
		(0.005)			(0.007)	(0.009)
Initial Level of Spread	0.055*	<i>-0.052</i>	0.041*	0.047	<i>-0.056</i>	<i>-0.061</i>
	(0.028)	(0.088)	(0.020)	(0.031)	(0.078)	(0.049)
MP X GDP	<i>0.088</i>	<i>0.503</i>	-0.188	-0.315	<i>0.274</i>	-0.565
	(0.303)	(1.576)	(0.306)	(0.535)	(1.437)	(1.163)
MP X Exchange Rate Overvaluation	<i>3.837**</i>		<i>3.437**</i>	<i>3.220**</i>		
	(1.515)		(1.578)	1.283		
MP X Debt to Total Assets	0.367		0.470	0.381		
	(0.301)		(0.345)	(0.356)		
MP X Institutional Quality	<i>0.731</i>		<i>0.119</i>	<i>0.591</i>		
	(0.474)		(0.446)	(0.439)		
MP X Short Term External Debt	<i>-0.074</i>	0.037	<i>-0.078</i>	<i>-0.131</i>	0.132	<i>-0.842</i>
	(0.069)	(0.176)	(0.075)	(0.094)	(0.396)	(0.477)
MP X Capital Account Openness	0.054*	0.120***	0.085***	0.050*	0.138**	0.150***
	(0.025)	(0.027)	(0.027)	(0.024)	(0.042)	(0.025)
MP X Fiscal Position	-0.627	<i>0.691</i>	-0.718	-0.958	<i>0.723</i>	<i>-4.283*</i>
	(0.572)	(0.764)	(0.549)	(0.746)	(1.764)	(2.276)
MP X Stock Prices	-0.331*	-1.305	-0.166	-0.364*	-1.181	-0.919*
	(0.176)	(0.783)	(0.176)	(0.176)	(0.720)	(0.481)
MP X Central Bank Transparency		-0.022			-0.043	<i>0.012</i>
		(0.023)			(0.031)	(0.027)
R-Squared	0.404	0.658	0.469	0.434	0.694	0.754
Number of Observations	131	70	131	131	70	70

Notes: The interaction terms are represented as "MP X Episode-Specific Fundamental". The values in parenthesis represent the robust standard errors which are clustered by episode. The significance level of the variables are indicated by * (10%), ** (5%) and *** (1%). Counter intuitively-signed coefficients are represented in italics. (1%) significant coefficients having anticipated signs are represented in bold.

^a The interaction of monetary policy with current account position is discarded from the regression due to high multicollinearity.

^b The interaction of monetary policy with current account position, overvalued exchange rates, corporate short term debt, and institutional quality do not appear due to multicollinearity.

Table A5. Regression Results of the Advanced Economies with the Real Exchange Rates

Lagged Dependent Variable	1	2 ^a	3	4	5 ^a	6 ^a
			0.360***		0.354**	
			(0.059)		(0.110)	
Time Trend				-0.105		-0.103
				(0.048)		(0.050)
Monetary Policy	-0.119***	-0.673*	-0.094**	-0.121***	-0.420	-0.649**
	(0.019)	(0.245)	(0.019)	(0.013)	(0.188)	(0.142)
GDP	-0.109	-0.406	-0.127**	-0.292	-0.258	-0.465
	(0.069)	(0.357)	(0.028)	(0.124)	(0.189)	(0.255)
Current Account	-0.170	-0.174	-0.160	-0.009	-0.104	-0.062
	(0.382)	(0.137)	(0.257)	(0.319)	(0.087)	(0.079)
Exchange Rate Overvaluation	-0.546	<i>0.448</i>	-0.920***	-0.421	-0.033	<i>0.537**</i>
	(0.303)	(0.245)	(0.128)	(0.196)	(0.331)	(0.114)
Debt to Total Assets	<i>-0.094</i>	0.742	<i>-0.199*</i>	<i>-0.205</i>	0.375	0.415
	(0.148)	(0.537)	(0.079)	(0.093)	(0.320)	(0.205)
Institutional Quality	-0.342		-0.338**	-0.445		
	(0.292)		(0.105)	(0.219)		
Capital Account Openness		0.018			0.021	0.032
		(0.019)			(0.011)	(0.020)
Fiscal Position	<i>0.476</i>		<i>0.396</i>	<i>0.159</i>		
	(0.242)		(0.180)	(0.150)		
Stock Prices	<i>0.196**</i>	<i>0.022</i>	<i>0.127</i>	<i>0.185**</i>	<i>0.002</i>	<i>0.018</i>
	(0.049)	(0.084)	(0.081)	(0.042)	(0.047)	(0.093)
Initial Level of Spread	0.118	1.105	<i>-0.044</i>	0.011	0.598	0.749**
	(0.322)	(0.653)	(0.143)	(0.311)	(0.406)	(0.232)
MP X GDP	<i>0.585**</i>	<i>-0.372*</i>	<i>0.586**</i>	<i>0.432**</i>	-0.119	-0.337*
	(0.175)	(0.256)	(0.101)	(0.121)	(0.161)	(0.113)
MP X Current Account	-0.102		-0.313**	<i>0.091</i>		
	(0.110)		(0.080)	(0.175)		
MP X Exchange Rate Overvaluation	<i>0.930</i>	<i>0.620**</i>	<i>1.519</i>	-0.063	<i>1.123***</i>	<i>0.441</i>
	(1.280)	(0.313)	(0.639)	(0.937)	(0.170)	(0.433)
MP X Debt to Total Assets		0.470			<i>-0.021</i>	0.396
		(0.679)			(0.412)	(0.320)
MP X Capital Account Openness		0.208**			0.179**	0.209**
		(0.039)			(0.032)	(0.037)
MP X Fiscal Position	-3.476*		-3.342***	-3.778*		
	(1.379)		(0.437)	(1.205)		
MP X Stock Prices	<i>0.009</i>	-0.045	<i>0.057</i>	<i>0.025</i>	-0.053*	-0.047
	(0.060)	(0.032)	(0.047)	(0.065)	(0.022)	(0.038)
R-Squared	0.211	0.273	0.323	0.239	0.364	0.308
Number of Observations	72	62	72	72	62	62

Note: The interaction terms are represented as "MP X Episode-Specific Fundamental". The values in parenthesis represent the robust standard errors which are clustered by episode. The significance level of the variables are indicated by * (10%), ** (5%) and *** (1%). Counter intuitively-signed coefficients are represented in italics. (1%) significant coefficients having anticipated signs are represented in bold.

^a The variables institutional quality and fiscal position and the interaction of the monetary policy with the fiscal position and current account position are excluded due to high multicollinearity.

Appendix B: Data Description and Sources

1. Change in the Nominal Exchange Rate: The monthly percentage change of the domestic currency price of the US Dollar, lagged by one month. Source: IFS, line rf.
2. Change in the Real Exchange Rate: The monthly percentage change in the price adjusted exchange rates (domestic currency per US Dollar) based on the purchasing power parity, lagged by one month. Source: IFS, lines rf and 64.
3. Change in the Monetary Policy: The monthly averages of the daily money market interest rates are taken as spreads over the US Federal Funds Rate; the percentage changes are taken in the spreads and lagged by one month. Source: Datastream and IFS.
4. GDP Growth: The growth rate of the previous year's GDP per capita from the average of the five years preceding it. Source: World Bank, World Development Indicators (WDI).
5. Exchange Rate Overvaluation: The average growth rate of an economy's real exchange rate against the US Dollar for the 12 months prior to the crisis. Source: IFS, lines rf and 64.
6. Current Account Position: The difference between an economy's exports and imports, converted into US Dollars and divided by non-gold reserves, lagged by one month, levels. Source: IFS, lines 70.D, 71.D, rf and 1LD.
7. Ratio of Domestic Short Term Debt to Total Assets: The average of the sum of the individual debt to assets ratios per firm in the market, one year prior to the crisis, levels. Source: Thomson Financial Worldscope Database via Datastream.
8. Institutional Quality: PRS (Political Risk Services) International Country Risk Guide (ICRG) rating constructed by taking account the economies' political, financial and economic conditions and assigning a rating between 0 and 100, where 100 indicates the highest quality. Source: Political Risk Services (PRS) Group.
9. Short-term External Debt Position: Short term external debt consists of international claims of the Bank of International Settlement on cross-border banking claims which have maturity of one year or less, including both private and public debt. The yearly ratios of short-term external debt of the economy to the non-gold reserves in the year before the crisis, levels. Source: World Bank, World Development Indicators (short-term external debt) and IFS, line 1.L.D (non-gold reserves).
10. Stock Prices: The monthly changes in the stock price index, lagged by one month. Source: IFS line 62.
11. Fiscal Position: The ratio of the fiscal position to CPI is divided by the GDP of the economy, one year before the crisis period, levels. Source: IFS Annual, lines ccscd, 64 and 99.b.
12. Capital Account Openness Index: The yearly index is constructed by taking the information from IMF's Annual Report on Exchange Arrangements and Exchange Restrictions about exchange rates, current account transactions, capital account restrictions and the requirement of the surrender of export proceeds by Menzie Chinn and Hiro Ito (Chinn and Ito, 2006). Source: Updated version for 2007 (25.03.2009) taken from: <http://web.pdx.edu/~ito/>
13. Central Bank Transparency: The Transparency of the Monetary Policy Index is developed by Eijffinger and Geraats (2006) focusing on the political, economic, procedural and operational features of central banks. The study has available data for the advanced economies. The data for the emerging economies is taken from Dincer and Eichengreen (2009).

References

- Arellano, M. and Bond, S. (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies*, 58: 277-97.
- Arellano, M and Bover, O. (1995), "Another Look at the Instrumental-variable Estimation of Error-components Models." *Journal of Econometrics*, 68: 29-52.
- Blundell, R. and Bond, S. (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics* 87: 115-43.
- Burnside, C., Eichenbaum, M., Rebelo, S. (2007), "Currency Crisis Models." *The New Palgrave: A Dictionary of Economics*, 2nd Edition. Palgrave Macmillan Publishers.
- Chang, R. and Velasco, A. (1999), "Liquidity Crises in Emerging Markets: Theory and Policy." NBER Working Paper 7272. Cambridge, MA: National Bureau of Economic Research.
- Chinn, M. D. and Ito, H. (2006), "What Matters for Financial Development? Capital Controls, Institutions, and Interactions." *Journal of Development Economics*, 81: 163-92.
- Corsetti, G., Pesenti, P., and Roubini, N. (1998), "Paper Tigers? A Model of the Asian Crisis." NBER Working Papers 6783. Cambridge, MA: National Bureau of Economic Research.
- Dincer, N. and Eichengreen, B. (2009), "Central Bank Transparency: Causes, Consequences and Updates." NBER Working Papers 14791. Cambridge, MA: National Bureau of Economic Research.
- Eijffinger, S.C.W. and Geraats, P. M. (2006), "How Transparent are Central Banks?" *European Journal of Political Economy*, 22(1): 1-21.
- Eijffinger, S.C.W., & Goderis, B. (2008), "The Effect of Monetary Policy on Exchange Rates during Currency Crises: the Role of Debt, Institutions, and Financial Openness." *Review of International Economics*, 16(3): 559-75.
- _____. (2007), "Currency Crises, Monetary Policy and Corporate Balance Sheets." *German Economic Review*, 8(3): 309-43.
- Frankel, J. A. (2005), "Contractionary Currency Crashes in Developing Countries." NBER Working Papers 11508. Cambridge, MA: National Bureau of Economic Research.
- Frankel, J. A. and Schmukler, S. L. (1998), "Country Funds and Asymmetric Information." Policy Research Working Paper Series 1886. Washington: The World Bank.
- Furman, J. and Stiglitz, J. E. (1998), "Economic Crises: Evidence and Insights from East Asia." *Brookings Papers on Economic Activity*, 29(2): 1-136.
- Goderis, B. and Ioannidou, P. V. (2008), "Do High Interest Rates Defend Currencies During Speculative Attacks? New evidence." *Journal of International Economics*. Elsevier, 74(1): 158-169 (January).
- IMF. (1986-2008), Various Issues. *International Financial Statistics*. Washington, D.C.: International Monetary Fund.

- _____. (2009), *World Economic Outlook Database – WEO Groups and Aggregates Information*. Washington D.C.: International Monetary Fund (October). (<http://www.imf.org/external/pubs/ft/weo/2009/02/weodata/groups.htm#oem>; downloaded 08-11-2009).
- _____. (2009), *World Economic Outlook*. Washington D.C.: International Monetary Fund (April).
- _____. (2009), *World Economic Outlook*. Washington D.C. : International Monetary Fund (October).
- Kaminsky, G. L. (2006), “Currency crises: Are they all the same?” *Journal of International Money and Finance*, 25: 503-27.
- Kaminsky, G. L. and Reinhart, C. M. (1999), “The Twin Crises: The Causes of Banking and Balance-of-Payments Problems” *The American Economic Review*, 89(3): 473-500.
- Kraay, A. (2003), “Do High Interest Rates Defend Currencies during Speculative Attacks?” *Journal of International Economics*, 59: 297-321.
- Krugman, P. (1979), “A Model of Balance-of-Payments Crises”. *Journal of Money, Credit and Banking*, 11(3): 311-25.
- _____. (1997), “Currency Crises.” Prepared for NBER Conference (October). (<http://web.mit.edu/krugman/www/crises.html>; downloaded 01-10-2009)
- _____. (1999), “Balance Sheets, the Transfer Problem, and Financial Crises.” *International Tax and Public Finance*, 6(4): 459-72.
- Obstfeld, M. (1994), “The Logic of Currency Crises.” *Cahiers Economiques et Monétaires Bank of France*, 43:189-213.
- Radalet, S. and Sachs, J. (1999), “What Have We Learned, So Far, From the Asian Financial Crisis?” Mimeo, Harvard Institute for International Development (January).
- Roodman, D. M. (2006), “How to Do xtabond2: An Introduction to “Difference” and “System” GMM in Stata.” Center for Global Development Working Paper 103 (December).