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Output Costs of Currency and Balance of Payments Crises in Emerging Markets

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Abstract

This paper investigates the output effects of severe currency and balance of payments crises in emerging markets. Using a panel data set over the 1975-97 period and covering 32 emerging-market economies (with 78 crisis episodes), we find that currency and balance of payments crises—even after controlling for county-specific, structural, institutional and macroeconomic factors-- significantly reduce output (cumulative) by about 5-8 percent over a two-three year period. This adverse effect is two- to four times larger than the average output loss associated with a currency crisis in a developing economy. Typically, growth in emerging-market economies hit by a currency crisis tends to return to trend by the third year following the crisis. These results are robust to the specification of the output equation, lag structure, and the distinction between large and average crisis episodes. Real exchange rate overvaluation and an economic downturn in major trading partners are two other factors adversely affecting economic growth. The large output costs associated with currency and balance of payments crises in emerging markets is likely related to their dependence on private market capital markets and abrupt reversals in capital inflows that in turn forces substantial real-side adjustment.

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1. Introduction

Severe balance of payments and currency crises occur with some frequency in emerging-market economies— more than 78 crisis episodes over the past 25 years, indicating that about 10 percent of the time some emerging-market economy in some part of the world was facing serious turbulence in currency markets. Moreover, this frequency of currency crises appears to be a reoccurring phenomenon, persistent over time and across regions of the world (Glick and Hutchison, 2001). A large and growing literature attempts to explain the factors that cause currency/balance of payment crises, as well as their timing, on the basis of macroeconomic, institutional and structural factors. See, for example, Berg, Patillo, 1999; Eichengreen, Rose, and Wyplosz, 1995; Frankel and Rose, 1996; Glick and Hutchison, 2001; and Kaminsky, Lizondo, and Reinhart, 1998.

Much less work, however, has been undertaken on the ultimate *output costs* of a currency and/or balance of payments crisis. There are two opposing views on the likely output effect of a balance of payments and currency crisis. The traditional view is that, with wage and price rigidities, a sharp nominal devaluation would produce a real depreciation in the short-run, increase exports and stimulate employment and output. Indeed, a sharp devaluation in the past often was accompanied by accusations that a country was pursuing a "beggar thy neighbor" policy and "exporting" unemployment. By contrast, an alternative view is that sharp devaluation could have a contractionary effect, working through such channels as a wealth effect on aggregate demand, higher production costs, disruption in credit markets, a sudden cessation in capital inflows (limiting imported capital goods), and so on. An important theme here is that balance of

payments crisis and sharp currency devaluation are often associated with disruption in the orderly working of international financial markets.

The limited empirical literature on the output costs of currency and balance of payments crises usually focuses on single crisis episodes; e.g. Lederman, Menendez, Perry and Stiglitz (2000) for the Mexican crisis and Lane and Phillips (1999) for the Asian crisis. Broad cross-country studies are few, and most focus on crisis episodes that are known to have been contractionary (e.g. Calvo and Reinhart, 1999; Kaminsky and Reinhart, 1999).

Milesi-Ferretti and Razin (1998), Gupta et al. (2000) and Hutchison (2001), by contrast, analyze output developments in a broad sample of countries. Milesi-Ferretti and Razin (1998) consider a sample of 105 low and middle-income developing economies, and focus on current account reversals (both explaining reversals, and estimating the effects on output and exports arising from sharp reversals). Gupta et al. (2000) consider output developments (deviations from trends) in the aftermath of a currency crisis—essentially a cross-section of currency crisis episodes-- and attempt to explain the determinants of the size of the output loss (or gain) in 125 industrial, emerging and developing economies. Using this "event study" form of methodology, they find that over 40 percent of currency crises have an expansionary effect on output. Hutchison (2001) considers the impact on the evolution of output when developing and emerging-market economies adopt IMF stabilization programs, especially in response to a balance of payments crisis. Using a panel data set encompassing 67 countries, 461 IMF stabilization programs and 160 currency crises, he finds that both IMF programs and currency crises are associated with modest declines in output growth.

The focus of our study, by contrast, is on the output effects of currency and balance of payments crises in *emerging-market* economies. Several recent studies indicate that emerging markets may be different with respect to the factors that make them susceptible to a currency crisis (Glick and Hutchison, 2001) and how they respond to currency crises (IMF, 1998). Our objective is to document output developments in emerging markets in a systematic way, ensuring that economic downturns associated macroeconomic policies and external shocks are not misleadingly attributed to currency crises. To this end, we investigate output growth equations, using panel data with fixed effects for 32 emerging-market economies over the 1975-97 period (78 currency and balance of payments crises). Our methodology differs from most other studies in that currency crises are only one possible factor influencing the evolution of output. We explain output growth developments by external factors (foreign output growth, openness and real exchange rate overvaluation), policy developments (budget policy and credit growth), and lagged values of output growth, as well as the occurrence of a currency crisis.

Using this empirical model, we measure the marginal effect associated with a severe balance of payments/currency crisis. Within this context, we are able to address five related questions. What is the average effect of a currency crisis on output growth? How long do the adverse effects of a currency crisis on output continue and are they eventually reversed? How robust are these results to model specification? Are the output effects of particularly severe currency crises proportionally larger? And, is there any evidence that causality runs from real output growth declines to currency crises rather than vice versa?

Section 2 presents the basic empirical model. Section 3 discusses the data employed in the study. Section 4 reports before/after (currency/balance of payment crises) summary

statistics on key macroeconomic variables and the primary empirical results of the study. This section presents estimation results of the "reduced form" output equations, model dynamics and robustness checks. Section 5 concludes the paper and addresses the factors that may be responsible for the especially large output costs associated with currency crises in emerging market economies compared with a broader sample of developing economies.

Section 2. Estimating the Effects of Currency and BOP Crises on Real Output Growth

Our approach to estimating the effects of a currency crisis/balance of payments on output growth is to postulate an equation for the evolution of output in emerging markets. The determinants of output in this model are a set of domestic policy and external factors, as well as country-specific fixed effects and lagged output growth. Domestic policy factors are changes in government budgets and credit growth. External factors are growth in world output and real exchange rate overvaluation. The structural factor we consider is the openness of the economy to international trade. Country-specific fixed effects are introduced in order to account for the widely varying growth experiences in our set of emerging-market economies. All of the variables, with the exception of openness, are introduced with a one-year lag in order to capture the delayed response of output to macroeconomic developments. This formulation of the model also avoids the potential for biased coefficient estimates on the domestic policy variables due to feedback effects from output growth to policy formulation (simultaneous equation bias).

In the context of our "benchmark" model, we test for the additional effect on output growth arising from a balance of payments or currency crisis. We consider both

lagged and contemporaneous effects of crises on output growth, and also estimate several variants of the model, including changes in the lag structure, definition of crises, and so, to check the robustness of the basic results. The coefficient estimate on our currency/balance of payments crisis measure may be interpreted as the marginal effect of a crisis, after controlling for several of the other factors that may influence the evolution of output growth. In this sense, our main concern is to introduce relevant control variables into the regression equation so that the impact on output growth of a currency or balance of payments crisis is not simply due to omitted variables bias.

The formal specification of the empirical model is as follows. The growth of real GDP for the *i*th country at time *t* (y_{it}) is explained by policy variables (x_{it}); exogenous external factors (w_{it}); the recent occurrence of a currency or balance-of-payments crisis ($D^{cc}_{i(t-1)}$); and unobservable random disturbances (ε_{it}).

$$y_{it} = \beta_0 + \beta_k x_{it} + \alpha_h w_{it} + \beta^{cc} D^{cc}_{i(t-1)} + \varepsilon_{it} \quad (1)$$

where x is a k-element vector of policy variables for country i at time t, w is an h-element vector of exogenous variables for country i at time t, $D^{cc}_{i(t-1)}$ is a dummy variable equal to unity if the country has recently experienced a currency crisis or balance of payments crisis (and zero otherwise). ε_{it} is a zero mean, fixed variance, serially uncorrelated, disturbance term[1]. β_0 is a vector of country fixed effects (allowing average growth rates to vary across countries in the sample), β_k is a k-element vector measuring the impact of policy changes on output, α_h is a h-element vector measuring the impact of exogenous

factors on output, and β^{cc} measures the effect of currency/balance-of-payments crises on output growth.

Section 3. Data Description

Defining Currency and Balance of Payments Crises

Our indicator of currency and balance of payments crises is constructed from "large" values in an index of currency pressure, defined as a weighted average of monthly real exchange rate changes and monthly (percent) international reserve losses.[2] Following convention (e.g. Kaminsky and Reinhart, 1999) the weights are inversely related to the variance of changes of each component over the sample for each country. Our measure, taken from Glick and Hutchison (2000 and 2001), presumes that any nominal currency changes or reserve changes associated with exchange rate pressure should affect the purchasing power of the domestic currency, i.e. result in a change in the real exchange rate (at least in the short run). This condition excludes some large depreciations that occur during high inflation episodes, but it avoids screening out sizeable depreciation events in more moderate inflation periods for countries that have occasionally experienced periods of hyperinflation and extreme devaluation.[3] An episode of serious exchange rate pressure, i.e. a standard crisis episode, is defined as a value in the index—a

[1] See Dooley (1999) and Gupta et al. (2000) for discussions of the factors that cause output to fall following a currency crisis.

[2] Our currency pressure measure of crises does not include episodes of defense involving sharp rises in interest rates. Data for market-determined interest rates are not available for much of the sample period in many of the developing countries in our dataset.

[3] This approach differs from that of Kaminsky and Reinhart (1999), for example, who deal with episodes of hyperinflation by separating the nominal exchange rate depreciation observations for each country according to whether or not inflation in the previous 6 months was greater than 150 percent, and they calculate for each sub-sample separate standard deviation and mean estimates with which to define exchange rate crisis episodes.

threshold point-- that exceeds the mean plus 2 times the country-specific standard deviation, provided that it also exceeds 5 percent.[4] The "major crisis" threshold point is 3 times the country-specific standard deviation. The first condition insures that, relative to its own history, unusually large values of the index of currency pressure are counted as a crisis while the second condition attempts to screen out values that are insufficiently large in an economic (real) sense.

For each country-year in our sample, we construct binary measures of currency crises, as defined above (1 = crisis, 0 = no crisis). A currency crisis is deemed to have occurred for a given year if the currency pressure index for any month of that year satisfies our criteria (i.e. two standard deviations above the mean as well as greater than five percent in magnitude). To reduce the chances of capturing the continuation of the same currency crisis episode, we impose windows on our data. In particular, after identifying each "large" indication of currency pressure, we treat any similar threshold point reached in the following 24-month window as a part of the same currency episode and skip the years of that change before continuing the identification of new crises. With this methodology, we identify 78 currency crises for the emerging markets over the 1975-97 period.

Control Variables in the Output Growth Equation

As discussed in section 2, the external exogenous factors included in our empirical are (trade-weighted) lagged external growth rates of major trading partners, a measure of

[4]Other studies defining the threshold of large changes in terms of country-specific moments include Kaminsky and Reinhart (1999); Kaminsky, Lizondo, and Reinhart (1998); and Esquivel amd Larrain (1998). Kaminsky and Reinhart (1999) use a three standard deviation cut-off. While the choice of cut-off point is somewhat arbitrary, Frankel and Rose (1996) suggest that the results are not very sensitive to the precise cut-off chosen in selecting crisis episodes. Our output equation estimates using "major" currency crises, evaluated with the 3-standard deviation threshold, are very similar to the benchmark crisis measure.

"openness" to foreign trade, and the lagged rate of real exchange rate overvaluation.[5] The (lagged) policy factors considered are the change in the budget surplus to GDP ratio and credit growth.

In controlling for sample selection bias—countries that have currency crises have a different set of characteristics than other countries—we use the Heckman Inverse Mills Ratio (IMR) statistic. This involves estimating a function over the likelihood of a currency/balance of payments crisis occurring. The crisis pressure equation, following Glick and Hutchison (2001) consists of five explanatory variables: lagged real exchange rate overvaluation, lagged ratio of broad money to reserves (in natural logarithms), lagged export growth, the contemporaneous onset of a banking crisis, and the lagged onset of a banking crisis. These variables are highly significant in the currency crisis probit equation. All of the macroeconomic data series are taken from the International Monetary Fund's IFS CD-ROM.

The minimum data requirements to be included in our study are that GDP are available for a minimum of 10 consecutive years over the period 1975-97. We use annual observations in our analysis. While we employ monthly data for our (real) exchange rate and international reserves pressure index to identify currency crises and date each by the year in which it occurs, using annual data enables inclusion of a relatively large number of countries.

[5] Real exchange rate overvaluation is defined as deviations from a fitted trend in the real trade weighted exchange rate. The real trade-weighted exchange rate is the trade-weighted sum of the bilateral real exchange rates (defined in terms of CPI indices) against the U.S. dollar, the German mark, and the Japanese yen. The trade-weights are based on the average bilateral trade with the United States, the European Union, and Japan in 1980 and 1990.

Section 4. Empirical Results

Macro Developments: Before/After Statistics

Tables 1 and 2 present summary statistics on the timing of currency crises and key macroeconomic developments. Table 1 presents the before and after statistics for the standard definition of currency crises and Table 2 presents the statistics for major currency crises. Four-year windows are imposed on the before/after data statistics to clearly delineate the macroeconomic developments around the time of currency crises.

The current account clearly improves following the currency crisis, moving from an average deficit of about 0.4 percent of GDP to a surplus of 0.8 percent for the standard currency crisis and over 1 percent for major crises. Not surprising, given that a currency crisis has taken place, the current account turnaround follows a sharp reversal (about 5 percent relative to trend) from real exchange rate overvaluation to undervaluation. Inflation and credit growth are on a rising trend before and after the crisis, and budget deficits tend to rise modestly following the crisis. Prior to a currency crisis, foreign interest rates typically rise about 100 basis points on average and foreign growth rates decline modestly.

Benchmark Model Estimates

Table 3 presents the results from the benchmark model. Judging by the adjusted R-square statistics, the models explain about 35 percent of the variation in output growth. The statistically significant control variables are external output growth, real exchange rate overvaluation, and trade openness. A one- percent rise in the growth rate of the world

economy raises output growth in emerging-market economies by about 0.3-0.4 percentage points on average.

A rise in real exchange rate overvaluation significantly reduces output growth in emerging markets. This is noteworthy in its own right, indicating that emerging market economies should avoid currency overvaluation, but also because real exchange rate overvaluation is a reliable predictor of future currency crises (see Glick and Hutchison, 2001). Emerging markets that are more open—defined as the sum of exports and imports relative to GDP—also tend to grow faster. However, budget changes and credit growth are not statistically significant. The coefficient estimates for the control variables are consistent across alternative specifications of the model reported in columns (1)-(3) of table 3 and in the other tables.

Turning to the key variable of interest, the coefficient estimate reported in column (1) indicate that a currency crisis is associated with a contemporaneous fall in GDP growth of about 2 percentage points. There may be a simultaneity problem, however, in that a fall in output growth may be a contributing factor to a currency crisis. To address this issue, we investigate the effect of a lagged currency crisis on output growth. Currency crises seem to have an even larger adverse effect—about 2 ½ percentage points—on future output growth (one year ahead; reported in column 2). Including both contemporaneous and lagged currency crises, shown in column 3, do not substantially change the coefficient estimates. After a two-year period, the cumulative negative effect of a currency crisis on output about 4 ½ percent. This is substantially larger than the 2 percent negative output effect found in a broader sample of developing economies (Glick

and Hutchison, 2001), indicating that emerging markets are more adversely affected by turbulence in currency markets.

Dynamics

Table 4 presents more information on the dynamics of output adjustment to currency crises. To allow for additional lagged values, we focus attention on the currency crisis "onset"—the initial year of the currency crisis. Column 1 reports the analogous regression using the onset variable to that of Column 3 in Table 3 (using the full duration of a currency crisis). Not surprisingly, since most currency crises have duration of only about one year, the results of column 1 of Table 4 are very similar to those reported in Table 3. Adding further lags (second, third and fourth year lags) to the model, reported in column 2, indicate that the contemporaneous and one-year ahead effects of a currency crisis remain negative and highly significant and roughly the same magnitude as reported previously. This is followed by reduced significance of a currency crisis on output, and eventually a positive--though not statistically significant—output effect in the third- and fourth years.

We also include lead values of currency crises in the equations, shown in columns (3) and (4), to further investigate the dynamic responses. Only one of the lead value coefficients, the one-year lead value of currency crises in column (4), is statistically significant. This regression indicates that a currency crisis tends to follow, by about a year, a decline in real output growth. On the other hand, a currency crisis also is associated with a decline in output growth contemporaneously and over a period of two

years. These model estimates suggest that, within 2-3 years, output declines by almost 8 percent for an average currency crisis in an emerging-market economy.

Major Currency Crises

An important question, posed in the introduction, is whether a particularly severe currency crisis—substantially larger than the normal crisis—generally has an especially severe effect on growth. To investigate this issue, we introduce a "major" currency crisis variable that is identified by a threshold point in our pressure index that exceeds 3-standard deviations from the mean. We report these results in Table 5.

Somewhat surprisingly, the output effects of a major crisis are not larger than the typical crisis situation. The estimated coefficients on the major currency crisis variable are somewhat less (in absolute value) than those for the regular crisis measure. The cumulative effect of a major currency crisis, judging from column (3), is that output declines by about 7 percent. Major currency and balance of payments crises do not appear to have a substantially different impact on output growth than the average crisis.

Sample Selection Bias and the Inverse Mills Ratio

It is possible that the results reported to this point are subject to sample selection bias. Countries that experience a currency/balance of payments crisis, or particular episodes characterized by severe turbulence in international markets, may be different in important respects from other countries or episodes. That is, it may not be the currency crisis per se but several other factors contributing to balance of payments crises—and

which also characterized crisis-prone countries or episodes—that are causing the decline in output growth. This is a variant of the sample selection bias problem.

We employ Heckman's (1979) Inverse Mills Ratio (IMR) to control for sample selection bias of this form. This statistic is constructed from the results of a probit regression explaining currency crises (with the explanatory variables described in section 3) and added as an additional explanatory variable in the output growth regressions. Including the IMR in the regression of interest is the standard approach to account for sample selection bias. If the coefficient on the IMR statistic is statistically significant, it is evidence of a sample selection problem.

These results are reported in Table 6. In no case is the IMR coefficient statistically significant and sample selection bias may be rejected. The coefficient estimates on the other explanatory variables, both the control variables and currency/balance of payments crisis variables, are very similar to those reported in Table 4.

Section 6. Conclusions

Our research supports the view that currency crises are typically associated with a substantial slowdown in economic growth over a 2-3 year period. Severe pressure on the currency, reflected either by substantial losses in international reserves or a sharp depreciation, does not enhance a country's economic growth prospects in the short run. Some currency and balance of payment crises may have an expansionary effect on output, as suggested by Gupta et al. (2000) using a different methodology, but the average effect is clearly contractionary. This result is robust to various model and

dynamic specifications. Moreover, these results are not driven by particularly severe ("major") crisis episodes—major crises do not appear to contract output to a larger extent than smaller crisis episodes that are observed more frequently.

Moreover, the adverse output effect of a crisis is much larger in emerging markets than in a broader sample of developing economies. Other work, investigating 67 developing and emerging-market economies, finds that a currency/balance of payments crisis lowers output by about 2 percent over a 2-year period (Hutchison, 2001). In emerging markets, our results indicate that a crisis lowers output somewhere in the range of 5-8 percent over a 2-3 year period. The range of estimates is wide, reflecting different specifications of the model. But even the small end of the range indicates that the slowdown in emerging markets is more than twice that of developing economies generally.

In terms of the other variables of the model, it is clear that real exchange rate overvaluation is an important factor slowing output growth. Since real overvaluation also plays an important role in generating currency and balance of payments in the first instance, the adverse effects appear to work through two channels. The direct channel is to reduce real output by deterioration in export competitiveness. The indirect channel is by contributing to a currency crisis, which in turn is associated with a disruption in financial markets and downturn in output growth. A decline in growth in major trading partners, not surprisingly, is an additional factor contributing to a slowdown iin emerging markets.

An important issue for future research is to explain why emerging markets appear to be so greatly affected by currency and balance of payments crisis. One potential

explanation, that seems consistent with the stylized facts, is the heavy dependence of most emerging markets on private capital flows and international financial markets generally. The sudden cessation of capital flows during periods of market turbulence, forcing abrupt adjustments in imports (especially imported investment goods and raw materials necessary for production), could play an important role in the collapse in output growth. Another explanation, of course, is more pedestrian—emerging markets grow much faster than developing economies, so that a larger percentage point fall in output growth following a financial crisis may only be expected. In either case, however, the ultimate factors transmitting a currency/balance of payments crisis into a sharp output contraction needs to be explained.

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Table 1

Descriptive Statistics[a] – Around Currency Crises

	t-2	t-1	t	t+1	t+2
Change in current account	-0.97	-0.38	-0.38	0.82	0.45
Change in budget surplus	-1.06	-0.94	-0.91	-1.03	-1.05
Inflation rate	17.32	19.26	23.46	25.05	24.46
Credit growth rate	28.55	28.69	30.13	31.97	32.82
Foreign growth rates (weighted average)	2.96	3.19	2.83	2.65	2.85
Foreign interest rates (weighted average)	5.95	7.07	6.98	6.9	6.76
RER overvaluation measure	2.79	3.05	-1.84	-3.55	-2.62

[a] percentages.

Table 2

Descriptive Statistics[a] – Around Major Currency Crises

	t-2	t-1	t	t+1	t+2
Change in current account	-0.69	-0.49	-0.41	1.07	0.16
Change in budget surplus	-0.99	-0.93	-0.95	-0.94	-1.11
Inflation rate	15.37	17.19	23.48	25.07	23.81
Credit growth rate	26.47	27.63	30.44	31.41	32.49
Foreign growth rates (weighted average)	2.97	3.21	2.88	2.66	2.85
Foreign interest rates (weighted average)	5.92	6.46	7.02	6.96	6.77
RER overvaluation measure	3.05	3.17	-2.17	-3.85	-3.04

[a] percentages.

Table 3

Growth Equation – OLS - Benchmark

Dependent Variable: real GDP growth rate (DLRGDP)

Variables [a]	Coefficients (t-statistics)		
Change in budget surplus to real GDP ratio (t-1)	3.578 (0.42)	5.289 (0.66)	5.404 (0.67)
Credit growth (t-1)	-0.016 (-1.56)	-0.009 (-1.06)	-0.007 (-0.86)
Real GDP growth (t-1)	0.231*** (4.56)	0.191*** (3.96)	0.163*** (3.38)
External growth rates - weighted average (t-1)	0.360*** (3.12)	0.315*** (2.80)	0.334*** (3.05)
Real exchange rate overvaluation (t-1)	-0.052*** (-3.49)	-0.069*** (-5.04)	-0.056*** (-3.76)
Openness	0.025*** (5.15)	0.025*** (5.21)	0.023*** (4.79)
Currency crises dummy (t)	-2.150*** (-2.37)		-2.120*** (-2.97)
Currency crises dummy (t-1)		-2.405*** (3.30)	-2.354*** (-3.35)
Adjusted R^2	0.35	0.36	0.39
Number of observations	370	363	363
Durbin-Watson Statistic	2.20	2.11	2.13

[a] all regressions include country dummies**.**

Table 4

Growth Equation – OLS - Dynamics

Dependent Variable: real GDP growth rate (DLRGDP)

Variables [a]	Coefficients (t-statistics)			
Change in budget surplus to real GDP ratio (t-1)	3.695 (0.46)	10.463 (1.21)	10.490 (1.16)	6.653 (0.79)
Credit growth (t-1)	-0.008 (-0.99)	-0.021** (-2.10)	-0.019* (-1.81)	-0.010 (-1.23)
Real GDP growth (t-1)	0.190*** (3.74)	0.198*** (3.46)	0.199*** (3.34)	0.179*** (3.35)
External growth rates - weighted average (t-1)	0.313*** (2.87)	0.265** (2.17)	0.260** (2.12)	0.302*** (2.77)
Real exchange rate overvaluation (t-1)	-0.056*** (-3.68)	-0.056*** (-3.48)	-0.055*** (-2.80)	-0.536*** (-3.00)
Openness	0.024*** (4.89)	0.023*** (4.26)	0.021*** (3.57)	0.018*** (3.40)
Currency crises onset dummy - lead (t+2)			0.403 (0.65)	-0.062 (-0.12)
Currency crises onset dummy - lead (t+1)			-0.909 (-1.07)	-1.621** (-2.28)
Currency crises onset dummy (t)	-2.085** (-2.40)	-2.200** (-2.31)	-2.774** (-2.48)	-3.081*** (-3.06)
Currency crises onset dummy - lag (t-1)	-2.548*** (-3.30)	-2.469*** (-2.84)	-2.709*** (-2.90)	-3.355*** (-3.89)
Currency crises onset dummy - lag (t-2)		-1.178 (-1.43)	-1.214 (-1.39)	-1.522* (-1.80)
Currency crises onset dummy - lag (t-3)		0.992 (1.42)	0.844 (1.12)	
Currency crises onset dummy - lag (t-4)		0.363 (0.47	0.431 (0.53)	
Adjusted R^2	0.37	0.40	0.41	0.41
Number of observations	363	299	274	325
Durbin-Watson Statistic	2.13	2.09	2.06	2.11

[a] all regressions include country dummies.

Table 5

Growth Equation – OLS – Major Crises

Dependent Variable: real GDP growth rate (DLRGDP)

Variables [a]	Coefficients (t-statistics)		
Change in budget surplus to real GDP ratio (t-1)	5.249 (0.66)	12.780 (1.51)	8.392 (1.00)
Credit growth (t-1)	-0.006 (-0.75)	-0.019** (-2.02)	-0.009 (-1.11)
Real GDP growth (t-1)	0.199*** (4.21)	0.195*** (3.59)	0.208*** (3.98)
External growth rates - weighted average (t-1)	0.321*** (2.94)	0.229* (1.89)	0.301*** (2.72)
Real exchange rate overvaluation (t-1)	-0.054*** (-3.56)	-0.060*** (-3.59)	-0.053*** (-2.80)
Openness	0.026*** (5.44)	0.024*** (4.77)	0.021*** (4.16)
Major currency crises onset dummy - lead (t+2)			0.101 (0.16)
Major currency crises onset dummy - lead (t+1)			-1.312* (-1.67)
Major currency crises onset dummy (t)	-2.279*** (-2.64)	-1.864** (-2.08)	-2.946*** (-2.93)
Major currency crises onset dummy - lag (t-1)	-2.751*** (-2.66)	-2.988*** (-2.60)	-3.287*** (-2.90)
Major currency crises onset dummy - lag (t-2)		-0.899 (-1.18)	-0.986 (-1.28)
Major currency crises onset dummy - lag (t-3)		0.354 (0.45)	
Major currency crises onset dummy - lag (t-4)		0.756 (1.07)	
Adjusted R^2	0.37	0.38	0.39
Number of observations	363	317	325
Durbin-Watson Statistic	2.11	2.08	2.13

[a] all regressions include country dummies.

Table 6

Growth Equation – Robustness

Dependent Variable: real GDP growth rate (DLRGDP)

Variables [a]	Coefficients	
Change in budget surplus to real GDP ratio (t-1)	5.351 (0.66)	10.411 (1.20)
Credit growth (t-1)	-0.007 (-0.)86	-0.021** (-2.10)
Real GDP growth (t-1)	0.164*** (3.43)	0.199*** (3.51)
External growth rates - weighted average (t-1)	0.334*** (3.05)	0.265** (2.18)
Real exchange rate overvaluation (t-1)	-0.056*** (-3.73)	-0.056*** (-3.45)
Openness	0.023*** (4.79)	0.023 (4.26)
Inverse Mills Ratio (Heckman correction)	11.683 (0.16)	9.915 (0.13)
Currency crises onset dummy (t)	-2.113*** (-2.98)	-2.191**[b] (-2.32)
Currency crises onset dummy (t-1)	-2.348*** (-3.34)	-2.459***[b] (-2.83)
Currency crises onset dummy (t-2)		-1.166 (-1.41)
Currency crises onset dummy (t-3)		0.996 (1.42)
Currency crises onset dummy (t-4)		0.364 (0.47)
Adjusted R^2	0.39	0.40
Number of observations	363	299
Durbin-Watson Statistic	2.13	2.09

[a] all regressions include country dummies.
[b] onset variable.