Bank of Israel **Research Department**

Currency Crises and Real Exchange Rate Depreciation[1]

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Discussion Paper 2016.01
January 2016

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Special thanks are expressed to Moran Cohen for his excellent and efficient help in processing the data and his advice that contributed considerably to compiling the research. I would also like to thank the Sapir Forum for their generous grant towards this study.

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Currency Crises and Real Exchange Rate Depreciation

By: Roni Frish

Abstract

This research examines episodes of sharp depreciation in the real exchange rate that occurred in 1980–2009, with a special attention on prolonged depreciations that did not soon wind down. Previous research focused on sharp nominal depreciations[1] (such as Kaminsky et al. (1988), Frankel and Rose (1996), Eichengreen et al. (2002) and Bussiere (2013)), and found a large number of variables that could signal such an occurrence. A sharp and prolonged real depreciation is a rarer occurrence, reflecting a sharp and prolonged decline in the relative price of domestically produced goods relative to goods produced abroad, and the factors behind it have barely been studied in the empirical literature. An empirical examination of the real effective exchange rate (REER, which is calculated by the IMF) indicates that the most notable variable that preceded a sharp and prolonged real depreciation are a large and prolonged Current Account deficit. High inflation and low foreign currency reserves increase the chance of a sharp and transitory nominal depreciation, but were not found to have an effect on the probability of a sharp and prolonged real depreciation. The phenomenon of sharp depreciations is related to the low elasticity of exports and imports (the Current Account) with regard to the real exchange rate: a reduction in the Current Account deficit requires a large and prolonged real depreciation. (At times even such a depreciation is not enough to reduce the deficit because Marshall–Lerner conditions do not fulfil.[2])

[1] In some of the research, the definition of a nominal exchange rate crisis was a situation in which the central bank's nominal interest rate increased sharply. The interest rate increase was intended to avoid outflows of foreign capital from the economy and a sharp depreciation.

[2] Marshall–Lerner conditions establish whether a depreciation will lead to an improvement in the current account.

משברי מטבע ושער החליפין הריאלי

רוני פריש

תקציר

עבודה זו בוחנת אירועים של פיחותים חדים בשער החליפין הריאלי שהתרחשו בעולם במהלך השנים 1980 עד 2009, בדגש על פיחותים מתמשכים שלא נשחקו במהרה. מחקרים קודמים התמקדו באירועים של פיחותים נומינאליים חדים[1] (לדוגמה: Kaminsky et al. (1988), Frankel & Rose (1996), Eichengreen et al. (2002), Bussiere (2013)) ומצאו מספר רב של משתנים העשויים לאותת על אירוע כזה. פיחות ריאלי חד ומתמשך הוא תופעה נדירה יותר המשקפת ירידה חדה ומתמידה במחיר היחסי של המוצרים מייצור מקומי ביחס למוצרים המיוצרים בחו"ל והגורמים לה כמעט שלא נבחנו בספרות האמפירית. בחינה אמפירית של שער החליפין הריאלי (REER, אותו מחשבת קרן המטבע הבין לאומית) מגלה שהמאפיינים הבולטים ביותר שקדמו לפיחות ריאלי חד ומתמשך הם גרעון גדול ומתמשך בחשבון השוטף ומשטר של שער חליפין קבוע. מרבית הפיחותים החדים לא נבעו מבהלה זמנית – הפיחותים החדים התגלו כמתמשכים (ולא זמניים) – ולא נבעו מציפיות אופטימיות מדי טרם הפיחות – קצב הצמיחה שנתיים לפני הפיחות החד היה נמוך ביחס לממוצע ארוך הטווח (למעט בפיחותים החדים שהתרחשו במדינות מזרח אסיה במחצית השנייה של שנות התשעים). אינפלציה גבוהה ויתרות מט"ח נמוכות מגדילות את הסיכוי לפיחות חד וזמני, אך לא נמצאה להן השפעה על הסיכוי לפיחות חד ומתמשך. תופעת הפיחותים החדים קשורה בגמישות הנמוכה של החשבון השוטף (היצוא והיבוא) ביחס לשער החליפין הריאלי: צמצום הגרעון בחשבון השוטף מחייב פיחות ריאלי גדול ומתמשך, ולעיתים אפילו פיחות כזה אינו מספיק לצמצום הגרעון משום שתנאי Marshall Lerner, אינם מתקיימים[2].

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[1] בחלק מהמחקרים הגדירו כמשבר בשער החליפין הנומינאלי מצב שבו הריבית הנומינאלית של הבנק המרכזי עלתה בשיעור חד; העלאת הריבית נועדה למנוע בריחת הון זר מהמשק ופיחות חד.

[2] תנאי Marshall Lerner קובעים האם פיחות יגרום לשיפור בחשבון השוטף.

1. Foreword

The question at the focus of this research is what, in general, causes a sharp real depreciation in the exchange rate, and in particular, a sharp and prolonged depreciation—one that is not soon diminished. This paper examines episodes of sharp depreciations in the real exchange rate (hereinafter, also termed the exchange rate) worldwide between 1980 and 2009, with an emphasis on episodes that were followed by a prolonged real depreciation. A sharp and prolonged real depreciation—defined as a decline in the relative price of domestically produced goods in terms of foreign currency—is relatively rare.[3] A sharp real depreciation could be the result of a permanent shock that reduces the economy's potential income: for example, a prolonged violent dispute that affects production capacity, or a sharp decline in the global price of the economy's key export (such as a decline in the price of oil worldwide affecting the purchasing power of oil-exporting nations). A sharp depreciation could also be the result of "revised expectations" following a period of overly optimistic expectations that led to higher demand for investments and private consumption; when this hope is found to be excessive, demand for consumption and investment could collapse, resulting in a slowdown of activity and a real depreciation. Openness to international flows of capital might exacerbate the occurrence of sharp depreciations arising from overly optimistic hopes, given that capital inflows facilitate the financing of surplus investment over savings (equivalent to a deficit in the Current Account).[4]

A sudden stop in the global flow of capital to an economy may trigger a sharp currency depreciation. A sudden halt could be the result of a negative real shock or revised expectations (the collapse of income from exports or the realization that overly optimistic hopes will not materialize), but could also be the result of a trigger or of a liquidity crisis. A trigger is a relatively trivial event that in itself should not cause a sharp depreciation, but generates panic among investors, which in turn leads to a sharp depreciation. An attempt to distinguish between the different factors that cause a sharp depreciation is neither simple nor clear cut, as there may be situations of multiple equilibria. However, if we ignore models that allow for multiple equilibria, we can assume that a liquidity crisis will only cause a temporary depreciation and a temporary decline in the Current Account deficit, whereas persistent (prolonged) depreciations result from prolonged weakening of the real variables. As for a depreciation resulting from overly optimistic expectations, it would be expected that such a depreciation would have been preceded by a rapid increase in GDP, low rate of unemployment, growing Current Account deficit and a trend of appreciation in the real exchange rate.

The research method in this study is similar to that applied in studies that examined the causes of sharp nominal depreciations (currency crises) by examining

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[3] A sharp and prolonged depreciation contradicts the weak "law of one price" which assumes that the price of a basket of goods is the same in all countries, excluding differences stemming from transport costs, taxes, etc. A basket of products consists of goods whose price in the global market is given, and goods that cannot be traded in the international market and whose price is determined in the domestic market. A real depreciation reflects a decline in the prices of nontradable goods.

[4] Flows of capital enable the benefit of future improvement to be used in the present, while increasing the deficit in the Current Account and real appreciation. However, should the anticipated improvement fail to materialize, the flow of capital will be reversed and a sharp depreciation will occur. "Overly optimistic expectations" may also occur in an economy closed to capital flows—in such a case the real interest rate will increase more sharply (compared with open economies) and the Current Account deficit will increase more moderately.

stylized facts and using logistic regressions.[5] First, all the sharp, real depreciations in the sample meeting our defined criteria for a sharp depreciation (arbitrary criteria) will be located. Second, stylized facts regarding the development of selected indicators before sharp depreciation events will be presented and compared with their development in other years when there was no sharp depreciation or a sharp depreciation in close proximity time-wise (tranquil periods). Third, using logistic regression, the factors preceding episodes of sharp, real depreciation and episodes of prolonged sharp depreciation will be examined. Some of the estimations will consist only of countries in which there was at least one sharp depreciation in the sample period (fixed effect), other estimations also include countries in which there was no sharp depreciation during the sample period (random effect). We note that previous studies employed additional research methods including a non-parametric estimate and a review of type II error – signaling crises that failed to materialize (Kaminsky et al. 1998).

In this research, 75 sharp real depreciations of the real exchange rate were found and monitored over time. These included the crises in South America in 1982–83, the Mexican crisis of 1994, the crisis in Japan in 1995, the Asian crises in 1996–97, the crisis in Russia in 1997–98, the crisis in Argentina in 2002, and other episodes of sharp depreciation that were not necessarily accompanied by deep economic recession. The most notable feature that preceded many of the sharp depreciations (50 of the 75 sharp depreciations studied) is a large and prolonged deficit in the Current Account; a large deficit in the Current Account also preceded most of the persistent sharp depreciations that did not wind down over the subsequent three years. In the two to three years preceding the sharp depreciation, growth was lower than the long-term growth rate, so the sharp depreciations were not preceded by "overly optimistic expectations" (excluding those that occurred in East Asia in the second half of the 1990s). The large Current Account deficit prior to the sharp depreciations was structural rather than cyclical. The government deficit and public consumption (as a percent of GDP) failed to provide any indication of the imminent sharp depreciation: three years before the crisis both were similar to the average in tranquil periods.

During and immediately after the sharp depreciation the unemployment rate soared, growth was low and even negative, public consumption declined and the government deficit increased. However, after the sharp depreciation, growth rates recovered (and were faster than during the period of calm) and the unemployment rate dropped back almost to its level in the calm period. Another key finding is that for the most part, the sharp depreciation remained in place for an extremely long period; in most episodes of sharp, real depreciation, the real exchange rate had not returned to its pre-crisis level even more than ten years afterward. Furthermore, in many cases, the initial sharp depreciation scarcely diminished over time and it did not lead to an excessive surplus in the Current Account (except for the crises in East Asia in 1996–97 and in Russia in 1998). It follows that most of the sharp depreciations cannot be attributed to panic on the part of foreign investors.

Using logistic regressions, a broad set of explanatory variables were examined, in order to find the factors that make it possible to predict a sharp, real depreciation two years in advance (and alternatively an episode of persistent sharp, real depreciation). The number of variables found to be significant as explanatory factors was very small—a large deficit in the Current Account and a fixed exchange rate regime. A slowdown in

[5] Frankel & Rose (1996), Eichengreen et al. (2002), Freund (2005) and many more.

economic growth was not found to significantly affect the probability of a sharp depreciation, except where sharp depreciations that occurred in East Asia in 1996–97 were filtered out of the sample (the wave of depreciations in Asia were preceded by a period of rapid growth). A large Current Account deficit, slowdown of growth and fixed exchange rate increased the probability of a sharp depreciation in the real exchange rate. In estimating the probability of a sharp depreciation, the extent of the economy's liabilities abroad, the volume of the economy's assets abroad and the difference between them (surplus liabilities) were not found to be significant; likewise the scope of liabilities in debt instruments and surplus liabilities in debt instruments were also found not to have a significant effect. Furthermore, no significant influence was found for a series of other variables including: the terms of trade, government deficit, public consumption, the political violence index, volume of credit (as a share of GDP), the output gap and unemployment rate.

Finally, we examined the assumption that a "large" and prolonged deficit in the Current Account ends with a sharp real depreciation in the exchange rate. Our chosen threshold was a Current Account deficit of 3 percent of GDP (since the countries that had experienced a sharp real depreciation had an average deficit of this level two to three years before the sharp depreciation). We looked for all cases in which the three-year average Current Account deficit crossed the 3 percent of GDP threshold, and we tracked their development. 87 cases were found in total: in 37 cases, the prolonged current account deficit ended in sharp depreciation, in 14 other cases the prolonged deficit ended in other type of crisis (11 Eastern European countries, Cyprus, Greece, and Spain in 2009).[6] The 87 cases can also be classified by duration of the deficit: a large, persistent deficit of more than 5 years occurred in just 46 cases, and in half of these there was a sharp real depreciation during that period. Very few countries managed to get out of a large, prolonged deficit in the Current Account without a crisis or sharp depreciation and they include the US (from 1982 onward), Canada (1960–96), Australia (from 1960 onward), New Zealand (from 1973 onward), Denmark (1976–86), Ireland (1974–86), and Singapore (1976–84), as well as Tunisia and Pakistan whose real exchange rate data is less reliable. Ireland and Singapore are particularly noteworthy as the only developing countries (they were under-developed at the end of the 1970s) with reliable real exchange rate data that managed to escape from a large, prolonged Current Account deficit without a sharp depreciation or crisis.

The most plausible explanation for the range of findings lies in the fact that the elasticity of the Current Account (in relation) to the real exchange rate is only slightly higher than unit elasticity so that a large depreciation is required to reduce the Current Account deficit. Low Current Account elasticity relative to the exchange rate makes it possible to explain the fact that a Current Account deficit preceded most of the sharp depreciations, in addition to the fact that sharp, prolonged depreciations did not necessarily improve the Current Account (cases in which the Marshall-Lerner conditions were not satisfied). It can explain depreciations that are sharp and surprising yet at the same time are stable and don't wind down in subsequent years. It provides an explanation for foreign investors' confusion in times of crisis—investors have difficulty estimating what the prevailing real equilibrium exchange rate will be when the crisis ends. It may also explain foreign investors' concern over financing countries with a large Current Account deficit; and the concern of countries with promising potential for

[6] Of the 87 episodes in which the average for the three-year Current Account crossed the 3 percent of GDP threshold, 51 episodes ended with a sharp depreciation or some form of crisis.

growth to borrow from the world in the long term.[7] Although in the long term the effect of the depreciation will almost certainly abate and the Law of One Price will come into play, the adjustment process is long and slow.

2. Review of the literature

The literature includes numerous studies that examined the causes of a sharp depreciation in the nominal exchange rate (currency crises): Frankel & Rose (1996) examined currency crises in developing economies. A currency crisis was defined as a nominal devaluation of more than 25 percent in the nominal exchange rate. Their research found that currency crises are not preceded by an extraordinary deficit in the Current Account or government budget, contrary to first-generation economic literature that linked currency crises to such deficits.[8] In contrast, Eichengreen et al. (2002) found that in the two years preceding currency crises, there was a large Current Account deficit compared with the average (a difference of 2 percent of GDP relative to tranquil periods), and that the currency crisis was preceded by accommodative monetary policy reflected in an increase in the money supply and a rise in the inflation rate; yet at the same time, there was no difference in the GDP growth rate before the crisis compared with the period of calm (a period of calm is a relatively long time period that does not include the crisis and the period affected by it). Nor was the government budget deficit before the crisis unusual (compared with Germany's deficit which was used as the benchmark country). Kaminsky et al. (1988) examined early signals of currency crises (sharp nominal depreciation). Their study examined an extremely large number of variables and classified them into several categories (financial account, current account, external debt, credit and finance, real sector, institutional and structural variables, political variables, and global variables for growth and output). The indicators that signaled a sharp depreciation two years later were: a decline in foreign currency reserves, deviation of the real exchange rate from its normal trend (a real depreciation is an advance signal of a currency crisis), rapid increase in credit, increase in domestic credit and credit to the public sector, and an acceleration in inflation. Other variables that were found to have an effect (though to a lesser degree) were the deficit in the goods and services account, the growth rate of exports, and the rate of growth of GDP and the fiscal deficit. Unlike most of the previous studies, this study also considered the probability of a second type of error with the purpose of eliminating false negatives.[9]

Berg et al. (2005) examined the predictive power of two models to provide early warning of currency crises—that of Kaminsky et al. (1988), and a similar model developed at the IMF by Berg et al. (2000). The predictive power was examined outside the sample period. Significant predictive power was found in the model presented by Kaminsky et al. (1998), and its ability to predict crises outside the period of the sample was only slightly lower than that of the sample period; in contrast, the predictive power outside the sample of the other model (developed by the IMF) was much lower and marginal, but still positive. The estimates prepared by international credit-rating companies had negligible predictive power.

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[7] The Southeast Asia countries accumulated extremely large foreign exchange balances in order to reduce their dependence on the global capital market.

[8] Krugman P. (1979), *A Model of Balance of Payments Crises*.

[9] The study is also noteworthy for the broad, methodical review of the empirical literature that it presents.

Bussiere (2013) examined factors that might predict currency crises. The study focused on 27 developing economies (1994–2001) and found several significant early warning signals: the ratio of short term debt to foreign exchange reserves, contagion from other countries, over-appreciation of the effective exchange rate (relative to its normal pattern) and a boom in loans in the economy. The first two variables (ratio of debt to foreign exchange reserves and contagion) precede crisis by only a small amount of time, whereas the other two (appreciation of the exchange rate and burgeoning credit) precede the crisis by a longer period. Another interesting result is that the occurrence of a crisis increases the chance of another crisis in that same country in the future (all other factors constant).

Cumperayot and Kouwenberg (2013) examined whether extreme fluctuations in 18 economic and financial variables that were found to predict currency crises in earlier studies do in fact do so. The study found that extreme values in these indicators do not predict currency crises. The review addressed 46 countries between 1974 and 2008. Notably, this study was the first to use an index of the real exchange rate, in addition to two indicators that addressed the nominal exchange rate (which were also discussed in the other studies) and these three indices were consolidated to create a single currency crisis index.[10]

Edwards (2004) studied the connection between the Current Account and the nominal exchange rate. His study tracked the Current Account of all countries in the world from 1975 to 2001. The majority of countries had a Current Account deficit while only a few had a surplus— mostly oil exporting nations, which had a large surplus. A notable difference was found between a large surplus and a large deficit in the Current Account: a large Current Account surplus tends to persist whereas a large deficit generally contracts rapidly (within two years). The research examined the phenomenon of a Current Account reversal: in 12 percent of the observations, the Current Account deficit declined by 4 percent or more of GDP within just one year. This was particularly prevalent in Africa and the Middle East (15–17 percent of the observations) and rarer in the industrialized countries (just two percent). The chance of experiencing a Current Account reversal depends on the size of the Current Account deficit, the scope of the external debt, the size of the central bank's reserves, volume of credit and scale of interest payments on the debt (all variables are relative to GDP). No correlation was found between a reversal of the Current Account and a banking crisis. The Current Account reversal almost always leads to a significant currency depreciation and slowdown in the rate of growth.

Milesi-Ferretti and Razin (2008) studied episodes of Current Account reversal and currency crises in 105 countries with low to medium GDP per capita (48 were in Africa and 5 were in Europe). The study examined 100 to 152 episodes of a significant, prolonged reduction of the Current Account deficit (decline of at least 3 percent of GDP within three years) and 109 to 138 episodes of currency crisis (at least 25 percent depreciation in the nominal exchange rate). The probability of a Current Account reversal in the subsequent period increased as the Current Account deficit was higher, the foreign exchange reserves were lower and the terms of trade worsened. The rate of growth was not found to have a significant effect and the effect of the size of the debt was not found to be stable. A sharp depreciation (currency crisis) tended to occur when the real exchange rate was appreciated compared with the long-term average, when the

[10] Consequently, this study too did not examine the factors that precede a large depreciation in the real exchange rate.

foreign exchange reserves were low and when external conditions included high interest rates in the US alongside slow growth in industrialized countries. The researchers examined the relationship between a Current Account reversal and sharp depreciation and found that in almost one third of the cases, the Current Account reversal was preceded by a sharp depreciation. The researchers were of the opinion that the threshold that obligates the economy to reduce the Current Account deficit is the level of external debt relative to GDP and not necessarily the level of the current deficit.

Freund (2005) pinpointed 25 cases of Current Account reversal in industrialized countries: cases in which the Current Account deficit declines from a relatively high level (generally 5 percent of GDP or more) and stabilizes at a lower level of no more than 2 percent of GDP. The study found that a period of 'correction' of the Current Account involves a significant real depreciation and slowdown of the rate of growth. Nevertheless, the study claims that the development of a Current Account deficit and a reduction of the deficit is generally a symptom of the business cycle and not of reaching the threshold that requires a reduction of the Current Account deficit. This is due to the fact that considerable variance was found in the threshold from which the correction process, ranging from 3 to 10 percent of GDP, begins, and because by and large, the reversal of the business cycle precedes a reduction of the Current Account deficit.

Croke, Kamin and Leduc (2005) found 23 episodes of a Current Account deficit in industrialized countries that occurred from 1980 through 2000. They followed these episodes for 4 years, two years before the turning point and two years after it. Over the four-year period, the deficit diminished on average by two percentage points of GDP (for the 23 episodes). During the period examined, the rate of growth of GDP slowed (from 3 to 1 percent), there was a real depreciation (7 percent), and a decline in the share of investment in GDP (by 4 percentage points). Before the turning point, imports and exports increased (in real terms, at fixed prices) at a similar rate, but after the turning point, exports grew more rapidly and the growth of imports came to a halt. The researchers distinguished between two types of episode: those in which the GDP growth rate increased rapidly after the reversal, and those in which the rate of growth slowed. In the former, the Current Account deficit was lower, the export base was broader, a larger real depreciation occurred (20 percent over 4 years), and the fiscal deficit contracted. In the latter, the GDP growth rate slowed much more after the turning point (by 3 percentage points relative to the OECD average), the decline in investments and imports was greater, there was no fiscal restraint, and there was no real depreciation during the period: there was an appreciation until the turning point, and the real exchange rate stabilized after the turning point.

Obstfeld and Rogoff (2005) calibrated the economies of the US, Europe and Asia and the international trade between them. They found that a real depreciation of 33 percent in the US dollar was necessary to reduce the US's Current Account deficit by 5 percent of GDP (from a deficit of 5 percent of GDP to a balanced Current Account). The required depreciation is greater (more than 33 percent) when we assume that the elasticity of substitution between tradable and nontradable goods is less than unity, as was found in previous studies. The unique status of the US dollar in the global capital market, and the balance of the US's assets and liabilities moderated the required depreciation. Yet, the researchers estimated that a more moderate depreciation would be required if productivity in the tradable sector of the US economy was to improve

relative to that of the nontradable sector (or if productivity in the nontradable sector in Asia and Europe was to decline).[11]

Bahmani, Harvey and Hegerty (2013) estimated the long-term elasticity of imports and exports relative to the exchange rate in 29 countries, with the purpose of testing the Marshall-Lerner conditions. They found that the Marshall-Lerner conditions were not satisfied in half of the countries—the common elasticity of imports and exports in relation to the exchange rate was smaller than one. In these countries, depreciation does not reduce the Current Account deficit (countries where the elasticity is not much greater than 1 require a large depreciation).

As noted, this paper will examine the factors in a sharp depreciation in the exchange rate, and in this sense it is similar to the studies conducted by Eichengreen et al. (2002), Frankel & Rose (1996), and Kaminsky et al. (1998), but it differs from them in that the emphasis is on real and prolonged depreciation. The filtering out of transitory depreciations will help locate the real fundamental factors that impact on the exchange rate. Little attention has been paid in the empirical literature to the factors contributing to a real depreciation.

Data sources in this study: The vast majority of the data are from the International Monetary Fund and the World Bank, except for indices of political violence that were taken from the Center for Systemic Peace and figures on assets abroad that were taken from the External Wealth of Nations and Mark II database. The real effective exchange rate data (REER) refer to the rate published by the IMF, and we supplemented the REER for countries lacking data by using the nominal exchange rate data and consumer price indices.

3. Sharp depreciations in the real exchange rate

3. A Basic facts

An extraordinary depreciation is defined as a **real** depreciation of 10 percent compared with the previous quarter, and provided that a real appreciation of more than 7 percent did not occur in the following quarter.[12] We monitored the development of key variables, including that of per capita GDP, the Current Account deficit and the unemployment rate in the years preceding the sharp depreciation (the base year). The database relates to the period 1980 through 2011 and includes 82 countries with a population of one million or more for which data on GDP and the Current Account were available (for some of the countries, data were available from 1975). Due to the lack of (reliable) data, we preferred not to include sub-Sahara African countries in this study, and the sharp depreciations that occurred in these countries are not included here. For the most part, we also ignore the sharp depreciations that occurred in and after the 2008 financial crisis due to the special nature of these crises. In all, we found 75 extraordinary real depreciations in 46 countries in which it was possible to track development of the key variables for two consecutive years before the crisis (and

[11] An improvement in US's relative productivity (productivity of the tradable sector in the US relative to the nontradable sector in the US) compared with relative productivity in the other countries causes a real appreciation in the US. According to the study, a 20 percent improvement in the US's relative productivity compared with relative productivity of the other countries will reduce the required depreciation by 12 percentage points (to 21 percent instead of 33 percent).

[12] A sharp depreciation is defined on the basis of the quarterly data, but the estimates in this paper were all based on annual data.

provided that during this period there was no additional extraordinary depreciation). When the monitored period was extended to 3 years, the number of episodes dropped to 58 (Table 1B). When it was extended to 4 years, the number of episodes declined to 49, and when it was 5 years, the number of episodes was 40. The decline in the number of episodes can be attributed to a lack of data for years prior to 1980.[13]

Tables 1A to 1D show the average real exchange rates,[14] the Current Account surplus (as a percent of GDP), and the change in per capita GDP in the years preceding the extraordinary depreciations (the tables include only those episodes for which there is data on all the years examined, for the three variables: exchange rate, current account and growth). Sequential data are also shown for some of the depreciation episodes with respect to the following variables: unemployment rate, public consumption as a share of GDP, the government deficit and the Industry value added (% of GDP) —the number of countries in the sequence is different for each of the variables and it appears in the last row of the table (and accordingly, the average in the no crisis period only includes the countries for which there is a sequence). The tables indicate that the real, sharp depreciations were preceded, on average, by a large, prolonged Current Account deficit and there is also a marked slowdown in the rate of growth of GDP. Partial data for the terms of trade show that prior to the sharp depreciations, the terms of trade worsened (a decline in the ratio of export prices to import prices), which exacerbated the problem of the Current Account deficit. The weight of government expenditure in GDP and the government deficit in the period preceding the crisis does not differ greatly from that in tranquil periods (here too there was only partial data).

Table 1
Development of key pre-crisis indicators
Table 1A: Two year time window – 75 episodes

Period	Real exchange rate	Current account	Per capita GDP (annual growth rate)	Unemployment rate	Weight of public consumption [3]	Industry, value added [2]	Terms of trade [4]
-2	113.8	-3.6	0.9	8.6	14.4	19.4	102.9
-1	116.9	-4.2	1.1	8.9	14.5	19.3	100.1
0	100.0	-2.6	-0.5	10.1	14.0	18.9	100.0
Tranquil period [1]	***	-1.3	2.6	8.3	14.2	19.1	***
N. of Crises	75	75	75	45	74	57	26
N. of Countries [5]	46	46	46	29	45	35	17

[1] Tranquil period shows the (simple) average for the variable in no crisis periods.
[2] Industry, value added (% of GDP) excluding mining and quarrying.
[3] General Government Final Consumption Expenditure (% of GDP).
[4] Excluding Chile, where there was an extraordinary decline in the terms of trade index.
[5] Some countries experienced more than one crisis.

[13] Another contributory factor to the drop in the number of crises is our condition that the period monitored before the crisis must not overlap the period following a previous crisis.
[14] The exchange rate index was defined as 100 in the year in which the depreciation occurred, a drop in the index is a real depreciation. Exchange rate data are as calculated by the IMF – REER –real effective exchange rate in terms of the consumer price index.

Table 1B: Three year time window – 58 episodes

Period	Real exchange rate	Current account	Per capita GDP (annual growth rate)	Unemploy-ment rate	Weight of public consumption	Industry	Terms of trade
-3	116.5	-2.5	1.3	8.4	14.4	20.6	103.3
-2	118.1	-3.3	1.2	8.5	14.5	20.3	103.1
-1	119.9	-3.8	0.9	9.1	14.6	20.2	100.2
0	100.0	-2.0	-0.8	10.1	14.1	20.0	100.0
Tranquil period	***	-0.9	2.6	8.1	14.6	20.1	***
N. of Crises	58	58	58	33	57	43	21
N. of Countries	40	40	40	24	39	30	17
Obs	232	1,153	1,153	609	1,125	824	84

Table 1C: Four year time window – 49 episodes

Period	Real exchange rate	Current account	Per capita GDP (annual growth rate)	Unemployment rate	Weight of public consumption	Industry
-4	121.1	-2.6	1.2	7.9	14.1	19.2
-3	124.3	-2.8	1.7	8.2	14.2	19.3
-2	123.6	-3.6	0.9	8.4	14.4	19.2
-1	122.0	-3.9	0.6	9.0	14.3	19.0
0	100.0	-1.5	-0.8	10.1	14.0	18.8
Tranquil period	***	-0.9	2.6	8.2	14.6	20.6
N. of Crises	49	49	49	27	48	36
N. of Countries	37	37	37	21	36	27

Table 1D: Five year time window – 40 episodes

Period	Real exchange rate	Current account	Per capita GDP (annual growth rate)	Unemployment rate	Weight of public consumption	Industry
-5	116.3	-2.2	2.4	8.5	14.0	20.8
-4	117.0	-2.8	2.3	8.0	14.3	20.4
-3	118.7	-2.8	1.8	8.3	14.5	20.5
-2	118.6	-3.4	1.4	8.6	14.7	20.2
-1	120.1	-3.5	1.0	9.0	14.6	20.0
0	100.0	-1.0	-1.0	10.0	14.4	19.8
Tranquil period	***	-0.9	2.4	8.4	14.4	20.6
N. of Crises	40	40	40	22	40	30
N. of Countries	34	34	34	19	34	26

The Current Account: The sharp depreciation in the real exchange rate was preceded by a large and prolonged Current Account deficit. The deficit was much higher than the general norm in those countries in tranquil periods and it increased gradually against the backdrop of a steady appreciation in the real exchange rate. In the 58 episodes (that were found in the 3-year time window), the average three-year deficit was 3.2 percent of GDP compared with just one percent of GDP in tranquil periods (the average in tranquil periods in those countries). Moreover, in the pre-crisis period, the deficit gradually increased, peaking in the year before the crisis.

Growth of GDP and unemployment rate: Three years before the crisis, the rate of growth slowed in a process which gained momentum up to the year of the crisis—the growth rate two years before the crisis (year T-2) was 1.7 percentage points lower than

the average growth rate. The unemployment rate rose steadily in the years preceding the crisis, by about 0.7 percentage points in the two years preceding the crisis (between T-3 and T-1) and the unemployment rate in these years was higher than in tranquil periods. No support was found for the widely accepted notion that the origins of the sharp depreciation lie in an "overheating" of the economy—the rate of growth of per capita GDP and the unemployment rate in the years preceding the crisis (between year T-5 and year T-3) were not substantially different from tranquil periods (and they cannot explain the extraordinary Current Account deficit).

The weight of public consumption in GDP increased gradually in the years preceding the crisis; but the level of consumption was not significantly different from the long-term average. Nor was the government deficit (this figure is only available for some of the depreciations and is therefore not presented) higher than in the tranquil periods preceding the crisis, except for the year before the crisis when the deficit increased in parallel to the slowdown in the rate of growth (which negatively impacted tax revenues). In the year before the crisis, the weight of public consumption did not deviate from its weight in the tranquil period; it follows that the increase in the government deficit immediately prior to the crisis reflects a decline in its revenues, against the background of a slowdown in growth and a rise in unemployment. Krugman (1979), in his well-known paper, linked the deficit in the government budget to the collapse of the fixed exchange rate regime and sharp nominal depreciation. However, at first glance the importance of public consumption as a key cause of a real sharp depreciation seems doubtful.

The real exchange rate tended towards appreciation in the run-up to the crisis (excluding in the 4-year time window).

The weight of industrial production in GDP diminished slightly in the period preceding the crisis—a decline of approximately 0.4 percentage points over the two years preceding the crisis (between year T-3 and year T-1). This decline can be attributed partially to the declining trend in the weight of industrial production in GDP over time and to a real currency appreciation in the period preceding the crisis.

Terms of trade: We do not have sufficient data on the terms of trade, the index is based on the prices of imports and exports published by the IMF[15] (later on we will also use UN data). However, the existing data indicate a decline in the ratio of export prices to import prices prior to the sharp depreciation, namely—the worsening of the terms of trade preceded the sharp depreciation.[16]

The conclusions above are largely independent of the chosen time window (3, 4 or 5 years). Nevertheless, in the longer sample (5 years) an important, significant difference in relation to the other samples was found: The rate of growth of GDP 4 or 5 years before the crisis was more rapid than that obtained in the two other samples, and similar to that of the tranquil periods. The difference stems from filtering out several episodes (Russia 1998, Portugal 1979, Iran 1990, and Paraguay 1987) that were preceded by a sharp decline in the rate of growth in years T-4 or T-5 before the depreciation. When looking at each of the crises separately, it can be seen that there is no real connection between the sharp depreciation and events that shocked the economy temporarily four

[15] Export Unit Values and Import Unit Values.

[16] Notably, given that one country's exports are another country's imports, we can assume that there is no trend in the price ratio (export prices to import prices).

or five years earlier,[17] but it is certainly possible that these shocks left those economies more vulnerable to the possibility of a sharp depreciation.

Developments after an episode of sharp depreciation (Table 2, 56 episodes): The rate of growth of GDP recovered gradually, and in years 2 and 3 was higher than that in the tranquil period. At the same time, the unemployment rate dropped after peaking in year 1, although it remained high relative to the tranquil period. In periods 2 and 3, the government deficit returned to its tranquil period level. The large Current Account deficit before the depreciation shifted to a small surplus in the year following the sharp depreciation (year 1) and to equilibrium in the subsequent years (years 2 and 3). The exchange rage stabilized at a level 25 percent lower than its pre-crisis level. The terms of trade index returned to its previous level, its deterioration was only transitory (as noted, little data was available for this variable).

Table 2: After the sharp depreciation, 3-year time window – 56 episodes

Period	Real exchange rate	Current account	Rate of growth	Unemployment rate	Public consumption	Industrial production	Terms of trade
-1 to -3	117.7	-3.3	1.3	8.6	14.4	20.8	102.2
0	100.0	-2.1	-0.8	10.3	14.2	20.7	100.0
1	89.3	0.7	0.8	10.6	13.6	21.0	103.1
2	91.3	0.3	3.4	10.0	13.3	20.8	103.5
3	93.2	-0.4	3.7	9.4	13.3	20.7	103.5
Tranquil peri	***	-1.0	2.6	8.1	14.2	19.6	***
Crises	56	56	56	31	38	39	21
Countries	39	39	39	23	54	27	17

Table 3: Three-year time window – 45 sharp, prolonged depreciations (out of 56 sharp depreciations)

Period	Real exchange rate	Current account	Rate of growth	Unemployment rate	Public consumption	Terms of trade
-3	118.2	-3.1	0.8	8.6	14.0	100.6
-2	119.8	-3.7	1.1	9.0	14.0	100.3
-1	120.5	-3.8	0.9	9.8	14.4	98.9
0	100.0	-2.2	-1.0	10.9	13.9	100.0
1	86.8	1.0	0.7	9.5	13.4	103.2
2	88.3	0.4	3.6	9.1	13.2	101.7
3	84.5	-0.5	3.7	8.5	12.8	102.2
Tranquil peri	.	-0.8	2.8	7.6	13.8	.
Crises	45	45	45	27	44	16

[17] In Portugal 1979, there was a depreciation five years after the 1974 Carnation Revolution which was accompanied by a drop in GDP in 1975. In Russia 1998, there was a depreciation five years after a drop in GDP following the break-up of the USSR (1991) and subsequent instability. The depreciation in Iran 1990 occurred five years after a worsening of the Iran-Iraq war and falling oil prices. We also note the real depreciation in China in 1994 which occurred five years after the Tiananmen Square protests and was accompanied by a marked slowdown of growth in 1989 and 1990, and a rapid return to growth in the following years.

Sharp and prolonged depreciations (Table 3, 45 episodes selected from 56 episodes of sharp depreciation): We monitored sharp depreciations after which the real exchange rate remained depreciated for 3 or more years (in 11 other episodes, the sharp depreciation dissipated over 3 years).

Compared with all the sharp depreciations (Table 2), the 45 sharp, prolonged depreciations (Table 3) were preceded by a larger Current Account deficit, the growth rate of per capita GDP was lower, and the unemployment rate was higher. The average sharp depreciation was 28 percent and it occurred between year -1 and year 1 (around year zero); in the subsequent two years, the real exchange rate stabilized at its depreciated level. The Current Account shifted from a large deficit (year -1) to a surplus (year 1), and then it gradually declined, while the growth rate accelerated (year 2 and 3).

3.B Currency crises and the Current Account deficit

The table in Appendix 1 presents the 75 sharp depreciations that were identified, and classifies them in two groups, based on the size of the Current Account deficit before the sharp depreciation. Group 1 (Table 1.A in Appendix 1) includes 50 sharp depreciations that were preceded by a large Current Account deficit in the three years prior to the sharp depreciation (deficit of 2.5 percent of GDP or more), and it is sorted into three sub-groups: sub-group 1.1 lists 29 episodes in which the Current Account deficit improved significantly (Current Account deficit declined) after the sharp depreciation and the real exchange rate stabilized at a lower level compared with the average for the three years preceding the sharp depreciation. Sub-group 1.2 lists 11 sharp depreciations that were preceded by a large Current Account deficit, but the sharp depreciation did not result in a reduction of the Current Account deficit. Sub-group 1.3 lists 10 other sharp depreciations that were preceded by a large Current Account deficit but the sharp depreciation wound down over the subsequent three years. Group 2 (Table 1.B in Appendix 1) includes 25 sharp depreciations that were not preceded by a large Current Account deficit: in 18 of them the sharp depreciation persisted and in 7 the sharp depreciation diminished over the next three years. The reasons for these depreciations will be discussed in Section 3.C.

Table 4 helps us track the development of the Current Account and growth of per capita GDP in the sub-groups in Group 1. The dissipating depreciations (sub-group 1.3) and the depreciations that persisted but did not lead to a decline in the Current Account deficit (sub-group 1.2), were preceded by near-zero or even negative growth (in year -2); two years before the sharp depreciation, the Current Account deficit was slightly larger than in tranquil periods, a gap of less than one percentage point of GDP. The sharp depreciations in sub-group 1.1 (depreciations that persisted and reduced the Current Account deficit) were preceded by a larger deficit in the Current Account but growth slowed more moderately than in the other two groups. The sharp depreciations in sub-group 1.3 were relatively moderate (compared with the other sharp depreciations) and reflected fluctuating exchange rates; the real exchange rate returned to its previous level two years after the sharp depreciation.

Table 4: Classification of the sharp depreciations that were preceded by a large Current Account deficit (average three-year deficit of 2.5 percent of GDP or more) based on their persistence and effect on the Current Account deficit

	Sub-group 1.1 Depreciations that persisted and reduced the Current Account deficit			Sub-group 1.2 Depreciations that did not reduce the deficit			Sub-group 1.3 Depreciations that dissipated		
	Real exchange rate	Current account	Growth rate	Real exchange rate	Current account	Growth rate	Real exchange rate	Current account	Growth rate
-2	115	-6.5	1.3	115	-4.2	0.4	102	-4.0	-1.6
-1	119	-6.3	1.5	114	-4.8	1.0	110	-6.3	-0.4
0	100	-3.6	-1.9	100	-4.7	0.3	100	-2.9	-1.1
1	85	0.7	-0.6	89	-5.6	0.3	98	-2.0	0.2
2	87	0.0	3.3	84	-7.8	1.5	110	-2.4	2.2
Tranquil	.	-1.0	2.5	.	-3.4	1.4	.	-3.2	1.9
Crises	29			11			10		
Countries	22			10			10		

Sixty-seven percent of the sharp depreciations occurred after a Current Account deficit greater than 2.5 percent of GDP. While the Current Account deficit was greater than 2.5 percent of GDP in only 45 percent of the observations. It follows that before an inspection of the other explanatory variables, there appears to be a correlation between a large Current Account deficit and sharp depreciations.

The 11 sharp depreciations that were included in group 1.2 were characterized by a relatively large deficit in the Current Account, but the sharp depreciation did not reduce this deficit. One possible explanation is that the price elasticity of imports and exports is relatively low (the Marshall-Lerner conditions are not satisfied); the quantitative increases in exports and the quantitative decrease in imports are insufficient to compensate for the change in the price of the imports and exports. In most cases, the large deficit continued for 3 to 7 years after the sharp depreciation, and in exceptional cases for much longer (in Australia the deficit lasted from 1985 until the end of the sample period in 2011). However, when comparing the exchange rate in the year in which the improvement in the Current Account began with the exchange rate that preceded the sharp depreciation, we found a marked real depreciation (excluding Greece 1983 and Australia 1985).

In Group 1.3 there were 10 sharp real depreciation episodes that wound down over a relatively short period. In most cases, the Current Account deficit diminished despite the fact that the sharp depreciation wound down (Israel[18] 1983, Bulgaria 1994, Ecuador 1999, Brazil 2002 and Haiti 2002, the Dominican Republic 2003). In some of the episodes, the Current Account deficit persisted long after the sharp depreciation wound down (Bolivia 1982–93, Peru 1992–99, Romania 1999–2009). Four episodes took place against the backdrop of rapid inflation of 80 percent or more (Peru, Israel,

[18] In Israel, the increase in the deficit from 1982 through 1984 took place against the backdrop of an attempt at liberalization (due to the First Lebanon War) and reduced tariffs. After this plan failed, a stabilization plan was introduced which included reducing the government deficit that contributed to lowering the Current Account deficit, and the use of the exchange rate as an anchor to stabilize inflation, which led to a real temporary depreciation.

Bulgaria, Romania), greatly increasing the chances of a sharp, nominal depreciation that would rapidly subside.

3.C Currency crises without a large Current Account deficit

Table 5: Sharp depreciations that were preceded by a low Current Account deficit (Average three-year deficit of less than 2.5 percent of GDP)

	Group 2			Sub-group 2.1 (prolonged depreciations)		
	Real exchange rate	Current account	Rate of growth	Real exchange rate	Current account	Rate of growth
-2	114	-0.2	1.8	118	-0.2	0.7
-1	117	-1.0	1.3	120	-0.7	1.0
0	100	-0.1	0.6	100	0.0	0.9
1	86	1.8	1.0	79	2.5	0.9
2	89	2.1	4.0	79	2.4	5.2
Tranquil	.	0.3	2.6	.	0.7	2.8
Crises	**25**			**18**		
Countries	**19**			**15**		

As noted, 25 sharp depreciations were found that were not preceded by a Current Account deficit. What caused countries without a large Current Account deficit to suffer a sharp depreciation? Table 5 shows that the prolonged depreciations (18 in all) were preceded by a slowdown of economic activity—the per capita rate of growth was 2 percentage points slower than the long-term average. Table 5 helps disprove the theory that sharp depreciations precede a deterioration of the Current Account. Nevertheless, a detailed review points to a range of reasons for the sharp depreciations, some of which are linked to the Current Account: the depreciation in Mexico in 1985 occurred after a large Current Account deficit in 1979–81 and against the backdrop of falling oil prices worldwide and the expectation of lower revenues from oil exports[19] (the anticipated decline in oil revenues contributed to the depreciation in Iran in 1985 and the depreciation in Russia in 1998); the depreciation in Turkey in 2001 came against the backdrop of a real appreciation and increase in the Current Account deficit following use of the exchange rate as an anchor to curb inflation;[20] and the 1991 depreciation in India was preceded by a large Current Account deficit in terms of exports – in the three years preceding the depreciation, import volume was 34 percent higher than export volume.[21] The Russian crisis of 1998 occurred after energy prices collapsed, when fuel

[19] Mexico's revenues from oil exports accounted for 75 percent of its foreign currency income, The decline in oil prices and severe earthquake in Mexico City in 1985 affected the government's ability to meet the large debt repayments scheduled following the debt crisis of 1982, and forced it to ask for a further aid package from the IMF.

[20] The Turkish depreciation in 2001 occurred after the failure of the plan to stabilize inflation by pegging the nominal exchange rate. The stabilization plan did not gain the confidence of investors, who feared the basic problems that caused inflation and recession, including a large government deficit and political instability. Despite the pegging of the exchange rate in December 1999, prices continued to rise, the real exchange rate appreciated by 8 percent in 2000 and the Current Account deficit reached 3.7 percent. Capital flowed out of the economy, forcing the government to depreciate the currency.

[21] Given that the weight of imports and exports in GDP was low, even a small Current Account deficit in terms of GDP requires a larger adjustment of imports and exports.

accounted for two thirds of all Russia's export revenues.[22] Nevertheless, there were other reasons for the real depreciations besides the Current Account: a large government deficit (e.g., Italy 1992, Turkey 2001, India 1991, Mexico 1985), political instability (e.g., India 1991 and Turkey 2001), and the element of contagion from crises in neighboring countries (e.g., Italy 1993, Korea 1997, and Uruguay 2002). The crisis in Russia in 1998 contained all three elements: political instability that prevented the adoption of critical reforms for the transition to an open market economy; an inability to collect taxes (a fiscal deficit of 5 percent of GDP); and contagion from the Asian crisis.[23] Below we will provide a broader description of specific episodes of sharp depreciation that were not preceded by a Current Account deficit, but it should be pointed out that these episodes are rarer and cannot be attributed to a single common cause.

Japan's 1995 depreciation is the most prominent example of a sharp depreciation that was not the result of a large Current Account deficit or fear that such a deficit would develop.[24] The collapse of real estate and share prices in Japan in 1990–91 led to a drop in demand for investments and consumption, to an erosion of the banks' equity and to three years of zero growth (1992 through 1995). At the same time, there was a real cumulative appreciation of 25 percent, and the real exchange rate reached an all-time high (from 1975). The principal explanation for the real appreciation (Obstfeld 2009) was the disparity in the nominal interest rate: whereas interest rates declined rapidly in the US from 1990 to 1994, the interest rate set by Japan's central bank, a rate that peaked when the asset bubble developed, declined too slowly. Despite the appreciation, Japan retained a surplus of almost 3 percent of GDP in its Current Account in the recession years. The sharp depreciation of 1995 allowed it to continue to retain a surplus of two percent of GDP even after economic growth resumed (imports recovered). Notably, the trend of depreciation of the real exchange rate continued until 2007, against the background of the continuous surplus in the Current Account, which reached a record of almost 5 percent of GDP (in 2007).

Another currency crisis that cannot be attributed to a Current Account deficit is the Chinese crisis of 1985. The 1985 depreciation was part of a trend of real depreciation that continued from the earliest data we have on China's real exchange rate (1982) until 1994—surprising in light of China's rapid growth in that period. The generally accepted explanation is that at the beginning of the period there was marked over-appreciation in China's real exchange rate. This over-appreciation did not lead to an excessively large deficit in the Current Account due to the strict limitations imposed on imports, which was reflected in the relatively low share of imports in GDP in the early 1980s (just 9 percent of GDP). Notably, in 1984–85, China's stability declined and the Tiananmen Square demonstrations in 1989 apparently affected the continuing trend of depreciation. Finally, it should be noted that 5 of the 23 sharp depreciations in Group 2 occurred in two oil-producing countries that suffered from political and security instability (Venezuela and Iran) and from volatile oil prices, and a further

[22] Revenues from fuel exports accounted for 45 percent of all exports in 1997. The price of fuel fell by 52 percent (from $23 to $11 a barrel).

[23] Chiodo and Owyang (2002): A Case Study of a Currency Crisis: The Russian Default of 1998.

[24] Obstfeld, though, surmised that the cause of Japan's depreciation was the increase in fuel prices from 1994 to 1997. He argues that Japan's tradable sector is heavily dependent on energy and that the decline in the price of energy improves the relative productivity of Japan's tradable sector (relative to the productivity of the non-tradable sector).

depreciation in Brazil in the period of hyper-inflation (Brazil 1990)—extreme scenarios and rampant inflation serve to further increase fluctuations in the real exchange rate.

In conclusion, an individual (rather than a statistical) review of sharp depreciations that were not preceded by a large Current Account deficit shows that there are almost as many causes of depreciation as there are events of sharp depreciations: a slowdown in the rate of growth, an increase in the government budget deficit, and political instability may cause a sharp real depreciation. However, other than a deficit in the Current Account, no single factor can be shown to cause a large number of sharp depreciations. An actual deficit in the Current Account, or fear of an increased deficit in the future in the wake of falling export prices or a sharp depreciation at trade partners, appears to be the most prominent cause of sharp depreciations.

3.D Reversal of the flow of capital

The principal difficulty in determining that most of the sharp depreciations are attributable to a Current Account deficit lies in the concept of a reversal (known as sudden stops) of the flow of capital. A sudden stop in capital flows is a stop in the inflow of international capital to an economy, which forces a sharp reduction in the Current Account deficit. This reduction is greater than required to balance the balance of payments. The reason for the change in the behavior of foreign investors is not always clear (it could stems from 'panic'), but the result of this change is a sharp reduction in the Current Account deficit.

Below we will define sudden stops in the movement of capital as occurring when both of the following two stringent conditions are met:

1. An increase of 4 percent of GDP or more in the Current Account surplus, between the period before the depreciation and the period following the depreciation (each period lasts for three years).
2. A shift to a surplus of two percent of GDP in the Current Account in the three years following the sharp depreciation.

We found 13 sharp depreciations in this strict definition that occurred against the backdrop of a reversal of the flow of capital; however, this small group included most of the known, serious crises: the 4 crises in East Asia (Thailand, Korea, Malaysia and Indonesia), the Russian crisis in 1998, and the Argentinian crisis in 2002. These crises created much greater interest than most of the other sharp depreciations that were studied here.

Table 6: Sharp depreciations that occurred against the backdrop of sudden stops in the flow of capital

Location and date of the crisis	Change in the Current Account surplus (percent of GDP)	Current account surplus, average for 3 years preceding the depreciation	Significant crisis (around the same time) (or group of crises)
Thailand 1997	17.4	-7.2	East Asia 1997
Malaysia 1997	19.5	-6.7	East Asia 1997
Korea, Rep. 1997	9.3	-2.4	East Asia 1997
Indonesia 1997	7.4	-2.9	East Asia 1997
Russian Federation 1998	12.9	0.9	
Ukraine 1998	7.4	-2.8	
Argentina 2002	6.7	-2.9	
Mexico 1982	7.3	-5.3	
Venezuela, RB 1989	4.8	-5.6	
Venezuela, RB 1994	8.9	-2.2	
Venezuela, RB 2002	10.4	4.6	
Egypt, Arab Rep. 1989	9.8	-2.3	
Paraguay 1989	12.2	-9.6	

3.E Regional currency crises

A significant proportion of the sharp real depreciations that we found occurred in waves of regional depreciations, the most prominent and well-known of which are the South American crises[25] in the early 1980s, the wave of crises in East Asia in 1996–97, and the crises in Western Europe in 1992. As has been seen, the Current Account deficit is the most pronounced characteristic to have preceded the real, sharp depreciations but a more detailed analysis of these waves of depreciation reveals unique characteristics that are lost in the general average. The wave of crises that affected the countries of East Asia was preceded by a period of accelerated growth, whereas elsewhere, the other waves of crises were preceded by extremely slow growth (of GDP); in the waves of depreciations in South America and Europe, public consumption relative to GDP peaked a year or two before the depreciation, whereas in the other crises the weight of public consumption did not increase. Below we will compare the sharp depreciations that occurred within the context of the different regional crises, and also compare these sharp depreciations with the other sharp depreciations – the entire analysis relates to the averages. The key message is that a sharp real depreciation is not triggered by any single pattern, there are important differences in developments before and during the crisis and in the process of recovery; these differences might escape us if we make do with a standard statistical test. The Appendix provides a more detailed description of the developments that led to the regional crises.

Comparison of the groups of crises: South America (1982–85), East Asia (1996–98) and Europe (1992–93):

Background to the depreciation: The countries of South America and East Asia all had a large, extraordinary Current Account deficit: the Current Account deficits of the East Asian countries were larger than those that characterized the Latin American countries in the mid-1980s. Nevertheless, the volume of foreign trade (goods and services) of the East Asian countries was greater than that of the South American countries, and the deficit in the trade account relative to their exports (net_ex/ex) was

[25] South American countries include Latin America countries and Caribbean countries.

only slightly higher than in the South American countries. In the European countries, the Current Account deficit was 2 percentage points higher than in tranquil periods, and the foreign trade deficit in terms of exports was rather low.

Considerable differences were found in the rate of growth in the period preceding the depreciation: The depreciations that occurred in Europe were preceded by extraordinary, negative, growth relative to tranquil periods. The depreciations that occurred in South America were preceded by a slowdown of growth, the rate of growth was extremely low two years before the crisis, (in 1977–79 growth was rapid in Mexico and Chile and slower in Brazil and Argentina), whereas the countries of East Asia showed extremely rapid growth by all standards, and certainly compared to that of the South American countries.

Fiscal policy: In the East Asian countries, public consumption as a percentage of GDP before the crisis was lower than in tranquil periods and the government budget had a surplus of income over expenses; although some of the East Asian governments had commitments outside the budget framework to financial intermediaries who operated as a form of government arm and provided loans to firms favored by the government. In the South American countries, public consumption as a percentage of GDP was one percentage point of GDP higher than in tranquil periods and the government deficit (for which there are few observations) was just slightly higher than its level in tranquil periods. In the European countries there was an extremely high, extraordinary deficit in the government budget.

The terms of trade index (based on the energy prices index) does not indicate a real change in the crisis period except for the crisis in the South American countries that were forced to deal with a worsening of the terms of trade in year 1+ after the sharp depreciation—when there was also a large depreciation (does not appear in the table).

Intensity and impact of the depreciation: The cumulative real depreciation of 24 percent in East Asia (from year -3 to +3) was greater than the depreciation of 18 percent in South America in the early 1980s. But the dynamics of the depreciation were completely different: in East Asia, the initial depreciation was extremely sharp (30 percent) but a significant appreciation (of 12.5 percent) began in the following year and was followed by a further appreciation. In contrast, in Latin America, the real exchange rate stabilized (in year +2) after the initial depreciation. The initial sharp depreciation in the East Asia countries indicates that the panic element in the Asian crisis was greater than in the crises in South America, even though in both crises foreign investors sought to realize their investments immediately. The signs of panic in East Asia were noticeable in the extremely sharp shift from a large deficit in the Current Account to an even larger surplus in the Current Account—a change that reflected the volume of capital withdrawn from the economy and moved abroad (the financial account deficit is the same as the current account surplus and the drop in the central bank's foreign currency reserves); the change in the Current Account deficit in the South American countries was more moderate and there was no reversal from deficit to surplus.[26] The effect of the panic is also noticeable in the rate of growth at the time of the depreciation: during the crisis, the GDP of the Asian economies declined sharply (7.3 percent) after which the rate of growth gradually returned to a level higher than in the tranquil period. In contrast, in South America, the rate of growth declined more moderately after which it returned to its average level for tranquil periods.

[26] A reversal of this kind occurred in Mexico (but not in the average).

Regarding the crises in Europe (Italy, Sweden and the UK) in 1992–93: the cumulative depreciation (from year -3 to +3) was more moderate than those of South America and East Asia. The real, sharp depreciation did not cause a negative shock: the rate of growth accelerated in the year of the sharp depreciation, the Current Account deficit contracted moderately (there was no reversal of capital flows) and the real exchange rate stabilized (even depreciating later on).

Table 7
Classification of the sharp depreciations according to their association with the "waves of depreciation" (region and period)

Year of crisis T=0	South America 1982–85 (11 events)				East Asia 1996–98 (6 events)				Europe 1992–93 (UK, Italy and Sweden)			
	Real exchange rate	Rate of growth	Current account surplus, percent of GDP	Weight of public consumption in GDP	Real exchange rate	Rate of growth	Current account surplus, percent of GDP	Weight of public consumption in GDP	Real exchange rate	Rate of growth	Current account surplus, percent of GDP	Weight of public consumption in GDP
-3	100	2.1	-4.1	18.5	100	5.9	-4.8	10.5	100	1.9	-3.0	21.9
-2	104	0.1	-5.3	18.9	99	6.1	-6.4	10.5	104	0.2	-2.4	22.5
-1	103	1.4	-5.2	18.7	101	5.4	-6.5	10.5	105	-0.7	-2.4	23.2
0	91	0.9	-5.4	17.9	97	2.8	-4.8	10.5	96	-0.7	-2.2	23.3
1	80	1.2	-4.3	17.6	71	-7.3	6.5	10.5	87	1.5	-0.2	22.7
2	77	2.5	-2.8	17.1	80	3.5	6.4	10.7	87	3.2	0.8	21.9
3	76	3.4	-2.6	16.2	82	4.5	3.5	9.7	86	2.4	1.1	21.5
4-7	75	1.4	-2.1	16.4	77	3.4	2.6	10.2	91	3.1	1.6	21.0
8-10	74	2.8	-2.8	16.5	81	4.5	4.0	10.7	89	2.2	1.0	21.6
11-13	79	2.5	-2.3	17.2	83	3.3	4.5	11.7	93	1.9	1.3	22.3
Tranquil	--	2.35	-2.1	17.6	--	3.46	0.75	11.1	--	1.9	0.29	22.1

(Table 7 continued) Developments in episodes of other sharp depreciations

Year of crisis T=0	36 other sharp depreciations (excluding South America 1982–85, East Asia 1996–98 and Europe 1992–93)					17 sharp depreciations— of the 36 other sharp depreciations—that can be monitored for a prolonged period				
	Real exchange rate	Growth rate	Current account surplus, percent of GDP	Net exports as part of total exports	Weight of public consumption in GDP	Real exchange rate	Growth rate	Current account surplus, percent of GDP	Net exports as part of total exports	Weight of public consumption in GDP
-3	100	0.5	-1.9	-13	13.1	100	-0.3	-2.1	-14.2	13.3
-2	102	0.8	-2.4	-13	13.1	102	0.6	-2.2	-11.9	13.1
-1	106	0.5	-3.2	-15	13.3	105	0.1	-2.1	-10.1	13.4
0	86	-2.0	-0.6	3	13.0	88	-1.1	-2.1	-9.1	13.4
1	79	2.4	1.4	2	12.3	76	2.8	0.0	-7.4	13.0
2	80	3.8	0.3	0	12.1	72	3.0	0.1	-7.2	12.9
3	82	4.1	-0.3	-7	12.3	72	3.2	-0.9	-11.1	13.0
4-7	--	--	--	--	--	74	2.9	-0.9	-10.1	12.9
8-10	--	--	--	--	--	76	2.9	-1.2	-8.4	13.5
11-13	--	--	--	--	--	76	2.0	0.5	-4.3	13.9
Tranquil	--	2.6	-1.2	-8%	13.3	--	2.57	-0.73	-9.9	13.8

The other depreciations: A review of the 36 depreciations that were not included in the three regional depreciation groups discussed above (hereinafter—others): The cumulative depreciation (from -3 to +3) was similar on average to the depreciation that occurred on average in the crises in Latin America and East Asia (18 percent). The depreciations were preceded by extremely low rates of growth that were exceptional relative to the tranquil period (in the three years before the sharp depreciation, growth was 2 percentage points lower than in the tranquil period). Surplus imports over exports (net_ex) were equal to 13 percent of total exports. The Current Account deficit was one to two percent of GDP higher than in the tranquil period. Public consumption as a percentage of GDP was not exceptional relative to the tranquil period and the government deficit deviated significantly only in the year before the depreciation (year -1). As noted earlier, the cumulative depreciation was similar to the depreciation that occurred on average in the crises in South America and East Asia, but the dynamics were different from those of East Asia: the exchange rate tended towards appreciation until the sharp depreciation (in year 0 and year 1) and subsequently there was only a moderate "correction" (appreciation). During the period of the depreciation there was a rapid shift from a Current Account deficit to surplus (sudden stops in the flow of capital) and a sharp decline in the rate of growth in the year of the depreciation–pointing to panic at the time of the depreciation (although to a far lesser degree than in the East Asia crises). In the year after the depreciation, the rate of growth returned to its level in the tranquil period and the unemployment rate declined. Industrial production, which as a percentage of GDP had declined gradually until the crisis, returned to its level in the tranquil period.

The years following the depreciation: The significant difference between East Asia and South America in the period following the crisis was that the countries in the former managed to restore the rapid rate of growth that had characterized them with a large, stable surplus in the Current Account, whereas in South America the recovery of growth was accompanied by a renewed increase in the Current Account deficit. Growth in the South American countries was accompanied by an increase in imports (relatively high income elasticity of imports) and a Current Account deficit, which required policy makers to reign in growth or depreciate the currency. In contrast, the East Asia countries were characterized by a more competitive export sector (and possibly also lower income elasticity of imports) and the Current Account deficit did not restrict further growth. Despite this significant difference, there was little difference between the development of the exchange rate in the Latin America countries and those in East Asia: after the exchange rate stabilized (in year t+2) it remained at its depreciated level for many years both in Latin America and in East Asia.

In the **UK, Italy and Sweden (the European countries)** there was some appreciation in the ten years following the sharp depreciation, but the exchange rate remained considerably more depreciated than its level before the depreciation. The rate of growth after the crisis was slightly faster than in the tranquil periods and the Current Account surplus was higher than in the tranquil period. This was also the case in the other sharp depreciations that can be monitored (17 out of 36 other depreciations): slightly faster growth than in the tranquil period, an improvement in the Current Account surplus, and moderate appreciation during the period following the sharp depreciation (on average).

4. Estimating the probability of a sharp depreciation of the real exchange rate

We have already noted that this paper examines the underlying forces behind sharp real depreciations, using research methods similar to those employed by Rose (1996) and Eichengreen et al. (2002), which examined the causes of sharp nominal depreciations. The research method employed in this study and the variables that were chosen are similar to those examined in previous studies. We would expect that sharp real and persistent depreciations will be the result of a weakening of the real underlying causes (deficit in the Current Account, government deficit, slowdown of growth, etc.), unlike the nominal depreciations that may also be the result of nominal causes or passing shocks (change in the exchange rate regime, accelerated inflation, decline in foreign currency reserves, etc.).

Below we will examine the factors that determine the probability of a sharp depreciation. To do so, we will estimate a logit panel regression; the dependent variable is an episode of a real, sharp depreciation (Dmi_Crisis). First we will estimate regression 1 with a single explanatory variable, where **the explanatory variable precedes the explained variable by two years**.[27] All the regressions include a fixed effect for the country. We ran regression 1 several times, replacing the independent variable each regression, and have termed it a "replaced" variable.

$$1.\ \text{logit}(\text{Dmi\_Crisis}_{i,t}) = \alpha + \beta X_{i,t-2} + FE_i + u_{i,t}$$

The results of the estimations appear in Table 8 column 1. The results of the regression 1 estimation relative to the basic list of crises are that the most pronounced variable capable of forecasting a sharp depreciation in two years' time is a deficit in the Current Account of the balance of payments—a Current Account deficit, relative to its average level, increases the probability of the occurrence of an episode of sharp depreciation two years later. (The importance of the Current Account deficit is also that variables connected with it that were also found to be significant: a low savings rate (as percent of GDP) and slow growth of exports increased the probability of a sharp depreciation two years later, as did a high level of public consumption as a percentage of GDP). Other variables that increased the probability of a sharp depreciation two-years ahead (as a single explanatory variable) are: a fixed exchange rate regime, high rate of inflation and low level of foreign currency reserves (in terms of import months). Variables that were examined and not found to be significant (as a single explanatory variable with a two-year lag) are: the rate of growth of per capita GDP, change in the rate of growth, unemployment rate, GDP gap, terms of trade (UN index), business sector credit (percent of GDP), political violence index, share of investment in GDP, (real) rate of growth of imports and net volume of assets of the economy abroad. The significant effect that was found for the net income account was the opposite of that expected[28] so that no importance whatsoever can be attributed to it. (It may be assessed that two years before the sharp depreciation, the economy postponed some of the interest payments to abroad due to liquidity problems, and it was therefore found that a decline in interest payments actually increased the probability of a sharp depreciation).

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[27] The sharp depreciation affects numerous variables and there is therefore no point in conducting a contemporaneous estimate, the use of the two-year lag is generally accepted in previous studies.

[28] An increase in the net income account (income from interest and dividends on the country's overseas investments less interest payments and dividends for foreign investors in the economy) increases the Current Account surplus. There is no reason to expect that an increase in the Current Account surplus should lead to a sharp depreciation.

Sharp, prolonged depreciations (hereinafter – prolonged depreciations): We estimated Regression 1 relative to an episode of sharp real prolonged depreciation—17 sharp depreciations that wound down over the next three years were filtered out of the basic list of sharp depreciations (see column 2). The results of the estimation show that here, too, an increase in the Current Account deficit increased the probability of a prolonged depreciation. Furthermore, a decline in the share of savings in GDP and an increase in the weight of investment in GDP increased the probability of a prolonged depreciation of the real exchange rate.[29] A fixed exchange rate regime (two years before the sharp depreciation) increased the chances of a prolonged depreciation. The terms of trade index is another variable that was found to be significant—recall that this was not found to be significant in the estimation that included all the sharp depreciations. Inflation and foreign currency reserves were not found to significantly affect the probability of an episode of prolonged depreciation. As we saw in the previous section, many of the sharp depreciations that dissipated were set against the background of high inflation. High inflation increased the chances of a sharp depreciation but it does not explain prolonged depreciations. Larger foreign currency reserves might reduce the chances of a sharp depreciation, but they cannot prevent a sharp, prolonged depreciation. Other variables that did not affect the probability of a prolonged depreciation are government consumption and exports (that were found to be significant in explaining a sharp depreciation) as well as the rate of growth of per capita GDP, the unemployment rate, GDP gap, political violence indices, banking sector credit, credit to the business sector, and the scope of assets and liabilities in the economy vis-a-vis abroad (relative to GDP).

In estimations with a single explanatory variable, we found that the Current Account deficit is a significant variable that precedes a sharp, prolonged depreciation. To examine the effect of the other variables, we tested their effect given the Current Account deficit, running Regression 2 on the set of replaced variables (X_{it}):

$$2.\ \text{logit}(\text{Dmi\_}C\text{risis}_{i,t}) = \alpha + \beta X_{i,t-2} + \delta_1 \cdot CA_{t-3} + \delta_2 \cdot \Delta CA_{t-2} + FE_i + u_{i,t}$$

Regression 2 was run several times as well, with the independent "replaced" variable exchanged each regression.

Results of the estimation in relation to the list of sharp, prolonged depreciations (see Table 8): Most of the replaced variables were not significant, except for the exchange rate regime (a fixed (pegged) exchange rate regime increases the probability of a sharp depreciation). In the results of the estimation in relation to the list of all the sharp depreciations, inflation, foreign exchange reserves and changes in the rate of growth were also found to be significant. As noted, low inflation and high foreign exchange reserves reduce the probability of a sharp depreciation, but do not reduce the probability of a prolonged, sharp depreciation. The variables that were tested alongside the Current Account and were not found to be significant in explaining a sharp depreciation or a prolonged, sharp depreciation included: share of savings in GDP, share of investment in GDP, weight of public consumption in GDP, the unemployment rate, GDP gap, terms of trade (UN index), credit to the business sector (as percent of GDP), credit by the banking sector (as percent of GDP), the political violence index (within a country,

[29] An increase in investments increases the Current Account deficit (which is the difference between savings and investment). One of the explanations for the Southeast Asia crisis is the low return on investments, however the long maturity process of the investments makes it difficult to examine this assumption. With hindsight, the rate of growth of the East Asia economies remained high even after the crisis.

between countries and comprehensive index), the weight of industry in GDP, the weight of investment in GDP, the quantitative increase in imports, the quantitative increase in exports, the economy's net assets abroad (the difference between the economy's total liabilities abroad and its total assets abroad), and the economy's net assets abroad in debt instruments (the difference between debt instrument assets and debt instrument liabilities, out of the total International Investment Position).

Table 8: Test of the ability of different variables to forecast an episode of sharp depreciation within a two-year time range

Results of the estimation of the variables as a single explanatory variable (columns 1 & 2), and in addition to the Current Account surplus (columns 3 & 4).

XTlogit regressions, fixed effect (fixed effects per country) 1980–2007

	All depreciations	**Prolonged depreciations**	**All depreciations**	**Prolonged depreciations**
	1	2	3	4
Estimation specifications	Regression 1	Regression 1	Regression 2	Regression 2
Current Account surplus (% of GDP)	-0.080***	-0.273***	--	--
	(0.025)	(0.061)	--	--
Exchange rate regime – 1 – fixed, 2—mixed fixed, 3—mixed floating, 4 – floating	-0.411***	-0.731***	-0.348**	-0.545***
	(0.137)	(0.209)	(0.152)	(0.200)
Inflation, change in consumer prices	0.027**	-0.427	0.037***	-0.915
	(0.011)	(0.531)	(0.014)	(0.797)
Foreign exchange reserves (in import months)	-0.165**	-0.054	-0.17*	-0.058
	(0.083)	(0.098)	(0.096)	(0.105)
Final government consumption (% of GDP)	0.117**	0.090	0.081	0.030
	(0.049)	(0.078)	(0.055)	(0.068)
National savings rate (% of GDP)	-0.045*	-0.097**	-0.016	-0.021
	(0.025)	(0.041)	(0.021)	(0.032)
Weight of investment in GDP	0.034	0.077*	-0.001	-0.040
	(0.026)	(0.045)	(0.03)	(0.039)
Export of goods & services (real annual rate)	-0.018*	-0.009	-0.007	0.003
	(0.010)	(0.017)	(0.011)	(0.015)
Import of goods & services (real annual rate)	0.009	0.009	0.004	0.003
	(0.008)	(0.012)	(0.009)	(0.012)
Rate of growth	-0.913	-2.65	-4.042	-6.519
	(2.359)	(3.335)	(3.157)	(4.075)
Change in rate of growth	2.721	-2.073	4.354*	3.107
	(2.389)	(4.119)	(2.613)	(3.860)
Unemployment rate	-0.077	-0.118	-0.015	0.022
	(0.065)	(0.090)	(0.071)	(0.068)
GDP gap (in terms of potential GDP)	0.157	0.037	0.211	0.159
	(0.149)	(0.193)	(0.216)	(0.221)
Terms of trade (UN index)	0.007	0.015**	0.000	0.006
	(0.005)	(0.006)	(0.006)	(0.006)
Terms of trade (consolidated index)	0.008*	0.013**	0.0024	0.0106
	(0.005)	(0.006)	(0.006)	(0.007)
Banking sector credit (% of GDP)	0.002	-0.011	0.005	-0.002
	(0.006)	(0.009)	(0.006)	(0.009)
Business sector credit (% of GDP)	0.004	-0.002	0.007	0.007
	(0.008)	(0.010)	(0.008)	(0.010)
Political violence index (inter-country)	0.063	0.427	0.062	0.321
	(0.201)	(0.434)	(0.206)	(0.346)
Political violence index (intra-country)	0.071	0.155	0.070	-0.027
	(0.116)	(0.220)	(0.126)	(0.134)
Industry, value added (% of GDP)	0.003	-0.067	0.000	-0.069
	(0.026)	(0.042)	(0.032)	(0.044)
Economy's net assets abroad	-0.683	0.033	-0.673	-1.594
	(2.010)	(2.616)	(2.538)	(3.408)
Deviation from exchange rate (moving average for 5-8 years	0.0037	0.0161*	0.0053	0.0169*
	(0.004)	(0.009)	(0.004)	(0.009)

In conclusion, in fixed effects estimation, two variables were found that significantly increase the chances of a sharp depreciation: a Current Account deficit and a fixed exchange rate regime (see estimation in Table 8). High inflation and a low volume of foreign exchange reserves may trigger a sharp depreciation but they do not cause a prolonged, sharp depreciation. A slower rate of growth was not found to significantly affect the probability of a sharp depreciation and of a prolonged sharp depreciation (also in an estimation that excludes the countries of Southeast Asia).

Another variable that was found to be significant in explaining a prolonged, sharp depreciation is connected with the actual real exchange rate: the explanatory variable we tested is the difference between the real exchange rate and its long-term average in the past – a moving average for the previous 8 years. This difference with a two-year lag was not found to be significant in explaining a sharp depreciation. However, it was found to be significant in explaining prolonged, sharp depreciations – an appreciated exchange rate relative to the average in previous years increased the chances of a sharp depreciation two years later.

Only those countries which experienced a sharp depreciation (in the sample period) are included in the fixed effects estimation. These estimations calculate the difference in the explanatory variable between the pre-crisis period and the average for the entire sample period, and examine whether this difference relates to a sharp depreciation episode (see Table 1 for comparison). By estimating Random Effects regression we can increase the number of observations and also take into account those countries that did not experience a sharp depreciation. However, in addition to the advantage stemming from the increase in the number of observations, the variance in the sample almost certainly also increases—a variance stemming from fixed effects that separate the group of countries in which a crisis occurred from the other countries. If the difference between the two groups of countries is unobserved or constant, then the fixed effects method has an advantage. However, if the causes of the crisis are observed (or do not correlate with the other explanatory variables) then the random effects method has an advantage, due to the greater number of observations in the sample.

Let us repeat the estimation using a logistic regression of the probability of an episode of sharp depreciation and an episode of sharp, prolonged depreciation, but this time using the random effects method:

3. $\text{logit}(\text{Dmi\_Crisis}_{i,t}) = \alpha + \beta X_{i,t-2} + \delta_1 \cdot CA_{t-2} + RE + u_{i,t}$

The estimation includes two explanatory variables: the Current Account with a two-year lag and a replaced (substituted) variable with a two-year lag. A Current Account surplus was found to be significant for all the sharp depreciations and for the prolonged depreciations. However, most of the other (replaced) explanatory variables were not found to be significant in explaining sharp depreciations, except for two: high inflation and a high level of public expenditure that increased the probability of a sharp depreciation (two years later). None of the other (replaced) variables was found to significantly affect episodes of prolonged depreciation. The only variable that was significant in explaining prolonged depreciations is a Current Account surplus.

Sensitivity test 1: Appendix 3 shows the results of the Regression 1 estimation in relation to all the sharp depreciations except for the Southeast Asia countries (fixed effects); as noted, the run up of events prior to the crises of East Asia in 1996—97 was different from those that preceded most of the other crises, and it is therefore worth distinguishing between them (Section 3.E). The estimations without the Southeast Asia

countries produced similar results, with one difference: the foreign exchange reserves were not found to be significant. Nor was any difference found in the results of the estimations for prolonged depreciations with or without the Southeast Asia countries. Even without the Southeast Asia countries that grew rapidly prior to the crisis, the rate of growth was not found to have any significant effect on the probability of a sharp depreciation.[30]

Sensitivity test 2: Appendix 3 shows the estimations in relation to an expanded list of sharp depreciations[31] that also include the sharp depreciations of 2008 and 2009. These depreciations were affected by the global financial crisis of 2008. The results in relation to the expanded list of depreciations is distinguished by the fact that the rate of savings, the rate of change in exports and the foreign currency reserves did not significantly affect the probability of a sharp depreciation; the effect of the other variables was found to be similar.

Sensitivity test 3: This consisted of the inclusion of time effect (dummy) variables in estimating random effects (Table 9). As noted, most of the sharp depreciations were grouped into a few years in which waves of depreciations occurred; the effect of the waves of depreciation is reflected in the dummy variables for years with a relatively large number of sharp depreciations: 1990, 1997, 1998, and 2002. The estimation in Table 9 relates to the question of whether the cause of the depreciation is the undermining by the underlying factors (e.g., an increase in the Current Account deficit) or contagion from neighboring countries, or a combination of the two. The results of the estimation indicate that a surplus in the Current Account with a one-year lag is significant on the side of the time effect (dummy) variables, and that the Current Account surplus with a two year lag is significant on the side of the time effect dummy variables and the floating exchange rate regime dummy variable (with a two-year lag). In contrast, a surplus in the Current Account with a two-year lag is not significant on the side of the one-year dummy variable only (i.e., without the floating exchange rate regime variable, which itself is not significant). Inclusion of the dummy variables for years weakens the effect of the Current Account. This may indicate the importance of the contagion factor, but it does not eliminate the effect of the Current Account (or the importance of the underlying factors). As we mentioned in the description of the waves of depreciations appeared in Section 3.E, the waves of depreciation in Southeast Asia, South America, Europe and other countries were preceded by a large Current Account deficit in terms of GDP or in terms of exports.

[30] The average rate of growth for the countries of Southeast Asia was rapid, the fixed effects test the effect of the rate of growth relative to the average in the period of the sample.

[31] The list of depreciations includes 12 other sharp depreciations that occurred in 2008 and 2009 (Australia, Brazil, Canada, Hungary, Korea, Mexico and Norway in 2008; Armenia, Moldova, Mongolia, Russia and Ukraine in 2009).

Table 9
The Current Account's effect on the probability of a sharp depreciation and sharp prolonged depreciation
Explanatory variable: episode of sharp depreciation, 1980–2007
Random effects estimation

	1	2	3	4	5	6
	All depreciations	**All depreciations**	**All depreciations**	**Prolonged depreciations**	**Prolonged depreciations**	**Prolonged depreciations**
Current account with two-year lag	*-0.030 (0.016)	-0.024 (0.017)	*-0.042 (0.023)	**-0.049 (0.025)	-0.037 (0.026)	*-0.064 (0.035)
Dummy variable - exchange rate regime	No	No	0.431 (0.349)	No	No	0.858 (0.593)
Dummy variable - years	No	Yes	Yes	No	Yes	Yes
Observations	2,161	2,161	1,939	2,161	2,161	1,939
Countries	105	105	100	105	105	100

5. Current Account deficit and its effect on the real exchange rate

5.A Large Current Account deficit

In light of the importance of the Current Account deficit in explaining sharp depreciations, and in view of the fact that previous studies were in disagreement over the effect of the Current Account deficit on a sharp, nominal depreciation (see for example, Frankel & Rose (1996) who found that currency crises were not preceded by a large Current Account deficit); we will examine the connection between the two variables from the opposite direction. We will examine the effect of a large three-year deficit in the Current Account on the subsequent change in the exchange rate, in the Current Account and in the rate of growth in the following years. In this section (5.A), our review relates to all countries except for those in Africa, due to the limited data available for that region.[32] The sample includes Current Account data from 1960 through 2011, although for most countries, Current Account data only start from the 1970s; exchange rate data are available from 1980 onward. The explanatory variable is a dummy variable for the three-year surplus in the Current Account (average for the years t-1 to t-3): a surplus larger than the 75th percentile (surplus of one percent GDP or more), a surplus smaller than the median (deficit of more than 2.1 percent of GDP), a surplus smaller than the 25th percentile (deficit of more than 4.9 percent of GDP). As expected, a three-year surplus in the Current Account of more than one percent of GDP leads to an appreciation in the real exchange rate over the next three years, and a three-year deficit of more than 4.9 percent of GDP leads to a real depreciation. However, the size of the deficit does not predict the size of the depreciation in the real exchange rate: a large three-year deficit (of more than 4.9 percent of GDP) leads to a real depreciation of 7 percent over the subsequent three years (between the average for years t to t+2 and the average for years t-1 and t-3 [Table 10, left-hand column, first row]), but a three-year deficit of more than 2.1 percent of GDP (greater than the median) leads to a larger real depreciation of 9 percent (Table 10, left hand column, second row). The most significant finding is that the Current Account has a tendency to balance itself in the subsequent three years: after a large three-year deficit (larger than 4.85 percent of GDP, 25th percentile), the deficit declines and after a three-year surplus (larger than 0.96 percent of GDP, 75th percentile) the surplus declines (Table 10, middle column).

[32] Sub-Sahara African countries were not included in any of the estimations in this study.

Another finding is that after a three-year deficit (larger than 4.85 percent of GDP), the rate of growth slows by one standard deviation (SD) (insignificant) and after a three-year surplus (larger than 0.96 percent of GDP), the rate of growth accelerates by one SD (insignificant). Although these results are not significant, the difference between them could indicate that a large Current Account deficit triggers a certain slowdown in the rate of growth of per capita GDP compared with a Current Account surplus (based on the expectation according to Thirwall's Law) (Table 10, right-hand column).

Table 10: The effect of the Current Account surplus on the real exchange rate, the Current Account surplus and on GDP per capita growth rate.
Dependent variable - change in the Real exchange rate, Growth of per capita GDP, and Current Account surplus (years t-3, t-2, t-1 relative to years t, t+1, t+2).
Explanatory variable – average Current Account surplus for years t-1 to t-3, **Fixed Effects**, (excluding African countries).

The only explanatory variable – dummy variable (row)	Dependent variable: Real exchange rate, (between the average of t, t+1, t+2 and the average of t-3, t-2, t-1)	Dependent variable: Current Account surplus, (between the average of t, t+1, t+2 and the average of t-3, t-2, t-1)	Dependent variable: Growth of per capita GDP, (between the average of t, t+1, t+2 and the average of t-3, t-2, t-1)
Dummy variable for surplus smaller than 25th percentile [-4.85]	-0.0694*** (0.0118) R^2=0.02	4.8808*** (0.2939) R^2=0.11	-0.2703 (0.2599) R^2=0.0005
Dummy variable for surplus smaller than 50th percentile [-2.1]	-0.0938*** (0.0104) R^2=0.047	4.2291*** (0.2613) R^2=0.10	-0.3348 (0.2292) R^2=0.001
Dummy variable for surplus greater than 75th percentile [0.96]	0.0897*** (0.0118) R^2=0.033	-4.7992*** (0.3152) R^2=0.095	0.2377 (0.2755) R^2=0.0003
Number of observations	1,762	2,300	2,274

Square brackets show the Current Account surplus in the appropriate (75, 50 or 25) percentile.

Table 11: The effect of the Current Account surplus on the real exchange rate, the Current Account surplus and on GDP per capita growth rate.
Dependent variable - change in the Real exchange rate, Growth of per capita GDP, and Current Account surplus (years t-3, t-2, t-1 relative to years t, t+1, t+2).
Explanatory variable – average Current Account surplus for years t-1 to t-3, **Random Effects**, (excluding African countries).

The only explanatory variable – dummy variable (row)	Dependent variable: Real exchange rate, (between the average of t, t+1, t+2 and the average of t-3, t-2, t-1)	Dependent variable: Current Account surplus, (between the average of t, t+1, t+2 and the average of t-3, t-2, t-1)	Dependent variable: Growth of per capita GDP, (between the average of t, t+1, t+2 and the average of t-3, t-2, t-1)
Dummy variable for surplus smaller than 25th percentile [-4.85]	-0.0530*** (0.0113) chi^2=22.02	4.5125*** (0.2773) chi^2=264.7	-0.2971 (0.2309) chi^2=1.65
Dummy variable for surplus smaller than 50th percentile [-2.1]	-0.0758*** (0.0098) chi^2=59.85	3.7838*** (0.2465) chi^2=235.5	-0.2804 (0.2009) chi^2=1.94
Dummy variable for surplus greater than 75th percentile [0.96]	0.0736*** (0.0112) chi^2=43.27	-4.1494*** (0.2966) chi^2=195.67	0.1903 (0.2389) chi^2=0.63
Number of observations	1,762	2,300	2,274

Square brackets show the level of the Current Account surplus in the percentile (75, 50 or 25).

5.B Prolonged deficit in the Current Account

To examine whether a large prolonged Current Account deficit tends to end with a sharp depreciation, we identified all the episodes in which the average three-year Current Account deficit was greater than 3 percent of GDP, and we tracked the deficit in those countries. In total, 87 episodes were found where the average three-year deficit crossed the threshold of 3 percent of GDP[33] (Table 12). In 41 out of the 87 episodes the Current Account deficit declined considerably over a period of up to 5 years. In 46 episodes, there was a significant, prolonged deficit for more than 5 years, and in half of them a real, sharp depreciation occurred during that period. A large prolonged deficit of more than 8 years was found in 35 episodes: in one-third of them a sharp depreciation or similar crisis occurred during the time frame of 8 years (including Cyprus, Greece and Spain in 2009); another third occurred in the Eastern European countries in the period following the break-up of the Soviet Union, these deficits ended without a sharp depreciation but were accompanied by a sharp decline in the Current Account deficit and in GDP and by a prolonged recession.[34]

Table 12: Is a high Current Account deficit sustainable?
Tracking of 87 episodes in which the Current Account deficit crossed the high-deficit threshold, three-year deficit of 3 percent or more

Significant decline of deficit:	Within 5 years	From 5 to 8 years	More than 8 years	Total
Number of episodes by duration	41	11	35	87
Episodes that included a sharp depreciation	17-19	6	12[1]	35-37
Median of annual rate of growth		1.6	2.1	

[1] 12 Episodes of sharp depreciation or similar crisis occurred during the time frame of 8 years.

There are very few examples of a large, prolonged Current Account deficit without a sharp depreciation or crisis: Ireland (1974–86) and Denmark (1976–86), although in these cases, too, there was a cumulative real depreciation of 10 percent between 1984 and 1986.[35] Singapore too had a prolonged deficit (1976–84), but shortly after the deficit declined, there was a real depreciation of 20 percent (1985–87). Other countries that had a prolonged Current Account deficit and stable exchange rate are Australia,[36] (with consecutive deficits since 1960), New Zealand (since 1973) and the US (since 1982), up to the last known figures, and Canada, which had an almost unbroken deficit from 1960 through 1996. Over the last 30 years, the average deficit was 4.5 percent of

[33] In 13 other episodes, the deficit crossed the threshold but it could not be tracked due to non-sequential data.

[34] Notably, the multiyear rate of growth (8 years) in episodes that ended with a sharp depreciation was lower than that of the other episodes: the median in the first group was 1.6 percent whereas the median for the group of countries with the prolonged deficit that ended without a depreciation (including Eastern Europe) was 2.6 percent.

[35] Ireland and Denmark had cumulative real depreciation of 9 and 11 percent, respectively, between 1984, when the deficit was balanced, and 1986. Both countries reduced their public spending: Ireland from 1987 to 1989, and Denmark from 1987 to 1990. It should be clarified that the decline in the government deficit tends to increase savings in the economy and the excess of savings over investment (the Current Account surplus), by way of a real depreciation. Notably, Denmark's fiscal restraint in 1982 did not reduce the Current Account deficit or curb economic activity since in parallel private consumption increased and private savings fell. See Giavazzi & Pagano 1990.

[36] Australia had one episode of sharp depreciation in 1985.

GDP in Australia, 5.6 percent of GDP in New Zealand, and 2.9 percent of GDP in the US. Only two undeveloped economies: Tunisia and Pakistan[37]—have had a large, prolonged deficit that did not end with a sharp depreciation (see Table 13). Cross-referencing Current Account figures with data on the economy's Internal Investment Position shows a prolonged deterioration in New Zealand, Australia, Ireland and Denmark. The deficits of the US and Singapore were financed by the surpluses accumulated in previous years, and Canada's deficit has never led to any change in the surplus liabilities (excess liabilities over assets).

Table 13: Is a high Current Account deficit sustainable?
Examination of episodes of large, prolonged Current Account deficit of at least 5 years.
The table shows the date on which the three-year deficit crossed the 3 percent threshold. The averages for the Current Account deficit, rate of growth of GDP and government deficit in the eight years following the specified date, and the change in the real exchange rate over 7 years from the start of the deficit.

	Current Account	Annual rate of growth	Government deficit	Change in real exchange rate over 7 years (appreciation (+))	Comments
Bulgaria 2000	-10.1	7	1.1	32	Eastern Europe
Estonia1997	-8.6	8	0.2	24	Eastern Europe
Georgia1999	-8.5	7	0.8	13	Eastern Europe
Latvia 1997	-8.1	8	-2	15	Eastern Europe
Hungary 1994	-6.4	3	-2.8	14	Eastern Europe
Albania 1996	-6.1	6	-8.6	50	Eastern Europe
Croatia 1997	-5.8	4	-4.4	4	Eastern Europe
Macedonia 1998	-5.5	2	-1.3	0	Eastern Europe
Romania 1992	-5.1	0	..	72	Eastern Europe, sharp depreciation in 1999
Czech Rep 1996	-4.8	2	-4.7	28	Eastern Europe
Slovak Rep 1997	-4.7	4	-4.6	..	Eastern Europe
Slovak Rep 2004	-4.5	5	-3.9	37	Eastern Europe
United States 2000	**-4.9**	**2**	**-2.4**	**-12**	**Large cumulative depreciation**
New Zealand 1976	**-4.5**	**1**	**..**	**29**	
Australia 1981	**-4.6**	**2**	**1**	**-18**	**Large cumulative depreciation**
Canada 1975	**-3.1**	**1**	**-4.5**	**50**	
Canada 1988	**-3.1**	**1**	**-6.5**	**-17**	**Large cumulative depreciation**
Denmark 1977	-3.3	2	-6.6	-4	Large deficit until 1986
Ireland 1976	-8.2	..	-11.1	32	Large deficit until 1986
Honduras 1990	-6.6	1	..	2	33% depreciation 1990-2000
Tunisia 1978	-6.6	3	..	0	
Pakistan 1990	-4.4	2	-5.1	-7	
Costa Rica 1997	-4.3	3	-3.7	-7	17% depreciation 1997-2011
Costa Rica 1989	-3.9	2	..	1	19% depreciation 1989-2011
Sri Lanka 2000	-3.1	4	-7.9	-5	19% depreciation 2000-2011
Guatemala 1987	-4.8	2	..	-8	
Singapore 1976	-7.8	6	..	-5	Deficit decreased in 1983, surplus from 1986
Thailand 1990	-6.3	6	1.4	-9	Large cumulative depreciation + crisis in 1997

[37] Sri Lanka, Honduras and Costa Rica also had large, prolonged deficits but they were followed by a real, considerable depreciation (17 to 33 percent).

Malaysia 1991	-3.7	5	1.4	-17	Large cumulative depreciation + crisis in 1997
Egypt 1980	-4.3	4	..	108	Crisis in 1989
Dominican 1987	-3.7	2	..	10	Crisis in 2003
Chile 1980	-8.3	2	..	-44	Large cumulative depreciation + crisis in 1982
Greece 1979	-4.4	0	-7.1	-17	Large cumulative depreciation + crisis in 1983
Jamaica 1980	-8.3	-1	..	-38	Large cumulative depreciation + crisis in 1983
Philippines 1979	-4.4	-2	..	-20	Large cumulative depreciation + crisis in 1986
Spain 2001	-6.5	2	-0.1	17	Crisis in 2009
Cyprus 2001	-6.3	2	-2.1	16	Crisis in 2009
Greece 2001	-9.4	3	-6.3	18	Crisis in 2009
Portugal 1997	-8.1	2	-3.8	8	Crisis in 2009
Bolivia 1980	-5.2	-4	-13	-19	Large cumulative deprecitation + crisis in 1982
Nepal 1983	-5.7	2	..	-43	Large cumulative deprecitation + crisis in 1986
Paraguay 1980	-7.8	1	..	-40	Large cumulative deprecitation + crisis in 1982
Pakistan 1980	-2.5	3	..	-30	Large cumulative depreciation
Israel 1975	-6.8	1	..	-2	Crisis in 1979
Philippines 1990	-4.1	1	0.1	27	Crisis in 1997
Peru 1990	-6.1	2	..	27	Crisis in 1982

Eleven of the episodes of a large, prolonged deficit in the Current Account (where there was no real, sharp depreciation) occurred in the countries of Eastern Europe. The history of these countries serves as a test of the assumption that a Current Account deficit is a way to transfer resources between periods (Obstfeld and Rogoff (1995)). In the 1990s, the Eastern European nations certainly had promising growth potential and a considerable lag in the capital stock, justifying the transfer of resources from the future to the present (namely, to borrow from the rest of the world). In fact, the Current Account deficit, which is the difference between savings and investment, increased significantly and peaked in 2007–08 (Table 14). The flow of capital was based on a striking increase in direct investments (Bulgaria, Estonia, Romania, Hungary and Slovakia) which are considered a relatively stable form of financing. In the years preceding the global crisis, GDP in most Eastern European countries grew rapidly (excluding Moldova and Hungary), and price levels (relative to the US, PWT data) which were much lower than those in Western Europe and the US rose rapidly.[38] However the global crisis that erupted in 2008 cut off the flow of capital and the Current Account deficit shrank sharply (excluding Albania and the Czech Republic). The shut-down in the flow of capital is a key indicator of a crisis in the balance of payments, but unlike other balance-of-payments crises, the real exchange rates remained remarkably stable and there were almost no sharp depreciations (except for Albania). Nevertheless, the rapid increase in prices (in terms of PPP) was reversed and prices fell by 10 percent on average between 2008 and 2010, meaning that after 2008 there was a significant real depreciation. Additionally, GDP, which had grown rapidly until 2008 (8 percent on average for the countries in Table 14), shrank in 2009 and 2010 (by 2 percent on average). The rate of growth in Eastern Europe slowed much more sharply than in

[38] Average prices in the countries listed in Table 14 rose from 37 in 2002 to 68 in 2008 (i.e., price levels were 63 percent lower than in the US in 2002 but were only 32 percent lower than the US in 2008).

Western Europe, and the rate of growth of Eastern European countries with a large Current Account deficit was particularly slow. The sharp slowdown in GDP, sharp contraction of the Current Account, and reversal of the real exchange rate from rapid appreciation to depreciation are familiar signs of a balance of payments crisis. Although the crisis in Eastern Europe was triggered by the global crisis of 2008 (and not the Current Account deficits) and most countries in Eastern Europe did not experience a sharp real depreciation, the Current Account deficit did not diminish gradually but was accompanied by a severe slowdown of economic activity. Moldova, Romania, Croatia, Slovakia and the Baltic States suffered a serious economic crisis against the backdrop of the prolonged deficit in the Current Account.

In conclusion, only a few examples were found of economies that sustained a large, prolonged Current Account deficit without experiencing an episode of sharp depreciation or a crisis in real economic activity of the type that affected Spain, Portugal, Greece, Cyprus and Eastern Europe in 2008.

Table 14: Current Account, rate of growth and change in price levels (PPP) in Eastern European countries, 2006–10

	Current Account surplus			Price Level - PPP[1]		Rate of growth of GDP		
	2007	2010	Change between 2007 and 2010	2008 compared to 2006	2010 compared to 2008	1995–2005	2006–07	2009–10
Bulgaria	-27.2	-1.2	25.9	30%	-10%	4%	7%	-2%
Latvia	-22.3	3	25.4	43%	-15%	8%	12%	-9%
Georgia	-19.8	-10.3	9.5	32%	-13%	8%	11%	0%
Estonia	-15.9	2.9	18.8	26%	-11%	8%	9%	-6%
Moldova	-15.2	-7.9	7.3	52%	-8%	3%	4%	1%
Lithuania	-14.6	1.5	16	28%	-12%	7%	9%	-6%
Romania	-13.6	-4.5	9.1	27%	-16%	3%	7%	-4%
Albania	-10.8	-11.4	-0.7	14%	-9%	6%	5%	3%
Macedonia	-7.4	-2.2	5.2	26%	-10%	2%	5%	0%
Croatia	-7.3	-1.6	5.7	21%	-10%	4%	5%	-3%
Hungary	-7.3	1.2	8.5	27%	-14%	4%	2%	-3%
Belarus	-6.7	-15	-8.3	22%	-15%	7%	10%	5%
Armenia	-6.4	-14.7	-8.2	45%	-12%	9%	13%	-6%
Slovak Republic	-4.9	-3.5	1.4	38%	-8%	4%	9%	-1%
Czech Republic	-4.4	-3.8	0.6	31%	-12%	3%	6%	-1%
Ukraine	-3.7	-2.2	1.5	27%	-16%	4%	8%	-5%
Russian Federation	6	4.8	-1.2	33%	-4%	4%	9%	-2%

1 Price Level of GDP, G-K method (US = 100), Penn World Table.

2 Lithuania, Latvia, Estonia are members of the ERM and have a floating currency band of +/-15 percent relative to the Euro. Slovakia joined the eurozone in 2009, Estonia in 2011 and Romania is expected to join in 2015. Bulgaria has a floating currency band against the euro.

6. Conclusion:

We found that sharp, prolonged depreciations were frequently preceded by a large, prolonged deficit in the Current Account. Contrary to the theory posited by Obstfeld and Rogoff (1995), rather than heralding rapid future growth, a large Current Account deficit increases the chances of a sharp real depreciation (and a certain slowdown of growth). Furthermore, contrary to the above-mentioned theory, the need to balance the

Current Account is critical not only in the long term but also in the 3 to 8 year range; the examples of a large, prolonged deficit in the Current Account without a depreciation or capital crisis are few and far between. The key finding in this paper is that a real, large and prolonged depreciation is necessary to reduce the Current Account deficit—a real depreciation on the scale of 25 to 30 percent is required to increase the Current Account by three percent of GDP. In some countries, even a sharp, prolonged depreciation of this kind failed to reduce the Current Account deficit. This elasticity is somewhere between that estimated in the study of Bahmani, et al., who found that the Marshall-Lerner conditions are not satisfied in half of the countries; and the calibration presented by Obstfeld and Rogoff (2002), whereby the US economy would have to make a real depreciation of approximately (only) 33 percent to reduce the Current Account deficit by five percent of GDP.

If the elasticity of the Current Account relative to the real exchange rate is not significantly different from unity (but higher than unity so that the Marshall-Lerner conditions are still satisfied), this may explain why a three-year deficit of three percent of GDP is considered a large deficit that raises fears of a currency crisis even in economies with promising growth potential. This elasticity also helps us understand the confusion faced by foreign investors in times of crisis—the investors have difficulty understanding what the real equilibrium exchange rate will be at the end of the crisis, particularly when there is uncertainty over the elasticity. A mistaken estimate of the degree of elasticity might create an impression of panic (reversal of capital flows, as occurred in Southeast Asia in 1996–97, for example). Foreign investors' fears that the Marshall-Lerner conditions are not satisfied might lead them to dispose of their investments in the local currency, since the depreciation that occurred is not expected to balance the Current Account.

Krugman (1989) distinguished between the short to medium term and the long term. In the short to medium term, the elasticity of exports and imports to the real exchange rate is rather low so that only extremely large fluctuations in the real exchange rate will help reduce a Current Account deficit. However, in the long term there is much higher elasticity, and this is confirmed by the fact that in the long term the real exchange rate is a stationary (stable) variable that upholds the assumption of purchasing power parity. (PPP is the basic assumption in many economic models and empirical evidence has been found for it). In the long term, the economy can develop new export industries and find new markets, enabling it to increase exports and reduce the Current Account deficit without a large decline in prices. However, it appears that international capital markets have limited patience and investors are cautious about financing an economy that requires a prolonged adjustment process. In many cases, the combination of impatience in the global capital markets and low elasticity of exports and imports to the exchange rate in the medium term causes a large Current Account deficit to end in crisis.

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Appendix 1:

Appendix Table 1.A
50 sharp depreciations that were preceded by a large Current Account deficit

Time and place of the crisis	Average inflation in three years before the sharp depreciation	Exchange rate regime, before the sharp depreciation [1]	Change (appreciation) in real exchange rate in three years preceding sharp depreciation	Current Account surplus, average for three years after the depreciation	Current Account surplus, average for three years preceding the depreciation	Significant crisis (or group of crises) close in time
Group 1.1 – 29 sharp, prolonged depreciations followed by significant decrease in Current Account deficit						
Lao PDR 1997	15	1	-5%	-0.1	-12.7	East Asia 1997
Georgia 1999	17	2	2%	-6.9	-12.7	Russia 1998
Moldova 1998	22	2	14%	-5.1	-10.1	Russia 1998
Chile 1982	27	1	19%	-8.4	-9.1	S. America 1982-83
Jamaica 1983	11	1	17%	-8.9	-9.0	S. America 1982-83
Paraguay 1989	27	1	-15%	2.6	-9.6	
Chile 1985	19	2	-19%	-3.7	-8.7	Mexico 1986
Tunisia 1986	8	2	-1%	-0.2	-7.7	
Thailand 1997	6	2	0%	10.2	-7.2	East Asia 1997
Ecuador 1983	15	1	9%	-2.5	-7.2	S. America 1982-83
Malaysia 1997	4	2	4%	12.7	-6.7	East Asia 1997
Mexico 1995	11	2	4%	-2.2	-6.5	
Colombia 1985	20	2	-7%	0.5	-6.4	Mexico 1985
Venezuela, RB 1989	30	1	-24%	4.8	-5.6	
Uruguay 1982	49	2	13%	-2.0	-5.4	S. America 1982-83
Mexico 1982	27	2	13%	2.3	-5.3	S. America 1982-83
Dominican Republic 1984	7	1	-3%	-3.8	-5.3	
Brazil 1983	97	2	26%	-0.7	-5.2	S. America 1982-83
Colombia 1999	19	2	0%	-0.5	-5.0	
Philippines 1986	25	1	8%	-1.9	-4.2	
Jamaica 1991	16	1	-5%	-0.4	-4.0	
Philippines 1997	9	1	11%	-1.4	-4.0	East Asia 1997
United Kingdom 1992	7	2	5%	-1.3	-3.6	Russia 1998
Argentina 2002	-1	1	3%	3.8	-2.9	
Kazakhstan 1998	78	2	38%	-1.8	-2.7	EMS
Indonesia 1997	9	2	-2%	4.4	-2.7	East Asia 1997
Ukraine 1998	158	2	40%	4.5	-2.6	Russia 1998
Sweden 1993	7	2	4%	1.5	-2.6	
Sweden 1982	15	2	3%	-0.3	-2.5	EMS
Group 1.2 – 11 sharp, prolonged depreciations that did not lead to a significant decrease in Current Account deficit						
Nepal 1991	9	1	-17%	-6.7	-7.6	
Paraguay 1985	27	1	-6%	-9.5	-6.2	Mexico 1995
Paraguay 1982	27	1	9%	-6.5	-6.2	S. America 1982-83
Israel 1979	39	.	-35%	-6.4	-5.2	
Nepal 1986	8	1	-12%	-6.3	-4.8	
Portugal 1979	23	.	-18%	-9.6	-4.3	
Greece 1983	23	2	8%	-5.0	-4.2	
Australia 1985	8	3	1%	-4.8	-4.1	
Brazil 1999	9	2	0%	-3.2	-3.4	
Guatemala 1986	10	1	21%	-5.3	-3.0	
Bolivia 1985	560	1	23%	-8.8	-2.9	Mexico 1995

Group 1.3 – 10 sharp depreciations that wound down after three years						
Romania 1999	84	2	53%	-4.2	-6.7	
Israel 1983	185	2	5%	0.8	-6.4	
Bolivia 1982	40	1	27%	-3.6	-5.7	S. America 1982-83
New Zealand 1984	13	2	-1%	-9.3	-5.2	
Bulgaria 1994	163	3	52%	1.4	-4.8	
Peru 1992	3,763	3	25%	-7.2	-4.2	S. America 1982-83
Brazil 2002	6	3	-9%	1.4	-4.1	Argentina 2002
Ecuador 1999	30	2	5%	-0.2	-3.7	
Dominican Republic 2003	7	2	-1%	-0.1	-3.4	
Haiti 2002	12	2	-5%	-1.0	-2.8	Argentina 2002

[1] Exchange rate regime: 1 fixed, 2 intermediate regime, 3 floating.

Appendix Table 1.B
25 sharp depreciations that were not preceded by a large Current Account deficit

Time and place of the crisis	Average inflation in three years before the sharp depreciation	Exchange rate regime, before the sharp depreciation[1]	Change in real exchange rate in three years preceding sharp depreciation	Current Account surplus (percent of GDP)	Current Account surplus, average for three years preceding the depreciation	Significant crisis (or group of crises) close in time
Group 1.2 – 18 sharp, prolonged depreciations (that persisted for more than three years)						
Ecuador 1986	36	1	-14%	-6.2	-2.5	Mexico 1985
Uruguay 2002	5	2	-2%	-0.2	-2.3	Argentina 2002
Egypt, Arab Rep. 1989	21	2	16%	7.4	-2.3	Real appreciation + high inflation
India 1991	8	2	-20%	-0.9	-2.3	Large budget deficit, political instability, large deficit in terms of exports
Korea, Rep. 1997	5	2	-1%	6.9	-2.2	Regional crisis
Dominican Republic 1987	24	3	6%	-3.1	-2.2	
Iran, Islamic Rep. 1989	27	2	73%	0.3	-1.9	Real appreciation and high inflation
Algeria 1990	7	2	-29%	..	-1.7	
Italy 1992	6	2	5%	1.4	-1.6	EMS, large budget deficit
Indonesia 1983	13	2	15%	-3.3	-0.9	
China 1990	15	1	26%	0.8	-0.8	Tiananmen Square events
Egypt, Arab Rep. 2003	3	2	-21%	3.3	-0.2	
Russian Federation 1998	87	2	31%	13.9	1.5	Real appreciation, high inflation, collapse of import revenues
China 1985	-	1	-12%	-1.2	1.8	Economy closed to international trade
Venezuela, RB 1984	11	1	14%	-0.4	1.8	
Mexico 1985	75	2	3%	-0.3	2.3	Falling oil prices, earthquake, large budget deficit
Japan 1995	1	3	25%	2.2	2.9	End of asset bubble in 1991, severe recession + real, sharp appreciation
Venezuela, RB 2002	17	2	11%	15.0	4.6	Argentina 2002
Group 2.2 – 7 sharp depreciations that wound down after three years						
Venezuela, RB 1994	35	2	10%	6.7	-2.2	Real appreciation against inflation, large budget deficit
Turkey 2001	68	2	9%	-2.1	-1.1	Real appreciation against high inflation, deterioration in terms of trade
Colombia 2002	9	3	-11%	-1.3	-0.5	Large budget deficit, crisis in Argentina
Brazil 1990	763	2	32%	0.4	0.3	Real appreciation and high inflation
China 1994	8	2	2%	1.6	0.8	
Syrian Arab Republic 1994	11	1	11%	1.9	1.4	
Iran, Islamic Rep. 1985	17	2	8%	-1.9	1.6	Falling oil prices

[1] 1. Exchange rate regime: 1 fixed, 2 intermediate regime, 3 floating.

Appendix 2:

More on the causes of regional crises:

The East Asia crises in 1996–97: The years preceding the crises in East Asia were the perfect example of correct economic management: the governments had a budget surplus, the government aid plans for selected industries led to rapid growth of exports, and GDP in most countries grew rapidly. Although the economic growth was based on large deficits in the Current Account, the assumption was that these deficits would be used to finance investments with solid returns (in view of the rapid increase in productivity, exports and GDP), so that the deficit would therefore be temporary and passing, which would not indicate an over-appreciation of the real exchange rate. In 1994, Krugman argued that the rapid growth in East Asia was not accompanied by increased productivity but was based on a marked increase in capital. In the second half of 1995, the growth of exports slowed as did the growth rates of countries in the region (some of which had strong trade ties with one another). Against the backdrop of the slowdown, the prevailing view was that the banking system, which had acted as the arm of the government in encouraging certain branches of industry, had given loans to failed projects and the firms would therefore be unable to repay their debts to the banks.[39] In fact, the banks were the arm of the government and the banks' bad debts must therefore be attributed to the government; consequently, the government debt was actually much larger than the official debt figure.

Appendix Table 2.A

Key indicators for select East Asia countries, 1994–96

	Rate of growth of GDP	Current Account balance	Government surplus	Weight of investment in GDP
Laos	4.8	-12.7	N.A	N.A
Malaysia	7.0	-6.7	2.5	42.1
Thailand	7.1	-7.2	3	41.4
Philippines	2.6	-4.0	0	23.5
Korea	7.1	-2.2	2.4	37.8
Indonesia	6.3	-2.7	2.2	31.2

The East Asia crisis began in Thailand due to a marked slowdown in the growth rate of exports and a notable deficit in the Current Account. The Thai currency was pegged to the dollar in a fixed exchange rate regime, and its real value rose steadily in the two years preceding the crisis. The mismatch between the currency's value and real developments created expectations of a depreciation and repeated speculative attacks led to a sharp depreciation in 1997. In the same quarter, the crisis spread to Indonesia and the Philippines (where the Current Account deficits were low relative to Thailand), and Malaysia (which had introduced a floating exchange rate regime in 1995). Subsequently, there was also a sharp depreciation in South Korea, with its large, advanced economy but which also had a large short-term debt. The depreciation did not diminish the external debt of these countries since the international liabilities were largely based on debt quoted in foreign currency. In fact, the depreciation actually

[39] In July 1997, the huge Korean company Kia Motors experienced a crisis and required an urgent government bailout. Subsequently, both Daewoo Motors and Samsung Motors were found to be in financial difficulties.

aggravated the state of the local financial system given that most liabilities were denominated in foreign currency while most of the assets were denominated in domestic currency. Thailand, Korea and Indonesia were forced to accept large aid packages from the IMF to extricate themselves from the crisis.

In East Asia, the crises in Thailand, Malaysia, Philippines and Laos all closely resemble the "overappreciation crisis pattern", and all had particularly large Current Account deficits. Developments in Indonesia and Korea—countries that had lower Current Account deficits—were somewhat similar to this pattern. Indonesia and Korea might have extricated themselves from the Current Account deficits unharmed were it not for the effect of the regional crisis[40] and the fact that their liabilities were mostly based on short-term debt.[41] Nevertheless, the real exchange rates for both countries remaining at much more depreciated levels than their pre-crisis level for many years after the crisis[42] indicates that a significant correction of the real exchange rate was necessary.

The crisis in Latin America 1982–83. The large Current Account deficits of Latin American countries were supported by external entities that led to an increase in capital inflows.[43] The oil-producing countries looked for investment channels for their surplus revenues, while the low US federal funds rate (in 1975–78) encouraged investors to buy high-risk assets as US commercial banks intensified their international financing activity (to compensate for the loss of market segment in more traditional areas of activity). Some of the Latin American countries grew relatively rapidly in the 1970s, but even those countries that grew more slowly benefited as well from investors' confidence and increased their Current Account deficits. The deficit was mainly financed by government debt: according to the World Bank, the countries of Latin America together increased their national debt from US$ 29 billion in 1970 to US$ 169 billion in 1978. Eighty percent of this debt was government debt and the interest on this debt was largely variable (LIBOR).

[40] A depreciation in one country reduces its demand for the exports of other countries. Additionally, a depreciation in one country improves its competitiveness relative to the other countries in the region. There are also channels of "contagion" that do not arise from a direct relationship between economies, for example: depreciation in one country caused investors a loss, motivating them to reduce their exposure to other countries in the region, thus increasing the depreciation pressure in the other countries as well.

[41] According to Chang and Velasco (1998), 80 percent of the flow of capital into Thailand, Indonesia and South Korea in 1990-1994 was in short-term loans, in Malaysia the percentage was 92 percent.

[42] The real exchange rate depreciated by 20 percent in Korea and 30 percent in Indonesia – on average for 14 years after the crisis compared with the 7 year average before the crisis.

[43] This in addition to the internal factors and liberalization in the movement of capital.

Appendix Table 2.B
Macroeconomic indicators for countries in Latin America before and after the crisis of 1982

	Current Account before 1979–81	Current Account after 1983–85	Weight of exports in GDP 1979–81	Rate of growth 1970–79	Rate of growth 1977–79	Public consumption 1977–80	Change in real exchange rate [1]
Brazil	-4.9	-1.2	9	5.9	3.5	9.5	-18%
Chile	-9.1	-8.4	21	0.9	6.7	13.9	-25%
Mexico	-5.3	2.3	11	3.4	5.0	10.7	-24%
Uruguay	-5.4	-2.0	16	2.3	4.0	12.5	-33%
Paraguay	-6.2	-6.5	14	5.3	9.2	6.2	-19%
Ecuador	-6.4	-0.9	24	4.3	1.8	17.7	-12%
Bolivia	-5.7	-3.6	24	1.6	-0.9	13.3	72%
Argentina [2]	-4.3	-2.2	6	1.3	2.6	10.4	NA
Honduras [2]	-10.5	-7.6	36	2.7	3.1	11.7	NA

[1] The average real exchange rate for 1983-1985 compared with 1980-1981.
[2] We did not have information about the real exchange rate for Argentina and Honduras, but they too almost certainly had a real, sharp depreciation.

The energy crisis in 1979 increased the costs of imported fuel for South American countries, and led to an increase in the monetary interest rate in the US. Higher US interest rates increased the costs of financing the debt of the South American countries, diverted foreign investments to more secure assets in the US and strengthened the dollar (and as a result, the debt burden in terms of domestic currency grew). Furthermore, the higher interest rate and energy prices slowed the growth rate in South America so that investors lost confidence in the ability of the emerging markets to repay their debts. Between 1979 and 1982, the national debt in South American countries doubled. Mexico was the first to announce a default to the IMF, and was followed by Brazil, Argentina and Venezuela, who all asked to reschedule their debts. The crisis spread because a default by one country affected the credit rating of the large US banks (the principal financing agents) and their ability to continue to lend money to other countries. Moreover, contagion spread from one country to another, magnifying the crisis in the entire region—any depreciation by one country affected the situation of exporters in the other countries and the crisis spread. It was only in 1989 that the banks and the US Administration concluded that the debt rescheduling was insufficient and that debts had to be wiped out (Brady Plan).

EMS crisis – The depreciation in the UK and Italy in 1992, and that of Sweden in 1993, resembles the pattern of a crisis originating in an overappreciation: a gradual currency appreciation against the backdrop of an ever increasing Current Account deficit, until there is a sharp, prolonged depreciation in the real exchange rate. The similarity to the overappreciation pattern is far from perfect given that the Current Account deficits were not particularly high, especially in Italy[44] (but in view of the recession, the structural/cyclically adjusted deficit was clearly higher).

The currencies of Italy and the UK were part of the European EMS currency arrangement that limited fluctuations in the value of the European currencies that were

[44] One similarity between the depreciation in Italy and those of Mexico and Argentina was the use of a fixed exchange rate with the purpose of overcoming high inflation.

part of the arrangement;[45] in practice, the currencies were pegged to the German mark (Deutschmark) as the strongest currency on the continent (partly due to the monetary policy of Germany's central bank). In the years preceding the crisis (1990–92), exports from Sweden, the UK[46] and Italy fell considerably, the Current Account deficit increased and growth slowed. Against this backdrop, the need for a real depreciation increased, although the depreciation only took place after these countries abandoned their commitment to the EMS arrangement and a there was a nominal depreciation.

Appendix Table 2.C
Development of the Current Account, GDP and the real exchange rate before and after the EMS crisis

		Current Account surplus [1]	Real exchange rate (index)	Weight of exports in GDP [1]	Rate of growth of GDP	Weight of public consumption [1]
Sweden	1985–87	-0.3	100.0	33.9	2.6	26.9
	1990–92	-2.6	112.0	28.9	-1.1	27.8
	1993–95	0.1	92.2	36.2	1.3	27.8
UK	1985–87	-0.4	100.0	26.6	3.8	20.7
	1990–92	-2.6	109.3	23.5	-0.4	20.5
	1993–95	-1.3	95.1	26.7	2.9	20.0
Italy	1985–87	-0.3	100.0	20.1	2.9	18.7
	1990–92	-1.9	110.0	18.4	1.4	20.1
	1993–95	1.4	88.0	23.3	1.4	18.9

[1] Percent of GDP.

[45] The EMS began to operate in 1987 and it restricted the fluctuations in the cross value of different European currencies – countries where the demand for their currency weakened were forced to raise their interest rates to maintain the value of their currency.

[46] The UK's current account deficit in 1988–90 reached 4.3 percent of GDP and it shrank to 1.8 percent of GDP in the year before the crisis (1991).

Appendix 3:

Appendix Table 3.A
Estimating the probability of a sharp depreciation. Explanatory variables: "replaced variable" with a two-year lag (appears in left-hand column) and fixed effect for country

$$\text{logit}(\text{Dmi\_Crisis}_{i,t}) = \alpha + \beta X_{i,t-2} + FE_i + u_{i,t}$$

(Each cell represents a different regression, using a different "replaced variable")

	Sharp depreciations	Sharp depreciations	Sharp depreciations	Prolonged depreciations	Prolonged depreciations	Prolonged depreciations
	1980-2007	1980-2011	1980-2007	1980-2007	1980-2011	1980-2007
Fixed Effects	All countries	All countries	Excluding S.E. Asia	All countries	All countries	Excluding S.E. Asia
	1A	1B	1C	1D	1E	1F
Current Account surplus (percent of GDP)	-0.08*** (0.025)	-0.061*** (0.021)	-0.073*** (0.026)	-0.273*** (0.061)	-0.246*** (0.055)	-0.303*** (0.067)
Exchange rate regime: 1-fixed, 2-mixed fixed, 3- mixed floating & 4-floating.	-0.411*** (0.137)	-0.36*** (0.129)	-0.501*** (0.15)	-0.731*** (0.209)	-0.737*** (0.211)	-0.958*** (0.255)
Inflation, change in consumer prices	0.027** (0.011)	0.024** (0.011)	0.027** (0.011)	-0.427 (0.531)	-0.266 (0.396)	-0.565 (0.656)
Foreign exchange reserves (in import months)	-0.165** (0.083)	-0.087 (0.059)	-0.097 (0.09)	-0.054 (0.098)	-0.1 (0.086)	-0.038 (0.109)
Net income account (percent of GDP)	19.469** (8.778)	17.196** (7.571)	17.523* (9.725)	21.717* (12.358)	16.766 (11.448)	25.063 (15.269)
Net income account, investments (percent of GDP)	23.169** (10.125)	16.748** (8.499)	20.692* (10.592)	29.188* (15.338)	19.745 (13.236)	33.124* (16.979)
Debt servicing in relation to national income	-0.163*** (0.062)	-0.117** (0.05)	-0.137** (0.063)	-0.203** (0.097)	-0.137* (0.082)	-0.195* (0.102)
Total savings (percent of GDP)	-0.071** (0.028)	-0.029 (0.022)	-0.09*** (0.031)	-0.085** (0.041)	-0.086** (0.039)	-0.087** (0.044)
Index of GDP prices	-0.007*** (0.003)	-0.004** (0.002)	-0.007** (0.003)	-0.009** (0.004)	-0.012*** (0.004)	-0.009** (0.004)
Final government consumption (percent of GDP)	0.117** (0.049)	0.081* (0.043)	0.128** (0.05)	0.09 (0.078)	0.065 (0.074)	0.118 (0.082)
Rate of national savings (percent of GDP)	-0.045* (0.025)	-0.027 (0.018)	-0.053** (0.027)	-0.097** (0.041)	-0.106*** (0.038)	-0.096** (0.042)
Export of goods (real annual rate)	-0.019* (0.01)	-0.012 (0.009)	-0.02* (0.011)	-0.003 (0.017)	0.004 (0.016)	0 (0.018)
Export of goods and services (real annual rate)	-0.018* (0.01)	-0.011 (0.01)	-0.02* (0.011)	-0.009 (0.017)	-0.002 (0.017)	-0.008 (0.018)
(PPG + PNG) (NFL, of GDP) Portfolio investment, bonds	9.004 (13.644)	4.798 (11.286)	4.129 (15.911)	-8.475 (23.565)	-7.432 (20.26)	-22.374 (31.595)
Rate of growth	-0.913 (2.359)	0.832 (2.293)	-1.87 (2.354)	-2.65 (3.335)	-3.344 (3.258)	-2.042 (3.53)
Change in rate of growth	2.721 (2.389)	3.384 (2.157)	2.717 (2.547)	-2.073 (4.119)	-0.845 (4.171)	-0.991 (4.317)
Unemployment rate	-0.077 (0.065)	-0.099 (0.063)	-0.058 (0.066)	-0.118 (0.09)	-0.1 (0.091)	-0.097 (0.092)
GDP gap (in terms of potential GDP)	0.157 (0.149)	0.191 (0.13)	0.129 (0.174)	0.037 (0.193)	0.022 (0.186)	0.031 (0.218)
Terms of trade (UN index)	0.007 (0.005)	0.007 (0.004)	0.007 (0.005)	0.015** (0.006)	0.012** (0.006)	0.015** (0.006)
Terms of trade (consolidated)	0.007 (0.004)	0.008 (0.005)	0.007 (0.005)	0.012** (0.006)	0.015** (0.006)	0.015** (0.006)

Credit to banking sector (percent of GDP)	0.002 (0.006)	0.005 (0.005)	0.003 (0.007)	-0.011 (0.009)	-0.013 (0.009)	-0.013 (0.011)
Credit to business sector (percent of GDP)	0.004 (0.008)	0.009 (0.006)	0.001 (0.009)	-0.002 (0.01)	-0.007 (0.01)	-0.003 (0.012)
Political violence index (between countries)	0.063 (0.201)	0.071 (0.199)	0.105 (0.205)	0.427 (0.434)	0.442 (0.416)	0.715 (0.988)
Political violence index (within country)	0.071 (0.116)	0.11 (0.109)	0.183 (0.172)	0.155 (0.22)	0.187 (0.202)	-0.003 (0.232)
Political violence index (inclusive)	0.054 (0.088)	0.08 (0.084)	0.104 (0.109)	0.158 (0.164)	0.179 (0.156)	0.091 (0.157)
Industry, value added (% of GDP)	0.003 (0.026)	0.002 (0.023)	0.004 (0.027)	-0.067 (0.042)	-0.054 (0.041)	-0.07 (0.044)
Weight of investment in GDP	0.034 (0.026)	0.026 (0.021)	0.012 (0.031)	0.077* (0.045)	0.067 (0.043)	0.07 (0.051)
Import of goods (real annual rate)	-0.002 (0.008)	0.005 (0.007)	-0.008 (0.009)	0.003 (0.012)	0.004 (0.012)	0.004 (0.013)
Import of goods and services (real annual rate)	0.009 (0.008)	0.015** (0.007)	0.005 (0.009)	0.009 (0.012)	0.01 (0.013)	0.012 (0.013)
The economy's net assets abroad	-0.683 (2.01)	-0.122 (1.248)	-0.492 (2.165)	0.033 (2.616)	0.018 (2.394)	0.241 (2.708)
The economy's net assets abroad in debt instruments	0.727 (0.756)	0.761 (0.687)	0.567 (0.853)	2.493 (1.544)	1.361 (1.307)	2.426 (1.626)

Appendix Table 3.B
Estimation of the probability of a sharp depreciation: Explanatory variables: "Replaced variable" with a two-year time lag (appears in left-hand column) and fixed effect for country, Current Account deficit with a 3-year lag and change in deficit with two-year lag

$$\text{logit}(\text{Dmi\_Crisis}_{i,t}) = \alpha + \beta X_{i,t-2} + \delta_1 \cdot CA_{t-3} + \delta_2 \cdot \Delta CA_{t-2} + FE_i + u_{i,t}$$

(Each cell represents a different regression, using a different "replaced variable")

Fixed Effects	1980-2007	1980-2011	1980-2007 excluding S.E. Asia	1980-2007 excluding depreciations that wound down	1980-2011 excluding depreciations that wound down	1980-2007 excluding S.E. Asia and depreciations that wound down
	2A	2B	2C	2D	2E	2F
Exchange rate regime: 1-fixed, 2- mixed fixed, 3 – mixed floating, 4-floating	-0.348** (0.152)	-0.287** (0.142)	-0.436** (0.166)	-0.545*** (0.2)	-0.498*** (0.197)	-0.678*** (0.236)
Inflation, change in consumer prices	0.037*** (0.014)	0.035** (0.014)	0.036*** (0.014)	-0.915 (0.797)	-0.58 (0.651)	-1.323 (1.013)
Foreign exchange reserves (in import months)	-0.17* (0.096)	-0.097 (0.066)	-0.114* (0.109)	-0.058 (0.105)	-0.108 (0.09)	0.031 (0.129)
Net income account (percent of GDP)	20.474** (9.882)	20.525** (8.486)	19.569** (11.232)	23.491* (12.138)	24.938** (11.654)	25.743* (15.307)
Net income account, investments (percent of GDP)	25.132** (11.584)	20.655** (9.643)	23.127** (12.278)	28.742** (14.596)	28.423** (13.753)	29.142* (16.61)
Debt servicing in relation to national income	-0.163** (0.069)	-0.13** (0.056)	-0.137** (0.071)	-0.159* (0.084)	-0.131* (0.073)	-0.134 (0.09)
Total savings (percent of GDP)	-0.029 (0.034)	0.009 (0.028)	-0.054 (0.038)	0.021 (0.042)	0.014 (0.04)	-0.002 (0.049)
Index of GDP prices	-0.004 (0.003)	-0.003* (0.002)	-0.004 (0.003)	-0.006 (0.004)	-0.01*** (0.004)	-0.004 (0.004)
Final government consumption (percent of GDP)	0.081 (0.055)	0.053 (0.048)	0.1 (0.057)	0.03 (0.068)	0.014 (0.064)	0.063 (0.072)
Rate of national savings (percent of GDP)	-0.016 (0.021)	-0.011 (0.018)	-0.024 (0.025)	-0.021 (0.032)	-0.043 (0.028)	-0.041 (0.045)
Export of goods (real annual rate)	-0.01 (0.011)	-0.005 (0.01)	-0.009 (0.012)	-0.004 (0.014)	-0.001 (0.014)	0.005 (0.016)
Export of goods and services (real annual rate)	-0.007 (0.011)	-0.002 (0.011)	-0.007 (0.013)	0.003 (0.015)	0.006 (0.015)	0.01 (0.017)
(PPG + PNG) (NFL, of GDP) Portfolio investment, bonds	10.002 (14.557)	-0.35 (11.419)	10.712 (16.523)	-2.1 (17.576)	-10.278 (14.879)	-6.411 (21.814)
Rate of growth	-4.042 (3.157)	-1.406 (2.753)	-5.663 (3.344)	-6.519 (4.075)	-7.36* (3.914)	-8.564* (4.6)
Change in rate of growth	4.354* (2.613)	4.605* (2.362)	4.502* (2.781)	3.107 (3.86)	5.177 (3.777)	4.267 (4.455)
Unemployment rate	-0.015 (0.071)	-0.042 (0.066)	0.004 (0.074)	0.022 (0.068)	0.059 (0.064)	0.036 (0.071)
GDP gap (in terms of potential GDP)	0.211 (0.216)	0.308 (0.191)	0.219 (0.297)	0.159 (0.221)	0.12 (0.205)	0.146 (0.341)
Terms of trade (UN index)	0 (0.006)	0.001 (0.005)	-0.003 (0.007)	0.006 (0.006)	0.004 (0.006)	0.005 (0.007)
Terms of trade (consolidated index)	0.001 (0.005)	0.002 (0.006)	-0.000 (0.006)	0.004 (0.006)	0.006 (0.006)	0.005 (0.007)
Credit to the bank sector (percent of GDP)	0.005 (0.006)	0.008 (0.005)	0.007 (0.007)	-0.002 (0.009)	-0.006 (0.008)	-0.009 (0.012)

Credit to the business sector (percent of GDP)	0.007 (0.008)	0.011* (0.006)	0.004 (0.01)	0.007 (0.01)	-0.001 (0.008)	0.001 (0.013)
Political violence index (between countries)	0.062 (0.206)	0.088 (0.205)	0.12 (0.213)	0.321 (0.346)	0.272 (0.328)	0.701 (0.817)
Political violence index (within country)	0.07 (0.126)	0.119 (0.117)	0.262 (0.208)	-0.027 (0.134)	0.017 (0.131)	0.135 (0.249)
Political violence index (inclusive)	0.056 (0.097)	0.09 (0.091)	0.145 (0.127)	0.025 (0.122)	0.05 (0.117)	0.216 (0.192)
Weight of industry in GDP	0 (0.032)	0.007 (0.027)	-0.006 (0.034)	-0.069 (0.044)	-0.064 (0.042)	-0.112* (0.054)
Weight of investment in GDP	-0.001 (0.03)	0.015 (0.026)	-0.023 (0.036)	-0.04 (0.039)	-0.049 (0.038)	-0.106* (0.055)
Import of goods (real annual rate)	-0.01 (0.009)	-0.002 (0.008)	-0.016 (0.01)	-0.004 (0.011)	-0.003 (0.011)	-0.01 (0.013)
Import of goods & services (real annual rate)	0.004 (0.009)	0.01 (0.009)	0 (0.01)	0.003 (0.012)	0.005 (0.012)	0 (0.013)
The economy's net assets abroad	-0.673 (2.538)	0.213 (1.417)	-0.313 (2.676)	-1.594 (3.408)	-2.545 (2.789)	-1.954 (3.899)
The economy's net assets abroad in debt instruments	1.28 (0.815)	1.096 (0.761)	1.357 (0.922)	2.048* (1.214)	1.659 (1.112)	2.671* (1.532)