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Thirty Years of Current Account Imbalances, Current Account Reversals, and Sudden Stops

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In this paper I analyze the anatomy of current account adjustments in the world economy during the past three decades. The main findings may be summarized as follows: (i) Major reversals in current account deficits have tended to be associated with "sudden stops" of capital inflows. (ii) The probability of a country experiencing a reversal is captured by a small number of variables that include the (lagged) current account to GDP ratio, the external debt to GDP ratio, the level of international reserves, domestic credit creation, and debt services. (iii) Current account reversals have had a negative effect on real growth that goes beyond their direct effect on investments. (iv) There is persuasive evidence indicating that the negative effect of current account reversals on growth will depend on the country's degree of openness. More open countries will suffer less—in terms of lower growth—than countries with a lower degree of openness. (v) I was unable to find evidence supporting the hypothesis that countries with a higher degree of dollarization are more severely affected by current account reversals than countries with a lower degree of dollarization. And (vi) the empirical analysis suggests that countries with more flexible exchange rate regimes are able to accommodate the shocks stemming from a reversal better than countries with more rigid exchange rate regimes. [JEL F30, F32]

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Recent discussions on international macroeconomic policy have centered on the large current account imbalances experienced by a number of countries, including the United States with a deficit of 5 percent of GDP and China with a surplus of almost 3 percent of GDP.[1] Policymakers, analysts, and academics have focused on the international adjustment process, and have discussed the way in which the correction of these current account imbalances is likely to affect exchange rates, job creation, and economic growth.[2] The source of financing of the U.S. current account deficit has also become a source of concern. A number of analysts have argued that by relying on foreign—and particularly Asian—central banks' purchases of treasury securities, the United States has become particularly vulnerable to sudden changes in expectations and economic sentiments.[3] The IMF's former Director of Research, Ken Rogoff, has made a similar point. In a press conference given in September 18, 2003, a few days before stepping down from the position, he said:[4]

> [L]ooking . . . to the second half of 2004 and beyond, there are still many risks . . . These include the disturbing pattern of global current account imbalances, which is likely to get worse before it gets better, with the United States continuing to absorb a large share of world savings, and Asia providing much of it. (Rogoff, 2003.)

And from here Rogoff went on to argue that the effects of these imbalances on currency values are likely to be significant:

> [W]hen the dollar falls, the question is, where is the burden of adjustment going to be? It is going to be a serious problem regardless of how the fall in the dollar is distributed although the more slowly it happens, the better. But, clearly, if the euro has to bear the lion's share of the adjustment in the dollar, that is going to create a lot more difficulties than if it is more evenly distributed; than if the Asian currencies—not just China but all the Asian currencies—also appreciate, allowing themselves to appreciate significantly against the dollar. (Rogoff, 2003.)

Discussions on current account imbalances and on the burden of the adjustment process are not new in international policy circles. Indeed, in the 1940s John Maynard Keynes was clearly aware of the issue, and his proposal for an international

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[1]Although it has attracted less international attention, Russia's current account surplus, in excess of 8 percent of GDP, is also becoming the subject of some debate.

[2]During his much-publicized trip to China and Japan in September 2003, U.S. Treasury Secretary John W. Snow tried to persuade the Japanese and Chinese authorities that they should allow their currencies to appreciate relative to the U.S. dollar. An appreciation of the yen and the yuan, he implied, would allow for a gradual correction of international imbalances and for a fairer distribution of the burdens of adjustment. Indeed, many analysts have argued that a strengthening of the Asian currencies is required to lift some of the pressure from the euro, whose appreciation during the past year and a half has seriously affected European competitiveness. See, for example, Hughes (2003).

[3]See, for example, Martin Wolf's October 1, 2003, article in the *Financial Times,* "Funding America's Recovery Is a Very Dangerous Game," (page 15).

[4]The complete press conference is available via the Internet at: *http://www.imf.org/external/np/tr/2003/tr030918.htm.*

"Clearing Union" was based on the notion that in the face of large payments imbalances both deficit and surplus nations should share the burdens of adjustment.[5]

In recent years there have also been concerns regarding current account behavior in the emerging and transition countries. In particular, a number of authors have asked whether large current account deficits have been associated with the currency crises of the 1990s and 2000s. While some authors, including Fischer (2003), have argued that large current account deficits are a sign of clear (and future) danger, others have argued that significant deficits do not increase the probability of a currency crisis (Frankel and Rose, 1996). Recently, much of the discussion on the emerging and transition nations has moved towards the implementation of appropriate "crisis prevention" policies. In that spirit, a number of analysts have developed models of current account sustainability and have asked what determines the sustainable level of international financing that a particular country is able to secure over the medium and long run.[6] Some authors have also analyzed episodes of current account reversals, or large reductions in the current account deficit in a short period of time (Milesi-Ferretti and Razin, 2000; and Edwards, 2002).

Modern macroeconomic models of open economies have emphasized the fact that the current account is an intertemporal phenomenon. These models recognize two basic interrelated facts. First, from a basic national accounting perspective the current account is equal to savings minus investment. Second, since both savings and investment decisions are based on intertemporal factors—such as life cycle considerations and expected returns on investment projects—the current account is necessarily an intertemporal phenomenon. Sachs (1981) emphasized forcefully the intertemporal nature of the current account, arguing that to the extent higher current account deficits reflected new investment opportunities, there was no reason to be concerned about them. An important and powerful implication of intertemporal models is that, at the margin, changes in national savings should be fully reflected in changes in the current account balance (Obstfeld and Rogoff, 1996). Empirically, however, this prediction of the theory has been systematically rejected by the data.[7] Typical analyses that have regressed the current account on savings have found a coefficient of approximately 0.25, significantly below the hypothesized value of 1.

Numerical simulations based on the intertemporal approach have also failed to account for current account behavior. According to these models a country's optimal response to negative exogenous shocks is to run *very high* current account deficits, indeed much higher than what is observed. Obstfeld and Rogoff (1996), for example, develop a model of a small open economy where under a set of plausible parameters the steady state trade surplus is equal to 45 percent of GDP, and

[5]See, for example, the discussion in Chapter 6 of Skidelsky's (2000) third volume of Keynes' biography, and the papers, reports, and memoranda by Keynes cited in that chapter.

[6]Some of the most influential work on this subject has been done at the IMF by Gian Milesi-Ferretti and his associates. See Milesi-Ferretti and Razin (1996, 1998, 2000), Ostry (1997), Adedeji (2001), McGettigan (2000), and Knight and Scacciavillani (1998).

[7]See, for example, Ogaki, Ostry, and Reinhart (1995), Ghosh and Ostry (1995), and Nason and Rogers (2002).

the steady state debt to GDP ratio is equal to 15.[8] According to a model developed by Fernandez de Cordoba and Kehoe (2000) the optimal response to financial reform in an industrial country such as Spain is to run a current account deficit that peaks at 60 percent of GDP.[9]

In trying to explain the lack of empirical success of intertemporal models a number of authors have compiled a list of (inadequate) assumptions that can account for the observed discrepancies between theory and reality. These include nonseparable preferences, less than perfect international capital mobility, fiscal shocks, and changing interest rates (Nason and Rogers, 2002). In a series of recent papers Kraay and Ventura (2000, 2002) and Ventura (2003) have proposed some amendments to the traditional intertemporal model that go a long way in helping bridge theory with reality. In their model portfolio decisions play a key role in determining the evolution of the current account balance. When investors care about both return and risk, changes in savings will not be translated into a one-to-one improvement in the current account. In this case investors will want to maintain the composition of their portfolios, and only a proportion of the additional savings will be devoted to increasing the holdings of foreign assets (i.e., bank loans). In addition, they argue that when short-run adjustment costs in investment are added to the analysis, the amended intertemporal model traces reality quite closely. In this setting the behavior of countries' net foreign assets play an important role in explaining current account behavior. In particular, and as pointed out by Lane and Milesi-Ferretti (2002, 2003), changes in foreign asset valuation stemming from exchange rate adjustments will tend to affect the adjustment process and the evolution of current account balances.

Models that emphasize portfolio balance are also promising for understanding current account behavior in emerging countries. In particular, shifts in portfolio allocations driven by changes in perceived risk in the emerging countries can explain some of the large changes in current account deficits observed in these countries, including major current account reversals. As pointed out by Edwards (1999), a reduction in foreigners' (net) demand of an emerging country's assets will result in a decline in the country's sustainable current account deficit, forcing it into adjusting. Indeed, if this reduction in foreigners' demand for the country's assets is abrupt and significant—that is, if the country faces what has become to be known as a "sudden stop"—we are very likely to observe a major current account reversal. The magnitude of the current account adjustment will be particularly large during the transition from the "old" to the "new" foreign (net) demand for the country's assets. Although portfolio-based models of the current account are powerful and show considerable promise, there are still a number of questions that need to be addressed. As Ventura (2003) has argued, these include understanding better the role of trade in contingent financial claims, and understanding why international risk sharing is limited and why countries do not buy insurance.

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[8]Obstfeld and Rogoff (1996) do not claim that this model is particularly realistic. In fact, they present its implications to highlight some of the shortcomings of simple intertemporal models of the current account.

[9]Their analysis is carried on in terms of the trade account balance. In their model, however, there are no differences between the trade and current account balances.

The purpose of this paper is to analyze the historical behavior of current account imbalances, and the patterns of adjustment followed by countries with large payments disequilibria.[10] Since the focus of the discussion is on adjustment, the analysis mostly deals with extreme observations or episodes when countries have experienced *large* deficits and, to some extent, large surpluses. I am particularly interested in understanding the connection between current account adjustments and exchange rates. I am also concerned with the costs of current account deficit reversals, and their connection to sudden stops of capital inflows.[11] I analyze whether openness, the extent of dollarization, and the exchange rate regime affect the costs of reversals. Broadly speaking, in addressing these issues I am interested in tackling the question of whether the current account *matters.* More specifically, I ask whether economic authorities should be concerned if the country in question runs (large) current account deficits. In the past, authors that have dealt with this issue have reached different conclusions. Sachs (1981), for example, argued that to the extent that a (large) deficit was the result of an increase in investment, there was *no* cause for concern or for policy action. In an important article Corden (1994) argues that "[a]n increase in the current account deficit that results from a shift in private sector behavior—a rise in investment or a fall in savings—*should not be a matter of concern at all*" (p. 92, emphasis added). This view that large current deficits don't matter if they stem from private sector behavior has been associated with former U.K. Chancellor of the Exchequer Nigel Lawson, and is sometimes referred to as *Lawson's Doctrine.* In a series of papers Fischer (1988, 1994, 2003) has taken a different position. For example, in Fischer (1988, p. 115) he argued that the "primary indicator [of a looming crisis] is the current account deficit." And, in 1994, months before the Mexican crisis, he said: "[t]he Mexican current account deficit is huge, and it is being financed largely by portfolio investment. Those investments can turn around very quickly and leave Mexico with no choice but to devalue . . . And as the European and especially the Swedish experiences show, there may be no interest rate high enough to prevent an outflow and a forced devaluation" (Fischer, 1994, p. 306).[12]

In terms of the current literature, this paper is (somewhat) in the tradition of the work by Milesi-Ferretti and Razin (1998, 2000) and Edwards (1999, 2002, 2003) on sustainability, and of the recent work by Ventura (2003), Kraay and Ventura (2000, 2003), and Edwards (2002) that emphasizes the role of portfolio asset allocation in understanding current account behavior. The paper is eminently empirical; readers interested in models of the current account are referred to Obstfeld and Rogoff (1996) and Ventura (2003).

[10]This paper is part of a research project on adjustment in open economies. Other papers in this project include Edwards (1999), De Gregorio, Edwards, and Valdes (2000), Edwards and Susmel (2003), and Edwards (2003).

[11]On sudden stops see Dornbusch and others (1995) and Calvo (2003).

[12]In Edwards (2002) I argue that there is evidence suggesting that large current account deficits increase the probability of a balance of payments crisis. For results that point in the opposite direction see Frankel and Rose (1996).

I. Three Decades of Current Account Imbalances

In this section I analyze the distribution of current account balances in the world economy during the past 32 years. The data are taken from the World Bank data set (World Development Indicators) and cover all countries—advanced, transition and emerging—for which there is information.[13] In order to organize the discussion I have divided the data into six regions: (1) industrialized countries, (2) Latin America and the Caribbean, (3) Asia, (4) Africa, (5) Middle East and Northern Africa, and (6) Eastern Europe. The data set covers 157 countries during the 1970–2001 period. There are over 3,600 observations, and it is the largest data set that can be used in empirical work on the current account. There are 643 observations for the industrial countries, 808 for Latin America and the Caribbean, 513 for Asia, 1,108 for Africa, 297 for the Middle East and North Africa, and 286 for Eastern and Central Europe. As will be explained later, in some of the empirical exercises I have restricted the data set to countries with a population above 500,000, and income per capita above US$500 in 1985 purchasing power parity (PPP) terms. For a list of the countries included in the analysis see the appendix.

International Distribution of Current Account Imbalances

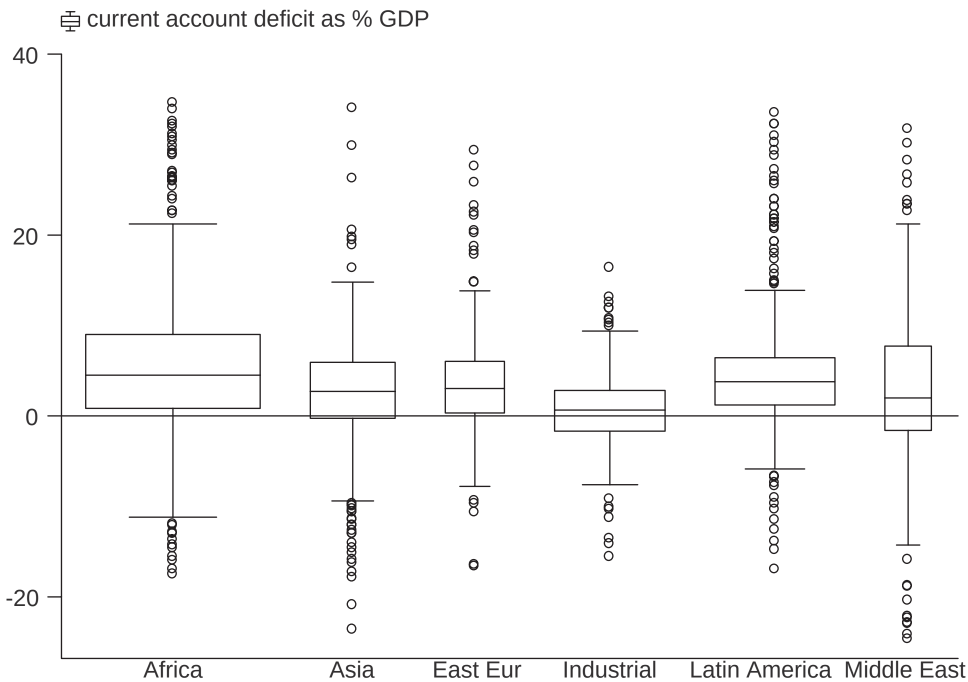
The data on current account imbalances during the past three decades are summarized in Figures 1 and 2. In these figures, as in all tables in this paper, a positive number denotes a current account deficit; surpluses have a negative sign. Figure 1 contains "box-and-whisker" plots that summarize the distribution of current account deficits for each of the six regions. The lines in the middle of each box represent the median of the current account balance for that particular region. Each box extends from the 25th percentile of the distribution to the 75th percentile, thus covering the interquartile range (IQR). The lines that come out from each box are called the whiskers, and extend to the largest data point up to 1.5 times the corresponding edge of the IQR. The whiskers capture the so-called "adjacent values." Observations beyond the end of the whiskers are depicted individually. Finally, the width of each box reflects the number of observations in each region.[14] In Figure 2, on the other hand, I present the evolution of the average current account deficit to GDP ratio by regions for the 1970–2001 period.

A number of interesting aspects of current account behavior emerge from these figures, and from the supporting data (see the appendix for details on the distributions by region and year). As Figure 1 shows, during this period the median balance was in every one of the six regions—including in the industrial countries—a *deficit.* For the complete 32 year period (1970–2001) more than one half of the countries had current account *deficits* in excess of 3.1 percent of GDP. For this 32 year period the third quartile corresponds to a current account deficit of 7.2 percent of GDP. Naturally, and as Figure 1 shows, the third quartile differs for each region, with the

[13]When data from the IMF's *International Financial Statistics* are used, however, the results are very similar.

[14]See Chambers and others (1983). The Stata manual provides a simple and useful explanation of box-and-whisker graphs.

Figure 1. Distribution of Current Account Deficits as Percentage of GDP, by Regions, 1970–2001
(Deficits are positive numbers)



largest values corresponding to Africa and Latin America, with current account deficits of 9.9 percent and 8 percent of GDP respectively. The industrial countries have the smallest third quartile, with a deficit of 3 percent of GDP. Figure 1 also shows that the lowest limit of the interquartile range—the first quartile—corresponds to a current account surplus in only three of the regions: Asia, industrial countries, and the Middle East. The overall value (for all countries and years) of the first quartile corresponds to a current account surplus of 0.28 percent of GDP.

Out of the 3,655 country-year observations in the sample, 923 correspond to current account surpluses, and 2,732 correspond to deficits. Moreover, for the period as a whole the number of deficit countries exceeds the number of surplus countries in every one of the regions. Naturally, since by construction the sum of all current account balances around the world should add up to zero, the smaller number of surplus countries have to run relatively large individual surpluses, when these are measured in currency terms.[15]

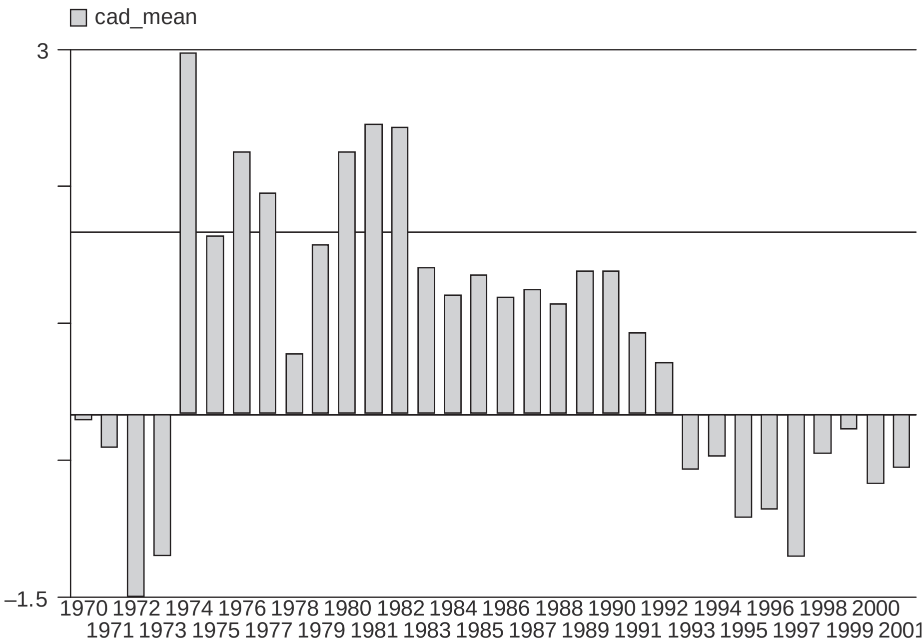
Figure 2 shows that after the 1973 oil-shock there were important changes in *average* current account balances in the industrial nations, the Middle East, and

(*text continues on page 11*)

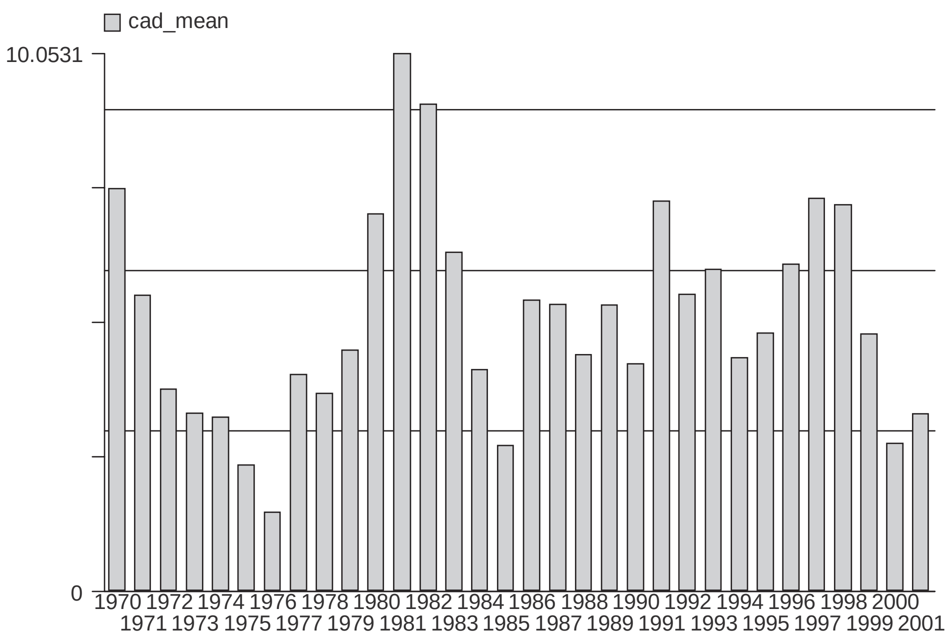
[15]An interesting recent puzzle is that the growing discrepancy between the sum of all recorded deficits and surpluses, as a practical matter the sum of all current account balances, is not equal to zero. Dealing with this (important) issue is beyond the scope of the current paper, however.

Figure 2. Average Current Account Deficits As Percentage of GDP by Region, 1970–2001

(Deficits are positive numbers)

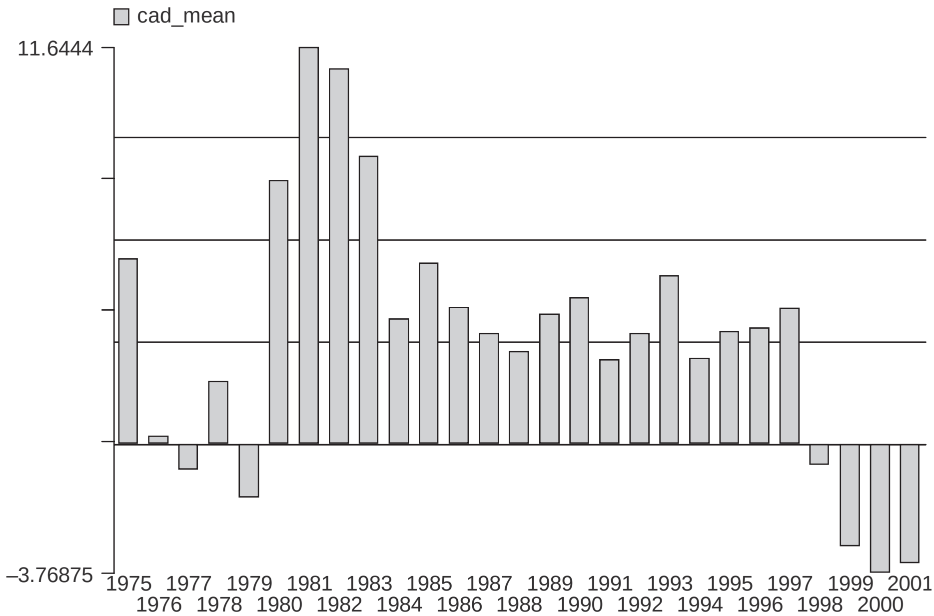


A. Industrial Countries

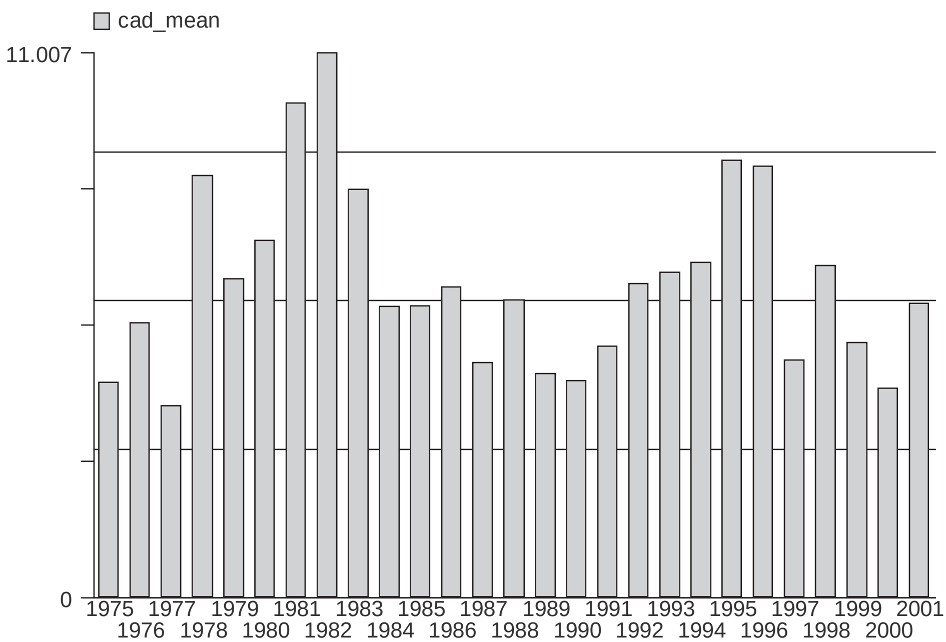


B. Latin America and the Caribbean

Figure 2. *(continued)*

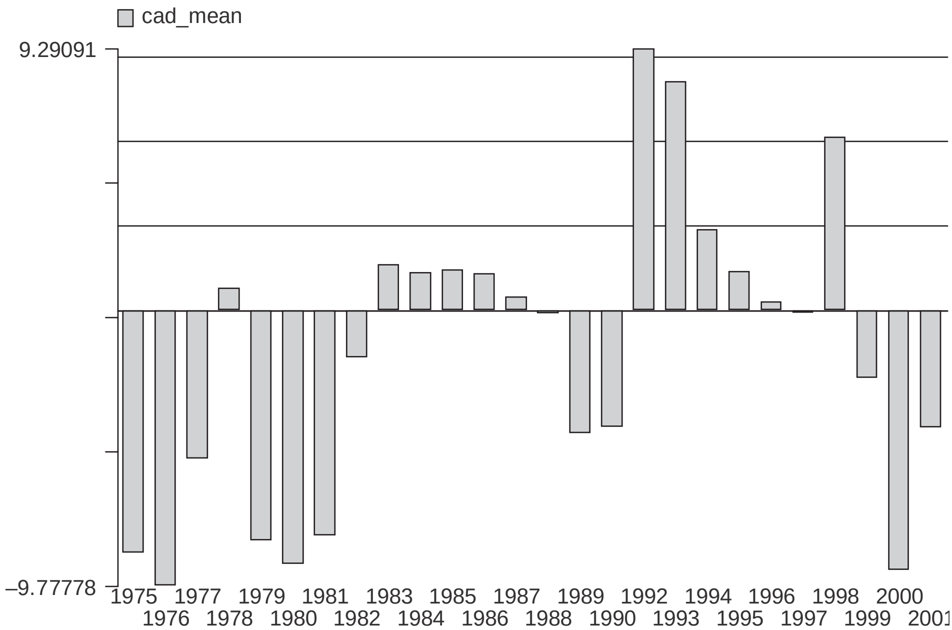


C. Asia

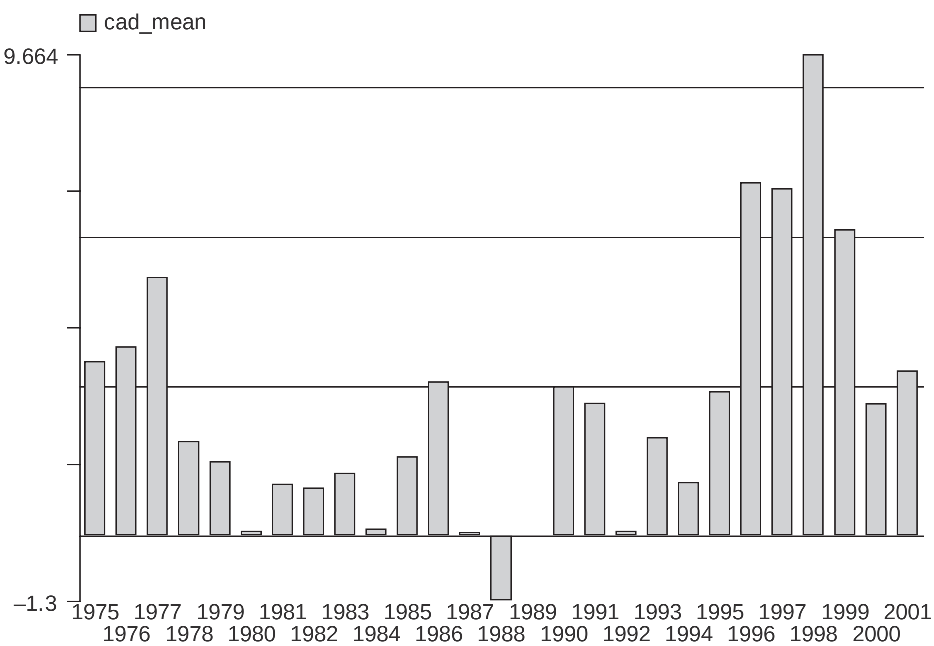


D. Africa

Figure 2. *(concluded)*



E. Middle East



F. Central and Eastern Europe

Africa. Interestingly, no discernible change can be detected in Latin America or Asia. An analysis of median and third-quartile balances, however, shows a different picture, and indicates that after 1973 there were significant shifts in the distribution of balances (see the appendix for year to year details). For example, the median balance climbs from a deficit of 1 percent to one of 4 percent in Latin America; in Asia it goes from less than 1 percent to 3 percent of GDP. Interestingly, the median and third quartile deficits for Africa experience a *decline* after 1973, reflecting the region's inability to finance these large shocks. In contrast with the first oil shock, the 1979 oil shock affected both the means and medians of current account balances in every region in the world. The impact of this shock was particularly severe in Latin America, where the deficit jumped from an average of 3.7 percent of GDP in 1978 to over 10 percent of GDP in 1981.

Figure 2 captures vividly the magnitude of external adjustment undertaken by emerging economies during the debt crisis of the 1980s. In Latin America, for example, reduction in the average current account deficit amounted to 7.3 percent of GDP between 1981 and 1985. As may be seen from Figure 2, during the 1980s adjustment was not confined to the Latin American region. Indeed, other emerging regions also experienced severe reductions in their deficits during this period. In Asia, for instance, the current account adjustment was almost 8 percent of GDP between 1981 and 1984. As Figure 2 shows, the late 1990s and early 2000s have also been characterized by very large adjustments in the emerging and transition countries. These adjustments have been related to the recurrent currency crises of the second half of the 1990s and early 2000s, and have been particularly severe in Asia and Eastern Europe, where average balances adjusted by 7.5 percent and 6.3 percent of GDP, respectively. These tables also show that the industrialized countries went back to having sustained surpluses only after 1993.[16]

High and Persistent Current Account Deficits and Surpluses

According to modern intertemporal models of the current account, including the portfolio-based models of Kraay and Ventura (2000, 2002) and Edwards (1999, 2002), countries will tend to experience short-term deviations from their long-run *sustainable* current account levels.[17] This implies that large current account imbalances—or

[16]From the perspective of current controversies on the international adjustment process, it is interesting to compare the historical behavior of the U.S. current account to the distribution of current accounts for the industrial countries as a group. During the 1970s, the United States ran either small surpluses or small deficits, and the country's current account was very close to the median of the distribution for industrial nations. During most of the 1980s the United States ran a current account deficit. However, in every year but one (1987) the deficit was *below* the third quartile threshold for industrial countries. In 1987 an adjustment process began; the deficit declined steadily until in 1991 the United States ran a small current account surplus. Starting in 1992, a long period of deficits began, which continues until today. In 1999, 2000, and 2001, the U.S. current account deficit was among the 25 percent largest deficits of all industrial countries. There is little doubt that once data for 2002 and 2003 are collected, the United States will again be among the highest deficit countries for those two years. This will make the United States the first large industrial country to have persistently *large* current account deficits for five or more consecutive years. See the discussion below on persistent deficits.

[17]In these models changes in current account balances are (largely) the result of efforts by domestic economic agents to smooth consumption. The sustainable level of the current account balance will, in turn, depend on portfolio decisions both by foreign and domestic investors.

large deviations from sustainability—should not be persistent through time. Once the temporary shocks that trigger the large imbalances have passed, the current account will return to its long-run sustainable level. In this subsection I use the data set described above to analyze the degree of persistence through time of large current account imbalances. I am particularly interested in finding out whether the degree of persistence is similar for large deficits and for large surpluses. I do this by estimating a number of probit regressions on the probability of countries' having a high deficit (or surplus) in a particular year. Although this analysis is *not* a test of the basic intertemporal models, or their portfolio-based versions, it does provide information on the important issue of persistence of large current account imbalances. As a first step I constructed two measures of "high deficits" and two measures of "high surpluses."

- High Deficit 1: This index takes the value of 1 if, in a particular year, a country's deficit is higher than its region's third quartile. The index takes a value of zero otherwise.[18]
- High Deficit 2: This index takes the value of 1 if, in a particular year, a country's deficit is higher than its region's ninth percentile. It takes a value of zero otherwise. Notice that this definition is "stricter" than the High Deficit 1 definition.
- High Surplus 1: This index takes the value of 1 if, in a particular year, a country's surplus is among its region's 25 percent highest surpluses. The index takes a value of zero otherwise.
- High Surplus 2: This index takes the value of 1 if, in a particular year, a country's surplus is among its region's 10 percent highest surpluses. It takes a value of zero otherwise.

In order to investigate the degree of persistence of high current account imbalances I estimated a number of panel probit regressions of the following type:

$$high_{jt} = \alpha + \sum \beta_k high_{jt-k} + \gamma X_{jt} + \varepsilon_{jt}, \qquad (1)$$

where $high_{jt}$ is a dummy variable that takes a value of 1 if country j has a high surplus (deficit) in period t; X_{jt}, refers to other covariates including time, country, and/or region fixed effects. ε_{jt} is an error term with the usual properties.[19] My main interest is on the β_k coefficients on lagged high surpluses (deficits): I am interested in finding out whether having had a high deficit in the past (up to four years) affects the probability of having a high deficit in the current period. The results are in Table 1, where as is customary I report the estimated (dF/dx) coefficients, which capture the change in the probability of a high surplus (deficit) in period t, if there is a high deficit in period $t–k$.[20] As may be seen, the coefficients of all four years' lagged high surpluses' indicators are significantly different from zero at conven-

[18]Notice that the thresholds for defining *high* deficits and surpluses are year-specific. That is, for every year there is a different threshold for each region.

[19]An alternative strategy would be to estimate regressions using the quintiles themselves as the dependent variable. However, the results convey the same message as those reported here.

[20]The dF/dx have been computed for a discrete change in the dummy variables from 0 to 1, and have been evaluated for the mean values of all the regressors.

Table 1. Probit Regressions: Deficits and Surpluses Persistence

Variable	(1) High surplus	(2) High deficit
First lag	0.543	0.403
	(12.15)**	(12.25)**
Second lag	0.169	0.082
	(3.54)**	(3.81)**
Third lag	0.143	0.026
	(2.77)**	(1.50)
Fourth lag	0.153	0.006
	(3.15)**	(0.38)
Pseudo-R^2	0.36	0.39
Observations	2,381	2,381

Notes: absolute value of *z* statistics in parentheses; **significant at 1 percent; and region and year dummies are included, but not reported.

tional levels, indicating a certain degree of persistence of high surpluses. Interestingly, when regressions of this type were estimated for the case of high deficits—equation 2 in Table 1—the results were quite different, and only the first two lagged coefficients are significantly different from zero. These estimates suggest that during the past three decades the international adjustment process has tended to be asymmetric: high current account surpluses have tended to be more persistent than current account deficits. This conclusion is supported by an analysis of the number of countries that have experienced high deficits or surpluses for at least five consecutive years. Table 2 contains such a list for the case of deficits; the case of surpluses is in Table 3.

As may be seen from Table 2 a rather small number of countries has experienced long periods of high deficits. Consider the case of Latin America, a region with a reputation for macroeconomic mismanagement: according to the first definition, only three countries have had persistently high deficits, and only one of these—Nicaragua—has had a high deficit for more than 10 consecutive years.[21] According to the data in Column A, only 7 out of the 49 African countries are persistent high deficit countries. Interestingly, New Zealand is the only country in the sample that according to the first definition has had two episodes of high persistent deficits—1982–88 and 1994–2001. Column A in Table 2 shows that only four countries in the sample—Australia, Nicaragua, Guinea-Bissau, and Mauritania—have had high deficits that have persisted for more than 10 consecutive years.[22]

[21]Nicaragua's severe crisis is largely the result of the economic mismanagement during the Sandinista rule during the 1980s.

[22]When different and a stricter definition of high and persistence deficits is used—those countries with deficits in the tenth decile of the distribution for at least five consecutive years—the results are broadly consistent with those discussed here—see Column B of Table 2 for details.

Table 2. Countries with Persistent High Current Account Deficits by Region, 1970–2001

Region	(A) High deficit 1	(B) High deficit 2
Industrialized Countries		
Australia	1981–2000	—
Canada	1989–94	—
Ireland	1976–84	1978–84
New Zealand	1982–88 and 1994–2001	1984–88
Portugal	1996–2001	—
Latin America and Caribbean		
Guyana	1979–85	1979–85
Honduras	1975–80	—
Nicaragua	1981–2000	1984–90 and 1992–2000
Asia		
Bhutan	1981–99	1982–89
Lao P.D.R.	1994–98	—
Nepal	1996–2000	—
Papua New Guinea	1980–84	—
Singapore	1972–80	—
Africa		
Congo, Rep. of	1900–96	—
Guinea-Bissau	1982–96	1982–93
Lesotho	1995–2001	1995–2000
Mali	1984–90	—
Mauritania	1975–88	—
Mozambique	1987–98	—
Swaziland	1978–85	—
Middle East		
Cyprus[1]	1977–81	—
Egypt	1972–77	—
Lebanon	1992–98	—
Saudi Arabia	1983–91	—
Eastern Europe		
Armenia	1994–98	—
Azerbaijan	1995–99	1995–99

[1]Although Cyprus is considered a European country by the IMF, the author has listed it under Middle East in an effort to present more accurately the country's current level of economic development.

Source: Author's elaboration based on *World Development Indicators.*

As Column A in Table 3 shows, there are 30 episodes of persistently high surpluses during the period under study.[23] Of these, 9 correspond to advanced nations. Four of the 30 persistently high surplus episodes took place in major oil producers—Trinidad and Tobago, Nigeria, Kuwait, and Russia—and five episodes correspond to countries belonging to the South African currency union (Lesotho,

[23]Notice that I am referring to "episodes." Some countries have had more than one episode of high and persistent surpluses.

Table 3. Countries with Persistent High Current Account Surpluses by Region, 1970–2001

Region	(A) High surplus 1	(B) High surplus 2
Industrialized countries		
Switzerland	1980–2001	1987–2001
Belgium	1986–2001	—
Finland	1995–2001	—
Japan	1983–1992	—
Netherlands	1972–77, 1981–91 and 1993–2000	—
Latin America and Caribbean		
Trinidad and Tobago	1990–96	—
Asia		
China	1994–98	—
Fiji	1985–89	—
Hong Kong SAR	1971–78 and 1980–94	1984–90
Singapore	1988–2001	1994–2001
Papua New Guinea	1992–96	—
Africa		
Algeria	1980–85	—
Botswana	1985–2001	1985–89 and 1991–2001
Chad	1980–84	—
Gabon	1978–84 and 1993–97	1979–84
Gambia, The	1984–1994	—
Lesotho	1980–84 and 1989–94	1990–94
Mauritania	1995–2001	1995–2001
Namibia	1990–2000	—
Nigeria	1984–92	—
South Africa	1985–95	—
Swaziland	1986–91	1987–91
Middle East		
Kuwait	1975–89	1980–89
Eastern Europe		
Russian Federation	1995–2001	—
Kuwait	1980–2001	1987–2001

Source: Author's elaboration based on *World Development Indicators.*

Namibia, South Africa, and Swaziland). Interestingly, neither China nor Japan have been among the persistent high surplus countries during the past few years—that is, after 1998. Of the 30 high surplus episodes in Column A of Table 3, 9 have lasted for more than 10 years, and four countries have had more than one five-year episode with high surpluses. Both of these figures are significantly higher than the equivalent ones for the case of high deficits; indeed, as Table 2, Column A shows, only four countries had high *deficits* for 10 or more consecutive years, and only one had more than one five-year episode with high deficits (New Zealand).

II. Anatomy of Current Account Adjustments

In this section I investigate the anatomy of the adjustment processes in high deficit countries, investigating as many of the main aspects of the adjustment process as possible, and report empirical results that deal with the following questions:

- Has adjustment tended to be gradual, or rather abrupt?
- How common have large deficit reversals been during the past three decades?
- Has the incidence of current account deficit reversals been similar across regions?
- Following deficit reversals, have the current account adjustments tended to be lasting, or have current account balances deteriorated shortly after the reversal episode?
- Historically, have major current account deficit reversals been associated with sudden stops of capital inflows?
- To what extent have current account deficit reversals been associated with balance of payments and/or currency crises?
- Have current account deficit reversals been associated with banking crises?
- Have current account reversals tended to take place within the context of IMF programs?
- Have current account deficit reversals had a negative effect on growth or other forms of real economic activity? The analysis of this particular question is the subject of Section III.

The analysis presented in this section differs from other work on the subject, and in particular from studies on current account deficit reversals such as Milesi-Ferretti and Razin (2000), Edwards (2002), and Guidotti and others (2003), in several respects. First the coverage, both in terms of countries and time period, is greater in this paper than in previous work. Second, I use a methodology based on the calculation of nonparametric tests and frequency tables. And, third, I analyze aspects of reversals—including their possible connection to banking crises and "sudden stops" of capital inflows—that have not been addressed in previous work.

Current Account Deficit Reversals: Incidence and Duration

I define current account deficit reversals—reversals, in short—in two alternative ways: (i) Reversal A is defined as a reduction in the current account deficit of at least 4 percent of GDP in one year; and (ii) Reversal B is defined as a reduction in the current account deficit of at least 6 percent of GDP in a three-year period.[24]

In Table 4 I present tabulation tables on current account reversals by region as well as for the complete sample. These tables include two versions of the Pearson tests for the independence of the frequency of reversals across the six

[24]In both cases the timing of the reversal is recorded as the year when the episode ends. That is, if a country reduces its current account deficit by 7 percent of GDP between 1980 and 1982, the episode is recorded as having taken place in 1982. Also, for a particular episode to classify as a current account deficit reversal, the initial balance has to be indeed a *deficit.* Notice that these definitions are somewhat different from those used in other studies, including Freund (2000), Milesi-Ferretti and Razin (2000), Edwards (2002), and Guidotti and others (2003).

Table 4. Incidence of Reversals

Panel A. *Reversal A*

Region	No reversal	Reversal
Industrial countries	98.0	2.0
Latin America and Caribbean	87.7	12.3
Asia	87.7	12.3
Africa	83.4	16.6
Middle East	85.0	15.0
Eastern Europe	88.9	11.1
Total	**88.2**	**11.8**
Observations	2,678	
Pearson		
Uncorrected χ^2 (5)	65.41	
Design-based F(5, 13385)	13.08	
p-value	0.00	

Panel B. *Reversal B*

Region	No reversal	Reversal
Industrial countries	97.3	2.7
Latin American and Caribbean	92.0	8.0
Asia	88.3	11.7
Africa	88.3	11.7
Middle East	86.6	13.4
Eastern Europe	90.7	9.3
Total	**90.8**	**9.2**
Observations	2,501	
Pearson		
Uncorrected χ^2 (5)	37.31	
Design-based F(5, 12500)	7.46	
p-value	0.00	

regions.[25] Panel A includes the results for the Reversal A definition, while Panel B has the results for the Reversal B definition. As may be seen, for the complete sample the incidence of Reversal A was 11.8 percent of all country-year observations, while it was only 9.2 percent for the Reversal B definition. The lowest incidence of deficit reversals occurs in the advanced countries, with 2 percent and 2.7 percent incidence for Reversals A and B respectively; the region with highest incidences is Africa with 16.6 percent and 11.7 percent respectively. As the χ^2 and the F statistics indicate, the incidence of deficit reversals is statistically different among the six different regions. Homogeneity tests also indicate that once the industrial countries' group is excluded, the incidence of reversals is still significantly different among the emerging and transition economies.

[25]The first one is the traditional Pearson χ^2 test. The second one is an F-test, which makes a correction in case the data in the sample are not identically and independently distributed.

This finding differs from what was found by Milesi-Ferretti and Razin (2000, p. 292), who found that the occurrence of reversals was similar across groups of countries.

From a policy point of view an important question is whether these reversals have been sustained through time, or whether they have been short lived. I address this issue by investigating whether at horizons of three and five years after each reversal the current account deficit was still lower than what it was the year before the reversal. The results obtained are reported for in Table 5. As may be seen, these results suggest that in a vast majority of cases—between 68 percent and 83 percent of cases, depending on the definition of reversal—the current account deficit was lower three or five years after the reversal than what it was the year before the reversal started.

Current Account Deficits Reversals and Sudden Stops

Since the currency crises of the 1990s international economists have had a renewed interest in the behavior of capital flows around the world. In particular, a number of authors have argued that in a world of high capital mobility sudden stops of capital inflows can be highly disruptive, forcing countries to implement costly adjustments (Dornbusch and others, 1995; Calvo, 2003; Calvo and others, 2003; and Mody and Taylor, 2002). In this subsection I investigate the connection between sudden stops and current account reversals. The results indicate that, as expected, these two phenomena have been closely related. However, the relationship is less than one-to-one; historically there have been many major current account deficit reversals that have not been related to sudden stops, and there have been numerous sudden stops that have not been associated to reversals. This indicates that when facing a sudden stop of capital inflows many countries have been able to effectively use their international reserves in order avoid an *abrupt* and major current account reversal. At the same time, these results suggest that a number of countries have gone through large current account reversals without having faced a sudden stop in capital inflows. Most of the countries in this group were not receiving large inflows to begin with, and had financed their large deficits by drawing down international reserves.

Table 5. Sustainability Through Time of Current Account Reversals

	Sustainability		
	Not sustained	Sustained	Total
		At 3 years	
Reversal A	16.9	83.1	272
Reversal B	23.7	76.3	198
		At 5 years	
Reversal A	19.8	80.2	247
Reversal B	32.4	67.6	179

Table 6. Incidence of Sudden Stops

Region	No sudden stop	Sudden stop
Industrial countries	96.5	3.5
Latin America and Caribbean	95.5	4.5
Asia	96.1	3.9
Africa	93.1	6.9
Middle East	89.4	10.6
Eastern Europe	92.9	7.1
Total	**94.4**	**5.6**
Observations	2,193	
Pearson		
Uncorrected χ^2 (5)	18.59	
Design-based *F* (5, 12500)	3.72	
p-value	0.002	

I defined a sudden-stop episode as an abrupt and major reduction in capital inflows to a country that up to that time had been receiving large volumes of foreign capital. More specifically, I imposed the following requirements for an episode to qualify as a sudden stop: (i) the country in question must have received an inflow of capital larger than its region's third quartile during the previous two years prior to the sudden stop; and (ii), net capital inflows must have declined by at least 5 percent of GDP in one year.[26] In Table 6 I present a tabulation of the incidence of sudden stops for the complete sample as well as by region. As may be seen, the historical occurrence is less than 6 percent for the complete sample, and ranges from 3.5 percent for the advanced nations to 10.6 percent for the Middle Eastern countries. When alternative and stricter definitions of sudden stops were used, the incidence for the complete sample declined to 3.9 percent of all observations. Notice that the nonparametric χ^2 and the *F* statistics indicate that the incidence of sudden stops is statistically different among the six different regions in our analysis.

In Table 7 I present two-way frequency tables for the sudden stops and the current account deficit reversal definition Reversal A, both for the complete sample as well as for each one of our six regions. The table shows that for the complete sample (2,228 observations) 46.1 percent of countries subject to a sudden stop also faced a current account reversal. At the same time, 22.9 percent of those with reversals also experienced (in the same year) a sudden stop of capital inflows. The regional data show that joint incidence of reversals and sudden stops has been highest in Africa, where approximately 62 percent of sudden stops happened at the same time as current account reversals, and almost 30 percent of reversals coincided with sudden stops. Notice that for every one of the regions, as well as for the

[26]In order to check for the robustness of the results, I also used two alternative definitions of sudden stops, which considered a reduction in inflows of 3 and 7 percent of GDP in one year. Due to space considerations, however, I don't report detailed results using these definitions.

Table 7. Reversals and Sudden Stops

All countries

	No sudden stop	Sudden stop	Total
No reversal	1,892	69	1,961
	96.5	3.5	100
	90.2	53.1	88.0
Reversal	206	61	267
	77.1	22.9	100
	9.8	46.9	12.0
Total	2,098	130	2,228
	94.2	5.8	100
	100	100	100

Pearson χ^2 (1) = 159.78 p-value = 0.000

Industrial countries

	No sudden stop	Sudden stop	Total
No reversal	539	18	557
	96.8	3.2	100
	98.2	81.8	97.6
Reversal	10	4	14
	71.4	28.6	100
	1.8	18.2	2.5
Total	549	22	571
	96.2	3.8	100
	100	100	100

Pearson χ^2 (1) = 21.14 p-value = 0.000

Latin America and Caribbean

	No sudden stop	Sudden stop	Total
No reversal	578	23	601
	96.2	3.83	100
	87.2	44.2	84.1
Reversal	85	29	114
	74.6	25.4	100
	12.8	55.8	15.9
Total	663	52	715
	92.7	7.3	100
	100	100	100

Pearson χ^2 (1) = 18.35 p-value = 0.000

Table 7. *(continued)*

Asia

	No sudden stop	Sudden stop	Total
No reversal	294	12	306
	96.1	3.9	100
	87.5	48.0	84.8
Reversal	42	13	55
	76.4	23.6	100
	12.5	52.0	15.2
Total	336	25	361
	93.1	6.9	100
	100	100	100

Pearson χ^2 (1) = 9.55 p-value = 0.002

Africa

	No sudden stop	Sudden stop	Total
No reversal	579	21	600
	96.5	3.5	100
	85.8	37.5	82.1
Reversal	96	35	131
	73.3	26.7	100
	14.2	62.5	17.9
Total	675	56	731
	92.3	7.7	100
	100	100	100

Pearson χ^2 (1) = 60.63 p-value = 0.000

Middle East

	No sudden stop	Sudden stop	Total
No reversal	193	12	205
	94.2	5.8	100
	87.7	50.0	84.0
Reversal	27	12	39
	69.2	30.8	100
	12.3	50.0	16.0
Total	220	24	244
	90.2	9.8	100
	100	100	100

Pearson χ^2 (1) = 22.38 p-value = 0.000

Table 7. *(concluded)*

	Eastern Europe		
	No sudden stop	Sudden stop	Total
No reversal	159	8	167
	95.2	4.8	100
	91.4	57.1	88.8
Reversal	15	6	21
	71.4	28.6	100
	8.6	42.9	11.2
Total	174	14	188
	92.6	7.4	100
	100	100	100

Pearson χ^2 (1) = 10.80 *p*-value = 0.001

complete sample, the Pearson χ^2 tests have very small p-values, indicating that the observed differences across rows and columns are significant. That is, these tests suggest that although there are observed differences across these phenomena, the two are statistically related. Interestingly, these results do not change in any significant way if different definitions of reversals and sudden stops are used, or if alternative configurations of lags and leads are considered.

Current Account Deficit Reversals, Adjustment, and Currency Crises

In this subsection I investigate the nature of the adjustment associated with a current account deficit reversal. I am particularly interested in finding out whether current account reversals have been associated with broadly defined currency crises. Authors that have previously looked into this issue have focused on rather narrow definitions of "crisis." For example, Milesi-Ferretti and Razin (2000) considered abrupt devaluations to construct several indexes of crisis. Edwards (2002), on the other hand, focused on changes in an external condition index, as well as on discrete and large devaluations. In this paper, and in contrast with previous work on the subject, I distinguish between two type of crises: *international reserves* crises, and *exchange rate* crises. The starting point for this analysis is the construction of an index of "external pressures" along the lines suggested by Eichengreen and others (1996):

$$I_t = \Delta e/e - (\sigma_e/\sigma_R) * (\Delta R/R), \tag{2}$$

where ($\Delta e/e$) is the rate of change of the nominal exchange rate, and ($\Delta R/R$) is the rate of change of international reserves. σ_e is the standard deviation of changes in exchange rates, and σ_R is the standard deviation of changes in international reserves. Traditional analyses define a crisis (C_t) to have taken place when the index in equation (2) exceeds the mean of the index plus k standard deviations.

The crisis indicator C_t takes a value of 1 (crisis) or zero (no crisis) according to the following rule:[27]

$$C_t = \begin{cases} 1 \; if \, I_t \; \geq \; mean(I_t) + k\sigma_I \\ 0 \qquad otherwise \end{cases}. \tag{3}$$

Instead of focusing on this single traditional index, I construct two alternative crisis indicators that help clarify the nature of the adjustment process. These alternative indicators make a distinction between changes in C_t that stem from large reductions in reserves, and changes in C_t that are the result of massive devaluations. In the construction of both of these indexes I take the value of k to be equal to 2. These crisis indicators are specifically defined as follows:[28]

- ***International Reserves Crisis*** (*Crisis_Res*): In this case the decline in reserves by itself accounts for triggering the crisis indicator C_t. That is, in this case, while the country experiences a major loss in international reserves, its nominal exchange rate does not go through a major adjustment.
- ***Exchange Rate Crisis*** (*Crisis_Er*): In this case it is the nominal exchange rate by itself that triggers the C_t crisis indicator. Here the country lets the exchange rate depreciate significantly *before* it has experienced a major loss in international reserves.

Table 8 presents a summary of the occurrence of the two types of crises for the complete sample, as well as for each one of the regions. The table also includes the Pearson tests for independence. Three conclusions emerge from this table: (i) crises have been a rather infrequent event;[29] (ii) The occurrence of both types of crises is statistically different across regions (see the χ^2 statistic); and (iii) the incidence of *Crisis_ER* has been, in every region, greater than the incidence of *Crisis_Res.*[30]

I use nonparametric tests based on a *stratified case-control* methodology to analyze whether current account reversals have been associated to the two types of crises defined above.[31] This approach consists of formally testing—using a χ^2 statistic—whether there is a significant relationship between a particular outcome (the case) and another variable to which both case and control variables have been "exposed." The first step is to separate observations into a "case group" and a

[27]The pioneer work here is Eichengreen and others (1996), who suggested that the index (2) also included changes in domestic interest rates. Most emerging and transition economies, however, don't have long time series on interest rates. For this reason, most empirical analyses are based on a restricted version of the index, such as 2.

[28]For details see the discussion in Edwards and Magendzo (2003).

[29]This is, in a way, by construction, since k was chosen to be equal to 2.

[30]As it has been usually been done in empirical work on crises I also built alternative indicators that considered a three-year window after each crisis. The results, however, are very similar to those obtained when the basic definitions are used. For this reason, and due to space considerations, I don't report them in this paper.

[31]This approach is used frequently by epidemiologists. I became interested in statistical techniques used by epidemiologists in doing research on financial crisis contagion across countries—see Edwards (2000). See Fleiss (1981) for details on the actual case-control method.

Table 8. Incidence of "International Reserves" and "Exchange Rates" Crises

Region	Exchange-rate crises	Reserves crises
Industrial	2.8	2.4
Latin America	8.6	2.1
Asia	8.2	6.3
Africa	10.4	8.1
Middle East	4.7	2.3
East Europe	12.7	3.8
Total	**8.0**	**2.6**
Observations	2,528	2,528
Pearson		
Uncorrected χ^2 (5)	32.86	31.26
Design-based F (5, 12565)	6.57	6.24
p-value	0.00	0.00

"control group." Countries that for a given year have experienced a "crisis" are considered to be a "case." Noncrisis observations constitute the control group. The second step consists of calculating how many observations in both the case and control groups have been subject to a current account reversal—these are the exposed countries. From this information an odds ratio is calculated, and a χ^2 test is computed in order to determine whether the odds ratio is significantly different from 1. If the hypothesis that the odds ratio is equal to 1 is rejected, then there is evidence supporting the hypothesis that countries that are subject to a reversal have a significant probability of experiencing a crisis.

The results are presented in Table 9 for the *Reversal A* definition of current account reversals (4 percent of GDP in one year)—when the *Reversal B* definition (6 percent of GDP in three years) was used the results were very similar and, thus, are not reported here due to space considerations. These results may be summarized as follows: (1) the hypothesis that the odds-ratios are the same across regions cannot be rejected for any of the two definitions of crisis (see the test for homogeneity). This means that computing a single χ^2 statistic is appropriate for the sample as a whole. (2) The hypothesis that the odds-ratio is equal to one is rejected at conventional levels for the exchange rate definition of crises, *Crisis_Er.* This means that, statistically speaking, countries subject to current account reversals have a significant probability of suffering a major devaluation of their currency, even if international reserves do not decline massively. And (3) the hypothesis that the odds ratio is equal to one cannot be rejected for the reserves definition of crisis *Crisis_Res.* This means that the occurrence of current account reversals does not appear to increase the probability of a country facing a reserve crisis, as defined above.

Current Account Reversals, Banking Crises, and IMF Programs

In this subsection I investigate two final aspects of current account adjustment processes: (i) whether current account reversals have historically been related to

Table 9. Current Account Reversals and Occurrence of Crises

Panel A. *Reversal A* and reserves crises

Region	Odd ratio	95 percent conf. interval	
Industrial countries	0.000	0.000	16.025
Latin American and Caribbean	1.578	0.162	7.877
Asia	0.681	0.075	2.974
Africa	0.995	0.021	9.006
Middle East	1.336	0.026	14.064
Eastern Europe	3.689	0.325	24.370
Test of homogeneity			
χ^2 (5)	2.86		
p-value	0.72		
Test odds ratio = 1			
Mantel-Haenszel χ^2 (5)	0.20		
p-value	0.65		

Panel B. *Reversal A* and exchange-rate crises

Region	Odd ratio	95 percent conf. interval	
Industrial countries	9.864	0.906	57.612
Latin American and Caribbean	2.716	1.159	5.939
Asia	3.006	1.068	7.678
Africa	1.160	0.578	2.193
Middle East	0.000	0.000	1.972
Eastern Europe	1.693	0.376	5.917
Test of homogeneity			
χ^2 (5)	4.80		
p-value	0.44		
Test odds ratio = 1			
Mantel-Haenszel χ^2 (5)	8.13		
p-value	0.004		

banking crises; and (ii), the relationship between current account reversals and IMF programs. A number of authors have argued that one of the costliest effects of external shocks is that they tend to generate banking crises and collapses. Most of the analyses on this subject have focused on the joint occurrence of devaluation crises and banking crises—see, for example, the discussion in Kaminsky and Reinhart (1999). In this subsection I take a slightly different approach, and I investigate whether major reversals in current account deficits—not all of which end up in devaluation crises, as established above—have been associated with banking crises. I address this issue in Table 10, where I present two-way tabulations for the *Reversal A* definition of current account reversals and a dummy variable that takes the value of 1 if that year there has been a banking crises.[32] The three panels in

[32]The data on banking crises are from Glick and Hutchison (1999). When the *Reversal B* definition is used the results are similar to those reported above.

Table 10. Current Account Reversals and Banking Crisis*

Panel A. Contemporaneous

Reversal A	No banking crisis	Banking crisis	Total
No reversal	2,220	112	2,332
	95.2	4.8	100
	88.1	86.2	88.0
Reversal	299	18	317
	94.3	5.7	100
	11.9	13.9	12.0
Total	2,519	130	2,649
	95.1	4.9	100
	100	100	100

Pearson χ^2 (1) = 0.458 *p*-value = 0.498

Panel B. Lagged bank crises

Reversal A	No banking crisis	Banking crisis	Total
No reversal	2,332	110	2,442
	95.5	4.5	100
	88.2	85.3	88.1
Reversal	312	19	331
	94.3	5.7	100
	11.8	14.7	11.9
Total	2,644	129	2,773
	95.4	4.6	100
	100	100	100

Pearson χ^2 (1) = 1.00 *p*-value = 0.316

Panel C. Lagged *Reversal A*

Reversal A	No banking crisis	Banking crisis	Total
No reversal	2,161	110	2,271
	95.2	4.8	100
	88.2	85.3	88.1
Reversal	288	19	307
	93.8	6.19	100
	11.8	14.7	11.9
Total	2,449	129	2,578
	95.0	5.0	100
	100	100	100

Pearson χ^2 (1) = 1.03 *p*-value = 0.31

Table 10 present two-way tabulations under different structures of lags: while in Panel A both variables are contemporaneous, in Panel B the dummy for banking crises is lagged one year. This allows us to consider situations were a banking crisis follows in time a current account reversal episode. Finally, in Panel C the *Reversal A* dummy has been lagged one year. All three Panels—see, in particular, the Pearson χ^2 tests for independence of rows and columns—show that there has not been a significant relation, at any lag or lead, between reversals and major banking crises.

In Table 11 I present two-way tabulation tables for the *Reversal A* indicator and dummy variable (*imfprog*) that takes the value of 1 if during that year the

Table 11. Current Account Reversals and IMF Programs

Panel A. Contemporaneous variables

Reversal A	No IMF programs	IMF programs	Total
No reversal	890	761	1,651
	53.9	46.1	100
	86.2	84.6	85.5
Reversal	142	138	280
	50.7	49.3	100
	13.8	15.4	14.5
Total	1,032	899	1,931
	53.4	46.6	100
	100	100	100

Pearson χ^2 (1) = 0.98 p-value = 0.32

Panel B. IMF programs lagged

Reversal A	No IMF programs	IMF programs	Total
No reversal	866	784	1,650
	52.5	47.5	100
	84.5	86.6	85.5
Reversal	159	121	280
	56.8	43.2	100
	15.5	13.4	14.5
Total	1,025	905	1,930
	53.1	46.9	100
	100	100	100

Pearson χ^2 (1) = 1.78 p-value = 0.18

Panel C. *Reversal A* lagged

Reversal A	No IMF programs	IMF programs	Total
No Reversal	912	768	1,680
	54.3	45.7	100
	86.0	85.3	85.7
Reversal	149	132	281
	53.0	47.0	100
	14.0	14.7	14.3
Total	1,061	900	1,961
	54.1	45.9	100
	100	100	100

Pearson χ^2 (1) = 0.15 p-value = 0.69

country in question had an IMF program, and a value of zero otherwise.[33] As before, the tabulations are presented for three different lag-lead structures. The results indicate that, at least within the leads and lags considered here, there has not been a strong historical relation between reversals and IMF programs. Indeed, the χ^2 tests for independence of rows and columns have relatively high *p*-values.

III. Costs of Current Account Reversals

In this section I investigate the extent to which current account reversals have had an effect on real economic performance. I am particularly interested in analyzing if the impact of current account reversals on real economic activity depends on variables such as the country's degree of openness, its degree of dollarization, and its exchange rate regime. According to a variety of models stemming from many different traditions—including models in the Mundell-Fleming tradition, as well as recent ones based on the sudden-stop framework—the real costs of foreign shocks are inversely proportional to the degree of openness of the economy.[34] According to these models, countries that are less open internationally will have to make a greater effort, in terms of reducing aggregate demand (absorption) and/or in terms of real devaluations, than counties with a larger external sector. In models in the Mundell-Fleming tradition, this phenomenon is reflected in the fact that the *expenditure reducing* effort, for any given level of expenditure switching, is inversely proportional to the marginal propensity to import—see Frenkel and Razin, 1987.

In a recent analysis of the 2001–02 Argentine crisis, Calvo and others (2003) have developed a model where a sudden stop of capital inflows results in an abrupt current account reversal, and in a major real exchange rate depreciation. In this model the "required" real depreciation depends on the country's degree of openness. Calvo and others (2003) argue that in Chile—one of the most open countries in Latin America—a sudden stop would require a 32 percent real depreciation to reestablish external equilibrium.[35] The authors' calculations suggest that in relatively closed Argentina the depreciation required for eliminating the current account deficit is, at 46 percent, significantly higher than in Chile. In this model the real depreciation that stems from the sudden stop—and concomitant current account reversal—has a more negative effect on real performance in countries with a higher degree of dollarization. This effect takes place through two channels. First, countries with corporate dollarized liabilities will experience massive jumps in indebtedness and will be unable to service their debts. Moreover, as Caballero and Krishnamurthy (2000) have argued, the value of collateral provided by producers of nontradables will decline significantly, further amplifying the costs of the crisis. The second channel is related to fiscal policy and fiscal sustainability.

[33]The variable *imfprog* takes a value of one if in that year the country has any of the following types of programs: Stand-by, ESAF, EFF and SAF. The raw data for constructing this dummy were taken from Evrensel (2002) and from the IMF web page: *http://www.imf.org/external/np/tre/tad/exfin1.cfm.*

[34]See, for example, Part II of Frenkel and Razin (1987) and Calvo and others (2003).

[35]The authors define "new equilibrium" as a situation in which the current account deficit is completely eliminated.

To the extent that a proportion of the public sector debt is denominated in foreign currency, the real depreciation will increase the ratio of public sector debt to GDP.[36] In order to maintain fiscal sustainability the authorities will have to run a higher primary surplus, thus, reducing aggregate demand and economic activity.

For a long time economists have argued that the exchange rate regime plays an important role in the adjustment process. Meade (1951, pp. 201–2) argued early on that countries with a flexible exchange rate regime are able to accommodate better external shocks, including terms of trade and capital account shocks.[37] This suggests that current account reversals will have a smaller (negative) effect on real economic activity countries with more flexible regimes. In this section I use a treatment regressions framework to investigate empirically if these three factors—openness, the extent of dollarization, and the exchange rate regime—have indeed affected the way in which current account reversals affect real economic activity.

Previous empirical work on the (potential) real effects of reversals have reached different conclusions. Milesi-Ferretti and Razin (2000), for example, used both *before* and *after* analyses as well as cross-country regressions to deal with this issue and concluded that "reversal events seem to entail substantial changes in macroeconomic performance between the period before and the period after the crisis but *are not systematically associated with a growth slowdown* (p. 303, emphasis added)." Edwards (2002), on the other hand, used dynamic panel regression analysis and concluded that major current account reversals had a negative effect on investment, and that they had "a negative effect on GDP per capita growth, even after controlling for investment (p. 52)." Neither of these papers, however, analyzed the interaction between openness, dollarization or the exchange rate regime and the costs of current account reversals.[38]

Current Account Reversals and Growth: An Empirical Model

Changes in investment constitute, almost by definition, the main channel through which current account reversals affect economic activity. Since the current account deficit is equal to investment minus savings, a major reversal will imply, with a high degree of probability, a decline in investment and, thus, in economic activity. An important question is whether reversals affect growth through channels other than investment. In this section I tackle this issue by using panel data to estimate jointly growth equations and current account reversal equations.

My main interest is to understand what is the conditional effect—if any—of a current account reversal on real macroeconomic performance. In order to do this, I use a "treatment effects" model to estimate jointly an "outcome equation" on real GDP growth and a probit equation on the probability that a country experiences a

[36]See Edwards (2003) for an analysis of the relationship between fiscal sustainability and the real exchange rate in very poor HIPC countries.

[37]For a discussion and empirical analysis of this proposition see Edwards and Levy-Yeyati (2003).

[38]In a recent paper, Guidotti and others (2003) consider the role of openness in an analysis of imports and exports behavior in the aftermath of a reversal. The spirit of their analysis, however, is somewhat different from that of the other works discussed here.

current account reversal. The empirical treatment effects model may be written as follows:

$$y_{tj} = \boldsymbol{x_{tj}}\beta + \gamma\delta_{tj} + \theta(\delta_{tj} \times Openness_{tj}) + \mu_{jt} \tag{4}$$

$$\delta_{jt} = \begin{cases} 1, & \text{if } \delta^*_{jt} > 0 \\ 0, & \text{otherwise} \end{cases} \tag{5}$$

$$\delta^*_{jt} = \boldsymbol{w_{jt}}\alpha + \varepsilon_{jt}. \tag{6}$$

Equation (4) is the real growth equation, where y_{jt} stands for real GDP growth in country j and period t; $\boldsymbol{x_{jt}}$ is a vector of covariates that capture the role of traditional determinants of growth, such as investment, openness, and government consumption; δ_{jt} is a dummy variable (i.e., the treatment variable) that takes a value of one if country j in period t experienced a current account reversal, and zero if the country did not experience reversal. Accordingly, γ is the parameter of interest: the effect of the treatment on the outcome. Whether the country experiences a current account reversal is assumed to be the result of an unobserved latent variable δ^*_{jt}, described in equation (5). Openness is a variable that measures the extent to which country j in period t is open to international trade. θ is the coefficient of the interaction between openness and the reversal dummy. δ^*_{jt}, in turn, is assumed to depend linearly on vector $\boldsymbol{w_{jt}}$. Some of the variables in $\boldsymbol{w_{jt}}$ may be included in $\boldsymbol{x_{jt}}$ (Maddala 1983, p. 120).[39] β and α are parameter vectors to be estimated. μ_{jt} and ε_{jt} are error terms assumed to be bivariate normal, with a zero mean and a covariance matrix given by:

$$\begin{pmatrix} \sigma & \varsigma \\ \varsigma & 1 \end{pmatrix} \tag{7}$$

If equations (4) and (6) are independent, the covariance term ς in equation (7) will be zero. Under most plausible conditions, however, it is likely that this covariance term will be different from zero.

Greene (2000) has shown that if equation (4) is estimated by least squares, the treatment effect will be overestimated. Traditionally, this problem has been tackled by estimating the model using a two-step procedure (Maddala, 1983). In the first step, the treatment equation (5) is estimated using probit regressions. From this estimation a hazard is obtained for each $j\ t$ observation. In the second step, the outcome equation (4) is estimated with the hazard added as an additional covariate. From the residuals of this augmented outcome regression, it is possible to compute consistent estimates of the variance-covariance matrix (7).

[39]It is assumed, however, that δ^*_{jt} does not depend on y_{jt}. Otherwise, as discussed below, the model cannot be identified.

An alternative to the two-step approach is to use a maximum likelihood procedure to estimate the model in equations (4) through (7) jointly.[40] As shown by Greene (2000), the log likelihood for observation k is given by equations (8) and (8′):

$$L_k = \log \Phi\left\{\frac{w_k\alpha + (y_k - x_k\beta - \delta)\,\varsigma/\sigma}{\sqrt{1-\varsigma^2}}\right\} - \frac{1}{2}\left\{\frac{y_k - x_k\beta - \delta}{\sigma}\right\}^2 - \log\sqrt{2\pi}\sigma, \quad (8)$$

if $\delta_k = 1$

$$L_k = \log \Phi\left\{\frac{-w_k\alpha - (y_k - x_k\beta)\,\varsigma/\sigma}{\sqrt{1-\varsigma^2}}\right\} - \frac{1}{2}\left\{\frac{y_k - x_k\beta}{\sigma}\right\}^2 - \log\sqrt{2\pi}\sigma, \quad (8')$$

if $\delta_k = 0$.

The model in equations (4)–(7) will satisfy the consistency and identifying conditions of mixed models with latent variables if the outcome variable y_{jt} is not a determinant (directly or indirectly) of the treatment equation—that is, if y is not one of the variables in $\boldsymbol{w}$ in equation (6).[41] For the cases of per capita GDP growth this is a reasonable assumption.

Since I am interested in understanding if openness (among other variables) plays a role in the effect of reversals on growth, one of the $\boldsymbol{x}_{jt}$ variables in equation (4) is a term that interacts the dummy variable δ_{tk} and an openness variable. The latter is defined as the ratio of imports plus exports over the country's GDP. Since the presence of such an interactive term makes the estimation of the system (4)–(8) somewhat complex, the results reported here correspond to the two-steps procedure described above. In the estimation I also impose some exclusionary restrictions; that is, a number of the $\boldsymbol{w}_{jt}$ covariates included in equation (6), are not included in the outcome equation (4). These exclusionary restrictions are not required for identification of the parameters, but they are generally recommended as a way of addressing issues of collinearity.[42]

Basic Results: Reversals and Openness

In this section I report the results obtained from the estimation of the treatment effects model given by equations (4) through (7). I proceed as follows: I first discuss the specification used for the first-stage probit equation on the probability of experiencing a current account reversal. I then discuss the specification for the outcome equations on GDP growth. Finally, I present the results from the estimation of the treatment models. In the subsections that follow I discuss some extensions and robustness issues.

[40]The two-steps estimates yield similar results and are available from the authors on request.

[41]Details on identification and consistency of models with mixed structures can be found in Maddala (1983). See, also, Heckman (1978), Angrist (2000), and Wooldridge (2002).

[42]Wooldridge (2002).

Equation specification

The treatment equation. Following work done by Frankel and Rose (1996), Milesi-Ferretti and Razin (2000), and Edwards (2002), among others, in the estimation of the first-step probit regressions I included the following covariates: (i) the ratio of the current account deficit to GDP lagged one, two, and three periods. It is expected that, with other things equal, countries with a larger current account deficit will have a higher probability of experiencing a reversal. The best results were obtained when the one-year deficit was included. (ii) The one-year lagged external debt over GDP ratio. Its coefficient is expected to be positive in the estimation of the first-step probit equation (6). (iii) The ratio of net international reserves to GDP, lagged one year. Its coefficient is expected to be negative, indicating that with other things equal, countries with a higher stock of reserves have a lower probability of experiencing a current account reversal. (iv) Short term (less than one year maturity) external debt as a proportion of external debt lagged one period. Its coefficient is expected to be positive. (v) The one-year lagged rate of growth of domestic credit. Its coefficient is expected to be positive. (vi) The lagged ratio of external debt service to exports. Again, its coefficient is expected to be positive. (vii) Year dummies, and (viii) country-specific dummies. In some of the probit regressions I also included the ratio of FDI to GDP and the public sector deficit (both lagged). Their coefficients were not significant, however. Since these variables were available for a relatively smaller number of observations than the other variables, they were not included in the final specification of the probit equations (6).

Growth outcome equations. The dependent variable was real GDP growth obtained from the *World Development Indicators.* In specifying the growth equation I followed the by-now-standard empirical growth literature (Barro and Sala-ì-Martin, 1995; Barro, 1996). As is customary I included the following covariates: (i) the logarithm of initial GDP; its coefficient is expected to be negative and capture (conditional) convergence. (ii) The investment to GDP ratio; its coefficient is expected to be positive. (iii) The rate of growth of population, as a proxy for the rate of growth of labor. (iv) An openness index defined as the ratio of exports plus imports over GDP. As Sachs and Warner (1995) have argued, its coefficient is expected to be positive. (v) The ratio of government consumption to GDP, whose coefficient is expected to be negative (Barro and Sala-ì-Martin, 1995). (vi) Year dummies, and (vii) country specific dummies.[43]

In addition to the covariates discussed above, the outcome growth equation also includes the two variables of interest: the current account reversal dummy, and the current account reversal dummy interacted with the openness variable. If current account reversals have a negative impact on economic activity, beyond their effects on investment, we would expect the coefficient of the reversals'

[43]These country specific dummies capture the effect of structural variables that do not change (significantly) through time.

dummy to be significantly negative in the estimation of equation (4). Moreover, if this effect is inversely proportional to the country's degree of openness, the coefficient of the interaction between reversals and openness should be significantly positive.

Main results

In Table 12 I summarize the basic results obtained from the estimation of number of treatment models for GDP growth (the coefficients of the time-specific and country specific dummy variables are not reported due to space considerations). The table contains two panels. The upper panel includes the results from the growth outcome equation; the lower panel contains the estimates for the "treatment equation," or probit equation on the probability of experiencing a current account reversal. As pointed out above, the treatment observations correspond to current account reversal episodes, and the untreated group is comprised of all country-year observations were there have been no reversals. Table 12 also includes the estimated coefficient of the hazard variable in the second step estimation, as well as the estimated elements of the variance-covariance matrix (7). The first two equations in the table include current values of the reversal dummy and of the interactive variable. The last two equations also include lagged values for these variables. Due to space considerations I only report the results for the *Reversal A* definition of current account reversals; those for the alternative *Reversal B* definition are similar.

Probability of experiencing a current account reversal. The probit estimates are presented in the lower panel of Table 12. As may be seen, the results are similar across models and are quite satisfactory. All of the coefficients have the expected signs, and are statistically significant at conventional levels. These results indicate that the probability of experiencing a reversal is higher for countries with a large (lagged) current account deficit, a high external debt ratio, and a rapid rate of growth of domestic credit. Countries that have a higher level of net international reserves have a lower probability of experiencing a reversal. The coefficients of the short-term debt and total debt service have the expected signs, but tend not to be significant.

GDP growth models. The results from the estimation of the growth equation are reported in Panel A of Table 12. The first equation (12.1) includes the current account reversal dummy, but does not include a term that interacts the reversals dummy with openness. The second equation (12.2) includes the interactive term. Equations (12.3) and (12.4) include lagged terms of the reversal dummy and of the reversal-openness interactive term. As the Table shows, the lagged values were not significant. Thus, in the discussion that follows I concentrate on equations (12.1) and (12.2).

As may be seen, the growth equation results presented in Table 12 are interesting: The traditional covariates have the expected signs, and with the exception of *openness* they are significant at conventional levels. More important for the topic of this paper, in equation (12.2) the coefficients of the current account

Table 12. Growth and Current Account Reversals
(Treatment effects model—two-step estimates)

Variable	(12.1)	(12.2)	(12.3)	(12.4)
Panel A				
Population growth rate	0.299	0.294	0.241	0.274
	(1.64)	(1.59)	(1.32)	(1.48)
Investment to GDP	0.176	0.168	0.189	0.173
	(6.98)**	(6.58)**	(7.35)**	(6.68)**
Government consumption to GDP	–0.162	–0.146	–0.172	–0.170
	(4.81)**	(4.28)**	(4.95)**	(4.84)**
Openness	0.006	0.002	–0.006	–0.007
	(0.57)	(0.24)	(0.60)	(0.70)
Log initial GDP per capita	–2.688	–2.733	–2.542	–2.472
	(2.73)**	(2.72)**	(2.59)**	(2.48)*
Reversal A	–1.82	–4.32	–1.714	–3.931
	(2.59)**	(4.11)**	(2.44)*	(3.73)**
*Reversal A** Openness		0.028		0.028
		(3.12)**		(3.03)**
Reversal A (–1)			0.253	–0.033
			(1.01)	(0.04)
Reversal A (–1)* Openness (–1)				0.007
				(0.77)
Panel B				
Current account deficit to GDP (–1)	0.128	0.128	0.131	0.131
	(12.01)**	(12.01)**	(11.92)**	(11.94)**
External debt to GDP (–1)	0.004	0.005	0.006	0.006
	(2.82)**	(2.95)**	(3.52)**	(3.54)**
Net int. reserves to GDP (–1)	–14.26	–15.07	–14.16	–14.25
	(1.83)	(1.97)*	(1.82)	(1.83)
Short term ext. debt to exports (–1)	0.003	0.003	0.003	0.003
	(0.50)	(0.43)	(0.45)	(0.43)
Domestic credit growth (–1)	0.0002	0.0002	0.0001	0.0002
	(1.45)	(1.42)	(1.53)	(1.53)
External debt service / exports (–1)	0.002			
	(0.45)			
Hazard lambda	0.917	1.122	0.865	0.906
	(2.07)*	(2.48)*	(1.96)*	(2.01)*
rho	0.214	0.256	0.203	0.209
sigma	4.282	4.377	4.268	4.325
Wald χ^2 (215)	637.24	683.31	650.12	638.34
Observations	1540	1544	1504	1502

Notes: Absolute value of *z*-statistics in parentheses; *significant at 5 percent; **significant at 1 percent; (–1) denotes a one-period lagged variable; country-specific and year dummies are included, but not reported.

reversal dummy is always significantly negative and the coefficients of the term that interacts openness and reversals is significantly positive. According to these results, the effects of reversals on growth depend significantly on the degree of openness of the economy—measured as the ratio of imports plus exports to GDP—and may be expressed as follows:

$$\textit{Growth Effects of Reversals} = -4.323 + 0.028\ \textit{openness}. \tag{9}$$

The variable *openness* in the data set varies significantly across countries. Its mean for the complete period is 64 percent, its standard deviation is 35 percent, and its median is 57.4 percent. The first quartile is 29.3 percent, and the third quartile is 84.5 percent. This means that for a country with a degree of openness equal to the mean, the point estimate of the effect of a current account reversal on growth is: –2.531 percent ($-4.323 + 0.028 \times 64 = -2.531$). If the country's degree of openness is equal to the first quartile, the (negative) effect of a reversal on growth is significantly higher at –3.50 percent. But if the country is very open to international trade, and its degree of openness corresponds to the third quartile, the effect of a reversal on growth is much smaller, at –1.96 percent. To make the point more vividly, consider the case of two neighboring countries in Latin America: Argentina and Chile. While Argentina is relatively closed—the average value for *openness* variable in the 1995–2001 period is 20 percent—Chile is quite open, with an average for the openness variable of 60 percent during the same period. This implies that a reversal in Argentina will tend to have a negative effect on growth equal to –3.763 percent; in Chile, on the other hand, the effect of the reversal on growth would only be –2.64.

In the rest of this section I report results from a number of extensions to the analysis presented in Table 12. In particular I analyze three issues: (i) whether the effects of reversals on growth depend on the level of external debt of the country in question; (ii) if reversals affect GDP growth differently in countries with different exchange rate regimes; and (iii) whether the reduction in growth depends on the actual magnitude of the reversal.

Dollarization and Current Account Reversals

As pointed out above, many recent discussions on macroeconomic instability in the emerging economies have centered on the role of dollarized liabilities. According to a number of authors countries with a high level of dollarized liabilities will be severely affected by reversals.[44] The argument is based on the notion that reversals tend to result (or be associated) with large exchange rate changes. To the extent that the real exchange rate indeed depreciates, the ratio of foreign currency denominated debt to GDP will increase massively, forcing the country to

[44]Strictly speaking this argument has been made in terms of sudden stops. As I argued above, sudden stops and reversals are distinctly different phenomena. The analysis in this section is in terms of reversals. On dollarization and the Argentine crisis see Calvo and others (2003). On a general discussion on the extent of dollarization in Latin America see Savastano (1992).

implement a deep(er) and costly adjustment. In order to investigate whether this conjecture is supported by the data I estimated systems of the type of (4)–(7) where in addition to the regressors described above, I also included the reversals dummy interacted with the country's total external debt (both public and private) denominated in foreign currency. Since (most) advanced countries are able to issue debt denominated in their own currency they are excluded from the analysis. If countries with higher dollarized liabilities suffer more from a reversal we would expect the coefficient of the interactive term to be significantly negative. However, the results from these regressions (not reported here due to space considerations, but available on request) indicate that the interactive term is positive (rather than negative) and not significant at conventional levels. This result was maintained when alternative estimation methods and different samples were used.

There are several possible explanation for these results, including that total external debt is not the best indicator of the extent of dollarized liabilities; that the channels through which the presence of dollarized liabilities affect growth are complex, and not captured by a model such as the one estimated in this paper; and that what matters is the extent of currency mismatches in the financial sector, rather that the actual extent of dollarization.

In order to further investigate this issue I included a variable that interacted *Reversals* with the ratio of foreign debt to the sum of imports and exports.[45] This interactive variable would be high in countries with a high external debt to GDP and/or a low degree of openness. If the presence of dollarized liabilities and the lack of openness jointly amplify the costs of reversals, we would expect the estimated coefficient of this interactive variable to be significantly negative. This, however, was not the case. Its estimated coefficient was 0.023 with a *z*-test statistic of 0.23.

Unfortunately, there are no data for a large panel of countries on the extent of dollarization of the financial sector. It is possible, however, to use a more limited data set—both in terms of years and countries' coverage—to further investigate this issue. I use the data set recently assembled by Reinhart, Rogoff, and Savastano (2003b), which covers 117 countries for the period 1996–2001. As before, the results obtained from this analysis did not provide support to the hypothesis that current account reversals result in higher real costs in countries with a greater degree of dollarization (detailed results available on request).[46]

The results reported above refer to whether the extent of dollarization affects the costs associated with current account reversals. An alternative question, and one that is also important in the current policy debate is whether countries with a higher degree of dollarization have a higher probability of experiencing a current account reversal, or a sudden stop for that matter. This would indeed be the case

[45]Of course, this is equivalent to a ratio of two ratios: (i) the foreign debt to GDP ratio, relative to (ii) the imports plus exports to GDP ratio (openness).

[46]In investigating this issue I used three procedures. First, I included in the estimation of the treatment equations a term that interacts Reinhart and others (2003b) composite index of dollarization with the reversal dummy. Second, I split the sample according to their classification of very high, high, moderate, and low degree of dollarization. And third, I split the sample according to the authors' four types of dollarization. In neither of these cases did I find support for the hypothesis that dollarization amplifies the effects of current account reversals.

if countries with dollarized financial systems are particularly vulnerable to external shocks (Calvo, Izquierdo, and Mejia, 2003). In order to investigate this issue I reestimated the propensity probit equation on the probability of experiencing a reversal with Reinhart and others (2003b) dollarization index as an additional regressor. The following results were obtained (z-statistic in parenthesis; time and country specific fixed effects not reported):

$$\delta_{jt} = \underset{(8.52)}{0.146}\ \textit{Current Account} + \underset{(4.72)}{0.214}\ \textit{dollarization} + \underset{(2.18)}{0.005}\ \textit{external debt}$$

$$-\underset{(-0.91)}{0.116}\ \textit{reserves} + \underset{(0.94)}{0.001}\ \textit{credit growth}$$

$$N = 892$$

All in all, I consider these results to be preliminary in nature. I believe that further research on the subject is required to come to a firmer conclusion on the effect of dollarization on the adjustment process. This additional research should include an effort to increase the coverage of the dollarization variables, both in terms of time-span as well as in terms of countries. Indeed, the fact that the best measure available—calculated by Reinhart, Rogoff, and Savastano (2003b)—covers only 1996–2001 means that the regression analysis reported above was undertaken on a limited number of observations.[47]

Exchange Regimes and Current Account Reversals

A number of recent policy discussions on the future of the international financial architecture have focused on the role of alternative exchange regimes in helping countries cope better with the vicissitudes of the international economy. In this section I investigate whether current account reversals have a different real effect on growth in countries with different exchange rate regimes. In particular, I analyze whether, as supporters of flexibility have argued, countries with flexible exchange rates have a greater capacity to absorb external shocks. If this were the case we would expect that the real costs of current account reversals would be smaller in countries with flexible regimes than in those with more rigid one.

I use the exchange rate regime classification devised by Levy-Yeyati and Sturzenegger (2003), that considers the *actual* rather than the *official* regime for each individual country at a particular moment in time.[48] Countries are classified into four regimes:

- ***Hard pegs*** (*Hard*): This group includes counties with currency boards, members of currency unions, and dollarized countries.

[47]In fact, when I used the Reinhart and others (2003b) dollarization index on the complete sample, the results were encouraging, and suggested that dollarized liabilities may indeed amplify the costs of reversals. Naturally, this conclusion is only valid to the extent that the 1996–2001 index also captures the extent of dollarization during the longer period. At this point, however, I am not prepared to make that claim.

[48]See also Reinhart and Rogoff (2002).

- ***Pegged regimes*** (*Peg*): This definition includes all alternative versions of pegged regimes, including pegged-but-adjustable. It also includes the hard regimes described above.
- ***Intermediate regimes*** (*Intermediate*): This group includes crawling pegs, managed floats, and other forms of intermediate regimes.
- ***Flexible rates:*** (*Flexible*): This group includes countries with flexible exchange rates, including free floating.

I proceeded as follows: For each of the four regimes I estimated treatment regression systems of the type (4)–(7). I then compared the estimates of both the reversals treatment dummy, as well as the term that interacts reversals and openness. Formal χ^2 tests for the equality of coefficients across regimes were then performed. If more flexible regimes act as shock absorbers, as their supporters have argued, we would expect that their coefficient of reversals would be smaller, in absolute value, than that of the more rigid exchange rate arrangements. In the actual estimation countries were classified according to the regime they had the year before the reversal was initiated. This was done as a way of dealing with countries that switched regimes during the sample period, and to properly classify those countries that as a consequence of—or in conjunction with—the reversal moved from one regime to a different one.

The results obtained are presented in Table 13, where I only report the estimates for the *Reversal A* dummy and for the interactive term. As may be seen, the point estimates for the *Reversal A* dummy are significantly negative for *Hard, Pegged,* and *Intermediate* exchange rate regimes. Moreover the point estimate of this dummy strictly declines (in absolute value) as the exchange rate regime becomes more flexible. As may be seen, its estimated coefficient for the *Flexible* regime group is not significantly different from zero, suggesting that while reversals are indeed costly (in terms of reduced GDP growth) under rigid and semi-rigid

Table 13. Exchange Rate Regimes and Current Account Reversals: Selected Estimated Coefficients*

(Treatment regressions)

Exchange rate regime	*Reversal A* dummy	Interactive term (*Reversal A* * openness)
Hard Peg	–9.114	0.075
	(–2.61)	(3.20)
Pegged	–6.770	0.053
	(–4.48)	(4.15)
Intermediate	–4.710	0.027
	(–2.79)	(1.71)
Flexible	2.060	–0.025
	(1.07)	(–1.05)

Note: Each equation was specified as explained in the text.
*Numbers in parentheses are *z*-statistics.

regimes, they are not significantly so in countries with exchange rate flexibility. A formal χ^2 test on the equality of these coefficients across different regimes' equations indicates that the null hypotheses is rejected: the χ^2 had a value of 21.1 for the *Reversal A* dummies, and 17.9 for the interactive terms.

Since, as the results in Table 13 indicate, the point estimates of the interactive term also vary across regimes, the actual effect of reversals on growth should be compared for given degrees of openness. The results indicate that for a variety of degrees of openness—up to 100 percent of GDP—the costs, in terms of a decline in GDP growth, of current account reversals has been higher in countries with more rigid exchange rate regimes, than in countries with more flexible ones.

Magnitude of the Reversals

The empirical results presented in this section has focused on current account reversals as a phenomenon that can be analyzed using a treatment-based analysis, where reversal events are captured by a "treatment" dummy variable. A potential limitation of this analysis is that it does not consider the actual magnitude of the reversal, and considers that a reversal of 5 percent of GDP is equal to one of 8 percent of GDP. In order to deal with this issue I estimated a number of treatment regressions systems that included terms that interacts the reversal dummy with the actual magnitude of the reversal. To the extent that the magnitude of the reversals matters—with higher reversals being more costly—the coefficient of this interacted term should be significantly negative. The results obtained from this analysis indicate that the estimated coefficient was indeed negative, with a point estimate of –0.015. However, it was not significant (z-statistic equal to –0.21), indicating that once reversals reach a certain level, their effects on growth are similar.

IV. Concluding Remarks

In this paper I have analyzed the anatomy of current account imbalances in the world economy during the past three decades. The analysis proceeded from a general picture of the distribution of deficits and surpluses, to a detailed investigation of the most important characteristics of major current account adjustments. The approach followed has been a combination of graphical displays, tabulation tables, nonparametric tests, and treatment effects regressions. I believe that by combining these different tools, I have been able to convey a clear and broad picture of the main characteristics of the adjustment process.

The main findings of the analysis of the anatomy of current account imbalances may be summarized as follows: (i) throughout the sample period the vast majority of countries have run current account deficits. Only in three regions has the median of current account balances been a surplus—industrial countries, the Middle East, and Asia—and in all of them this surplus has been small. (ii) *Large* current account deficits have not had a significant degree of persistence through time. Only a few countries have run persistently large deficits. (iii) The degree of persistence of *large surpluses* has been higher. A larger number of countries have run persistently large surpluses, indicating that under the current "rules of the game" the nature of the adjustment process is asymmetrical. (iv) Major reversals in current account deficits have tended to be persistent through time, and strongly associated with sudden stops of capital inflows. (v) There is a high probability that reversals lead to an exchange rate crisis; the evidence also indicates that countries that try to face reversals by running down reserves significantly usually do not succeed. (vi) There has been no statistically significant relationship between reversals and banking crises. (vii) Within a three-year window there has been no statistically significant relation between reversals and IMF programs.

The main results from the econometric analysis of the probability of countries experiencing a reversal, and of their effects on real economic activity may be summarized as follows. (i) The probability of a country experiencing a reversal is appropriately captured by a small number of variables that include the (lagged) current account to GDP ratio, the external debt to GDP ratio, the level of international reserves, domestic credit creation, and debt services. (ii) Current account reversals have had a negative effect on real growth that goes beyond their direct effect on investments. (iii) There is persuasive evidence indicating that the negative effect of current account reversals on growth will depend on the country's degree of openness. More open countries will suffer less—in terms of lower growth—than countries with a lower degree of openness. (iv) I was unable to find evidence supporting the hypothesis that countries with a higher degree of dollarization are more severely affected by current account reversals than countries with a lower degree of dollarization. And, (v) the empirical analysis suggests that countries with more flexible exchange rate regimes are able to accommodate the shocks stemming from a reversal better than countries with more rigid exchange rate regime.

APPENDIX

Table A.1. List of Countries by Region

		Industrial countries		
Australia	Finland	Ireland	New Zealand	Switzerland
Austria	France	Italy	Norway	United Kingdom
Belgium	Germany	Japan	Portugal	United States
Canada	Greece	Malta	Spain	
Denmark	Iceland	Netherlands	Sweden	
		Latin America and Caribbean		
Antigua and Barbuda	Brazil	El Salvador	Mexico	St. Vincent and the Grenadines
Argentina	Chile	Grenada	Nicaragua	Suriname
Aruba	Colombia	Guatemala	Panama	Trinidad and Tobago
Bahamas, The	Costa Rica	Guyana	Paraguay	Uruguay
Barbados	Dominica	Haiti	Peru	República Bolivariana de Venezuela
Belize	Dominican Republic	Honduras	St. Kitts and Nevis	
Bolivia	Ecuador	Jamaica	St. Lucia	
		Asia		
Bangladesh	Hong Kong SAR	Lao P.D.R.	Pakistan	Solomon Islands
Bhutan	India	Malaysia	Papua New Guinea	Sri Lanka
Cambodia	Indonesia	Maldives	Philippines	Thailand
China	Kiribati	Nepal	Singapore	Vietnam
Fiji				
		Africa		
Angola	Comoros	Guinea-Bissau	Mozambique	Sudan
Benin	Congo, Rep. of	Kenya	Namibia	Swaziland
Botswana	Côte d'Ivoire	Lesotho	Niger	Tanzania
Burkina Faso	Djibouti	Madagascar	Nigeria	Togo
Burundi	Ethiopia	Malawi	Rwanda	Tonga
Cameroon	Gabon	Mali	Senegal	Tunisia
Cape Verde	Gambia, The	Mauritania	Seychelles	Uganda
Central African Republic	Ghana	Mauritius	Sierra Leone	Zimbabwe
Chad	Guinea	Morocco	South Africa	
		Middle East		
Bahrain	Iran, I.R. of	Kuwait	Oman	Syrian Arab Republic
Cyprus[1]	Israel	Lebanon	Saudi Arabia	Yemen
Egypt	Jordan			
		Eastern Europe		
Albania	Czech Republic	Latvia	Romania	Turkmenistan
Armenia	Estonia	Lithuania	Russian Federation	Ukraine
Azerbaijan	Hungary	Moldova	Slovak Republic	Uzbekistan
Belarus	Kazakhstan	Mongolia	Slovenia	
Bulgaria	Kyrgyz Republic	Poland	Turkey	

[1]Although Cyprus is considered a European country by the IMF, the author has listed it under Middle East in an effort to present more accurately the country's current level of economic development.

Table A.2. Mean Current Account to GDP Ratios by Region, 1970–2001

Year	Industrial	Latin America	Asia	Africa	Middle East	Eastern Europe	Total
1970	–0.05	7.52	0.26	0.90	6.67	…	2.62
1971	–0.28	5.53	0.64	5.25	2.23	…	2.05
1972	–1.50	3.78	2.43	6.20	–3.40	…	0.75
1973	–1.17	3.33	1.35	7.20	0.23	…	1.13
1974	2.97	3.26	4.56	–3.07	–8.04	1.50	0.44
1975	1.47	2.36	5.44	4.35	–8.62	3.50	2.17
1976	2.16	1.48	0.25	5.55	–9.78	3.80	1.46
1977	1.82	4.05	–0.74	3.88	–5.25	5.19	2.09
1978	0.50	3.70	1.85	8.53	0.80	1.90	4.23
1979	1.40	4.51	–1.57	6.44	–8.16	1.50	2.76
1980	2.16	7.05	7.74	7.21	–9.02	0.10	4.92
1981	2.39	10.05	11.64	10.00	–8.00	1.05	7.35
1982	2.36	9.10	11.01	11.01	–1.68	0.97	7.82
1983	1.20	6.33	8.44	8.25	1.63	1.26	5.91
1984	0.98	4.14	3.69	5.88	1.34	0.15	3.78
1985	1.15	2.72	5.32	5.90	1.45	1.60	3.79
1986	0.96	5.44	4.02	6.28	1.30	3.09	4.41
1987	1.03	5.36	3.25	4.75	0.48	0.08	3.59
1988	0.91	4.42	2.73	6.01	–0.10	–1.30	3.63
1989	1.18	5.35	3.82	4.52	–4.36	0.04	3.21
1990	1.18	4.25	4.31	4.39	–4.13	3.00	3.04
1991	0.67	7.29	2.48	5.08	28.84	2.67	6.24
1992	0.43	5.55	3.25	6.34	9.29	0.10	4.45
1993	–0.46	6.01	4.94	6.58	8.13	1.98	4.71
1994	–0.35	4.36	2.52	6.77	2.87	1.08	3.52
1995	–0.85	4.83	3.31	8.84	1.39	2.90	4.30
1996	–0.78	6.12	3.42	8.71	0.32	7.09	5.09
1997	–1.18	7.34	4.00	4.80	–0.09	6.97	4.20
1998	–0.33	7.22	–0.63	6.71	6.16	9.66	5.12
1999	–0.13	4.81	–2.99	5.16	–2.40	6.14	2.76
2000	–0.57	2.76	–3.77	4.23	–9.22	2.66	0.84
2001	–0.45	3.32	–3.51	5.95	–4.16	3.31	1.98
Total	0.62	5.36	3.19	6.34	–0.04	3.87	3.96

Table A.3. Median Current Account to GDP Ratios by Region, 1970–2001

Year	Industrial	Latin America	Asia	Africa	Middle East	Eastern Europe	Total
1970	–0.40	4.10	0.90	0.90	5.90	…	0.90
1971	–0.50	4.60	1.00	5.25	7.25	…	1.05
1972	–1.00	1.45	1.55	6.20	1.25	…	0.40
1973	0.15	1.05	0.70	7.20	2.25	…	0.85
1974	2.90	4.00	3.00	2.40	–0.80	1.50	2.90
1975	1.35	4.10	3.65	6.50	–3.80	3.50	3.30
1976	2.65	1.40	0.20	5.05	–3.20	3.80	3.30
1977	2.05	3.95	–0.70	4.10	–1.65	5.20	2.80
1978	0.65	3.95	2.55	9.90	3.00	1.90	3.50
1979	0.70	4.70	2.70	6.40	–8.90	1.50	3.20
1980	2.30	5.55	4.80	8.40	–3.95	0.10	4.35
1981	2.70	9.05	8.55	10.00	1.45	1.05	6.85
1982	1.95	7.60	7.80	9.50	–1.55	1.50	6.55
1983	0.90	4.70	7.30	6.40	5.10	0.90	4.30
1984	0.25	3.30	2.10	4.10	4.90	0.65	2.50
1985	1.00	2.10	3.85	4.20	2.60	1.70	2.95
1986	–0.10	3.00	2.40	3.60	2.30	3.30	2.85
1987	0.40	4.15	1.70	5.00	2.45	0.90	2.60
1988	1.15	2.25	2.75	6.00	1.55	1.30	2.60
1989	1.50	4.40	3.45	3.65	–0.50	1.70	2.80
1990	1.40	2.80	4.45	3.80	–1.00	3.65	2.80
1991	0.90	4.80	3.20	3.70	10.10	0.70	3.10
1992	0.80	4.40	2.00	5.80	9.30	–0.10	3.25
1993	0.50	4.70	4.50	6.60	7.15	1.95	3.45
1994	–0.40	3.50	4.60	5.70	4.70	1.60	2.90
1995	–0.75	3.20	4.65	5.50	0.60	1.85	2.70
1996	–0.95	4.60	3.90	4.60	–0.35	5.40	3.65
1997	–0.65	4.90	4.10	5.20	–0.20	6.20	3.60
1998	0.20	4.90	0.70	5.60	3.30	7.00	3.80
1999	–0.50	3.60	–1.60	4.15	–0.30	4.30	2.70
2000	0.50	3.40	–1.75	3.30	–7.30	4.20	2.80
2001	–0.05	3.30	–2.60	3.95	–4.80	4.60	2.10
Total	0.70	4.10	2.70	5.30	1.40	3.00	3.10

Table A.4. Third Quartile Current Account to GDP Ratios by Region, 1970–2001

Year	Industrial	Latin America	Asia	Africa	Middle East	Eastern Europe	Total
1970	0.60	6.90	1.30	1.90	11.50	…	4.10
1971	0.40	7.80	1.70	8.30	9.30	…	5.70
1972	0.30	2.40	3.60	12.00	4.15	…	2.50
1973	1.30	4.10	1.30	10.00	5.75	…	2.90
1974	4.40	10.00	5.60	4.60	12.40	1.50	5.30
1975	4.40	6.80	9.40	8.40	14.80	3.50	7.60
1976	4.30	4.00	6.20	8.35	3.30	3.80	5.40
1977	3.60	7.30	4.15	7.70	2.60	5.20	5.90
1978	2.50	7.60	3.85	12.40	9.20	1.90	8.90
1979	2.70	6.70	5.80	12.30	5.30	1.50	7.10
1980	3.60	11.60	10.90	13.00	2.60	5.00	10.50
1981	4.30	13.45	13.00	12.90	5.90	2.70	12.20
1982	4.00	11.75	13.10	13.70	8.30	2.30	10.70
1983	2.40	7.45	11.00	12.40	7.70	3.10	8.10
1984	3.00	6.60	4.95	8.80	8.20	1.95	6.35
1985	3.60	6.40	6.65	8.40	7.50	2.05	6.60
1986	3.30	7.80	5.70	8.20	9.40	5.20	6.40
1987	3.20	8.75	5.60	9.65	5.40	2.50	6.30
1988	3.00	7.65	5.80	9.75	4.10	1.70	6.60
1989	3.60	7.10	7.90	7.25	5.20	2.00	5.70
1990	3.40	7.65	6.85	9.00	2.15	8.30	6.40
1991	2.80	12.40	6.75	9.60	20.00	3.50	7.70
1992	2.70	8.00	4.70	8.90	17.20	3.50	7.10
1993	1.70	8.90	7.90	8.30	13.00	4.20	7.90
1994	1.70	7.30	6.20	9.20	6.70	3.70	6.30
1995	1.15	5.50	7.95	11.20	5.05	5.65	7.10
1996	1.85	7.80	7.50	10.40	4.20	9.20	8.10
1997	2.10	10.50	8.10	7.85	2.10	10.80	7.20
1998	2.50	8.90	5.40	10.15	12.35	11.30	8.90
1999	2.80	5.60	2.10	10.75	1.90	8.00	5.90
2000	3.10	5.20	0.60	8.50	1.20	5.90	5.50
2001	2.60	4.65	1.70	8.30	0.00	6.60	4.80
Total	3.00	8.00	6.40	9.90	6.40	6.10	7.20

Table A.5. First Quartile Current Account to GDP Ratios by Region, 1970–2001

Year	Industrial	Latin America	Asia	Africa	Middle East	Eastern Europe	Total
1970	–0.70	2.80	0.10	–0.10	2.60	…	0.76
1971	–1.30	0.10	0.10	2.20	–4.85	…	0.08
1972	–1.70	0.60	–1.20	0.40	–10.95	…	–1.27
1973	–2.70	–0.20	–0.70	4.40	–5.30	…	0.28
1974	–0.10	2.80	0.90	–17.40	–10.90	1.50	–4.75
1975	–0.30	1.30	0.70	0.40	–30.80	3.50	–1.57
1976	0.75	–1.10	–3.40	3.05	–12.90	3.80	–0.39
1977	–0.10	0.40	–4.95	0.60	–12.80	5.20	–0.95
1978	–1.40	0.25	–0.35	4.20	0.70	1.90	1.26
1979	0.00	0.40	–4.40	0.00	–13.70	1.50	–1.58
1980	0.50	0.55	1.20	2.20	–15.80	–4.80	–0.93
1981	–0.40	5.35	2.70	5.40	–17.00	–0.60	1.50
1982	–1.00	5.00	3.40	4.70	–6.50	–0.90	2.08
1983	–0.40	1.70	0.90	3.40	–2.70	–0.20	1.12
1984	–0.80	1.20	0.50	0.10	–3.40	–1.65	–0.26
1985	–1.60	–0.50	1.95	1.10	–1.10	1.15	0.38
1986	–1.60	0.60	–0.15	0.60	0.60	1.00	0.22
1987	–1.00	1.25	0.20	0.45	0.20	–0.20	0.26
1988	0.10	0.50	–2.15	1.65	1.40	–1.80	0.07
1989	–0.20	0.70	0.25	0.95	–12.40	–0.90	–0.71
1990	–1.00	–1.65	2.15	0.90	–12.40	–1.10	–1.00
1991	–1.50	0.75	1.10	0.40	2.10	–1.20	0.25
1992	–2.00	–0.30	0.40	1.60	1.30	–0.90	0.15
1993	–3.10	0.60	1.30	1.80	–0.10	–0.95	0.27
1994	–2.80	0.20	0.30	0.30	–4.25	–2.00	–0.83
1995	–2.95	1.55	1.85	2.10	–4.05	0.15	0.48
1996	–3.55	1.60	0.40	1.30	–3.20	2.40	0.31
1997	–4.15	2.60	1.80	1.35	–1.35	2.50	0.84
1998	–3.20	2.40	–3.00	1.80	0.35	2.50	0.37
1999	–2.60	2.50	–7.10	0.25	–4.80	1.90	–1.15
2000	–2.90	3.00	–6.55	0.10	–22.40	2.80	–2.34
2001	–2.80	1.95	–6.75	0.05	–11.70	1.20	–1.93
Total	–1.45	1.22	–0.58	0.95	–6.75	0.56	–0.28

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