Large Depreciations: Recent Experience in Historical Perspective

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LARGE DEPRECIATIONS: RECENT EXPERIENCE IN HISTORICAL PERSPECTIVE *

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Abstract

Data for a large sample of countries dating back to the early 1970s reveal that the large depreciations against the dollar that are occurring in many countries are not unprecedented in magnitude or duration. The pass-through to inflation from exchange rate depreciation has been slightly more muted than in previous occasions, but it is not out of line with experience since the mid-1990s. The current account adjustment has been more limited than in the past, possibly suggesting that the period of weak currencies may be prolonged.

A key feature of current developments in the global economy is the sharp depreciation of the currencies of many emerging-market economies as well as some advanced economies. As a result of currency weakening, inflation has risen in many countries. At the same time, economic activity has been sluggish, creating a dilemma for monetary policy. The exchange rate is also a key relative price that determines competitiveness and helps external and internal adjustment by reducing the current account deficit and inducing demand for domestic goods, thereby helping the recovery.

Defining large depreciations is not trivial in a world of flexible exchange rates, particularly when the purpose is to characterize the complete episode. Most past research was devoted to currency crises. Defining a crisis was rather simple, as one needed to identify periods in which the exchange rate jumped significantly. Edwards (1989) undertook an early study of large devaluations. The International Monetary Fund (IMF) conducted the most recent study of large depreciations—in 2015.[1]

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[1] The report is a comprehensive study of external adjustment and exchange rates. Like this study, it focuses on large depreciations with respect to the dollar. In a large sample of countries starting in 1980 and ending in 2014, it identifies 123 episodes, by looking at annual data and using threshold depreciations for the whole sample of countries. Its criteria are stricter than the ones used here. The report finds very few episodes in

One would like to define an entire depreciation event, rather than merely identifying a sudden and significant change. In this regard, my purpose is closer to that of Goldfajn and Valdés (1999), who studied periods of significant appreciations by defining deviations of the real exchange rate against some equilibrium value. Defining large depreciations is not easy. It requires a number of definitional assumptions, because they may take place gradually over a longer period of time, often without sudden changes, and the process can be quite persistent.

This paper examines episodes of large depreciations from a historical perspective, starting in 1970. It presents some stylized facts about the frequency and magnitude, as well as the relationship with inflation and adjustment, of large depreciations. It concludes with some remarks on policies and recommendations for further research.

1. The Data

All data on exchange rates and prices are from the IMF's Information Notice System and International Financial Statistics.[2] The focus is on the relative value of the currencies with respect to the US dollar. In principle, multilateral exchange rates, such as nominal effective exchange rates, could provide a better measure for the relative value of currencies than the bilateral one with the dollar. However, there are practical and conceptual reasons to look at exchange rates with respect to the dollar. Fewer data are available on nominal effective exchange rates: The monthly database of the Bank for International Settlements starts only in 1994, and data from the IMF are available only until late 2014. In contrast, exchange rate data with respect to the dollar are available for a 45-year period that runs through November 2015. Moreover, the focus of recent discussions has been on the depreciation of currencies against the dollar.

I report correlations with nominal effective exchange rates. Unless otherwise noted, the nominal exchange rate is measured as the price of the dollar in terms of the local currency (hence a depreciation means that the exchange rate is going up).

There are also conceptual reasons to focus on dollar exchange rates. Using exchange rates weighted by trade partners may not be more appropriate to study the effects of inflation, because many goods, especially the most homogeneous ones, are invoiced in dollars, whether or not they are sold in the United States (see Goldberg and Tille 2009 and Burstein and Gopinath 2014). In contrast, in terms of competitiveness and the relevant relative prices for current account adjustment, weighting the value of the currency by trade partners may provide a more accurate measure than just a bilateral exchange rate.

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the current decade and fails to identify some of the best-known events that have occurred since 2013 in emerging markets, which are of particular interest here.

[2] Price indexes for Chile, Jordan, and Mexico were obtained from their central banks.

The sample consists of all countries with more than 3 million people and $5,000 of per capita GDP in 2014 purchasing power parity dollars for which data are available for at least part of the 1970s (with the obvious omission of the United States). The last observation is November 2015. The number of countries is 47.

Many practical details are needed to define episodes of depreciation, all of which may be controversial. However, choosing a clear method for all countries provides a typology that avoids tailoring definitions for each country.[3]

2. The Methodology

The methodology used to identify a currency crisis is not the most appropriate for examining episodes of large depreciations, because it considers only discrete changes. The focus here is also on periods of continuous but severe depreciations. For this reason, I follow more closely the approach of Detken and Smets (2004) to detect asset price booms and Goldfajn and Valdés (1999) to define periods of real appreciations.

For each country, I compute the bilateral real exchange rate vis-à-vis the dollar—that is, the nominal exchange rate of a country multiplied by the US producer price index (PPI) and divided by the country's consumer price index (CPI). (The details of the methodology are presented in the appendix A.) This methodology controls for episodes of high inflation in which the currency is weakening because of the inflation process despite the stability of the bilateral real exchange.

I apply a one-sided Hodrick-Prescott filter to this series, which allows deviations with respect to the trend to be measured. Large depreciations are defined as ones in which the gap is at least 1.5 times the standard deviation; they are computed on a country-by-country basis. Another option could be to consider the same standard deviation for all countries. However, the level and volatility of exchange rates depend on country-specific characteristics, such as the volatility of growth, inflation, and the terms of trade. It is also necessary to distinguish between the standard deviation of periods of high versus low (defined here as single-digit) inflation.

To determine when a particular episode started and ended, I looked backward to find a minimum value of the exchange rate and forward to find a maximum. Where two consecutive events occurred within 12 months, I merged them.

I restricted the sample to episodes in which inflation was less than 50 percent, the episode lasted more than six months, and the depreciation was less than 500 percent. Some

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[3] Tailor-made definitions could be appropriate for case studies, a complementary approach to the one adopted here, which seeks the largest possible sample.

episodes took place during periods of fixed exchange rates. Because of the very low volatility during a period of fixed exchange rate, there would be a tendency to find relevant gaps with the trend of the bilateral real exchange rate just due to fluctuations in the domestic CPI with respect to the US PPI rather than changes in the exchange rate; those events were not included.

In a few cases, large depreciations with respect to the dollar were accompanied by appreciations of the effective exchange rate. All episodes of this kind were eliminated, in order to avoid biases in the comparisons of effective versus dollar exchange rates. Argentina was excluded because of the lack of reliable CPI data. The full sample contained 155 events in 47 countries.[4]

The dating of the events could indicate an earlier beginning of an episode than is usually presumed. For some countries, for example, the methodology indicates that the depreciations during the Asian crisis began in 1995 or 1996—that is, before large depreciations took place—because the search for a minimum may move back the beginning of the event to periods of relative calm, resulting in a lengthening of the episodes. A longer duration reduces the average annual depreciation during the episode. Further work could refine this criterion to improve the description of the episodes, but in this research I have chosen to have a homogeneous criterion to define the episodes.

3. The Evidence

How common are large depreciations? Is the current experience unique? Figure 1 shows the number of events that occurred each year between 1970 and 2014. Most episodes lasted more than a year; all events falling in a given year are counted. Therefore, an event that lasted for, say, three years, is counted in all the three years it touched.

In figures 1 and 2, the sample is restricted to countries for which data were available for the whole sample, in order to avoid biases caused by a change in the size of the sample. This restriction reduced the sample to 106 events and 31 countries.[5] Figures 3–6 use the whole sample, regardless of how complete the country data are.

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[4] Some events identified in this paper are over by the end of the sample (November 2015). This raises concerns about whether this is the actual end of the events or just an end due to data). To assess this issue, the exchange rate series of countries that have events ending up to nine months (search window used in the algorithm) before the end of the sample are extended. This procedure gives 14 events ending in the 9-month window in 2015 (1 in June, 7 in September, 2 in October, and 4 in November). Using the latest available data at the time of writing (March 2016), I find that 2 events do not change their end date. The rest have new end dates, which are concentrated in January 2016 (8 cases), plus 2 cases in December 2015 and 2 in February. This is caused by a strong appreciation of currencies by the turn of 2016. Regardless of this, the main findings of this paper do not change.

[5] For this reason, figures 1 and 2 do not include the European countries that later joined the euro.

The data reveal that for many currencies, the current depreciations against the dollar are not unique. Figure 1 also shows the evolution of the broad real dollar exchange rate, measured in the "advanced economies' way," i.e., the relative value of US goods with respect to foreign goods. Therefore the US real exchange rate appreciates when this index goes up, contrary to the convention used for the rest of the data presented here. The number of large depreciation episodes moves alongside the global value of the dollar, but the relationship is not merely mechanical; it varies over time. During the debt crisis and the Federal Reserve's tightening of monetary policy in the early 1980s the dollar reached a peak, for example, even though the number of episodes of large depreciations declined.[6]

Two periods over the last 45 years had a large number of episodes. The most notable one started around the mid-1990s, with the run-up of the dollar; it coincided with the Asian crisis and massive depreciations in many emerging economies. The other began with the global financial crisis of 2008–09. The immediate massive depreciations did not last very long, and in many cases they were followed by periods of appreciation. Depreciations resumed quite significantly after the announcement of tapering in the United States in May 2013. The number of episodes increased in the last 15 years, possibly because of greater exchange rate flexibility around the world, a finding that requires further exploration.

The recent experience has not been exceptional in terms of median annual depreciation and duration of the episodes (figure 2). The depreciation is the annual equivalent depreciation of the exchange rate during the entire episode. Because the large depreciations during the Asian crisis lasted longer, this period appears less severe than others. When the duration of an episode is six months to a year, I use the actual depreciation. The depreciations during the global financial crisis were sharp and brief; in recent years they lasted longer but they have been less severe.[7]

One concern is that large depreciations may not be the same when multilateral exchange rates are used instead of the dollar; a depreciation event against the dollar may be more muted in multilateral terms if all currencies are weakening against the dollar.

The effective nominal depreciation is indeed somewhat smaller, as figure 3 shows.[8] This result is expected when the main driver is the strengthening of the dollar, but the correlation is still high. On average the slopes for the four periods studied are similar (at about 0.7), except for 2002–09 (1.27), when the depreciation against the dollar was larger than the depreciation against multilateral exchange rates because the dollar weakened.

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[6] Some episodes started before the actual tightening by the Fed, because the episode began with the most recent local minimum and the appreciation of the dollar began in the late 1970s.

[7] The spike in 1977 is the result of a very small number of events (see figure 1) with relatively large depreciations.

[8] Real effective exchange rate indexes are available only for the period 1979–2014. The sample is therefore restricted to 129 events and 45 countries.

The correlation is 0.74 for the whole dataset and 0.69 for the 2010–15 period. Except in 2002–09, a 10 percent depreciation against the dollar represented about a 7 percent depreciation in real multilateral terms. Depreciations against the dollar were thus also associated with significant depreciations on a multilateral basis, suggesting that bilateral rates are a good proxy for changes in overall exchange rates.

4. The Inflationary Consequences of Large Depreciations

Figure 4 shows the effect of depreciation on inflation. It indicates that contemporaneous pass-through was relatively small and declined in the 2000s.

In figure 5 I compute two pass-through coefficients by dividing inflation by depreciation with respect to the dollar. In both cases the annual depreciation of the event is used; what changes is the rate of inflation. The horizontal axis is the contemporaneous pass-through, which uses the annual inflation rate during the episode. The vertical axis is the end-of-period pass-through, which uses the annual inflation in the last month of the event. Most data fall below the 45-degree line (contemporaneous pass-through was greater than end-of-period pass-through), indicating that the effects of the depreciation decline toward the end of the episode. This result implies that inflation is falling and the pass-through is relatively rapid, something Gopinath (2016) finds in a different context. In addition, because the coefficients are less than one and decrease over time, the real exchange rate converges to a more depreciated value after large depreciations.

Time series studies show a decline in these coefficients (for emerging markets, see Mihaljek and Klau 2008; for industrial countries, see Gagnon and Ihrig 2004 and Takhtamanova 2010). However, the data used in this work, which focus on large depreciations, are closer to the work of Borensztein and De Gregorio (1999), who analyze the pass-through after currency crises, which are much more stressful than the episodes examined here. In a sample that runs through 1996, they find that the pass-through is about 60 percent after two years. I find smaller values. This may be the consequence of currency crisis resulting in greater increases in inflation than those of large depreciations, most of which are not caused by currency crisis.

Figure 6 shows the evolution of pass-through over time. There is some evidence of a declining pass-through after large depreciations, although it is not smooth. During the 1970s the average pass-through was 43 percent. It was 28 percent in 1981–86, 27 percent in 1995–2002, and 19 percent in 2008–15 (although the 2008–15 value was affected by the low figures for 2008–09).

Like in other time series studies, the results presented here show that large depreciations have had more moderate effects on inflation in recent years than they did earlier, in particular during the first 15 years of the sample. More work is needed to establish the robustness of this evidence during periods of large depreciations, which may be different from the findings for more tranquil times.

The pass-through is not a mechanical response to some country characteristic; it also depends on the source of the depreciation. If monetary loosening causes the depreciation, one would expect larger inflationary effects than if the cause were a real shock that required a real depreciation. Explanations of the evolution of the pass-through should therefore focus not only on country-specific features but also on the nature of the shocks.

5. Economic Adjustment to Depreciations

In order to review the adjustment to large exchange rate depreciations, I show the evolution of the current account, the rate of GDP growth, and the real effective exchange rate in two five-year periods that include a large number of depreciation events: 1997–2001 and 2011–15. The sample in the first period contains 40 countries; the sample in the second period includes 23.[9] The countries are pooled, so some caution must be used when interpreting the data, as not all episodes in every country have the same starting date. The purpose of this simple exercise is to get a basic understanding of the economic adjustment.

Figure 7 shows the evolution of the current account in both periods (it starts two years before and ends two years after each episode). A depreciation event reduces the value of the GDP in foreign currency; the current account adjustment could thus be underestimated when measured as a percentage of GDP, as done in figure 7. However, there is no reason to think the bias would be different in the two periods under consideration.

In the first period (panel a), the current account balance improves persistently over time; in the second period (panel b), it remains relatively stable. However, the latter period has been characterized by both a decline in the terms of trade and depreciations in commodity-exporting countries, so some comparison problems may arise. Indeed, the lack of adjustment in the second period may owe much to the decline in the value of exports relative to imports.

Indirect evidence on the effect of prices can be obtained by looking at the evolution of the terms of trade and commodity prices. Figure 8 shows the evolution of the CRB index of commodities. In the first period (panel a), commodity prices began declining sharply from high levels in 1998; they recovered only in 2002 and 2003. In contrast, in the second period (panel b), commodity prices keep rising until 2011, before declining rapidly. In the first period, the current account improves despite lower commodity prices. In the second period, the current account balance remains stable, even deteriorating when commodity prices rise. This result may reflect the investment boom that many countries experienced

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[9] For each sample all the countries that experienced at least one year of a large depreciation are included in the full period. Averages are simple averages.

during the commodity boom, which may have more than offset the price effects. In contrast, the most recent investment slump has not been large enough to improve the current account balance.

Commodity prices are not necessarily a good proxy for the terms of trade of commodity-exporting countries, for a few reasons. First, many commodity producers are consumers of other commodities.[10] Figure 8 also shows the evolution of the terms of trade in Latin America to illustrate this point. While commodity prices were declining in the late 1990s, the average terms of trade in the region were improving, which may have helped turn around the current account deficit. In contrast, the decline in the terms of trade in the recent episode has been persistent since 2012, albeit much milder than the fall in commodity prices. The evolution of the terms of trade may partly explain the lack of sufficient adjustment of the current account.

This evidence raises the issue of the effectiveness of depreciation to increase net exports, an issue discussed in IMF (2015). The evolution of the current account around the turn of the 20th century and today raises questions about the benign view that the impact of depreciation on the current account balance has not changed over time.

There are several reasons to think that the impact of exchange rates on the current account has diminished. First, global trade has declined (see Freund 2016 for further discussion). Of course, if the decline were the result of the retrenchment of global value chains, it would represent only a shift in the location of businesses. Nevertheless, one should observe a decline in the current account balance, something that did not happen.

Second, the decline in global trade is related to the decline in the demand for foreign goods by China, a consequence of the shift in China's growth strategy from investment and manufacturing toward consumption and services. Commodities were the first to take the hit. But all tradable goods have felt the shift in domestic demand in China from manufacturing to services, making it more difficult for exporters to penetrate foreign markets and gain market share.

Third, effective exchange rates, weighted by the relevance of trade partners, may not fully capture the fact that depreciation is taking place in countries that compete to sell the same goods in global markets. The Argentinean, Australian, and Chilean wine industries have all become more competitive.[11]

Whether the limited adjustment in the current account reflects a price effect (as a result of a deterioration of the terms of trade) or some quantity effects (such as the low dynamism of global trade or a potential decline in trade elasticities), the implication for

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[10] For a discussion of this issue in the context of Latin America's recent experience, see De Gregorio (2016).
[11] See IDB (2016) for further discussion and evidence on this issue.

exchange rates is similar. Compared with other episodes, more exchange rate depreciation or a longer duration may be needed to foster the adjustment.

The Asian crisis of 1998–99 took place during the first period, and this is reflected in the deceleration of 1998 (figure 9, panel a). GDP growth recovered but fell again following the US recession of 2001. The second depreciation episode started with the Great Recession (figure 9, panel b). It was followed by a strong recovery and then a slowdown, which is expected to end with growth of about 4 percent in 2017, similar to the rate at the end of the first period. There is no difference between the two periods worth highlighting, given the different states of the world economy across periods. However, improved prospects today depend on the expansionary powers of the real exchange rate depreciation, which may be weaker than in the past.

A potential explanation for the lack of current account adjustment in 2011–15 compared with 1997–2001 could be the fact that the recent depreciation against the dollar may not have been accompanied by a multilateral real depreciation. Figure 10 examines this hypothesis by comparing the median and the mean real effective exchange rate depreciations in the two periods. In both periods the depreciations were much larger when measured with respect to the dollar than at a multilateral level. However, the magnitudes of the real depreciations in both episodes were similar. It is hence unlikely that the lack of adjustment in the current episode is the result of a small real depreciation.

6. Concluding Remarks

The current episode of sharp depreciation is not unprecedented in terms of the number of countries involved, the magnitude of the depreciations, or their duration. Many countries are struggling with the inflationary impact of depreciation, their currencies having weakened not only against the dollar but also against other currencies. Monetary policy faces a difficult challenge, particularly in inflation-targeting economies. Where activity is weak and inflation rising, the direction of monetary policy depends on the impact these developments have on projected inflation—and the impacts point in opposing directions. On average, the pass-through from exchange rates to inflation has declined. In addition, the impact of depreciation on inflation is relatively short lived. One could therefore expect activity effects to dominate. However, the implication for monetary policy is not simple, because the impact of rising inflation on inflationary expectations may have first-order impacts for monetary policy decisions. The pass-through depends on the credibility of monetary policy, among other things.

Several countries experiencing depreciation are commodity exporters or countries that, despite not being classified as commodity exporters, had an investment surge in the commodity sector (examples in Latin America include Brazil and Mexico). There was also an investment boom in traditional commodity exporters in Latin America, such as Chile, Colombia, Peru, and Venezuela. Depreciation provides the appropriate price signals to move resources from commodities to other tradable goods sectors. In the context of

subdued domestic demand, it should boost external demand and contribute to the recovery of activity.

Current account adjustments have been slower recently than in previous episodes, in particular at the turn of the 20th century. Activity has been slowing, although recovery is expected this year and next. Against this background, a key issue is whether the exchange rate has been effective in producing the external adjustment and boosting aggregate demand. The report by the IMF (2015) argues that the effects of exchange rates on the current account have not changed significantly. That finding does not imply, however, that the impulse from global trade and prices is the same as it was.

The implication of a decline in the responsiveness of external demand to exchange rates is direct: The required depreciation must be larger or last longer. In the first months of 2016 many currencies have appreciated, but they have not reverted to the previous large depreciations, and it is unlikely that this will happen in the near future.

Several extensions of this research and further analysis are needed to check the robustness of the findings. The definition of episodes could be refined and compared with criteria based on multilateral effective exchange rates rather than the bilateral rates with respect to the US dollar. Despite the high correlation between bilateral exchange rate movements and multilateral rates, multilateral rates may be worth exploring. Future research should also link the recent large depreciations of several currencies with the evolution of commodity prices and the terms of trade and its impact on the economy.

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Appendix A Identification of Episodes of Large Depreciation

Large depreciation episodes are defined as follows:

1. For each country, the bilateral real exchange rate with respect to the US dollar is calculated. This step controls for inflation differentials that may be moving the exchange rate, especially in a period with many episodes of high inflation.

2. The trend of this series is recursively calculated using a one-sided Hodrick-Prescott filter with a smoothing parameter of 129,600 (as data are monthly), which provides enough smoothness to detect significant deviations from the trend. This smoothing parameter, suggested by Ravn and Uhlig (2002), provides more smoothness than the traditional 14,400.

3. The percentage difference between the actual series and the trend is calculated. A positive (negative) gap corresponds to a depreciation (appreciation) of the bilateral real exchange rate. From this new series, two standard deviations are computed, one for the whole series (σ_{all}) and one for all periods in which 12-month inflation was under 10 percent (σ_{10}). This distinction is made because episodes of high inflation, and depreciation, tend to generate standard deviations that are too large, making it difficult to detect periods of large depreciation in times of low inflation. For example, if a country experiences a temporary hike in inflation, it will have a large standard deviation, and in periods of low inflation there will never be an event.

4. A large depreciation event is defined as one in which the gap between the actual bilateral real exchange rate and its trend is greater than 1.5 times the relevant standard deviations. If inflation exceeds 10 percent, the standard deviation used to define an event is σ_{all}, and if it is below 10 percent the standard deviation σ_{10} is used.

    The beginning and the end of an episode are the minimum and maximum exchange rates, respectively. From the period identified in step 4, the algorithm tests whether it is the minimum in a nine-month window. If it is, it marks the beginning; if it is not, the method goes back a period and tests the same condition with the same nine-month window centered on that value. This procedure is conducted until the minimum is found. A similar process is used to determine the end of the period. Which exchange rate is used depends on the level of inflation. In low inflation environments, the nominal exchange rate is used. When inflation is above 10 percent, the bilateral real exchange rate is used. In some cases a depreciation is followed by a few months of appreciation before the depreciation resumes. When the beginning of a new event within 12 months follows the end of one event, the two events are considered the same event.

Table A.1 Start date, duration, and magnitude of large depreciations included in analysis

| Country	Begin	Duration (months)	Depreciation (percent)	Country	Begin	Duration (months)	Depreciation (percent)	Country	Begin	Duration (months)	Depreciation (percent)
Algeria	1998	25	38.8	Hungary	1999	21	42.2	Philippines	1982	16	64.2
Austria	1980	19	41.8	Hungary	2004	19	19.3	Portugal	1973	6	20.6
Austria	1987	18	21.2	Hungary	2008	42	61.9	Portugal	1982	15	74.2
Austria	1995	28	33.6	India	1974	23	14.4	Portugal	1992	17	40.8
Belgium	1973	6	20.7	India	1988	63	141.6	Portugal	1995	32	28.0
Belgium	1980	56	137.8	India	1998	42	15.6	Rep. of Congo	1973	10	20.3
Belgium	1987	18	21.3	India	2008	8	15.7	Rep. of Congo	1980	19	48.1
Belgium	1995	28	34.2	India	2011	29	43.7	Rep. of Congo	1987	18	21.4
Bolivia	1970	41	68.4	Indonesia	1977	19	50.7	Rep. of Congo	1990	8	21.4
Bolivia	1996	101	56.4	Indonesia	1983	47	138.0	Rep. of Congo	1998	32	39.9
Brazil	1996	34	89.8	Indonesia	2011	30	42.8	Rep. of Congo	2004	11	13.5
Brazil	2002	6	64.0	Israel	1977	9	74.3	Rep. of Congo	2009	7	22.2
Brazil	2011	50	149.8	Israel	1988	10	26.6	Singapore	1973	30	6.6
Canada	1972	30	5.1	Israel	1992	14	21.4	Singapore	2014	14	13.8
Canada	1991	39	25.3	Israel	1996	70	57.0	South Africa	1974	18	29.8
Canada	2007	16	32.8	Israel	2005	11	8.6	South Africa	1983	30	145.3
Canada	2012	36	35.6	Israel	2011	13	17.4	South Africa	2006	6	26.4
Chile	1981	14	95.8	Italy	1980	19	54.6	South Africa	2007	11	45.6
Chile	1995	76	89.5	Italy	1992	17	54.2	South Africa	2011	55	109.5
Chile	2008	8	47.1	Japan	1978	18	36.8	Spain	1980	19	51.5
Chile	2013	31	49.0	Japan	1988	17	28.6	Spain	1992	17	53.4
China	1980	76	156.3	Japan	1995	40	72.9	Sri Lanka	1975	41	141.9
Colombia	2008	8	46.7	Japan	2011	44	61.2	Sri Lanka	2011	12	21.3
Colombia	2014	14	63.9	Jordan	1987	23	93.0	Sweden	1973	6	18.8
Costa Rica	1973	21	28.9	Korea	1979	16	39.8	Sweden	1992	16	58.1
Costa Rica	1990	22	58.4	Korea	1995	34	85.0	Sweden	1996	56	63.4
Costa Rica	2008	16	18.8	Korea	2007	17	58.9	Sweden	2004	11	21.1
Costa Rica	2012	19	11.1	Libya	1994	6	39.7	Sweden	2008	11	44.2
Denmark	1973	6	20.3	Libya	2001	30	156.4	Sweden	2014	20	35.2
Denmark	1978	34	53.4	Malaysia	1975	13	14.3	Switzerland	1980	19	36.1
Denmark	1987	18	22.5	Malaysia	1997	16	67.8	Switzerland	1987	19	22.7
Denmark	1992	12	23.6	Malaysia	2014	13	35.7	Switzerland	1995	28	33.2
Denmark	1995	25	29.7	Mexico	1976	9	82.0	Switzerland	2004	11	14.3
Denmark	1998	32	40.0	Mexico	2002	28	26.3	Thailand	1995	75	85.6
Denmark	2004	11	14.1	Mexico	2008	7	46.1	Tunisia	1973	8	13.1
Denmark	2009	7	22.2	Mexico	2013	29	37.7	Tunisia	1980	30	55.0
Finland	1980	56	87.6	Morocco	1998	32	30.1	Tunisia	1987	20	17.1
Finland	1990	34	62.4	Morocco	2004	11	10.9	Tunisia	1995	74	61.7
France	1973	6	23.9	Morocco	2009	7	17.9	Tunisia	2004	11	13.2
France	1987	18	21.4	Netherlands	1980	19	46.0	Tunisia	2009	7	17.9
France	1990	8	21.4	Netherlands	1987	18	21.4	Turkey	2007	15	45.7
France	1995	25	28.4	Netherlands	1995	28	34.1	Turkey	2010	13	26.7
Germany	1973	6	20.4	Norway	1973	13	3.9	Turkey	2013	32	70.1
Germany	1975	9	13.3	Norway	1988	13	16.2	United Kingdom	1980	53	119.2
Germany	1980	19	45.1	Norway	1992	18	30.9	United Kingdom	1988	14	20.8
Germany	1987	18	21.3	Norway	1996	9	20.1	United Kingdom	1992	12	30.0
Germany	1995	28	33.5	Norway	1998	24	26.0	United Kingdom	1999	20	18.4
Greece	1992	11	30.6	Norway	2008	7	38.8	United Kingdom	2004	11	11.2
Greece	1995	67	76.7	Norway	2014	18	45.4	United Kingdom	2007	16	46.7
Guatemala	1996	45	41.8	Peru	1997	51	36.4	Uruguay	1972	7	149.5
Hong Kong	1974	12	2.0	Peru	2013	33	27.3	Venezuela	2001	13	119.8
Hungary	1995	7	19.6	Philippines	1974	15	11.8				

Figure 1 Number of episodes of exchange rate depreciations and real exchange rate of US dollar in sample countries, 1970–2014
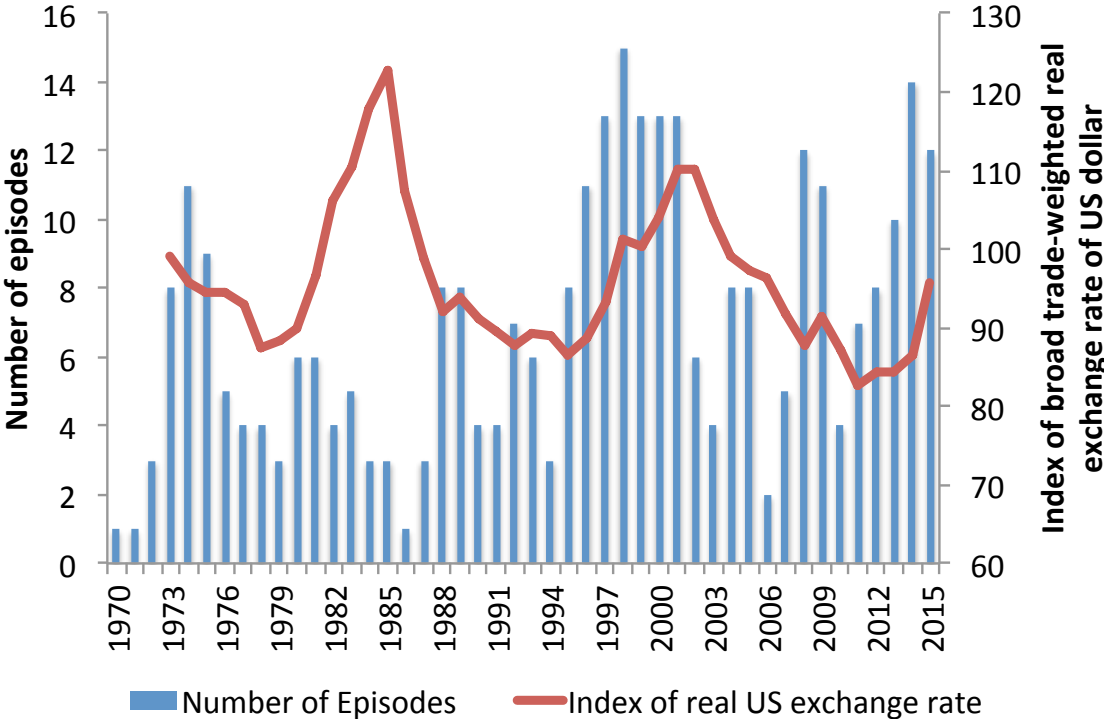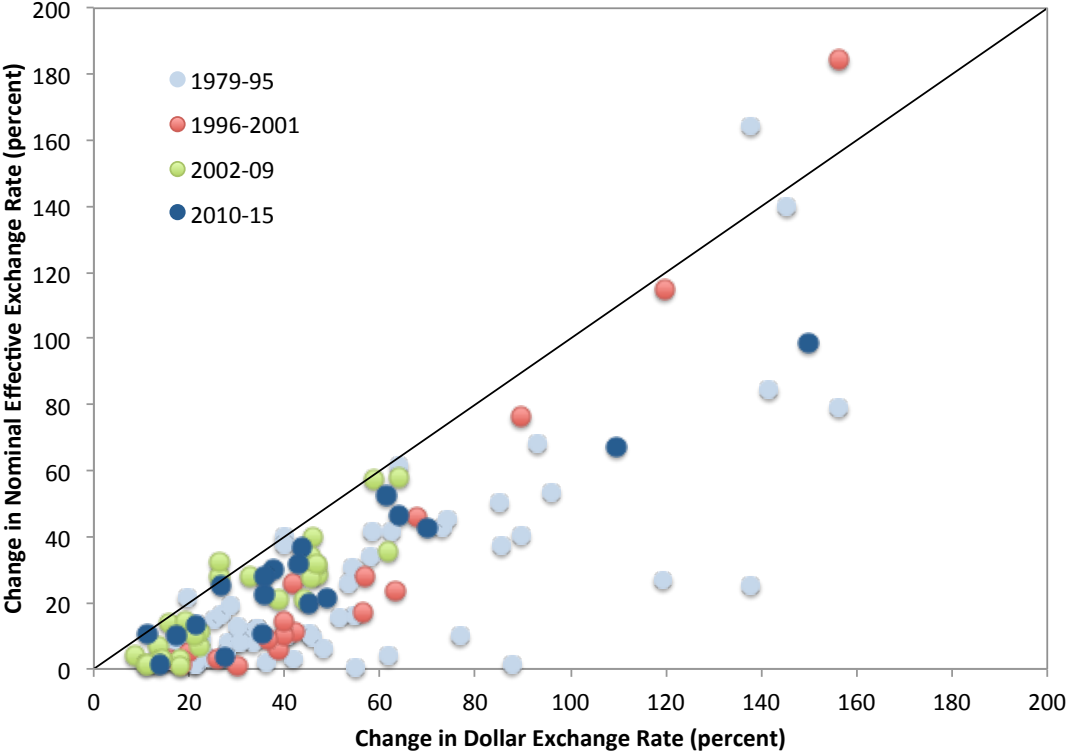

Note: March 1973 = 100.
Source: Author's calculations and FRED (Federal Reserve Bank of St. Louis Economic Data) for Real Broad Exchange Rate for U.S.

Figure 2 Median annual size and duration of depreciation in sample countries, 1973–2015
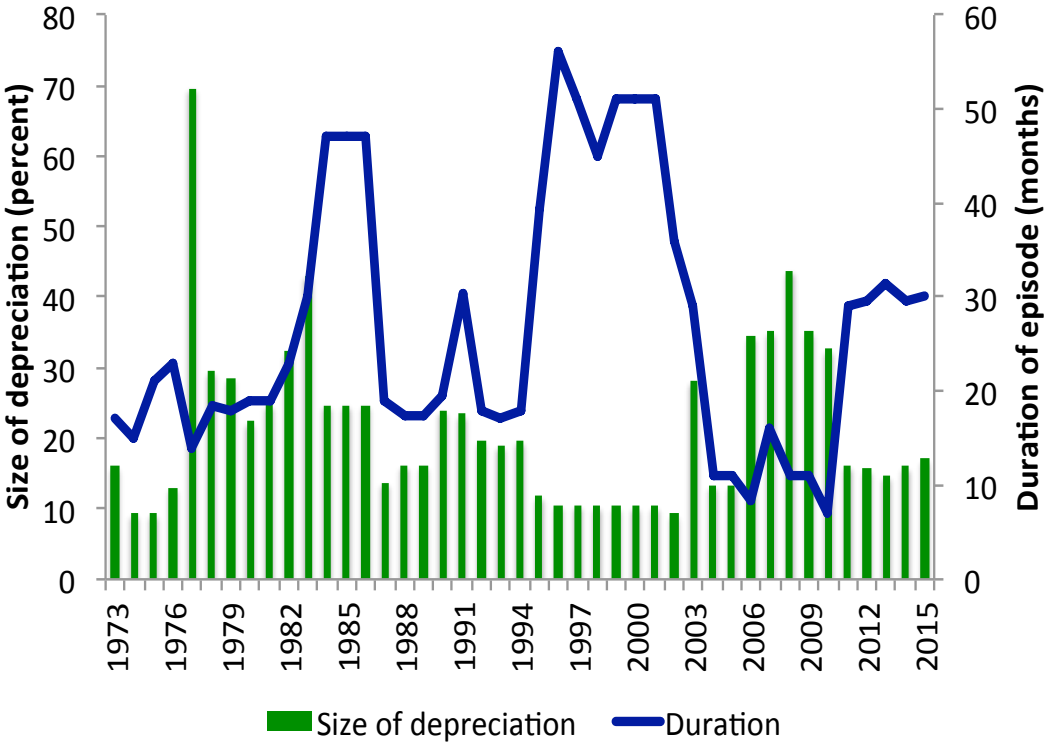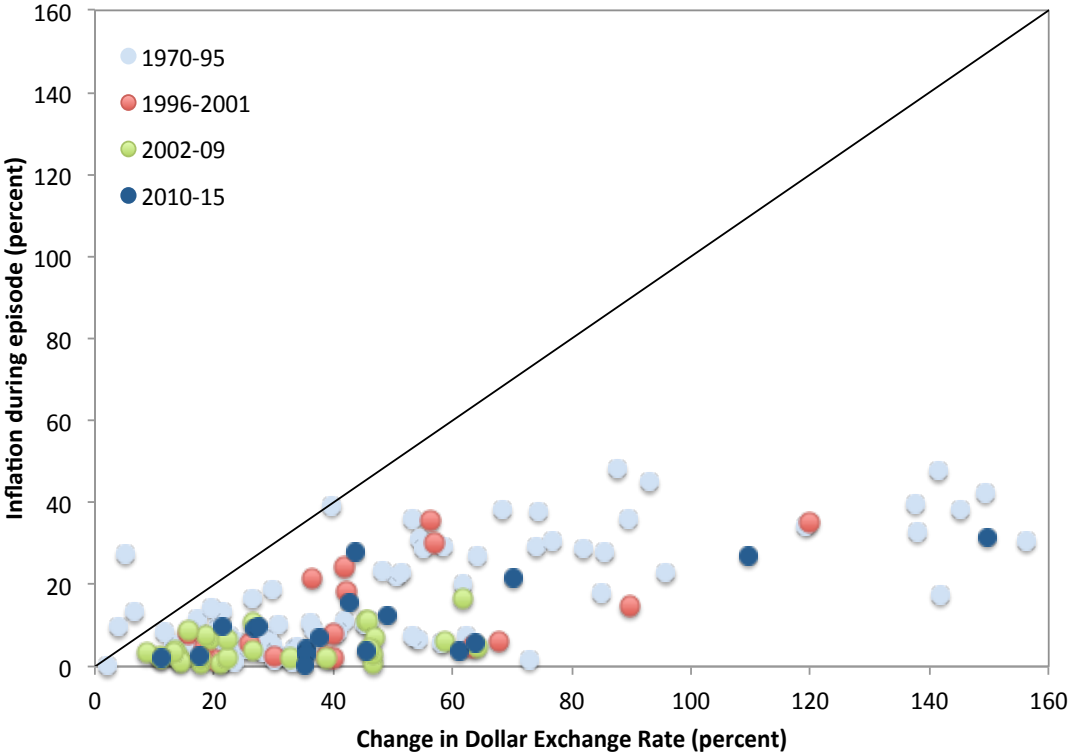

Source: Author's calculations.

Figure 3 Changes in US dollar and nominal effective exchange rates in sample countries, 1979–2015

Source: Author's calculations.

Figure 4 Inflation and bilateral depreciation in sample countries, 1970–2015

Source: Author's calculations.

Figure 5 Contemporaneous and end-of-period pass-through of US dollar depreciation to inflation in sample countries in four periods between 1970 and 2015
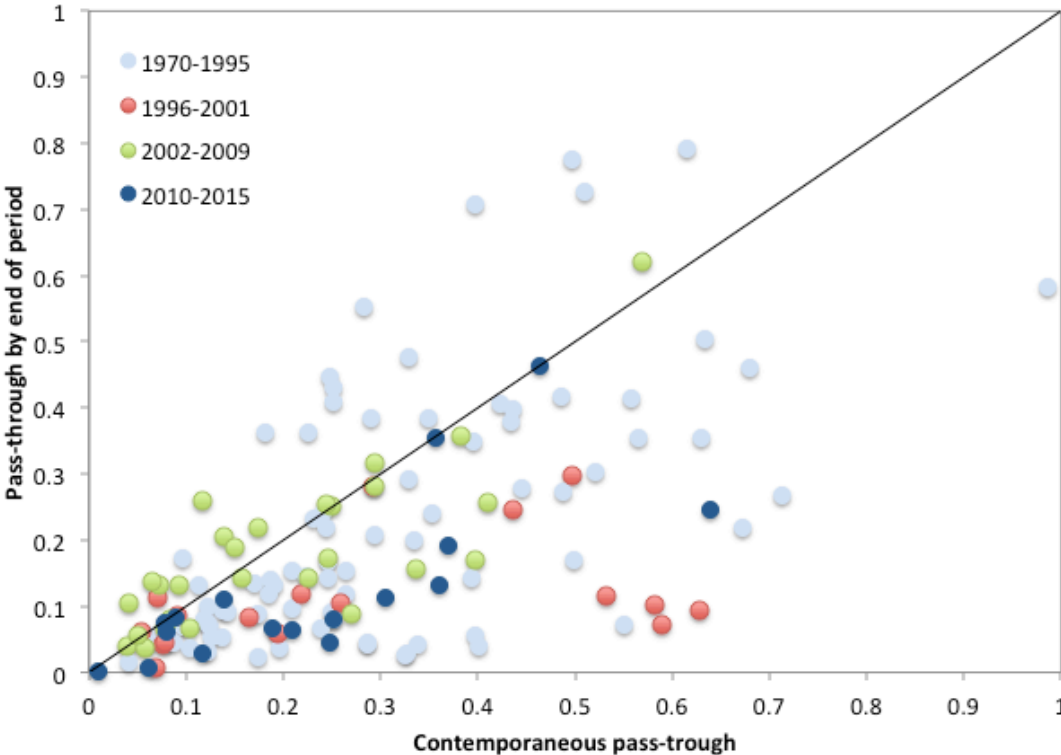
Note: Pass-through is measured as the ratio between the inflation rate and the rate of depreciation.

Source: Author's calculations.

Figure 6 Pass-through of US dollar depreciation to inflation in sample countries, 1970–2015
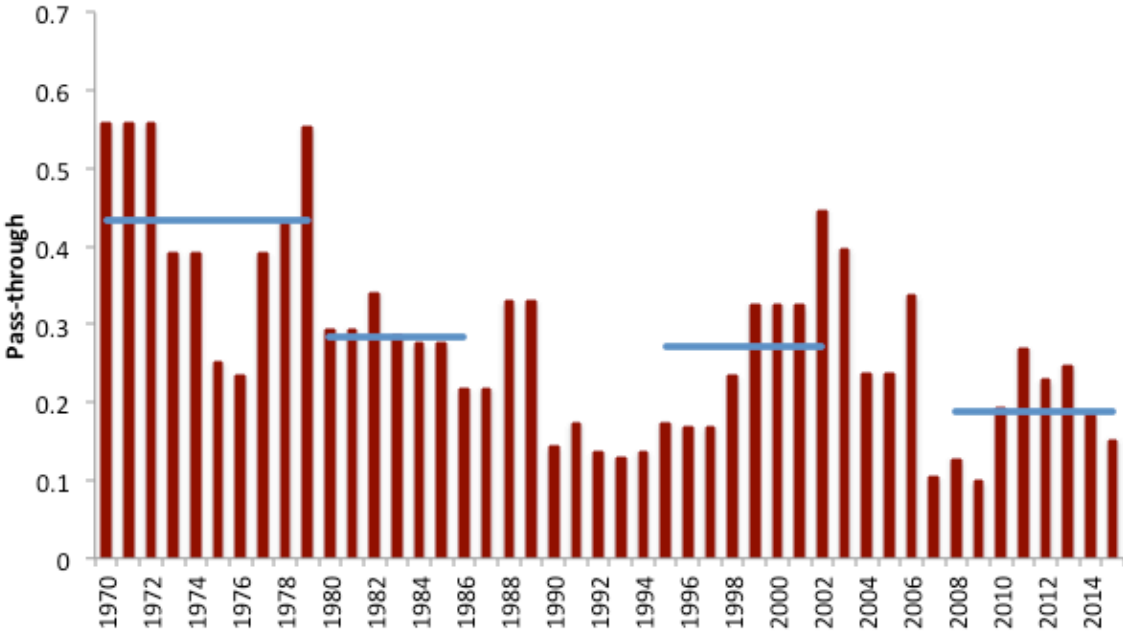
Note: Pass-through is measured as the ratio between the inflation rate and the rate of depreciation. The blue lines show period averages as explained in text. *Source*: Author's calculations.
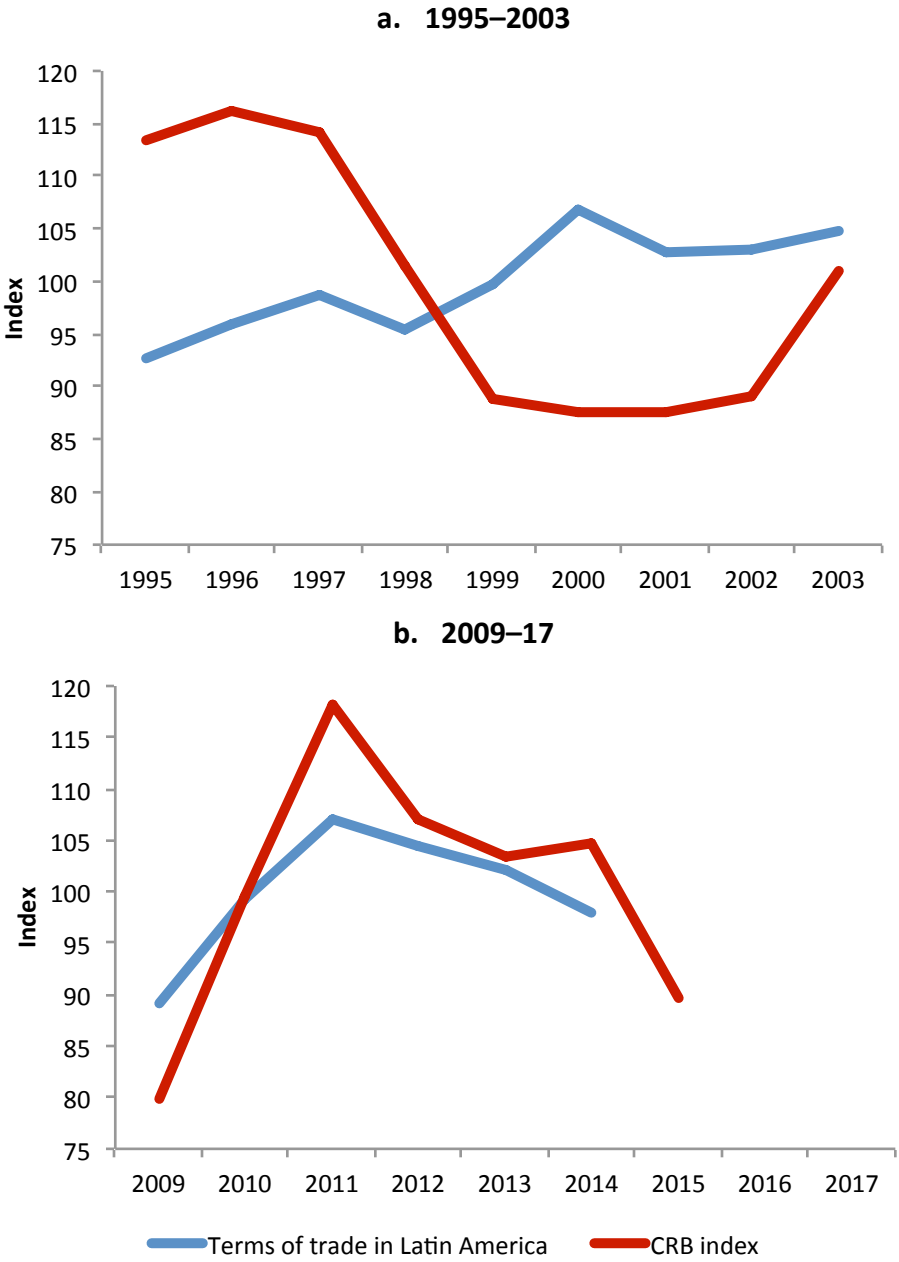
Figure 7 Current account as percent of GDP, 1995–2003 and 2009–17
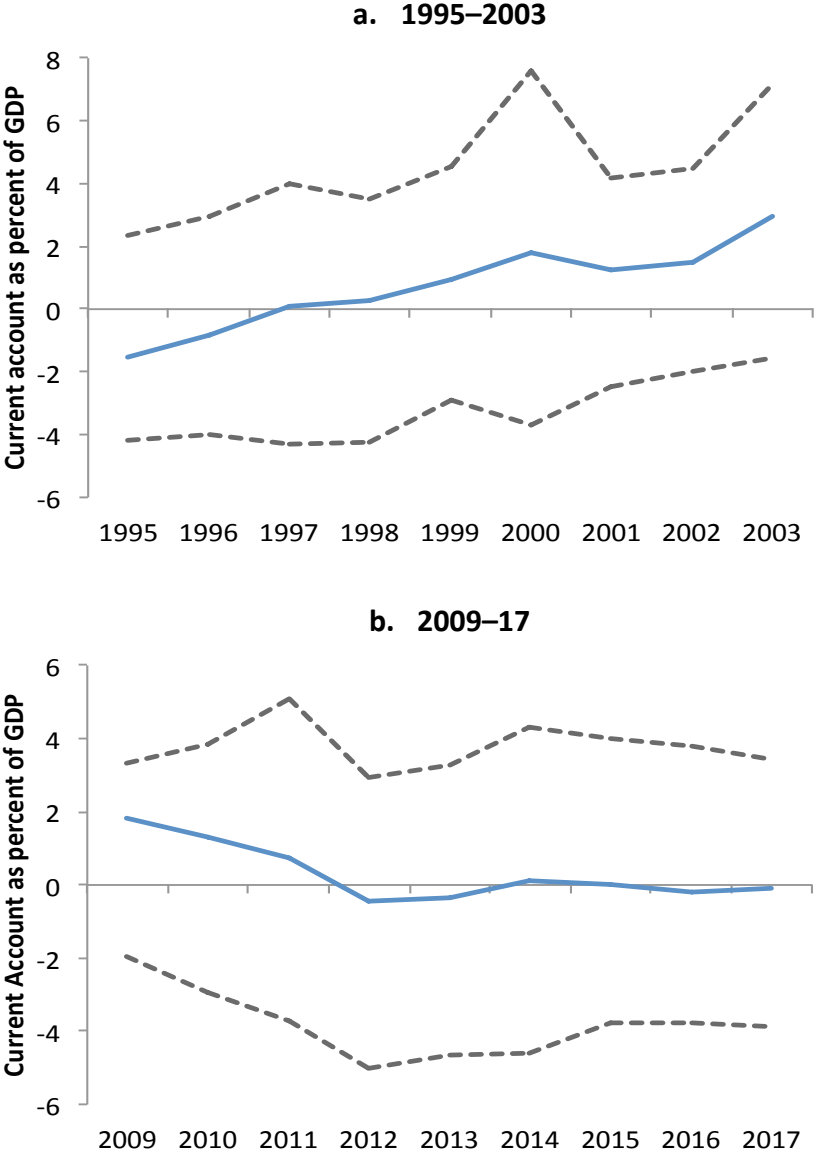
a. 1995–2003

b. 2009–17

Note: Dotted lines indicate the 0.2 and 0.8 percentiles. Figures for 2016 and 2017 are forecasts.
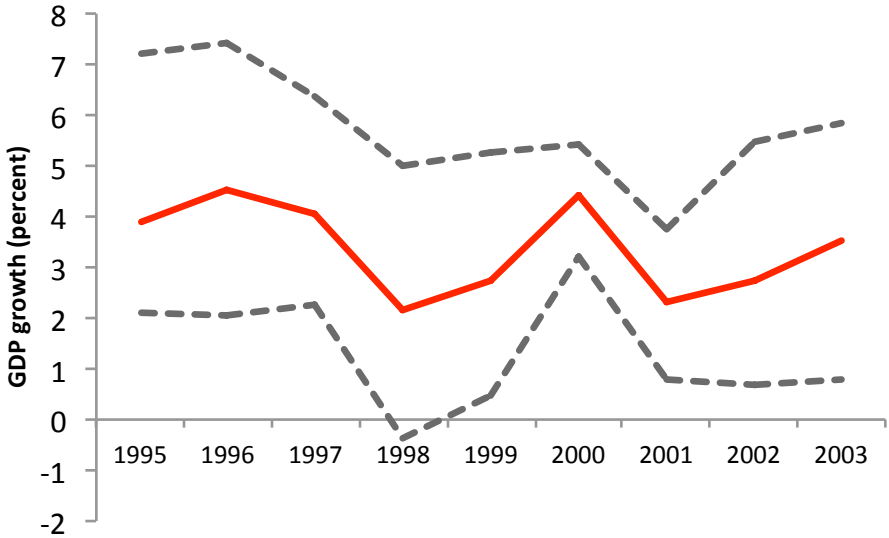
Source: IMF-WEO October 2015.

Figure 8 CRB index of commodity prices and the terms of trade in Latin America, 1995–2003 and 2009–17

a. 1995–2003

b. 2009–17
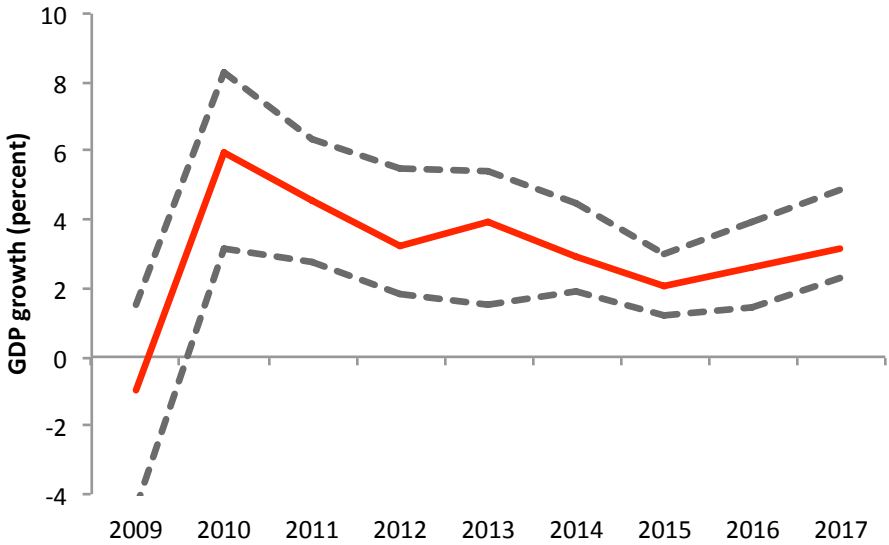

Terms of trade in Latin America   CRB index

Note: Index period average = 100. For comparison purposes the time line contains the same number of years, but for 2016-17 there are no data.
Source: CRB index: Bloomberg. Terms of trade: ECLAC.

Figure 9 Annual GDP growth in sample countries, 1995–2017
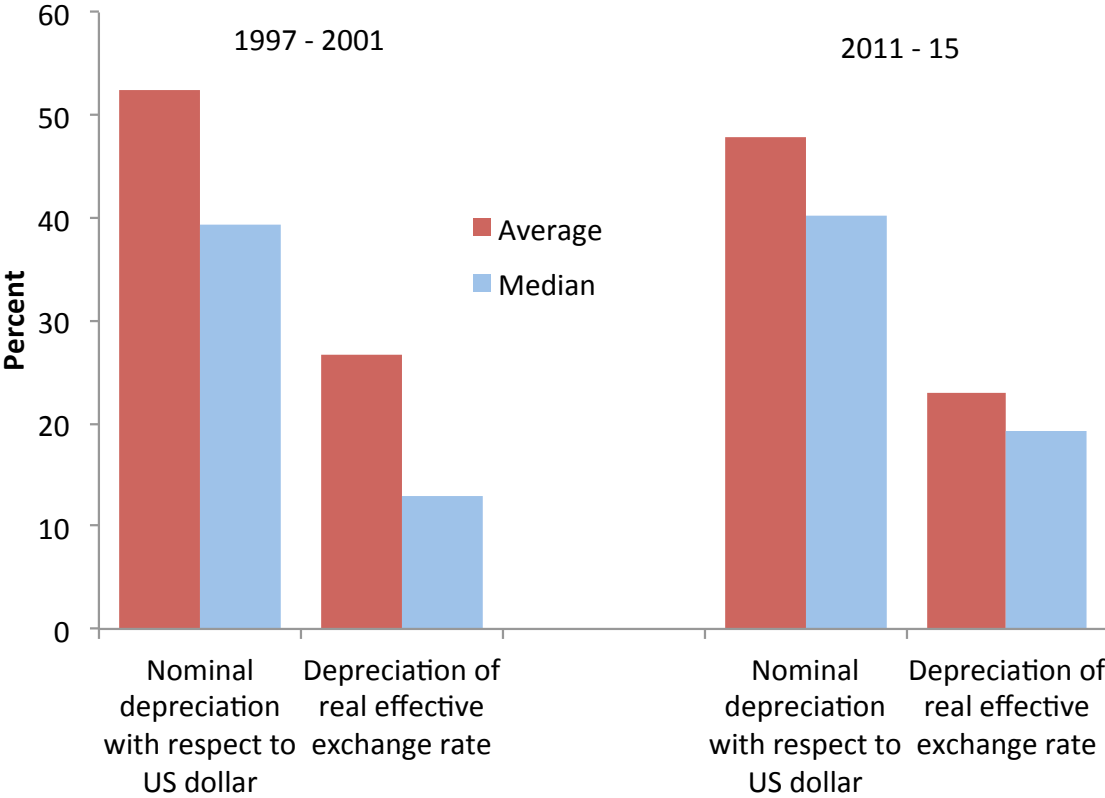
a. 1995–2003

b. 2009–17

Note: Dotted lines indicate the 0.2 and 0.8 percentiles. Figures for 2016 and 2017 are forecasts.
Source: IMF-WEO October 2015.

Figure 10 Multilateral real exchange rate and bilateral exchange rate depreciations, 1997–2001 and 2011–15

Source: IMF International Financial Statistics.