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## Currency Collapses and Output Dynamics in Commodity Dependent Countries

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# Currency Collapses and Output Dynamics in Commodity Dependent Countries

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## Abstract

This paper provides new empirical evidence on the relationship between currency collapses (i.e. large nominal depreciations or devaluations) and real output by paying a specific attention to commodity exporting countries. Using a dataset including 108 emerging and developing economies for the period 1970-2016, we document and estimate what happens to output growth during episodes of currency collapses for commodity-dependent and non commodity-dependent countries. One particular feature of our analysis is to control for war events. We find that currency crises occur more frequently in commodity-dependent countries (one crisis every 17 years versus 30 years for non commodity-dependent countries) and with a larger magnitude (median depreciation about 12 percent points larger for commodity-dependent countries). In both groups of countries, output growth declines in response to the currency collapse. It appears however that output growth starts to slowdown earlier in commodity-dependent countries while the impact is more persistent in non commodity-dependent countries. The magnitude of the output growth slowdown is very close between the two groups of countries. Finally, we find that the output growth-currency collapse relationship differs among commodity-dependent countries according to the category of their main exported commodity. More precisely, it turns out that currency collapses affect mainly the output growth of agricultural exporters while the impact on the output growth of energy or mineral exporters is not significant.

*Keywords:* Currency crises, nominal depreciations, commodity currencies, exchange rates, output growth, recovery

JEL classification: E32, F31, F32, F41, F43, Q02

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## 1. Introduction

During past decades, numerous countries, particularly emerging market economies and low-income economies, have been subject to currency col-

lapses, that is to large nominal depreciations or devaluations. For instance, Laeven and Valencia (2013) identified 218 episodes of currency collapses (defined as a nominal depreciation of at least 30 % that is also at least a 10 % increase in the rate of depreciation compared to the year before) for a sample of 162 countries over the period from 1970 to 2012. While many empirical studies have investigated the macroeconomic consequences of currency collapses, what happens precisely to output in the aftermath of a currency collapse still needs to be settled in the empirical macroeconomic literature. For example, it appears from the recent analysis performed by Bussiere et al. (2012), which is based on nearly 50 years of data covering 108 emerging and developing countries, that the response of output to currency collapses varies across time and across regions. Bleaney (2005), who uses a small sample of emerging countries, shows that it also widely varies across countries.

The objective of our study is to provide new empirical evidence on the impact of currency collapses on output. In contrast to some recent studies, which usually cover a large sample of countries (see for instance Bussiere et al. (2012) or Gupta et al. (2007)), our analysis partially focuses on commodity producing countries. For several reasons explained below, we do indeed believe that the currency crisis-output relationship in commodity producing countries could be different from the corresponding relationship in non-commodity producing countries.

A first reason is that many countries that are specialized in the production of exportable commodities are commodity currency countries, which means that world commodity prices are a fundamental determinant of their exchange rate (Chen and Rogoff (2003), Cashin et al. (2004), Bodart et al. (2012)). This implies that currency collapses could be associated with commodity price collapses. If so, for commodity producing countries, currency collapses could be associated with a strong contractionary shock on output <sup>1</sup>. The dynamics of output around the currency collapse in economies that are heavily dependent on commodities could also be shaped differently than in non-commodity producing countries. This will depend on whether the commodity price collapse arises before or after the currency collapse. In their large-scale empirical analysis, Bussiere et al. (2012) find that the output

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<sup>1</sup>For a synthesized view of how commodity price declines hurt economic growth of commodity exporters, see Christensen (2016).

losses of a currency crisis tend to materialize **before** the currency collapse and that the depreciation itself actually has a **positive** effect on output. We may suspect that, others things being equal, this is also what we should find for commodity producing countries if the commodity price collapse arises **before** the currency collapse. Conversely, given that exchange rates are forward-looking variables that move in response to expected variations in fundamentals<sup>2</sup>, the commodity price collapse could arise after the collapse of the exchange rate. Strong empirical support for this argument is provided by Chen et al. (2010) who find that commodity exchange rates are effective predictors of future commodity prices. If the commodity collapse actually takes place **after** the currency collapse, despite the beneficial effect of the depreciation, output could fall after the collapse of the currency, instead of increasing as found by Bussiere et al. (2012).

The second reason, which is closely related to the previous one, suggests that the trigger of the currency collapse could differ between commodity and non-commodity producing countries. While many episodes of currency collapses are due to sharp reversals of international capital flows or sudden stops (see Lane and Milesi-Ferretti (2012)), it is less likely that this is the case for commodity producing countries. Many commodity exporting countries are in fact low-income countries, as for instance Sub-Saharan African countries, which have usually a very limited access to the international capital markets. For those countries, as suggested above, it is therefore more likely that the collapse of their exchange be triggered by a sharp drop in world commodity prices rather than by a sudden stop.

A third reason is provided by Forbes (2002) who shows that how depreciations affect economic growth in the short-run and the long-run may also depend on the impact of the depreciation on firm performances. More precisely, within the framework of a small open economy that produces an exportable commodity, Forbes (2002) finds that the output of commodity firms in the crisis country increases immediately after the collapse of the currency. What triggers this positive response of output is a decrease in the relative cost of labor. In the long-run, the devaluation raises the cost of capital of commodity firms. As this effect tends to offset the benefits of

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<sup>2</sup>This implies that, for commodity-dependent countries exchange rates, market expectations of changes in commodity prices should be priced into current exchange rates, through standard forward-looking mechanisms.

cheaper labor, the long-run impact of the devaluation on the output of commodity firms becomes ambiguous in the long-run. Forbes (2002) however shows that, under certain conditions (low capital/labor ratio, small increase in the cost of capital), the output of commodity firms also increases in the long-run. Her empirical tests confirm the main conclusions of her theoretical analysis. She finds indeed that, immediately after a currency collapse, commodity firms in the crisis country have higher output growth<sup>3</sup>. This impact is short-lived as it disappears within one year but the level of output remains higher indefinitely. So, according to Forbes (2002), commodity producing countries are more likely than others to have an increase of output in the short-run aftermath of a currency collapse. The long-run effect is however not clearcut. It should be positive for countries where the production technology is labor intensive but negative for those countries where the production of commodities requires a more capital intensive technology.

A fourth reason comes from the financialization of storable commodities (see Cheng and Xiong (2014)). This phenomenon implies that the price of storable commodities behaves as an asset price and that, accordingly, it is inversely related to the level of world interest rates (see for instance Frankel (2008)). Let's consider an increase of world interest rates. This shock implies that the opportunity cost of physical commodity holding becomes higher while money-market instruments offer higher yields. This leads to a contraction in the demand for storable commodities (which are an alternative asset class) and, consequently, to a decline of commodity prices. So, if world interest rate increases, world commodity prices decline. For our concern, we conclude that if the currency collapse is due to a tightening of international financial conditions ("sudden stop"), countries that produce storable primary commodities could have a greater output loss (or a smaller output gain) than other countries because of a decline in the world price of the commodity that they export.

A final reason comes from the fact that taxes on commodity exports are usually a main fiscal revenue for many small commodity producing countries. Their budget balance is therefore very sensitive to large exchange rate changes. Given that most commodity prices are quoted in dollars and that commodity producing countries are usually price-takers on interna-

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<sup>3</sup>Forbes (2002) also finds that firms with greater foreign sales exposure tend to have significantly higher sales and higher net income after depreciations.

tional markets, the amount of export taxes in domestic currency should increase immediately after a currency collapse. Following the depreciation of the currency, commodity producing countries should thus benefit from additional fiscal revenues that they could use to attenuate some of the contractionary effects of the currency collapse (as for instance an increase in the cost of servicing the debt denominated in foreign currency). We must however notice that what happens ultimately to the fiscal revenues will depend on whether the currency collapse is associated or not with a collapse of world commodity prices.

The rest of the paper is organized as follows. In the two following sections, we define what is a commodity-dependent country (section 2) and explain how currency collapses are measured (section 3). In section 4, we present our empirical analysis and discuss our results. Robustness checks are performed in Section 5 and Section 6 concludes.

## **2. Defining commodity-dependent countries**

For comparability purposes, our dataset includes the same 108 emerging and developing countries covered by Gupta et al. (2007) and by Bussiere et al. (2012), but excluding Yugoslavia and Somalia (due to missing values for the latter). There are several ways to measure a country's commodity dependence. Typical measures of commodity dependence are the share of commodity export earnings in total exports (or in total merchandise exports) and the share of commodity exports (or production) in GDP. Alternatively, commodity dependence can be measured by the percentage of people employed in the production of commodities or by the share of government revenues due to commodity production and exports.

For the purpose of our analysis, the criterion that we believe to be the most relevant is the share of commodity exports in total exports. Inspired from an IMF definition (IMF (2015)), a country is classified as a commodity exporter when its primary commodity exports (categories SITC4 0, 1, 2, 3, 4 and 68 of the Standard International Trade Classification) account for at least 35 percent of the value of its total exports of goods and services on average over a given time window. In the robustness analysis, it will be checked whether our results are modified when the level of the threshold is lower or higher than 35 percent.

We rely on UNCOMTRADE data of commodity exports and on World Bank data of total exports to compute the 1995-2015 average value of the ratio between primary commodity exports and total exports. Commodity-dependent countries, namely countries whose average primary commodity exports to total exports ratio exceed 35%, are reported in Table 1 while Table 2 provides the list of non dependent countries. We observe that 59 emerging and developing countries qualify as commodity-dependent and 47 as non dependent. For all countries listed in Table 1 and Table 2, we also report the (1995-2015 average) ratio of primary commodity exports to merchandise exports <sup>4</sup> and the ratio of primary commodity exports to GDP (a broad measure of the degree of openness of the economy).

#### INSERT TABLES 1 AND 2

As one of our purpose is to examine whether the currency collapse-output relationship depends on which commodities a country produces and exports, we need to cover a wide variety of commodities. Therefore, following Cashin et al. (2004) and Bodart et al. (2012, 2015), we retrieved from the UNCOMTRADE database 36 primary commodities for which corresponding price data exist. We report in Table 3 the name of the commodities, together with their SITC4 3-digit codes and their respective categories/types: minerals, energy and agriculturals <sup>5</sup>.

#### INSERT TABLE 3

For each country of our sample that we have determined as being commodity-dependent, we report in Table 4 the shares of the top 1, top 2 and top 3 commodities in total commodity exports, these shares being an average over the period 1995-2015. One can observe that commodity-dependent countries heavily rely on their top 1 commodity export: across countries, the top 1 exported commodity accounts on average for 48% of the total commodity exports, the top 2 for 15% and the top 3 for a bit less than 8%. One can notice that, for a few countries, there is a very high dependence on the top 1 commodity. This is notably the case of oil exporting countries like Venezuela, Nigeria, Congo and Iran, for whom crude oil accounts for around

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<sup>4</sup>The ratio of primary commodity exports to merchandise exports is used by UNCTAD to measure commodity dependence. According to UNCTAD, a country is considered as being commodity-dependent when this ratio exceeds 60 percent (UNCTAD (2016)).

<sup>5</sup>The agriculturals category is a residual category which includes all commodities other than minerals and energy. It so includes meat, fish and beverages.



90% of their total exports of primary commodities. Other countries that are highly dependent (larger than 70%) of their top 1 commodity are Mali (cotton), Zambia (copper), Burundi (coffee) and Guinea-Bissau (fruits).

INSERT TABLES 4

Using the results of Table 4, Figure 1 displays, for each commodity, the percentage of commodity-dependent countries for which this particular commodity appears to be the top 1, top 2, or top 3 commodity export. Without any surprise, crude oil is the main commodity of specialization, being the top 1 commodity export for one-third of the commodity-dependent countries and the top 3 for more than half of them. Other main (top 1) commodities are copper, coffee, cotton, sugar, cocoa and wood. Overall, 26 of our 36 commodities appear to be in the top 3 for at least one country of the sample.

INSERT FIGURE 1

In the rest of the paper, for ease of convenience, commodity-dependent countries will be referred to as *Cdty* countries and non commodity-dependent countries as *Non – Cdty* countries.

### 3. Defining currency collapses

As our analysis is concerned with what happens to output around currency collapses, defining empirically what is a currency collapse is a key question. Unfortunately, the literature does not provide one single definition of what is a currency collapse or a large exchange rate depreciation. Many studies, as for instance Bussiere et al. (2012), address this problem by using several definitions of what is a currency collapse. To keep the presentation of our results as simple as possible, our strategy is to conduct the core part of our empirical analysis with one definition. We will then check in the robustness section to what extent our core results are modified when currency collapses are defined in alternative ways.

Our core definition of what is a currency collapse is taken from Milesi-Ferretti and Razin (2000), this definition being also used by Bussiere et al. (2012) and Gupta et al. (2007).<sup>6</sup> Let  $S_t$  denotes the dollar nominal exchange

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<sup>6</sup>The definition of Milesi-Ferretti and Razin (2000) actually refines the definition of Frankel and Rose (1996) to account for high-inflation episodes.

rate of any country, expressed as units of the country’s currency per one unit of the US dollar. Further denote  $\Delta S_t = \left(\frac{S_t}{S_{t-1}} - 1\right)$ , the rate of depreciation of the exchange rate from year  $t - 1$  to year  $t$ . It is therefore considered that a currency collapse occurs at year  $t = T$  if  $\Delta S_t$  satisfies the following three criteria:

- a. The exchange rate depreciates by at least 25 percent:  $\Delta S_T \geq 0.25$ ;
- b. The depreciation of the exchange rate is at least twice higher than the depreciation that occurred the year before:  $\Delta S_T \geq 2 * \Delta S_{T-1}$ ;
- c. The depreciation that occurred during the previous year does not exceed 40 percent:  $\Delta S_{T-1} \leq 0.40$ .

From a close look at the data, we realized that during several episodes of currency collapses, the country experiencing the collapse was actually involved in a major conflict (civil war, interstate war). Given that such conflicts may have a severe and lasting disrupting effect on economic activity (see for instance Collier (1999)) and given that there is also evidence showing that commodity producing countries are more prone to civil wars (Fearon (2005) and Bruckner and Ciccone (2010)), we suspect that these conflicts can potentially alter the relationship that we seek to identify between the dynamics of output and the dynamics of exchange rates around currency collapses. For that reason, we also constructed a "war adjusted" series of currency collapses where it is imposed that no major conflicts are taking place within a three-year window before and after the currency collapse. Dates of conflicts are those provided by the Department of Peace and Conflict Research at Uppsala University (Gleditsch et al. (2002), as updated by Allansson et al. (2017)).

Data on nominal exchange rates are taken from the website of the Bank of International Settlements (*BIS*).<sup>7</sup> The BIS nominal exchange rate data set contains long time-series on *USD* exchange rates for currencies of approximately 190 economies at daily, monthly, quarterly and annual frequencies. The *USD* nominal exchange rates of the 106 countries of our sample are reported in Figures 2 to 6 together with the crisis episodes identified with our benchmark definition. It can be seen that famous currency crises are well captured (1994 for Mexico, 1994 for CFA devaluations, 1997 for East Asian countries, 2002 for Argentina, etc.).

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<sup>7</sup><https://www.bis.org/statistics/xrusd.htm>.

## INSERT FIGURES 2 TO 6

Stylized facts about currency collapses are reported in Table 5. Results are displayed for the full sample, along with a breakdown by commodity dependence and commodity types. Over the 45 years of our sample, we obtain 225 episodes of currency collapse for 106 countries, so approximately one crisis every 21 years. These results are in line with those of Bussiere et al. (2012) and Gupta et al. (2007). It also appears that *Cdty* countries have been more subject to currency crashes than *Non - cdty* countries: (i) about two thirds of the currency crashes recorded between 1970 and 2016 occurred in *Cdty* countries; (ii) the average number of crises per country is about 1.5 for *Non - Cdty* countries and 2.5 for *Cdty* countries; and (iii) the average time separating two crises is about 17 years for *Cdty* countries and about 30 years for *Non - Cdty* countries. We can also observe in Table 5 that, during episodes of currency crashes, *Cdty* countries experienced a larger depreciation of their exchange rate than *Non - cdty* countries. Finally, the likelihood that a currency collapse arises in a *Cdty* country does not seem to depend on the type of the top commodity that the country exports.

## INSERT TABLE 5

Figure 7 shows the distribution of currency collapses. For reasons of visibility, we only report on the graphs depreciations smaller than 250% <sup>8</sup>. We logically see a density mass close to the threshold used to determine when there is a currency collapse. We also note that the distributions have fat right tails. This feature, which is due to a few episodes of very extreme depreciations, explains why median rather than average are reported in Table 5.

## INSERT FIGURE 7

Needless to say, the 25 per cent cut-off of our core currency crash definition is arbitrary. We will therefore explore the sensitivity of our results to variant definitions in Section 5. The definition of what is a currency collapse is modified in two ways. On the one hand, we keep on considering that there is a currency collapse when the exchange rate depreciates by at least

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<sup>8</sup>There are 25 episodes of currency collapses larger than 1000%, recorded for Brazil, Democratic Republic of Congo, Nicaragua, Zimbabwe and Argentina.

25 percent, but the time window over which the depreciation is measured is reduced successively from 1 year to 6 months, 3 months and 1 month. These definitions are thus more restrictive than the benchmark definition where the collapse is measured over a 12 month period. On the other hand, we increased the severity of the currency crisis by setting the depreciation of the exchange rate during the crisis to at least 40, 50 and 60 percent. Stylized facts established with these variant definitions are presented in Table 6. One can observe that the number of episodes of currency crises is almost unchanged when the depreciation of the exchange rate is measured over shorter periods. However, the shorter is the period, the higher is the (median) depreciation of the exchange rate during a crisis. As we could expect, it also appears that the number of crises decreases as we increase the depreciation threshold to 40 percent, 50 percent and to 60 percent. One can finally notice that these alternative definitions do not change much the distribution of currency crises between *Cdty* and *Non - cdty* countries.

INSERT TABLE 6

#### 4. Empirical analysis

In order to shed a preliminary light on what is the time path of output around currency collapses, we start by conducting an event study. The event study is carried out by plotting on separate graphs the annual real GDP growth, on the one hand, and the annual percentage change of the exchange rate, on the other hand, over a window surrounding a currency collapse from year  $T - 3$  to year  $T + 3$ .<sup>9</sup>

Charts in Figure 8 display the output growth and exchange rate dynamics for *Cdty* countries and *Non - cdty* countries. Regarding the exchange rate dynamics (panel on the right), one can observe that the median depreciation of the exchange rate tends to be larger for *Cdty* countries than for *Non - cdty* countries. The pattern of GDP growth (panel on the left) looks very similar to what is reported by Bussiere et al. (2012): GDP growth starts to slowdown at least one year before the currency collapse, its decline is the largest during the year of the currency collapse, it recovers as of year  $T + 1$  and output returns to its pre-crisis level as of year  $T + 2$ . This pattern holds for the two groups of countries. There is however a sharp difference in terms

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<sup>9</sup>For graphical convenience, growth is computed in terms of deviations from growth in  $T - 4$ . Annual data on real GDP growth come from the World Bank database.

of magnitude, with the slowdown of GDP growth being less pronounced for *Cdty* countries than for *Non – cdty* countries.

INSERT FIGURE 8

In what follows, we use an econometric analysis to provide more formal statistical evidence about what happens to output growth before and after currency collapses. We do so by estimating the following equation:

$$g_{i,t} = \sum_{j=-3}^3 \beta_j D_{i,t-j} + \mu_i + \nu_t + \epsilon_{i,t} \quad (1)$$

where  $g_{i,t}$  is the annual percentage change of the real GDP of country  $i$  in year  $t$ ,  $D_{i,t-j}$  is the dummy variable for currency collapse that is equal to 1 if country  $i$  had a currency collapse at time  $t$  and 0 otherwise,  $\mu_i$  is a country fixed effect,  $\nu_t$  is a time fixed effect and  $\epsilon_{i,t}$  is the error term. This specification includes maximum 158 regressors (106 country dummies, 45 year dummies and 7 lead and lag dummies defined with respect to currency collapses).

Contrary to the event study, the econometric analysis is not limited to episodes of currency collapses. It also incorporates countries and periods that do not exhibit a currency collapse, those observations serving as a control group. As a consequence, the econometric results will show how and to what extent output growth in countries subject to currency collapses differs from what happens to the dynamics of output growth in countries that do not experience a sharp collapse of their exchange rate.

Estimates of Equation (1) are reported in Table 7 for all the countries of our sample, for *Cdty* and *Non – cdty* countries, controlling, and not controlling, for war events. For the full sample (see columns (1) and (4), we find that countries experiencing a currency collapse have lower growth in the year of the collapse and in the year prior to the collapse (see the coefficient of the dummy with time subscript  $T - 1$ ) than countries that did not experience a currency collapse. More precisely, when war episodes are excluded, we observe that average annual growth is reduced by 1.1 percentage points the year preceding the currency collapse and by 2.1 percentage points the year of the currency collapse. The dynamic profile of the output response is similar to Bussiere et al. (2012) who also finds that output growth is reduced

the years of and before the collapse.

When we estimate Equation (1) separately for *Cdty* countries, on the one hand, and for *Non - cdty* countries on the other hand, we find that the dynamics of the output response differs between the two groups of countries (see columns (3) and (6)) for *Cdty* countries and (2) and (5) for *Non - cdty* countries). For countries in both groups, output growth is lower in the year of the collapse. But it appears that there is an additional (statistically significant) negative impact on the output growth of *Cdty* countries in the year that precedes the collapse of the currency (see columns (3) and (6)). For *Non - cdty* countries, instead, the slowdown tends to persist the year after the currency collapse. This effect is however hardly significant (see columns (2)) and (5)), and the bulk of the slowdown does take place the year of the collapse. Our evidence therefore suggests that the findings of Bussiere et al. (2012) only hold for *Cdty* countries. The fact that the slowdown of output growth in *Cdty* countries does not persist after the currency collapse is in line with Forbes (2002) who finds that commodity firms recover faster after a currency collapse. Our estimates also show that the size of the growth slowdown does not differ much between *Cdty* countries and *Non - cdty* countries. Total decline in output growth for countries experiencing a currency collapse versus countries that do not is on average equal to 4.6 percentage points for *Cdty* countries and to 4.4 percentage points for *Non - cdty* countries when war episodes are not excluded and to respectively 3.3 and 3.2 percentage points when war episodes are excluded <sup>10</sup>. We can notice from these numbers that the magnitude of the output growth slowdown is smaller when war episodes are not included in the sample. This in turn implies that the impact of currency collapses on output is not *contractionary* when war adjusted data are used <sup>11</sup>.

To check whether our estimates are not biased by several episodes of extreme growths <sup>12</sup>, we report in columns (7), (8), and (9) of Table 7 the

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<sup>10</sup>The total impact on growth is computed by summing up the coefficients that are statistically significant.

<sup>11</sup>We consider that the impact of currency crisis is *contractionary* if output growth becomes *negative* in response to the crisis.

<sup>12</sup>It is suspected that extreme growth episodes are related to specific events such as wars, climatic events, revolutions, which are likely not caused by depreciations. If it turns out that these specific events affect disproportionately one or another group of countries (as climatic events could do), this would induce a bias in our results.

results obtained by proceeding to a truncated regression where growth rate values at the lower and the higher percentiles are neutralized. Data used for these regressions also exclude war episodes. For *Cdty* countries (see column (9)), one can observe that the dynamics of output growth is almost unchanged. The magnitude of the slowdown is also very close to the one indicated by the results in column (6). Regarding *Non – cdty* countries, the exclusion of extreme growth values changes the dynamics of output growth around currency collapse. By comparison with the results of column (5), it now appears that the decline of GDP growth after the year of the currency collapse is no longer significant.

#### INSERT TABLE 7

We go further with our analysis by investigating whether the currency collapse-output relationship differs according to the category of the main commodity that is exported by a country. This analysis is dictated in particular by the results of Aslam et al. (2016) who find that output growth responds more strongly to swings in commodity terms of trade that affect countries specialized in energy and minerals. Three broad categories of commodities are considered: energy, minerals and agriculturals, as detailed in Table 3. We thus divide our sample into three subsamples, each groupings being composed of the countries specialized in the export of the same group of commodities. For each groupings, we proceed to the estimation of Equation (1) using data excluding episodes of war conflicts. Results are reported in Table 8. In order to facilitate the comparison with the previous results, the estimates obtained for the whole set of *Cdty* countries and *Non – cdty* countries are reproduced in the table (respectively in column (2) and (1)). One can observe that the dynamics of output growth around currency collapses differs strongly across commodities. First of all, it turns out that the dynamics identified for all commodities in Table 7 only survive for the group of countries specialized in the production of agricultural goods. An additional negatively significant effect even appears 2 years before the collapse of the currency. For *Cdty* countries exporting mainly energy or minerals, however, currency collapses have no significant negative impact on output growth. Second, the slowdown experienced by *Cdty* countries exporting agriculturals is economically large: summing up the significant negative effects, output growth is reduced on average by about 5.9 percentage points compared to similar countries that did not suffer from a collapse of their currency. The size of the slowdown is such that currency collapses

are strongly contractionary for this group of countries <sup>13</sup>.

What mechanisms lie behind these differentiated effects for energy, minerals and agriculturals remains an open question. We do however believe that the mechanisms at play could be the same as those highlighted by Aslam et al. (2016) and Forbes (2002) who have investigated how shocks to commodity terms of trade affect the output performance of commodity producing countries. On the one hand, Aslam et al. (2016) finds that the output response differs between extractive and non-extractive commodities and, on the other hand, the analysis of Forbes (2002) suggests that the output response depends on the capital-labour ratio in the commodity production process.

INSERT TABLE 8

## 5. Robustness analysis

In this section, we check the robustness of our results to several key features of our empirical framework. We will start by changing the threshold that is used to define when a country is commodity dependent. So far, it has been considered that a country is commodity dependent if the ratio between the primary commodity exports of the country and its total exports exceeds 35%. We will set alternative values to this ratio, ranging from 20% to 65%. As announced in Section 3, we will then examine whether the results discussed in the previous section are modified when we use variant definitions of what is a currency collapse. We will finally investigate if our results are robust to alternative measures of a country's commodity dependence.

Estimates obtained when different thresholds are set for the degree of commodity dependence are reported in Table 9. The benchmark case corresponds to the 35% threshold (column (4)). The dynamics of output growth around currency collapse is qualitatively unchanged when the degree of commodity dependence is comprised between 20% and 55%. As of 60%, the dynamics is modified, as output growth is no longer affected the year before the currency collapse. In addition, the contemporaneous effect becomes less significant. In a nutshell, our results suggest that the higher the degree of

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<sup>13</sup>The constant of the regression is 3.2 percent.



commodity dependence, the less exposed is the country to the negative impact of currency crash.

#### INSERT TABLE 9

We now report estimates obtained with our variant definitions of a currency collapse. The magnitude of the currency collapse is increased to 40%, 50%, and 60% in Table 10, while the time window over which we measure the depreciation of the exchange is reduced from 1 year to 6 months, 3 months and 1 month in Table 11. In both tables, results for the benchmark case are reproduced in columns (1) and (2) for convenience. Estimates reported in both tables show that the currency collapse-output growth relationship remains different between *Cdty* countries and *Non-cdty* countries when we increase the severity of the currency crisis. Results in Table 10 even show that those differences are more pronounced when the severity of the crisis increases. The slowdown of growth in *Non-cdty* countries becomes indeed more persistent, one major consequence being that currency collapses become now contractionary (see columns (3) and (5)).

#### INSERT TABLES 10 AND 11

We finally report in Table 12 estimates obtained when alternative definitions of a country's commodity dependence are considered. Three new criteria are used: (1) the share of commodity exports in total merchandise exports exceeds 60%<sup>14</sup>; (2) the share of commodity exports in GDP exceeds 10%; and (3) the share of commodity exports in total exports exceeds 35% and the share of net commodity exports (commodity exports minus commodity imports) in total trade (total exports plus total imports) exceeds 5%<sup>15</sup>. One can observe that the results obtained with the new criteria are qualitatively similar to the benchmark case. In particular, across the different criteria, the dynamics of the output response remains different between commodity dependent countries and non-commodity dependent countries.

#### INSERT TABLE 12

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<sup>14</sup>This criterion is used by UNCTAD.

<sup>15</sup>This criterion is due to the IMF.

## 6. Conclusions

This paper provides new empirical evidence on the relationship between currency collapses (i.e. large nominal depreciations or devaluations) and real output by paying a specific attention to commodity exporting countries.

We find that currency crises hit commodity-dependent countries more frequently (one crisis every 17 years, on average) than non commodity-dependent countries (one crisis every 30 years, on average) and that the nominal exchange rate of commodity-dependent countries depreciates during the crisis by more than the exchange rate of non commodity-dependent countries (the difference being about 12 percent points at the median level). As far as we know, this result has not been documented before, and it thus constitutes a new piece of evidence to the growing literature on commodity currencies.

Regarding the output dynamics around the currency crises, we note that GDP growth is reduced during periods of currency collapses in both commodity-dependent and non commodity-dependent countries. We find however that the time profile of the impact on GDP growth is different between the two groups of countries. For commodity-dependent countries, the impact becomes statistically significant one year before the collapse of the currency and during the year of the currency collapse while, for non commodity-dependent countries, it covers the year of the currency collapse and the year that follows. This evidence provides incidental support to the results of Forbes (2002) who have found that commodity firms respond quickly and positively to sudden depreciations. We also find that the size of the decline in GDP growth does not differ much between commodity-dependent countries and non commodity-dependent ones.

We also observe that the commodity-dependent countries whose output is the more affected by currency crises are those specialized in the export of agricultural products. Conversely, currency crises have no significant impact on the output growth of countries specialized in the export of either energy or minerals.

Lastly, we find that the dynamics of output growth around currency collapses depends on the degree of commodity dependence. Our evidence shows indeed that the impact of currency crises on output growth becomes not significant for highly commodity dependent countries. Our evidence also show

that the differences between non commodity-dependent and commodity-dependent countries become more pronounced as the size of the depreciation gets larger.

As our analysis does not try to identify what are the shocks that are at the origin of currency collapses, we cannot provide a precise explanation of why the dynamics of output around currency collapses differs between commodity dependent and non commodity-dependent countries. A likely explanation is however that the shocks triggering currency collapses and/or the mechanisms through which currency crashes affect output do differ between commodity dependent countries and countries which are not commodity dependent. This would be the case for instance if it would turn out that currency collapses in commodity dependent countries are mainly due to sharp fall in international commodity prices. As it is established that shocks to international commodity prices are typically long-lasting (Cashin et al. (2000)), this could also explain why the decline of output growth in commodity dependent countries starts before the collapse of the exchange rate.

Another explanation to the differences in the currency collapse-output relationship between commodity dependent and non commodity-dependent countries could be that the expenditure switching effect of the currency collapse is stronger for commodity dependent countries than for non-dependent ones. One reason behind this is that the commodity sector accounts usually for a large share of GDP in commodity dependent countries (see Table 1). If it also turns out that commodity exporters are price takers on world commodity markets, exchange rate changes should feed fully and immediately into the domestic currency price of commodities. For those reasons, the positive effect on output of exchange rate changes should materialize more quickly in commodity dependent countries than in non commodity-dependent ones.

Why the currency collapse-output relationship differs so strongly between countries specialized in the export of agriculturals and those exporting mainly energy and minerals remains an open question, which deserves further investigation.

A striking fact when exploring the GDP growth dataset is the mass of extreme values, with about 50 of our observations of GDP annual growth exceeding 20% in absolute value, and even 2 observations exceeding 100%.

It turns out that these outliers were largely (but not exclusively) related to war events. Since it has been documented that commodity exporters are more prone to civil wars (see Fearon (2005) for a critical view), we considered relevant to control for wars. We find indeed that wars influence the results by amplifying the output fall associated to currency crises. In particular, while our evidence shows that currency collapses are contractionary when we do not control for war episodes, it appears however that this is no longer the case when war episodes are excluded. This suggests that wars, and related extreme events, should deserve being more systematically taken into account by similar empirical analyses.

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Table 1: Commodity-dependent countries

Country	Abbreviation	cdty-to-merch ratio	cdty-to-exports ratio	cdty-to-GDP ratio
Algeria	DZA	98	94	33
Argentina	ARG	66	56	10
Belize	BLZ	76	41	23
Benin	BEN	83	65	15
Bhutan	BTN	44	39	14
Bolivia	BOL	82	75	23
Brazil	BRA	51	45	5
Burkina Faso	BFA	71	51	8
Burundi	BDI	69	51	4
Cameroon	CMR	91	61	16
Central African Republic	CAF	60	60	6
Chad	TCD	95	95	27
Chile	CHL	83	70	24
Colombia	COL	68	57	9
Congo	COG	93	86	66
Cote d'Ivoire	CIV	80	68	31
Democratic Republic of the Congo	COD	62	52	13
Ecuador	ECU	91	78	21
Equatorial Guinea	GNQ	96	126	84
Ethiopia	ETH	86	41	6
Gabon	GAB	94	85	49
Ghana	GHA	75	59	20
Guatemala	GTM	55	43	10
Guinea	GIN	82	76	21
Guinea-Bissau	GNB	97	83	15
Guyana	GUY	59	46	34
Honduras	HND	45	56	21
Indonesia	IDN	53	48	14
Iran (Islamic Republic of)	IRN	85	81	18
Kenya	KEN	68	39	10
Lao People's Democratic Republic	LAO	63	48	13
Madagascar	MDG	55	38	9
Malawi	MWI	88	76	17
Mali	MLI	51	43	10
Mauritania	MRT	92	90	32
Myanmar	MMR	71	64	17
Nicaragua	NIC	59	54	14
Niger	NER	65	57	10
Nigeria	NGA	98	99	34
Oman	OMN	84	79	47
Papua New Guinea	PNG	78	71	45
Paraguay	PRY	88	52	27
Peru	PER	68	59	13
Rwanda	RWA	87	44	5
Senegal	SEN	66	44	12
Seychelles	SYC	88	36	30
Solomon Islands	SLB	93	69	27
Sudan	SDN	88	80	11
Swaziland	SWZ	41	37	22
Syrian Arab Republic	SYR	76	56	22
Togo	TGO	62	49	18
Trinidad and Tobago	TTO	65	57	33
Uganda	UGA	77	46	7
United Republic of Tanzania	TZA	68	38	7
Uruguay	URY	68	44	11
Venezuela (Bolivarian Republic of)	VEN	88	82	23
Yemen	YEM	96	81	29
Zambia	ZMB	85	75	25
Zimbabwe	ZWE	71	61	21

*Note:* cdty-to-merch, cdty-to-exports and cdty-to-GDP ratios refer to the ratio of commodity exports to merchandise exports, the ratio of commodity exports to total exports and the ratio of commodity exports to GDP.

A country is commodity-dependent if the share of its commodity exports in total exports exceeds (or is equal to) 35%. Due to missing data, cdty-to-exports is arbitrarily set equal to cdty-to-merch for TCD and CAF.

Table 2: Non commodity-dependent countries

Country	Abbréviation	cdty-to-merch ratio	cdty-to-exports ratio	cdty-to-GDP ratio
Bangladesh	BGD	7	6	1
Barbados	BRB	50	11	5
Botswana	BWA	16	14	7
Cape Verde	CPV	45	3	1
China	CHN	9	10	2
China, Taiwan Province of	TWN	8	8	.
Comoros	COM	64	15	3
Costa Rica	CRI	36	30	11
Czech Republic	CZE	11	11	6
Djibouti	DJI	58	10	4
Dominican Republic	DOM	21	16	4
Egypt	EGY	57	24	5
El Salvador	SLV	28	29	6
Fiji	FJI	61	31	17
Gambia	GMB	75	11	4
Grenada	GRD	55	10	3
Haiti	HTI	12	7	1
Hungary	HUN	15	13	8
India	IND	29	19	4
Israel	ISR	6	4	1
Jamaica	JAM	85	32	12
Jordan	JOR	29	16	8
Lebanon	LBN	29	6	3
Lesotho	LSO	7	7	3
Liberia	LBR	32	23	12
Malaysia	MYS	27	24	23
Maldives	MDV	73	13	10
Malta	MLT	21	7	9
Mauritius	MUS	29	16	9
Mexico	MEX	20	20	5
Morocco	MAR	36	26	7
Nepal	NPL	25	13	2
Pakistan	PAK	20	16	2
Panama	PAN	35	11	7
Philippines	PHL	14	13	4
Republic of Korea	KOR	10	8	4
Romania	ROU	20	18	6
Saint Vincent and the Grenadines	VCT	40	10	4
Samoa	WSM	28	10	3
Sao Tome and Principe	STP	68	24	3
Sierra Leone	SLE	41	26	5
South Africa	ZAF	45	34	10
Sri Lanka	LKA	27	21	6
Thailand	THA	24	20	12
Tunisia	TUN	23	17	8
Turkey	TUR	19	12	3
Vanuatu	VUT	68	13	6

*Note:* cdty-to-merch, cdty-to-exports and cdty-to-GDP ratios refer to the ratio of commodity exports to merchandise exports, the ratio of commodity exports to total exports and the ratio of commodity exports to GDP.

A country is commodity non-dependent if the share of its commodity exports in total exports is inferior to 35%.

Due to missing data, cdty-to-exports is set equal to cdty-to-merch for TWN.



Table 3: List of commodities

#	Commodity categories	SITC4	Types
1	Meats	001, 011, 012, 016, 017	Agriculturals
2	Fish	034, 035	Agriculturals
3	Crustaceans	036	Agriculturals
4	Wheat	041	Agriculturals
5	Rice	042	Agriculturals
6	Barley	043	Agriculturals
7	Maize	044	Agriculturals
8	Fruits (mainly bananas)	057, 058	Agriculturals
9	Juices (mainly oranges)	059	Agriculturals
10	Sugar	061, 062	Agriculturals
11	Coffee	071	Agriculturals
12	Cocoa	072, 073	Agriculturals
13	Tea	074	Agriculturals
14	Spices	075	Agriculturals
15	Feeding stuff for animals	081	Agriculturals
16	Tobacco	121	Agriculturals
17	Hides	211, 212	Agriculturals
18	Oil seeds	222, 223	Agriculturals
19	Rubber	231	Agriculturals
20	Wood	245, 246, 247, 248, 251	Agriculturals
21	Cotton	263	Agriculturals
22	Wool	268	Agriculturals
23	Vegetable oils	411, 421, 422, 431	Agriculturals
24	Phosphate	272	Metals
25	Iron	281, 282	Metals
26	Silver	681	Metals
27	Copper	283, 682	Metals
28	Nickel	284, 683	Metals
29	Aluminium	285, 684	Metals
30	Lead	685	Metals
31	Zinc	686	Metals
32	Tin	687	Metals
33	Uranium	286	Metals
34	Coal	321, 322, 325	Energy
35	Crude oil	333, 334, 335	Energy
36	Natural gas	342, 343, 344	Energy

*Note:* The 3-digit codes correspond to the United Nations Standard International Trade Classification, Rev.4 (SITC4).

Table 4: Main exported commodities

Country	Top 1	Top 2	Top 3	C1 pc	C2 pc	C3 pc
Algeria	Crude oil	Natural gas	Phosphate	0.69	0.31	0.00
Argentina	Feeding stuff for animals	Crude oil	Vegetable oils	0.18	0.15	0.12
Belize	Sugar	Fruits (mainly bananas)	Juices (mainly oranges)	0.20	0.19	0.14
Benin	Cotton	Uranium	Fruits (mainly bananas)	0.50	0.12	0.11
Bhutan	Copper	Fruits (mainly bananas)	Spices	0.11	0.11	0.05
Bolivia	Natural gas	Feeding stuff for animals	Crude oil	0.34	0.10	0.06
Brazil	Iron	Meat	Oil seeds	0.15	0.11	0.11
Burkina Faso	Cotton	Oil seeds	Fruits (mainly bananas)	0.70	0.10	0.03
Burundi	Coffee	Tea	Sugar	0.70	0.12	0.02
Cameroon	Crude oil	Wood	Cocoa	0.49	0.17	0.11
Central African Republic	Wood	Cotton	Coffee	0.46	0.20	0.05
Chad	Crude oil	Cotton	Tobacco	0.55	0.36	0.01
Chile	Copper	Fruits (mainly bananas)	Wood	0.56	0.09	0.09
Colombia	Crude oil	Coal	Coffee	0.48	0.16	0.13
Congo	Crude oil	Wood	Copper	0.88	0.05	0.03
Cote d'Ivoire	Cocoa	Crude oil	Fruits (mainly bananas)	0.43	0.26	0.05
Democratic Republic of the Congo	Copper	Crude oil	Wood	0.26	0.23	0.07
Ecuador	Crude oil	Fruits (mainly bananas)	Crustaceans	0.52	0.18	0.09
Equatorial Guinea	Crude oil	Natural gas	Wood	0.81	0.08	0.08
Ethiopia	Coffee	Oil seeds	Meat	0.46	0.14	0.05
Gabon	Crude oil	Wood	Coffee	0.80	0.13	0.00
Ghana	Cocoa	Crude oil	Wood	0.49	0.14	0.07
Guatemala	Coffee	Fruits (mainly bananas)	Sugar	0.22	0.17	0.15
Guinea	Aluminium	Crude oil	Natural gas	0.65	0.14	0.05
Guinea-Bissau	Fruits (mainly bananas)	Crude oil	Crustaceans	0.72	0.14	0.07
Guyana	Sugar	Aluminium	Rice	0.29	0.22	0.21
Honduras	Coffee	Fruits (mainly bananas)	Crustaceans	0.29	0.21	0.09
Indonesia	Crude oil	Natural gas	Vegetable oils	0.22	0.18	0.13
Iran (Islamic Republic of)	Crude oil	Fruits (mainly bananas)	Iron	0.89	0.03	0.01
Kenya	Tea	Crude oil	Coffee	0.29	0.12	0.09
Lao People's Democratic Republic	Wood	Copper	Coffee	0.47	0.23	0.08
Madagascar	Spices	Crustaceans	Fruits (mainly bananas)	0.25	0.20	0.06
Malawi	Tobacco	Sugar	Tea	0.67	0.09	0.08
Mali	Cotton	Meat	Crude oil	0.80	0.06	0.04
Mauritania	Iron	Fish	Crustaceans	0.46	0.21	0.19
Myanmar	Natural gas	Wood	Crustaceans	0.32	0.25	0.08
Nicaragua	Coffee	Meat	Crustaceans	0.23	0.18	0.12
Niger	Uranium	Crude oil	Meat	0.35	0.29	0.14
Nigeria	Crude oil	Natural gas	Cocoa	0.91	0.05	0.01
Oman	Crude oil	Natural gas	Aluminium	0.81	0.11	0.01
Papua New Guinea	Crude oil	Copper	Wood	0.27	0.21	0.13
Paraguay	Oil seeds	Meat	Feeding stuff for animals	0.37	0.12	0.10
Peru	Copper	Feeding stuff for animals	Crude oil	0.31	0.12	0.11
Rwanda	Coffee	Crude oil	Tea	0.34	0.13	0.11
Senegal	Crude oil	Fish	Crustaceans	0.30	0.18	0.11
Seychelles	Fish	Crude oil	Crustaceans	0.20	0.20	0.02
Solomon Islands	Wood	Fish	Vegetable oils	0.67	0.13	0.05
Sudan	Crude oil	Oil seeds	Meat	0.66	0.09	0.08
Swaziland	Sugar	Wood	Fruits (mainly bananas)	0.38	0.24	0.09
Syrian Arab Republic	Crude oil	Fruits (mainly bananas)	Meat	0.57	0.05	0.04
Togo	Phosphate	Cotton	Crude oil	0.23	0.19	0.15
Trinidad and Tobago	Crude oil	Natural gas	Iron	0.60	0.30	0.01
Uganda	Coffee	Fish	Tobacco	0.41	0.15	0.07
United Republic of Tanzania	Fish	Tobacco	Coffee	0.12	0.12	0.11
Uruguay	Meat	Rice	Oil seeds	0.30	0.11	0.08
Venezuela (Bolivarian Republic of)	Crude oil	Aluminium	Coal	0.93	0.03	0.01
Yemen	Crude oil	Natural gas	Fish	0.86	0.08	0.02
Zambia	Copper	Tobacco	Sugar	0.73	0.03	0.03
Zimbabwe	Tobacco	Nickel	Cotton	0.36	0.15	0.09

*Note:* The columns C1pc, C2pc and C3pc refer to the shares of the top 1, top 2 and top 3 commodities, respectively, in the total commodity exports. Table restricted to the subset of commodity-dependent countries.

Table 5: Currency collapses: stylized facts

	# countries	# crises	Average years between crises	Median crisis depreciation
<b>Full sample</b>	106	225	21.2	55.5%
<b>Commodity dependence</b>				
Non-dependent	47	71	29.8	47.1%
Dependent	59	154	17.2	59.5%
<b>Main commodity type</b>				
Energy	21	53	17.8	62.3%
Metals	10	25	18.0	41.7%
Agriculturals	28	76	16.6	60.1%

*Note:* Crisis episodes are based on our core definition of currency collapses.

Table 6: Currency collapses: stylized facts for alternative definitions

Crisis definitions	Sample	# Countries	# Crises	Average years between crises	Median crisis depreciation
-25% over 1 year (benchm.)	Full sample	106	225	21.2	55.5%
	Commodity non dep.	47	71	29.8	47.1%
	Commodity dep.	59	154	17.2	59.5%
-25% over 6 months	Full sample	106	226	21.1	67.4%
	Commodity non dep.	47	71	29.8	55.5%
	Commodity dep.	59	155	17.1	73.9%
-25% over 3 months	Full sample	106	233	20.5	84.2%
	Commodity non dep.	47	71	29.8	67.8%
	Commodity dep.	59	172	15.4	93.0%
-25% over 1 month	Full sample	106	217	22.0	94.1%
	Commodity non dep.	47	56	37.8	61.6%
	Commodity dep.	59	161	16.5	96.1%
-40% over 1 year	Full sample	106	150	31.8	78.9%
	Commodity non dep.	47	43	49.2	67.8%
	Commodity dep.	59	107	24.8	89.0%
-50% over 1 year	Full sample	106	122	39.1	93.1%
	Commodity non dep.	47	33	64.1	77.8%
	Commodity dep.	59	89	29.8	96.1%
-60% over 1 year	Full sample	106	102	46.8	96.1%
	Commodity non dep.	47	27	78.3	82.3%
	Commodity dep.	59	75	35.4	96.1%

*Note:* Crisis episodes are based on our core definition of currency collapses and on alternatives based on different speed (25% depreciation within a half year, quarter or month) and intensity of the crisis (depreciation of 40%, 50% and 60%).

Table 7: Output growth effects of currency collapses

	(1) Full	(2) Non-cdty War in	(3) Cdty	(4) Full	(5) Non-cdty Wars out	(6) Cdty	(7) Full Wars, p1 and p99 out	(8) Non-cdty	(9) Cdty
Collapse $T+3$	0.423 (0.772)	0.616 (0.918)	0.314 (0.989)	0.942 (0.784)	0.744 (1.020)	1.063 (0.981)	0.591* (0.326)	0.817 (0.613)	0.578 (0.385)
Collapse $T+2$	0.177 (0.427)	0.323 (0.672)	0.099 (0.545)	0.234 (0.452)	0.574 (0.698)	0.058 (0.593)	0.011 (0.350)	0.607 (0.575)	-0.182 (0.461)
Collapse $T+1$	-0.533 (0.401)	-1.318* (0.687)	-0.152 (0.501)	-0.474 (0.423)	-1.296* (0.710)	-0.015 (0.521)	-0.454 (0.389)	-0.951 (0.579)	-0.119 (0.499)
Collapse $T$	-2.422*** (0.531)	-3.062*** (0.796)	-2.205*** (0.701)	-2.104*** (0.484)	-3.150*** (0.843)	-1.658*** (0.593)	-2.118*** (0.419)	-3.061*** (0.696)	-1.743*** (0.509)
Collapse $T-1$	-1.632** (0.640)	-0.085 (1.212)	-2.408*** (0.801)	-1.128** (0.550)	-0.111 (1.378)	-1.661*** (0.618)	-1.178** (0.462)	-1.022 (0.836)	-1.416** (0.566)
Collapse $T-2$	-0.438 (0.486)	0.865 (0.758)	-0.979 (0.611)	-0.377 (0.485)	1.043 (0.863)	-0.917 (0.592)	-0.475 (0.398)	0.240 (0.421)	-0.767 (0.529)
Collapse $T-3$	-0.215 (0.522)	-0.335 (1.245)	-0.173 (0.522)	-0.217 (0.531)	-0.459 (1.322)	-0.106 (0.528)	0.330 (0.355)	1.191** (0.518)	0.044 (0.426)
Constant	4.284*** (0.742)	3.873*** (1.045)	4.592*** (1.021)	4.225*** (0.768)	3.849*** (1.054)	4.533*** (1.078)	4.187*** (0.584)	3.675*** (0.729)	4.481*** (0.846)
N	3778	1603	2175	3584	1525	2059	3514	1499	2015
Log-likelihood	-1.2e+04	-5.0e+03	-7.1e+03	-1.1e+04	-4.7e+03	-6.6e+03	-9.8e+03	-3.9e+03	-5.7e+03
AIC	2.4e+04	1.0e+04	1.4e+04	2.3e+04	9544.203	1.3e+04	2.0e+04	7980.675	1.2e+04
BIC	2.5e+04	1.0e+04	1.4e+04	2.3e+04	9789.372	1.4e+04	2.0e+04	8225.052	1.2e+04

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Note: Two-way (years and countries) fixed effects models explaining output growth around currency crisis episodes based on our core definition. The time line goes from bottom to top of the table, with "T-" ("T+") variables capturing the growth effects before (after) the crisis. Columns 4, 5 and 6 exclude war events. Columns 7, 8 and 9 exclude war events and rely on a truncated regression where lower (-12%) and upper (+19%) growth percentiles are neutralized. Robust standard errors.

Table 8: Output growth effects of currency collapses by commodity specialization

	(1) Non-cdty	(2) Cdty	(3) Cdty Energy	(4) Cdty Minerals	(5) Cdty Agri
Collapse $T+3$	0.744 (1.020)	1.063 (0.981)	3.297 (2.787)	-0.716 (1.517)	0.328 (0.638)
Collapse $T+2$	0.574 (0.698)	0.058 (0.593)	1.070 (1.345)	-0.727 (0.800)	-0.728 (0.671)
Collapse $T+1$	-1.296* (0.710)	-0.015 (0.521)	-0.050 (0.944)	-0.506 (1.112)	0.002 (0.816)
Collapse $T$	-3.150*** (0.843)	-1.658*** (0.593)	-1.623 (0.997)	-0.536 (1.271)	-1.659* (0.820)
Collapse $T-1$	-0.111 (1.378)	-1.661*** (0.618)	-1.888 (1.307)	0.987 (0.977)	-2.134** (0.917)
Collapse $T-2$	1.043 (0.863)	-0.917 (0.592)	0.696 (0.865)	-0.481 (1.099)	-2.087** (0.803)
Collapse $T-3$	-0.459 (1.322)	-0.106 (0.528)	-0.625 (1.062)	-0.284 (1.005)	0.273 (0.731)
Constant	3.849*** (1.054)	4.533*** (1.078)	8.854*** (1.895)	-1.434 (2.471)	3.159** (1.255)
N	1525	2059	715	345	999
Log-likelihood	-4.7e+03	-6.6e+03	-2.5e+03	-968.272	-3.0e+03
AIC	9544.203	1.3e+04	5066.898	2028.545	5996.106
BIC	9789.372	1.4e+04	5277.223	2205.348	6221.817

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Note: Two-way (years and countries) fixed effects models explaining output growth around currency crisis episodes based on our core definition. The time line goes from bottom to top of the table, with "T-" ("T+") variables capturing the growth effects before (after) the crisis. War events are excluded. Robust standard errors.

Table 9: Commodity-dependent countries - output growth effects of currency collapses by degree of commodity dependence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	20%	25%	30%	35%	40%	45%	50%	55%	60%	65%
Collapse $T+3$	0.690 (0.906)	0.820 (0.975)	1.130 (0.930)	1.063 (0.981)	1.053 (1.049)	0.984 (1.205)	1.013 (1.357)	1.121 (1.535)	1.917 (1.832)	1.693 (2.013)
Collapse $T+2$	0.090 (0.501)	0.070 (0.532)	0.062 (0.559)	0.058 (0.593)	-0.046 (0.614)	0.201 (0.741)	0.323 (0.829)	0.132 (0.948)	0.212 (1.132)	0.247 (1.155)
Collapse $T+1$	-0.039 (0.456)	0.033 (0.481)	0.029 (0.502)	-0.015 (0.521)	0.030 (0.545)	-0.017 (0.610)	0.024 (0.692)	-0.354 (0.750)	-0.284 (0.896)	0.094 (0.738)
Collapse $T$	-1.690*** (0.553)	-1.650*** (0.559)	-1.494** (0.579)	-1.658*** (0.593)	-1.564** (0.623)	-1.684** (0.658)	-1.549** (0.748)	-1.834** (0.819)	-1.838* (0.949)	-1.803* (0.973)
Collapse $T-1$	-1.409** (0.602)	-1.517** (0.621)	-1.402** (0.646)	-1.661*** (0.618)	-1.872*** (0.661)	-1.420** (0.678)	-1.227* (0.723)	-1.435* (0.776)	-1.558 (1.046)	-1.407 (1.163)
Collapse $T-2$	-0.593 (0.527)	-0.742 (0.544)	-0.801 (0.574)	-0.917 (0.592)	-0.853 (0.624)	-0.395 (0.681)	-0.153 (0.756)	-0.196 (0.838)	0.448 (0.975)	0.032 (1.073)
Collapse $T-3$	0.020 (0.492)	-0.131 (0.509)	0.012 (0.516)	-0.106 (0.528)	-0.071 (0.559)	0.215 (0.632)	0.248 (0.694)	0.010 (0.791)	0.468 (0.885)	-0.039 (0.956)
Constant	4.222*** (0.871)	4.286*** (0.938)	4.302*** (1.014)	4.533*** (1.078)	4.428*** (1.162)	4.294*** (1.340)	4.080*** (1.403)	4.338*** (1.589)	5.355** (1.995)	5.244** (2.163)
N	2501	2310	2168	2059	1845	1545	1380	1215	889	796
Log-likelihood	-8.2e+03	-7.4e+03	-6.9e+03	-6.6e+03	-6.0e+03	-5.1e+03	-4.6e+03	-4.1e+03	-3.1e+03	-2.8e+03
AIC	1.6e+04	1.5e+04	1.4e+04	1.3e+04	1.2e+04	1.0e+04	9258.834	8259.627	6209.731	5599.890
BIC	1.7e+04	1.5e+04	1.4e+04	1.4e+04	1.2e+04	1.0e+04	9499.406	8494.342	6430.075	5815.152

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Note: Two-way (years and countries) fixed effects models explaining output growth around currency crisis episodes based on our core definition. The subset of commodity-dependent countries is restricted to countries with commodity exports to total exports ratio exceeding 20% in column (1), up to 65% in column (10), the benchmark of 35% being reported in Column (4). The time line goes from bottom to top of the table, with "T-" ("T+") variables capturing the growth effects before (after) the crisis. War events are excluded. Robust standard errors.

Table 10: Output growth effects of currency collapses - does the size of the depreciation matter?

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	25%		40%		50%		60%	
	Non-cdty	Cdty	Non-cdty	Cdty	Non-cdty	Cdty	Non-cdty	Cdty
[1em] Collapse $T+3$	0.746 (1.020)	1.063 (0.981)	0.201 (1.484)	1.788 (1.533)	-0.114 (1.856)	1.947 (1.722)	-0.380 (1.778)	2.701 (1.926)
Collapse $T+2$	0.576 (0.699)	0.058 (0.593)	-0.018 (0.614)	0.610 (0.838)	0.308 (0.723)	0.923 (0.871)	2.012** (0.803)	1.145 (0.966)
Collapse $T+1$	-1.299* (0.711)	-0.015 (0.521)	-2.519*** (0.879)	-0.556 (0.568)	-2.891*** (1.059)	-0.552 (0.521)	-1.678* (0.917)	-0.571 (0.563)
Collapse $T$	-3.150*** (0.843)	-1.658*** (0.593)	-3.632*** (1.002)	-1.583* (0.816)	-3.595*** (1.114)	-1.553 (0.970)	-2.560*** (0.929)	-1.548 (1.084)
Collapse $T-1$	-0.115 (1.379)	-1.661*** (0.618)	0.025 (1.624)	-1.852*** (0.649)	-0.203 (1.925)	-2.115*** (0.701)	0.791 (2.108)	-1.954** (0.736)
Collapse $T-2$	1.044 (0.863)	-0.917 (0.592)	0.836 (1.115)	-1.196* (0.647)	0.088 (1.282)	-1.564** (0.705)	0.809 (1.703)	-1.010 (0.760)
Collapse $T-3$	-0.459 (1.322)	-0.106 (0.528)	-0.695 (1.840)	-0.491 (0.717)	-0.968 (2.118)	-0.544 (0.901)	-1.248 (2.423)	-0.448 (0.909)
Constant	3.842*** (1.054)	4.533*** (1.078)	3.947*** (1.032)	4.472*** (1.068)	3.749*** (1.058)	4.477*** (1.070)	3.707*** (1.055)	4.494*** (1.064)
N	1525	2059	1525	2059	1525	2059	1525	2059
Log-likelihood	-4.7e+03	-6.6e+03	-4.7e+03	-6.6e+03	-4.7e+03	-6.6e+03	-4.7e+03	-6.6e+03
AIC	9544.203	1.3e+04	9544.762	1.3e+04	9547.936	1.3e+04	9552.263	1.3e+04
BIC	9789.372	1.4e+04	9789.931	1.4e+04	9793.104	1.4e+04	9797.431	1.4e+04

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

*Note:* Two-way (years and countries) fixed effects models explaining output growth around currency crisis episodes based on our core definition in columns (1) and (2), and on alternative currency crisis definitions requiring a minimum 40% depreciation in columns (3) and (4), minimum 50% depreciation in columns (5) and (6) and minimum 60% depreciation in columns (7) and (8). The time line goes from bottom to top of the table, with "T-" ("T+") variables capturing the growth effects before (after) the crisis. War events are excluded. Robust standard errors.

Table 11: Output growth effects of currency collapses - do abrupt and smooth depreciation differ?

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Year		Half-year		Quarter		Month	
	Non-cdty	Cdty	Non-cdty	Cdty	Non-cdty	Cdty	Non-cdty	Cdty
Collapse $T+3$	0.746 (1.020)	1.063 (0.981)	-0.031 (0.914)	0.862 (1.137)	0.969 (0.974)	0.728 (1.119)	0.300 (1.168)	1.032 (1.124)
Collapse $T+2$	0.576 (0.699)	0.058 (0.593)	-0.269 (0.806)	0.202 (0.689)	-0.495 (0.788)	0.137 (0.535)	0.834 (3.327)	0.269 (0.570)
Collapse $T+1$	-1.299* (0.711)	-0.015 (0.521)	-1.636 (1.171)	-0.802* (0.432)	-2.367** (0.986)	-0.613 (0.459)	-0.883 (1.431)	-0.150 (0.520)
Collapse $T$	-3.150*** (0.843)	-1.658*** (0.593)	-3.296*** (0.927)	-1.981*** (0.649)	-1.788 (1.785)	-1.844*** (0.610)	-2.802** (1.151)	-1.670** (0.710)
Collapse $T-1$	-0.115 (1.379)	-1.661*** (0.618)	-0.602 (0.522)	-1.659*** (0.578)	-0.311 (0.758)	-1.955*** (0.545)	-1.747* (1.002)	-2.495*** (0.523)
Collapse $T-2$	1.044 (0.863)	-0.917 (0.592)	0.415 (1.012)	-0.998* (0.517)	0.058 (0.740)	-1.533*** (0.537)	0.268 (1.329)	-1.178* (0.606)
Collapse $T-3$	-0.459 (1.322)	-0.106 (0.528)	-1.545 (1.463)	-0.344 (0.531)	-0.859 (1.388)	-0.344 (0.657)	-2.558 (2.232)	-1.048* (0.549)
Constant	3.842*** (1.054)	4.533*** (1.078)	3.898*** (1.037)	4.572*** (1.066)	3.688*** (1.036)	4.562*** (1.058)	3.926*** (1.049)	4.584*** (1.067)
N	1525	2059	1525	2060	1525	2061	1525	2062
Log-likelihood	-4.7e+03	-6.6e+03	-4.7e+03	-6.6e+03	-4.7e+03	-6.6e+03	-4.7e+03	-6.6e+03
AIC	9544.203	1.3e+04	9539.279	1.3e+04	9546.297	1.3e+04	9543.575	1.3e+04
BIC	9789.372	1.4e+04	9784.447	1.4e+04	9791.465	1.4e+04	9788.744	1.4e+04

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Note: Two-way (years and countries) fixed effects models explaining output growth around currency crisis episodes based on our core definition in columns (1) and (2), requiring a 25% depreciation within a year, and on alternative currency crisis definitions requiring a 25% depreciation within 6 months in columns (3) and (4), within 3 months in columns (5) and (6) and within one month (abrupt) in columns (7) and (8). The time line goes from bottom to top of the table, with "T-" ("T+") variables capturing the growth effects before (after) the crisis. War events are excluded. Robust standard errors.



Table 12: Commodity-dependent countries - output growth effects of currency collapses by criterion of commodity dependence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	IMF 35%		UNCTAD 60%		GDP 10%		IMF 35% + XM 5%	
	Non-cdty	Cdty	Non-cdty	Cdty	Non-cdty	Cdty	Non-cdty	Cdty
Collapse $T+3$	0.746 (1.020)	1.063 (0.981)	0.552 (0.842)	1.246 (1.079)	0.711 (0.855)	0.962 (1.093)	0.464 (0.754)	1.335 (1.367)
Collapse $T+2$	0.576 (0.699)	0.058 (0.593)	0.188 (0.590)	0.271 (0.634)	0.341 (0.566)	0.156 (0.678)	0.035 (0.486)	0.324 (0.806)
Collapse $T+1$	-1.299* (0.711)	-0.015 (0.521)	-1.453** (0.617)	0.174 (0.552)	-0.631 (0.695)	-0.274 (0.535)	-0.339 (0.561)	-0.384 (0.640)
Collapse $T$	-3.150*** (0.843)	-1.658*** (0.593)	-3.530*** (0.681)	-1.275* (0.666)	-2.632*** (0.761)	-1.676** (0.658)	-2.149*** (0.689)	-1.917** (0.747)
Collapse $T-1$	-0.115 (1.379)	-1.661*** (0.618)	-0.742 (1.008)	-1.485* (0.754)	-0.903 (0.978)	-1.342* (0.740)	-0.821 (0.894)	-1.622* (0.811)
Collapse $T-2$	1.044 (0.863)	-0.917 (0.592)	-0.062 (0.710)	-0.606 (0.670)	-0.656 (0.678)	-0.252 (0.656)	-0.636 (0.657)	-0.254 (0.724)
Collapse $T-3$	-0.459 (1.322)	-0.106 (0.528)	-0.994 (0.961)	0.091 (0.621)	-1.083 (0.919)	0.304 (0.625)	-0.401 (0.858)	-0.099 (0.737)
Constant	3.842*** (1.054)	4.533*** (1.078)	4.308*** (0.917)	4.218*** (1.211)	4.011*** (0.949)	4.469*** (1.184)	3.759*** (0.780)	4.948*** (1.583)
N	1512	2059	1729	1842	1768	1803	2299	1272
Log-likelihood	-4.7e+03	-6.6e+03	-5.3e+03	-6.0e+03	-5.1e+03	-6.1e+03	-7.0e+03	-4.2e+03
AIC	9471.015	1.3e+04	1.1e+04	1.2e+04	1.0e+04	1.2e+04	1.4e+04	8554.913
BIC	9705.148	1.4e+04	1.1e+04	1.2e+04	1.0e+04	1.2e+04	1.4e+04	8740.253

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

*Note:* Two-way (years and countries) fixed effects models explaining output growth around currency crisis episodes based on our core definition. The subsets of commodity non-dependent countries versus dependent ones is based on the following criteria/thresholds: a) share of commodities in total exports exceeds 35% (benchmark) as for columns (1) and (2); b) share of commodity in total merchandise exports exceeds 60% as for columns (3) and (4); c) share of commodity exports in GDP exceeds 10% as for columns (5) and (6); d) share of commodities in total exports exceeds 35% AND share of net exports in total trade exceeds 5% as for columns (7) and (8). The time line goes from bottom to top of the table, with "T-" ("T+") variables capturing the growth effects before (after) the crisis. War events are excluded. Robust standard errors.

Figure 1: Most frequent top 1/2/3 commodities among commodity-dependent countries

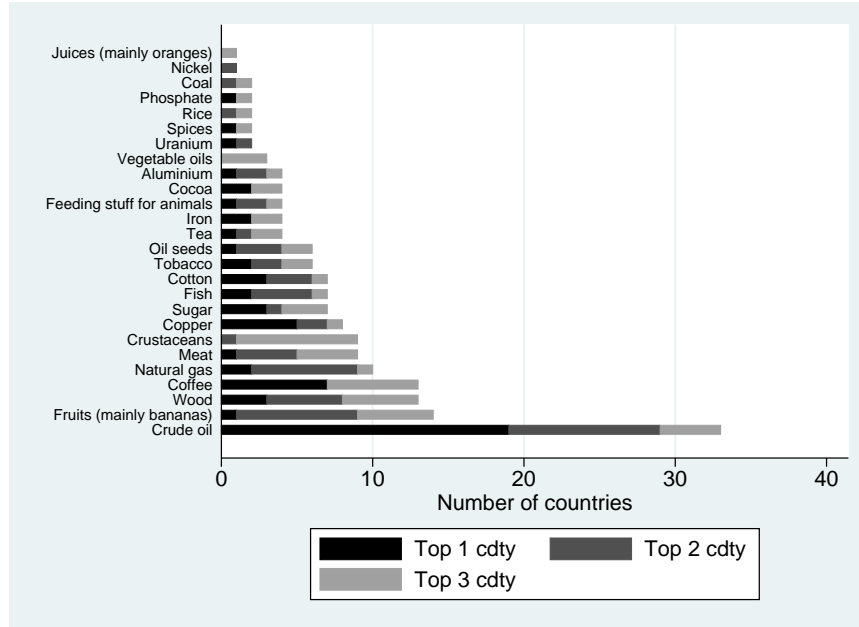


Figure 2: USD bilateral (log) exchange rates and currency collapses (1/5)

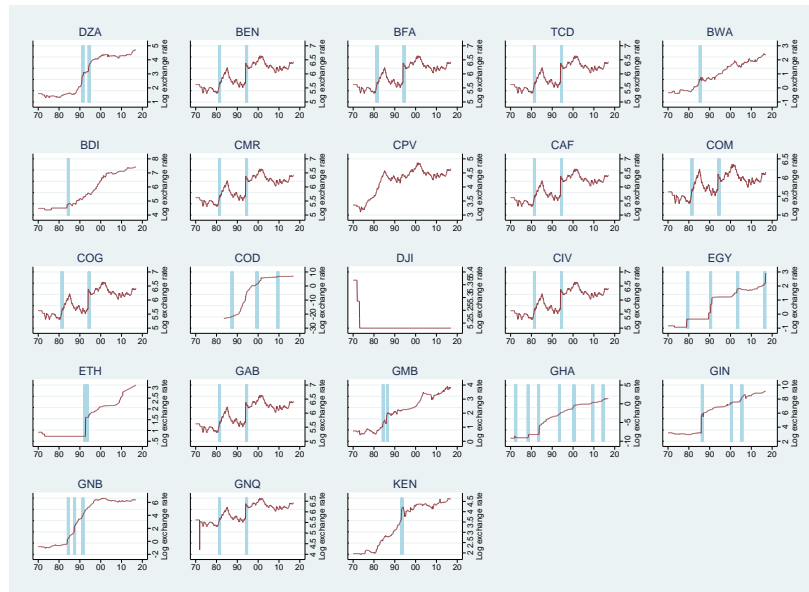


Figure 3: USD bilateral (log) exchange rates and currency collapses (2/5)

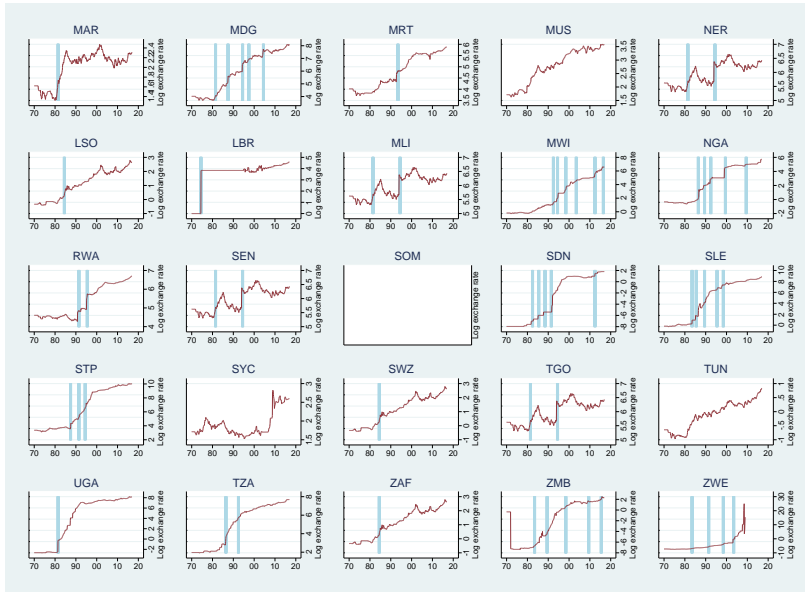


Figure 4: USD bilateral (log) exchange rates and currency collapses (3/5)

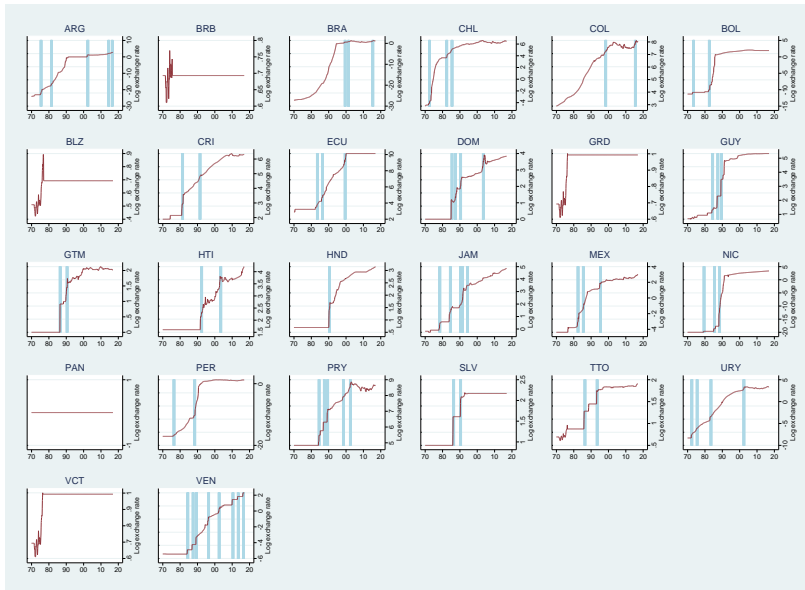


Figure 5: USD bilateral (log) exchange rates and currency collapses (4/5)

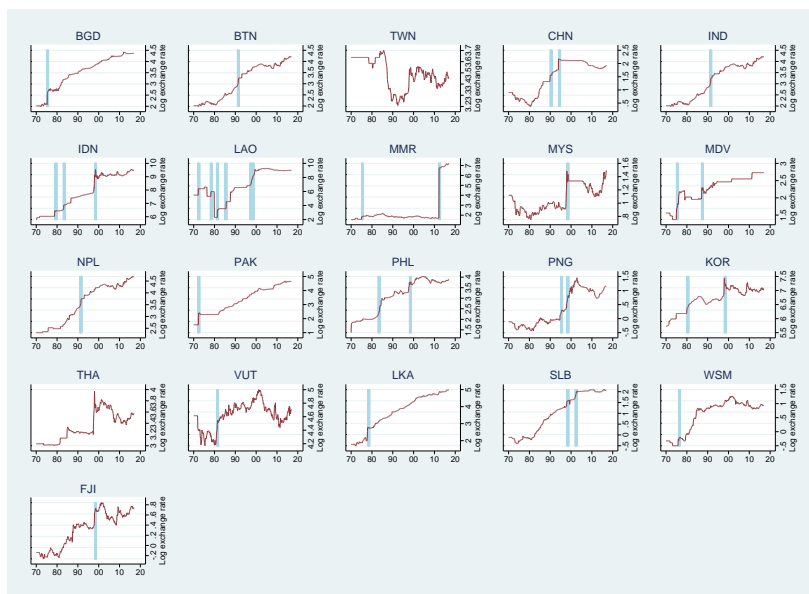


Figure 6: USD bilateral (log) exchange rates and currency collapses (5/5)

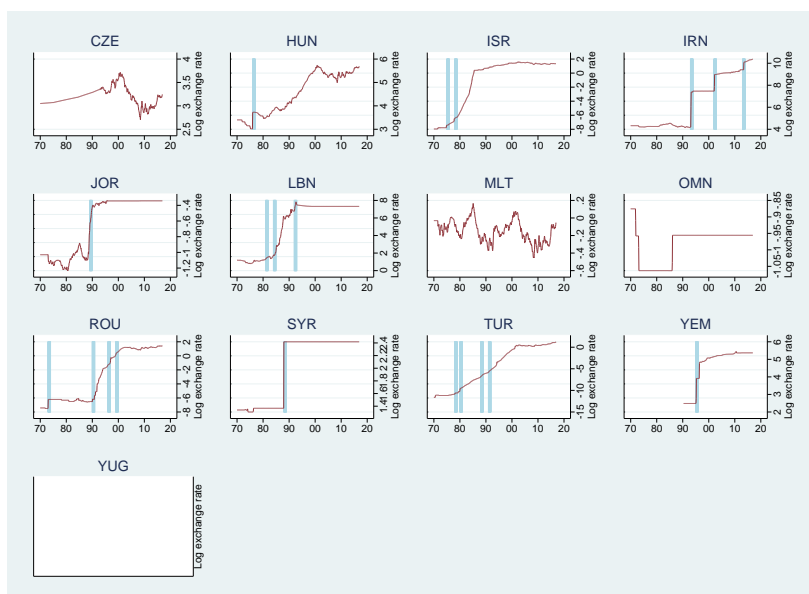


Figure 7: Distribution of currency collapses

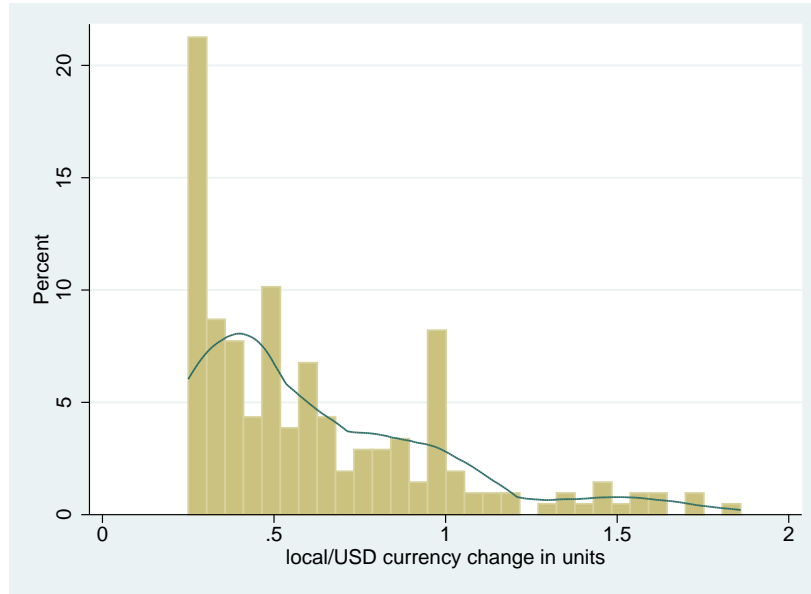


Figure 8: Event study - dynamic GDP growth response to currency crisis

