How Costly are Debt Crises?

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Abstract

The aim of this paper is to assess the short and medium term impact of debt crises. Using an unbalanced panel of 154 countries from 1970 to 2008, the paper shows that debt crises produce significant and long-lasting output losses. In particular, we find that debt crises are very costly, reducing output by 3-5 percent after one year and by 6-12 percent after 8 years. The results also suggest that debt crises are also more damaging than banking and currency crises, and that the occurrence of a triple crisis (debt, currency and banking crisis) is associated with a contemporaneous output loss of more than 10 percent. The significance of the results is robust to the estimation procedures used (LDSV and two-step GMM-system estimator), different specifications and datasets.

Keywords: Output Losses, Debt Crises, Sovereign Defaults.

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1. Introduction

The 2008 financial crisis has been exceptional not only for its severity and its synchronicity across countries, but also for the policy response. For many countries debt levels are projected to increase substantially as a consequence of fiscal bailouts, reduced revenues associated with output losses, and the increase in spending due to automatic stabilizers and from discretionary increases in the public deficit. According to the IMF (2010), the average gross general government debt-to-GDP ratio for the G-20 advanced economies is projected to rise by 37 percentage points from pre-crisis levels. According to the OECD Economic Outlook (2010) the increase in the gross debt-to-GDP ratio for OECD economies during the period 2007-2014 is estimated to be around 35 percentage points.[1] The large current increase in public debt is a pattern common to previous episodes of banking crises. Furceri and Zdzienicka (2010c) analyzing a panel of 154 countries from 1980 to 2006, show that severe banking crises are associated with a significant and long-lasting increase of about 37 percentage points of the government gross debt-to-GDP ratio. Reinhart and Rogoff (2009) estimate that in the three years after the occurrence of a banking crisis the real value of government debt rose on average by 86%. This large increase in public debt has frequently led to sovereign defaults.

How costly are debt crises? How big are the associated output losses? Although it is a common view that debt crises may be damaging, quite surprisingly, the number of works in the literature that have tested the effect of debt crises on output is very limited. In fact, while some works have focused on the history of sovereign debt defaults and debt restructuring (Beim and Calomiris, 2001; Sturzenegger and Zettelmeyer, 2006), and have analyzed the impact of debt

[1] Under the assumption that the underlying primary fiscal balance improves by ½ per cent of GDP until it is sufficient to ensure that the debt-to-GDP ratio is stable. See Chapter 4 of the *OECD Economic Outlook* 87 (2010) for more details.

crises on consumption (Eaton and Gersovitz, 1981), on the access to international capital market (Medeiros et al., 2005), on trade in goods and services (Rose, 2002; de Paoli *et al.,* 2006) and on the future costs of borrowing (Alfaro and Kanczuk, 2005), very few works have analyzed the output losses associated with debt crises.

To the best of our knowledge, only two works have assessed the impact of debt crises on output, and also with different conclusions. De Paoli *et al.* (2009), comparing output growth five years before and after the occurrence of a debt crisis, find that debt crises are associated with output losses of at least 5 percent per year and last about ten years. Levy-Yeyati and Panizza (2010) analyzing quarterly data for output growth find that growth recovers in the quarters immediately after the occurrence of a debt crisis and argue that the large negative effect of a sovereign default on output identifiable with annual data, is likely to be driven by the anticipation of defaults.

This gap in the literature is even more surprising given the high number of studies on the real costs of banking and/or currency crises. After the seminal paper by Kaminsky and Reinhart (1999), several works have tried to estimate the short-term output losses associated with currency and banking crises.[2] Cerra and Saxena (2008) were the first to extend the analysis to the long-term, and to assess whether output losses were temporary or permanent.[3] The results of these studies have generally concluded that: i) banking and currency crises are very damaging; ii) when currency and banking crises are considered together (*twin* crises) output losses are very large both in the short and in the long-term.

[2] See, for example, Bordo et al. (2001), Hutchison (2001), Huichison and Noy (2005) Demirgüç-Kunt et al. (2006), Gupta et al. (2007).

[3] The 2008 financial crisis has led to a renewed interest about the economic effects of financial crises. For recent works, see for example, Rose and Spiegel (2009), Furceri and Mourougane (2009); Cecchetti et al. (2009), Rodrick. (2009), and Furceri and Zdzienicka (2010 a,b).

The existing gap in the literature on the effect of debt crises on output growth is partially due to the *indistinguishable* connection that exists between currency, banking and debt crises. This is particularly the case for emerging economies that have been frequently hit by the simultaneous occurrence of banking, currency, and debt crises. The simultaneous occurrence of these types of financial crises is often attributed to the so-called "original sin" syndrome (Eichengreen et al., 2003), occurring when most of the private and public debt is short-term denominated in foreign currency. Following large domestic exchange rate depreciations associated with currency crises, public debt (when mostly foreign denominated) can increase considerably and lead to defaults. Reinhart and Rogoff (2010a,b) suggest the following causality: private sector defaults precede banking sector crises that coincide or precede public debt defaults. At the same, the opposite may also occur: public default may lead to banking crises when banks are the main holders of government debt. Banking and debt crises could also lead to currency crises. For instance, *third generation* crises theory (Krugman, 1999) underlines the role of maturity mismatches and currency disequilibria in private (mostly banking sector) balance sheets as the main reason for the onset of currency crises.

This paper tries to fill this gap by assessing the impact of debt crises episodes on output growth using a panel of 154 countries over the period 1970-2008. The paper contributes to the existing literature in several aspects:

- Given the above-mentioned connection between currency, banking and debt crises, these crises can then affect almost simultaneously output growth[4] and therefore amplifying or attenuating each other impact. This makes particularly difficult to isolate the impact of debt crises on the real output. To address this

[4] The transmission mechanisms in which currency, banking and debt crises can affect output growth are developed in detail in De Paoli *et al*. (2006).

issue two different approaches have been used. First, the effect of debt crises on output is estimated together with the effect of currency and banking crises. In this way, it is possible to quantify the *marginal* contribution of each crisis to contemporaneous and future output losses. Second, the effect of debt crises on output is estimated only for those episodes for which neither a banking nor a currency crisis occurred in the two years before.

- It analyzes the impact of debt crises on output both in the short and in the long-term.
- It uses several datasets of starting dates of debt crises episodes.

The estimates based on an unbalanced panel of 154 countries over the period 1970-2008 suggest that debt crises are very damaging both in the short and in the long-term. In the short-term, the baseline results suggest that debt crises reduce contemporaneous output by 3-5 percent. The results are robust to the estimation procedures used (LDSV and two-step GMM) and to different specifications. The range of estimates of the effect of debt crises on output growth becomes wider (3-10 percent) when different datasets of debt crises episodes are analyzed. Since these datasets mainly differ for the composition of the countries for which a debt crisis is attributed, rather than the dating of the crisis itself, it is likely that the different estimates simply reflect the heterogeneous response of countries to debt crises, and the different severity of the crises.

When compared to banking and currency crises, debt crises results to be more damaging in reducing contemporaneous output growth. In particular, the range of estimates across the different specifications suggest that the occurrence of a debt crisis reduces output by about 5.0 percent, the occurrence of a currency crisis is associated with a reduction in output of about 2.8

percent, and the occurrence of a banking crisis is found to lower output by about 2.0 percent. The joint occurrence of a triple crisis (debt, currency and banking crisis) is associated with a contemporaneous output loss of about 10 percent. At the same time, the results suggest that the occurrence of a twin or triple crisis does not appear to contribute to the additional (marginal) negative impact on output above and beyond the combined effect of the two or three types of crises.

The long-term analysis suggests that debt crises are associated with protracted output losses. In particular, 8 years after the occurrence of a debt crisis, output contracts by more than 6 percent. The effect is even larger (12 percent) when the analysis is restricted to episodes of debt crises neither preceded nor followed by other types of crises[5]. The statistically significance of the result is also robust to the estimation procedures used (LDSV and two-step GMM-system estimator) and to different specifications. These are large estimates and should alarm policy makers about the risk of possible future debt crises.

The rest of the paper is organized as follows. Section 2 describes the data and the identification of debt crises episodes. Section 3 presents the empirical methodology to assess the short and long-term effect of debt crises on output. Section 4 discusses the results. Section 5 summarizes the main results and concludes with some issues for future research.

2. Data

To identify debt crises episodes the paper relies on several datasets:

- The first dataset is the one constructed by Laeven and Valencia (2008) who list the starting date of debt crisis episodes, as a compilation of years of sovereign defaults to private

[5] When no other crises occur within a 9- year period

lending and years of debt rescheduling. The authors rely on information from Beim and Calomiris (2001), World Bank (2002), Sturzenegger and Zettelmeyer (2006), and IMF Staff reports. In particular, the Work Bank *Global Development Finance* Report (2002) provides the list of 26 countries for which debt-restructuring agreements with their commercial creditors were completed in 2001. Beim and Calomiris (2001) provide the date of debt defaults for several emerging economies during the period 1970-2000. Sturzenegger and Zettelmeyer (2006) list selected government defaults and restructurings of private held bonds and loans over the period 1920-2004.[6]

Table 1 lists all debt crises episodes identified by Laeven and Valencia (2008). Overall the authors identify 63 crises episodes, which mainly occurred in the 1980s: 7 episodes occurred in the period 1970-1979, 41 between 1980 and 1989, 7 in the period 1990-1999, and 8 after 1999.

- The second set of banking crises episodes is the one collected by De Paoli et al. (2006). The authors identify 39 (35) episodes of sovereign default over the 1970-2000 (Table 2a). Defaults are identified when the arrears on principal on external obligations towards private creditors reach at least 15 percent of total commercial debt outstanding (the arrears on interest on external obligations towards private creditors reach at least 5 percent of total commercial debt outstanding) and/or there is a rescheduling with private creditors as listed in the World Bank *Global Development Finance.*

- An alternative dataset of debt crises episodes is the one constructed by Reinhart et al. (2003). The authors identify 31 debt crises episodes over the period 1970-2001 using the dates

[6] The authors associated each debt defaults and restructuring episode with boom-bust cycles in international capital flows. In this way have been identified seven clusters in the history of European, Latin America and Caribbean, African and Asia countries. Defaults triggered by wars, revolutions, occupations, and state disintegrations were generally excluded, except when they coincided with a default cluster. Payment delays and other technical defaults that eventually resulted in full repayment were also generally excluded.

reported in Beim and Calomiris (2001) on defaults and restructurings, and Standard and Poor's *Credit Week* information (Table 2a).

- A fourth dataset is Detragiache and Spillimbergo (2000) which covers 54 episodes of debt crises (Table 2b). Defaults are identified when arrears of principal on interest on external obligations towards commercial creditors exceed 5 percent of total commercial debt outstanding (excluding the episodes that occur within four years of the previous defaults) and/or there is a rescheduling with private creditors as listed in the World Bank's *Global Development Finance*.

- Finally, the last dataset considered in the analysis is Levy-Yeyati and Panizza (2010). The authors identify 20 default episodes over the period 1980-2003 (excluding the episodes that occur within three years of the previous defaults). Episodes are classified as beginning years of foreign currency bank and bond debt default, using information reported in Standard and Poor's *Credit Week,* World Bank *Global Development Finance* and financial press. (Table 2b).

Table 3 presents descriptive statistics for total and foreign public debt (as share of GDP), and GDP growth in relation to the debt crises episodes identified in the datasets described above. Looking at the table, it is immediately evident that starting dates of debt crises are associated with periods of negative growth and relative high domestic and foreign public debt. In particular, focusing on the first raw of the table (for which more episodes and more observations for public debt are available) debt crises generally occur when the gross public debt-to-GDP ratio is higher than 80 percentage points, the public foreign gross debt-to-GDP ratio is above 55 percentage points, and GDP growth is about -2 percent.

Data for banking and currency crises episodes are taken from Laeven and Valencia (2008). The authors determine the starting dates of banking crises combining quantitative indicators measuring banking sector distress, such as a sharp increase in non-performing loans and bank

runs, with a subjective assessment of the situation. In particular, the database extends and builds on Caprio, et al. (2005) banking crises database and covers the universe of systemic banking crises for the period 1970-2007. Currency crises episodes are identified when a currency have a nominal depreciation of 10 percent in one year, and 30 percent overall (Frankel and Rose, 1996).

Data for real GDP are taken from the World Bank Economic Indicators. Data for public (domestic and foreign[7]) debt are taken from Panizza (2008).

3. Empirical Methodology

Alike other works in the literature on the short-term effects of banking and/or currency crises on output, the methodological approach used in the paper consists of estimating the sort-term output losses by regressing contemporaneous output growth against a dummy variable that takes value equal to 1 for the occurrence of a crisis and 0 otherwise, and a set of variables influencing short-term growth. In particular, the formal specification of the empirical model used for the short-term analysis is as follows:

$$y_{i,t} - y_{i,t-1} = \alpha_i \ + b_t \ + \sum_{j=1}^{2} \gamma_j \ \Delta y_{i,t-j} + \beta \ D_{i,t}^{D} + \boldsymbol{\delta' X_{it}} + \varepsilon_{i,t} \qquad (1)$$

where $y_{i,t}$ is the log of real GDP for country *i* at time *t* and zero otherwise, $D_{i,t}^{D}$ is a dummy variable that takes the value equal to 1 if a debt crisis occurred in country *i* at time *t* and 0 otherwise, α_i are country-specific effects included to account for different growth trends among countries, b_t are time-specific effects included to control for different shocks other then debt crises, $\boldsymbol{X_{it}}$ is a set of variables influencing growth in the short-term. The empirical literature on

[7] Foreign debt is defined as public debt issued in foreign countries and under the jurisdiction of a foreign court.

growth has suggested numerous variables as possible determinants of growth (see, for example, Levine and Renelt, 1992; Sala-i-Martin 1997). However, some of these variables are likely to influence growth only over the medium–term and are not available on yearly basis (e.g., human capital) over a long time span and for a large set of countries. Therefore to keep the specification parsimonious, the variables included in the vector $\boldsymbol{X_{it}}$ have been restricted to: trade openness (defined as the share of total exports and imports over GDP), population growth, (private) credit growth, real exchange rate growth and the initial (lagged) level of GDP. In addition, given that the main concern is to introduce relevant control variables into the regression so that the estimated impact of a debt crisis on output is not biased due to the omission of variables, two lags of real GDD growth have been included.

Equation 1 has been estimated using both the Least Squares Dummy Variables (LSDV) and the two-step GMM-system estimator. The GMM-estimator has undeniable advantages in the presence of endogeneity due to the presence of the lagged dependent variable among regressors, but also in presence of time-invariant country features that may be correlated with regressors. To deal with serial autocorrelation and cross-country heteroskedasticity the two-step estimator has been applied. Two lags of the dependent variable and other endogenous variables are used as instruments. [8]

The estimate of the coefficient β represents the estimated *marginal* effect of the occurrence of a debt crisis on growth.

This paper also assesses the effect of the crises on output in the medium and long-term. In order to estimate the medium and long-term dynamic impact of debt crises episodes on output,

[8] The two-step GMM-system estimates (with Windmeijer standard errors) are computed using the xtabond2 Stata command developed by Roodman (2009). Openness, lagged Real GDP, population growth and time dummies have been considered as predetermined while the rest of the control variables have been considered as endogenous and instrumented using 2 lags.

the paper follows the method proposed by Jorda (2005) and Teuling and Zubanov (2009) which consists of estimating impulse response functions (IRFs) directly from local projections. In detail, for each future period *k* the following equation has been estimated on annual data:

$$y_{i,t+k} - y_{i,t} = \alpha_i^k + b_t^k + \sum_{j=1}^{l} \gamma_j^k \Delta y_{i,t-j} + \beta_k D_{i,t}^D + \varepsilon_{i,t}^k \quad (2)$$

with *k*= 1,..8. β_k measures the impact of banking crises on the change of (the log of) the real output for each future period *k*. The number of lags (*l*) has been chosen equal to two, even if the results are extremely robust to different numbers of lags included in the specification. Corrections for heteroskedasticity, when appropriate, have been applied using White robust standard errors. Impulse response functions (IRFs) are then obtained by plotting the estimated β_k for *k*= 0,1,..8. 95% confidence bands for the estimated IRFs are computed using the standard deviations associated with the estimated coefficients β_k.

As for Equation 1, Equation 2 has been estimated using both LSDV and the two-step GMM-system estimators, even if as *k* increases the risk of endogeneity, and therefore the possible bias of the LSDV estimates, is reduced.

4. Results

4.1 Short-term

Baseline

Table 3 presents the results obtained estimating Equation 1. In the first three columns of the table are reported the estimates obtained using LSDV, while in the last three columns those obtained using the two-step GMM-system estimator. Equation 1 has been estimated using three different specifications: i) no control variables; ii) control variables included at time *t* (with the

exception of the initial level of GDP per capita which is included at time *t-1*); and iii) control variables included at time *t-1* to eliminate reverse causality (with the exception of openness and population). The controls variables that are (most of the time) statistically significant are trade openness, current real exchange rate overvaluation, the initial level of GDP and lagged output growth (for the GMM specification). An increase in trade openness increases output growth, while a rise in exchange rate overvaluation reduces current output growth. The estimates of the coefficients, when statistically significant, are consistent across the different specifications and the estimation methods. Country and time fixed effects are found to be statistically significant.

Focusing on the effects of the occurrence of a debt crisis on contemporaneous output growth, the results reported in the table suggest that debt crises significantly reduce output growth. The coefficient associated with the debt crises dummy is negative and statistically significant in all specifications. Debt crises are found to reduce contemporaneous output by more than 3 percent, with a range of estimates between 3.2 (column V) and 5.3 percent (column I). The estimates obtained with LDSV and the two-step GMM-system estimators do not differ systematically across the three different specifications. For example, in the first specification a larger estimate is obtained for the LDSV, in the third a larger estimate is obtained for the two-step GMM-system estimator, and in the second the two point estimates only slightly differ. The difference between these estimates is never statistically significant.

Debt vs. Currency and Banking Crises

This section compares the impact of debt crises on output with the effect of banking and currency crises. To this purpose the following specification is estimated:

$$y_{i,t} - y_{i,t-1} = \alpha_i \ + b_t \ + \sum_{j=1}^{2} \gamma_j \ \Delta y_{i,t-j} + \beta_1 D_{i,t}^{D} + \beta_2 D_{i,t}^{C} + \beta_3 D_{i,t}^{B} + \theta_1 D_{i,t}^{D} D_{i,t}^{C} +$$

$$\theta_2 D_{i,t}^{D} D_{i,t}^{B} + \theta_3 D_{i,t}^{C} D_{i,t}^{B} + \vartheta D_{i,t}^{D} D_{i,t}^{C} D_{i,t}^{B} + \varepsilon_{i,t} \quad (3)$$

where $D_{i,t}^{C}$ ($D_{i,t}^{B}$) is a dummy variable that takes the value equal to 1 if a currency (banking) crisis occurred in country *i* at time *t*. The (full) empirical specification includes three types of twin crises: debt-currency($D_{i,t}^{D} D_{i,t}^{C}$), debt-banking ($D_{i,t}^{D} D_{i,t}^{B}$), and currency-banking ($D_{i,t}^{C} D_{i,t}^{B}$). Similarly to Hutchinson and Noy (2005), twin crises are defined as those crises in which the onset of a given crisis occurs 2 years before, during, or after the onset of another type of crises. Finally, Equation (3) also includes the *triple* crisis ($D_{i,t}^{D} D_{i,t}^{C} D_{i,t}^{B}$). Analogously to the definition of twin crises, triple crises are defined as those crises in which the onset of a given crisis occurs 2 years before, during, or after the onset of the other two types of crises. The results are qualitatively robust to different year bands (1 year and 3 years). $\beta_1, \beta_2, \beta_3, \theta_1, \theta_2, \theta_3$ and ϑ represent the *marginal* effect of debt, currency, banking, twin and triple crises on output growth.

Table 4 presents the results obtained estimating Equation 3, using both the LSDV and the two-step GMM-system estimator. To keep the specification parsimonious, the only control variables included are the two lags of GDP growth. The results, however, are qualitatively robust to the inclusion of the full set of controls *X* described in the previous section. The table presents five different specifications: i) $\vartheta = 0$; ii) $\beta_2 = \theta_1 = \theta_3 = \vartheta = 0$; iii) $\beta_3 = \theta_2 = \theta_3 = \vartheta = 0$; iv) a full specification in which all types of twin crises are included together with the triple crisis; and v) $\beta_2 = \beta_3 = \theta_1 = \theta_2 = \theta_3 = \vartheta = 0$ and only debt crises episodes for which neither a banking nor a currency crisis occurred in the 2 years before, during, or after the onset of a debt crisis[9].

[9] This restricts the number of debt crises episodes to 20.

The results of the table confirm that debt crises significantly reduce output growth. The coefficient associated with the debt crises dummy is negative and statistically significant in all specifications. Even more interestingly, the effect of debt crises on growth seems to be more detrimental than the effect of currency or banking crises. Based on the point estimates, it is possible to rank financial crises in order of disruptive effects on output as: 1) Debt crises; 2) Currency Crises and 3) Banking Crises. In particular, the range of estimates across the different specifications suggest that the occurrence of a debt crises reduces output by about 5.0 percent, the occurrence of a currency crisis is associated with a reduction of output of about 2.8 percent, and the occurrence of a banking crisis is found to lower output by about 2.0 percent. Overall, the joint occurrence of a triple crisis (debt, currency and banking crisis) is associated with a contemporaneous output loss of about 10 percent. The magnitude of the effect is extremely robust across the specifications. However, the estimates of the coefficients associated with both twin and triple crises are not statistically significant (with the exception of the twin banking-currency crises in column VI) suggesting that the occurrence of a twin or triple crisis does not appear to contribute to the additional (marginal) negative impact on output above and beyond the combined effect of the two or three types of crises.

As pointed by Reinhart and Rogoff (2010b) it is possible that a banking (and/or currency) crisis may trigger a debt crisis, in which case the estimated effect of debt crises on contemporaneous output could be just interpreted as the lagged effect of banking (or currency) crises episodes. To control for this, the analysis has been restricted to those episodes of debt crises in which neither a banking nor a currency crisis occurred in the 2 years before, during, or after the onset of a debt crisis. The results are presented in columns VII and VIII of the table. Looking at the table, it is possible to see that the results are robust also to these specifications. In

particular, the LDSV (GMM-system) estimates suggest that the occurrence of a debt crisis, which is not preceded or followed by another type of financial crisis, reduces contemporaneous output by about 5.3 (4.5) percent.

Alternative Debt Crises Episodes

To check for the robustness of our results Equation (1) has been re-estimated using the alternative datasets described in Section 2. The results obtained using both the LSDV and the GMM-system estimator for the full specification of Equation (1) are reported in Table 6a and 6b. Looking at the results, it is possible to observe that there is robust empirical evidence that debt crises have a significant and negative effect on contemporaneous growth. However, the magnitude of the point estimates varies between datasets and estimators. The smallest effect (2 percent) is obtained for the episodes identified by Detragiache and Spillimbergo (2000) using the two-step GMM-system estimator. The largest effect (10 percent) is found for the episodes identified by Levy-Yeyati and Panizza (2010) using the two-step GMM-system estimator. As discussed in section 2, these datasets mainly differ for the composition of the countries for which a debt crisis is attributed, rather than the dating of the crisis itself, therefore it is likely that the different estimates simply reflect the heterogeneous response of countries to the debt crises and the different severity of the crises. These differences are, however, not statistically significant.

4.2 Long-term

Baseline

The results from estimating the medium-long term impact of debt crises on output growth using Equation (2) are presented in Figure 1. The figure suggests that debt crises have long-

lasting effects on output growth, reducing output even 8 years after the occurrence of the crisis. In particular, the estimates obtained using both the LSDV and the GMM-system estimator suggest that 8 years after the occurrence of a debt crisis output contracts by about 6 percent.

To check for the robustness of our results, Equation (2) has been re-estimated by alternatively including a common and a country-specific time trend. The results using these different controls remain statistically significant and broadly unchanged.

As an additional robustness test the medium and long-term impact of debt crises on output has been estimated using an alternative empirical methodology. The approach consists of estimating an ARDL (4, 4) equation and to derive the relative impulse response functions[10]:

$$\Delta y_{it} = a_i + \sum_{j=1}^{4} \gamma_j \Delta y_{i,t-j} + \sum_{j=0}^{4} \beta_j D_{i,t-j} + \varepsilon_{it} \qquad (4)$$

The impulse response functions (IRFs) are obtained by simulating a one year crisis and by computing the response of output over time trough the estimated coefficients. In particular, the simultaneous response will be β_0, the one-ahead cumulative response will be $\delta_0 + (\beta_1 + \gamma_1\beta_0)$, and so on[11]. Then, 95-percent level confidence bands are derived using Monte-Carlo simulations using one thousand of trials. The results obtained by estimating Equation (4) are presented in Figure 3. Looking at the figure, it is immediately evident that the results obtained with this methodology are consistent with the baseline results. In particular, the figure confirms that debt crises have long-lasting effect on output: 8 years after the occurrence of a debt crises output contracts by about 9 percent.

[10] The approach was initially proposed by Romer and Romer (1989) and then recently applied by Cerra and Saxena (2008), Furceri and Mourougane (2009) and Furceri and Zdzienicka (2010a) to assess the long-term impact of banking crises on economic activity.

[11] It is worth to stress that the IRFs derived using this approach may be sensible to the choice of the number of lags, making thus the IRFs less stable. In addition, as pointed out by Cai and Den Haan (2009), the significance of long-lasting effects on output with ARDL models can be simply driven by the use of *one-type of shock* models.

Debt vs. Currency and Banking

The short-term analysis has pointed out that the effect of debt crises on output seems to be larger of the effect of currency and banking crises. To assess whether this finding is confirmed also in the long-run a modified version of Equation (2) has been estimated:

$$y_{i,t+k} - y_{i,t} = \alpha_i^k + b_t^k + \sum_{j=1}^{l} \gamma_j^k \Delta y_{i,t-j} + \beta_{1k} D_{i,t}^D + \beta_{2k} D_{i,t}^B + \beta_{3k} D_{i,t}^B + \varepsilon_{i,t}^k \quad (5)$$

where $D_{i,t}^D, D_{i,t}^C,$ and $D_{i,t}^B$ refer, respectively, to debt, currency and banking crises.

The results of estimating Equation (5) are presented in Figure 4. The figure contains three panels, one for each type of financial crisis. Looking at the figure, it is immediately evident that debt crises are not only the most detrimental in the short-run but also in the long-term. In particular, while 8 years after the occurrence of a debt crises output contracts by about 7 percent, the long-term effect is not statistically significant for the other two types of crises. Between currency and banking crises, the latter seems to have more persistent effects. In addition, when banking and currency crises are assessed separately as in Equation (1), the results (not reported for brevity) suggest that while 8 years after the occurrence of a banking crisis the effect on output is sizeable (4 percent) and statistically significant, the effect of currency crises is almost null and statistically insignificant.

As a robustness test, the analysis has been restricted to those episodes of debt crises in which neither a banking nor a currency crisis occurred in the 9 years before, during, or after the onset of a debt crisis. The results of this empirical exercise are presented in Figure 5 and confirm that debt crises have a long-lasting effect on output, even though the effect is larger than the baseline results. In particular, 8 years after the occurrence of a debt crisis, which is not preceded or followed by another type of financial crisis, output decreases by about 12 percent.

4. Conclusions and Issues for Future Research

The paper analyzes the short and long-run effects of debt crises on output. In the short-term, the (baseline) results suggest that debt crises are very damaging, reducing contemporaneous output by 3-5 percent. The results are robust to the estimation procedures used (LDSV and GMM-system estimator) and to different specifications. The range of estimates of the effect of debt crises on output becomes larger (3-10 percent) when different datasets of episodes of debt crises are analyzed. Since these datasets mainly differ for the composition of the countries for which a debt crisis is attributed, rather than the dating of the crisis itself, it is likely that the different estimates simply reflect the heterogeneous response of countries to the debt crises, and the different severity of the crises.

When compared to banking and currency crises, debt crises results to be more damaging in reducing contemporaneous output growth. In particular, the range of estimates across the different specifications suggest that the occurrence of a debt crises reduces output by about 5.0 percent, the occurrence of a currency crisis is associated with a reduction in output of about 2.8 percent, and the occurrence of a banking crisis is found to lower output by about 2.0 percent. The occurrence of a triple crisis (debt, currency and banking crisis) is associated with a contemporaneous output loss of about 10 percent. At the same time, the results suggest that the occurrence of a twin or triple crisis does not appear to contribute to the additional (marginal) negative impact on output above and beyond the combined effect of the two or three types of crises.

The medium-long term analysis confirms the disruptive effect of debt crises. In particular, debt crises are associated with protracted output losses. 8 years after the occurrence of a debt crisis, output contracts by more than 6 percent. The statistically significance of the result

is also robust to the estimation procedures used (LDSV and GMM-system estimator) and to different specifications. These are large estimates and should alarm policy makers about the risk of possible future debt crises.

Our study suggests that a number of interesting extensions can be pursued. First, it would be useful to empirically examine in detail the transmission mechanism trough which debt crises affect output. This analysis would be also useful to explain the heterogeneity in the response of output to debt crises across countries.

An additional promising direction would be to investigate whether output is negatively affected not only by the occurrence of a debt crisis, but also when public (total and foreign) debt exceeds a particular threshold. A first work in this direction is Reinhart and Rogoff (2010). The authors, analyzing a multi-country historical large dataset on central government debt as well as data on external (public and private) debt, present descriptive evidence showing that when the gross public debt-to-GDP ratio exceeds 90 percent, median growth rates fall by one percent. Similarly, when external debt reaches 60 percent of GDP annual growth declines by about two percent.

A possible way to empirically test the Reinhart and Rogoff's prediction is to estimate a model specification similar to Equation (1), in which a dummy variable is constructed as taking a value equal to 1 if the debt-to-GDP (foreign debt-to-GDP) ratio exceeds 90 (60) percent and 0 otherwise. The results obtained estimating this specification using both LSDV and GMM-system estimator are reported in Table 7. The results seem to validate Reinhart and Rogoff's prediction, although not in terms of the magnitude of the effects. In particular, when the debt-to-GP ratio (foreign debt-to-GDP) exceeds 90 (60) percent, output starts to contracts by about 0.6-0.7 percent. However, although the results validate their prediction it would be interesting to assess

whether growth starts to decrease when different thresholds of the debt-to-GDP and of the foreign debt-to-GDP ratio are exceeded. Some recent works (Kumar and Woo, 2010; Checherita and Rother, 2010; and Carner et al. 2010) try to address this issue but further works in assessing non linearity also in a non-parametric framework would be extremely relevant in the current scenario in which public debts are expected to rise for several years for many developed and developing countries.

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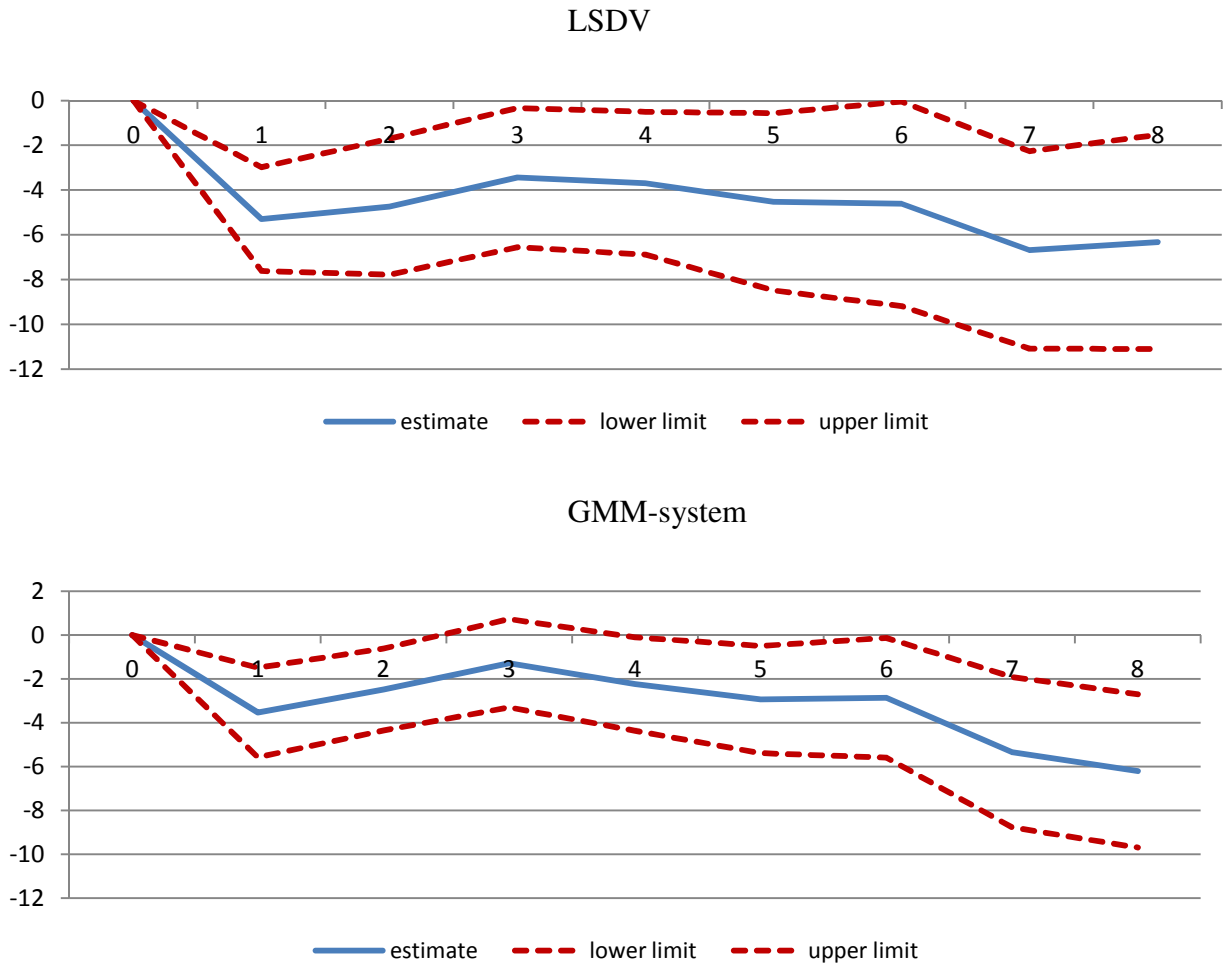
Figure 1. The effect of debt crises on output-baseline



Note: dotted lines represent 95% confidence bands.

Figure 2. The effect of debt crises on output-baseline (LDSV)

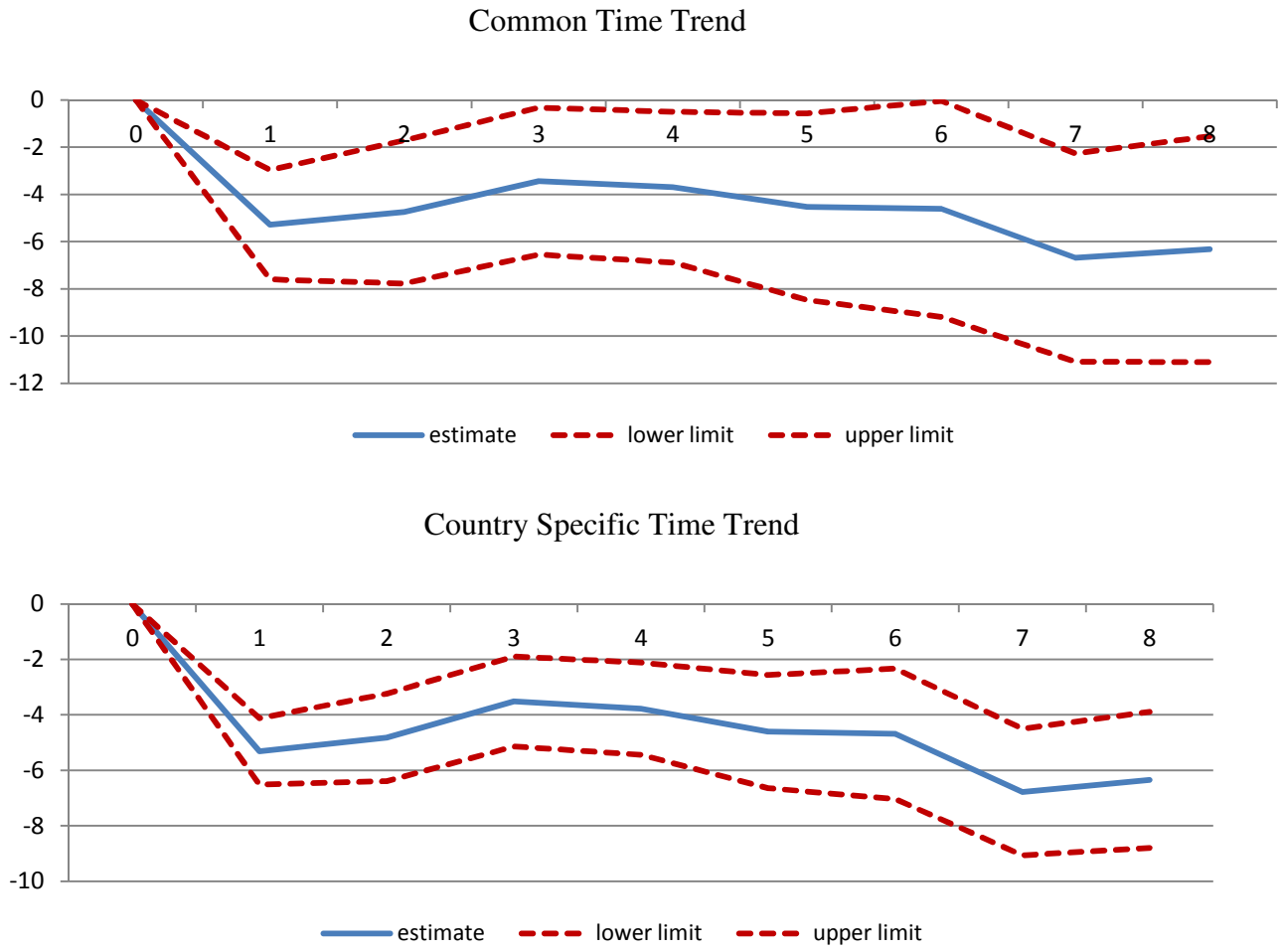
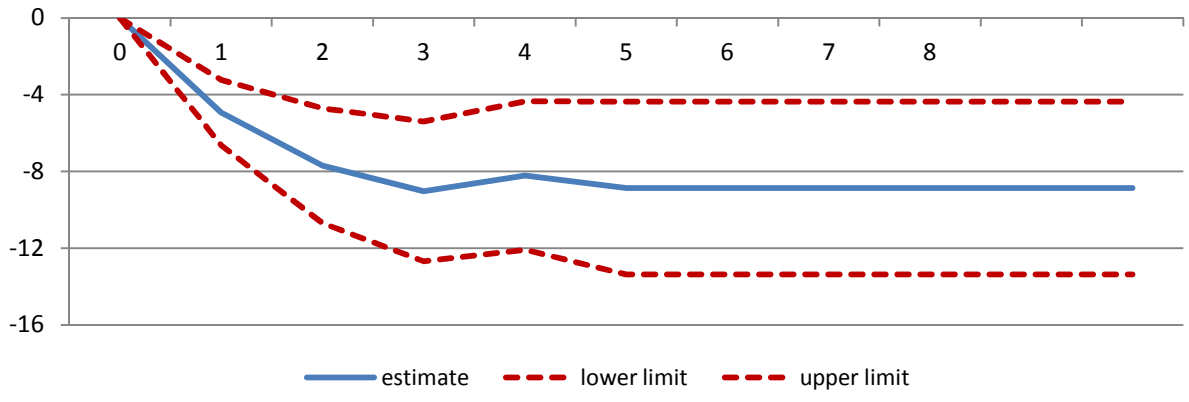
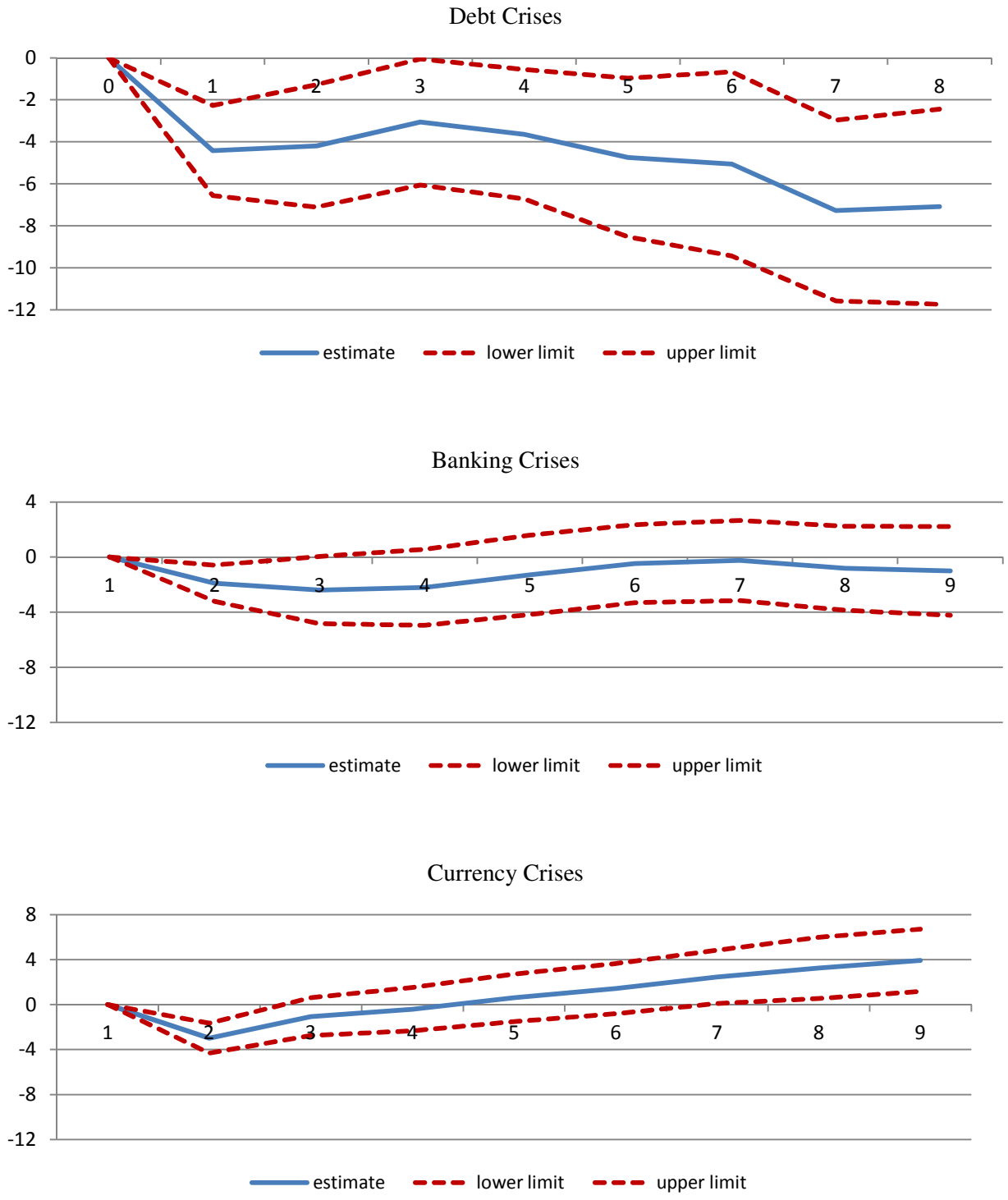


Figure 3. The effect of debt crises on output-alternative approach (ARDL4,4)-LSDV



Note: dotted lines represent 95% confidence bands.

Figure 4. The effect of debt crises vs. banking vs. currency



Note: dotted lines represent 95% confidence bands.

Figure 5. The effect of debt crises- no other crises in the 9 years period

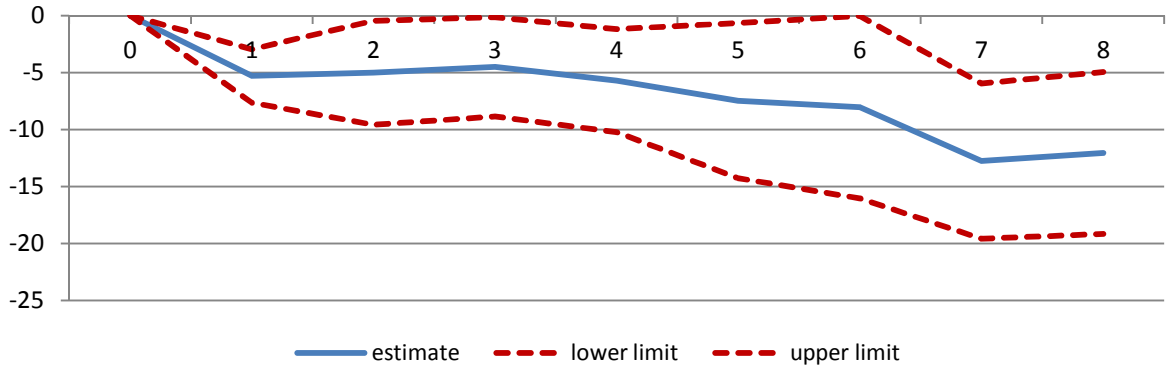


Table 1. Debt Crises Episodes-LV

Country	Debt Crisis (Starting Date)	Country	Deb Debt Crisis (Starting Date)
Albania	1990	Madagascar	1981
Angola	1988	Malawi	1982
Argentina	1982	Mexico	1982
Argentina	2001	Moldova	2002
Bolivia	1980	Morocco	1983
Brazil	1983	Mozambique	1984
Bulgaria	1990	Nicaragua	1980
Cameroon	1989	Niger	1983
Chile	1983	Nigeria	1983
Congo, Dem. Rep. of	1976	Panama	1983
Congo, Rep. of	1986	Paraguay	1982
Costa Rica	1981	Peru	1978
Côte d'Ivoire	1984	Philippines	1983
Côte d'Ivoire	2001	Poland	1981
Dominica	2002	Romania	1982
Dominican Republic	1982	Russia	1998
Dominican Republic	2003	Senegal	1981
Ecuador	1982	Sierra Leone	1977
Ecuador	1999	South Africa	1985
Egypt	1984	Sudan	1979
Gabon	1986	Tanzania	1984
Gabon	2002	Togo	1979
Gambia, The	1986	Trinidad and Tobago	1989
Grenada	2004	Turkey	1978
Guinea	1985	Uganda	1981
Guyana	1982	Ukraine	1998
Honduras	1981	Uruguay	1983
Indonesia	1999	Uruguay	2002
Iran, I.R. of	1992	Venezuela	1982
Jamaica	1978	Vietnam	1985
Jordan	1989	Zambia	1983
Liberia	1980		

Source: Leaven and Valencia (2008).

Table 2a. Alternative Debt Crises Episodes

DHS				RRS	
1st		2nd			
Country	Date	Country	Date	Country	Date
Albania	1991	Argentina	1983	Albania	1990
Algeria	1994	Bolivia	1982	Argentina	1982
Argentina	1983	Brazil	1983	Bolivia	1980
Bolivia	1982	Bulgaria	1991	Brazil	1983
Brazil	1983	Cameroon	1983	Bulgaria	1990
Bulgaria	1991	Congo, Dem. Rep. of	1970	Chile	1972
Cameroon	1983	Congo, Dem. Rep. of	1985	Costa Rica	1981
Chile	1983	Costa Rica	1981	Dominican Republic	1982
Congo, Dem. Rep.	1970	Costa Rica	1986	Ecuador	1982
Congo, Dem. Rep.	1985	Cote d'Ivoire	1987	Ecuador	1999
Costa Rica	1981	Dominican Republic	1984	Egypt, Arab Rep.	1984
Costa Rica	1986	Ecuador	1987	Guyana	1982
Cote d'Ivoire	1987	Georgia	1994	Honduras	1981
Dominican, Rep.	1984	Grenada	1987	Iran, I.R. Of	1992
Ecuador	1987	Guatemala	1985	Jamaica	1978
Georgia	1994	Guyana	1979	Jordan	1989
Grenada	1987	Haiti	1983	Mexico	1982
Guatemala	1985	Indonesia	1998	Morocco	1983
Guyana	1979	Jordan	1989	Panama	1983
Haiti	1983	Nicaragua	1978	Peru	1978
Indonesia	1998	Nicaragua	1985	Peru	1984
Jordan	1989	Nigeria	1987	Philippines	1983
Mexico	1982	Panama	1987	Poland	1981
Morocco	1983	Paraguay	1983	Romania	1982
Nicaragua	1978	Peru	1983	Russia	1991
Nicaragua	1985	Russia	1990	Russia	1998
Nigeria	1987	Sri Lanka	1990	Trinidad	1989
Panama	1987	Syrian Arab Rep.	1986	Turkey	1978
Paraguay	1983	Togo	1978	Uruguay	1983
Peru	1983	Togo	1991	Venezuela	1982
Philippines	1984	Venezuela, RB	1984	Venezuela	1995
Russia	1990	Zambia	1981		
Sri Lanka	1990				
Syrian Arab Rep.	1986				
Togo	1978				
Togo	1991				
Trinidad &Tobago	1989				
Venezuela,	1984				
Zambia	1981				

Source: De Paoli, Hoggarth and Saporta (2009), Reinhart, Rogoff and Savastano (2003).

Table 2b. Alternative Debt Crises Episodes

DS				LP	
Country	**Date**	**Country**	**Date**	**Country**	**Date**
Algeria	1991	Nigeria	1986	Argentina	1982
Argentina	1983	Panama	1987	Argentina	2001
Bangladesh	1978	Paraguay	1984	Chile	1983
Bangladesh	1991	Peru	1983	Dominican Republic	1982
Brazil	1983	Philippines	1984	Dominican Republic	1999
Burkina	1982	Senegal	1984	Ecuador	1999
Burundi	1986	Senegal	1989	Indonesia	1998
Cameroon	1979	Sierra Leone	1972	Mexico	1982
Cameroon	1985	Sri Lanka	1992	Nigeria	1983
Chile	1973	Sudan	1976	Nigeria	1986
Chile	1983	Thailand	1998	Pakistan	1997
Colombia	1985	Trinidad and Tobago	1988	Peru	1980
Congo, Dem. Rep.	1975	Tunisia	1991	Peru	1983
Costa Rica	1981	Venezuela,	1984	Philippines	1983
Cote d'Ivoire	1987	Zambia	1978	Russia	1991
Dominican, Rep.	1976			Russia	1998
Dominican, Rep.	1982			South Africa	1985
Ecuador	1983			South Africa	1989
Egypt, Arab Rep.	1986			Ukraine	1998
El Salvador	1984			Uruguay	1990
El Salvador	1995			Uruguay	2003
Ethiopia	1987				
Guatemala	1985				
Haiti	1983				
Honduras	1976				
Honduras	1983				
Indonesia	1998				
Jordan	1989				
Kenya	1990				
Korea, Rep.	1998				
Lesotho	1990				
Madagascar	1990				
Malawi	1982				
Malawi	1987				
Mexico	1982				
Morocco	1985				
Nicaragua	1978				
Niger	1984				
Nigeria	1972				

Source: Detragiache and Spillimbergo (2000), Levy-Yeyati and Panizza (2010).

Table 3. Descriptive statistics

Datasets	N. Crises	Debt over GDP (%)				Foreign debt over GDP (%)				GDP Growth (%)			
		Average	Max	Min	S.D.	Average	Max	Min	S.D.	Average	Max	Min	S.D.
LV	63	78.3	119.4	34.4	25.5	55.9	86.3	26.5	19.6	-2.1	7.5	-14.4	5.1
DHS_1	39	111.9	166.6	81.0	37.6	59.7	95.9	7.6	32.7	-2.5	10.6	-32.1	7.7
DHS_2	32	93.7	103.9	81.0	11.6	73.7	95.9	54.7	20.7	-1.6	10.6	-14.4	6.5
RRS	31	68.6	85.2	47.4	19.3	53.0	65.4	39.4	13.0	-2.2	5.9	-14.4	5.4
DS	54	63.8	142.0	10.8	39.7	41.0	70.6	6.0	23.3	0.7	15.4	-14.4	6.4
LY	21	64.5	96.6	21.0	26.1	46.7	78.4	21.0	20.9	-2.2	6.5	-14.1	5.3
Average		80.1				55.0				-1.6			

LV= Laeven and Valencia (2008); DHS_1= first measure reported in De Paoli et al. (2006); DHS_1= second measure reported in De Paoli et al. (2009); RRS= Reinhart et al. (2003); DS=Detragiache and Spillimbergo (2000); LP=Levy-Yeyati and Panizza (2010).

Table 4. Output Growth and Debt Crises

	(I) FE	(II) FE	(III) FE	(IV) GMM[a]	(V) GMM[a]	(VI) GMM[b]
Real GDP growth $_{t-1}$	0.056 (0.97)	0.216 (6.07)***	0.212 (5.92)***	0.261 (2.54)**	0.325 (5.57)***	0.334 (5.92)***
Real GDP growth $_{t-2}$	0.000 (0.01)	0.009 (0.30)	-0.015 (-0.53)	0.005 (0.65)	-0.020 (-0.51)	-0.028 (-0.73)
Debt Crises $_{t}$	-5.291 (-4.48)***	-3.405 (-4.05)***	-3.724 (-4.01)***	-3.534 (-3.39)***	-3.232 (-3.31)***	-4.817 (-2.56)***
Openness $_{t}$	-	1.001 (1.76)*	0.980 (1.68)*	-	0.466 (1.97)**	0.423 (1.77)*
Population growth $_{t}$	-	0.293 (1.45)	0.175 (0.89)	-	-0.008 (-0.10)	0.004 (0.04)
Credit Growth $_{t}$	-	-0.009 (-1.85)*	-	-	-0.009 (-1.06)	-0.007 (-0.86)
Real GDP$_{t-1}$ (log)	-	-7.016 (-9.43)***	-6.933 (-8.70)***	-	-0.071 (-1.53)	-0.072 (-1.60)*
Credit Growth $_{t-1}$	-	-	0.006 (1.46)	-	-	
Real Exchange Rate Growth $_{t}$	-	-0.001 (-2.24)**	-	-	-0.001 (-2.13)**	-0.001 (-2.19)**
Real Exchange Rate Growth $_{t-1}$	-	-	-0.001 (-1.33)	-	-	-
N	6398	2526	2526	6398	2526	2526
Adjusted R^2	0.04	0.25	0.26	-	-	-

Note: t-statistics in parenthesis. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Time dummies included but not reported.
FE= Least Square Dummy Variable estimator- Robust standard errors.
GMM=GMM-System Estimator: Two step using Windmeijer standard errors, Openness , lagged Real GDP, population growth and time dummies considered as predetermined, other control variables considered as endogenous (instrumented using 2 lags). Hansen test of over-identification restrictions always accepts the null hypothesis.
[a] Debt crises considered as predetermined.
[b] Debt crises considered as endogenous (instrumented using 2 lags).

Table 5. Output Growth and Financial Crises: Debt vs. Banking and Currency

	(I) FE	(II) FE	(III) FE	(IV) FE	(V) GMM[a]	(VI) GMM[b]	(VII) FE-only debt crises	(VIII) GMM[b]-only debt crises
Real GDP growth $_{t-1}$	0.055 (0.96)	0.056 (0.96)	0.056 (0.96)	0.055 (0.96)	0.248 (2.50)**	0.071 (1.37)	0.056 (0.97)	0.250 (2.51)**
Real GDP growth $_{t-2}$	-0.001 (-0.03)	-0.000 (-0.01)	-0.000 (-0.01)	-0.001 (-0.05)	0.003 (0.50)	0.011 (0.81)	-0.001 (-0.02)	0.004 (0.54)
Debt Crises $_t$	-4.417 (-4.04)***	-4.4284 (-4.04)***	-5.888 (-3.81)***	-5.319 (-4.14)***	-4.533 (-3.03)***	-5.700 (-2.87)***	-5.310 (-4.13)***	-4.501 (-3.00)***
Banking $_t$	-1.898 (-2.84)***	-1.886 (-2.84)***	-	-1.707 (-2.87)***	-1.839 (-2.75)***	-2.526 (-4.05)***	-2.209 (-3.12)**	-1.901 (-2.79)**
Currency $_t$	-2.984 (-4.38)***	-	-3.130 (-4.47)***	-2.501 (-3.55)***	-2.366 (-3.38)***	-2.876 (-4.38)***	-3.297 (-4.75)***	-3.167 (-4.89)***
Debt Crises $_t$ * Banking $_t$	-	-2.532 (-0.80)	-	-1.062 (-0.42)	1.066 (0.45)	1.183 (0.52)	-	-
Debt Crises $_t$ * Currency $_t$	-	-	2.304 (1.54)	5.589 (0.79)	0.378 (0.07)	2.685 (0.58)	-	-
Currency $_t$ * Banking $_t$	-	-	-	-1.940 (-1.06)	-2.755 (-1.59)*	-2.664 (-1.51)	-	-
Debt Crises $_t$ * Banking $_t$ * Currency	-	-	-	-2.736 (-0.37)	2.592 (0.45)	-0.637 (-0.11)		

Note: t-statistics in parenthesis. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Time dummies included but not reported.
FE= Least Square Dummy Variable estimator- Robust standard errors.
GMM=GMM-System Estimator: Two step using Windmeijer standard errors. Time dummies considered as predetermined, other control variables considered as endogenous (instrumented using 2 lags). Hansen test of over-identification restrictions always accepts the null hypothesis.
[a] Crises considered as predetermined.
[b] Crises considered as endogenous (instrumented using 2 lags).

Table 6a. Output Growth and Debt Crises- Alternative Crises Episodes: DHS & RRS

	(I) DHS-1st-FE	(II) DHS-1st-GMM[b]	(III) DHS-2nd -FE	(IV) DHS-2nd-GMM[b]	(III) RRS-FE	(IV) RRS-GMM[b]
Real GDP growth $_{t-1}$	0.215 (5.87)***	0.337 (6.18)***	0.217 (5.82)***	0.341 (5.81)***	0.218 (5.99)***	0.343 (6.10)***
Real GDP growth $_{t-2}$	-0.013 (-0.44)	-0.020 (-0.54)	-0.014 (-0.47)	-0.024 (-0.62)	-0.015 (-0.52)	-0.037 (-0.98)
Debt Crises $_{t}$	-4.142 (-3.08)***	-9.281 (-2.55)***	-4.205 (-2.20)**	-7.44 (-2.06)**	-4.134 (-2.90)***	-9.646 (-2.36)**
Openness $_{t}$	0.981 (1.70)*	0.416 (1.73)*	1.017 (1.78)*	0.453 (1.93)*	1.022 (1.76)*	0.412 (1.85)*
Population growth $_{t}$	0.177 (0.90)	0.030 (0.36)	0.169 (0.86)	0.011 (0.13)	0.169 (0.86)	0.020 (0.23)
Credit Growth $_{t}$	-	-0.011 (-1.19)	-	-0.011 (-1.20)	-	-0.009 (-1.32)
Real GDP$_{t-1}$ (log)	-6.952 (-8.75)***	-0.064 (-1.43)	-6.970 (-8.72)***	-0.063 (-1.42)	-6.975 (-8.71)***	-0.059 (-1.32)
Credit Growth $_{t-1}$	0.004 (1.10)	-	0.006 (1.32)	-	0.006 (1.33)	-
Real Exchange Rate Growth $_{t}$	-	-0.001 (-2.12)**	-	-0.001 (-2.09)**	-	-0.001 (-2.19)**
Real Exchange Rate Growth $_{t-1}$	-0.001 (-1.60)*	-	-0.001 (-1.38)	-	-0.001 (-1.35)	-

Note: t-statistics in parenthesis. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Time dummies included but not reported.
FE= Least Square Dummy Variable estimator- Robust standard errors.
GMM=GMM-System Estimator: Two step using Windmeijer standard errors, Openness , lagged Real GDP, population growth and time dummies considered as predetermined, other control variables considered as endogenous (instrumented using 2 lags). Hansen test of over-identification restrictions always accepts the null hypothesis.
[a] Debt crises considered as predetermined.
[b] Debt crises considered as endogenous (instrumented using 2 lags).

Table 6b. Output Growth and Debt Crises- Alternative Crises Episodes: DHS & RRS

	(I) DS-FE	(II) DS--GMM[b]	(III) LP-FE	(IV) LP-GMM[b]
Real GDP growth $_{t-1}$	0.216 (5.84)***	0.339 (5.80)***	0.216 (5.86)***	0.347 (6.33)***
Real GDP growth $_{t-2}$	-0.015 (-0.50)	-0.025 (-0.66)	-0.016 (-0.55)	-0.028 (-0.72)
Debt Crises $_{t}$	-2.171 (-1.98)**	-2.003 (-1.87)*	-3.914 (-2.49)**	-10.559 (-2.00)**
Openness $_{t}$	1.072 (1.76)*	0.438 (1.76)*	0.973 (1.65)*	0.420 (1.75)*
Population growth $_{t}$	0.183 (0.96)	-0.005 (-0.06)	0.175 (0.88)	-0.004 (-0.05)
Credit Growth $_{t}$	-	-0.012 (-1.20)	-	-0.010 (-1.14)
Real GDP$_{t-1}$ (log)	-6.943 (-8.71)***	-0.068 (-1.44)	-7.013 (-8.73)***	-0.055 (-1.18
Credit Growth $_{t-1}$	0.006 (1.34)	-	0.006 (1.39)	-
Real Exchange Rate Growth $_{t}$	-	-0.001 (-2.14)**	-	-0.001 (-2.10**
Real Exchange Rate Growth $_{t-1}$	-0.001 (-1.40)	-	-0.001 (-1.36)	-

Note: t-statistics in parenthesis. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Time dummies included but not reported.
FE= Least Square Dummy Variable estimator- Robust standard errors.
GMM=GMM-System Estimator: Two step using Windmeijer standard errors, Openness , lagged Real GDP, population growth and time dummies considered as predetermined, other control variables considered as endogenous (instrumented using 2 lags). Hansen test of over-identification restrictions always accepts the null hypothesis.
[a] Debt crises considered as predetermined.
[b] Debt crises considered as endogenous (instrumented using 2 lags).

Table 7. Output Growth and Debt-GDP Exceeding 90 %

	Debt-to-GDP ratio			Foreign Debt-to-GDP ratio		
	(I) FE	(II) GMM[a]	(III) GMM[b]	(IV) FE	(V) GMM[a]	(VI) GMM[b]
Real GDP growth $_{t-1}$	0.219 (5.93)***	0.329 (5.63)***	0.318 (5.64)***	0.195 (4.31)***	0.312 (4.39)***	0.289 (4.53)***
Real GDP growth $_{t-2}$	-0.015 (-0.52)	-0.029 (-0.77)	-0.022 (-0.55)	0.002 (0.07)	-0.013 (-0.29)	-0.008 (-0.17)
Debt Crises $_{t}$	-0.575 (-1.81)*	-0.673 (-3.51)***	-0.708 (-3.19)***	-0.760 (-1.73)*	-0.860 (-1.85)*	-0.705 (-0.90)
Openness $_{t}$	0.909 (1.53)	0.394 (1.72)*	0.394 (1.72)*	0.671 (1.08)	0.413 (1.24)	0.465 (1.41)
Population growth $_{t}$	0.164 (0.89)	0.038 (0.46)	0.040 (0.49)	0.242 (0.83)	-0.016 (-0.16)	0.040 (0.49)
Credit Growth $_{t}$	-	-0.011 (-1.25)	-0.012 (-1.45)	-	-0.014 (-0.96)	-0.011 (-0.76)
Real GDP$_{t-1}$ (log)	-7.239 (-9.17)***	-0.908 (-1.97)**	-0.906 (-1.96)**	-13.165 (-8.01)***	-0.127 (-1.86)*	-0.109 (-1.51)
Credit Growth $_{t-1}$	0.005 (1.26)	-	-	0.011 (1.39)	-	-
Real Exchange Rate Growth $_{t}$	-	-0.001 (-2.08)**	-0.001 (-2.19)**	-	-0.000 (-0.94)	-0.000 (-1.03)
Real Exchange Rate Growth $_{t-1}$	-0.001 (-1.28)		-	0.00 (0.48)		-

Note: t-statistics in parenthesis. ***,**,* denote significance at 1%, 5%, and 10%, respectively. Time dummies included but not reported.
FE= Least Square Dummy Variable estimator- Robust standard errors.
GMM=GMM-System Estimator: Two step using Windmeijer standard errors, Openness , lagged Real GDP, population growth and time dummies considered as predetermined, other control variables considered as endogenous (instrumented using 2 lags). Hansen test of over-identification restrictions always accepts the null hypothesis.
[a] Debt crises considered as predetermined.
[b] Debt crises considered as endogenous (instrumented using 2 lags). Hansen test of over-identification restrictions always accepts the null hypothesis.