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The Unexplained Part of Public Debt

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Abstract[1]

This paper shows that budget deficits account for a relatively small fraction of debt growth and that stock-flow reconciliation, which is often considered a residual entity, is one of the key determinants of debt dynamics. After having explained the importance of the stock-flow reconciliation, the paper shows that this residual entity can be partly explained by contingent liabilities and balance-sheet effects.

Keywords: Public Debt, Deficit, Balance-Sheet Effects
JEL Codes: H63, F34, C82

[1] The views expressed in this paper are the authors and do not necessarily reflect those of the Inter-American Development Bank. The usual caveats apply. Camila Campos: camila.campos@yale.edu, Dany Jaimovich: danyj@contractual.iadb.org, Ugo Panizza: ugop@iadb.org.

1. Introduction

How do countries get into debt? The answer to this question may seem trivial. Countries accumulate debt whenever they run a budget deficit (i.e., whenever public expenditure is higher than revenues). In fact, the standard Economics 101 debt accumulation equation states that the change in the stock of debt is equal to the budget deficit:

$$DEBT_t - DEBT_{t-1} = DEFICIT_t \qquad (1)$$

and that the stock of debt is equal to the sum of past budget deficits: $DEBT_t = \sum_{i=0}^{t} DEFICIT_{t-i}$.

Whoever has worked with actual debt and deficit data knows that Equation (1) rarely holds and that debt accumulation can be better described as:

$$DEBT_t - DEBT_{t-1} = DEFICIT_t + SF_t \qquad (2)$$

where SF_t is what is usually called "stock-flow reconciliation." Clearly, Equation (1) is a good approximation of debt accumulation only if one assumes that SF_t is not very large. The purpose of this paper is to describe some of SF_t's main characteristics. The paper shows that, contrary to what is usually assumed, the budget deficit accounts for a small fraction of the within-country variance of the change in debt over GDP and that stock-flow reconciliation plays an important role in explaining debt dynamics. The paper also shows that, on average, SF_t tends to be positive and that there are large cross-country differences in the magnitude of this residual entity. This suggests that the magnitude of stock-flow reconciliation is not likely to be purely due to random measurement error. In particular, the paper shows that the problem is especially serious in developing countries and, among this group of countries, the difference between debt and deficit is particularly large in Latin America and Sub-Saharan Africa.

The paper also runs a set of regressions aimed at explaining the main determinants of the magnitude of the stock-flow reconciliation and finds that balance-sheet effects due to real depreciations and contingent liabilities that arise at time of banking crises are strongly correlated with the difference between deficit and change in debt. However, the paper also shows that the regressions can only explain 20 percent of the within-country variance of the stock-flow

reconciliation and that there is still much that we do not understand about one of the main determinants of debt accumulation.

While we are not the first to show that stock-flow reconciliation is an important part of debt dynamic (see, among others IMF, 2003; Martner and Tromben, 2004; European Commission, 2005; Budina and Fiess, 2005), we are not aware of any other paper that systematically describes the main characteristics of this residual, but extremely important, determinant of debt accumulation.

The rest of the paper is organized as follows. Section 2 describes our main sources of data and presents some basic facts on public debt and deficit. Section 3 focuses on a detailed description of the stock-flow reconciliation. Section 4 runs a set of regressions aimed at explaining the main determinants of the stock flow reconciliation. Section 5 concludes.

2. Data

The purpose of this section is to describe our data on fiscal deficit and public debt. In this context, it is worth mentioning that obtaining reliable and comparable data on the stock public debt is a rather difficult exercise. In fact, the IMF International Financial Statistics (IFS) and IMF Government Finance Statistics (GFS), which are the most common sources of cross-country data on government statistics, report data for a rather limited set of countries. This is even the case for industrial countries; these sources do not report recent data on public debt for Japan and Italy, for example. Furthermore, most cross-country datasets do not make an effort to make the data comparable across countries (for a discussion of these issues, see IMF, 2003).[2]

Although there are now some papers that attempt to build comparable cross-country data-sets on public debt (Cowan et al., 2005; Jeanne and Guscina, 2006; IMF, 2003; Budina and Fiess, 2005), some of these data sets are not publicly available and all of them have a limited country and time coverage. As a consequence, we do not rely on these new data and only use publicly available sources (hence, the caveats mentioned above should be kept in mind). In particular, we start with IFS and GFS and supplement them with data collected from national sources (mostly from the websites or publications of the various Ministries of Finance), the UN Economic Commission for Latin America and Caribbean (ECLAC, see Martner and Tromben, 2004), and the Organization for Economic Cooperation and Development (OECD).

[2] The most important problems include the treatment of sub-national governments and the use of gross versus net debt (for a methodological note, see Cowan et al., 2005).

Using these various sources, we assemble an unbalanced panel covering 117 countries and consisting of approximately 1,900 observations. Table A1 in the Appendix lists all the countries included in our dataset, the time coverage for each country, and summary statistics for debt and deficit ratios. Our sample includes 24 high-income countries, 59 middle-income countries and 34 low-income countries. The regions with the largest number of countries are Sub-Saharan Africa (27 countries) and Latin America (25 countries). South Asia and East Asia are the regions with the smallest number of countries (five and eight countries, respectively). While long time series are available for some countries (e.g., Bahamas, Burundi, Costa Rica, Iceland, Norway and the US have more than 30 years of data), for others there are very few observations (Albania, Algeria, Gabon, Sudan, Togo, and Yemen are among the countries with less than five years of data).

Table 1 shows that the sample mean of the deficit to GDP ratio is 4.04 percent and that average deficit tends to decrease with the level of income. The region with the highest average deficit is South Asia (6.5 percent), followed by the Middle East (5.6 percent), and Sub-Saharan Africa (4.2 percent). Latin American countries tend to have fairly low levels of average deficit (just below the cross-country average) but the region is far from being homogeneous and is characterized by the largest variance in the sample.

Table 2 reports summary statistics for the debt-to-GDP ratio and shows that the cross-country average is close to 56 percent. South Asia and Sub-Saharan Africa are the regions with the highest levels of debt (67 and 60 percent, respectively) and East Asia and Eastern Europe and Central Asia are the regions with the lowest level of debt (35 and 37 percent, respectively). Latin America has a level of debt that is just below the sample average and is not much higher than that of the industrial countries included in our sample. Again, we find that Latin America is one of the most heterogeneous regions in our sample (in this case, second only to Sub-Saharan Africa). As one may expect, we find that most of the variance in debt-to-GDP is due to differences across countries (this is the between standard deviation). However, there is also substantial variance within countries. In fact, the within standard deviation (not reported in the table) is often close to 50 percent of the between standard deviation.

Table 3 focuses on the change in debt divided by GDP ($d_{i,t}$).[3] If Equation (1) were to hold, the change in debt should be equal to the budget deficit. By comparing Table 2 with Table 3, we find that the value of $d_{i,t}$ is almost five percentage points higher than average deficit over GDP, indicating that more than 50 percent of the average change in debt is not explained by deficit.[4] The Table also shows that while the difference between $d_{i,t}$ and the deficit is fairly small in industrial countries (about 0.3 percentage points), this difference is extremely large in Latin America and Sub-Saharan Africa, where the average deficit is about one-third the average change in debt.

We can now describe the characteristics of the stock-flow reconciliation by defining the following measure of the difference between change in debt and deficit for country *i* at time *t*.

$$\delta_{i,t} = \frac{\left(DEBT_{i,t} - DEBT_{i,t-1}\right) - DEFICIT_{i,t}}{Y_{i,t}} \times 100 \qquad (3)$$

Clearly, $\delta_{i,t}$ is just the stock-flow reconciliation of Equation (1) expressed in terms of GDP ($\delta_{i,t} = \frac{SF_{i,t}}{Y_{i,t}}$). Table 4 describes $\delta_{i,t}$ and shows that the change in debt is nearly five percentage points higher than the deficit (with the highest values in Latin America and Sub-Saharan Africa). However, the Table also shows that there are several countries with extremely large values of $\delta_{i,t}$ (in some cases well above 200 percent). In Latin America, for instance, the difference between the change in debt and deficit has a range of 350 percentage points (from –73

[3] It is important to note that we do not use the change in the debt-over-GDP ratio (i.e., $\theta_{i,t} = \left(\frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}}\right) \times 100$) but the change in debt divided by GDP at time *t* (i.e., $d_{i,t} = \left(\frac{D_t}{Y_t} - \frac{D_{t-1}}{Y_{t-1}(1+g)}\right) \times 100$). As nominal GDP growth (*g*) tends to be positive, $d_{i,t}$ is usually larger than $\theta_{i,t}$. We use this measure, rather than the standard $\theta_{i,t}$ because we want to isolate changes in debt from changes in the level of GDP.

[4] Using a different methodology and a shorter sample, IMF (2003) also finds similar but less drastic results. In particular, it finds that more than 25 percent of the increase in the debt-to-GDP ratio of a sample of emerging market countries over the 1997-2003 period is due to off balance-sheet factors. In a sample of 21 market-access countries, Budina and Fiess (2005) find that debt over GDP increased by 22.8 percentage points from 1994 to 2002, while real GDP grew by 9.3 percent, yielding a change in debt of approximately 37 percent. The deficit (primary plus interest rate bill) explained about one-third of this change while other factors (including the real exchange rate) explained the remaining two-thirds.

to 281). The industrial countries have the smallest range, but even in this case the range is close to 30 percentage points. These extreme values are due either to exceptional events or measurement error. In the second column of Table 5, the average value of $\delta_{i,t}$ is computed by dropping the top and bottom 2 percent of the distribution. After dropping these outliers, we find that $\delta_{i,t}$ has an average value of 3 percent and that the average values of $\delta_{i,t}$ for Latin America and the Middle East drop from 7 percent to 4 and 2 percent, respectively.

It is also interesting to see which countries tend to have large values of $\delta_{i,t}$. Table 5 summarizes all the episodes for which $\left|\delta_{i,t}\right| > 10$ (a full list of episodes is reported in Tables A2 and A3 in the appendix). There are 238 country-years (corresponding to 13 percent of observations) for which $\delta_{i,t} > 10$, and 50 country-years (3 percent of observations) for which $\delta_{i,t} < -10$. The industrial countries, East Asia, and South Asia are the regions with the lowest number of episodes (and very few episodes where $\delta_{i,t} < -10$). Sub Saharan Africa, the Middle East and North Africa, and Latin America are the regions with the largest number of episodes.

While this paper focuses on change in debt, we obtain the same results if we use the standard decomposition of the change in debt over GDP (θ).[5] Figure 1 shows that in most regions the stock flow adjustment is the main determinant of debt growth and inflation is the main determinant of debt reduction

3. Debt and Deficit

The previous section showed that simple comparisons of average values of deficit over GDP and change in debt indicate that Equation (1) is far from being a good approximation of the main determinants of debt accumulation and that what is usually considered a residual entity (the

[5] The standard decomposition takes the following form:

$$\frac{DEBT_t}{Y_t} - \frac{DEBT_{t-1}}{Y_{t-1}} = \frac{PD_t}{Y_t} + i\frac{DEBT_{t-1}}{Y_{t-1}(1+g)} - (gr+\pi)\frac{DEBT_{t-1}}{Y_{t-1}(1+g)} + \frac{SF_t}{Y_t}$$

where the first term on the RHS of the equation is the contribution of the primary deficit, the second term is the interest bill, the third term is the contribution of nominal growth (which can be split into real growth and inflation) and the last term is the stock-flow adjustment.

stock-flow reconciliation) is a key determinant of debt accumulation. In this section, we use different strategies to provide more evidence in this direction.

3.1 Regressions Analysis

One way to assess the importance of SF_t is to divide debt and deficit by current GDP and use our large panel to estimate the following fixed effects regression:

$$d_{t,i} = \alpha_i + \beta * def_{t,i} + \varepsilon_{t,i} \qquad (4)$$

where α_i is a country fixed effect (the country fixed effects control for the fact that the data come from different sources, countries have different levels of debt, and they use different methodologies for computing debt and deficit) and $def_{t,i}$ is deficit over GDP. If Equation (1) holds, we expect a high R^2 (the regression's R^2 should be 1 if Equation 1 holds exactly), α_i =0, and β =1. Hence, the regression's coefficients and R^2 can be used to asses the relative (un)importance of the deficit in explaining changes in debt. Table 6 reports the results of the estimation of Equation (4) for different sub-samples of countries. Column 1 describes the basic pattern. First of all, we find that β is greater than 1 (but not significantly different from 1) indicating that a 1 percent increase in the deficit to GDP ratio tends to translate into a 1.3 percent increase of the debt to GDP ratio. More interestingly, the regression's R^2 shows that, in our sample of countries, deficits explain less than 8 percent of the within country variance of $d_{t,i}$ and that SF_t explains more than 90 percent of the variance.[6]

As the low R2 could be due to the presence of outliers, in Column 2 we drop 47 outliers (defined as observations that have residuals with an absolute value greater than 2.5 standard deviations). After dropping these outliers, β drops to 1.18, but we still find that our model can only explain 23 percent of the variance of $d_{t,i}$. Figure 2 plots the fit of the regression reported in Column 2 and illustrates that the low R2 is not due to a few episodes with a particularly low fit, but that most countries have observations that are far away from the regression's line. Column 3

[6] We also ran separate regressions for the 58 countries for which there are at least 15 years of data. We found that β had average and median values of approximately 1 and ranged between –1.8 (Zaire) and 5.9 (Rwanda). The regressions' R2 had an average value of 0.32, a median value of 0.25, and ranged between 0.007 (Egypt) and 0.87 (Italy). There are only four countries (all industrial) that have an R2 above 0.8, 16 countries (11 of them industrial) for which the R2 is higher than 0.5, and 18 countries for which the R2 is less than 0.1.

of Table 4 addresses the outlier issues by running the same regression as in Column 1 using a median quantile regression with bootstrapped standard errors (STATA's BSQREG) and shows that in this case, the coefficient of the deficit variable drops to 0.87 and the R2 goes to 0.24.

The remaining columns run separate regressions for different regions of the world. Column 4 focuses on 29 countries located in Sub-Saharan Africa and finds that the deficit explains only 3 percent of the variance of $d_{t,i}$. Columns 5 and 6 show that in Latin America and the Caribbean (25 countries) and South Asia (5 countries), the deficit explains between 5 and 6 percent of the variance of $d_{t,i}$. Columns 7 and 8 focus on East Asia (8 countries) and the Middle East and North Africa (11 countries) and show that the deficit explains between 14 and 20 percent of the within country variance of $d_{t,i}$. The developing region with the best fit is East Europe and Central Asia (Column 9, 15 countries). In this case, the deficit explains 23 percent of the variance of $d_{t,i}$. Only in the sub-group of industrial countries (Column 10, 24 countries) does the deficit explain more than one-quarter of the within country variation of $d_{t,i}$ but even in this case, the regression can only explain half of the variance of the dependent variable.

3.2 Theoretical R2

As an alternative way to describe the pattern documented above, we build a measure aimed at determining which countries have the largest deviation from the theoretical identity $d = def$. Clearly, such a measure cannot be the country average of $\delta_{i,t}$ described in Table 5 because negative and positive values of $\delta_{i,t}$ would compensate each other. One possibility would be to adopt a strategy similar to the one of the previous section and run country-by-country regressions of $\Delta DEBT$ over $DEFICIT$ and use the fit of these regressions (their R2) as a measure of how much a country deviates from $d = def$. One problem with this strategy is that it would not help to differentiate countries that have a good fit in which $d = def$ holds, from countries that have a good fit but where the relationship between debt and deficit can be better described with an equation of the type: $d_t = \alpha + \beta * def_t + \varepsilon_t$ with $\alpha \neq 0$ and $\beta \neq 1$. An index that addresses these problems and relates to a regression's R2 can be defined as:

$$\phi_i = \frac{\sum_{t=1}^{T} (\delta_{i,t})^2}{\sum_{t=1}^{T} (d_{i,t} - \overline{d_i})^2} \qquad (5)$$

Note that ϕ_i is always non-negative and naturally relates to the R2 of a regression of $d_{i,t}$ over *def*. In fact, if we write $d_t = \alpha + \beta * def_t + \varepsilon_t$ and, if instead of estimating the regression's parameter, we force $\alpha = 0$ and $\beta = 1$, the R2 of the model would be 1-ϕ_i. Hence, if the true parameters describing the relationship between debt and deficit were $\alpha = 0$ and $\beta = 1$, ϕ_i would be equal to 0. Thus, higher values of ϕ_i indicate larger deviations of the true parameters from $\alpha = 0$ and $\beta = 1$. Figure 3 illustrates the theoretical distribution of ϕ_i for different values of β under the assumptions that $\alpha = 0$, $\alpha = 10$, and $\alpha = -10$. The figure shows that when $\alpha = 0$ the distribution is asymmetrical with ϕ_i rapidly going towards infinite when β tends to 0, and ϕ_i converging to around 1.5 when β goes to infinite, the figure also shows that ϕ_i is equal to 0 when β =1. When $\alpha = 10$, the distribution becomes monotone but still going to infinite when β goes to 0 and converging to approximately 1.5 when β goes to infinite. When $\alpha = -10$ the distribution reaches a minimum when β is around 4 and then starts increasing and, again, converges at around 1.5.

Figure 4 shows the values of ϕ_i for our sample of countries. Few countries have a value of ϕ_i close to 0 and most countries are concentrated in the 0.5-1.5 range. In particular, 15 percent of countries have values of ϕ_i that are below 0.5 (the lowest value, 0.009, is for Finland), 30 percent of countries have values that range between 0.5 and 1, 35 percent of countries have values that range between 1 and 1.5, and the remaining 20 percent have higher values. Table 7 shows that the mean and median of the distribution of ϕ_i is approximately 1 and that, as expected, the industrial countries have the lowest value of ϕ_i and Latin America and the Middle East have the highest values of ϕ_i.[7]

[7] It may seem surprising that while the theoretical distribution is highly skewed, the data of Table 7 indicate that the mean is identical to the median. This is due to the fact that Table 7 does not include four countries that have values of ϕ greater than 4 (these countries are Estonia, Seychelles, Luxembourg, and Sudan). If we include these countries, the median goes to 1.05, but the average jumps to 2.7.

3.3 Debt Explosions

So far, we documented that there are a large differences between deficit and change in debt. Now we explore whether the difference between these two variables is positively correlated with debt growth. Figure 5 plots the relationship between the growth rate of debt over GDP (defined as $\theta_{i,t} = \left(D_{i,t}/Y_{i,t} - D_{i,t-1}/Y_{i,t-1}\right)\times 100$) and the ratio between deficit and change in debt (defined as $\rho_{i,t} = def_{i,t}/d_{i,t}$).[8] It shows that at relatively low levels of debt growth (below 5 percent per year), the deficit explains approximately 80 percent of the change of debt. However, when debt starts growing at a faster rate, the share of debt explained by deficit drops dramatically. In particular, the figure shows that when annual debt growth reaches 10 percent of GDP, the deficit explains less than 40 percent of debt growth. Table 8 regresses $\theta_{i,t}$ over $\rho_{i,t}$ (controlling for country fixed effects) and confirms that there is a negative and statistically significant relationship between these two variables. While the fit of the regression is rather poor, the table shows that the fit improves if extreme values of $\theta_{i,t}$ are not considered (compare, for instance, Column 1 with Column 3 where episodes in which $\theta_{i,t}$>50 are dropped). The table also shows that the relationship between $\theta_{i,t}$ over $\rho_{i,t}$ does not vary much across groups of countries.

As a last exercise, we look at debt explosions (defined as episodes in which $\theta_{i,t}$>10); Table 9 summarizes the data and Table A4 lists all the episodes. The first panel of Table 9 shows that in the 172 episodes for which $\theta_{i,t}$>10 (9 percent of the country-years for which we have data), the average increase in debt over GDP was close to 28 percentage points, the average change in debt was around 46 percentage points (the difference between these two values is nominal GDP growth which, in presence of high inflation, can be very high), and the average ratio between these two variables was 70 percent. The fourth column of the table shows that in our sample of debt explosions, average deficit was close to 10 percent of GDP and the ratio between deficit and change in debt was about 27 percent. This is close to one-third of the same ratio during normal times (when 10>$\theta_{i,t}$>0 the ratio between deficit and change in debt is 75 percent). The table also shows that the regions with the highest occurrence of debt explosions are Latin America and Sub-Saharan Africa (41 and 66 episodes, respectively) and that East Europe

[8] We smooth the curve with a bandwidth of 25.

and Sub-Saharan Africa are the regions with the lowest average ratio between deficit and change in debt (18 and 13 percent, respectively).

Since the average values discussed above may be driven by extreme values of $\theta_{i,t}$, we restrict the sample in the second panel of Table 9 to 104 episodes for which $\theta_{i,t}$ ranges between 10 and 20 percent. In this case, we find that the average increase of the debt-to-GDP ratio is approximately 14 percent, the average change in debt is 24 percent and the average ratio between these two variables is 68 percent (basically identical to the top panel of the table). The fourth column of the table shows that the average deficit is 7 percent and that the ratio between average deficit and change in debt is 29 percent, which again is close to the top panel of the table. As before, we find that Latin America and Sub-Saharan Africa have the highest occurrence of debt explosions (18 and 36, respectively), but now we find that the Middle East and the industrial countries have a number of episodes that are not much lower than those of Latin America. In fact, we now find that Latin America has the second lowest (after the industrial countries) relative share of debt explosions. This confirms that debt explosions in Latin America tend to be very large. In fact, Latin America is the only region in the world where there are more episodes in which debt grows by more than 20 percent of GDP than episodes in which debt grows between 10 and 20 percent of GDP.

4. What Drives the Difference?

After having documented that there are large differences between deficits and change in debt, we now run a set of regressions aimed at exploring the determinants of these differences. We start by estimating the following model:

$$\delta_{i,t} = \alpha_i + \beta X_{i,t} + \gamma \pi_{i,t} + \varepsilon_{i,t} \qquad (6)$$

where α_i is a set of country fixed effects, $X_{i,t}$ a set of country-year specific variables that can explain the difference between deficit and change in debt, and $\pi_{i,t}$ is a measure of inflation (defined as ln(1+INF)). Although we do not have a clear theory of how inflation should affect $\delta_{i,t}$, we include this variable because the various components of $\delta_{i,t}$ are nominal variables measured in different periods of time (a stock at time *t*, a stock at time *t-1* and two flow variables measured between *t-1* and *t*). Hence, whenever the deficit is different from the change in debt,

the value of $\delta_{i,t}$ should be positively correlated with nominal GDP growth, which is heavily influenced by inflation.

One reason why the change in debt could be higher than the recorded deficit is the valuation effects due to currency depreciations in the presence of foreign currency debt. To explore this possibility, we start by focusing on developing countries (industrial countries do not have large stocks of foreign currency debt) and use data from the World Bank's Global Development Finance (GDF) to create three dummy variables that classify all developing countries into three groups of equal size.[9] The three dummies are defined as follows: (i) LOW takes a value of 1 for all country-years where the external debt-to-GDP ratio is below 38 percent; (ii) MEDIUM takes a value of 1 for all country-years where the external debt-to-GDP ratio ranges between 38 and 64 percent; (iii) HIGH takes a value of 1 for all country-years where the external debt-to-GDP ratio is above 64 percent. Next, we interact the three dummies with the change in the real exchange rate (DRER, an increase in DRER corresponds to a real depreciation).

Column 1 of Table 10 reports the results of our baseline estimation. As expected, we find that inflation has a positive and statistically significant coefficient. Furthermore, we find that currency depreciations are positively and significantly correlated with δ, a finding that provides evidence of the presence of balance-sheet effects. More interestingly, we find that the effect of currency depreciations is particularly large in countries with high levels of external debt. Consider, for instance, a real depreciation of 30 percent (not an uncommon event in some of the countries included in our sample). In countries characterized by low or medium levels of external debt, such a depreciation is associated with an increase of δ of approximately three to four percentage points, but in countries with high levels of debt, a similar depreciation would instead cause δ to increase by more than 10 percentage points. At the bottom of the table we show that the difference between coefficients is also statistically significant (this is not the case for the difference between the coefficients associated with low and medium external debt).

Next, we include industrial countries and assume that this set of countries has no foreign currency denominated external debt. Therefore, the regression coefficients should be interpreted

[9] Since the GDF data have information for total external debt, we are implicitly assuming that most external debt is public (or generates contingent liabilities of the public sector). We checked the validity of this assumption by computing the correlation between GDF data on total external debt and IFS data on public external debt and found that this correlation is 0.91.

as follows: DRER measures the effect of real depreciations in industrial countries; DRER+DRER*LOW measures the effect of a real depreciation in developing countries with low levels of external debt; DRER+DRER*MEDIUM measures the effect of a real depreciation in developing countries with average levels of external debt; and DRER+DRER*HIGH measures the effect of a real depreciation in developing countries with high levels of external debt. Column 2 shows that the coefficient of DRER is low and not statistically significant, indicating that there are no balance-sheet effects in industrial countries. As before, we find that balance-sheet effects are important in developing countries and that the effect of a real depreciation in all three groups of developing countries is significantly different (both in economic and statistical terms) from the effect of a depreciation in industrial countries. Finally, we still find that balance-sheet effects tend to be particularly important in countries with high levels of debt.

Column 3 explores the role of default, w expect defaults to be associated with debt reduction and hence negatively correlated with δ. To capture the effect of default, we use data from Standard and Poor's and build a dummy variable that takes a value of 1 around the last year of a default episode (in particular, it takes a value of 1 in the last year of the episode and in the year before and the year after the last year of the episode). Next, we build a default dummy that takes a value of 1 in the last year of a Paris club rescheduling and then another dummy that takes a value of 1 whenever the GDF reports that a country has rescheduled its debt. Finally, we build a dummy called DEFAULT that takes a value of 1 whenever one of the previously described dummies takes a value of 1. Column 3 shows that the default dummy has the expected negative sign but that the coefficient is small and not statistically significant (we obtain similar results if we use the three dummies separately).

Column 4 uses data from Caprio and Klingebiel (2003) to explore the role of banking crises. These are important events because they generate a series of contingent liabilities and other off-balance sheet activities that can translate into debt explosions. As expected, we find that the coefficient of the banking crisis dummy is positive and statistically significant. The coefficient is also quantitatively important, indicating that the average banking crisis is associated with an increase of three percentage points in δ.

Column 5 jointly includes all the variables discussed above. We find that the results are qualitatively similar to previous ones, but that the coefficient of DRER*MEDIUM is no longer statistically significant (however, DRER+ DRER*MEDIUM remains significant) and that the

same is true for banking crisis. In the last column of the table, we control for year fixed effects (which implicitly control for global shocks) and show that their inclusion does not affect our basic results.

It is interesting to note that the set of controls included in the regressions of Table 10 explains about 20 percent of the variance of δ and that the country fixed effects explain about 30 percent of the variance of δ (see last row of Table 10). This indicates that country specific factors explain most of the variance of δ and corroborates the findings of Table 4, which showed that there are large cross-country differences in the average value of δ. There are two possible explanations for this finding. The first has to do with the fact that measurement errors that lead to an underestimation of the deficit are more important in some countries than in others, which is probably related to the fact that poorer countries have less sophisticated accounting and budgeting systems. The other has to do with the fact that the importance of contingent liabilities that lead to debt explosions vary across countries and that our set of controls does not capture all these contingent liabilities.[10]

Table 11 includes GDP growth in the analysis. The first column shows that debt tends to grow more than deficit during periods of slow GDP growth. Column 2 substitutes GDP growth with two dummies variables that take a value of 1 during periods of high growth (GOOD TIMES) and periods of slow growth (BAD TIMES).[11] Also in this case, we find that debt tends to grow faster than the deficit during bad times and slower than the deficit during good times. Column 3 augments the regression in Column 1 with the set of controls in Table 10. We find that the sign of GDP growth remains negative but the coefficient drops by one-third and is no longer statistically significant. Column 4 uses the set of controls in Table 10 and the GOOD TIMES and BAD TIMES dummies. In this case, we still find that the two dummies have the opposite sign and are both statistically significant.

In Table 12 we estimate a set of regressions similar to those in Table 10 but now substitute δ with *d* and include *def* in the set of controls. This is equivalent to estimating the model of Table 10 by relaxing the restriction that the coefficient of *def* is 1. We find that the *def* coefficient is always smaller than 1 but that that this coefficient is never significantly different

[10] Another key difference is in the size of the regional government, which is often not well captured by our data.
[11] GOOD TIMES takes a value of 1 when growth is one standard deviation above the country average, BAD TIMES takes a value of 1 when growth is one standard deviation below the country average. REGULAR TIMES is the excluded dummy.

from 1. All our other results are unchanged (this was expected because Table 6 already indicated that the deficit by itself explains an extremely small share of the within-country variance of the change in debt).

One problem with the regressions of Tables 10, 11 and 12 is that they assume a linear relationship between the dependent variable and the set of independent variables. Therefore, the estimated results might be driven by extreme values of δ. To address this issue, we relax the linearity assumption and run two sets of Probit regressions. In the first set of Probits, the dependent variable is a dummy that takes a value of 1 for all country years in the top decile of the distribution of δ. In the second set of Probits, we repeat the experiment using the bottom decile of the distribution of δ.[12]

Table 13 reports the results for events in the top decile (in this group of events, δ ranges between 12.7 and 282 and has an average value of 44.5). We find that most of the results are similar to those in Table 10. In particular, Column 1 shows that the relationship between real depreciations and the probability of observing an extreme event of δ increases with the level of external debt. Column 2 shows that in industrial countries, real depreciations have a negative (but not statistically significant) correlation with the probability of observing an extreme event of δ. This column also shows that in countries with high levels of external debt, depreciations are highly correlated with the probability of observing an extreme event. One puzzling result of Table 13 is that the coefficient of the DEFAULT dummy is large, significant, and *positive* (Column 3). This is exactly the opposite of what we expected, and may have to do with the fact that defaulted debt is not immediately subtracted from the stock of public debt. The coefficient of the BANKING CRISIS dummy variable instead has the expected positive sign. Besides being statistically significant, the impact of this variable is also economically important. In particular, the point estimates indicate that a banking crisis is associated with a 10 percent increase in the probability of observing an extreme event of δ.

Table 14 focuses on events in the bottom decile of δ (in this group of events, δ ranges between -116 and –3.4 and has an average value of -10.9). As expected, we find that depreciations are negatively correlated with these types of events but the coefficients are rarely significant. In general, we find that our model does a very poor job of explaining these events.

[12] The results do not change if we define the dummies using the $|\delta|>10$ threshold.

5. Conclusions

The purpose of this paper was to document the fact that what is often considered a residual entity is indeed one of the key determinants of debt dynamic. After demonstrating the importance of the stock-flow reconciliation, this paper shows that this residual entity can be partly explained by contingent liabilities and balance-sheet effects. These results suggest that building a safer debt structure and implementing policies aimed at avoiding the creation of contingent liabilities are key to avoiding debt explosions (for contrasting views on how this can be achieved, see Goldstein and Turner, 2004 and Eichengreen, Hausmann and Panizza, 2003). However, this paper also shows that a large fraction of the variance of the stock-flow reconciliation cannot be explained by balance-sheet effects and our simple regressions.[13]

[13] One variable that is likely to be important but that we do not control for is the effect of court decisions that force the government to make payments (to public sector workers, for instance) that were not budgeted. We would like to thank Vito Tanzi for pointing this out.

References

Budina, N. and N. Fiess. 2005. "Public Debt and its Determinants in Market Access Countries." Washington, D.C.: The World Bank.

Caprio, G., and D. Klingebiel. 2003. "Episodes of Systematic and Borderline Financial Crises." Washington, DC, United States: World Bank. Mimeographed document. http://econ.worldbank.org/view.php?type=18&id=23456

Cowan, K., E. Levy-Yeyati, U. Panizza and F. Sturzenegger. 2006. "Public Debt in the Americas." (In progress).

Eichengreen, B., R. Hausmann and U. Panizza. 2003. "Currency Mismatches, Debt Intolerance and Original Sin: Why Are Not the Same and Why It Matters." NBER Working Paper 10036. Cambridge, United States: National Bureau of Economic Research.

European Commission. 2005. "General Government Data. General Government Expenditure, Balances and Gross Debt." Brussels, Belgium: European Commission.

Goldstein, M., and P. Turner. 2004. *Controlling Currency Mismatches in Emerging Markets*. Washington D.C.: Institute for International Economics.

International Monetary Fund. 2003. "Public Debt in Emerging Markets: Is it Too High?" *World Economic Outlook*, Chapter 3. Washington, DC, United States: International Monetary Fund.

Jeanne, O. and A. Guscina. 2006. Government Debt in Emerging Market Countries. A New Dataset. Mimeo, IMF

Levy-Yeyati, E., and F. Sturzenegger. 2005. "Methodological Note on the Construction of the Debt Database." Buenos Aires: Universidad Torcuato Di Tella.

Martner, R., and V. Tromben. 2004. "Public Debt Indicators in Latin American Countries: Snowball Effect, Currency Mismatch and the Original Sin." In: *Public Debt*. Perugia, Italy: Banca d'Italia.

Reinhart, C., K. Rogoff and M. Savastano. 2003. "Debt Intolerance." *Brookings Papers on Economic Activity* 1: 1-74.

Table 1. Deficit over GDP

Country Group	μ (%)	σ(%) Overall	σ(%) Between	Min (%)	Max (%)	N. of countries	N. of observations
All Countries	4.04	5.27	3.62	-18.26	66.05	117	1872
By Region							
EAP	2.65	3.08	2.86	-2.35	17.87	8	126
ECA	3.38	3.51	2.89	-10.02	19.64	15	142
IND	3.29	3.78	2.92	-6.89	20.79	24	485
LAC	3.93	7.38	4.56	-5.27	66.05	25	417
MNA	5.57	6.24	6.02	-9.92	26.78	11	201
SAS	6.53	3.16	1.75	-1.73	18.28	5	119
SSA	4.24	4.77	2.74	-18.26	45.15	29	382
By Income Groups							
Low	4.67	4.40	2.76	-18.26	45.15	34	440
Medium	4.13	6.18	4.28	-10.02	66.05	59	947
High	3.29	3.78	2.92	-6.89	20.79	24	485

The income group and regional classifications are those used by the World Bank

Table 2. Debt over GDP

Country Group	μ (%)	σ(%) Overall	σ(%) Between	Min (%)	Max (%)	N. of countries	N. of observations
All Countries	55.80	58.05	46.92	0.00	637.52	117	1872
By Region							
EAP	35.28	19.58	19.96	1.49	98.02	8	126
ECA	37.19	21.85	22.41	2.49	88.70	15	142
IND	43.91	26.75	27.08	1.47	121.53	24	485
LAC*	48.36	41.62	41.97	1.63	304.50	24	391
MNA**	46.81	40.84	40.09	0.00	210.76	10	172
SAS	60.27	21.97	16.04	5.92	116.48	5	119
SSA	66.86	53.97	46.42	1.98	299.73	29	382
By Income Groups							
Low	72.21	56.50	49.57	1.49	304.50	34	440
Medium	54.27	67.94	48.02	0.00	637.52	59	947
High	43.91	26.75	27.08	1.47	121.53	24	485

The income group and regional classifications are those used by the World Bank.
* Excludes Guyana ** Excludes Israel

Table 3. Change in Debt over GDP

Country Group	μ (%)	σ (%)		Min (%)	Max (%)	N. of countries	N. of observations
		Overall	Between				
All Countries	8.97	23.42	14.66	-118.17	303.57	117	1872
By Region							
EAP	5.11	9.08	6.42	-7.05	51.81	8	126
ECA	6.74	9.34	5.74	-5.71	74.38	15	142
IND	4.05	4.52	3.16	-10.77	22.49	24	485
LAC	11.45	31.31	16.37	-72.38	303.57	25	417
MNA	12.59	34.05	17.25	-31.86	300.14	11	201
SAS	7.98	8.12	3.18	-35.33	42.19	5	119
SSA	13.00	29.02	22.13	-118.17	233.42	29	382
By Income Groups							
Low	14.30	31.28	22.25	-118.17	243.68	34	440
Medium	9.00	24.39	11.54	-61.52	303.57	59	947
High	4.05	4.52	3.16	-10.77	22.49	24	485

The income group and regional classifications are those used by the World Bank

Table 4. Change in Debt Minus Deficit (δ)

Country Group	μ (%)		σ (%)		Min (%)	Max (%)	N. of countries	N. of observations
	All	Without Outliers*	Overall	Between				
All Countries	4.93	3.15	21.84	13.29	-116.61	281.93	117	1872
By Region								
EAP	2.46	2.46	7.99	4.28	-10.00	51.14	8	126
ECA	3.35	2.86	8.37	4.91	-11.03	72.56	15	142
IND	0.77	0.79	2.83	1.07	-12.16	14.07	24	485
LAC	7.52	4.32	28.82	13.68	-73.29	281.93	25	417
MNA	7.02	2.44	31.39	14.62	-39.15	273.36	11	201
SAS	1.45	2.14	7.55	1.86	-38.58	37.41	5	119
SSA	8.76	6.11	28.12	21.22	-116.61	226.90	29	382
By Income Groups								
Low	9.63	6.09	30.85	21.57	-116.61	247.90	34	440
Medium	4.87	3.09	21.88	8.87	-64.66	281.93	59	947
High	0.77	0.79	2.83	1.07	-12.16	14.07	24	485

The income group and regional classifications are those used by the World Bank.
*Outliers are the top and bottom 2 percent of the distribution.

Table 5. Episodes with $|\delta_{i,t}| > 10$

	Episodes with δ>5		Episodes with δ<-5	
	Number	Share of total	Number	Share of total
EAP	12	9.52	1	0.79
ECA	18	12.68	1	0.7
IND	6	1.24	1	0.21
LAC	71	17.03	12	2.88
MNA	35	17.41	13	6.47
SAS	7	5.88	3	2.52
SSA	89	23.3	19	4.97
All Countries	238	12.71	50	2.67

Table 6. Change in Debt over GDP and Deficit (regressions with country fixed effects)

	(1)	(2)	(3)	(4)	(5)
Deficit	1.316	1.189	0.872	1.102	1.101
	(0.226)***	(0.052)***	(0.066)***	(0.430)**	(0.354)***
N. Obs	1872	1825	1872	382	417
Nr. Cty	117	117	117	29	25
R2	0.074	0.23	0.246	0.032	0.051
Sample	All Countries	No Outliers	Quantile Regression	SSA	LAC
	(6)	(7)	(8)	(9)	(10)
Deficit	0.706	1.346	2.486	1.426	0.914
	(0.295)**	(0.361)***	(0.840)***	(0.346)***	(0.056)***
N. Obs	119	126	201	142	485
Nr. Cty	5	8	11	15	24
R2	0.065	0.135	0.199	0.228	0.514
Sample	SAS	EAP	MNA	ECA	IND

Robust standard errors in parenthesis.

Table 7. Φ Index

Country Group	μ (%)	σ (%)	Median (%)	Max (%)	Min (%)	N. of countries
All Countries	1.03	0.50	1.03	2.46	0.13	110
By Region						
EAP	0.98	0.32	0.95	1.56	0.58	8
ECA	0.98	0.62	1.00	2.06	0.15	14
IND	0.60	0.36	0.55	1.37	0.13	23
LAC	1.21	0.51	1.23	2.41	0.15	25
MNA	1.35	0.47	1.29	2.46	0.89	10
SAS	1.01	0.12	1.04	1.11	0.81	5
SSA	1.15	0.42	1.15	2.13	0.19	25
By Income Groups						
Low	1.15	0.43	1.15	2.13	0.19	31
Medium	1.13	0.50	1.14	2.46	0.15	56
High	0.60	0.36	0.55	1.37	0.13	23

Table 8. Change in Debt and ρ (controlling for country fixed effects)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
θ	-0.007	-0.011	-0.020	-0.018	-0.006
	(0.002)***	(0.003)***	(0.005)***	(0.013)	(0.008)
Constant	0.718	0.746	0.788	0.837	0.640
	(0.030)***	(0.033)***	(0.036)***	(0.121)***	(0.079)***
Observations	1061	1055	1039	64	77
Number of Countries	110	110	110	8	14
R-squared	0.01	0.01	0.02	0.03	0.01
Sample	*θ>0*	*0<θ<100*	*0<θ<50*	EAP, *θ>0*	ECA, *θ>0*
	(6)	**(7)**	**(8)**	**(9)**	**(10)**
θ	-0.019	-0.003	-0.024	-0.008	-0.005
	(0.012)	(0.004)	(0.006)***	(0.003)**	(0.008)
Constant	0.817	0.593	0.877	0.576	1.053
	(0.049)***	(0.061)***	(0.044)***	(0.068)***	(0.179)***
Observations	285	235	67	223	110
Number of Countries	24	24	5	25	10
R-squared	0.01	0.00	0.22	0.03	0.00
Sample	IND, *θ>0*	LAC, *θ>0*	SAS, *θ>0*	SSA, *θ>0*	MNA, *θ>0*

Table 9. Debt Explosions

	θ	d	θ/d	def	def/d	N	*Share*
All Episodes with θ>10							
ALL	27.45	46.34	69.25%	9.42	27.40%	172	9.19%
EAP	18.82	26.98	74.47%	6.11	24.40%	12	9.52%
ECA	20.90	27.23	72.50%	5.07	18.65%	11	7.75%
IND	12.59	15.25	82.78%	9.11	60.79%	13	2.68%
LAC	34.08	58.92	74.43%	14.63	35.27%	41	9.83%
MNA	30.22	63.75	60.28%	13.37	41.48%	23	11.44%
SAS	19.87	26.71	69.79%	7.57	32.61%	6	5.04%
SSA	28.63	47.08	64.95%	6.35	12.58%	66	9.52%
All Episodes with 10<θ<20							
ALL	13.45	24.39	67.88%	6.93	29.42%	104	5.56%
EAP	13.45	21.20	73.66%	4.79	24.38%	9	7.14%
ECA	13.33	19.60	69.10%	3.81	18.04%	9	6.34%
IND	12.59	15.25	82.78%	9.11	60.79%	13	2.68%
LAC	14.40	22.21	72.73%	7.76	31.71%	18	4.32%
MNA	13.07	40.93	62.40%	11.05	48.67%	15	7.46%
SAS	11.97	20.49	59.21%	8.74	42.15%	4	3.36%
SSA	13.65	24.33	61.56%	5.13	11.64%	36	9.42%

Table 10: The Determinants of δ

	(1)	(2)	(3)	(4)	(5)	(6)
INFLATION	25.526	24.869	25.428	25.136	25.223	25.885
	(11.454)**	(11.199)**	(11.285)**	(10.775)**	(11.346)**	(11.581)**
DRER*LOW	14.034	11.496			11.331	5.288
	(6.522)**	(6.732)*			(6.787)*	-6.794
DRER*MEDIUM	11.358	9.218			8.315	1.996
	(5.059)**	(5.171)*			-5.323	-6.22
DRER*HIGH	32.987	30.835			32.229	25.802
	(10.423)***	(10.469)***			(10.588)***	(10.738)**
DRER		2.22			1.95	8.676
		(1.513)			(1.589)	(3.715)**
DEFAULT			-0.077		-1.754	-2.471
			(2.015)		(1.981)	(1.963)
BANKING CRISIS				3.204	2.812	2.182
				(1.918)*	(1.908)	(1.909)
R-squared (within)	0.218	0.224	0.19	0.199	0.234	0.244
Observations	1065	1529	1529	1529	1529	1529
Nr. of Countries	78	102	102	102	102	102
Sample	Developing Countries	All Countries	All Countries	All Countries	All Countries	All Countries
Fixed Effects	Country	Country	Country	Country	Country	Ctry.-Year
DRER*LOW=DRER*MED	0.7654	0.7392			0.6757	0.6536
DRER*HIGH=DRER*MED	0.0612	0.0524			0.0396	0.0359
R-squared with country FE	0.4783	0.4825	0.4559	0.4584	0.4852	0.5025

Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 11. The Determinants of δ

	(1)	(2)	(3)	(4)
INFLATION	24.443	24.541	26.064	24.646
	(11.130)**	(10.838)**	(12.533)**	(11.305)**
DRER*LOW			15.872	15.998
			(7.496)**	(6.276)**
DRER*MEDIUM			4.183	4.376
			(5.526)	(5.874)
DRER*HIGH			35.377	35.300
			(11.147)***	(10.440)***
DRER			-0.493	-0.240
			(1.814)	(1.828)
DEFAULT			2.091	2.338
			(2.062)	(1.860)
BANKING CRISIS			-2.902	-2.921
			(2.519)	(1.979)
GDP GROWTH	-0.324		-0.198	
	(0.118)***		(0.130)	
GOOD TIMES DUMMY		-1.822		-1.582
		(0.857)**		(0.847)*
BAD TIMES DUMMY		3.772		2.933
		(1.241)***		(1.200)**
Observations	1528	1529	1238	1529
Nr. of Countries	102	102	92	102
R-squared (within)	0.1064	0.1104	0.1670	0.1550
Fixed Effects	Country	Country	Country	Country
Sample	All Countries	All Countries	All Countries	All Countries

Table 12. The Determinants of *d*

	(1)	(2)	(3)	(4)	(5)	(6)
DEFICIT/GDP	0.982	0.943	0.994	0.982	0.933	0.955
	(0.185)***	(0.143)***	(0.148)***	(0.149)***	(0.144)***	(0.153)***
INFLATION	25.536	24.917	25.433	25.152	25.274	25.89
	(11.486)**	(11.213)**	(11.342)**	(10.824)**	(11.343)**	(11.559)**
DRER*LOW	14.017	11.251			11.036	5.145
	(6.461)**	(6.505)*			(6.558)*	-6.673
DRER*MEDIUM	11.377	9.074			8.134	1.93
	(5.040)**	(5.190)*			-5.339	-6.237
DRER*HIGH	33.033	30.782			32.17	25.84
	(10.378)***	(10.497)***			(10.615)***	(10.724)**
DRER		2.421			2.181	8.746
		(1.545)			(1.613)	(3.729)**
DEFAULT			-0.076		-1.75	-2.485
			(2.011)		(1.977)	(1.966)
BANKING CRISIS				3.214	2.85	2.222
				(1.927)*	(1.914)	(1.917)
R-squared (within)	0.1914	0.1983	0.2419	0.2503	0.2026	0.229
Observations	1065	1529	1529	1529	1529	1529
Nr. of Countries	78	102	102	102	102	102
Sample	Developing Countries	All Countries	All Countries	All Countries	All Countries	All Countries
Fixed Effects	Country	Country	Country	Country	Country	Ctry.-Year
DRER: LOW=MED	0.7114	0.7447			0.681	0.6571
DRER: HIGH=MED	0.053	0.0514			0.0386	0.0349
R-squared with country FE	0.5074	0.5188	0.4939	0.4962	0.5213	0.5373

Robust standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 13. Probit Regressions for Episodes in Top δ Decile

	(1)	(2)	(3)	(4)	(5)	(6)
INFLATION	0.251	0.225	0.160	0.224	0.132	0.151
	(0.084)***	(0.072)***	(0.060)***	(0.077)***	(0.055)**	(0.064)**
DRER*LOW	0.098	0.134			0.140	0.060
	(0.169)	(0.159)			(0.158)	(0.179)
DRER*MEDIUM	0.190	0.249			0.241	0.197
	(0.115)*	(0.122)**			(0.120)**	(0.128)
DRER*HIGH	0.567	0.550			0.402	0.314
	(0.136)***	(0.136)***			(0.129)***	(0.147)**
DRER		-0.067			-0.078	0.005
		(0.075)			(0.080)	(0.099)
BANK CRISIS				0.099	0.072	0.050
				(0.029)***	(0.028)***	(0.026)*
DEFAULT			0.222		0.187	0.191
			(0.032)***		(0.032)***	(0.033)***
Observations	1066	1529	1529	1529	1529	1389
Nr. of Countries	78	102	102	102	102	102
Sample	Developing Countries	All Countries	All Countries	All Countries	All Countries	All Countries
FE	NO	NO	NO	NO	NO	YEAR

Standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 14. Probit Regressions for Episodes in Bottom δ Decile

	(1)	(2)	(3)	(4)	(5)	(6)
INFLATION	-0.005	0.014	0.002	0.011	-0.014	-0.017
	(0.035)	(0.030)	(0.029)	(0.028)	(0.032)	(0.032)
DRER*LOW	-0.161	-0.163			-0.180	-0.193
	(0.184)	(0.210)			(0.216)	(0.211)
DRER*MEDIUM	-0.320	-0.277			-0.293	-0.336
	(0.168)*	(0.201)			(0.204)	(0.210)
DRER*HIGH	-0.055	-0.024			-0.063	-0.141
	(0.130)	(0.169)			(0.165)	(0.187)
DRER		-0.003			-0.002	0.049
		(0.120)			(0.125)	(0.147)
BANK CRISIS				0.039	0.040	0.058
				(0.026)	(0.026)	(0.028)**
DEFAULT			0.051		0.051	0.054
			(0.026)**		(0.026)*	(0.026)**
Observations	1066	1529	1529	1529	1529	1529
Nr. of Countries	78	102	102	102	102	102
Sample	Developing Countries	All Countries	All Countries	All Countries	All Countries	All Countries
FE	NO	NO	NO	NO	NO	YEAR

Standard errors in parentheses. * Significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table A1. Countries Included in the Sample

Country	Code	Region	Initial year	Final year	Debt/GDP	Deficit/GDP	δ	ϕ
FIJI*	FJI	EAP	1972	1998	30.69	4.24	-0.93	0.88
INDONESIA	IDN	EAP	1973	1999	34.77	1.32	4.34	1.15
KOREA	KOR	EAP	1981	1997	13.96	0.59	1.59	0.82
MALAYSIA	MYS	EAP	1991	1999	47.02	0.15	0.41	0.65
MONGOLIA	MNG	EAP	1993	2001	73.08	8.94	11.99	1.15
PAPUA NEW GUINEA	PNG	EAP	1976	2002	45.79	2.45	2.66	1.56
SOLOMON ISLANDS*	SLB	EAP	1976	1984	15.00	4.41	-1.72	0.58
THAILAND	THA	EAP	1997	2003	20.26	1.72	2.30	1.02
ALBANIA	ALB	ECA	1996	1998	48.78	11.07	0.00	0.76
BELARUS	BLR	ECA	1993	1998	23.65	2.05	13.32	1.26
CROATIA	HRV	ECA	1996	2002	42.75	1.48	4.98	2.06
CYPRUS	CYP	ECA	1977	2003	48.77	4.68	1.14	0.83
CZECH REPUBLIC	CZE	ECA	1994	2003	12.69	1.38	0.18	0.27
ESTONIA	EST	ECA	1997	2001	3.72	-0.95	0.88	6.46
GEORGIA	GEO	ECA	1997	2003	61.53	2.78	5.52	1.31
HUNGARY	HUN	ECA	1992	2003	67.49	5.46	3.54	1.16
LATVIA	LVA	ECA	1996	2003	12.54	1.37	0.04	0.41
LITHUANIA	LTU	ECA	1999	2002	27.65	2.43	-0.23	0.15
POLAND	POL	ECA	1994	2001	44.71	1.63	2.49	1.18
RUSSIA	RUS	ECA	1994	2003	55.76	2.60	13.06	1.49
SLOVAK REPUBLIC	SVK	ECA	1996	2003	27.07	1.38	2.88	2.04
TAJIKISTAN	TJK	ECA	2001	2001	80.87	-0.06	-5.65	0.28
TURKEY*	TUR	ECA	1972	2001	21.80	5.12	2.93	0.57
AUSTRALIA	AUS	IND	1979	2002	12.25	0.80	-0.35	0.77
AUSTRIA	AUT	IND	1972	1994	31.85	3.99	-0.35	0.41
BELGIUM	BEL	IND	1972	1998	84.55	6.47	0.53	0.27
CANADA	CAN	IND	1975	2001	41.40	3.43	-0.21	0.32
DENMARK	DNK	IND	1981	2000	66.78	1.02	3.65	0.78
FINLAND	FIN	IND	1991	1998	52.11	8.00	0.03	0.13
FRANCE	FRA	IND	1993	1997	41.12	5.25	-0.89	0.81
GERMANY	DEU	IND	1976	1999	19.23	1.62	0.29	1.03
GREECE	GRC	IND	1994	1999	117.34	10.15	2.14	0.73
ICELAND	ISL	IND	1973	2003	31.74	2.22	2.87	1.21
IRELAND	IRL	IND	1982	1999	84.11	4.01	1.21	0.24
ITALY	ITA	IND	1981	1999	93.88	9.56	0.65	0.13
JAPAN	JPN	IND	1981	1993	48.65	3.45	0.52	0.98
LUXEMBOURG*	LUX	IND	1991	1997	2.89	-0.06	0.45	81.77
MALTA*	MLT	IND	1972	1998	25.61	2.30	0.56	0.86
NETHERLANDS	NLD	IND	1981	1998	52.97	3.56	0.10	0.14
NEW ZEALAND	NZL	IND	1993	2001	43.07	-1.40	-0.14	0.54
NORWAY	NOR	IND	1972	2003	26.19	0.61	1.39	1.37
PORTUGAL	PRT	IND	1981	1998	56.47	6.17	2.17	0.59
SPAIN	ESP	IND	1972	1999	31.84	3.45	0.68	0.37
SWEDEN	SWE	IND	1972	1999	46.97	4.40	0.47	0.49
SWITZERLAND	CHE	IND	1987	2003	21.00	0.50	0.83	0.99
UNITED KINGDOM	GBR	IND	1972	1999	45.46	3.25	0.51	0.55
UNITED STATES	USA	IND	1972	2003	35.71	2.45	0.00	0.17
ARGENTINA	ARG	LAC	1994	2003	59.87	1.56	11.56	1.22
BAHAMAS, THE	BHS	LAC	1972	2003	25.55	2.29	-0.08	0.60
BARBADOS	BRB	LAC	1978	2003	54.32	3.74	0.58	0.64
BOLIVIA	BOL	LAC	1991	2003	65.45	4.37	3.53	1.24
BRAZIL*	BRA	LAC	1992	1998	26.98	6.86	7.67	1.31
CHILE	CHL	LAC	1989	2001	25.41	-1.20	2.78	2.03
COLOMBIA	COL	LAC	1991	2003	25.81	3.79	1.96	0.71
COSTA RICA	CRI	LAC	1972	2002	30.01	2.86	2.54	1.38
ECUADOR	ECU	LAC	1991	2003	63.52	-0.30	0.79	1.01
EL SALVADOR	SLV	LAC	1972	2001	34.26	1.72	2.70	1.21
GRENADA	GRD	LAC	1994	1995	39.28	-0.57	-2.75	0.15
GUATEMALA	GTM	LAC	1991	2003	16.02	1.19	0.69	1.25
GUYANA	GUY	LAC	1972	1997	324.91	22.46	44.22	1.23

HAITI	HTI	LAC	1997	2003	46.26	2.03	5.04	1.80
HONDURAS*	HND	LAC	1972	2003	58.45	4.12	4.95	1.10
JAMAICA*	JAM	LAC	1981	2001	117.41	6.79	12.70	1.13
MEXICO*	MEX	LAC	1972	2003	32.28	3.84	4.68	0.71
NICARAGUA	NIC	LAC	1991	2003	216.01	1.57	56.61	1.56
PANAMA	PAN	LAC	1972	2000	55.53	3.29	1.60	0.97
PARAGUAY	PRY	LAC	1991	2001	19.26	0.63	3.76	1.43
PERU	PER	LAC	1991	2001	53.56	0.97	12.08	1.37
ST. VINCENT & GRENS.	VCT	LAC	1987	2001	47.48	2.34	2.13	1.60
SURINAME*	SUR	LAC	1972	1986	35.67	7.12	-3.07	0.38
URUGUAY	URY	LAC	1993	2001	26.48	2.18	4.14	1.74
VENEZUELA, REP. BOL.	VEN	LAC	1972	1985	11.39	-0.07	2.43	2.41
ALGERIA	DZA	MNA	2000	2001	0.06	-6.98	6.98	
BAHRAIN, KINGDOM OF	BHR	MNA	1982	2001	16.62	3.29	-1.40	2.46
ISRAEL	ISR	MNA	1973	2001	183.28	9.81	47.95	1.36
JORDAN	JOR	MNA	1972	2001	86.11	4.50	4.27	0.96
LEBANON	LBN	MNA	1993	1999	92.82	17.41	6.81	1.53
MOROCCO*	MAR	MNA	1972	2003	64.11	5.94	-0.87	0.89
OMAN	OMN	MNA	1972	2001	22.51	7.23	-5.08	1.51
SAUDI ARABIA	SAU	MNA	1996	2000	104.01	4.08	-1.90	1.10
TUNISIA	TUN	MNA	1972	2000	47.49	3.70	1.64	0.90
UNITED ARAB EMIRATES*	ARE	MNA	1981	1999	1.63	0.05	-0.23	1.22
YEMEN, REPUBLIC OF	YEM	MNA	1996	1999	7.18	2.39	0.35	1.54
INDIA	IND	SAS	1975	2001	46.15	5.85	0.28	1.04
MALDIVES	MDV	SAS	1982	2003	49.53	5.38	-1.20	1.01
NEPAL*	NPL	SAS	1975	2003	51.04	4.51	2.45	0.81
PAKISTAN	PAK	SAS	1972	1993	65.37	7.26	2.03	1.11
SRI LANKA	LKA	SAS	1974	2001	84.91	8.97	3.49	1.07
BURUNDI	BDI	SSA	1972	2003	85.08	1.68	11.81	1.52
CAMEROON*	CMR	SSA	1991	1999	95.99	2.01	16.75	1.29
CHAD	TCD	SSA	1991	2001	58.26	7.40	-1.27	1.09
CONGO, DEM. REP. OF*	ZAR	SSA	1972	1997	88.63	4.57	46.20	1.39
CONGO, REPUBLIC OF	COG	SSA	2000	2000	160.76	-1.16	-68.32	
COTE D IVOIRE*	CIV	SSA	1995	2001	135.29	0.69	1.38	0.97
ETHIOPIA	ETH	SSA	1983	1999	75.28	5.93	4.30	0.98
GABON	GAB	SSA	1991	1991	53.53	1.66	12.15	1.69
GAMBIA, THE	GMB	SSA	1974	1982	27.66	6.50	-0.62	0.19
GHANA*	GHA	SSA	1972	1998	22.64	3.75	0.79	1.03
GUINEA*	GIN	SSA	1991	1999	93.75	3.33	5.46	1.18
KENYA	KEN	SSA	1998	2003	64.98	1.28	2.95	2.13
LESOTHO*	LSO	SSA	1988	2003	79.17	3.61	4.70	1.09
MALAWI*	MWI	SSA	1972	1987	69.11	7.40	5.00	0.62
MALI	MLI	SSA	1983	1983	67.77	7.01	-5.22	
MAURITIUS	MUS	SSA	1979	2003	46.54	3.55	2.22	0.53
NAMIBIA	NAM	SSA	1990	2000	18.59	3.50	-0.61	1.19
NIGERIA	NGA	SSA	1972	1998	57.88	2.56	9.69	1.15
RWANDA	RWA	SSA	1978	2003	54.48	3.85	0.95	0.94
SENEGAL*	SEN	SSA	1983	2001	78.44	3.66	4.58	0.66
SEYCHELLES	SYC	SSA	1973	1977	5.09	0.56	0.11	17.06
SIERRA LEONE	SLE	SSA	1975	2003	105.52	7.63	18.21	1.56
SOUTH AFRICA	ZAF	SSA	1981	2003	34.98	3.64	0.74	0.93
SUDAN	SDN	SSA	1998	1999	203.80	0.65	62.55	90.39
SWAZILAND	SWZ	SSA	1979	2003	26.70	0.72	2.27	1.42
TOGO	TGO	SSA	1984	1986	89.77	2.94	-4.78	1.61
UGANDA	UGA	SSA	1992	2003	67.66	3.53	1.17	1.29
ZAMBIA*	ZMB	SSA	1978	1998	176.77	10.98	42.30	1.48
ZIMBABWE	ZWE	SSA	1977	1997	49.49	6.83	1.46	0.84

*Break in the series

Table A2. Episodes with δ>10

Country	Year	Code	Region	Country	Year	Code	Region	Country	Year	Code	Region
INDONESIA	1986	IDN	EAP	JAMAICA	2001	JAM	LAC	BURUNDI	1983	BDI	SSA
INDONESIA	1997	IDN	EAP	JAMAICA	1999	JAM	LAC	BURUNDI	2003	BDI	SSA
INDONESIA	1982	IDN	EAP	MEXICO	1987	MEX	LAC	BURUNDI	1992	BDI	SSA
INDONESIA	1978	IDN	EAP	MEXICO	1986	MEX	LAC	BURUNDI	1989	BDI	SSA
KOREA	1981	KOR	EAP	MEXICO	1994	MEX	LAC	CAMEROON	1994	CMR	SSA
MONGOLIA	1998	MNG	EAP	MEXICO	1982	MEX	LAC	CHAD	1999	TCD	SSA
MONGOLIA	1993	MNG	EAP	MEXICO	1989	MEX	LAC	CHAD	1995	TCD	SSA
MONGOLIA	1996	MNG	EAP	MEXICO	1985	MEX	LAC	CONGO, DEM. REP. OF	1989	ZAR	SSA
MONGOLIA	1994	MNG	EAP	NICARAGUA	1991	NIC	LAC	CONGO, DEM. REP. OF	1990	ZAR	SSA
PAPUA NEW GUINEA	1994	PNG	EAP	NICARAGUA	2001	NIC	LAC	CONGO, DEM. REP. OF	1997	ZAR	SSA
PAPUA NEW GUINEA	2001	PNG	EAP	NICARAGUA	2000	NIC	LAC	CONGO, DEM. REP. OF	1981	ZAR	SSA
PAPUA NEW GUINEA	1997	PNG	EAP	NICARAGUA	1995	NIC	LAC	CONGO, DEM. REP. OF	1993	ZAR	SSA
ALBANIA	1997	ALB	ECA	NICARAGUA	1998	NIC	LAC	CONGO, DEM. REP. OF	1992	ZAR	SSA
BELARUS	1994	BLR	ECA	NICARAGUA	1993	NIC	LAC	CONGO, DEM. REP. OF	1996	ZAR	SSA
BELARUS	1998	BLR	ECA	NICARAGUA	1992	NIC	LAC	CONGO, DEM. REP. OF	1994	ZAR	SSA
CROATIA	1998	HRV	ECA	NICARAGUA	1997	NIC	LAC	CONGO, DEM. REP. OF	1995	ZAR	SSA
CROATIA	1999	HRV	ECA	NICARAGUA	1999	NIC	LAC	CONGO, DEM. REP. OF	1980	ZAR	SSA
GEORGIA	1998	GEO	ECA	NICARAGUA	2002	NIC	LAC	COTE D IVOIRE	1995	CIV	SSA
GEORGIA	1999	GEO	ECA	NICARAGUA	1994	NIC	LAC	ETHIOPIA	1994	ETH	SSA
GEORGIA	1997	GEO	ECA	PANAMA	1993	PAN	LAC	ETHIOPIA	1993	ETH	SSA
HUNGARY	1993	HUN	ECA	PANAMA	1996	PAN	LAC	GABON	1991	GAB	SSA
RUSSIA	1998	RUS	ECA	PARAGUAY	2001	PRY	LAC	GHANA	1996	GHA	SSA
RUSSIA	1996	RUS	ECA	PERU	1991	PER	LAC	GUINEA	1998	GIN	SSA
RUSSIA	1995	RUS	ECA	PERU	1998	PER	LAC	KENYA	2000	KEN	SSA
RUSSIA	1994	RUS	ECA	PERU	1992	PER	LAC	LESOTHO	1996	LSO	SSA
RUSSIA	1999	RUS	ECA	PERU	1993	PER	LAC	LESOTHO	2000	LSO	SSA
SLOVAK REPUBLIC	2002	SVK	ECA	ST. VINCENT & GRENS.	1999	VCT	LAC	LESOTHO	1998	LSO	SSA
SLOVAK REPUBLIC	2001	SVK	ECA	BAHRAIN, KINGDOM OF	1988	BHR	MNA	LESOTHO	2001	LSO	SSA
TURKEY	1981	TUR	ECA	ISRAEL	1996	ISR	MNA	MALAWI	1986	MWI	SSA
TURKEY	2001	TUR	ECA	ISRAEL	1977	ISR	MNA	NIGERIA	1989	NGA	SSA
DENMARK	1993	DNK	IND	ISRAEL	1979	ISR	MNA	NIGERIA	1988	NGA	SSA
DENMARK	1983	DNK	IND	ISRAEL	1988	ISR	MNA	NIGERIA	1987	NGA	SSA
ICELAND	1984	ISL	IND	ISRAEL	1993	ISR	MNA	NIGERIA	1978	NGA	SSA
IRELAND	1983	IRL	IND	ISRAEL	1998	ISR	MNA	NIGERIA	1983	NGA	SSA
NORWAY	1986	NOR	IND	ISRAEL	1975	ISR	MNA	NIGERIA	1990	NGA	SSA
SWEDEN	1980	SWE	IND	ISRAEL	1985	ISR	MNA	NIGERIA	1981	NGA	SSA
ARGENTINA	2002	ARG	LAC	ISRAEL	1989	ISR	MNA	NIGERIA	1980	NGA	SSA
ARGENTINA	2003	ARG	LAC	ISRAEL	1981	ISR	MNA	NIGERIA	1993	NGA	SSA
BOLIVIA	1995	BOL	LAC	ISRAEL	1973	ISR	MNA	NIGERIA	1986	NGA	SSA
BOLIVIA	1993	BOL	LAC	ISRAEL	1974	ISR	MNA	RWANDA	1998	RWA	SSA
BRAZIL	1993	BRA	LAC	ISRAEL	1978	ISR	MNA	RWANDA	1994	RWA	SSA
BRAZIL	1992	BRA	LAC	ISRAEL	1984	ISR	MNA	RWANDA	2002	RWA	SSA
COSTA RICA	1991	CRI	LAC	ISRAEL	1980	ISR	MNA	RWANDA	2003	RWA	SSA
COSTA RICA	1998	CRI	LAC	ISRAEL	1986	ISR	MNA	RWANDA	1990	RWA	SSA
COSTA RICA	1978	CRI	LAC	ISRAEL	1990	ISR	MNA	RWANDA	1996	RWA	SSA
ECUADOR	1998	ECU	LAC	ISRAEL	1976	ISR	MNA	SENEGAL	1983	SEN	SSA
ECUADOR	1993	ECU	LAC	ISRAEL	1992	ISR	MNA	SIERRA LEONE	2003	SLE	SSA
ECUADOR	1999	ECU	LAC	ISRAEL	1987	ISR	MNA	SIERRA LEONE	1986	SLE	SSA
ECUADOR	1992	ECU	LAC	ISRAEL	1983	ISR	MNA	SIERRA LEONE	1992	SLE	SSA
EL SALVADOR	1987	SLV	LAC	ISRAEL	1982	ISR	MNA	SIERRA LEONE	1985	SLE	SSA
EL SALVADOR	1986	SLV	LAC	JORDAN	1988	JOR	MNA	SIERRA LEONE	1990	SLE	SSA
GUYANA	1995	GUY	LAC	JORDAN	1972	JOR	MNA	SIERRA LEONE	1988	SLE	SSA
GUYANA	1987	GUY	LAC	JORDAN	1990	JOR	MNA	SIERRA LEONE	1995	SLE	SSA
GUYANA	1989	GUY	LAC	LEBANON	1996	LBN	MNA	SIERRA LEONE	1999	SLE	SSA
GUYANA	1986	GUY	LAC	LEBANON	1994	LBN	MNA	SIERRA LEONE	1993	SLE	SSA
GUYANA	1994	GUY	LAC	LEBANON	1999	LBN	MNA	SIERRA LEONE	1989	SLE	SSA
GUYANA	1988	GUY	LAC	LEBANON	1993	LBN	MNA	SIERRA LEONE	1987	SLE	SSA
GUYANA	1980	GUY	LAC	MOROCCO	1983	MAR	MNA	SIERRA LEONE	1996	SLE	SSA
GUYANA	1976	GUY	LAC	MOROCCO	1997	MAR	MNA	SIERRA LEONE	1998	SLE	SSA
GUYANA	1982	GUY	LAC	MOROCCO	1992	MAR	MNA	SIERRA LEONE	1997	SLE	SSA
GUYANA	1979	GUY	LAC	SAUDI ARABIA	1996	SAU	MNA	SIERRA LEONE	2001	SLE	SSA
GUYANA	1991	GUY	LAC	SAUDI ARABIA	1998	SAU	MNA	SUDAN	1999	SDN	SSA
GUYANA	1985	GUY	LAC	MALDIVES	1985	MDV	SAS	SUDAN	1998	SDN	SSA
GUYANA	1975	GUY	LAC	MALDIVES	1982	MDV	SAS	SWAZILAND	1984	SWZ	SSA
GUYANA	1992	GUY	LAC	NEPAL	1991	NPL	SAS	UGANDA	2001	UGA	SSA
GUYANA	1990	GUY	LAC	PAKISTAN	1972	PAK	SAS	UGANDA	2002	UGA	SSA
HAITI	2002	HTI	LAC	SRI LANKA	1991	LKA	SAS	ZAMBIA	1993	ZMB	SSA
HONDURAS	1998	HND	LAC	SRI LANKA	1977	LKA	SAS	ZAMBIA	1982	ZMB	SSA
HONDURAS	1992	HND	LAC	SRI LANKA	1985	LKA	SAS	ZAMBIA	1990	ZMB	SSA
HONDURAS	1996	HND	LAC	BURUNDI	1996	BDI	SSA	ZAMBIA	1991	ZMB	SSA
HONDURAS	1993	HND	LAC	BURUNDI	1999	BDI	SSA	ZAMBIA	1995	ZMB	SSA
HONDURAS	1994	HND	LAC	BURUNDI	1998	BDI	SSA	ZAMBIA	1994	ZMB	SSA
HONDURAS	1990	HND	LAC	BURUNDI	1987	BDI	SSA	ZAMBIA	1996	ZMB	SSA
JAMAICA	1997	JAM	LAC	BURUNDI	2001	BDI	SSA	ZAMBIA	1986	ZMB	SSA
JAMAICA	1984	JAM	LAC	BURUNDI	1988	BDI	SSA	ZAMBIA	1998	ZMB	SSA
JAMAICA	1994	JAM	LAC	BURUNDI	1993	BDI	SSA	ZAMBIA	1984	ZMB	SSA
JAMAICA	1998	JAM	LAC	BURUNDI	1986	BDI	SSA	ZAMBIA	1985	ZMB	SSA
JAMAICA	1985	JAM	LAC	BURUNDI	1991	BDI	SSA	ZIMBABWE	1995	ZWE	SSA
JAMAICA	1983	JAM	LAC	BURUNDI	1995	BDI	SSA				
JAMAICA	1993	JAM	LAC	BURUNDI	2002	BDI	SSA				

Table A3. Episodes with δ<-10

Country	Year	Code	Region	Country	Year	Code	Region
INDONESIA	1998	IDN	EAP	SAUDI ARABIA	1999	SAU	MNA
ALBANIA	1998	ALB	ECA	MALDIVES	1984	MDV	SAS
AUSTRALIA	1980	AUS	IND	MALDIVES	1983	MDV	SAS
ECUADOR	2001	ECU	LAC	PAKISTAN	1973	PAK	SAS
ECUADOR	2000	ECU	LAC	CHAD	1994	TCD	SSA
GUYANA	1984	GUY	LAC	CHAD	1991	TCD	SSA
GUYANA	1996	GUY	LAC	CHAD	1998	TCD	SSA
GUYANA	1978	GUY	LAC	CONGO, DEM. REP. OF	1991	ZAR	SSA
HONDURAS	1991	HND	LAC	CONGO, REPUBLIC OF	2000	COG	SSA
JAMAICA	1992	JAM	LAC	COTE D IVOIRE	1998	CIV	SSA
NICARAGUA	1996	NIC	LAC	ETHIOPIA	1995	ETH	SSA
PANAMA	1989	PAN	LAC	GUINEA	1991	GIN	SSA
PANAMA	1990	PAN	LAC	LESOTHO	2003	LSO	SSA
ST. VINCENT & GRENS.	1997	VCT	LAC	LESOTHO	2002	LSO	SSA
SURINAME	1975	SUR	LAC	NIGERIA	1995	NGA	SSA
BAHRAIN, KINGDOM OF	1990	BHR	MNA	RWANDA	1995	RWA	SSA
BAHRAIN, KINGDOM OF	1987	BHR	MNA	SIERRA LEONE	2000	SLE	SSA
JORDAN	1992	JOR	MNA	SWAZILAND	1985	SWZ	SSA
JORDAN	1989	JOR	MNA	TOGO	1985	TGO	SSA
LEBANON	1997	LBN	MNA	UGANDA	1999	UGA	SSA
MOROCCO	1991	MAR	MNA	UGANDA	1992	UGA	SSA
OMAN	1992	OMN	MNA	ZAMBIA	1987	ZMB	SSA
OMAN	1993	OMN	MNA	ZIMBABWE	1996	ZWE	SSA
OMAN	1987	OMN	MNA				
OMAN	1999	OMN	MNA				
OMAN	1995	OMN	MNA				
OMAN	1989	OMN	MNA				

Table A4. Debt Explosions

Code	Reg	Year	deficit	d	θ	Code	Reg	Year	deficit	d	θ
ALB	ECA	1997	12.75	24.88	14.86	LSO	SSA	1998	3.84	21.99	14.95
ARG	LAC	2002	1.11	89.12	92.20	LSO	SSA	2000	3.44	23.97	16.43
BDI	SSA	1995	2.66	13.49	10.47	LSO	SSA	2001	0.64	25.91	20.34
BDI	SSA	1987	1.02	12.11	13.05	MAR	MNA	1984	6.04	15.49	11.05
BDI	SSA	2003	5.10	18.45	13.68	MAR	MNA	1981	13.36	18.02	11.71
BDI	SSA	1986	-2.54	21.24	14.24	MAR	MNA	1992	1.39	20.09	11.93
BDI	SSA	1992	8.91	22.55	15.31	MAR	MNA	1983	7.75	22.99	14.84
BDI	SSA	1993	5.47	21.71	15.45	MDV	SAS	1982	5.70	36.10	31.96
BDI	SSA	1983	0.91	17.30	15.94	MEX	LAC	1982	11.92	24.34	19.67
BDI	SSA	1998	4.93	40.26	16.30	MEX	LAC	1986	13.05	35.13	22.33
BDI	SSA	1988	-0.73	18.35	16.72	MNG	EAP	1996	7.68	31.12	12.53
BDI	SSA	1999	6.66	50.18	29.65	MNG	EAP	1994	8.96	47.47	13.57
BDI	SSA	2002	1.08	70.60	47.65	MNG	EAP	1999	10.79	13.56	15.19
BEL	IND	1981	11.96	14.63	10.38	MNG	EAP	1998	11.62	33.99	21.65
BEL	IND	1983	12.06	15.91	10.46	MNG	EAP	1993	17.87	47.19	34.63
BEL	IND	1982	10.70	13.99	11.03	MUS	SSA	1982	12.51	18.87	11.08
BLR	ECA	1994	1.83	74.38	70.74	MWI	SSA	1986	9.90	35.97	26.55
BOL	LAC	1993	4.74	18.38	12.00	NGA	SSA	1990	8.47	51.07	10.76
CMR	SSA	1993	1.73	9.29	11.91	NGA	SSA	1983	9.44	24.67	23.90
CMR	SSA	1991	5.24	11.42	13.17	NGA	SSA	1987	5.40	31.50	30.59
CMR	SSA	1994	2.90	82.55	83.45	NGA	SSA	1986	11.29	40.27	33.10
CRI	LAC	1978	4.36	19.34	13.93	NIC	LAC	2002	1.34	26.98	14.50
DNK	IND	1981	5.85	12.94	10.39	NIC	LAC	1993	0.04	68.50	26.10
DNK	IND	1993	2.44	13.74	11.44	NIC	LAC	1994	0.02	79.53	39.60
DNK	IND	1983	6.61	18.70	11.81	NIC	LAC	1997	0.76	84.65	65.80
DNK	IND	1982	7.78	16.79	13.05	NIC	LAC	1991	-4.22	243.68	111.50
ECU	LAC	1999	0.59	27.56	28.30	NPL	SAS	1991	8.00	18.57	11.97
ESP	IND	1993	5.88	13.70	11.05	OMN	MNA	1972	12.13	10.15	10.08
ETH	SSA	1990	9.77	14.45	11.81	OMN	MNA	1986	25.01	16.95	14.85
ETH	SSA	1994	9.95	48.11	27.42	PAK	SAS	1972	4.77	42.19	39.40
ETH	SSA	1993	5.49	44.03	40.80	PAN	LAC	1978	6.49	14.07	11.52
FIN	IND	1992	14.43	16.21	17.06	PAN	LAC	1996	0.65	18.83	17.70
FIN	IND	1993	13.07	16.99	17.83	PER	LAC	1998	0.19	14.91	11.00
GEO	ECA	1998	3.49	16.83	10.34	PNG	EAP	1994	2.54	16.29	10.74
GEO	ECA	1999	2.27	20.09	14.99	PNG	EAP	2001	1.33	16.70	12.28
GHA	SSA	1993	2.51	12.09	11.55	RUS	ECA	1999	1.18	23.25	15.60
GHA	SSA	1996	2.97	15.18	11.97	RUS	ECA	1998	4.83	25.62	18.40
GIN	SSA	1998	4.34	19.31	14.04	RWA	SSA	2002	2.17	17.06	12.09
GMB	SSA	1978	10.01	17.01	14.22	RWA	SSA	2003	3.48	23.72	16.93
GUY	LAC	1975	6.51	29.64	11.86	RWA	SSA	1990	5.68	23.45	21.71
GUY	LAC	1985	37.97	62.90	16.28	RWA	SSA	1994	1.92	47.73	45.35
GUY	LAC	1979	17.47	30.43	16.37	SAU	MNA	1998	3.29	19.12	14.67
GUY	LAC	1977	11.91	15.29	20.06	SAU	MNA	1996	3.13	21.46	16.43
GUY	LAC	1973	16.23	24.87	22.16	SDN	SSA	1999	0.89	69.81	22.12
GUY	LAC	1987	40.94	72.42	24.92	SLE	SSA	1986	2.33	36.94	12.07
GUY	LAC	1984	45.55	33.35	27.91	SLE	SSA	1980	12.78	21.92	15.54
GUY	LAC	1976	27.46	44.75	31.24	SLE	SSA	1995	5.67	34.68	16.56
GUY	LAC	1986	60.20	107.29	45.37	SLE	SSA	1996	5.76	34.51	19.21
GUY	LAC	1990	21.65	303.58	47.99	SLE	SSA	2003	7.04	46.65	27.35
GUY	LAC	1991	24.38	226.70	53.53	SLE	SSA	1990	2.45	51.44	27.90
GUY	LAC	1989	6.98	136.35	66.95	SLE	SSA	1992	4.85	72.50	38.11
GUY	LAC	1983	40.30	35.07	71.22	SLE	SSA	2001	11.10	64.84	49.34
GUY	LAC	1982	66.05	92.02	78.18	SLE	SSA	1999	8.46	94.09	58.89
GUY	LAC	1980	29.15	107.47	101.19	SLE	SSA	1998	4.55	63.99	68.81
HND	LAC	1990	6.84	58.52	52.09	SLV	LAC	1981	6.39	16.29	15.57
HRV	ECA	1999	1.78	14.55	10.81	SUR	LAC	1985	19.95	17.60	18.74
HRV	ECA	1998	-0.91	15.50	12.30	SUR	LAC	1986	25.04	29.45	28.69
HTI	LAC	2002	2.71	17.93	14.10	SVK	ECA	2001	3.17	14.60	12.39
HUN	ECA	1993	5.72	21.09	10.27	SWE	IND	1992	4.84	14.84	11.66
IDN	EAP	1978	3.14	14.19	10.74	SWE	IND	1993	15.03	11.87	11.87
IDN	EAP	1982	1.90	13.61	11.07	SWE	IND	1980	7.84	18.00	15.63
IDN	EAP	1986	3.52	22.13	19.86	SWZ	SSA	1984	0.50	20.26	18.26
IDN	EAP	1997	0.67	51.81	48.55	TCD	SSA	1994	12.55	-2.27	10.09
ISR	MNA	1984	18.84	223.12	10.49	TCD	SSA	1992	12.79	13.12	10.13
ISR	MNA	1981	21.97	142.39	15.02	TCD	SSA	2000	4.80	5.95	12.55
ISR	MNA	1976	18.39	59.67	20.77	TCD	SSA	1993	5.54	12.60	15.21
ISR	MNA	1979	15.12	89.61	24.64	TCD	SSA	1999	5.96	24.08	17.14
ISR	MNA	1977	19.43	69.90	36.42	TUN	MNA	1986	7.14	14.82	11.03
ISR	MNA	1980	16.17	130.39	45.36	TUR	ECA	2001	19.64	48.71	39.23
ISR	MNA	1983	26.78	300.14	189.53	UGA	SSA	2001	2.19	24.62	20.96
JAM	LAC	1998	6.70	20.53	12.41	VCT	LAC	1999	2.96	17.64	14.42
JAM	LAC	1999	4.54	26.63	19.23	ZAR	SSA	1996	0.32	158.19	10.11
JAM	LAC	1997	6.35	34.74	23.35	ZAR	SSA	1975	5.85	12.95	10.89
JAM	LAC	1983	19.88	66.10	57.16	ZAR	SSA	1995	-0.02	207.28	63.39
JOR	MNA	1987	8.97	14.97	11.26	ZAR	SSA	1994	1.77	141.87	65.80
JOR	MNA	1990	3.54	21.61	12.89	ZAR	SSA	1990	6.53	233.42	192.21
JOR	MNA	1988	9.05	141.95	140.37	ZMB	SSA	1998	5.48	45.41	10.98
KOR	EAP	1981	3.25	15.71	15.04	ZMB	SSA	1996	2.44	62.53	23.82
LBN	MNA	1998	16.00	21.66	11.03	ZMB	SSA	1991	45.15	135.08	32.77
LBN	MNA	1994	17.20	31.06	18.71	ZMB	SSA	1982	18.56	44.08	33.11
LBN	MNA	1996	20.58	31.31	20.32	ZMB	SSA	1985	15.17	74.69	55.22
LBN	MNA	1999	16.18	29.38	21.78	ZMB	SSA	1990	8.65	127.72	59.23
LKA	SAS	1977	4.59	17.31	10.56	ZMB	SSA	1986	15.03	158.14	107.10
LKA	SAS	1985	9.68	25.05	12.00	ZWE	SSA	1984	8.10	16.58	10.69
LKA	SAS	1988	12.70	21.03	13.36	ZWE	SSA	1995	9.40	33.82	21.72

Figure 1. Decomposition of Debt Growth

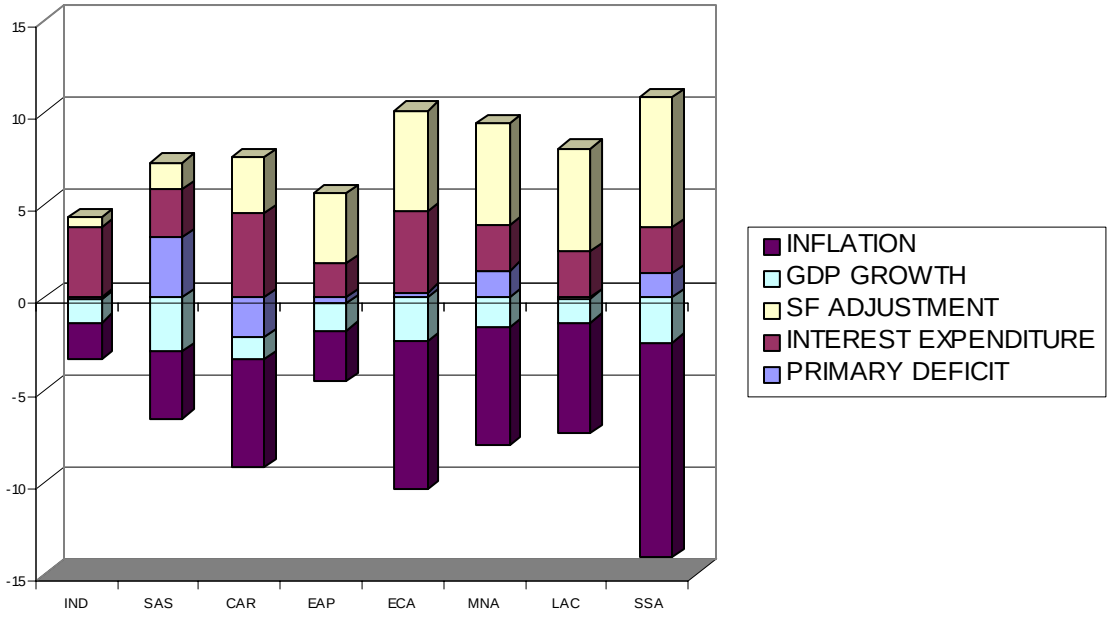

Figure 2. Deficit and Change in Debt

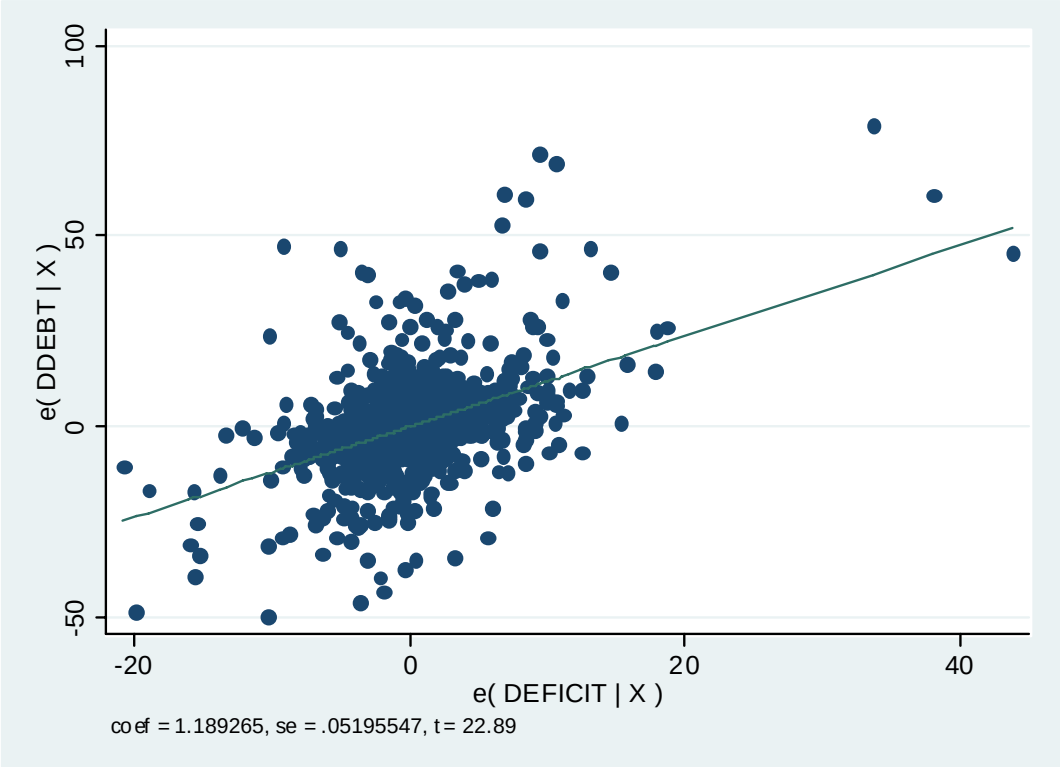

Figure 3. Distribution of ϕ under Different Assumption for α and β

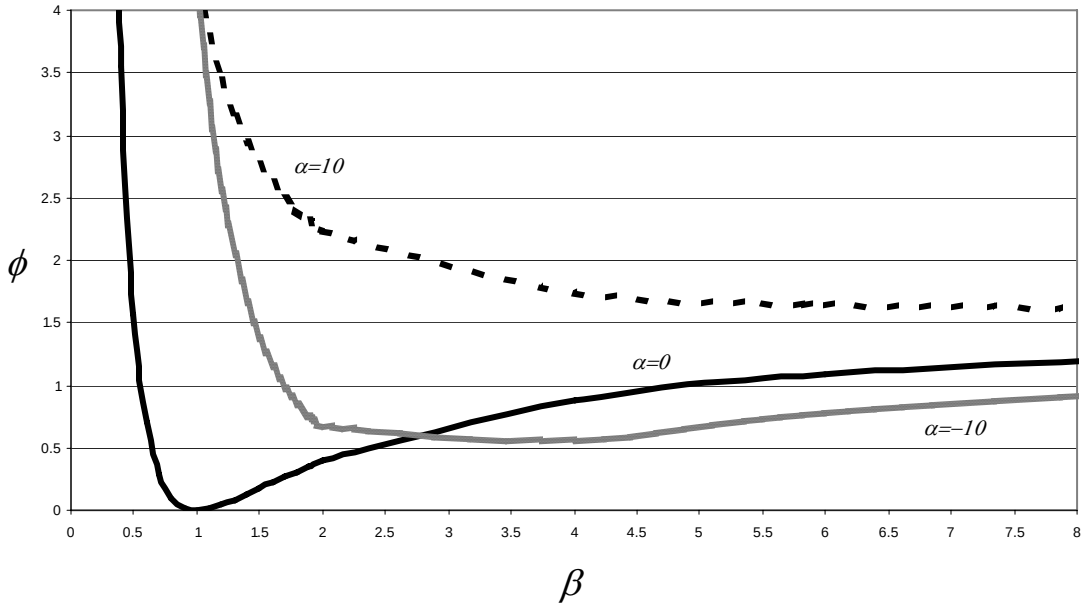

Figure 4. Values of ϕ for Different Countries

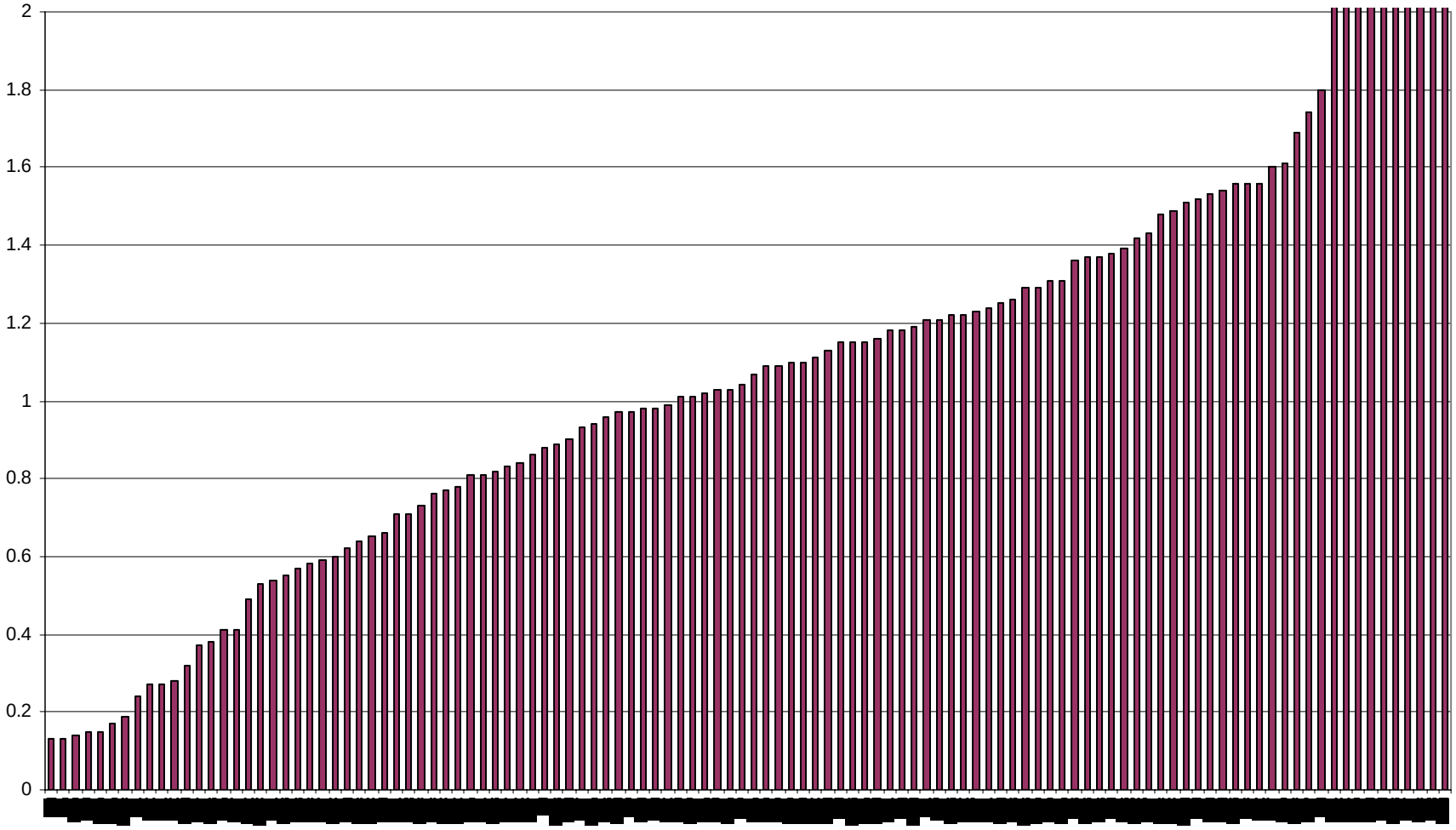

Figure 5: Changes in Debt over GDP (θ) and Ratio between Deficit and Change in Debt (ρ)