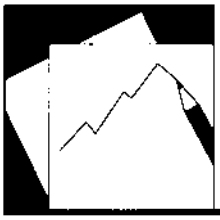
Working Paper

INTERNATIONAL MONETARY FUND

WP/08/42



IMF Working Paper

Budget Deficits and Interest Rates: A Fresh Perspective

Ari Aisen and David Hauner

INTERNATIONAL MONETARY FUND

 WP/08/42

IMF Working Paper

Fiscal Affairs Department

Budget Deficits and Interest Rates: A Fresh Perspective

Prepared by Ari Aisen and David Hauner[1]

Authorized for distribution by Steven Symansky

February 2008

Abstract

We extend the literature on budget deficits and interest rates in three ways: we examine both advanced and emerging economies and for the first time a large emerging market panel; explore interactions to explain some of the heterogeneity in the literature; and apply system GMM. There is overall a highly significant positive effect of budget deficits on interest rates, but the effect depends on interaction terms and is only significant under one of several conditions: deficits are high, mostly domestically financed, or interact with high domestic debt; financial openness is low; interest rates are liberalized; or financial depth is low.

JEL Classification Numbers: E43, E62

Keywords: Budget deficits, fiscal policy, interest rates, system GMM

Author's E-Mail Address: aaisen@imf.org, dhauner@imf.org

[1] We are grateful to Thierry Tressel for providing the data on interest rate liberalization, and to Eduardo Borensztein, Mark De Broeck, Stijn Claessens, David Coe, Xavier Debrun, Edimon Ginting, Manmohan Kumar, Alessandro Prati, Sven Stehn, Steve Symansky, Carlos Végh, Rodrigo Vergara, and participants in seminars at the IMF and the Central Bank of Chile, for helpful comments.

Contents Page

I. INTRODUCTION

Although it is one of the most studied issues in macroeconomics, it remains a subject of debate whether budget deficits affect interest rates and, if so, under what conditions. About a hundred papers have examined this crucial relationship for the advanced economies,[2] and yet the most pertinent conclusion from all this work remains the heterogeneity of its findings. For the U.S. alone, Gale and Orszag (2003) count about 30 studies that find robustly positive effects of deficits on interest rates, and about 30 that do not. Given this heterogeneity in the empirical literature, Bernheim (1989) aptly concludes that "it is easy to cite a large number of studies that support any conceivable position." However, despite this wealth of research, several important angles have so far received very little or no attention.

The main contribution of this paper is to extend the literature in three new directions. First, while there is so far very limited cross-country evidence on emerging markets,[3] we use a panel dataset of 60 advanced and emerging economies. This provides not only findings on emerging markets per se, but allows for a comparison between advanced and emerging economies and adds variation to the data. Second, we exploit this gain in variation to examine possible interactions between budget deficits and structural characteristics of the economy that may help shed some light on the heterogeneity in the existing literature. Third, while the literature has typically used VAR or conventional instrumental variable techniques, we use system GMM that provides for potentially much greater efficiency in the estimation.

We come to three main conclusions. First, there is a highly significant positive effect of budget deficits on interest rates in the order of about 26 basis points per 1 percent of GDP for the complete panel. Second, however, this effect varies by country group and period: the effects are larger and more robust in the emerging markets and in later periods than in the advanced economies and in earlier periods. Third, the effect of budget deficits on interest rates depends on interaction terms and is only significant under one of several conditions: deficits are high, mostly domestically financed, or interact with high domestic debt; financial openness is low; interest rates are liberalized; or financial depth is low.

These interactions may go a long way towards explaining some of the heterogeneity in the existing literature. Moreover, these findings also hold important policy implications, particularly regarding the effectiveness of fiscal stabilization. They suggest that fiscal policy is more effective when the initial budget deficit and level of debt are lower, and when financial openness and financial depth are greater, because the effect of deficits on interest rates is smaller under these conditions, implying less crowding out. The paper proceeds as follows: section II discusses the model and methodology; section III reviews the data; section IV presents the results; and section V concludes.

---

[2] See the recent surveys in Gale and Orszag (2003), which is also a good source for a brief discussion of the macroeconomic effects of budget deficits, and European Commission (2004).

[3] There are a few papers that examine the effect of budget deficits for individual emerging markets (Dua and Pandit, 2002, for India; Easterly and Schmidt-Hebbel, 1994, for Colombia, and Gochoco, 1991, for the Philippines). There are also cross-country studies on interest rate determination in emerging markets (Frankel et al., 2004; Neumeyer and Perri, 2005), but they do not account for the potential impact of fiscal policy.

II. MODEL AND METHODOLOGY

We estimate a standard reduced form equation of the nominal interest rate (i_t) in small open economies, as derived, for example, in Edwards and Khan (1985):[4]

$$i_{i,t} = \delta_0 + \delta_1 \overset{+}{i^*_{i,t}} + \delta_2 \overset{+}{s^e_{i,t}} + \delta_3 \overset{+}{r_{i,t}} + \delta_4 \overset{+}{\pi^e_{i,t}} + \delta_5 \log \overset{-}{m_{i,t}} + \delta_6 \overset{+}{y_{i,t}} + \delta_7 \overset{+}{d_{i,t}} + \delta_8 \overset{+}{i_{i,t-1}} + \varepsilon_{i,t}, \qquad (1)$$

where the lagged dependent variable accounts for delayed adjustment. In the polar case of perfect capital mobility, the nominal interest rate is determined only by external factors, namely the foreign nominal interest rate ($i^*_{i,t}$), expected depreciation ($s^e_{i,t}$), and a country-specific risk spread ($r_{i,t}$). In the polar case of a closed economy, the nominal interest rate is determined only by domestic factors, namely expected inflation ($\pi^e_{i,t}$), real money supply ($m_{i,t}$), which influences the nominal interest rate temporarily through liquidity, and the real interest rate. The real rate, in turn, is determined, as in the Solow growth model, by the rate of population growth, the rate of technical progress, and the savings rate. Here, the first two factors are captured by real GDP growth ($y_{i,t}$), while the savings rate is captured by the constant (δ_0) and the budget deficit ($d_{i,t}$).The expected signs appear above the variables. We are most interested in testing the null hypothesis that deficits have no effect, i.e., that $\delta_7 = 0$.

In this model, the extent to which budget deficit affect interest rates will depend on several factors. First, on the degree of capital mobility, where increasing mobility implies that more of the adjustment to higher deficits occurs through the exchange rate and less through higher domestic real interest rates. Second, it will depend on the degree to which deficits are financed domestically or externally, where only the former should affect the domestic real rate. Third, it will depend on the extent to which debt neutrality (Ricardian equivalence) holds, where more Ricardian behavior of households implies a smaller effect of deficits on interest rates. The degree of Ricardiansim will be, in particular, an increasing function of the degree of financial development and the planning horizon (Seater, 1993). Finally, it will depend on the degree to which interest rates are market-determined in the first place. These factors are at the heart of our examination of cross-country heterogeneity in the effect of budget deficits on interest rates. They suggest, in particular, that the effect is likely to be larger in developing countries where financial systems tend to be less developed, capital markets are often not fully liberalized, and planning horizons may also be shorter.

There are two main challenges in identification. One is that there is likely to be at least some degree of multicollinearity between several of the independent variables, particularly inflation, depreciation, and the budget deficit. A possible solution to this problem would be to bring the foreign rate, depreciation, and inflation to the left hand side and examine only the determinants of the residual interest rate spread. However, this imposes coefficients equal to one on these variables, which is not supported by the empirical literature. In particular, it is well established that inflation is not immediately incorporated in yields; indeed, we will later also

[4] We modify their model in two aspects: first, we add a risk premium; second, we make the real interest rate time-variant not only through the liquidity effect, but also through the budget deficit and output growth.

only find a coefficient of about 0.4. We thus follow the bulk of the literature[5] in looking at nominal rates. However, we use staggered regressions to examine to what extent multicollinearity may bias the coefficient on the deficit, in particular.

The second challenge is the potential endogeneity of several regressors. To address this problem, the literature has used either vector autoregressions (VARs) or instrumental variable estimators. However, both have significant shortcomings: VARs tend to be sensitive to ordering and do not lend themselves to the modeling of multiplicative relationships, which we are particularly interested in here. Many instrumental variable estimators, in turn, tend to suffer from weak instruments that make instrumental variable point estimates, hypothesis tests, and confidence intervals unreliable.

As a significant innovation to the existing literature, we use the two-step system GMM estimator developed in Arellano and Bover (1995) and Blundell and Bond (1998). It estimates in a system the regression equations in differences and levels, each with its specific set of instruments. Relative to conventional instrumental variable methods, it improves substantially on the weak instruments problem through more formal checks of the validity of the instruments and provides for potentially improved efficiency.. At the same time, it does not suffer from the aforementioned shortcomings of VARs. The approach is also appropriate for our purposes insofar as there is likely to be group-specific heteroskedasticity and serial correlation, and some variables may be predetermined (neither endogenous nor exogenous).

We implement the estimator with the program developed by Roodman (2006).[6] We include time dummies because they make the required assumption of no correlation across groups in the idiosyncratic disturbances more likely to hold, and use orthogonal deviations to maximize sample size in our panel with many gaps. The foreign interest rate and the time dummies are treated as exogenous, and all other variables as endogenous.

We deliberately do not use heterogeneous panel estimators, because ours is a story about cross-country and cross-period heterogeneity in the effects of deficits on interest rates. While such heterogeneity is typically undesirable, we are interested in exploiting it through various interaction terms. Applying heterogeneous panel estimators would not allow us to do this. Moreover, our specific interest in the between-group effects suggests that the efficiency gains from pooling outweigh the consistency loss. More generally, Baltagi et al. (2000) show that pooled estimators outperform heterogeneous panel estimators, as the former rely more on the between variation and thus produce more stable parameter estimates.

[5] E.g., Bernhardsen (2000), Dua and Pandit (2002), Evans (1987a, b), or Modigliani and Jappelli (1988).

[6] We apply the Windmeijer (2005) correction to the reported standard errors. Lag length selection is guided by the Arellano-Bond and Hansen tests. We use the maximum possible number of up to six lags in almost all cases. We collapse the instruments to limit their number. As the Hansen test becomes weak when instruments are many, we follow Roodman's (2006) rule of thumb to limit the number of instruments to the number of groups.

III. DATA

We estimate (1) for a 1970–2006 panel of 60 advanced and emerging economies that is typically used in the literature because of good data availability (see list in the Appendix). We exclude the U.S., as no plausibly exogenous international rate is available. Most data are from the IMF International Financial Statistics (IFS).

For nominal interest rates, we would prefer to use long rates because they are less affected by monetary policy, including its reaction to fiscal policy. However, the availability of long rates is limited, particularly in the earlier periods for emerging markets, and even much of the literature for advanced economies uses short rates.[7] We thus also use short rates with a maturity of three to twelve months. To maximize sample size, we pool (in the order of preference) T-bill rates (IFS line 60c), money market rates (IFS line 60b), savings rates (IFS line 60l), and lending rates (IFS line 60p). Pooling should be unproblematic because they are all extremely highly correlated; where two series need to be connected, we use ratio splicing.

To reduce the influence of short-run effects that may be introduced by using short rates, including the business cycle and monetary conditions, and focus on the cross-sectional and long-run effects, we average the data over five-year non-overlapping periods.[8] This approach is new in the interest rate literature, although it is common in the growth literature (e.g., Adam and Bevan, 2005; Easterly et al., 1997) and has been used in other contexts as well, such as the determinants of current account deficits (e.g., Calderon et al., 2002; Chinn and Ito, 2007).

We use the IMF World Economic Outlook Database for the budget deficit, as it should cover the general government, which is not always the case in the IFS, and for GDP. The foreign rate is the yield of one-year U.S. treasury bills (IFS line 61). Depreciation is the percent increase in the U.S. dollar exchange rate (IFS line rf). The risk spread is proxied by the International Country Risk Guide (ICRG) rating.[9] Inflation is the average annual change in the consumer price index (IFS line 64). Real money supply is given by the growth rate of the ratio of broad money (IFS line 35l) to GDP.[10] Finally, there is real GDP growth (WEO line NGDP_R).

---

[7] E.g., Barro and Sala-i-Martin (1990), Bernhardsen (2000), Driffill and Snell (2003), Evans (1987a, b), or Neumeyer and Perri (2005).

[8] We included the years 2005–06 in the last window.

[9] We do not use actual spreads because they are not available for many of the emerging markets in the earlier periods. Even the ICRG rating is available only from 1984 on, truncating our sample at the beginning when this variable is added to the regression. We prefer the ICRG to ratings of the major agencies due to better coverage.

[10] We need the growth rate of money supply instead of the level to control for monetary conditions as opposed to the degree of monetization. Nominal GDP is used as the deflator to proxy for money demand.

The interaction variables are domestic financing (IFS line 84a), domestic debt (IFS line 88a),[11] and financial depth measured by the liquid liabilities of the banking system (IFS line 55l or 34+35 if unavailable), each in percent of GDP. Moreover, they include indices of capital account and interest rate liberalization from Chinn and Ito (2006) and Abiad et al. (2007), respectively, where in both cases higher values imply greater liberalization.

A key implementation issue concerns expectations. Theory suggests that interest rates are determined by expected depreciation, inflation, and budget deficits (on the latter, see Feldstein, 1986). Ideally, we would have liked to use survey data, but even the most widely available consistent source (Consensus Economics, Inc.) only provides expected deficits for 21 countries. Thus, we follow much of the literature[12] in assuming that expectations equal current conditions, an extreme form of adaptive expectations where current conditions receive a weight equal to one. This assumption implies that these variables behave like random walks with zero drift, or as Garcia and Perron (1996) point out, assumes that agents use available information efficiently. This is indeed likely to be the case here, as our horizon of only up to one year implies that current and expected inflation are very highly correlated.[13]

We prefer this approach to the two available alternatives for the following reasons. First, there would be little to gain from using actual future outcomes, because we average all data over five years.[14] Second, imposing an ARMA process on the data to capture adaptive expectations implies a greater potential consistency loss than our simple approach.

Table 1 shows the descriptive statistics of the variables.

IV. RESULTS

A. Baseline

We start by examining the marginal effects of our independent variables on interest rates, given that some coefficients, such as those on budget deficits and inflation, are likely to be affected by multicollinearity. **Table 2** reports the results for the entire sample. We first regress the interest rate only on the budget deficits, plus the lagged dependent variable and the time dummies. The coefficient is highly significant and suggests that an increase in the deficit by 1 percent of GDP increases the interest rate by 44 basis points. Adding the other independent variables one by one leaves the coefficient on the budget deficit always highly significant, but reduces its size progressively to 26 basis points. This effect is of medium size when compared

[11] IFS defines as domestic debt obligations to domestic residents, or—if this information is unavailable—in domestic currency. Where IFS data is unavailable, we add data from Jeanne and Guscina (2006).

[12] E.g., Bai and Perron (2003), Driffill and Snell (2003), Caporale and Grier (2005), Gargia and Perron (1996).

[13] This assumption is less likely to hold under very high and volatile inflation, but we removed 24 observations that included hyperinflations, defined by a five-year average nominal interest rate exceeding 100 percent.

[14] Take the 1990–94 average for inflation. Given that our expectations horizon is one year, using future outcomes for expectations implies that inflation in 1991–95 enters the 5-year average, while using current inflation for expectations implies that inflation in 1990–94 enters. Thus, four of five years in the average, or 80 percent of the information, is the same.

to estimates in the existing literature: for the U.S., Gale and Orszag (2003) conclude that the studies that do find a significantly positive effect put it in most cases in the range between 20-60 basis points for an increase in the budget deficit by 1 percent of GDP.

The final specification—we will call this the baseline—is overall satisfactory according to the Arellano-Bond and Hansen tests (while the previous specifications are not necessarily), and the instruments are jointly highly relevant and far smaller in number than the groups. The lagged interest rate is never significant, suggesting that the five-year averaging removes the dynamic effects. The coefficients on the foreign rate and inflation, the two variables for which theory and the existing empirical literature suggest the strongest priors, are consistently highly significant and have the expected sign, as well as the risk premium. The coefficient of 0.41 on inflation rate is also in line with many previous estimates, suggesting that inflation gets only gradually incorporated into interest rates; the size of the coefficient on the foreign rate is somewhat high though. Depreciation remains highly significant with the expected sign only as long as inflation is not included, which is unsurprising given the high correlation between these variables. GDP growth is not significant, but the only puzzling result is the highly significant positive coefficient on money supply. Possible interpretations are that it reflects a positive effect of money growth on inflation expectations that is not sufficiently captured by our adaptive-expectations proxy for inflation and outweighs the negative liquidity effect.

It is interesting to note some of the marginal effects on the budget deficit when adding other variables. Adding the international rate leaves the deficit coefficient completely unchanged (as one would expect), but adding depreciation reduces its size substantially, indicating that some effect of the deficit on interest rates occurs indirectly over depreciation. Including the risk premium unfortunately leads to a large loss in observations, but adding then inflation again substantially reduces the size of the deficit coefficient, in line with findings that deficits are inflationary (Cãtao and Terrones, 2005). The fact that adding money supply increases the effect of deficits seems to suggest evidence of accommodative monetary policy that dampens the effect of the deficit when monetary policy is not controlled for. The result that GDP growth reduces the effect of deficits is likely to reflect the positive short-run correlation between deficits and GDP growth that one would intuitively expect.

B. Periods and Regions

We now move on to examine the influence of particular country groups and periods on the overall results. **Table 3** shows the results, which again always meet the usual tests. In the first column, we add dummies for the last four periods.[15] The results imply that deficits had a negative effect on interest rates during 1985–1994, as the combined coefficients (e.g., for 1985–89 equal to 3.284 – 3.395 = –0.111) are highly significantly different from zero according to Wald tests. However, the combined coefficient becomes significantly positive from 1995 onwards, with an effect of 38 basis points for the 2000–06 period; for 1995–99, the effect is 170 basis points, which is on the larger end, possibly due to the many crises during this period; but the significance of the combined coefficient is low. The main point, however, is that the effect

[15] The first three periods, which all have relatively few observations, together form the control group.

of deficits on interest rates turned from negative during 1985–94 to positive during 1995–2006. The puzzling negative coefficient in the earlier period is likely to result from regulations that repress the financial system and prevent an adjustment of interest rates to market levels, although there are also possible theoretical justifications for this seemingly paradoxical result (Agénor and Montiel, 1999, p. 181; Mountford and Uhlig, 2005). In any case, the switch in the sign of the deficit coefficient is likely to explain some of the heterogeneity in the previous literature and provides us an opening for the examination of interactions with structural characteristics of these economies that may have changed during this period, including the degree of interest rate liberalization.

The remaining columns of the table examine the effects of deficits on interest rates in various country groups. Three main findings emerge. First, an increase in the deficit ratio in emerging markets raises interest rates there by 24 basis points, while there is no significant effect in the advanced economies, in line with a large part of the literature (see introduction). These are the results from running the baseline separately for the two country groups, which is more consistent than pooling and allowing only the deficit coefficient to differ. This also means that the results in Table 2 for the entire sample are driven by the emerging economies.

Second, deficits affect interest rates in emerging more than in advanced economies. We just saw that this is the case when running the regressions separately for the two groups. However, while allowing only the deficit coefficient to differ between advanced and emerging economies (or between advanced economies and four different emerging market groups) yields significant positive coefficients also for the advanced economies, the effect is still statistically weaker and much smaller in magnitude than for the emerging markets.

Third, the effect of deficits on interest rates is larger in Latin America than in other regions. The magnitude of the effect is even implausibly large, probably due to the high incidence of crisis episodes in this region. For emerging markets in Asia and Europe, the results suggest an effect of about 60 basis points in both cases, which would be in line with larger previous estimates for advanced economies (see introduction). Interestingly, the effect of deficits on interest rates is highly significantly negative in the Middle East and Africa region, possibly reflecting relatively strong financial repression. Again, it seems crucial to understand what structural differences between the economies in the various regions, as well as between advanced and emerging economies, are behind these heterogeneous results.

C. Interactions

To examine this issue, we run the baseline with various variables interacting with the deficit. To bring out the extremes, we code the interaction terms as “high” and “low” dummies that equal one for values above and below the median, respectively. Note that it is not possible to do all interactions at the same time due to collinearity. We obtain a number of interesting results, shown in **Table 4**. Again all the regressions meet the usual tests.

First, deficits matter more for interest rates when they are large, domestically financed, or interacting with a high domestic debt. While low deficits do not significantly affect interest rates, the effect of large deficits is 52 basis points, twice the 26 basis points we found in the baseline. Regarding the interaction with domestic debt, on the face of it, the effect seems to be

larger for small debt. However, this reflects the fact that small domestic debt often simply reflects low financial depth. When we control for financial depth, deficits have a larger effect when they interact with high domestic debt, with the coefficient increasing to 65 basis points. Interacted with low debt, the coefficient is not even significant.

The nonlinear effect of deficits on interest rates and the interaction with debt are well established in the literature. However, the difference between domestic and external financing seems to be a novel result, although this distinction is an obvious one to make, because external financing should not affect the domestic saving-investment balance.[16] As expected, the effect is much larger and significant only when deficits are mostly financed domestically, with a coefficient of 92 basis points.

Second, greater financial openness reduces the effect of deficits on interest rates. The coefficient is 67 basis points for low financial openness, while it is not even significant for high financial openness. This result is important also because it provides empirical evidence on the effectiveness of fiscal policy under varying degrees of financial openness, a subject on which little work has been done so far. Our finding on interest rates is consistent with the result in Dellas et al. (2005) that the fiscal multiplier increases with financial openness.

Third, higher financial liberalization increases the effect of deficits on interest rates. The effect is 67 basis points under high interest rate liberalization and 45 basis points under low financial liberalization, and the difference is significant at the 13 percent level. This is an important finding because it shows how the well-known fiscal incentives for financial repression (Bencivenga and Smith, 1992) materialize in a lower effect of deficits on interest rates. At the extreme, these incentives can lead to a negative coefficient of deficits on interest rates, because a government may have a stronger incentive to control interest rates when deficits are high than when they are moderate, potentially leading to paradoxically lower interest rates in the country with the higher deficits. Financial repression is also likely to explain the result above that the effect of deficits on interest rates used to be smaller before the mid-1990s and is smaller in the Middle East than other regions.

Fourth, lower financial depth increases the effect of deficits on interest rates. The effect is actually even implausibly large—200 basis points—under low financial depth, while it is not significant under high financial depth. This is also a novel empirical result. It can be interpreted in at least two ways: low financial depth may exacerbate risk premium effects on interest rates, as argued theoretically in Caballero and Krishnamurty (2004); or it may lead to more direct competition by the government for the same funding that the private sector uses (namely bank credit), thus increasing the effect of deficits on interest rates (Montiel, 2003).

We would have liked to examine the interactions separately by region or period, but this is precluded by sample size. Moreover, given that the several interaction terms are highly collinear, it does not make sense to include them jointly in the same regression. We also experimented with a number of other possible interactions, in particular the exchange rate regime (using data from Levy-Yeyati and Sturzenegger, 2005) and political instability (using data from Aisen and Veiga, 2006), but do not find any significant effects.

[16] Adam and Bevan (2005) found that the effect of deficits on growth depends on the way they are financed.

V. CONCLUSIONS

This paper added a fresh perspective on the longstanding question whether budget deficits affect interest rates. We extended the literature by examining both advanced and emerging economies and for the first time a large emerging market panel; exploring interactions to explain some of the heterogeneity in the literature; and applying system GMM. We draw three main conclusions. First, there is a highly significant positive effect of budget deficits on interest rates in the order of about 26 basis points per 1 percent of GDP for the complete panel. Second, however, this effect varies by country group and time period: the effects are larger and more robust in the emerging markets and in later periods than in the advanced economies and earlier periods. Third, the effect of budget deficits on interest rates depends on interaction terms and is significant only under one of several conditions: when deficits are high; when they are mostly domestically financed; when they interact with high domestic debt; and when financial openness is low; moreover, the effect is larger when interest rates are more liberalized, and when the domestic financial sector is less developed.

These interactions may go a long way towards explaining some of the heterogeneity in the previous literature. Moreover, these findings also hold important policy implications, particularly regarding the effectiveness of fiscal stabilization. They suggest that fiscal policy is more effective when the initial budget deficit and level of debt are lower, and when financial openness and financial depth are greater, because the effect of deficits on interest rates is smaller under these conditions, implying less crowding out and a greater multiplier.

APPENDIX: COUNTRY GROUPS

Advanced economies (IMF World Economic Outlook definition): Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zeeland, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

Emerging Asia: China, India, Indonesia, Korea, Malaysia, Philippines, Thailand.

Emerging Europe: Bulgaria, Croatia, Czech Republic, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia, Ukraine.

Latin America: Argentina, Brazil, Chile, Colombia, Dominican Republic, Ecuador, El Salvador, Mexico, Panama, Peru, Uruguay, Venezuela.

Middle East and Africa: Algeria, Côte d'Ivoire, Egypt, Lebanon, Morocco, Nigeria, Pakistan, South Africa, Tunisia, Turkey.

REFERENCES

Abiad, A., E. Detragiache, and T. Tressel, 2007, "A New Database of Financial Reforms," forthcoming Working Paper, International Monetary Fund, Washington, DC.

Adam, C.S., and D.L. Bevan, 2005, "Fiscal Deficits and Growth in Developing Countries," *Journal of Public Economics* 89, 571–597.

Agénor, P.-R., and P.J. Montiel, 1999, *Development Macroeconomics*, MIT Press, Cambridge, MA.

Aisen, A., and F.J. Veiga, 2006, "Does Political Instability Lead to Higher Inflation? A Panel Data Analysis," *Journal of Money, Credit, and Banking* 38, 1379–1389.

Arellano, M., and S. Bond, 1991, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies* 58, 277–297.

Arellano, M., and O. Bover, 1995, "Another Look at the Instrumental Variables Estimation of Error-Component Models," *Journal of Econometrics* 68, 29–51.

Bai, J., and P. Perron, 2003, "Computation and Analysis of Multiple Structural Change Models," *Journal of Applied Econometrics* 18, 1–22.

Baltagi, B.H., J.M. Griffin, and W. Xiong, 2000, "To Pool or Not to Pool: Homogeneous versus Heterogeneous Estimators Applied to Cigarette Demand," *Review of Economics and Statistics* 82, 117–126.

Barro, R., and X. Sala-i-Martin, 1990. "World Real Interest Rates," in *NBER Macroeconomics Annual*, pp. 15–61, MIT Press, Cambridge, MA and London, UK.

Bencivenga, V.R., and B.D. Smith, 1992, "Deficits, Inflation, and the Banking System in Developing Countries: The Optimal Degree of Financial Repression," *Oxford Economic Papers* 44, 767–790.

Bernhardsen, T., 2000, "The Relationship between Interest Rate Differentials and Macroeconomic Variables: A Panel Study of European Countries," *Journal of International Money and Finance* 19, 289–308.

Bernheim, B.D., 1989, "A Neoclassical Perspective on Budget Deficits," *Journal of Economic Perspectives* 3, 55–72.

Blundell, R., and S. Bond, 1998, "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics* 87, 115–143.

Caballero, R., and A. Krishnamurthy, 2004, "Fiscal Policy and Financial Depth," NBER Working Paper No. 10532, National Bureau of Economic Research, Cambridge, MA.

Calderon, C.A., A. Chong, and N.V. Loayza, 2002, "Determinants of Current Account Deficits in Developing Countries," *Contributions to Macroeconomics* 2, Article 2.

Caporale, T., and K.B. Grier, 2005, "Inflation, Presidents, Fed Chairs, and Regime Shifts in the U.S. Real Interest Rate," *Journal of Money, Credit, and Banking* 37, 1153–1163.

Catão, L., and M.E. Terrones, 2005," Fiscal Deficits and Inflation," *Journal of Monetary Economics* 52, 529–554.

Chinn, M., and J. Frankel, 2005, "The Euro Area and World Interest Rates," Working Paper No. 1016, Center for International Economics, UC Santa Cruz, CA.

Chinn, M.D., and H. Ito, 2007, "Current Account Balances, Financial Development and Institutions: Assaying the World 'Saving Glut'," *Journal of International Money and Finance* 26, 546–569.

Chinn, M.D., and H. Ito, 2006, "What Matters for Financial Development? Capital Controls, Institutions, and Interactions," *Journal of Development Economics* 81, 163–192.

Chinn, M.D., and E.S. Prasad, 2003, "Medium-Term Determinants of Current Accounts in Industrial and Developing Countries: An Empirical Exploration," *Journal of International Economics* 59, 47–76.

Dellas, H., K. Neusser, and M. Wälti, 2005, "Fiscal Policy in Open Economies," Working Paper, Department of Economics, University of Bern, Switzerland.

Driffill, J., and A. Snell, 2003, "What Moves OECD Real Interest Rates?" *Journal of Money, Credit, and Banking* 35, 375–402.

Dua, P., and Pandit, R., 2002, "Interest Determination in India: Domestic and External Factors," *Journal of Policy Modeling* 24, 853–875.

Easterly, W., N. Loayza, and P. Montiel, 1997, "Has Latin America's Post Reform Growth Been Disappointing?" *Journal of International Economics* 43, 287–311.

Easterly, W.E., and K. Schmidt-Hebbel, 1993, "Fiscal Deficits and Macroeconomic Performance in Developing Countries," *World Bank Research Observer* 8, 211–37.

Edwards, S., and Khan, M.S., 1985, "Interest Determination in Developing Countries: A Conceptual Framework," *IMF Staff Papers* 32, 377–403.

European Commission, 2004, *Public Finances in EMU* (Brussels: European Commission).

Evans, P., 1987a, "Do Budget Deficits Raise Nominal Interest Rates? Evidence from Six Countries," *Journal of Monetary Economics* 20, 281–300.

Evans, P., 1987b, "Interest Rates and Expected Future Budget Deficits in the United States," *Journal of Political Economy* 95, 34–58.

Feldstein, M., 1986, "Budget Deficits, Tax Rules, and Real Interest Rates," NBER Working Paper No. 1970 (Cambridge: National Bureau of Economic Research).

Frankel, J., Schmukler, S.L., and Servén, L., 2004, "Global Transmission of Interest Rates: Monetary Independence and Currency Regime," *Journal of International Money and Finance* 23, 701–733.

Gale, W.G. and Orszag, P.R., 2003, "Economic Effects of Sustained Fiscal Deficits," *National Tax Journal* 56, 463–485.

Garcia, R., and P. Perron, 1996, "An Analysis of the Real Interest Rate under Regime Shifts," Review of Economics and Statistics 79, 111–124.

Gochoco, M.S., 1991, "Financial Liberalization and Interest Rate Determination: The Case of the Philippines, 1981–85," *Journal of Macroeconomics* 13, 335–350.

Jeanne, O., and A. Guscina, 2006, "Government Debt in Emerging Market Countries: A New Data Set," Working Paper No. 06/98, International Monetary Fund, Washington, DC.

Levy-Yeyati, E., and F. Sturzenegger, 2005, "Classifying Exchange Rate Regimes: Deeds vs. Words," *European Economic Review* 49, 1603–35.

Modigliani, F., and T. Jappelli, 1988, "The Determinants of Interest Rates in the Italian Economy," *Review of Economic Conditions in Italy* 1, 9–34.

Montiel, 2003, Development of Financial Markets and Macroeconomic Policy, Journal of African Economies, Supplement 2 October 2003, v. 12, pp. ii12-52

Mountford, A., and H. Uhlig, 2002, "What are the Effects of Fiscal Policy Shocks?" Discussion Paper No. 3338, Center for Economic Policy Research, London.

Neumeyer, P.A., and Perri, F., 2005, "Business Cycles in Emerging Economies: The Role of Interest Rates," *Journal of Monetary Economics* 52, 345–80.

Roodman, D., 2006, "How to Do xtabond2: An Introduction to 'Difference' and 'System' GMM in Stata, Working Paper No. 103, Center for Global Development, Washington, DC.

Seater, J.J., 1993, "Ricardian Equivalence," *Journal of Economic Literature* 31, 142–90.

Windmeijer, F., 2005, "A Finite Sample Correction for the Variance of Linear Efficient Two-Step GMM Estimators," *Journal of Econometrics* 126, 25–51.

Table 1. Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.
Interest rate	10.44	8.64	0.11	49.99
Foreign rate	7.71	2.29	4.73	12.38
Depreciation	9.22	28.51	-50.39	262.56
Risk spread	-71.23	12.16	-93.58	-28.27
Inflation	15.41	41.01	-0.38	626.07
Money supply	1.68	5.12	-14.75	24.82
GDP growth	3.65	2.82	-11.24	12.68
Budget deficit	3.11	5.24	-16.07	36.27
Domestic financing	2.23	2.93	-8.86	15.05
Domestic debt	27.93	20.57	0.06	109.32
Financial depth	53.78	55.53	8.84	416.82
Capital account liberalization	0.36	1.55	-1.75	2.62
Interest rate liberalization	1.78	1.30	0.00	3.00

Table 2. Baseline

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Budget deficit	0.438	0.438	0.312	0.559	0.484	0.586	0.259
	(0.196)**	(0.196)**	(0.111)***	(0.218)**	(0.169)***	(0.117)***	(0.106)**
Foreign rate		3.395	1.498	2.005	1.747	1.333	2.374
		(0.443)***	(0.678)**	(0.685)***	(0.443)***	(0.337)***	(0.476)***
Depreciation			0.289	0.217	0.056	-0.010	-0.171
			(0.086)***	(0.096)**	(0.067)	(0.047)	(0.062)***
Risk spread				0.051	0.064	0.010	0.118
				(0.076)	(0.048)	(0.038)	(0.057)**
Inflation					0.190	0.292	0.407
					(0.059)***	(0.042)***	(0.050)***
Money supply						0.417	0.521
						(0.056)***	(0.075)***
GDP growth							-0.259
							(0.305)
# observations	254	254	254	197	195	195	195
# countries	60	60	60	59	59	59	59
# instruments	16	16	21	21	26	31	36
Wald chi2 test *p*-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A-B test AR(1) *p*-value	0.183	0.183	0.031	0.106	0.080	0.099	0.074
A-B test AR(2) *p*-value	0.161	0.161	0.527	0.450	0.602	0.833	0.397
Hansen test *p*-value	0.062	0.062	0.012	0.024	0.056	0.252	0.249

Table 3. Periods and Regions

Countries	[1] All	[2] All	[3] Advanced	[4] Emerging	[5] All
Budget deficit	3.284		-0.076	0.242	
	(1.172)***		(0.241)	(0.055)***	
Budget deficit*1985-89	-3.395				
	(1.067)***				
Budget deficit*1990-94	-3.400				
	(1.199)***				
Budget deficit*1995-99	-1.578				
	-1.015				
Budget deficit*2000-06	-2.905				
	(1.186)**				
Budget deficit*Latin America					2.431
					(0.087)***
Budget deficit*Emerging Asia					0.620
					(0.114)***
Budget deficit*Emerging Europe					0.581
					(0.066)***
Budget deficit*Mideast & Africa					-0.161
					(0.063)**
Budget deficit*Advanced economy		0.248			0.160
		(0.150)			(0.072)**
Budget deficit*Emerging market		0.366			
		(0.114)***			
Foreign rate	-0.478	1.876	-1.137	3.952	2.954
	(0.635)	(0.531)***	(1.771)	(0.400)***	(0.103)***
Depreciation	-0.018	-0.131	0.007	-0.156	-0.082
	(0.060)	(0.056)**	(0.481)	(0.040)***	(0.016)***
Risk spread	0.072	0.061	-0.400	0.175	0.172
	(0.062)	(0.057)	(0.152)***	(0.044)***	(0.013)***
Inflation	0.299	0.388	1.401	0.302	0.258
	(0.041)***	(0.049)***	(0.294)***	(0.036)***	(0.020)***
Money supply	0.666	0.650	0.387	0.470	0.309
	(0.084)***	(0.078)***	(0.127)***	(0.036)***	(0.015)***
GDP growth	-0.318	-0.117	-0.022	-0.325	-0.004
	(0.216)	(0.312)	(0.445)	(0.227)	(0.061)
Lagged interest rate	0.000	0.000	0.769	0.000	0.000
	(0.000)	(0.000)	(0.097)***	(0.000)	(0.000)
Constant	11.964	-0.707	-30.655	-0.002	2.699
	(4.794)**	(3.114)	(11.927)**	(2.698)	(1.058)**
# observations	195	195	75	120	195
# countries	59	59	19	40	59
# instruments	39	41	18	35	56
Wald chi2 test *p* -value	0.000	0.000	0.000	0.000	0.000
A-B test AR(1) *p* -value	0.082	0.063	0.031	0.054	0.086
A-B test AR(2) *p* -value	0.651	0.388	0.206	0.179	0.734
Hansen test *p* -value	0.202	0.513	0.662	0.529	0.341

Table 4. Interactions

Variable	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Budget deficit*High budget deficit	0.516						
	(0.081)***						
*Low budget deficit	-0.245						
	(0.195)						
*High domestic financing		0.923					
		(0.186)***					
*Low domestic financing		0.618					
		(0.381)					
*High domestic debt			0.876	0.652			
			(0.135)***	(0.127)***			
*Low domestic debt			1.417	0.505			
			(0.367)***	(0.393)			
*High capital account openness					0.022		
					(0.114)		
*Low capital account openness					0.673		
					(0.069)***		
*High interest rate liberalization						0.674	
						(0.061)***	
*Low interest rate liberalization						0.449	
						(0.178)**	
*High financial depth							-0.111
							(0.340)
*Low financial depth							2.108
							(0.454)***
Financial depth				-0.017			
				(0.009)*			
Foreign rate	3.385	-1.016	0.406	-0.469	2.584	1.705	-0.030
	(0.263)***	(1.198)	(0.556)	(0.672)	(0.311)***	(0.440)***	(1.378)
Depreciation	-0.239	0.373	0.011	0.156	-0.150	-0.080	-0.082
	(0.053)***	(0.089)***	(0.069)	(0.106)	(0.040)***	(0.037)**	(0.144)
Risk spread	0.205	-0.132	-0.015	0.019	0.056	0.081	-0.083
	(0.046)***	(0.100)	(0.042)	(0.045)	(0.037)	(0.045)*	(0.117)
Inflation	0.411	0.146	0.210	0.093	0.418	0.399	0.375
	(0.046)***	(0.050)***	(0.061)***	(0.084)	(0.038)***	(0.038)***	(0.131)***
Money supply	0.523	0.404	0.417	0.379	0.464	0.478	0.629
	(0.073)***	(0.252)	(0.108)***	(0.119)***	(0.049)***	(0.062)***	(0.272)**
GDP growth	-0.076	-0.430	-0.277	-0.116	0.157	-0.066	0.097
	(0.171)	(0.450)	(0.210)	(0.172)	(0.153)	(0.173)	(0.564)
Lagged interest rate	0.000	0.000	0.079	0.080	0.000	0.000	0.000
	(0.000)	(0.000)	(0.030)***	(0.034)**	(0.000)	(0.000)	(0.000)
Constant	2.456	-0.059	0.700	7.909	-5.344	0.957	-3.056
	(3.205)	(5.960)	(4.239)	(3.787)**	(2.778)*	(2.836)	(6.312)
# observations	195	138	106	106	192	172	195
# countries	59	51	35	35	58	51	59
# instruments	41	26	30	34	41	41	27
Wald chi2 test *p* -value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
A-B test AR(1) *p* -value	0.066	0.082	0.000	0.100	0.028	0.063	0.021
A-B test AR(2) *p* -value	0.185	0.432	0.191	0.675	0.528	0.175	0.437
Hansen test *p* -value	0.305	0.157	0.402	0.451	0.306	0.640	0.427