Global Economy and Finance Journal
Volume 3. Number 2. September 2010. Pp. 89 -106

Real Interest Rates and Fiscal Policy: a Global Study

Ellis Heath*

Using a dynamic panel data set, I examine the effect of fiscal policy on real interest rates for a sample of 59 nations covering the time period from 1970 through 2006. Controlling for both country and time effects, I find that changes in national savings affect real interest rates. A one-percent increase in a country's deficit to output ratio corresponds to an increase in that country's real interest rate. This increase is statistically and economically significant; it ranges in magnitude from approximately 12 to 15 basis points. A surprising secondary result also emerges: a country's financial openness does not appear to play an important role in the determination of their real interest rate.

Field of Research: Economics, International finance

1. Introduction

In the forefront of every nation's fiscal policy debate exists the issue of whether to run a budget deficit or a budget surplus. Given that the latter is rarely attained by most countries, the debate then reduces to one that concerns the size of the budget deficit. One of the arguments given against increasing the magnitude of a budget deficit is the cost that will be incurred by the economy from a resulting increase in the real interest rate. When government spending grows more than government receipts, the private sector pays the price through an increase in real interest rates in response to the lower pool of loanable funds available to the economy. Recently, this debate has garnered more attention given that the U.S. has gone from having a rare budget surplus to the more typical budget deficit. Other nations have seen similar fluctuations.

A dynamic panel data set of 59 nations from 1970 through 2006 is used here. Both exchange rate regimes and financial openness are controlled for. Fiscal policy appears to affect real interest rates, but not as much as previous studies would suggest. A one-percent increase in the national deficit to national output ratio in real terms increases that nation’s real interest rate. The effect is statistically and economically significant. The benchmark result ranges in magnitude from around 12 to 15 basis points, depending on which measure of financial openness is used. This study is unique in that it covers a range of very different nations. It is not limited to nations with similar economies; it encompasses developed, developing and transitional economies. The findings contribute to the literature by showing that this relationship is not unique to either the US or the OECD. Each country's real interest rates may or may not react significantly to changes in fiscal policy, but underlying this relationship, there is an effect

*Ellis Heath, Harley Langdale, Jr. College of Business Administration, Valdosta State University email: EBHeath@valdosta.edu

that is not unique to any particular country. Fiscal policy affects real interest rates across the globe; these effects are statistically significant, but small in magnitude.

A second finding is the apparent unimportance of financial openness. At no stage is the financial openness variable statistically significant in the determination of the real interest rate. This result does not change when using a *de jure* measure of financial openness instead of a *de facto* one.

Section 2 goes over the previous literature. Section 3 describes the methodology and data in this study. Section 4 discusses the results. Section 5 provides some robustness checks and the final section concludes.

2. Literature Review

With his study on fiscal policy and how it effects the macroeconomy, Barro (1974) reexamines the work of David Ricardo. Elmendorf and Mankiw (1999) provide the most recent survey of this literature.

Since then, numerous empirical studies have been conducted testing Ricardian Equivalence as put forth by Barro (1974). Specifically, national savings is always constant, regardless of national deficits. If a government is operating under a national deficit, private savings will increase in anticipation of future tax increases or lower government spending. Changes in the national budget are then offset by equal changes in private savings. Since national savings provide the pool of loanable funds to the economy, the real interest rate does not change.

Another view is offered by the Keynesian IS-LM school of thought. It implies that Ricardian equivalence might fail. Under this explanation, private savings does not completely offset changes in the national budget. In a closed economy, the real interest rate responds to changes in the national budget, since national savings cannot expand through capital inflows. If the economy is an open one, national savings can expand through capital inflows or shrink if domestic capital goes abroad. If fiscal policy is expansionary, the real interest rate increases. The new higher real interest rate attracts foreign capital. This new source of capital expands the pool of loanable funds and drives down the real interest rate. Whether the real interest rate returns to its original level or not depends on the degree of financial openness that exists in the economy in question. In the Keynesian IS-LM view, exchange rate regimes are important as well. While they do not change the type of response from the real interest rate, a floating or fixed currency affects the magnitude of its response. A fixed currency dampens this effect since the central bank has to adjust the money supply in order to offset the change in the real interest rate and maintain their currency at a constant value. Gale and Orszag (2004) give a thorough overview of these different economic effects of budget deficits on real interest rates.

Numerous empirical studies using different approaches have been conducted to test for Ricardian Equivalence and if rejected, to test for the effect federal deficits have on real

interest rates. Studies that use expected or unanticipated deficits tend to support the Keynesian view. The most recent ones of this type are Canzoneri et al (2002) and Laubach (2009). Both find support for the Keynesian view. In fact, Laubach (2009) finds that an increase in the deficit-GDP ratio by one percent raises the ten-year Treasury note by at least 24 basis points. Other studies use the same approach but do not find such clear evidence to support Ricardian Equivalence. The most recent study being Engen and Hubbard (2004) which was in response to the Laubach study.[i] With more control variables, they find the same directional effect but of a much smaller magnitude at 18 basis points. Bradley (1986) is the only one of this type that supports Ricardian Equivalence.

In the same paper Engen and Hubbard (2004) also use a dynamic VAR analysis and get the same small magnitude effect. In more recent studies Perotti (2005) and Mountford and Uhlig (2008) get results that agree with Engen and Hubbard's. Dai and Phillipon (2004) and Tavares and Valkanov (2001) use a similar methodology and find strong support for the Keynesian view. Again, only older papers using this methodology find support for Ricardian Equivalence (See Evans 1989 and Plosser 1987, for example).

This paper uses current deficit information and expands upon the international study of Ardagna, Caselli and Lane (2007). Their study found that for OECD countries a one-percent increase in the national deficit-GDP ratio results in a cumulative change of 150 basis points for the real interest rate, while the one-time, initial increase is approximately 10 basis points.

Overall, the majority of the recent literature rejects Ricardian Equivalence, but debates the magnitude of the effect federal deficits have on real interest rates. This paper continues this trend but brings into the debate a wider range of economies--developed, developing and transitional.

3. Methodology and Data

In an effort to analyze the behavior of real interest rates when faced with changes in national budgets among a variety of nations, adjustments are made to an empirical model given by Giavazzi et al. (2000) and Kamps (2006). It is assumed that the real interest rate depends on the growth rate of per capita income and the ratio of the budget surplus to GDP. The model is dynamic due to an assumed persistence in the real interest rate. Therefore, lagged values of the real interest rate are included.[ii] Financial openness and exchange rate regimes are controlled for as well.

3.1 Pooled OLS

The general specification of the model assumes *n* lags of the dependent variable and is given as follows:

$$r_{it} = \beta_0 + \beta_1 y_{it} + \beta_2 s_{it} + \beta_3 (s_{it} * fo_{it}) + \beta_4 xch_{it} + \sum_{n=1}^{p} \alpha_n r_{it-n} + \varepsilon_{it} \qquad (1)$$

Here, *r* stands for the real interest rate, *y* is the growth in per capita income, *s* is the national budget-to-GDP ratio. Positive values of *s* indicate a budget surplus, while negative ones imply a national deficit. The variable *fo* is a measure of financial openness and *xch* is a binary variable that captures whether the *i*th country's exchange rate regime is floating or fixed by assigning a value of 1 for the former and 0 for the latter. Of course, *t* is a time subscript, *i* is the country subscript and *n* is the lag length. Also, as given by Equation 1, it is assumed that financial openness interacts with the national budget to affect the real interest rate.

3.2 Fixed Effects

Given the range of countries being examined and the time period being covered, certain specific effects would be expected. These may be sensitive to either country factors and/or time factors. If the individual country effects are due to variables being omitted, then, it is possible that there could be correlation issues with the other independent variables. Since the sample of countries used in this study is not truly random, controlling for fixed effects seems more appropriate.[iii] Accounting for this, the above model is estimated again, but in the following manner:

$$r_{it} = \beta_0 + \delta_i + \eta_t + \beta_1 y_{it} + \beta_2 s_{it} + \beta_3 (s_{it} * fo_{it}) + \beta_4 xch_{it} + \sum_{n=1}^{p} \alpha_n r_{it-n} + \varepsilon_{it} \quad (2)$$

Country fixed effects and time fixed effects are represented by the additional vectors δ_i and η_t, respectively.

3.3 Arellano-Bond Estimator

Since the dependent variable *r* depends on past values of *r*, dynamic effects need to be accounted for. Allowing lags of the dependent variable on the right-hand side of the equation could lead to an endogeneity problem. To obtain consistent parameters for this model and address the potential endogeneity issue, following Arellano and Bond (1991) a generalized method-of-moments (GMM) approach is used to estimate the parameters. First-differencing Equation 2 above gives the following:

$$\Delta r_t = \beta_0 + \beta_1 \Delta y_t + \beta_2 \Delta s_t + \beta_3 \Delta (s_t * fo_t) + \beta_4 \Delta xch_t + \sum_{n=1}^{p} \alpha_n \Delta r_{t-n} + \Delta \varepsilon_t \quad (3)$$

The individual country and time effects are now eliminated and estimation can be done using GMM procedures. For the dependent variable, the Arellano-Bond estimator calls for using the lagged variable r_{t-2} as an instrument and for the independent variables, their own differences are used as in Equation 3. So, following Arellano-Bond, the equation to be estimated is:

$$r_{t-2} = \beta_0 + \beta_1 \Delta y_t + \beta_2 \Delta s_t + \beta_3 \Delta (s_t * fo_t) + \beta_4 \Delta xch_t + \sum_{n=1}^{p} \alpha_n \Delta r_{t-n} + \Delta \varepsilon_t \quad (4)$$

Given the assumption of persistence in the real interest rate, one expects past values of *r* to be positively correlated with current values; therefore, α_p should be positive and statistically significant. Also, if β_1 is statistically significant, it should be positive, given that theory suggests that increases in per capita income drive the real interest rate up through higher demand for money. The sign of β_2 should be negative if it is significant;

this would confirm Keynesian IS-LM behavior of real interest rates in response to changes in the national budget. However, if this parameter is not statistically different from zero, then Ricardian equivalence would prevail. The parameter β_3 for the interaction variable *(s*fo)* should be positive if financial openness is important, since financial openness offsets the national budget effect on real interest rates by providing capital when shortages in the loanable funds market occur and vice versa. At first, it is not clear what the expected sign of the coefficient β_4 should be. Since central banks in countries with fixed exchange rates use monetary policy to offset changes in the interest rate, either sign could be appropriate. Fortunately, this will not matter since the purpose of including it here is simply to control for different currency regimes.

3.4 Data

The data for this study is annual and covers the period from 1970 through 2006; 59 countries are included.[iv] The lag used for the real interest rate independent variable is one.[v] The real interest rate is calculated by subtracting the inflation rate from the national treasury bill rate. The inflation rate is calculated using the consumer price index of each country. The real per capita GDP growth rate is obtained from each country's GDP series, population series and consumer price index. The national budget ratio is calculated using each country's surplus/deficit series and GDP series. Following Edison et al. (2002), the *de facto* financial openness series is the ratio of the country's capital inflows and outflows to GDP. All of the above series are taken from the International Monetary Fund's *International Financial Statistics* database. The *de jure* financial openness index is taken from the Chinn-Ito index.[vi] The exchange rate information was taken from the IMF *De Facto Exchange Rate Arrangements and Anchors of Monetary Policy*. Before 1970 the data for the variables in this paper were not available from the IMF. After 2006 the author did not have access to this data. The countries chosen in this paper were those that had data available over consecutive years during this time range. Panel data was used since this paper is a cross-sectional study over time.

4. Discussion of Results

4.1 Fiscal Policy, Real Interest Rates and de jure Financial Openness

In the appendix, the first column of Table 3-1 shows the results from the pooled OLS estimation using the *de jure* financial openness variable. At first glance, these benchmark results appear to support Ricardian equivalence; that is, fiscal policy is unimportant in the determination of real interest rates. If this were the case, the financial openness variable should not matter either. Here, it does. While the financial openness variable is statistically significant, economically its effect on real interest rates is small. It has the expected sign, since the coefficient's positive sign would indicate that financial openness improves the real interest rate impact, but economically, this is very small at 2 basis points. The coefficients for the other regressors are significant and as expected.

In all likelihood, the pooled OLS estimation is not adequate. Given the wide sample and broad time period, one would expect some fixed effects to occur. In the second column

of Table 3-1 the results from estimating Equation 2 are given. Controlling for both time and country fixed effects suggests that fiscal policy matters both statistically and economically. A one-percent change in the national budget to GDP ratio corresponds to a 12 basis point change in the real interest rate, regardless of country or time period. If a country increases its national deficit by one percent relative to its GDP, an increase of 12 basis points in the real interest rate would be expected. This estimate is higher than the estimate given by Ardagna, Caselli and Lane (2007), but less than that given by Laubach (2009) and Engen and Hubbard's (2004).

While the short-run effect found by Ardagna, Caselli and Lane (2007) was large, they did find that the long-run effect was prominent at 150 basis points after 10 years. Assuming that the financial openness coefficient is not statistically different from zero as the results indicate, based on the results from column two of Table 3-1, the long-run effect of a change in the national budget approaches approximately 16 basis points. This is illustrated in Figure 3-1 located in the appendix. This effect is permanent, but small compared to the 150 basis point effect in Ardagna, Caselli and Lane (2007).

Due to the fact that a lag of the dependent variable appears as an independent variable, controlling just for fixed effects may not be sufficient. Instrumenting and using the GMM technique as given by Arellano and Bond (1991), fiscal policy appears to matter a bit more. Statistically, the coefficient for the budget surplus variable is stronger. Economically, the basis point impact on the real interest rate is more at 15 basis points. Looking at Figure 3-2 of the appendix, the long-run effect is also greater after 10 years. This effect is permanent and asymptotically approaches 20 basis points.

In both the fixed effects and the GMM regressions, what stands out is that the coefficient for financial openness is never statistically significant. In all cases the control variables are important and they have the expected signs. While this might appear to be a puzzling result, it is not entirely so. In economic growth literature Fratzscher and Bussière (2004) document the failed efforts in the literature to quantify financial openness effects on economic growth. These findings here support this result.

4.2 Fiscal Policy, Real Interest Rates and de facto Financial Openness

In the appendix under Table 3-2 the results from the pooled OLS estimation using the *de facto* financial openness variable are given. As in the *de jure* case, fiscal policy does not seem to matter, however, neither does financial openness. Of the control variables only the currency regime and the one-year lag of the real interest rate appear important statistically.

As stated earlier, the pooled OLS estimation does not seem appropriate. Using two-way fixed effects for country and time, results similar to those in the *de jure* fixed effects regression are obtained. Financial openness is the only variable that does not appear to matter statistically. The other coefficients are all of similar magnitudes and statistical significance levels as those results using the *de jure* financial openness variable. The one-time basis point effect of an increase in the national deficit on the real interest rate

is approximately 15 basis points. The long-term effect is around 16.25 basis points as given in Figure 3-3 of the appendix.

Under the Arellano-Bond estimation, the statistical significance and economic magnitude are similar. Fiscal policy appears to matter, but financial openness does not. The basis point increase in the real interest rate from a one-percentage increase in the deficit-to-GDP ratio is approximately 13 basis points. The long-term effect approaches 20 basis points as shown in Figure 3-4 of the appendix.

5. Sensitivity Analysis

The results above are not sensitive to lag selection. A lag length of one seems the most appropriate, but additional lags of the dependent variable have no effect on the results that the budget surplus variable is negatively correlated to the real interest rate and that the financial openness variable is not statistically significant.

Excluding the exchange rate variable does not change the results for either the financial openness variable and for either estimation technique.

Sub-sample data sets also support the finding that financial openness is not important in the determination of real interest rates. In the appendix the first two rows of Table 3-3 and Table 3-4 show the results for sub-sample analysis based on whether a country is industrial or not. The results in the third row are from examining countries that are members of the OECD.[vii] However, only in the sub-sample for non-industrial countries is the national budget variable important.

In the previous analysis, correlation between the lagged dependent variable and the error term is not taken into consideration. When this is accounted for by using the Arellano-Bond estimator, the two original results are both supported: the national budget is statistically important in the determination of real interest rates and financial openness is not. This is shown in Table 3-5 and Table 3-6 of the appendix.

Next, all sub-Saharan nations, except for South Africa, are dropped. The results are given in the fourth rows of Table 3-3 through Table 3-6 found in the appendix. Again, the results are robust. The magnitude and sign of the effect of budget surplus variable on the real interest rate is approximately the same. Additionally, the coefficient for financial openness in all specifications is not significant statistically.

In Table 3-7 and Table 3-8 of the appendix, different GMM estimators with different specifications are used. Again, the results are the same. The budget surplus coefficient remains statistically and economically significant, while the financial openness variable is not statistically significant.

Finally, in the appendix under Table 3-9 and Table 3-10 the Sargan test using the Arellano-Bond estimator is conducted. For both financial openness variables the Sargan test provides a p-value greater than the significance level of 0.05. Therefore, the null

hypothesis of instrument exogeneity cannot be rejected indicating that the instruments are not correlated with the error term. The Sargan test for lags of the dependent variable greater than one is conducted. With the exception of a lag of two, all higher order lags do not allow for rejection of the null hypothesis of overidentifying restrictions being valid. The instruments appear to be exogenous. Additionally, in Table 3-11 of the appendix, the Arellano-Bond test for autocorrelation in the first-differenced errors is reported. The null hypothesis of serial correlation in the first-differenced error terms at an order higher than one is rejected; this implies that the moment conditions used by the Arellano-Bond estimator are valid.

6. Concluding Remarks

While Ricardian equivalence suggests that fiscal policy has no effect in the determination of the real interest rate, most empirical evidence suggests otherwise. However, although the literature appears to support the Keynesian IS-LM hypothesis that fiscal policy matters for real interest rates, there is often much disagreement over the degree of economic importance. Most of the focus on this issue is centered on the U.S. economy. The one study that has looked beyond the U.S. was limited to OECD countries all of which are developed nations that are similar in this regard to the U.S.

In this study the link between fiscal policy and real interest rates on a much broader sample is tested. Developed, developing and transitional economies are examined. Controlling for exchange rate regimes and financial openness, evidence is found that supports the Keynesian IS-LM hypothesis, but only slightly. While fiscal policy is statistically and economically important in the determination of real interest rates, in this study the effect is found to be smaller than estimated in previous studies, both in the short run and in the long run. Increases in the national deficit to GDP ratio are linked positively with changes in the real interest rate. The strongest effect is in the short-run. This effect ranges from 12 to 15 basis points. However, after approximately 5 years, the effect approaches its maximum level of around 16 to 20 basis points. Therefore, the long-run effect is not as important. This relationship is global in nature. The severity of the reaction of real interest rates to fiscal policy may vary across countries, but once factors unique to each country are accounted for, a global relationship appears. This is the void in the literature that this paper fills.

Additionally, a surprising result is uncovered: financial openness does not appear to play an important role in the determination of real interest rates. This result is robust to country selection and two different measures of financial openness. Possible explanations are that current measures of financial openness suffer from measurement error and/or the degree of financial openness in the world is close among different economies and therefore due to a lack of variation it does not appear to have much explanatory power for the determination of real interest rates. Also, it may be the case that trade openness better captures financial openness than conventional measures of financial openness do. Another possible explanation is that institutional quality is not captured. If institutions are weak, then the degree of financial openness in a country will

not matter since it will lack proper institutions to allow for this mechanism of capital flows to function properly.

This study has its limitation which ideally could be addressed in future studies. Post-2006 data could be added to lengthen the time range. Also, many countries are not included in this study; obtaining data for them and including them would be an improvement. Hopefully, the IMF will be able to expand this data set or it might be found at another source unknown to the author. Finally, controlling for institutional quality would provide an interesting extension to this study.

---

[i] Laubach (2009) was not published at this time and had been around since 2003. Engen & Hubbard's (2004) response was published earlier than the Laubach paper.
[ii] For example, see Rapach and Wohar (2004) concerning real interest rate persistence.
[iii] The Hausman test confirms this result.
[iv] See Table 3-12 for a list of the countries included in this paper and see Table 3-13 for the summary statistics for the data.
[v] Running the regression with two or more lags does not change the results significantly and furthermore, the second lag is not statistically significant.
[vi] The latest version of this index can be found at http://web.pdx.edu/~ito/. It is also described in Chinn and Ito (2008).
[vii] Not all countries of the OECD are in the original sample. Here, only countries from this sample that are in the OECD are examined.

References

Ardagna, S., Caselli, F. & Lane, T. 2007, 'Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries,' *The B.E. Journal of Macroeconomics*, 7, (1), Article 28.

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

Barro, R.J. 1974, 'Are Government Bonds Net Worth?' *Journal of Political Economy*, 82(6), 1095-1117.

Bradley, M.D. 1986, 'Government Spending or Deficit Financing: Which Causes Crowding Out?' *Journal of Economics and Business*, 38(3), 203-214.

Canzoneri, M.B., Cumby, R.E. & Diba, B.T. 2002, 'Should the European Central Bank and the Federal Reserve Be Concerned about Fiscal Policy?' Presented at the Federal Reserve Bank of Kansas City's symposium on 'Rethinking Stabilization Policy.'

Chinn, M. & Ito, H. 2008, 'A New Measure of Financial Openness,' *Journal of Comparative Policy Analysis: Research and Practice*, 10(3), 309-322.

Dai, Q. & Philippon, T. 2004, 'Government Deficits and Interest Rates: A No-Arbitrage Structural VAR Approach,' AFA 2005 Philadelphia Meetings.

Edison, H.J., Levine, R., Ricci, L. & Slok, T. 2002, 'International Financial Integration and Economic Growth,' *Journal of International Money and Finance*, 21(2002), 749-776.

Elmendorf, D.W. & Mankiw, N.G. 1999, 'Government Debt,'' In *Handbook of Macroeconomics*, edited by J.B Taylor & M. Woodford, 1C, 1615-1669.

Engen, E.M. & Hubbard, R.G. 2004, 'Federal Government Debt and Interest Rates,' *NBER Macroeconomics Annual*, 19, 83-138.

Evans, P. 1989, 'A Test of Steady-State Government-Debt Neutrality,' *Economic Inquiry*, 27(October), 534-548.

Fratzscher, M. & Bussière, M. 2004, 'Financial Openness and Growth: Short-Run Gain, Long-Run Pain?' *Working Paper Series 348*, European Central Bank.

Gale, W.G. & Orszag, P.R. 2004, 'Budget Deficits, National Saving and Interest Rates,' *Brookings Papers on Economic Activity*, Economic Studies Program, The Brookings Institution, 35(2004-2), 101-210.

Giavazzi, F., Jappelli, T. & Pagano, M. 2000, 'Searching for Non-linear Effects of Fiscal Policy: Evidence from Industrial and Developing Countries,' *European Economic Review*, 44(2000), 1259-1289.

Kamps, C. 2006, 'Are the Effects of Fiscal Policy Really Nonlinear? A Note,' *Empirica*, 33, 113-125.

Laubach, T. 2009, 'New Evidence on the Interest Rate Effects of Budget Deficits and Debt,' *Journal of the European Economic Association*, 7(4), 858-885.

Mountford, A. & Uhlig, H. 2008, 'What are the Effects of Fiscal Policy Shocks,' *NBER Working Papers 14551*, National Bureau of Economic Research, Inc.

Perotti, R. 2005, 'Estimating the Effects of Fiscal Policy in OECD Countries,' *Proceedings*, Federal Reserve Bank of San Francisco.

Plosser, C.I. 1987, 'Fiscal Policy and the Term Structure,' *Journal of Monetary Economics*, 20(6), 343-367.

Rapach, D.E. & Wohar, M.E. 2004, 'The Persistence in International Real Interest Rates,' *International Journal of Finance & Economics*, 9(4), 339-346.

Tavares, J. & Valkanov, R.I. 2001, 'The Neglected Effect of Fiscal Policy on Stock and Bond Returns,' *FEUNL Working Paper No. 413*.

Appendix

Table 3-1

De jure financial openness

	Default	With Time and Country Effects	*GMM*
Lagged real interest rate	**0.71*** **	**0.20*** **	**0.35*** **
	(0.02)	(0.03)	(0.03)
Per Capita GDP	**0.03** **	**0.25*** **	**0.19*** **
	(0.02)	(0.03)	(0.03)
National Budget to GDP ratio	-0.01	**-0.12** **	**-0.13** **
	(0.02)	(0.05)	(0.06)
Financial Openness	**-0.02** **	-0.04	-0.02
	(0.01)	(0.02)	(0.03)
Currency Regime	**0.41** **	**1.88*** **	**3.96*** **
	(0.18)	(0.62)	(0.79)

Standard errors are given in parenthesis. Bold face indicates coefficients have -value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 52 observations for the first two columns and 680 for the last one.

Table 3-2

De facto financial openness

	Default	With Time and Country Effects	*GMM*
Lagged real interest rate	**0.72*** **	**0.20*** **	**0.35*** **
	(0.02)	(0.03)	(0.03)
Per Capita GDP	0.02	**0.25*** **	**0.19*** **
	(0.02)	(0.03)	(0.03)
National Budget to GDP ratio	-0.03	**-0.15*** **	**-0.15*** **
	(0.02)	(0.05)	(0.05)
Financial Openness	0.0001	0.00003	0.0002
	(0.0002)	(0.0003)	(0.0004)
Currency Regime	**0.44** **	**1.87*** **	**3.96*** **
	(0.18)	(0.62)	(0.79)

Standard errors are given in parenthesis. Bold face indicates coefficients have -value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 752 observations for the first two columns and 680 for the last one.

Table 3-3

De jure Sensitivity Analysis (FE)

	National Budget	Financial Openness
Industrial Countries	-0.04	0.004
	(0.05)	(0.02)
No Industrial Countries	**-0.13****	-0.05
	(0.07)	(0.04)
OECD Countries in sample	-0.01	0.002
	(0.05)	(0.02)
No Sub-Saharan Countries	**-0.10****	-0.04
	(0.05)	(0.03)

Standard errors are given in parenthesis. Bold face indicates coefficients have p-value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 316 observations for the first row, 436 for the second, 306 for the third row and 757 for the last row.

Table 3-4

De facto Sensitivity Analysis (FE)

	National Budget	Financial Openness
Industrial Countries	-0.04	0.0000
	(0.05)	(0.0004)
No Industrial Countries	**-0.18*****	0.0001
	(0.07)	(0.0004)
OECD Countries in sample	-0.03	0.002
	(0.05)	(0.002)
No Sub-Saharan Countries	**-0.13*****	0.000
	(0.04)	(0.000)

Standard errors are given in parenthesis. Bold face indicates coefficients have p-value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 316 observations for the first row, 436 for the second, 306 for the third row and 757 for the last row.

Table 3-5

De jure Sensitivity Analysis (GMM)

	National Budget	Financial Openness
Industrial Countries	**-0.11****	0.02
	(0.05)	(0.02)
No Industrial Countries	**-0.15****	-0.02
	(0.07)	(0.04)
OECD Countries in sample	**-0.08****	0.009
	(0.05)	(0.02)
No Sub-Saharan Countries	**-0.13****	-0.02
	(0.06)	(0.03)

Standard errors are given in parenthesis. Bold face indicates coefficients have p-value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 295 observations for the first row, 385 for the second, 283 for the third row and 682 for the last row.

Table 3-6

De facto Sensitivity Analysis (GMM)

	National Budget	Financial Openness
Industrial Countries	**-0.10****	0.0001
	(0.04)	(0.0004)
No Industrial Countries	**-0.19*****	0.0003
	(0.07)	(0.0005)
OECD Countries in sample	**-0.10****	0.003
	(0.05)	(0.002)
No Sub-Saharan Countries	**-0.14*****	-0.000
	(0.05)	(0.000)

Standard errors are given in parenthesis. Bold face indicates coefficients have p-value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 295 observations for the first row, 385 for the second, 283 for the third row and 682 for the last row.

Table 3-7

De jure Sensitivity Analysis (Other Estimators)

	National Budget	Financial Openness
Blundell-Bond Estimator	**-0.14*****	-0.01
	(0.05)	(0.03)
Arellano-Bond with strictly exogenous covariates	**-0.11****	-0.01
	(0.05)	(0.03)
Arellano-Bover/Blundell-Bond Estimator with strictly exogenous covariates	**-0.14*****	-0.01
	(0.05)	(0.03)

Standard errors are given in parenthesis. Bold face indicates coefficients have p-value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 752 observations for each row.

Table 3-8

De facto Sensitivity Analysis (Other Estimators)

	National Budget	Financial Openness
Blundell-Bond Estimator	**-0.14*** **	0.000
	(0.05)	(0.000)
Arellano-Bond with strictly exogenous covariates	**-0.12** **	-0.000
	(0.05)	(0.000)
Arellano-Bover/Blundell-Bond Estimator with strictly exogenous covariates	**-0.14*** **	0.000
	(0.05)	(0.000)

Standard errors are given in parenthesis. Bold face indicates coefficients have p-value less than or equal to 0.10 (*** ≤ 0.01; ** ≤ 0.05; * ≤ 0.10). There are 752 observations for each row.

Table 3-9

Sargan Test (*de jure*)

	National Budget to GDP ratio	Financial Openness	P-value
One lag	**-0.13** **	-0.02	0.05
	(0.06)	(0.03)	
Two lags	**-0.13** **	-0.01	0.00
	(0.06)	(0.03)	
Three lags	**-0.15** **	0.01	0.12
	(0.06)	(0.03)	

Table 3-10

Sargan Test (*de facto*)

	National Budget to GDP ratio	Financial Openness	P-value
One lag	**-0.15*** **	0.0002	0.05
	(0.05)	(0.0004)	
Two lags	**-0.14*** **	-0.00004	0.00
	(0.05)	(0.0004)	
Three lags	**-0.14*** **	-0.00001	0.13
	(0.05)	(0.0004)	

Table 3-11

Autocorrelation Tests

	P-value	
	Order 1	Order 2
De jure Financial Openness	0.0007	0.9641
De facto Financial Openness	0.0007	0.9793

Table 3-12

Countries in sample

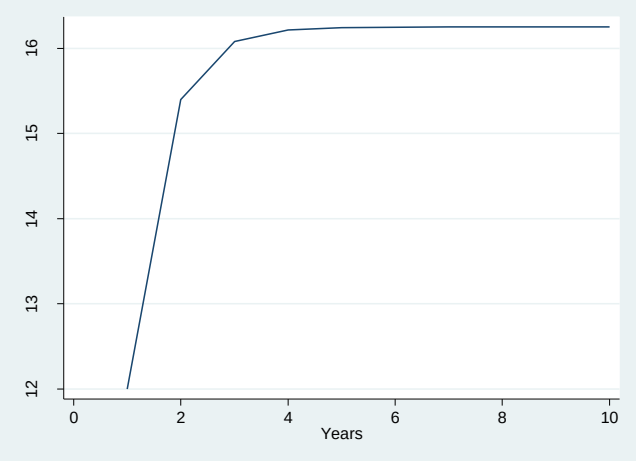
Australia	Iceland	Philippines
Bahamas	Israel	Poland
Bahrain	Italy	Seychelles
Barbados	Jamaica	Singapore
Belgium	Kenya	Slovenia
Belize	Kuwait	South Africa
Bolivia	Kyrgyz Rep.	Spain
Brazil	Latvia	Sri Lanka
Canada	Lesotho	St. Kitts & Nevis
Cyprus	Lithuania	St. Lucia
Czech Rep.	Malawi	Swaziland
Egypt	Malaysia	Sweden
Ethiopia	Malta	Switzerland
Fiji	Mexico	Thailand
France	Moldova	Trinidad & Tobago
Germany	Morocco	Uganda
Greece	Nepal	United Kingdom
Grenada	Netherlands	United States
Haiti	New Zealand	Zambia
Hungary	Papua N. Guinea	

Table 3-13

Name	Definition	Summary Statistics for Data					Source(s)
		Mean	Median	Maximum	Minimum	Standard Deviation	
r	Difference between nominal short-term interest rate and the annual rate of change of the private consumption deflator	1.47	2.17	33.21	-81.10	6.36	Treasury Bill Rate (60C.ZF) and CPI (64.XZF) from IMF's *International Financial Statistics* database
y	Annual growth rate of real per capita GDP	1.18	1.74	30.17	-37.91	5.82	GDP (99B.CZF), Population (99Z.ZF) and CPI (64.XZF) from IMF's *International Financial Statistics* database
s	Ratio of the national budget to GDP	-2.94	-2.83	16.11	-31.63	4.33	Government Cash Surplus/Deficit (cCSD.CG) and GDP (99B.CZF) from IMF's *International Financial Statistics* database
fo (de jure)	Financial Openness measure	0.64	0.18	2.60	-1.77	1.52	Chinn-Ito Index from http://www.ssc.wisc.edu/~mchinn
fo (de facto)	Financial Openness measure	25.72	5.10	1321.54	0.00	88.34	Flows of capital (78BDD+78BED+78BFD+78BGD) and GDP (99B.CZF) from IMF's *International Financial Statistics* database
xch	Binary variable that taks on value of 0 if currency regime is managed and 1, otherwise	0.53	-	-	-	0.50	*Exchange Rate Arrangements and Anchors of Monetary Policy*

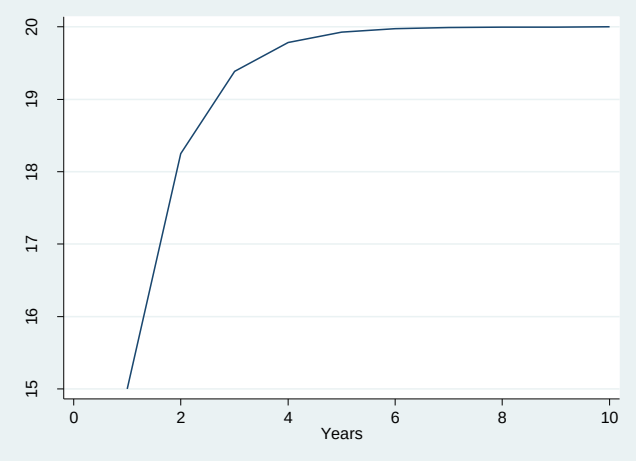
Observations: 833

Figure 3-1



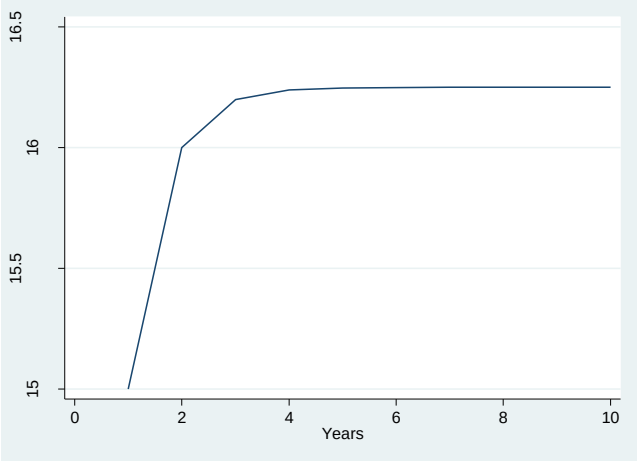
The above graph shows the outcome of a one-percentage point increase in the deficit-to-GDP ratio on the real interest rate using results from *de jure* fixed effect estimation.

Figure 3-2



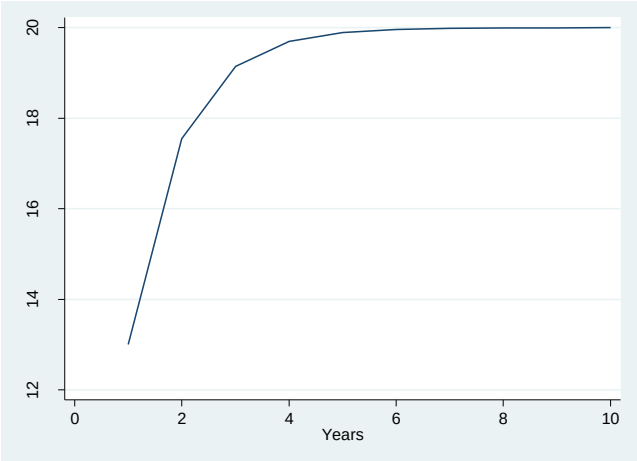
The above graph shows the outcome of a one-percentage point increase in the deficit-to-GDP ratio on the real interest rate using results from *de jure* GMM estimation.

Figure 3-3



The above graph shows the outcome of a one-percentage point increase in the deficit-to-GDP ratio on the real interest rate using results from *de facto* fixed effect estimation.

Figure 3-4



The above graph shows the outcome of a one-percentage point increase in the deficit-to-GDP ratio on the real interest rate using results from *de facto* GMM estimation.