Banco de México

Documentos de Investigación

Banco de México

Working Papers

N° 2014-15

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July 2014

Documento de Investigación
2014-15

Working Paper
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Abstract: We estimate fiscal multipliers in a panel of countries using dynamic panel techniques and quarterly data for 55 countries. By using a GMM estimator and lagged dependent variables as instruments in a SVAR model, we attempt to correct for the biases present in this setting, to alleviate concerns about causality, and to decrease potential effects of third factors. Contrary to previous research, we find no strong evidence of monetary accommodation, a positive and larger fiscal multiplier in developing than in high-income countries, and zero in high-debt countries and in flexible exchange rates countries.

Keywords: Fiscal multipliers, Panel of countries, SVAR, GMM.
JEL Classification: E62, E63, H60.

Resumen: En este trabajo estimamos los multiplicadores fiscales para un panel de 55 países usando técnicas de panel dinámico y datos trimestrales. Al usar un estimador GMM y rezagos de las variables dependientes como instrumentos, intentamos corregir los sesgos presentes en este caso, además de aliviar los problemas de causalidad y de disminuir los efectos potenciales de otros factores. Al contrario de las conclusiones reportadas en la literatura, encontramos que los multiplicadores fiscales son positivos en los países en desarrollo y mayores que los estimados para los países desarrollados. En la misma línea, encontramos además que estos multiplicadores son cero en los países con deuda alta y en los países con tipo de cambio flexible. Tampoco encontramos evidencia importante que sugiera acomodación monetaria.

Palabras Clave: Multiplicadores fiscales, Panel de países, SVAR, GMM.

*We thank Nicolás Amoroso, Wendy Edelberg, Jonathan Huntley, Bill Randolph, Mark Lasky, and seminar participants at the Congressional Budget Office, the Bank of México, the Southern Economics Association 2011 meetings and the Latin American Econometric Society 2013 meetings for comments that helped to improve this paper. The views expressed in this paper are the authors' and should not be interpreted as Bank of México's.

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1 Introduction

The size of fiscal multipliers, or the change in output in response to a change in fiscal policy, remains a source of disagreement among economists despite the importance to public policy. This disagreement comes mainly from the differences in the methodologies and data used by different researchers to avoid the potential bias caused by endogeneity between output (GDP) and fiscal policy. A growing economy may be responsible for increases in government spending, but observed increases in government spending may cause a growing economy. In addition, a third fact may cause changes in both government spending and output. For example, a sudden discovery of a natural resource may trigger at the same time an increase in output and an increase in government spending. Fiscal policy is also known to be implemented with a lag, which is tightly linked to identifying the anticipation from the part of private agents of changes in fiscal policy that may affect their behavior.

This paper contributes to the literature of fiscal multipliers by showing, contrary to previous research, that there is no strong evidence of monetary accommodation,[1] that fiscal multipliers are positive and larger in developing than in high-income countries, and that they are zero in high-debt countries and in flexible exchange rates countries. Other results show fiscal multipliers that are positive and statistically different from zero, with an impact multiplier of 0.3 and a long run multiplier between 0.9 and 1.0. We also find that not controlling for the interest rates (and implicitly for monetary policy) or for the real exchange rate, makes the estimates smaller. In our estimations, private consumption response is positive to fiscal shocks at different horizons.

More generally, results in this paper question the robustness of the conclusions drawn in previous VAR literature with panel data. By using dynamic panel data techniques -a Generalized Method of Moments estimator that instruments the endogenous variables as Holtz-Eakin, Newey and Rosen (1988)- instead of using an OLS estimator with fixed effects as is common in the literature, we attempt to further correct for the potential

[1] We refer to monetary accommodation to the active role that the monetary authority can play to enhance the effects of fiscal policy.

biases induced by the correlation of the lags with the error terms known to be present in this type of setting. Because this technique uses instruments for the endogenous variables, it also ameliorates two additional sources of endogeneity, namely the simultaneity between government spending and output growth and the likely presence of a third factor that may affect both government spending and output. In fact, OLS overestimates the fiscal multipliers, as is shown in section 5 of the paper. On the other hand, by using a more comprehensive dataset than previous studies, we are able to establish that the sample selection is important when estimating fiscal multipliers in a panel of countries. This result is not specific to our dataset as we also show later in the paper.

In the next section we discuss the potential issues in estimating fiscal multipliers. In section 3 we present our identification strategy. We describe our data in section 4 and show our results in sections 5. In this section we also analyze the sources of differences between our results and previous research. We conclude in section 6.

2 Issues in Estimating Fiscal Multipliers

Studies use mainly two alternative approaches and identifying assumptions to solve the endogeneity problem.[2,3] The first approach, the "narrative approach", uses information about shocks that are unexpected and independent of the state of the economy, and which prompt the government to spend more. Using such strategy, Ramey and Shapiro (1997) create a univariate autoregressive model and use it to estimate the effects that military buildups have on a variety of macroeconomic variables. In their study, the military buildup is signaled by a dummy variable to indicate the Korean War, the Vietnam War and the Carter-Reagan buildup. Ramey and Shapiro explain that military buildups are natural shocks to the economy because they usually occur rapidly and unexpectedly. Moreover, the military buildup variable is attractive because it is likely to

[2]Previous research usually ignores the endogeneity problem that refers to a third factor as the cause of both the increase in government spending and the change in output.

[3]A different approach is taken by Suarez-Serrato and Wingender (2011), who use the fact that a large number of federal spending and transfer programs depend on population estimates, which change during Census years due to a change in methodology. They find a multiplier of about 1.9.

be exogenous to other macroeconomic variables, allowing them to analyze a pure shock to GDP. They find that military buildups have a positive impact on GDP for three years and reach a peak impact of 3 percent after an the onset of one of those episodes, which correspond to an increase of around 1% in government spending according to Edelberg et al, (1997).[4] The main critique of early implementations of this approach is the limited amount of episodes available to identify the fiscal multipliers, although this issue is corrected in Ramey (2011).[5] In this later study, Ramey (2011) expanded on her previous work to include two new variables that measure military buildup anticipations and to use a SVAR approach instead of a univariate approach. Her findings indicate that government spending multipliers range from 0.6 to 1.1. She finds negative private consumption responses to government spending and shows that previous findings of positive consumption responses, as in Blanchard and Perotti (2002), come from the fact that agents anticipate the government spending more than one quarter in advance, invalidating the identification assumption that within a quarter shocks to output do not cannot affect government spending. Other authors have used variations of the strategy of identifying fiscal multipliers using military spending. For example, Nakamura and Steinsson (2012) used historical data on military procurement across US states to estimate a fiscal multiplier of about 1.5, and Barro and Redlick (2011) use military spending to estimate a multiplier that is below 1.

The second approach uses a structural vector auto regression (SVAR) to identify the effects of spending on output by assuming that within a quarter the government cannot respond with fiscal policy to unexpected changes in output, and that either spending doesn't respond to taxes or vice versa within that quarter. Blanchard and Perotti (2002) study the effects of shocks to government spending and taxes on United States economic

[4]Edelberg, Eichenbaum and Fisher (1997) expand on an earlier version of the Ramey and Shapiro (1997) study, and use a vector autoregressive model to analyze the effect of an exogenous shock to US government purchases on various macroeconomic variables. Edelberg, Eichenbaum and Fisher test the uncertainty surrounding the dates used for the three military buildups in the Ramey and Shapiro paper, finding that the dates chosen are robust. Additionally they find that an exogenous shock to government purchases has a similar effect on GDP as the military buildup shocks in the Ramey and Shapiro paper.

[5]Another critique of this approach poses that wars could not be entirely exogenous, and instead politically motivated to increase output. This is the same reverse causality mechanism mentioned before in the introduction.

activity using this identification strategy. By using a mixed structural VAR/event study approach, their results suggest that positive shocks to government spending have a positive effect on output. Specifically, they find that GDP increases on impact by 0.84 dollars following a positive government spending shock, then declines, and rises again, to reach a peak effect of 1.29 dollars per 1 dollar of spending after almost 4 years. Other studies for the US, which also use a SVAR, include Mountford and Uhlig (2009), who find an impact multiplier of 0.65 and a long run multiplier of -1, Fatas and Mihov (2001), who find a long run multiplier similar to the estimates by Blanchard and Perotti (2002), and Auerbach and Gorodnichenko (2012), who use semiannual data to estimate fiscal multipliers through the business cycle.[6]

The SVAR approach has been used by studies that use a panel of countries. Perotti (2004) analyzes the effect of fiscal policy shocks on the economies of five separate OECD countries (the United States, West Germany, the United Kingdom, Canada, and Australia) using a SVAR with a large dataset that begins in 1960 and terminates in 2001. He breaks his sample into pre-1980 and post-1980, finding that the effects of fiscal policy tend to be smaller than other studies suggest: a government spending multiplier greater than 1 is only estimated in the United States prior to 1980. In the post-1980 sample, Perotti estimates a GDP cumulative response to a spending shock to range from anywhere between negative 2.25 to positive 0.77 percent. Beetsma and Giuliodori (2011) find a multiplier of 1.6 for the European countries, although using annual data. More recently, Ravn et al. (2012), use a SVAR from four industrialized countries and document a positive fiscal multiplier, a positive response of private consumption, and a depreciation of the real exchange rate.

Ilzetzki, Mendoza and Végh (IMV) (2013) is the closest work related to this paper. They use a SVAR model with Blanchard and Perotti (2002) identification strategy to analyze the impact of government expenditure shocks on output for 44 countries at a quarterly frequency. Overall, they conclude that fiscal multipliers are much smaller than other studies suggest. Additionally, their results suggest that country characteristics are

[6] A closely related literature investigates the effect of tax policy on output in a SVAR context, sharing similar identification challenges. See for example Mertens and Ravn (2012).

crucial in determining the size of the multiplier, finding: an increase in government consumption leads to a higher output effect in industrial countries compared to developing countries; the fiscal multiplier is relatively large in economies operating under predetermined exchange rates, but zero in economies operating under flexible exchange rates; open economies have smaller multipliers than closed economies; and fiscal multipliers are negative in high-debt countries. We depart from their study in two important ways. First, we use a different sample with more countries (55) over a longer period (1988 to 2010), having available more than 3000 observations. Second, we use panel SVAR estimator that corrects for the correlation between the error terms and the explanatory variables present in this type of setting. This estimator uses lagged values of the endogenous variables as instruments, which ameliorates concerns about the possibility that fiscal policy is anticipated by economic agents, and about the possibility that a third unobserved factor drives the results. We obtain different results than they do and test the sources of differences. In particular, we do not get negative multipliers for developing countries and we do not see any differences in the output response to government spending between high and low debt countries. Overall, although we can replicate their results when we use their method and sample of countries, we obtain different results when we use their dataset but with a different sample of countries.

3 Identification

We use the basic identification strategy of Blanchard and Perotti (2002) plus a correction for the endogeneity present in the panel SVAR using a generalized method of moments estimator and lagged endogenous variables as instruments. By accounting for the dynamic correlation between the lags of the variables with the error terms, we are able to ameliorate the potential biases that come from anticipation effects and from the presence of a third factor that causes movements in both government spending and output. The panel SVAR is an extension of the structural VAR and allows for unobserved individual heterogeneity in each country characteristics through fixed effects. We estimate the

following equation:

$$z_{i,t} = \beta_{i,t} + \beta(L) z_{i,t-1} + \epsilon_{i,t} \tag{1}$$

where $\beta_{i,t}$ is a vector that includes fixed effects and a common quadratic trend. $z_{i,t}$ is a vector $[G, Y, r, x, Z]$, where G is log of per-capita government spending, Y is log of per capita output, r is the policy interest rate, x is an index of the real effective interest rate, and Z is a set of variables that includes the log of total employment and the log of per capita consumption. The identification strategy treats the shocks to government spending as exogenous to output within a quarter. We analyze the response the variables in z have to a shock in government spending. We take 4 lags as our benchmark, but results are robust to the consideration of a structure with 8 lags. We detrended the data using a quadratic trend, but results are almost identical with a linear trend. Our benchmark estimation includes the interest rate and the real exchange rate, but we also report some robustness results if we do not include them in the estimation.

We are inerested in the second equation of this system, and in particular our focus is the effect of government spending G over output Y. The response of the interest rate to changes in government spending could also shed light on the monetary authorities responses to monetary policy, an issue we will explore later.

There are two potential sources of biases in this type of estimation that come from violating the conditional independence assumption (unobserved state variables follow an i.i.d. process and are conditional independent of observed state variables). First, a third unobserved factor can affect at the same time government spending and output; an example could be some political considerations lead to war and then to higher government spending and output. And second, fiscal policy can be anticipated with more than one quarter so that the shocks to fiscal policy and the shocks to output are correlated.

We control for the bias sources in two ways: by using the panel VAR estimator, which instruments the endogenous variables with lagged values, and by using fixed effects in the error term. With respect to the possible presence of a third unobserved factor, lagged

endogenous variables as instruments help to control for underlying time-variant third factors, while fixed effects control for this bias if the third factor is fixed through time. Fixed effects also control for variation in characteristics across countries and for the presence of individual unobserved heterogeneity. The problem with fixed effects is that they are correlated with the lags of the dependent variables. Fixed effects are usually removed by taking first differences, but in this case first differences will yield again biased coefficients because the differenced variables are correlated with the differenced error terms. The method we apply, and that was proposed by Holtz-Eakin et al. (1988), is a generalized method of moments estimator that uses lagged instruments to overcome this endogeneity biases. To calculate the standard errors of the impulse-responses, we follow a bootstrapping procedure in which we generate random draws of the coefficients and calculate for each draw the impulse-response. We repeat this procedure 500 times.[7]

The estimator we used also helps to control for the second bias source, so that shocks to output and shocks to government spending are not correlated. As mentioned above, using this estimator we are able to account for the correlation of the lagged variables with the error term, correcting for the potential bias induced by the anticipation effects that this error term contains.[8] In addition, Judson and Owen (1999) conclude that for practical purposes, the type of GMM estimator that we use in this paper is the best option to estimate the parameters in unbalanced panels with a small time dimension as is the case in our dataset.

4 Data

We compiled a quarterly panel dataset that begins in 1988 and goes through the fourth quarter of 2010. We identify a total of 55 countries including countries in Latin America,

[7] We use the codes developed by Inessa Love (2006) as the base for our estimations.

[8] In a previous version of this paper, we also used the narrative approach to identify the effects of government spending on output through wars as exogenous shocks. With different data sources, we identified 22 war episodes. The estimates we obtained using this method had large standard errors, possibly because of the small number of war episodes, and we could not get statistical identification of the effects.

Asia/Pacific and the OECD countries. Table 1 shows the countries included in the sample.[9] We included data from the last recession (2008 to 2010) in the estimation, but results were almost unchanged when we excluded this period.

For the macroeconomic series, including total government consumption, Gross Domestic Product (GDP), private consumption, civilian employment,[10] and GDP price deflators, we use quarterly series that are not interpolated but directly reported from central banks, governments and statistical offices. We take the data from Haver Analytics, a private company that sells data services. All series are adjusted seasonally and we deflate the data to real terms using each country's GDP deflator. Countries reported data in thousands, millions, billions or trillions, so all data were also converted into millions. We use quarterly policy interest rate (discount rate) from the IMF and monthly policy rates from the sources shown for each country in case they do not appear in the IMF dataset. In the last case, we collapsed all monthly data to a quarterly frequency. We use the index of the real effective exchange rate, Wholesale Price Index as reported by the IMF and broad indices of real exchange rates reported by the Bank of International Settlements. Table 2 shows basic statistics for the variables of interest.

To help control for differences between countries, we converted all macro data into per capita terms, following Ramey (2012), by dividing the data by each country's population. We obtain the population data from the World Bank's World Development Indicators 2012 dataset. This data is annual, so we interpolated it into quarterly data. Results are robust when we consider aggregate series instead of per capita variables.

We follow IMV method to classify the exchange rate regimes, which is based on the de-facto classification of Ilzezki, Reinhart and Rogoff (2008).[11] A list of the exchange

[9]The complete list of countries and periods for each series is listed in a separate supplement accompanying this document.

[10]Countries where civilian employment is not available include (parentheses indicate the proxy used in different controls): Brazil (economically active population), Ecuador (employment: global occupation rate), Pakistan (total employment), Peru (employed in metropolitan Lima), and the Philippines (employment).

[11]A country is considered to have a fixed exchange rate if during 8 quarters or more it has no legal tender, hard pegs, crawling pegs, and de facto or pre-announced bands or crawling bands with margins of no larger than +/- 2 percent. All other episodes are considered flexible.

rate regimes for the countries is shown in Table 3. We also follow IMV to classify a country's openness by a de-facto measure of a country's trade ratio (defined as exports plus imports to GDP). If a country's ratio is greater than 60 percent it is considered open (see Table 4 for a complete list of open and closed economies). We use the Reinhart and Rogoff (2010) database of national debt to classify countries according to their ratios of general government debt to GDP (see Table 5). We use a threshold of 60 percent above which a country is classified as high-debt country. And, finally, we use the 2010 World Bank classification of developing vs. high income countries.

Although the data set used by IMV is similar to the one used in this paper, there are important differences between them. First, they use 44 countries and we use 55.[12] The second difference is that, while we have the same time period for all the sample, countries in the IMV dataset have different time periods. Those features make our dataset 50% larger than the IMV dataset: our total number of observations in the pooled data is about 3900 while the IMV dataset has around 2500.[13] With respect to the quality of our data, we rely on the reported values from central banks and statistical agencies. Although it is true that some countries do not have over all the period the same methodology to collect and report data as is the case in the IMV dataset, we obtain similar results to IMV when we use the same sample of countries, suggesting data quality is comparable.

5 Results

Figure 1 shows statistically and significant positive multiplier estimates through all the horizon of analysis.[14] The impact multiplier is 0.36 and the long run multiplier is 0.92.

[12]The countries that appear in the IMV dataset but do not appear in our dataset are Botswana, Bulgaria, Croatia, Estonia, Israel, Latvia, Lithuania, Romania, Slovenia and Uruguay. It can be seen that they are predominantly former Soviet Union countries (7 out of 10). At the same time, the countries that appear in our data set but do not appear in the IMV dataset are Austria, Bolivia, China, Costa Rica, Guatemala, Hong Kong, India, Indonesia, Japan, Korea, Luxembourg, New Zealand, Pakistan, Paraguay, Philippines, the Russian Federation, Singapore, Switzerland, Taiwan, Venezuela and Vietnam.

[13]The number of observations that we use in the main estimation is 3131. If we consider the IMV data, only 2241 can be used with our estimator.

[14]We calculate two types of multipliers: the impact multiplier, which measures the change in output in response to a one unit change in government spending in a given quarter, and the cumulative

Those results hold whether we include or not the interest rate and the real exchange rate, although the numbers show a small change. In principle, controlling for the interest rate should isolate the effect of monetary and fiscal policy, but the small change in the estimates for the multipliers suggest that on average the monetary authority does not accommodate much to fiscal policy. To illustrate this point, Figure 2 shows the response of output, interest rate and real exchange rate to a one unit standard deviation shock in government spending.[15] Although the interest rate decreases in the first quarter, it increases afterwards and is not statistically different to zero, suggesting no accommodation from the monetary authority after the first quarter of the shock. At the same time, the real exchange rate depreciates in the first quarters, but its change is not different from zero from the third quarter on of the shock. This suggests a non persistent effect in the real exchange rate of higher demand and imports. Ravn et. al. (2012) also observe a depreciation of the exchange rate in response to an increase in government purchases, and propose an explanation based on deep habits, who cause markups to decline in markets with strong aggregate demand, such that when government spending increases, markups fall on domestically sold goods, depreciating the exchange rate. Although those numbers are not too big, they imply a positive response of output to government spending, and may imply larger multipliers during some periods of the business cycles.

Positive multipliers are consistent in principle with both the Keynessian and neoclassical models.[16] In the neoclassical model (see for example Baxter and King (1993)), an increase in government spending creates a negative wealth effect for households because it has to be matched by an increase of taxes in the future. Individuals reduce consumption and leisure because of the negative wealth effect, increasing at the same time labor supply and driving down the wage rate. Higher labor supply, in turn, increases

multiplier, which measures the cumulative change in output divided by the cumulative change in government spending over a determined time horizon. Because all our specifications are in logs, we have to multiply those values by the ratio of average output to average government spending to obtain the fiscal multipliers.

[15]The impulse response function of the variable X with respect to the variable Y is the response of the variable X to a one unit standard deviation shock in the variable Y. The units are in percentage points. The confidence intervals represent 90% of the distribution (5% the lower and 95% the higher).

[16]Positive multipliers also suggest negative output effects of fiscal consolidations. Under specific circumstances, those effects may occur (Giavazzi and Pagano (1990), Alesina and Ardagana (1998)), but on average for our sample, results suggest that is not the case.

output. The main difference between the neoclassical model and the new Keynesian model comes from the response of private consumption, which decreases in the neoclassical model but increases in the new Keynessian model. Consumption may increase in the new Keynesian model when government spending increases because nonseparability between consumption and leisure, because the aggregate demand for labor shifts with counter-cyclical markups, because nominal rigidities, because increasing returns in production or because rule of thumb consumers. The key issue is that consumption increases when the real wage does not change or when it increases. This effect can be attained when the labor demand curve shifts outwards, at the same time that the labor supply shifts outwards, such that the real wage does not fall. The fact that the multipliers are on average lower than 1 may suggest some crowding out because output rises less than government spending. Another point to notice is that different sources of government financing might have a different effect in the short and in the long run. Higher debt, for example, could affect long-run sustainability and thus current fiscal policy as well.

We find that private consumption responds positively to government spending in our panel of countries, giving support to the Keynesian theories (see figures 3 and 4).[17] Although always positive, this response in statistically significant only until the third year, suggesting that probably the effects on consumption dilute with time. Consistent with theory, we find that employment increases in all cases. This result is consistent with the result that Blanchard and Perotti (2002) find for the United States, but is the opposite of the results of Ramey and Shapiro (1997), Edelberg et al (1999) and Ramey (2009). Ramey argues that the differences come from anticipation effects: once she controls for expectations using the identification strategy of Blanchard and Perotti (2002), private consumption actually falls. Our results are not particular to one country or to a small number of episodes: we use a large sample of countries and correct for additional potential biases coming from third factors affecting output and government spending.

[17]Non-keynesian effects of fiscal policy, however, are not ruled out because of this result. Those effects may come, for example, through changes in expectations, credibility and interest rate premiums and lack of wealth effects on labor supply (Barry and Devereux, 2003). In fact, for our sample as shown later, high-debt countries have a lower fiscal multipliers; this may come from of credibility concerns.

We next analyze the fiscal multipliers for countries operating in flexible vs. fixed exchange rate regimes. When we do not control for the interest rate or the real exchange rate, the impact and cumulative multipliers are statistically different throughout all the time of analysis (figure 5). The impact multipliers are 0.57 and 0.27 in the case of the fixed and flexible exchange rates, respectively, and the difference is statistically significant. In a 5 year horizon, the cumulative multipliers are 1.58 and -0.27 respectively. However, in the case of countries operating under flexible exchange rates, the multiplier is not statistically different from zero except during the first year, a period in which it is positive. IMV obtain the same relative results, although they get a negative cumulative multiplier in the case of the flexible exchange rate regimes, and we do not. It is interesting to note that once we control for the interest rate and the real exchange rate (figure 6), the statistical differences disappear between multipliers. This shows that their differences do come from the behavior of the real exchange rate and the interest rate. At the same time, the fiscal multipliers for the countries operating under fixed exchange rates are always statistically different from zero and positive, while they are not different from zero for countries operating under flexible exchange rates.

Those results are in principle consistent with the Mundell Fleming model. Under flexible exchange rate regimes, an increase in government spending causes an appreciation of the real exchange rate given an increase in imports relative to exports. Under fixed exchange rates, the monetary authority intervenes to prevent this appreciation by expanding the money supply. Figure 7 shows the response of such variables to a shock in government spending. In the case of the flexible exchange rate countries, we observe an appreciation of the real exchange rate as the theory predicts. In the case of the countries operating under fixed exchange rate regimes we do not observe monetary accommodation. We observe an initial real exchange rate depreciation that disappears after the first quarter that may be explained by the mechanism proposed by Ravn et al. (2012) as explained before.

We next analyze the response of economies that differ in their degree of trade openness. Figure 8 shows impact multipliers that are statistically positive and different

between both cases (0.62 for closed economies and 0.37 for open economies). Long run multipliers have positive point estimates, but they are statistically positive only for closed economies. Although they are statistically not distinguishable from each other after the first year, the uncertainty is higher in the case of the open economies. Those results are consistent with IMV, although our point estimates are higher and nonnegative in both cases while they find negative multipliers in the case of the open economies. Those results are also consistent in principle with the Mundell Fleming model. In the case of open economies, this model predicts that part of the demand generated by an increase in government spending should go to imported goods, ameliorating the domestic output response. This also implies an appreciation of the real exchange rate, which is what we observe in figure 9 after the third quarter.

Figure 10 shows the differences between the fiscal multipliers of high-income vs. developing countries. We find that the impact multipliers are both positive and not statistically different. In the long run, the fiscal multiplier for developing countries is 0.88, suggesting some degree of crowding out because output rises less than total government spending. This multiplier is statistically different from zero. In the case of high-income countries, we find that the fiscal multiplier is positive although not statistically different from zero. Those results are in contrast to IMV, who find a negative multiplier not statistically different from zero for developing countries and positive multipliers for high income countries. Interestingly, figure 11 shows that the fiscal multipliers are both statistically different form zero during the first 3 years if we do not control for either the interest rate or the real exchange rate, suggesting the importance of those variables. The same figure shows that if we do not control for the interest rate or the real exchange rate, impact multipliers are both positive and statistically different. To precisely analyze the mechanisms behind this behavior, figure 12 shows how in the case of developing countries the interest rate increases after an initial negative response, suggesting an initial accommodation from the monetary authority. In the case of the high-income countries, there is also an initial accommodation of the monetary authority, but it is zero after the third quarter throughout all the period of analysis. In the case of the real exchange rate, the only change that is distinguishable from zero is in the case of the developing

countries, where we can observe a depreciation of this index in the first quarters. The picture that emerges is that the crowding out effect, although present in both cases, is bigger in the case of high income countries, a result in contrast with previous studies. We think those results are more in line with the notion that developing countries have more binding constraints to spending that can be alleviated with fiscal stimulus.

The level of indebtedness may influence the effect of government spending on output. The intuition is that a high level of debt may affect the expectations about repayment and about future fiscal adjustment, counteracting the expansionary effects of an increase in government spending. Figure 13 shows that the fiscal stimulus is more effective in countries with a low level of debt: the multiplier in the long run is 1.49 in the case of low debt countries vs. 0.39 in the case of high debt countries, and the impact multiplier is 0.44 vs 0.37, respectively. After the third quarter, however, the multiplier for high debt countries is not different from zero, while it is zero in in the case of low debt countries. Although changes in the interest rate and the real exchange rate are not statistically different from zero (figure 14), the point estimates suggest that an increase in government spending in a high debt country may either signal difficulty of payment later or inflationary concerns, as the increase in the interest rate suggests.

5.1 Sources of divergence with previous results

We investigate in this section the factors that explain the divergence with previous results, specifically the differences with the results of IMV. In order to make the comparisons possible through all the empirical exercises of this section, we do not use per capita data as we have done so far in the paper and instead we use aggregate data, we calculate the multiplier discounting it by the median interest rate as IMV, and we use the same variables that they use in the estimation, changing the discount rate that we used in previous estimations with the current account measure. We take the IMV dataset from the public version posted with their publication. Using the IMV dataset, we are able to replicate the results for each of the cases reported in their paper. We calculate the aggregate multipliers in their case to facilitate comparissons with our results.

We start by calculating the average multipliers for all the IMV sample of countries using an OLS estimator (this is the original estimation in their paper) and the panel SVAR estimator that we use in this paper. Figure 15 shows that the biases in the point estimates are considerable in the long run: while the OLS estimator produces an average multiplier 0.26, the panel SVAR estimator produces a multiplier of -0.4. The bias reflects that the error term capturing shocks to output is positively correlated with government spending, as expected. The confidence intervals overlap, and the GMM estimator has much bigger standard errors due to the bootstrapping procedure we use. The fact that the panel SVAR estimator produces even lower multipliers than the OLS estimator does not explain the differences in the results, given that although we use this estimator, we generally obtain much higher multipliers than Ilzetzki et al. If anything, the use of this estimator reduces the differences between our results and their results.

We next analyze the effect of having different countries in the samples. As we will show, this is the key factor explaining the differences in results. We create a panel with the IMV data that only considers countries present in our data. In total, 34 countries are present in both datasets. The countries present in the IMV dataset but not in ours are are Botswana, Bulgaria, Croatia, Estonia, Israel, Latvia, Lithuania, Romania, Slovenia and Uruguay. The countries present in our data set but not in the IMV dataset are Austria, Bolivia, China, Costa Rica, Guatemala, Hong Kong, India, Indonesia, Japan, Korea, Luxembourg, New Zealand, Pakistan, Paraguay, Philippines, the Russian Federation, Singapore, Switzerland, Taiwan, Venezuela and Vietnam. Figure 16 shows the results of estimating the fiscal multipliers with this common set of countries and compares it with the multipliers estimated with all the countries present in each dataset. The upper panel compares the fiscal multipliers when we use the original set of countries and the panel SVAR estimator. As we have shown before, the IMV sample produces a multiplier of 0.05 in the short run and -0.40 in the long run (not statistically different from zero), while we obtain a multiplier of 0.43 in the short run and of 0.83 in the long run (both statistically different from zero).[18] The lower panel shows the same estimation with the

[18]Those numbers differ slightly from the previously reported multipliers because we use the current account instead of the discount rate and because we use aggregate data instead of per capital data.

common set of countries. Results are very similar: Using the IMV data, we obtain a fiscal multiplier of 0.40 and 0.43 in the short and in the long run, statistically different from zero through almost in the entire period. We obtain with our data fiscal multipliers of 0.52 and 0.54 in the short and the long run. The confidence intervals vastly overlap. It is clear from this figure that the sample composition explains almost all the differences between our results and the results of IMV.

When we use the same sample of countries present in both datasets to analyze the multipliers in developing vs high income countries, we still obtain positive fiscal multipliers in the short run, a result that is different to their results, although it is lower than the multipliers of high income countries and zero in the long run as it is shown in Figure 17. In the other cases (debt, exchange rate regime and degree of trade openness), we obtained similar results than the ones at the beginning of section 5. [19]. Table 6 summarizes the results presented in figures 15 and 16, namely that sample selection is the main driver of the differences between our estimates and IMV results.

6 Conclusions

We use quarterly data in a panel of 55 countries between 1988 and 2010 to analyze the effect of shocks to government spending on GDP and private consumption. In addition to using a more comprehensive dataset than previous studies, as an additional innovation we use panel SVAR techniques to correct for the correlation of the explanatory variables with the error terms known to be present in this type of settings. This helps to ameliorate other possible sources of endogeneity like anticipation effects of third variables that may affect both output and government spending.

We find positive multipliers of around 0.3 on impact and between 0.9 and 1.0 in the long run. In addition, we find positive private consumption and employment responses, giving support to Keynessian theories. Those numbers, although not larger than one,

[19] We also changed the time period and dropped the crisis years between 2008 and 2010. The period of analysis did not have almost any effect on the results.

show that fiscal policy can be effective stimulating the economy, an important policy issue especially in times of economic turmoil. A short run-multiplier bigger than zero gives support to a countercyclical fiscal policy. A long-run multiplier bigger than zero is important to ensure that countercyclical fiscal policy does not have negative long-run effects. At the end, with the possibility that fiscal multipliers are lower than one (although positive) policymakers should weight the benefits of fiscal policy under times of economic stress versus the potential displacement of private investment that could have other long-run effects.

Results in this paper question previous conclusions drawn in the panel VAR literature that analyzes fiscal multipliers. The type of estimator and the sample selection are important drivers of those conclusions. Contrary to previous research,we find that the fiscal multiplier is larger in developing than in high-income countries, that it is zero in high debt countries and in countries operating under flexible exchange rates (instead of negative), and we do not find strong evidence of monetary accommodation. The differences between our results and those of previous studies come fundamentally from the sample of countries. The use of a GMM estimator instead of an OLS estimator also shows that OLS estimators induce some important biases in the results.

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Table 1: Countries included in the sample 1988q1 to 2010q4

1	**ARGENTINA**	**29**	**KOREA**
2	**AUSTRALIA**	**30**	**LUXEMBOURG**
3	**AUSTRIA**	**31**	**MALAYSIA**
4	**BELGIUM**	**32**	**MEXICO**
5	**BOLIVIA**	**33**	**NETHERLANDS**
6	**BRAZIL**	**34**	**NEW ZEALAND**
7	**CANADA**	**35**	**NORWAY**
8	**CHILE**	**36**	**PAKISTAN**
9	**CHINA,P.R.: MAINLAND**	**37**	**PARAGUAY**
10	**COLOMBIA**	**38**	**PERU**
11	**COSTA RICA**	**39**	**PHILIPPINES**
12	**CZECH REPUBLIC**	**40**	**POLAND**
13	**DENMARK**	**41**	**PORTUGAL**
14	**ECUADOR**	**42**	**RUSSIA**
15	**EL SALVADOR**	**43**	**SINGAPORE**
16	**FINLAND**	**44**	**SLOVAK REPUBLIC**
17	**FRANCE**	**45**	**SOUTH AFRICA**
18	**GERMANY**	**46**	**SPAIN**
19	**GREECE**	**47**	**SWEDEN**
20	**GUATEMALA**	**48**	**SWITZERLAND**
21	**CHINA,P.R.:HONG KONG**	**49**	**TAIWAN**
22	**HUNGARY**	**50**	**THAILAND**
23	**ICELAND**	**51**	**TURKEY**
24	**INDIA**	**52**	**UNITED KINGDOM**
25	**INDONESIA**	**53**	**UNITED STATES**
26	**IRELAND**	**54**	**VENEZUELA, REP. BOL.**
27	**ITALY**	**55**	**VIETNAM**
28	**JAPAN**		

Table 2: Basic Statistics

		GDP	Private consumption	Government spending	Government spending / GDP
All	# obs	3890	3904	3905	3890
	Mean	198679	122002	46654	0.161
	Std. Dev.	443017	294976	97318	0.054
Fixed	# obs	1666	1680	1681	1666
	Mean	319119	200646	72223	0.162
	Std. Dev.	635755	426306	136690	0.050
Flexible	# obs	2224	2224	2224	2224
	Mean	108458	62594	27328	0.161
	Std. Dev.	146995	85437	40550	0.057
Open	# obs	1950	1950	1950	1950
	Mean	78728	43810	18174	0.166
	Std. Dev.	112579	66055	25729	0.059
Closed	# obs	1769	1767	1768	1769
	Mean	347385	217367	81254	0.161
	Std. Dev.	613942	412542	133545	0.048
low debt	# obs	2611	2625	2627	2611
	Mean	156294	93879	38685	0.162
	Std. Dev.	291623	187439	72623	0.053
high debt	# obs	937	937	936	937
	Mean	374347	236476	84121	0.172
	Std. Dev.	730064	495247	150066	0.050
high income	# obs	2213	2213	2212	2213
	Mean	298379	182429	72076	0.191
	Std. Dev.	563616	378019	121999	0.043
developing	# obs	1677	1691	1693	1677
	Mean	67113	42921	13439	0.122
	Std. Dev.	75577	53606	21316	0.040

All quantities in millions of 2008 dollars

Table 3: Episodes of flexible and fixed exchange rates

	Country	Periods of Fixed exchange rate. All other periods are considered flexible regimes
1	Argentina	1993q1:2001q3;2007q1-2010q4
2	Australia	-
3	Austria	1988q1 - 2010q4
4	Belgium	1988q1 - 2010q4
5	Bolivia	1988q1 - 2010q4
6	Brazil	1989q1; 1994q3-1998q4
7	Canada	1988q1-2001q4
8	Chile	1989q2 - 1991q4; 1998q3 - 1999q2
9	China	1992q3 - 2005q2; 2008q4 - 2010q4
10	Colombia	-
11	Costa rica	1991q1 - 2010q4
12	Czech Republic	1988q1 - 1995q4; 1997q2 -2001q4
13	Denmark	1988q1 - 2010q4
14	Ecuador	1997q1 - 1997q3;2000q1 - 2010q4
15	El Salvador	1990q2 - 2010q4
16	Finland	1988q1 - 1992q2, 1993q2 - 2010q4
17	France	1988q1 - 2010q4
18	Germany	1999q1 - 2010q4
19	Greece	1988q1 - 2010q4
20	Guatemala	1988q3 - 1989q1;1991q2 - 2010q4
21	Hong Kong	1988q1 - 2010q4
22	Hungary	1994q2 - 2005q1; 2009q4
23	Iceland	1988q1:2000q3
24	India	1988q1 - 2010q4
25	Indonesia	1988q1 - 1997q2
26	Ireland	1988q1 - 1997q2
27	Italy	1988q1 - 1992q2; 1993q2 - 2010q4
28	Japan	-
29	South Korea	1988q1 - 1997q3
30	Luxembourg	1988q1 - 2010q4
31	Malaysia	1988q1 - 1997q2; 1998q4 - 2007q4
32	Mexico	1988q4 - 1994q4
33	Netherlands	1988q1 - 2010q4
34	New zealand	-
35	Norway	-
36	Pakistan	1988q1 - 2007q4; 2008q3 - 2010q4
37	Paraguay	1991q1 - 1999q2; 2010q1 - 2010q4
38	Peru	1993q4 - 2010q4
39	Philippines	1988q1 - 1993q1; 1995q3 - 1997q2; 1999q4 - 2007q3
40	Poland	1990q1 - 1991q1
41	Portugal	1988q1 - 2010q4
42	Russia	1988q1 - 1991q4; 1999q4 - 2009q3
43	Singapore	-
44	Slovakia	1988q1 - 1992q4; 1993q2 - 1997q2; 1998q4 - 2010q4
45	South africa	-
46	Spain	1988q1 - 2010q4
47	Sweden	1988q1 - 1992q3
48	Switzerland	1988q1 - 1998q4
49	taiwan	1988q1 - 2010q4
50	thailand	1988q1 - 1997q2
51	Turkey	-
52	United Kingdom	1990q4 -1992q2
53	United States	-
54	Venezuela	1996q3 - 2007q3; 2008q1 - 2010q4
55	Vietnam	1988q1 - 2010q4

Source: Own calculations based on Ilzetzki, Reinhart and Rogoff tables (2008)

Table 4: Open and Closed Economies*

	Country	Periods when open. All other periods are classified as closed regimes
1	Argentina	No data before 1993q1. Closed all other periods
2	Australia	-
3	Austria	1988q1 -2010q4
4	Belgium	No data before 1995q1. Open 1988q1 - 1994q4; 2008q1 -2008q3
5	Bolivia	2004q4 - 2010q4
6	Brazil	-
7	Canada	1993q3 - 2009q1 and 2010q2
8	Chile	1990q1 - 1991q1;1995q4; 2000q3 - 2010q4
9	China	No data before 1992q2; open 2004q4 - 2008q1
10	Colombia	-
11	Costa rica	no data before 1991q1. open 1991q1 - 2010q4
12	Czech Republic	no data before 1994q4; open 1995q1 - 2010q4
13	Denmark	no data before 1989q4; open 1990q1 - 2010q4
14	Ecuador	1991q4 - 2010q4
15	El Salvador	no data before 1990q4; open 2000q2 - 2000q4;2003q3; 2004q2 - 2004q4; 2005q2; 2006q1 - 2006q3; 2007q1 - 2008q3; 2010q1 - 2010q4
16	Finland	2004q1 - 2010q4
17	France	-
18	Germany	2000q1 - 2010q4
19	Greece	2000q1 -2000q2; 20008q2
20	Guatemala	2001q1 - 2008q3; 2010q2 - 2010q4
21	Hong Kong	1988q1 -2010q4
22	Hungary	no data before 1995q2; open 1995q3 - 2010q4
23	Iceland	no data before 1996q4; open 1997q1 - 2010q4
24	India	-
25	Indonesia	no data before 1990q1; open 1997q4 - 1998q4; 2000q1 - 2002q4;2008q1-2008q2
26	Ireland	no data before 1996q4; open 1997q1 - 2010q4
27	Italy	-
28	Japan	-
29	South Korea	1988q1 - 1988q4; 1997q1 - 2010q2
30	Luxembourg	-
31	Malaysia	No data
32	Mexico	-
33	Netherlands	1988q1 -2010q4
34	New Zealand	1992q4; 1999q4 - 2002q4; 2004q2; 2006q2 -2006q4; 2008q1 - 2009q1
35	Norway	1988q1 -2010q4
36	Pakistan	-
37	Paraguay	no data before 1993q4; open 1994q1 - 2010q4
38	Peru	-
39	Philippines	1990q4 - 2010q2
40	Poland	2002q3 - 2010q4
41	Portugal	1988q1 - 2010q4
42	Russia	2003q1
43	Singapore	No data
44	Slovakia	no data before 1994q4; open 1995q1 - 2010q4
45	South Africa	1988q1 - 2010q4
46	Spain	2000q2 - 2001q2; 2006q4 - 2008q2
47	Sweden	No data before 1993q1; open 1993q2 - 2010q4
48	Switzerland	1988q1 - 2010q4
49	Taiwan	1988q1 - 2010q4
50	Thailand	No data before 1992q4; open 1993q1 - 2010q4
51	Turkey	-
52	United Kingdom	2008q2 - 2008q3; 2010q3
53	United States	-
54	Venezuela	No data before 1997q4: open 2006q2 - 2009q1
55	Vietnam	No data before 1989q4: open 1990q1 - 1990q4; 1994q1 - 2010q4

$*$ Open economies are considered those with a Trade (nominal exports+imports) to GDP ratio greater than 60%
Source: Own calculations

Table 5: Episodes of High Debt[1]

	Country	Episodes of high debt
1	Argentina	1988q1 - 1989q4; 2002q1 - 2006q4
2	Australia	-
3	Austria	2009q1 - 2010q4
4	Belgium	1988q1 - 2010q4
5	Bolivia	1988q1 - 1995q4;1998q1 - 2005q4
6	Brazil	1988q1 - 1988q4; 1991q1 - 1993q4; 1997q1 - 1998q4; 2001q1 - 2001q4; 2003q1 - 2004q4; 2010q4
7	Canada	1988q1 - 2002q4
8	Chile	1988q1 - 1988q4
9	China	-
10	Colombia	-
11	Costa rica	1988q1 - 1991q4; 2003q1 - 2004q4
12	Czech Republic	No data
13	Denmark	1988q1 - 1999q4
14	Ecuador	1988q1 - 1996q4; 1988q1 - 2001q4
15	El Salvador	-
16	Finland	1995q1 - 1997q4
17	France	2003q1 - 2010q4
18	Germany	-
19	Greece	1988q1 - 2010q4
20	Guatemala	-
21	Hong Kong	No data
22	Hungary	No data before 1990q4; 1991q1 - 2003q4; 2006q1 - 2010q4
23	Iceland	2009q1 - 2010q4
24	India	-
25	Indonesia	1998q1 -2002q4
26	Ireland	1988q1 - 1996q4; 1988q1 - 2001q4
27	Italy	1988q1 - 2010q4
28	Japan	1995q1 - 2010q4
29	South Korea	-
30	Luxembourg	No data
31	Malaysia	1988q1 - 1992q4
32	Mexico	1988q1 - 1989q4
33	Netherlands	1992q1 - 1993q4
34	New Zealand	No data before 1991q4; 1992q1 - 1993q4
35	Norway	-
36	Pakistan	No data
37	Paraguay	-
38	Peru	1990q1 - 1994q4
39	Philippines	1988q1 - 1995q4; 1997q1 - 2006q4
40	Poland	No data before 1989q4; 1990q1 -1994q4
41	Portugal	2003q1 - 2010q4
42	Russia	No data before 1989q4; 1990q1 -1993q4; 1999q1 - 1999q4
43	Singapore	1988q1 - 2009q4
44	Slovakia	No data before 1992q4
45	South Africa	-
46	Spain	1993q1 - 2000q4
47	Sweden	-
48	Switzerland	-
49	Taiwan	-
50	Thailand	-
51	Turkey	2002q1-2005q4
52	United Kingdom	2010q1 - 2010q4
53	United States	1991q1 - 1999q4; 2003q1 - 2010q4
54	Venezuela	1989q1 - 1995q4
55	Vietnam	No data

Gross Debt of Central Government Exceeding 60% of GDP
Source: Own calculations based on Reinhart and Rogoff (2010)

Table 6: Fiscal Multipliers Calculated Using Different Estimators and Datasets

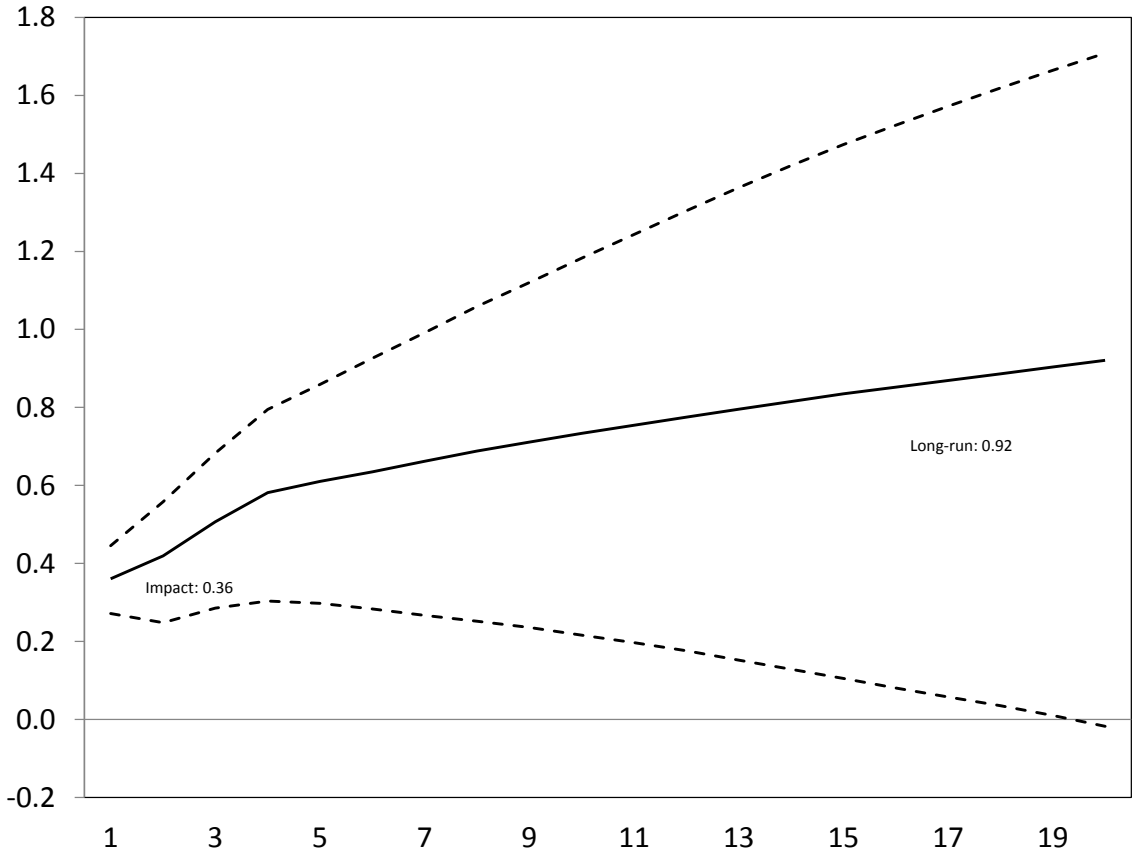
	Dataset	Estimator	Sample	Multipliers	
				Impact	Long-Run
Original IMV	IMV	OLS	All Countries in IMV	-0.02	0.26
IMV Sample Selection	IMV	OLS	footnote (1)	0.3 *	0.7*
IMV GMM	IMV	GMM	All countries in IMV	0.02	-0.40
IMV GMM + Sample selection	IMV	GMM	footnote (1)	0.40*	0.43 *
Original CB	CB	GMM	All countries in CB	0.43*	0.83*
CB Sample selection	CB	GMM	footnote (2)	0.52 *	0.54^{+}

(1) Countries excluded from the IMV dataset are Botswana, Bulgaria, Croatia, Estonia, Israel, Latvia, Lithuania, Romania, Slovenia and Uruguay. The final dataset is comprised of the countries that intersect with the CB dataset

(2) Countries excluded from the CB dataset are Austria, Bolivia, China, Costa Rica, Guatemala, Hong Kong, India, Indonesia, Japan, Korea, Luxembourg, New Zealand, Pakistan, Paraguay, Philippines, Russian Federation, Singapore, Switzerland, Taiwan, Venezuela, Vietnam. The final dataset is comprised the countries that intersect with the IMV dataset

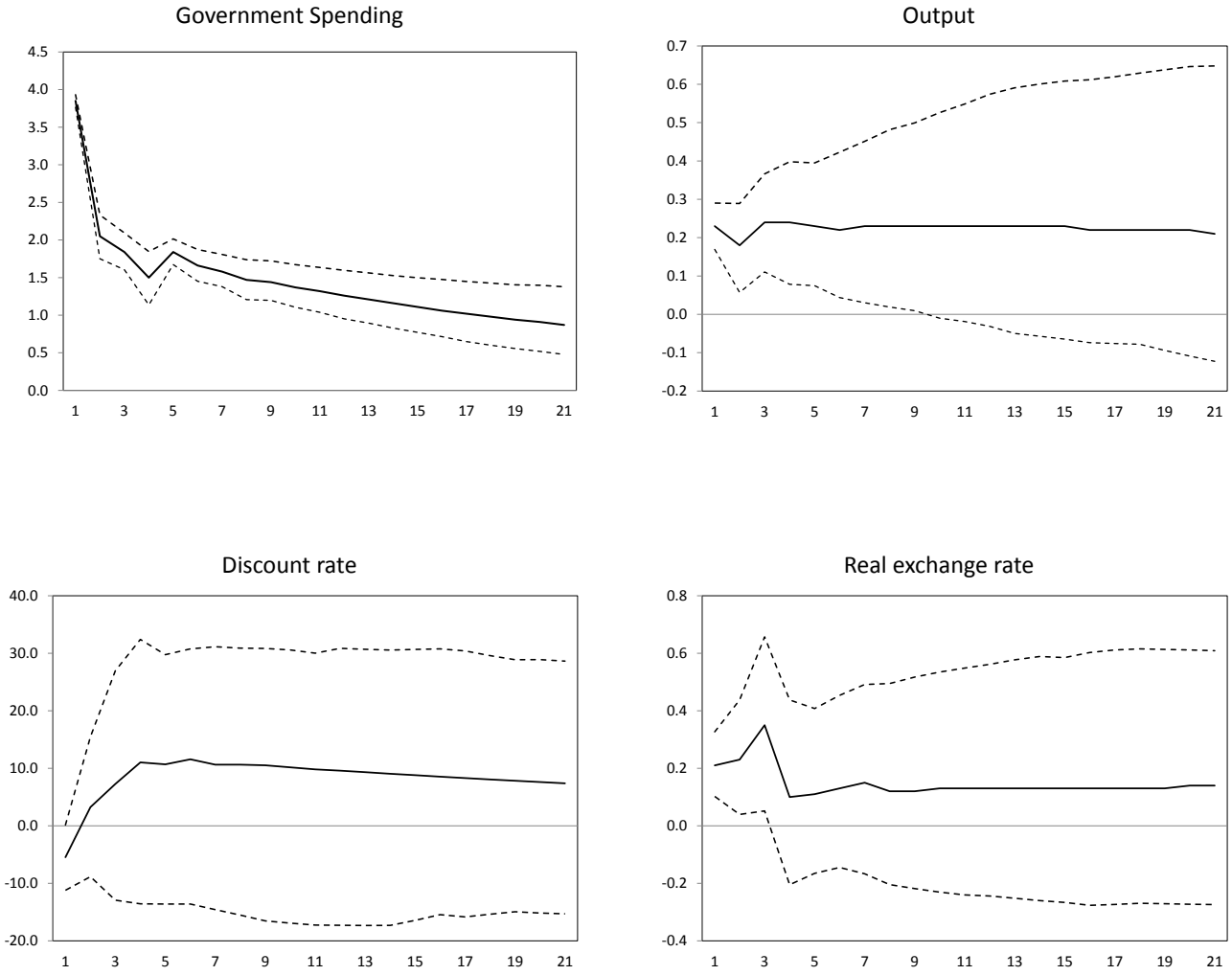
(3) * Statistically different from zero at 5% of significance. $^{+}$ Statistically different from zero at 10% of significance.

Figure 1: Aggregate Fiscal Multipliers



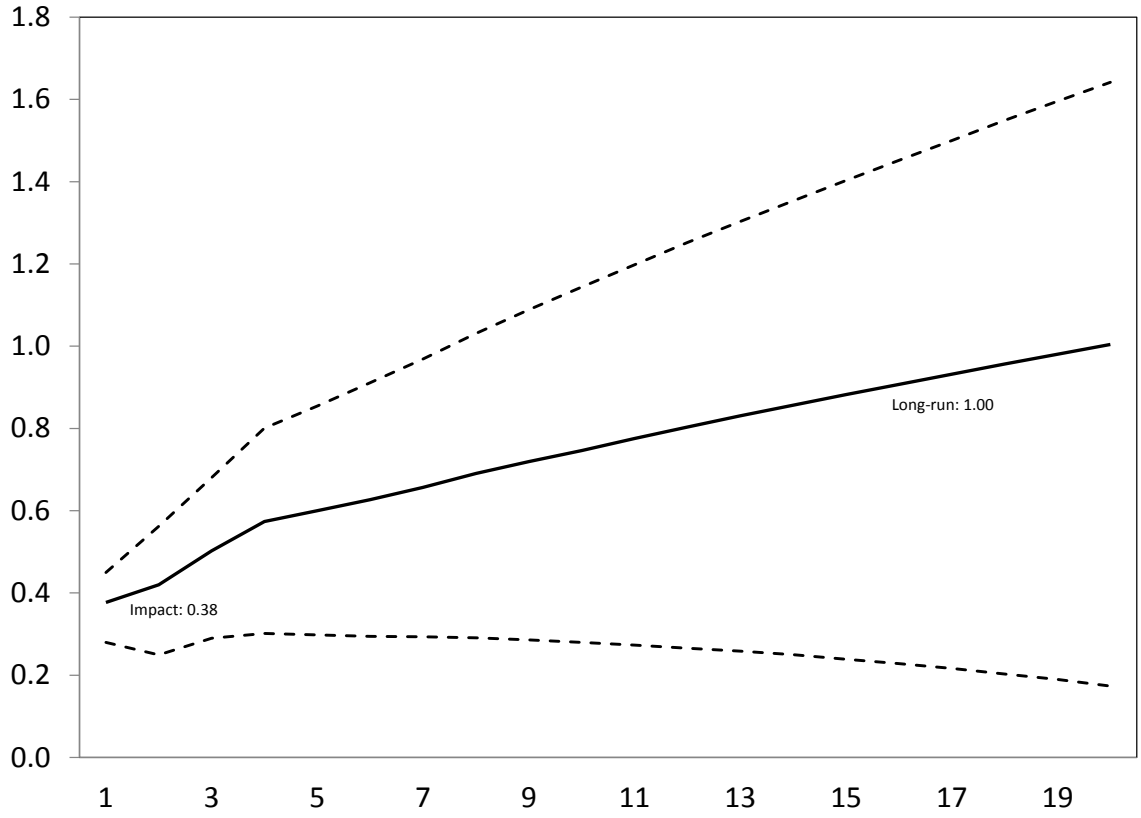
The SVAR system includes log of per-capita government spending, log of per-capita output, policy (discount) interest rate and an index of the real exchange rate. Total number of observations was 3131 for all 55 countries

Figure 2: Impulse response functions from a shock to government spending



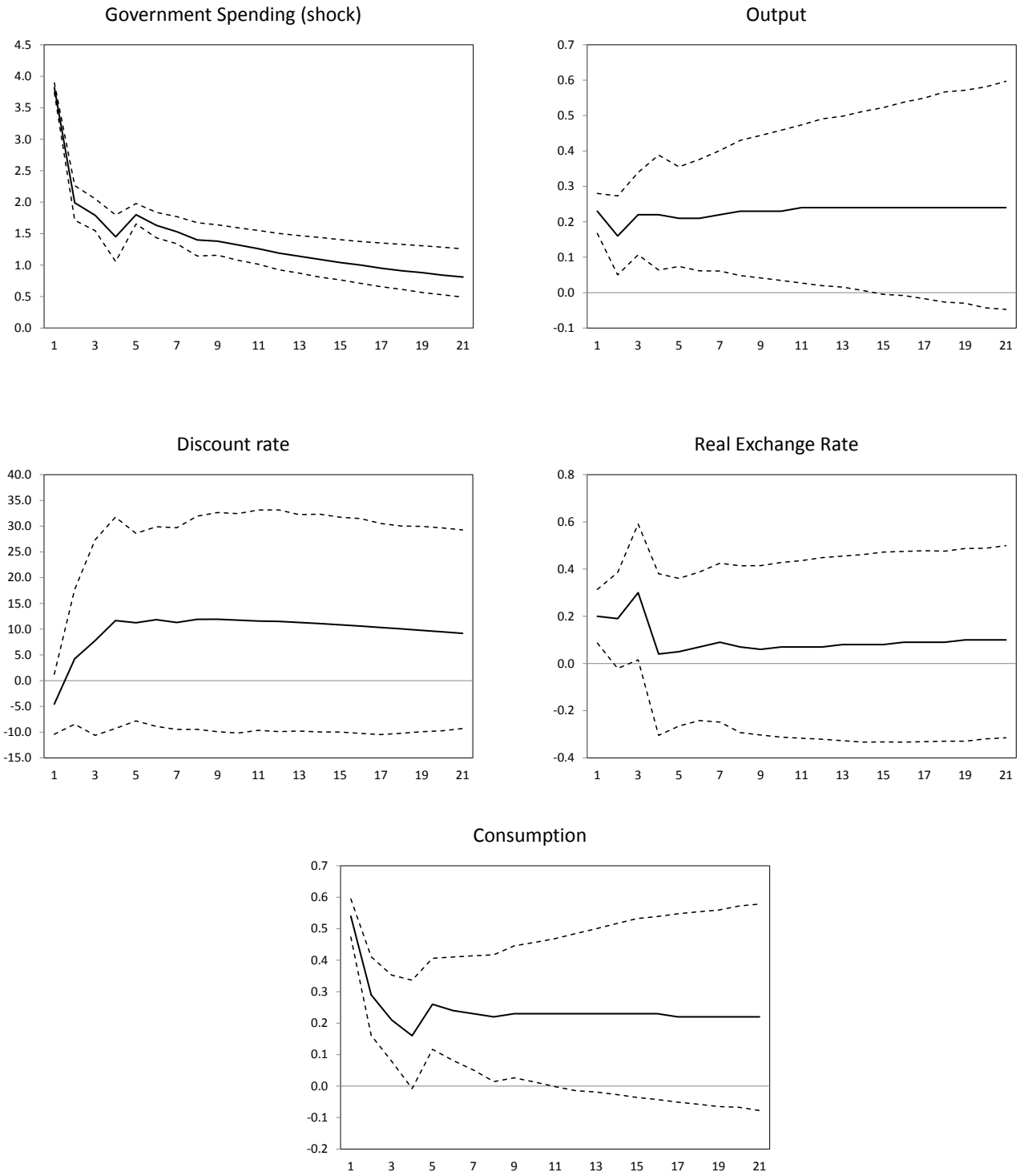
1. The impulse response function of the variable X with respect to the variable Y is the response of the variable X to a one unit standard deviation shock in the variable Y. The units are in percentage points. The confidence intervals represent 90% of the distribution (5% the lower and 95% the higher)
2. 55 countries included, 3131 observations

Figure 3: Aggregate Fiscal Multipliers Adding Consumption



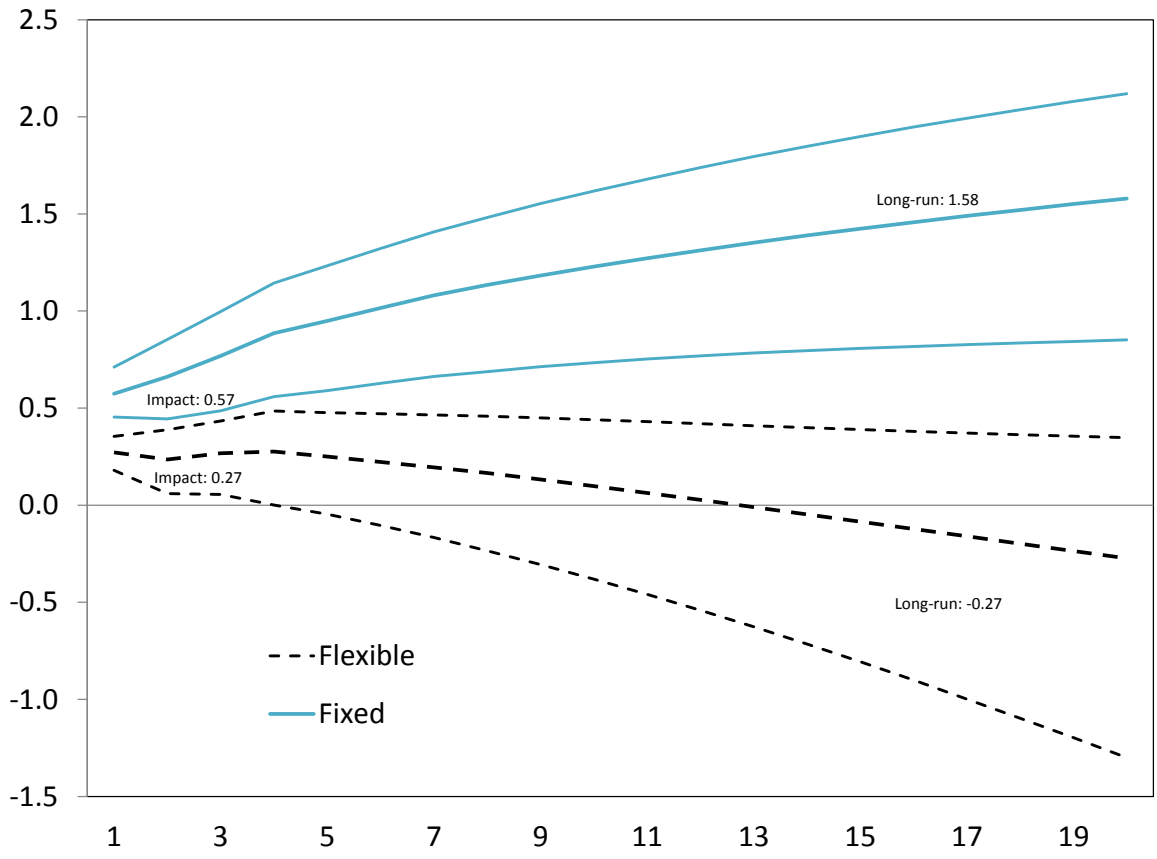
The SVAR system includes log of per-capita government spending, log of per-capita output, policy (discount) interest rate, an index of the real exchange rate and log of per capita private consumption. Total number of observations was 3065 for all 55 countries

Figure 4: Impulse response functions adding consumption



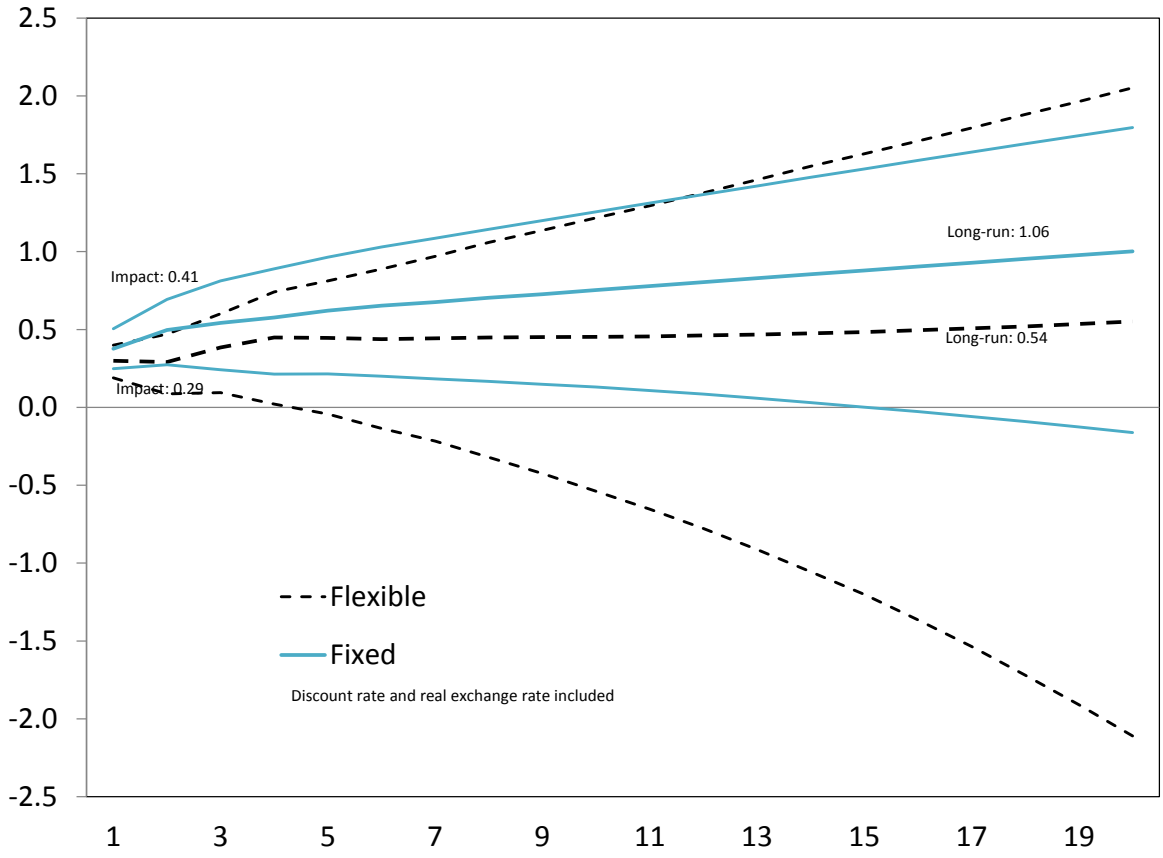
1. The impulse response function of the variable X with respect to the variable Y is the response of the variable X to a one unit standard deviation shock in the variable Y. The units are in percentage points. The confidence intervals represent 90% of the distribution (5% the lower and 95% the higher)
2. 55 countries included, 3065 observations

Figure 5: Fiscal Multipliers: Fixed vs. Flexible Exchange Rate Regimes



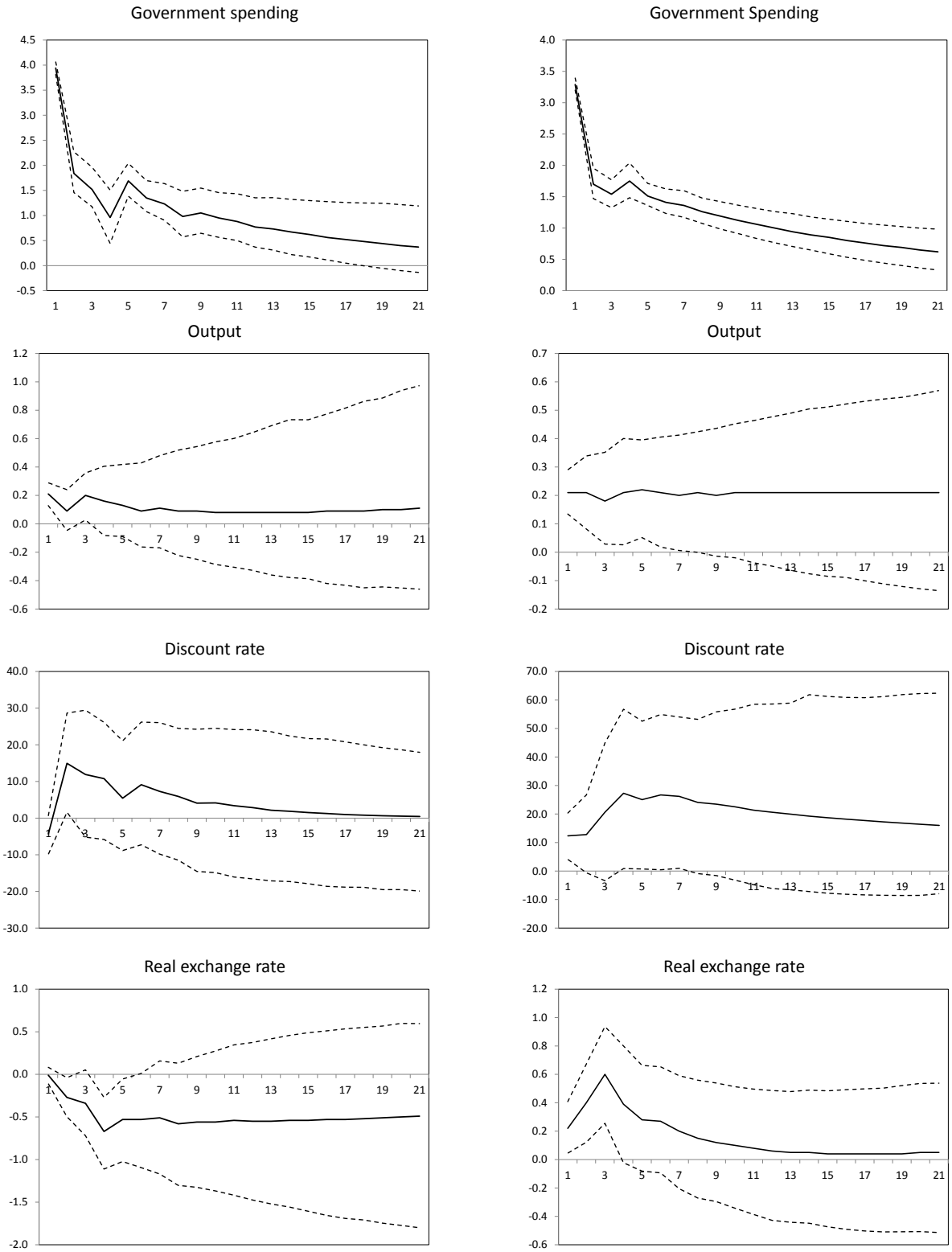
The SVAR system includes log of per-capita government spending and log of per-capita output. Total number of observations was 2018 for fixed exchange rate regimes and 1482 for flexible exchange rate regimes

Figure 6: Fiscal Multipliers: Flexible vs. Fixed exchange rate regimes Controlling for Real Interest Rate and Real Exchange Rate



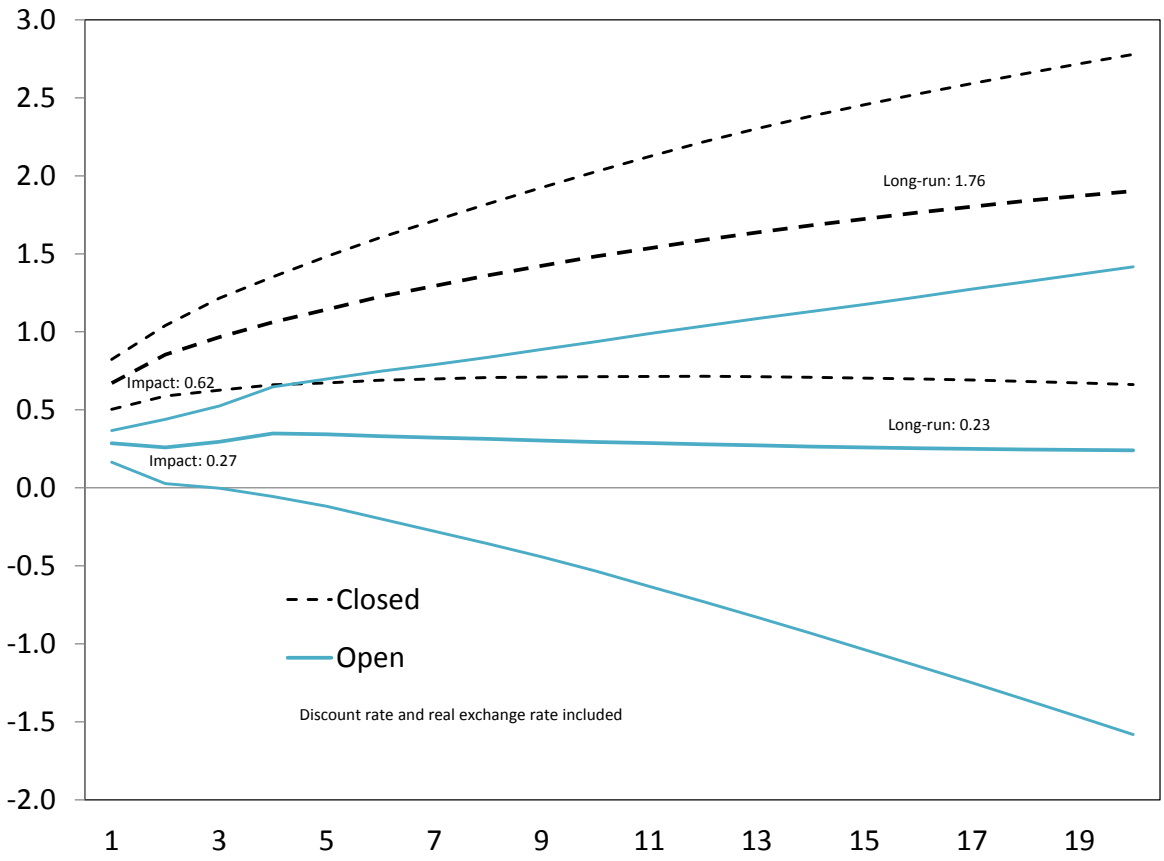
The SVAR system includes log of per-capita government spending, log of per-capita output, policy (discount) interest rate and an index of the real exchange rate. Total number of observations was 1516 for fixed exchange rate regimes and 1469 for flexible exchange rate regimes

Figure 7: Impulse response functions: Flexible and fixed exchange rate regimes



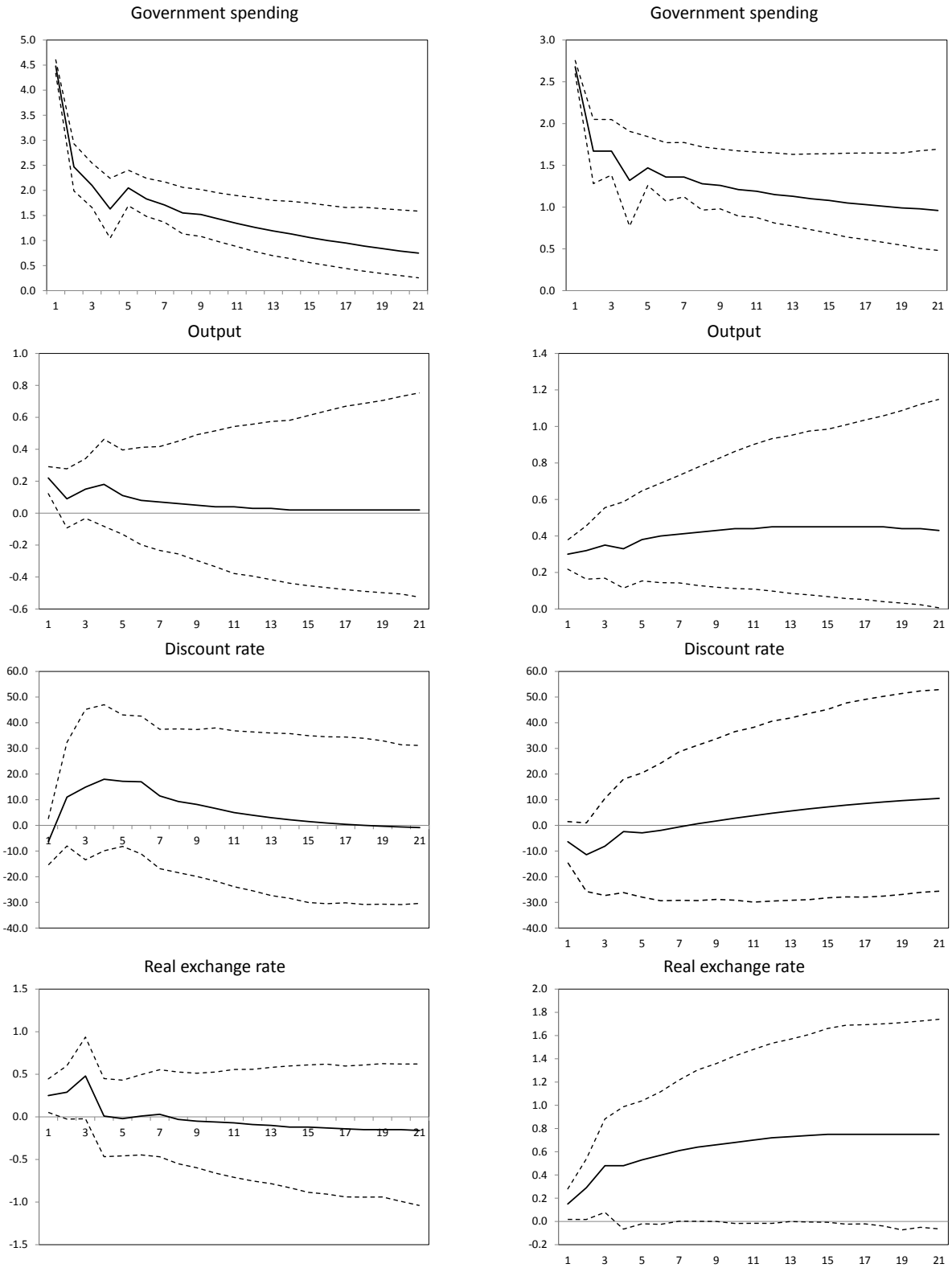
1. The impulse response function of the variable X with respect to the variable Y is the response of the variable X to a one unit standard deviation shock in the variable Y. The units are in percentage points. The confidence intervals represent 90% of the distribution (5% the lower and 95% the higher)
2. The responses of Fixed exchange rate regimes are on the right

Figure 8: Fiscal Multipliers: Open vs. Closed economies



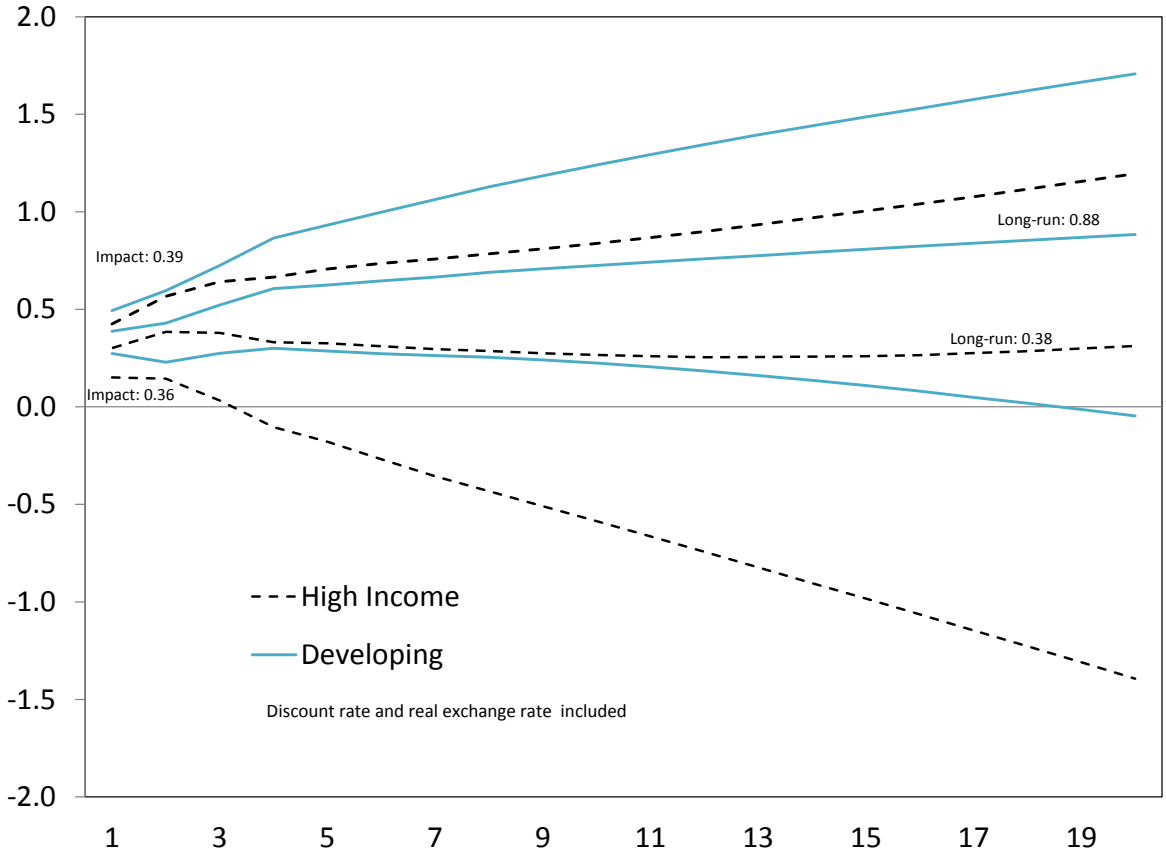
The SVAR system includes log of per-capita government spending and log of per-capita output, policy (discount) interest rate and an index of the real exchange rate. Total number of observations was 1542 for open economies and 1370 for closed economies.

Figure 9: Impulse response functions: Open vs. closed economies



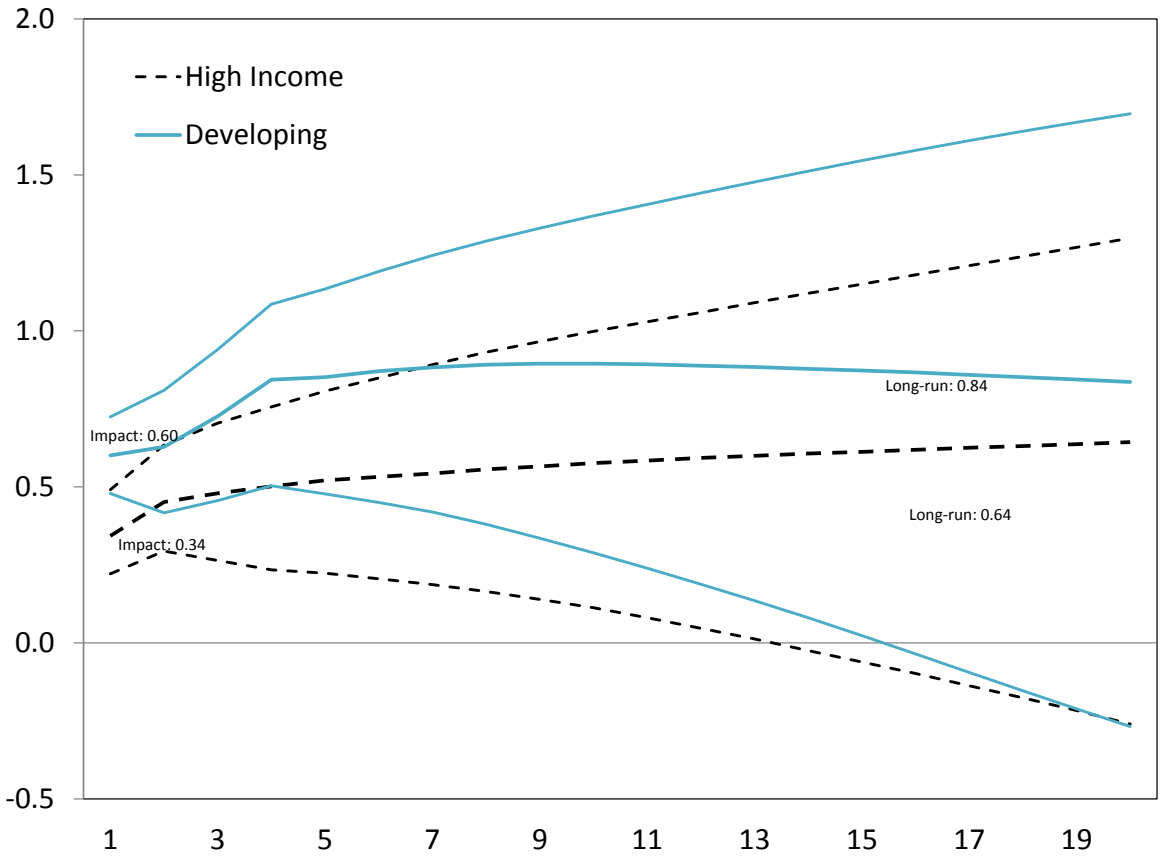
1. The impulse response function of the variable X with respect to the variable Y is the response of the variable X to a one unit standard deviation shock in the variable Y. The units are in percentage points. The confidence intervals represent 90% of the distribution (5% the lower and 95% the higher)
2. Closed economies responses on the right

Figure 10: Fiscal Multipliers: High Income vs. Developing countries



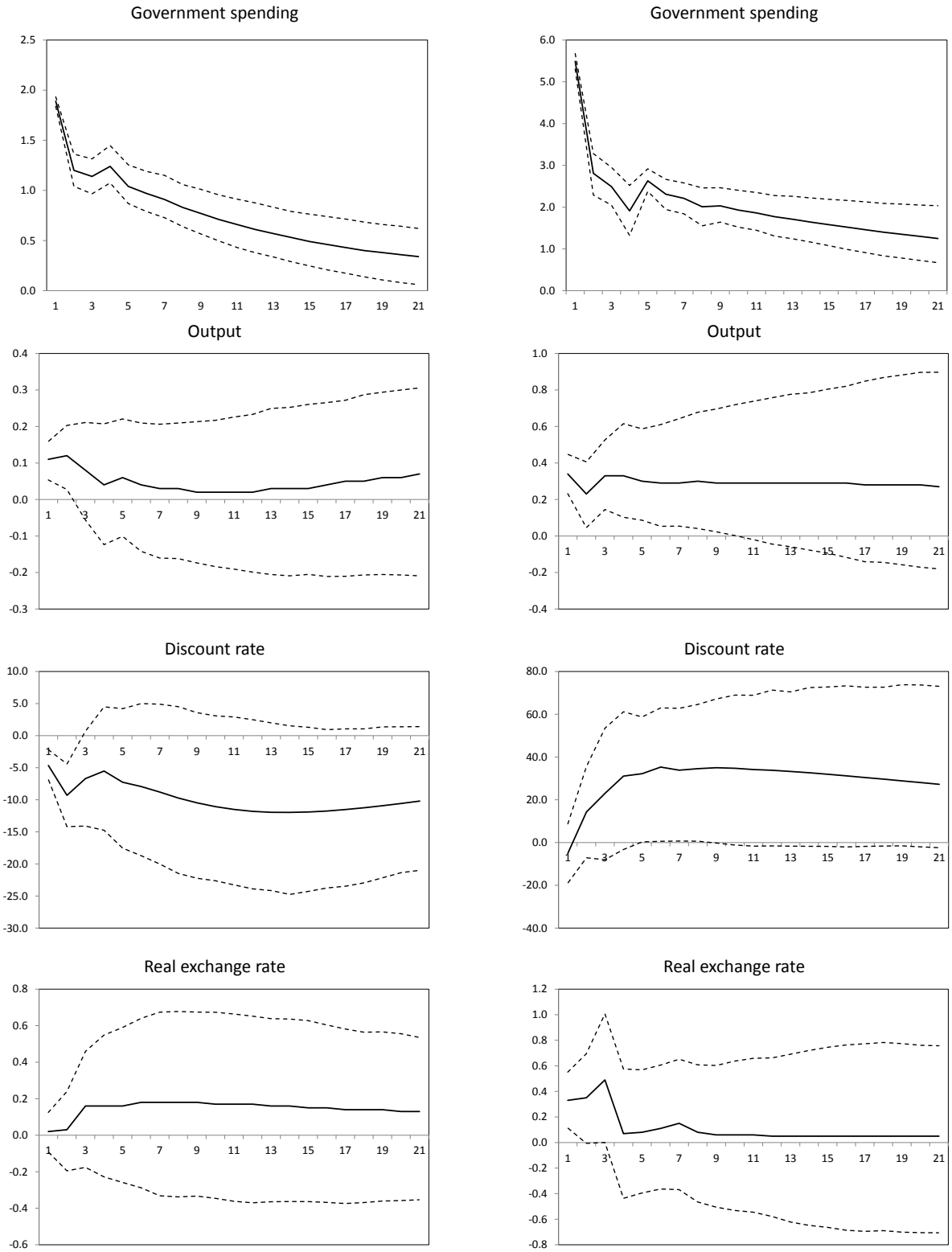
The SVAR system includes log of per-capita government spending and log of per-capita output, policy (discount) interest rate and an index of the real exchange rate. Total number of observations was 2026 for high income countries and 1640 for developing countries.

Figure 11: Fiscal Multipliers: High Income vs. Developing countries



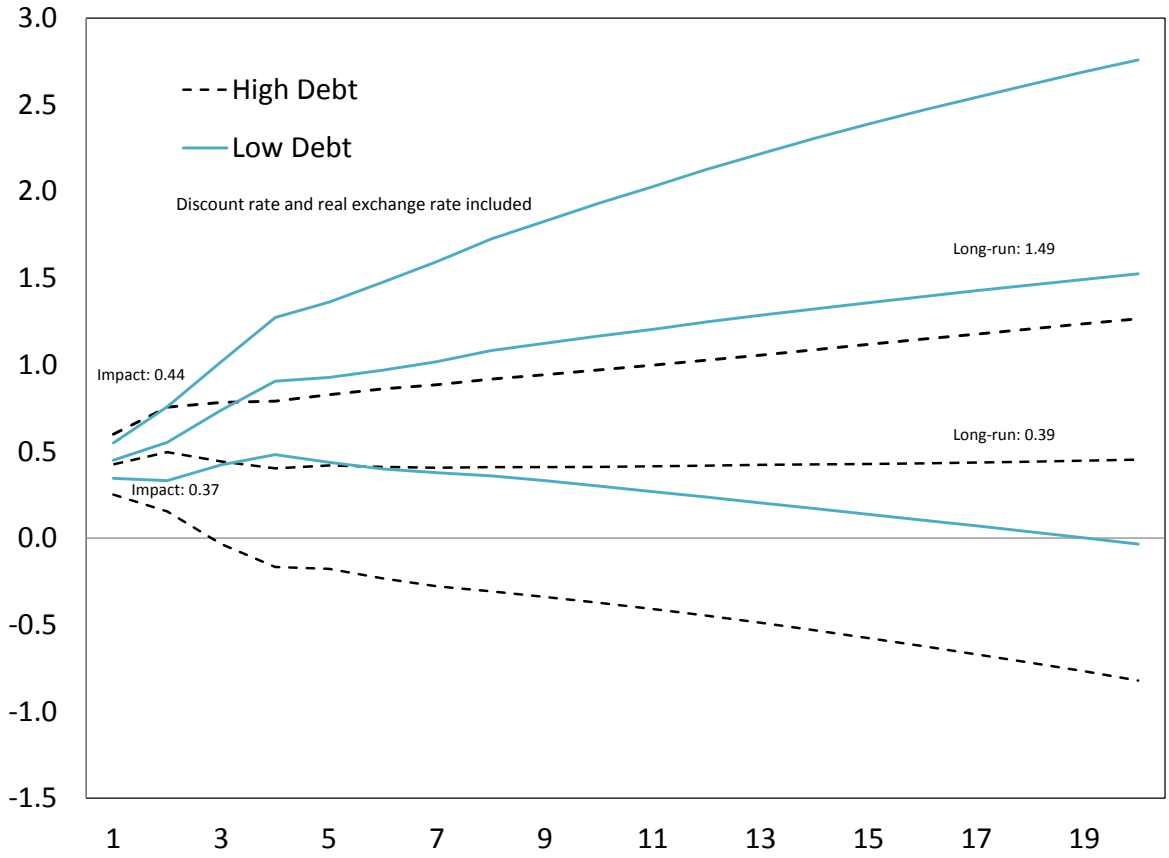
The SVAR system includes log of per-capita government spending and log of per-capita output. Different from Figure 10, this figure shows a VAR that does not include interest rate nor the real exchange rate. Total number of observations was 1831 for high income countries and 1300 for developing countries.

Figure 12: Impulse response functions: High Income vs Developing countries



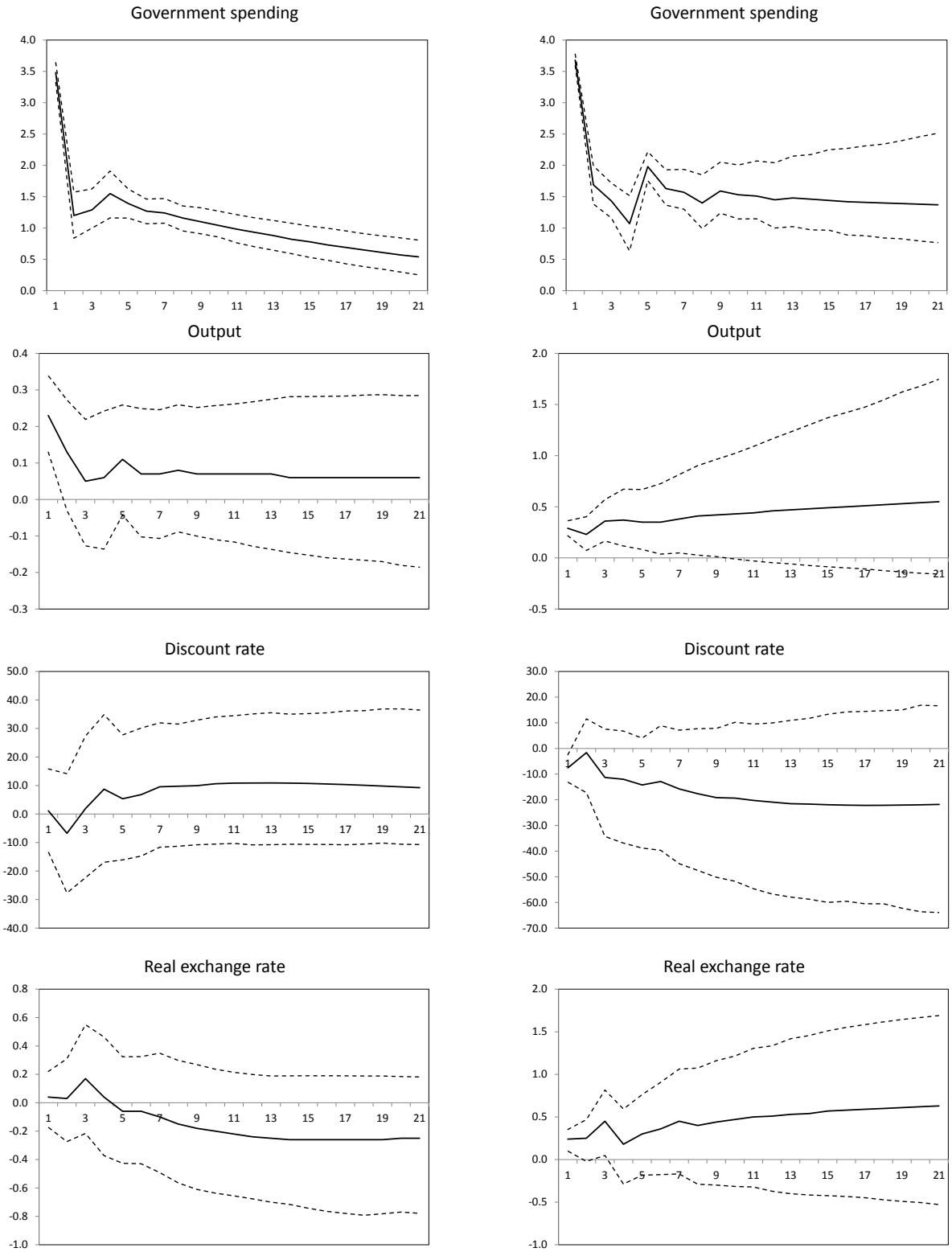
1. The impulse response function of the variable X with respect to the variable Y is the response of the variable X to a one unit standard deviation shock in the variable Y. The units are in percentage points. The confidence intervals represent 90% of the distribution (5% the lower and 95% the higher)
2. Developing countries' responses on the right

Figure 13: Fiscal Multipliers: High Debt vs. Low Debt countries controlling for the real interest rate and an index of the real exchange rate



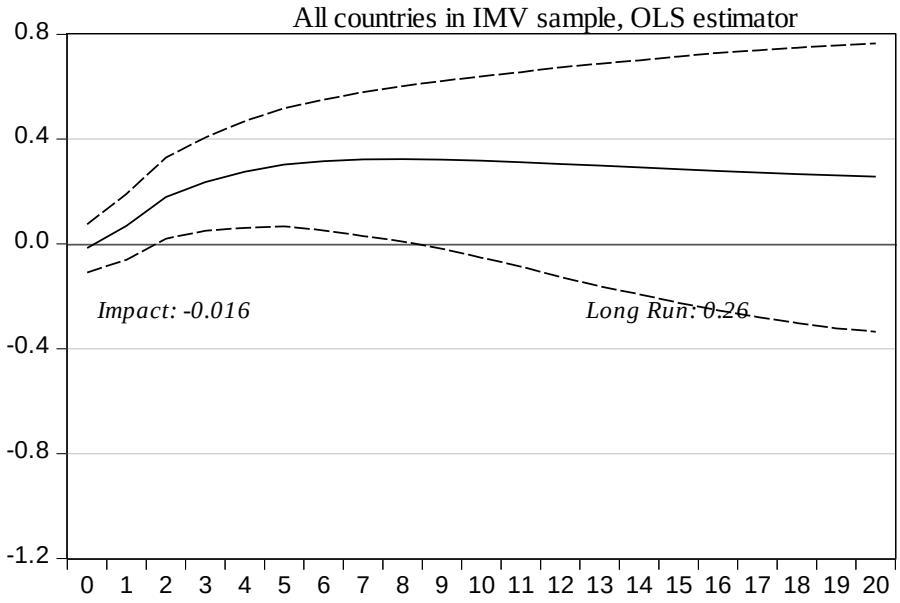
The SVAR system includes log of per-capita government spending and log of per-capita output, policy (discount) interest rate and an index of the real exchange rate. Total number of observations was 2082 for low debt and 712 for high debt countries.

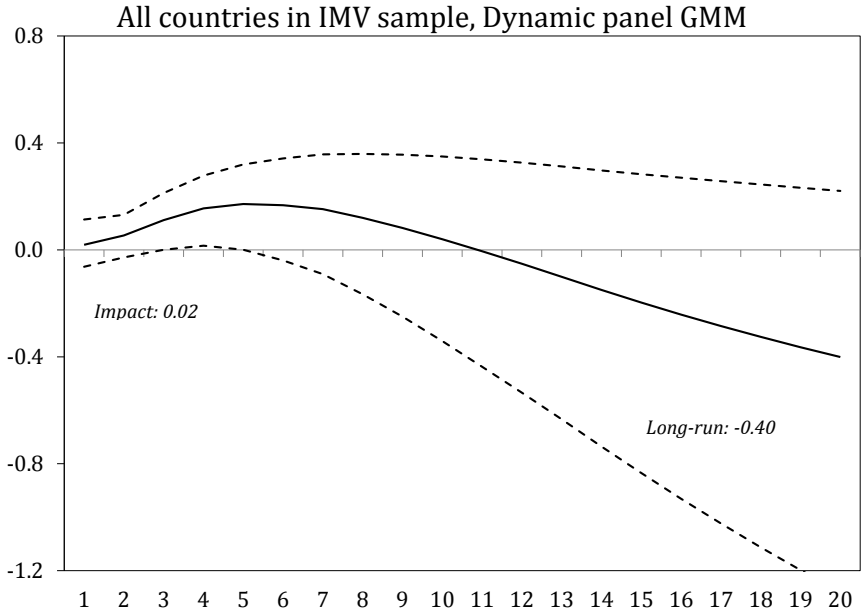
Figure 14: Impulse response functions: High debt vs low debt countries



1. The impulse response function of the variable X with respect to the variable Y is the response of the variable X to a one unit standard deviation shock in the variable Y. The units are in percentage points. The confidence intervals represent 90% of the distribution (5% the lower and 95% the higher)
2. Low debt countries responses on the right

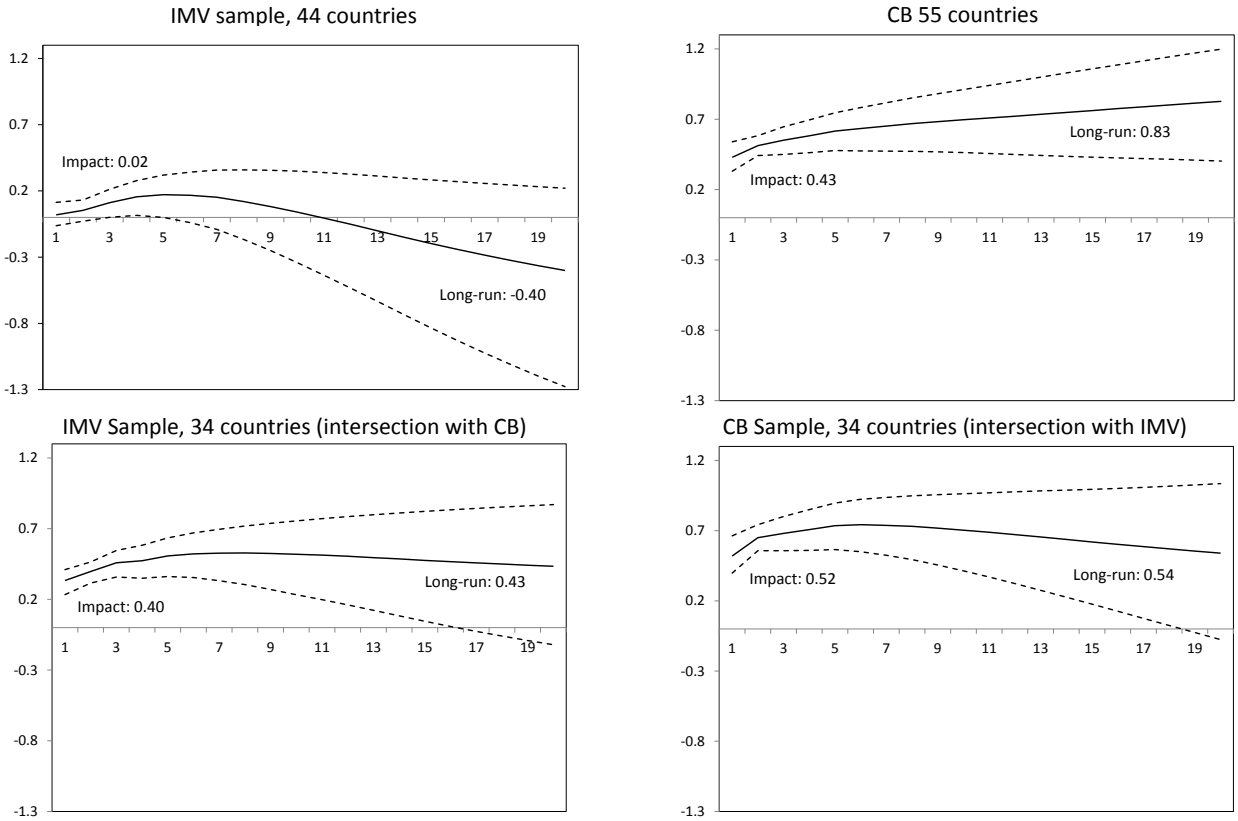
Figure 15: Method comparison: OLS vs. Dynamic Panel GMM





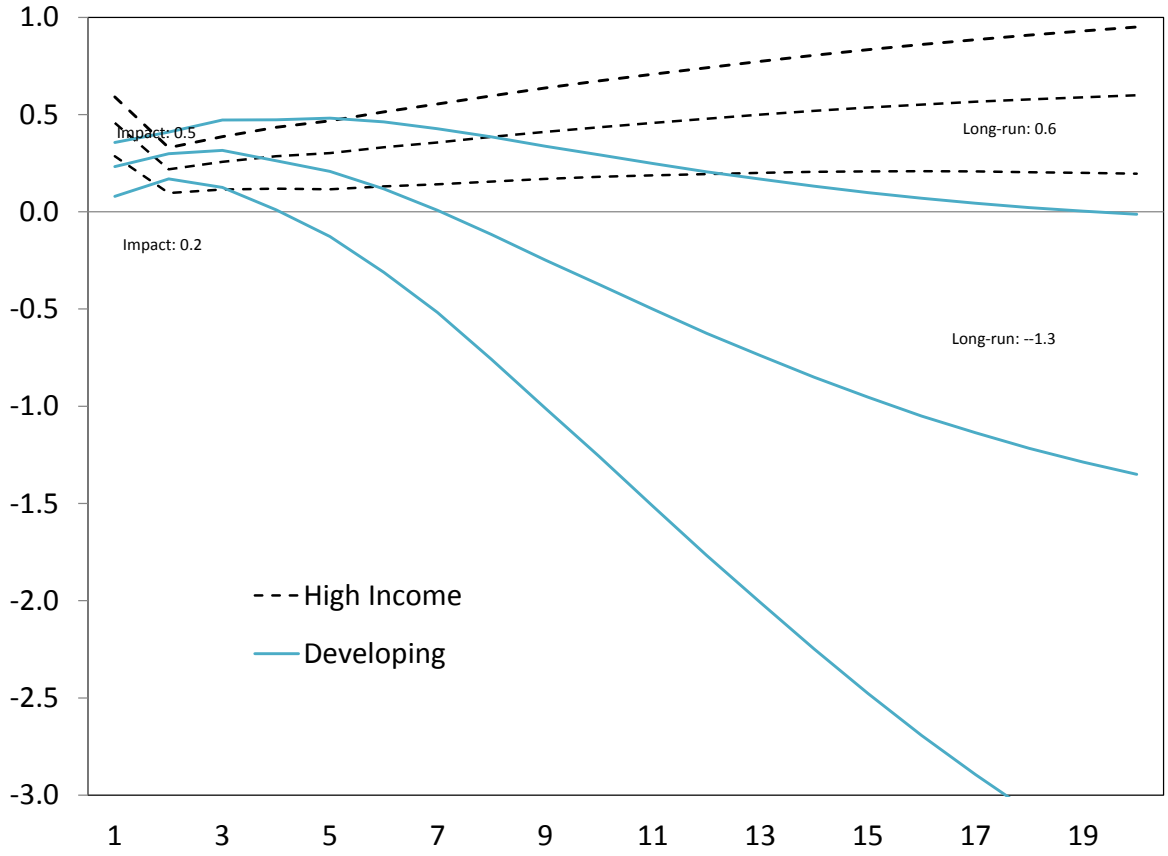
The upper figure shows the multipliers that we obtained when we used all countries in the Ilzetzki, Mendoza and Végh (2013) dataset and an OLS estimator. The lower figure shows the multipliers that we obtained using the same countries and the dynamic panel GMM estimator proposed by Holtz-Eakin et al. (1988)

Figure 16: Sample selection effect



All estimations use the dynamic panel GMM estimator proposed by Holtz-Eakin et al. (1988) The upper left figure shows the multipliers calculated using the complete Ilzetzki et al. dataset (IMV). The upper right figure shows the multipliers calculated using all countries in our sample (CB). The lower left figure shows the multipliers calculated with the IMV dataset but using only the countries present in both the IMV dataset and in our dataset (CB). The lower right figure shows the multipliers calculated with our dataset but using only the countries present in both the IMV dataset and in our dataset (CB). The countries taken out of the original IMV dataset were Botswana, Bulgaria, Croatia, Estonia, Israel, Latvia, Lithuania, Romania, Slovenia and Uruguay. The countries taken out of our original dataset were Austria, Bolivia, China, Costa Rica, Guatemala, Hong Kong, India, Indonesia, Japan, Korea, Luxembourg, New Zealand, Pakistan, Paraguay, Philippines, Russian Federation, Singapore, Switzerland, Taiwan, Venezuela, Vietnam.

Figure 17: Fiscal Multipliers: High Income vs. Developing countries using IMV sample



The estimation uses GMM and a sample of countries from the IMV dataset that intersects with our dataset. Total number of observations was 1290 for high income countries and 613 for developing countries.

SUPPLEMENTARY INFORMATION: DATA SOURCES AND TIME PERIODS

COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
Argentina	GDP at current prices	Secretaría de Programación Económica Ministerio de Economía y Obras y Servicios Públicos	1993q1 - 2010q2
	Public consumption	Secretaría de Programación Econímica Ministerio de Economia y Obras y Servicios Públicos	1993q1 - 2010q2
	Private consumption	Secretaría de Programación Econímica Ministerio de Economía y Obras y Servicios Públicos	1993q1 - 2010q2
	GDP implicit deflator (1993=100)	Instituto Nacional de Estadística y Censos.	1993q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1991q1 -2010q4
	Real effective exchange rate	IMF, BIS	1994q1 - 2010q4
	Employment	Instituto Nacional de Estadística y Censos.	1991q1 -2010q1
Australia	GDP at current prices	Australian Bureau of Statistics	1988q1 - 2010q2
	Final consumption expenditures. Public	Australian Bureau of Statistics	1988q1 - 2010q2
	Final consumption expenditures. Private	Australian Bureau of Statistics	1988q1 - 2010q2
	GDP deflator (Q3/2005-Q2/2006=100)	Australian Bureau of Statistics	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment (Thousands)	Australian Bureau of Statistics	1988q1 - 2010q3
Austria	GDP at current prices	Statistik Austria	1988q1 - 2010q2
	Government spending	ISFDATA	1988q1 - 2010q2
	Final consumption expenditure	Statistik Austria	1988q1 - 2010q2
	GDP deflator (2000=100)	Statistik Austria	1988q1 - 2010q2
	Official interest rate	Austerreichische Nationalbank (OeNB)	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	Osterreichisches Institute for Wirtschaftsforschung	1988q1 - 2010q4
Belgium	GDP at current prices	Banque Nationale de Belgique	1995q1 - 2010q2
	Government final consumption expenditure	Banque Nationale de Belgique	1995q1 - 2010q2
	Private final consumption expenditure	Banque Nationale de Belgique	1995q1 - 2010q2
	GDP deflator (2005=100)	Banque Nationale de Belgique	1988q1 - 2010q4
	Official interest rate	IMF	1988q1 - 1998q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA.	
Bolivia	GDP at current prices	Instituto Nacional de Estadística/Banco Central de Bolivia	1993q2 - 2010q2
	Public consumption	Instituto Nacional de Estadística/Banco Central de Bolivia	1993q2 - 2010q2
	Private consumption	Instituto Nacional de Estadística/Banco Central de Bolivia	1993q2 - 2010q2
	GDP Implicit Deflator (1990=100)	Instituto Nacional de Estadística/Banco Central de Bolivia	1988q1 - 2010q2
	Discount rate (policy interest rate)	Weekly Bank Reports. Banco Central de Bolivia, IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA.	
Brazil	GDP at current prices	Fundaçao Instituto Brasileiro de Geografia e Estatistica.	1990q2 - 2010q2
	Government consumption	Fundaçao Instituto Brasileiro de Geografia e Estatistica.	1994q1 - 2010q2
	Private consumption	Fundaçao Instituto Brasileiro de Geografia e Estatistica.	1994q1 - 2010q2
	Wholesale Price Index, domestic supply (1994=100)	Fundaçao Getulio Vargas	
	SELIC (target rate)	Banco Central do Brasil, IMF	1998q1 - 2010q4

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment (economically active population)	Fundaçao Instituto Brasileiro de Geografia e Estatistica.	2001q3 - 2010q3
Canadí	GDP at current prices	Statistics Canada	1988q1 - 2010q2
	Government consumption	Statistics Canada	1988q1 - 2010q2
	Final consumption expenditures	Statistics Canada	1988q1 - 2010q2
	GDP deflator (2002=100)	Statistics Canada	1988q1 - 2010q2
	Target for the overnight rate	Bank of Canada	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment: 15 years & over (thous)	Statistics Canada	1988q1 - 2010q3
Chile	GDP at current prices	Banco Central de Chile	1990q1 - 2010q2
	Government consumption	Banco Central de Chile	1996q1 - 2010q2
	Consumption	Banco Central de Chile	1996q1 - 2010q2
	GDP implicit deflator (2003=100)	Banco Central de Chile	1988q1 - 2010q4
	Monetary Policy rate	Banco Central de Chile, IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	National Bureau of Statistics	1988q1 - 2010q4
China	GDP at current prices	China National Bureau of Statistics.	1992q1 - 2010q3
	Public consumption	China National Bureau of Statistics.	1988q1 - 2009q4
	Residential consumption	China National Bureau of Statistics.	1988q1 - 2009q4
	GDP deflator (1990=100)	China National Bureau of Statistics.	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1992q2 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	State Statistical Office	1988q1 - 2007q4
Colombia	GDP at current prices	Departamento Administrativo Nacional de Estadística (DANE)	1994q1 - 2009q4
	Government consumption	Departamento Administrativo Nacional de Estadística (DANE)	1994q1 - 2009q4
	Private consumption	Departamento Administrativo Nacional de Estadística (DANE)	2000q1 - 2010q2
	GDP implicit deflator (2000=100)	Departamento Administrativo Nacional de Estadística (DANE)	1988q1 - 2010q2
	Intervention rate	Banco de la Republica	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employed working age population	Departamento Administrativo Nacional de Estadística (DANE)	2001q1 - 2010q4
Costa Rica	GDP at current prices	Banco Central de Costa Rica	1991q1 - 2010q2
	Government consumption	Banco Central de Costa Rica.	1994q1 - 2010q2
	Private consumption	Banco Central de Costa Rica	1994q1 - 2010q2
	GDP Implicit Deflator (1991=100)	Banco Central de Costa Rica.	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA.	
Czech Republic	GDP at current prices	Czech Statistical Office	1995q1 - 2010q2
	Government consumption	Czech Statistical Office	1995q1 - 2010q2
	Private consumption	Czech Statistical Office	1995q1 - 2010q2

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	GDP Implicit Deflator	Czech Statistical Office	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1993q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1990q1 - 2010q4
	Employment	NA.	
Denmark	GDP at current prices	Danmarks Statistik	1990q1 - 2010q2
	Government consumption	Danmarks Statistik	1990q1 - 2010q2
	Private consumption	Danmarks Statistik	1990q1 - 2010q2
	GDP Implicit Deflator (1991=100)	Danmarks Statistik	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA.	
Ecuador	GDP at current prices	Banco Central del Ecuador	1990q1 - 2010q2
	Government consumption	Banco Central del Ecuador	1990q1 - 2010q2
	Private consumption	Banco Central del Ecuador	1990q1 - 2010q2
	GDP deflator	Banco Central del Ecuador	1988q1 - 2010q2
	Basic central Bank Rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment: global occupation rate (%)	Banco Central del Ecuador	1998q3 - 2008q4
El Salvador	GDP at current prices	Banco Central de Reserva del Salvador	1990q1 - 2010q2
	Public consumption	Banco Central de Reserva del Salvador	1993q2 - 2009q4
	Private consumption	Banco Central de Reserva del Salvador	1993q2 - 2009q4
	GDP Deflator	Haver Analytics	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1995q1 - 2010q4
	Real effective exchange rate	NA	
	Employment	NA.	
Finland	GDP at current prices	Tilastokeskus (Statistics Finland)	1988q1 -2010q2
	Final consumption expenditure. Private	Tilastokeskus (Statistics Finland)	1988q1 -2010q2
	Final consumption expenditure. Government	Tilastokeskus (Statistics Finland)	1988q1 -2010q2
	GDP deflator (2000=100)	Tilastokeskus (Statistics Finland)	1988q1 -2010q2
	Official interest rate (End of Period)	Bank of Finland	1988q1 -2010q4
	Real effective exchange rate	IMF,BIS	1988q1 -2010q4
	Employment	NA	
France	GDP at current prices	Institut National de la Statistique et des Etudes Economiques.	1988q1 -2010q2
	Final consumption expenditures. Public	Institut National de la Statistique et des Etudes Economiques.	1988q1 -2010q2
	Final consumption expenditures. Private	Institut National de la Statistique et des Etudes Economiques.	1988q1 -2010q2
	GDP deflator (2000=100)	Institut National de la Statistique et des Etudes Economiques.	1988q1 -2010q2
	Official interest rates	Banque de France	1988q1 -2010q2
	Real effective exchange rate	IMF, BIS	1988q1 -2010q2
	Employment	Institut National de la Statistique et des Etudes Economiques.	1995q1 -2010q2
Germany	GDP at current prices	Deutsche Bundesbank	1988q1 -2010q2

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	Final consumption expenditures. Public	Deutsche Bundesbank	1988q1 -2010q2
	Final consumption expenditures. Private	Deutsche Bundesbank	1988q1 -2010q2
	GDP deflator (2000=100)	Deutsche Bundesbank	1988q1 -2010q2
	Official interest rates	Deutsche Bundesbank	1988q1 -2010q2
	Real effective exchange rate	IMF, BIS	1988q1 -2010q2
	Employment (Thousands)	Deutsche Bundesbank	1988q1 -2010q2
Greece	GDP at current prices	National Statistical Service of Greece	2000q1 - 2010q2
	Public consumption	National Statistical Service of Greece	2000q1 - 2010q2
	Private consumption	National Statistical Service of Greece	2000q1 - 2010q2
	GDP deflator (2000=100). Quarterly	National Statistical Service of Greece	2000q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1988q1 - 2000q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA	
Guatemala	GDP at current prices	Banco de Guatemala	2001q1 - 2009q4
	Government consumption	Banco de Guatemala	2001q1 - 2009q4
	Private consumption	Banco de Guatemala	2001q1 - 2009q4
	GDP deflator	Banco de Guatemala	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1988q1 - 1992q2
	Real effective exchange rate	NA	
	Employment	NA	
Hong Kong	GDP at current prices	HK Census and Statistics Department	1988q1 -2010q3
	Government consumption expenditure	HK Census and Statistics Department	1988q1 -2010q3
	Private consumption expenditure	HK Census and Statistics Department	1988q1 -2010q3
	GDP deflator (2000=100)	HK Census and Statistics Department	1988q1 -2010q2
	Discount rate (policy interest rate)	IMF	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment	NA	
Hungary	GDP at current prices	Central Statistical Office	1995q1 - 2010q2
	Government consumption expenditure	Central Statistical Office	1995q1 - 2010q2
	Private consumption expenditure	Central Statistical Office	1995q1 - 2010q2
	GDP deflator	Central Statistical Office (Haver Analytics)	1995q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1990q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA	
Iceland	GDP at current prices	Statistics Iceland	1997q1 - 2010q2
	Government final consumption	Statistics Iceland	1997q1 - 2010q2
	Private final consumption	Statistics Iceland	1997q1 - 2010q2
	GDP implicit price deflator (2000=100)	Statistics Iceland	1988q1 - 2010q2
	Interbank Offered Rate (REIBOR)	Central Bank of Iceland	1994q2 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	Employment	NA.	
India	GDP at current prices	Central Statistical Organization, India.	1996q2 - 2010q2
	Government spending	ISFDATA	1996q2 - 2010q2
	Private consumption expenditure	Central Statistical Organization, India.	1996q2 - 2010q2
	GDP deflator (Fiscal Year 1999=100)	Central Statistical Organization, India.	1988q1 - 2010q4
	Discount rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Total employment	Reserve Bank of India	1988q1 - 2007q2
Indonesia	GDP at current prices	Biro Pusat Statistic	1988q1 - 2010q3
	General government consumption expenditure	Biro Pusat Statistic	2000q1 - 2010q3
	Private consumption expenditure	Biro Pusat Statistic	2000q1 - 2010q3
	GDP deflator (2000=100)	Biro Pusat Statistic	1988q1 - 2010q3
	Discount rate (policy interest rate)	IMF	1990q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1994q1 - 2010q4
	Employment	NA.	
Ireland	GDP at current prices & exchange rates (Mil.US$)	Central Statistics Office	1988q1 - 2010q2
	Government consumption expenditure	Central Statistics Office	1997q1 - 2010q2
	Final consumption expenditures. Private	Central Statistics Office	1997q1 - 2010q2
	GDP deflator (2005=100)	Central Statistics Office	1988q1 - 2010q4
	ECB main refinancing rate: minimum bid rate	Central Statistics Office	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA.	
Italy	GDP at current prices	Istituto Nazionale di Statistica	1988q1 -2010q2
	Final consumption expenditures. Public	Istituto Nazionale di Statistica	1988q1 -2010q2
	Final consumption expenditures. Private	Istituto Nazionale di Statistica	1988q1 -2010q2
	GDP deflator (SA, 2000=100	Istituto Nazionale di Statistica	1988q1 -2010q2
	Official interest rate (End of Period)	Banca d'Italia	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment	Istituto Nazionale di Statistica	1988q1 -2010q2
Japan	GDP at current prices	Cabinet Office	1988q1 -2010q2
	Government consumption expenditure	Cabinet Office	1988q1 -2010q2
	Private consumption expenditures	Cabinet Office	1988q1 -2010q2
	GDP deflator	Cabinet Office	1988q1 -2010q2
	Overnight call rate: uncollateralized (target)	Bank of Japan	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment	NA.	
Korea	GDP at current prices	The Bank of Korea	1988q1 -2010q2
	Final consumption expenditure. Government	The Bank of Korea	1988q1 -2010q2
	Final consumption expenditure. Private	The Bank of Korea	1988q1 -2010q2
	GDP deflator (2000=100)	The Bank of Korea	1988q1 -2010q2

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	Discount rate (policy interest rate)	IMF	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Total employment	National Statistical Office	1988q1 -2010q3
Luxembourg	GDP at current prices	Luxembourg Central Service of Statistics and Economic Studies.	1995q1 - 2010q2
	Final consumption expenditures.Public	Luxembourg Central Service of Statistics and Economic Studies.	1995q1 - 2010q2
	Final consumption expenditures.Private	Luxembourg Central Service of Statistics and Economic Studies.	1995q1 - 2010q2
	GDP deflator (2000=100)	Luxembourg Central Service of Statistics and Economic Studies.	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1990q1 - 1999q1
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA.	
Malaysia	GDP at current prices	Department of Statistics	1991q1 - 2010q2
	Government final consumption expenditure	Department of Statistics	1991q1 - 2010q2
	Final consumption expenditure. Private	Department of Statistics	1991q1 - 2010q2
	GDP deflator (2000=100)	Department of Statistics	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	2004q2 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employed	Department of Statistics	1998q1 - 2010q2
Mexico	GDP at current prices	Instituto Nacional de Estadistica Geografia e Informatica	1988q1 - 2010q2
	Government consumption	ISFTDATA	1993q1 - 2010q2
	Private consumption	Instituto Nacional de Estadistica GeografIa e Informatica	1993q1 - 2010q2
	GDP deflator (1993=100)	Instituto Nacional de Estadistica GeografIa e Informatica	1988q1 - 2010q2
	Target rate	Banco de Mexico, IMF	1995q2 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment (persons)	Instituto Nacional de Estadistica GeografIa e Informatica	2005q1 - 2010q3
Netherlands	GDP at current prices	Centraal bureau voor de statistiek	1988q1 -2010q2
	Final consumption expenditures. Public	Centraal bureau voor de statistiek	1988q1 -2010q2
	Final consumption expenditures.Private	Centraal bureau voor de statistiek	1988q1 -2010q2
	GDP deflator (2000=100)	Centraal bureau voor de statistiek	1988q1 -2010q2
	ECB main refinancing rate: minimum bid rate	De Nederlandsche Bank	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Total employment	NA	
New Zealand	GDP at current prices	Statistics New Zealand	1988q1 -2010q2
	Public consumption expenditure	Statistics New Zealand	1988q1 -2010q2
	Private consumption expenditure	Statistics New Zealand	1988q1 -2010q2
	GDP deflator (SA, Q3 1995-Q2 1996=1000)	Statistics New Zealand	1988q1 -2010q2
	Official cash rate (EOP)	Reserve Bank of New Zealand	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Total employment	NA	
Norway	GDP at current prices	Statistisk Sentralbyra	1988q1 -2010q2
	General government consumption	Statistisk Sentralbyra	1988q1 -2010q2

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	Private consumption	Statistisk Sentralbyra	1988q1 -2010q2
	GDP deflator (2005=100)	Statistisk Sentralbyra	1988q1 -2010q2
	Sight deposit rate	Norges Bank	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Total employment	NA	
Pakistan	GDP at current prices	Federal Bureau of Statistics	1988q4 - 2010q2
	General government	Federal Bureau of Statistics	1998q3 - 2010q2
	Total consumption. Private	Federal Bureau of Statistics	1998q3 - 2010q2
	GDP deflator (Fiscal year 2000= 100)	Federal Bureau of Statistics	1988q1 - 2010q4
	Discount rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment (10 Years and over)	Federal Bureau of Statistics	1989q3 - 2009q2
Paraguay	GDP at current prices	Banco Central del Paraguay	1994q1 - 2010q2
	Government consumption	Banco Central del Paraguay	1994q1 - 2010q2
	Private consumption	Banco Central del Paraguay	1994q1 - 2010q2
	GDP Implicit Deflator (1982=100)	Banco Central del Paraguay	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1989q4 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA.	
Peru	GDP at current prices	Ministerio de Economia y Obras y Servicios Publicos (Haver analytics)	1989q1 - 2010q2
	Public consumption	Ministerio de Economia y Obras y Servicios Publicos (Haver analytics)	1992q3 - 2010q2
	Private consumption	Ministerio de Economia y Obras y Servicios Publicos (Haver analytics)	1992q3 - 2010q2
	GDP Implicit Deflator (1994=100)	Ministerio de Economia y Obras y Servicios Publicos (Haver analytics)	1988q1 - 2010q2
	Reference rate (policy interest rate)	IMF	1991q3 - 2010q4
	Real effective exchange rate	IMF, BIS	1994q1 -2010q4
	Employed: Metropolitan Lima	Banco Central de Reserva del Peru	2001q2 - 2010q3
Philippines	GDP at current prices	National Economic and Development Authority	1988q1 - 2010q2
	Government consumption expenditure	National Economic and Development Authority	1991q3 - 2010q2
	Private consumption	National Economic and Development Authority	1991q3 - 2010q2
	Gross domestic product deflator (1985=100)	National Economic and Development Authority	1988q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employed	National Statistics Office	1990q4 - 2010q3
Poland	GDP at current prices	Central Statistical Office	1995q1 - 2010q2
	Government consumption	Central Statistical Office	1995q1 - 2010q2
	Private consumption	Central Statistical Office	1995q1 - 2010q2
	GDP deflator	Central Statistical Office (Haver Analytics)	1995q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1990q2 - 2010q4
	Real effective exchange rate	IMF,BIS	1988q1 - 2010q4
	Employment	Central Statistical Office	1992q2 - 2010q2

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
Portugal	GDP at current prices	Instituto Nacional de Estatistica	1995q1 - 2010q2
	Public consumption expenditures	Instituto Nacional de Estatistica	1995q1 - 2010q2
	Private consumption expenditures	Instituto Nacional de Estatistica	1995q1 - 2010q2
	GDP deflator (2000=100)	Instituto Nacional de Estatistica	1995q1 - 2010q2
	ECB main refinancing rate: minimum bid rate	European Central Bank	1992q1 - 2010q4
	Real effective exchange rate		1988q1 - 2010q4
	Employed (Thousand)	Instituto Nacional de Estatistica	NA
Russia	GDP at current prices	State Comitee of the Russian Federation	2003q1 - 2010q2
	Government consumption	State Comitee of the Russian Federation	2003q1 - 2010q2
	Private consumption	State Comitee of the Russian Federation	2003q1 - 2010q2
	GDP deflator	State Comitee of the Russian Federation(Haver Analytics)	2003q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1996q3 - 2010q4
	Real effective exchange rate	IMF,BIS	1988q1 - 2010q4
	Employment	State Comitee of the Russian Federation	1991q1 - 2010q3
Singapore	GDP at current prices	Department of Statistics	1988q1 -2010q2
	Government consumption	Department of Statistics	1988q1 -2010q2
	Private consumption	Department of Statistics	1988q1 -2010q2
	GDP deflator (2000=100)	Department of Statistics	1988q1 -2010q2
	Discount rate (policy interest rate)	IMF	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment	NA	
Slovakia	GDP at current prices	Statistical Office of the Slovak Republic	1995q1 - 2010q2
	Government consumption	Statistical Office of the Slovak Republic	1995q1 - 2010q2
	Private consumption	Statistical Office of the Slovak Republic	1995q1 - 2010q2
	GDP deflator	Statistical Office of the Slovak Republic (Haver Analytics)	1995q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1995q3 - 2010q4
	Real effective exchange rate	IMF,BIS	1990q1 - 2010q2
	Employment	NA	
South Africa	GDP at current prices	South African Reserve Bank	1988q1 -2010q2
	Government consumption	South African Reserve Bank	1988q1 -2010q2
	Private consumption	South African Reserve Bank	1988q1 -2010q2
	GDP deflator	South African Reserve Bank	1988q1 -2010q2
	Discount rate (policy interest rate)	IMF	1988q1 -2010q4
	Real effective exchange rate	IMF,BIS	1988q1 -2010q4
	Employment	South African Reserve Bank	2000q1 - 2010q2
Spain	GDP at current prices	Instituto Nacional de Estadistica	1988q1 -2010q2
	General government consumption exp	Instituto Nacional de Estadistica	1988q1 -2010q2
	Final consumption expenditure	Instituto Nacional de Estadistica	1988q1 -2010q2
	GDP deflator (2000=100)(Q1 2000-present)	Instituto Nacional de Estadistica	1988q1 -2010q2
	Official interest rate	European Central Bank	1988q1 -2010q4

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment (Thous)	Instituto Nacional de Estadistica	2000q1 - 2010q3
Sweden	GDP at current prices	Statistiska Centralbyran (Statistics Sweden)	1993q1 -2010q2
	Government consumption	Statistiska Centralbyran (Statistics Sweden)	1993q1 -2010q2
	Private consumption expenditures	Statistiska Centralbyran (Statistics Sweden)	1993q1 -2010q2
	Quarterly GDP deflator (2000=100)	Statistiska Centralbyran (Statistics Sweden)	1988q1 -2010q2
	Riksbank repo rate	Sveriges Riksbank	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment	NA	
Switzerland	GDP at current prices	Staatssekretariat fír Wirtschaft	1993q1 -2010q2
	Public consumption expenditure	Staatssekretariat fír Wirtschaft	1993q1 -2010q2
	Private consumption	Staatssekretariat fír Wirtschaft	1993q1 -2010q2
	Quarterly GDP Deflator (2000=100)	Staatssekretariat fír Wirtschaft	1988q1 -2010q2
	Discount rate (policy interest rate)	IMF	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment	NA	
Taiwan	GDP at current prices	Directorate-General of Budget, Accounting & Statistics, Executive Yuan (DGBASY).	1988q1 - 2010q2
	Government final consumption expenditure	Directorate-General of Budget, Accounting & Statistics, Executive Yuan (DGBASY).	1988q1 - 2010q2
	Private final consumption expenditure	Directorate-General of Budget, Accounting & Statistics, Executive Yuan (DGBASY).	1988q1 - 2010q2
	GDP deflator (2001=100)	Directorate-General of Budget, Accounting & Statistics, Executive Yuan (DGBASY).	1988q1 - 2010q2
	Rediscount rate	Central Bank of China	1988q1 - 2010q4
	Real effective exchange rate	NA	
	Employment	NA	
Thailand	GDP at current prices	National Economic and Social Development Board (NESBD)	1993q1 - 2010q2
	Government consumption expenditure	National Economic and Social Development Board (NESDB)	1993q1 - 2010q2
	Private consumption expenditure	National Economic and Social Development Board (NESDB)	1993q1 - 2010q2
	GDP deflator (1988=100)	National Economic and Social Development Board (NESDB)	1993q1 - 2010q2
	Policy target rate (%, EOP)	Bank of Thailand, IMF	1988q1 2010q4
	Real effective exchange rate	IMF, BIS	1994q1 - 2010q4
	Employment	NA	
Turkey	GDP at current prices	Haver Analytics	1988q1 - 2010q2
	Government final consumption expenditure	Haver Analytics	1993q1 - 2010q2
	Private final consumption expenditure	Haver Analytics	1989q4 - 2010q2
	GDP deflator	Haver Analytics	1988q1 2010q2
	Rediscount rate	IMF	1988q1 - 2010q2
	Real effective exchange rate	IMF, BIS	1994q1 - 2010q4
	Employment	Haver Analytics	1991q3 - 2010q2
United Kingdom	GDP at current prices	Office for National Statistics	1988q1 -2010q2
	Final consumption expenditures. Public	Office for National Statistics	1988q1 -2010q2
	Final consumption expenditures. Private	Office for National Statistics	1988q1 -2010q2

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COUNTRY	VARIABLE NAME	SOURCE	TIME PERIOD
	GDP deflator (2003=100)	Office for National Statistics	1988q1 -2010q2
	Base rate (repo rate), Bank of England (EOP)	Bank of England	1988q1 -2010q4
	Gross fixed capital formation	Office for National Statistics	1988q1 -2010q4
	Employment (Thous)	Office for National Statistics	1988q1 -2010q2
United States	Gross domestic product	Bureau of Economic Analysis	1988q1 -2010q2
	Final consumption expenditures. Public	Bureau of Economic Analysis	1988q1 -2010q2
	Private (personal consumption expenditure)	Bureau of Economic Analysis	1988q1 -2010q2
	GDP deflator (2000=100)	Bureau of Economic Analysis	1988q1 -2010q2
	Federal Funds Target Rate	U.S. Federal Reserve Bank	1988q1 -2010q4
	Real effective exchange rate	IMF, BIS	1988q1 -2010q4
	Employment	U.S. Bureau of Labor Statistics	1988q1 -2010q2
Venezuela	GDP at current prices	Banco Central de Venezuela	1997q1 - 2009q4
	Government consumption	Banco Central de Venezuela	1998q1 - 2009q4
	Private consumption	Banco Central de Venezuela	1998q1 - 2009q4
	GDPimplicit deflator (1997=100)	Banco Central de Venezuela	1998q1 - 2009q4
	Discount rate (policy interest rate)	IMF	1988q1 - 2010q4
	Real effective exchange rate	IMF, BIS	1988q1 - 2010q4
	Employment	NA	
Vietnam	GDP at current prices	General Statistics Office of Vietnam	1993q2 - 2010q2
	Final consumption expenditures. Public	General Statistics Office of Vietnam	1995q1 - 2010q2
	Final consumption expenditures. Private	General Statistics Office of Vietnam	1995q1 - 2010q2
	GDP deflator (1994=100)	General Statistics Office of Vietnam	1995q1 - 2010q2
	Discount rate (policy interest rate)	IMF	1996q1 - 2010q4
	Real effective exchange rate	NA	
	Employment	NA	