FC Research paper

14/01

Fiscal Multipliers in Emerging European Economies

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February, 2014

FISCAL COUNCIL – REPUBLIC OF SERBIA

FISCAL MULTIPLIERS IN EMERGING EUROPEAN ECONOMIES

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Abstract

Filling the evidence gap on the size and variations of fiscal multipliers in developing countries, and contributing to the debate on the fiscal transmission mechanism, we found that the government spending multipliers in emerging Europe are (i) higher than in developing countries and at lower end of those in developed countries; (ii) the fiscal multiplier is large under fixed exchange rate and close to zero under floating and this is related to different monetary policy stance across regimes; (iii) the multiplier substantially increases in the Great Recession relative to pre-crisis expansion; (iv) upon government spending shock private consumption increases under both exchange rate regimes, in downturn and expansion, and hence in the over-all sample, thus mimicking the corresponding pattern of spending multipliers, and hence supporting predictions of traditional and new Keynesian models rather than those of neoclassical ones.

JEL Classification Numbers: E62

Keywords: Fiscal multiplier, Emerging Europe, Panel VAR, Fiscal transmission mechanism

February 2014

1. *Introduction*

The Great Recession of 2009-2012 that triggered first fiscal stimulus measures, and subsequent fiscal tightening, has revived the longstanding debate on the size of fiscal multipliers. The crisis has refocused attention on the effectiveness of fiscal policy even in the short run, and hence sparked interest in fiscal multipliers.

Empirical evidence on the size of fiscal multipliers in emerging economies is scarce. While substantial empirical evidence has been accumulated in advanced economies, just a few studies explore the fiscal multiplier's size in developing counties –thus only two studies (Ilzetzki and Vegh 2008, and Ilzetzki et al. 2013) out of almost 40 appear in the most recent comprehensive survey of literature (Mineshima et al. 2013). Moreover, uncertainty over the size of fiscal multipliers is much higher in emerging economies due to its history of fiscal imprudence and blemished debt repayments, which intensifies the relevance of the issue.

There is no such a thing as a multiplier. The size of a multiplier depends on a number of factors, and is conditional on economic, financial and policy environment. Hence, there is a growing strand of literature (e.g. Ilzetzki et al. 2013, Corsetti et al. 2012, Blanchard and Leigh 2013) that empirically explores multiplier's size in different environments, e.g. across different exchange rate regimes, during boom and downturn, etc., asking when fiscal stimulus is effective or ineffective. Besides being relevant per se, this research has obvious policy implications.

Recent evidence for developed economies suggests that private consumption increases in response to a rise in government spending, hence co-moving with the corresponding response of output (cf. Blanchard and Perotti, 2002, Fatas and Mihov, 2001, Perotti, 2005 and 2007, Gali et al., 2007 and Bilbiie et al., 2008). The response of private consumption is of particular interest for the debate on the fiscal transmission mechanism, where the positive response concurs with predictions of traditional and some new Keynesian models, as opposed to the neoclassical ones. Again, evidence on the private consumption response in emerging market economies is missing.

This paper examines the size of fiscal multipliers in emerging European economies, overall and conditional on the exchange rate regime as well as on the state of the economy, and confronts the findings with those obtained in developing and developed economies. We are concentrating on government spending multipliers, but are also attempting to assess the revenue ones. In addition, we are exploring private consumption response upon government spending shock, again for the over-all sample and conditional on the exchange rate regime as well as the state of the economy. Specifically, we are examining whether these responses are positive and co-move with the output ones, and are asking if and when variations in private consumption response can account for varying spending multipliers.

While concentrating on emerging European economies, the paper is aiming to fill the evidence gap on fiscal multipliers in developing countries (just two studies of Ilzetzki and Vegh 2008, and Ilzetzki et al. 2013). Moreover, this set of countries is interesting per se, being a distinct and relatively compact group. They share common legacy from the second half of 20th century, institutional reforms and

accession to the EU during the 1990s and the 2000s, and common geography. As to specific determinants affecting fiscal multipliers, these countries are small, open economies, low indebted and with small automatic stabilizers, thus lending opportunity to assess multipliers while controlling for these factors. Furthermore, the exchange rate regime in these economies occupies (almost) corner solutions: hard fix with currency board and euro on one side and inflation targeting floaters on the other, enabling one to evaluate variations of fiscal multipliers across these clear-cut options. Finally, covering the Great Recession of 2009-2012 and preceding boom in emerging European economies, offers the opportunity to examine the effect of fiscal stimulus in financial crisis and under consequent credit crunch, vs. the stimulus in the expansion.

Following Blanchard and Perotti (2002), we use the Structural VAR approach at quarterly frequency to identify fiscal shocks; working with quarterly data is decisive for identification within this methodology. Nevertheless, quarterly dataset for emerging European countries is, like that for developing countries, just a decade or so long, so we have chosen to pool data across countries rather than estimating country-by-country (cf. also Ilzetzki et al. 2013). Relatively compact set of emerging European economies sides the concern of heterogeneity, and consequent imprecise estimates, often raised within panel approach.

The rest of the paper is organized as follows. Section 2 reviews the chosen set of emerging EU economies while examining main fiscal multiplier's determinants, and showing that these economies make a distinct and relatively compact set. The methodology and data used are explained in section 3. Main empirical findings on fiscal multipliers in the considered set of emerging EU economies are presented in section 4. Section 5 examines empirically the role of private consumption response in determining the size of spending multipliers. The conclusions and summary of our findings are given in section 6.

2. *Emerging EU economies and the size of the fiscal multipliers: A Background*

A set of emerging EU countries we shall be looking at is a distinct and relatively compact one. The sample contains ten countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia, over the period 1999 – 2012. They shared common institutional reforms from the early 1990s, and even more so in the period we have looked at: 1999-2012, as they went through transition process, prepared for accessing the EU, and joined it in 2004 and 2007 (Bulgaria and Romania). They are also compact in geographical terms and shared common legacy from the second half of 20^{th} century.

We shall screen this set of emerging EU economies from the perspective of the key factors determining the size of the fiscal multipliers, starting with the factors that are similar across the whole set of economies.

As to the *level of development*, most of these countries, for the most part of the sample, belong to emerging economies (cf. IMF WEO, April 2013, and WB Atlas method, 2013). While only Slovenia is a high income country over the whole sample, the Czech R. joined it in 2006; from 2008 to 2010, it was half-half, while in 2012, Bulgaria, Romania and Hungary are still left out from high income countries. But even those that recently joined the high income club are at the very bottom of it, e.g. Poland (cf. WB Atlas method, 2013). Similarly, the IMF lately (cf. IMF WEO, April 2013) classifies only Slovenia, the Czech R., Slovak R., and Estonia as high income countries, and others as still emerging economies. Being emerging economies, one would expect them to have lower multipliers than high income countries (cf. Mineshima et al. 2013).

All countries in our sample are *small open economies*. A standard criterion for openness that the ratio of trade (imports plus exports) to GDP exceeds 60% (see e.g. Ilzetzki et al. 2013) is satisfied by practically all countries over the whole sample, i.e. except for a few observations in Poland (9 quarters) and one in Romania all at the beginning of period. The trade ratio varies from the minimum of 75.2% in Poland to the maximum value 158% in Slovakia, with the median and average for the whole sample being quite large: 121% of GDP.

An alternative measure of trade openness that stresses the importance of imports for the size of multiplier is the propensity to import i.e. the ratio of imports to domestic demand (GDP minus net export, cf. Mineshima et al. 2013). Again, it clearly shows that the sample of our countries belongs to open economies. Namely, being on average 60% in our sample, it is on the high side when compared with OECD countries (cf. Mineshima et al. 2013, Fig. 1), and almost twice as large as in the EU15 (36%). Across countries in our sample, the propensity varies from 38 in Poland to 78 in Slovakia, while the median is equal to mean (60%).

Economic theory predicts, and empirical evidence confirms (cf. e.g. Ilzetzki et al. 2013, and Mineshima et al. 2013, Fig. 1) that larger trade openness leads to lower fiscal multipliers. Moreover, the size of an economy on its own also affects the multipliers, i.e. the smaller the economy the lower the multipliers. Namely in large economies part of the spending that leaked through imports would return as increased demand for exports, thus increasing the multiplier effect (cf. Chinn, 2013). The size of an economy is measured by GDP, and it shows that all economies in our sample are very small, apart from Poland, but it can also be considered as a small one[i]. Thus both measures of trade openness as well as GDP across emerging EU countries show that they represent a compact set of small open economies.

The size of *automatic stabilizers* is smaller in our set of emerging EU countries compared to developed Europe economies (EU17), while their smaller size leads to higher fiscal multipliers (cf. Spilimbergo et al., 2009, and Mineshima et al. 2013, Fig. 1). Namely, higher automatic stabilizers mitigate the effect of a fiscal stimulus on output increase, since the latter leads to higher tax revenue and lower transfers, consequently reducing the fiscal multiplier. The size of automatic stabilizers is measured as the semi-elasticity of budget balance and its average value during the 1999-2011 period is 0.36 for emerging EU economies, and 0.50 for developed EU ones (EU 17). On the higher side are Hungary (0.47) and Slovenia (0.46), followed by Poland and Czech R. (approximately 0.4), while for the other six

countries the semi-elasticity varies in range from 0.29 to 0.34 (cf. Mourre et al., 2013). Thus, each emerging economy in our sample has lower size of automatic stabilizers than the average in developed Europe, and variations within the emerging economies is relatively small, making it a fairly compact group. Low values of automatic stabilizers in a subset of emerging EU countries, apart from Hungary, are also reported in Dolls et al. (2012). For comparison, the semi-elasticity of the budget balance in the US is estimated at 0.34 (cf. Girouardand André, 2005), i.e. close to the average in emerging Europe. Moreover, estimates for Latin America (cf. Suescun, 2007) show that the semi-elasticity varies from negative to 0.4, hence again similar to those in our set of emerging EU countries.

The small impact of automatic stabilizers in emerging EU economies is due to their institutional features, specifically to their modest unemployment compensations as well as to the tax systems with the dominant role of VAT, social contributions, and in most countries proportional income tax. Thus again this set of countries appears a distinct and relatively compact one with respect to the institutional determinants of automatic stabilizers.

As to the *public debt level,* emerging EU countries have been on the prudent side. There is considerable empirical evidence that higher debt to GDP ratio leads to smaller multipliers thus making fiscal stimulus ineffective[ii]. Ilzetzki et al. (2013) identify a threshold of 60% for debt to GDP ratio, above which fiscal multipliers decrease. In our sample, mean and median debt to GDP ratio is 32% and 28% respectively, while corresponding figures in the pre-crisis period are 30% and 26%, and both increase in the crisis to 37%. There are very few instances of the debt ratio that exceeds 60%, with Hungary being an outlier recording higher debt for 8 years, and Bulgaria for three years. Nevertheless, it is high debt episodes, i.e. periods of three and more consecutive years with debt ratio above 60%,that lead to lower multipliers (cf. Ilzetzki et al. 2013). In our sample, there are only two such episodes: in Bulgaria (2000-2002) and Hungary (2005-2012). All above suggests that our set of emerging EU economies belongs to low indebted countries.

There is yet another common feature of our set of emerging EU economies relevant for assessing fiscal multipliers, i.e. their business cycles are strongly affected by those in developed Europe (cf. Cuaresma et al., 2011). To control for that, we include the EU15 (EU members before 2000) GDP gap as exogenous variable while evaluating fiscal multipliers in emerging EU economies.

The remaining factors affecting markedly the size of the fiscal multipliers: the exchange rate regime and related monetary policy stance, as well as the state of the economy, vary substantially across our sample of emerging EU economies in the period of 1999-2012. Also, government spending multipliers tend to differ from government revenue ones. Therefore while empirically assessing fiscal multipliers, we shall condition on these factors.

Exchange rate regime in our set of countries contains first hard fixers, i.e. three currency boards, membership in the euro area, and rather hard fix in Latvia, that did not abandon fixed rate even in the extreme 2009 crisis when GDP actually dropped by 18%. On the other hand, flexible exchange rates are accompanied in all cases except Slovenia with inflation targeting, resulting in very flexible exchange rates. Thus within each regime, economies are markedly homogenous with respect to

exchange rates, while sharply different across the alternative regimes. This differs from previous studies where the contrast between exchange rate regimes is not that strongly pronounced.

The monetary policy stance in our set of emerging EU economies follows directly from their exchange rate regimes described above. As these economies are small open ones with high degree of capital mobility, countries with fixed exchange rate regime hardly have any space for independent monetary policy. Consequently, they would pursue accommodative monetary policy upon fiscal expansion, which results in larger multipliers. On the other hand, flexible exchange rate leaves space for independent monetary policy, and since the floaters in our sample have opted for inflation targeting, the policy is governed by some form of Taylor rule. Accordingly, central banks in these countries are expected to increase interest rates upon fiscal stimulus thus dampening its effect on output. In other words, inflation targeters follow non-accommodative monetary policy. Incidence of policy interest rate constrained by zero-lower bound that would lead to accommodative monetary policy even under flexible exchange rates is not present in the sample.

In accord with the above, empirical evidence do suggest that multipliers are higher under a predetermined exchange rates relative to those under a flexible exchange rate regime (cf. Ilzetzki et al. 2013, Corsetti et al. 2012, and Born et al. 2013).

State of economy in our set of emerging European countries has substantially changed over the considered period of 1999-2012, i.e. from expansion starting in 2000 and going through mid-2008 to the Great Recession and financial crisis subsequently. Specifically, average annual growth rate was 5.4% in the expansion period, i.e. from 2000 to 2008, while negative -0.4% during the Great Depression (2009-2012). The output gap, at annual frequency, was positive in 82% instances in the first sub-period, i.e. 1999-2007 (90% in 2000-2007 period), and negative in 85% instances during the crisis, i.e. in 2009-2012.

Therefore by dividing our sample of emerging European economies into the pre and the post mid-2008 period, we shall be able to assess whether the size of multipliers change, and to what extent, in expansion and crisis, as some empirical evidence for high income countries suggest (e.g. IMF WEO 2012, Blanchard and Leigh 2013, Auerbach and Gorodnichenko, 2012a and 2012b, Batini et al. 2012, Corsetti et al. 2012).

Government revenue multipliers tend to be lower than government spending ones, as empirical evidence for high income economies shows (cf. Mineshima et al. 2013). A rationale is that the government spending has direct impact on aggregate demand, while tax decrease has an indirect one, partly spilling over into consumption while the impact takes time to build up.

3. *Methodology and data*

We have used the Structural VAR approach at quarterly frequency as in Blanchard and Perotti (2002) to identify fiscal shocks, and get the corresponding output response. A VAR is used to remove predictable responses of endogenous variables, so that corresponding residuals account for unpredicted

components of government expenditure and output, and hence their correlation captures the impact of unexpected fiscal expansion on output, i.e. fiscal multiplier. The use of high-frequency quarterly data, as opposed to annual ones, is essential for identification, as plausibly government requires a quarter, not a year, to react to output shocks. The SVAR employed captures this, i.e. that fiscal authority needs at least one period to respond with discretionary fiscal measures upon getting new information. Accordingly, the SVAR is identified such that unexpected government spending affects output within the period (quarter), while the output influences government spending with one period (quarter) lag.

Most of the recent studies use panels of international data due to short sample of macroeconomic series for individual countries, however typically at annual or semi-annual frequencies (cf. Beetsma et al., 2008, Corsetti et al., 2012, Bornet al., 2013). Our research thus joins the rare ones that employ a panel of quarterly data (cf. Ilzetzki et al., 2013) as required for credible identification of fiscal shocks.

The following SVAR is estimated:

$$(1)\ AX_{n,t} = \sum_{k=1}^{K} C_k X_{n.t-k} + B u_{n,t},$$

where $X_{n,t}$ is a four-dimensional vector comprising government consumption (G), GDP (Y) and additional two endogenous variables: the current account balance (CA) and the (difference of) real effective exchange rate (DREEX), for given quarter *t* and country *n* (see also Ilzetzki et al., 2013). Our benchmark model, as explained above, also includes GDP gap of the EU15 (Ygap EU15) as a control (exogenous) variable. C_k is a matrix of the own- and cross-effects of the k^{th} lag of the variables on their current observation. The matrix *B* is diagonal, so that the vector u_t is orthogonal, i.i.d. shocks to government consumption and output such that $E(u_{n,t})=0$ and $E(u_{n,t}u_{n,t'})$ is an identity matrix. The matrix *A* allows for the possibility of simultaneous effects between the endogenous variables. The specification of structural VAR model (1) can be written in reduced form and the matrix $A^{-1}C_k$ estimated by the OLS. In order to identify the structural model, we need to impose restriction on matrix *A*. Following Blanchard and Perotti (2002) and Ilzetzki et al., (2013), we have assumed that changes in government consumption require at least one quarter to respond to innovations in other macroeconomic variables. In the second step, we as Ilzetzki et al. (2013) have extended our baseline model by including interest rate (IR) as another endogenous variable in our baseline system.

In our subsequent analysis, tax revenues (T) are included in our benchmark regression. In order to estimate revenue multipliers, but also to check whether controlling for tax policy significantly changes spending multipliers, we have specified $X_{n,t} = (T_{n,t}, G_{n,t}, Y_{n,t})$ i.e. as a three-dimensional vector of taxes, government spending and GDP. We have also included three exogenous, control variables, in the model: CA, DREEX and YgapEU15. The system identification follows that of Blanchard and Perotti (2002), thus assuming that the elasticity of taxes and government spending to GDP is1 and 0, respectively. This implies that an increase in output automatically leads to a proportional rise in tax revenues but not in government expenditure. We have reported the results of the model estimated under the assumption that the spending decisions come first, and the results are robust, i.e. do not change when the tax decision comes first.

Finally, in order to assess fiscal transmission mechanism, specifically the impact of government expenditure (G) on main GDP components: private consumption (C), investment (I) and current account (CA), the model (1) is estimated with $X_{n,t} = (G_{n,t}, C_{n,t}, I_{n,t}, CA_{n,t})$, while also including two exogenous, control variables, in the model: DREEX and YgapEU15. This model is in line with the traditional Keynesian one.

We have used OLS regression with fixed country effects to estimate different model specifications. We have conducted a number of specification tests in order to choose optimal number of lags included in the model (1). As is often the case, the optimal number of lags varies greatly across country-groups and tests. The Akaike information criterion and the LM test suggest that optimal lag order *k* in the baseline SVAR model is 5 shifts. For simplicity, and for comparability across regressions, we have set k=5 in all reported results. Our results are robust to choosing the number of lags in each regression separately according to Akaike information criterion.

A detailed description of the data used for estimation is available in the data appendix, while the source is Eurostat. In addition, nominal data were deflated using the the CPI index. All variables turned out to be non-stationary, with the exception of the central bank interest rate and the ratio of current account to GDP. These two variables were included in levels, and the real exchange rate was included in the first differences. Other non-stationary variables enter the regressions as deviations from their quadratic trend, the latter being stationary according to ADF, IPS and Hadri tests.

Fiscal multipliers reported are defined as follows (see also Ilzetzki et al., 2013). The impact fiscal multiplier as:

$$impact\ multiplier = \frac{\Delta Y_o}{\Delta G_o},$$

and it measures absolute change in output upon a change in government expenditures at the moment the impulse to government expenditure occurs. In order to assess the effect of fiscal policy at longer forecast horizons, the cumulative multiplier are used, defined for horizon T as:

$$cumulative\ multiplier = \frac{\sum_{t=0}^{T} \Delta Y_t}{\sum_{t=0}^{T} \Delta G_t},$$

It measures the cumulative change in output per unit of additional government expenditures, from the time of impulse to government expenditure to the chosen horizon T.

4. *Empirical Results*

The empirical research is focused on estimating government spending multipliers for the overall sample and conditional on the exchange rate regime and the state of the economy. Also, some tentative estimates of tax multipliers are offered. Unless otherwise stated, spending multipliers are acquired

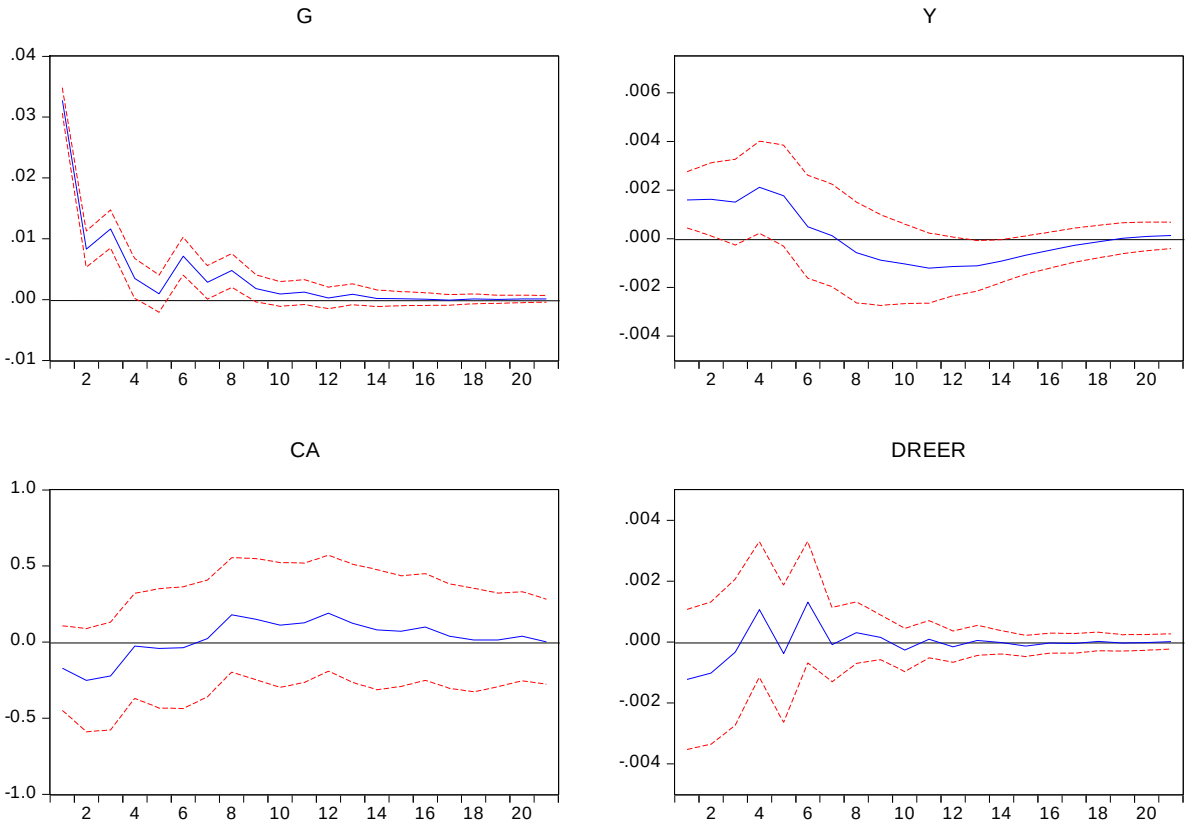
using the estimated benchmark model (1) with four endogenous variables $X_{n,t}$ = ($G_{n,t}$, $Y_{n,t}$, $DEER_{n,t}$, $CA_{n,t}$) and an exogenous, control variable YgapEU15.

4.1 Spending Multipliers in Emerging European Economies: Overall sample

We start with impulse responses of endogenous variables upon government spending shock (see Figure 1).

Figure 1

Impulse responses upon government spending shock



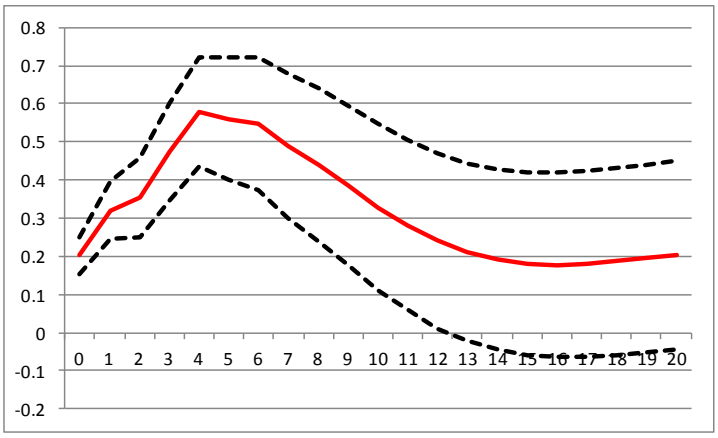
Note: Impulse response to a 1% shock to government spending by GDP (Y), current account (CA) and (difference) of real effective exchange rate (DREER). Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

Significant positive response of output (Y) is found both on impact and for five quarters, while insignificant for the other two variables (CA and DREER). Nevertheless, there are some indications that real exchange rate appreciates and that current account deteriorates during the first several quarters upon government spending shock.

Based on impulse response above fiscal multipliers: impact and cumulative, are calculated as defined in section 3 above. Empirical findings for these spending multipliers are summarized in Figure 2, together with 90% confidence interval, and in Table 1.

Figure 2

Expenditure multipliers: impact and cumulative



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

A standard summary of obtained multipliers is given in Table 1.

Table 1

Expenditure multipliers in emerging Europe: impact and cumulative

Impact	1st year (Q3) cumulative	Maximum (Q4) cumulative	Long-run (Q20) cumulative
0.20	0.48	0.58	0.20

As seen from Figure 1, the first three multipliers in Table 1 are significantly different from zero, while the long-run is almost so. Also, as the confidence intervals in Figure 2 indicate, relatively precise multiplier estimates are obtained through the first five quarters, while subsequently the estimates deteriorate a bit.

Our results, shown in Figure 2 are directly comparable with those of Ilzetzki et al. (2013), as essentially the same SVAR model specification is applied on the panel of developed and developing countries. They found the impact multiplier in developing countries to be -0.03 and statistically insignificant i.e. zero, while 0.39 and significantly different from zero in high income countries. Thus,

our estimate of the impact multiplier in emerging Europe, being significantly different from zero, is more like the one in high income countries, although substantially lower.

The same pattern holds for cumulative multipliers. In developing countries the maximum cumulative value is 0.25 but multipliers are not significantly different from zero, while in high income countries they are significant and steadily increasing, reaching 0.66 in the long-run i.e. in 20 quarters (cf. Ilzetzki et al., 2013). Again, the emerging Europe cumulative multipliers, reaching the maximum value of 0.58 and being significant for most of the period, are more akin to those in developed countries, albeit with quite a different time pattern.

Additional comparisons could be made while controlling for the level of public debt. Thus, Ilzetzki et al. (2011, Figure 11, p.46) found that maximum cumulative multiplier in low indebted countries is around 0.25 for developing and 0.70 for developed counties. As shown in section 2 above, emerging European countries belong to the low indebted ones, with the maximum cumulative multiplier equal to 0.58 (cf. Table 1). Thus again, the size of multiplier is between those in the low indebted developing and developed economies, but closer to the multipliers in the latter.

Finally, one can control for openness and the size of the economy while comparing multipliers. Ilzetzki et al. (2013) found that in joint sample of developed and developing open economies spending multipliers are zero. For a set of OECD countries average multiplier is just above 0.6 for open economies with propensity to import of 60% (cf. Mineshima et al. 2012, Figure 1) which is both mean and median value of import penetration in our sample. Comparable estimates for emerging European countries are the first year and maximum cumulative multipliers: 0.48 and 0.58 respectively, and they are more like the estimates obtained for OECD countries.

Recent literature surveys on the size of fiscal multipliers, notably Mineshima et al. (2013), lend an opportunity to compare our findings for emerging European economies with a large set of previous studies albeit almost all referring to developed countries. A standard benchmark used is the first-year (cumulative) multiplier. Thus estimates of government spending multipliers surveyed by Hall (2009) suggest the range of 0.5 to 1, and so do Boussard et al. (2012) review advancing the range of 0.4 to 1.2. The most recent extensive survey by Mineshima et al. (2013) suggests the plausible range for spending multipliers, i.e. when top and bottom 35% have been dropped, is 0.5 to 0.9, while only for Europe this range is from 0.5 to 0.7. These values come both from VAR estimates and DSGE models.

Our estimates of the first-year cumulative spending multiplier is 0.48 (cf. 3rd quarter in Figure 2 and Table 1 respectively) and is significant. Compared with the above estimates for developed countries, spending multiplier in emerging Europe tends to be similar to them but at their lower bound, nevertheless.

The above finding is also confirmed when our results are once again confronted with comparable results of Ilzetzki et al. (2013) and Ilzetzki and Vegh (2008), but now looking at the first-year cumulative multipliers. The former study estimates this multiplier in developing countries to be about 0.25 although insignificant, while 0.40 in developed ones (cf. Fig. 3, Ilzetzki et al., 2013); the latter study reports respectively 0.4 and 0.7.

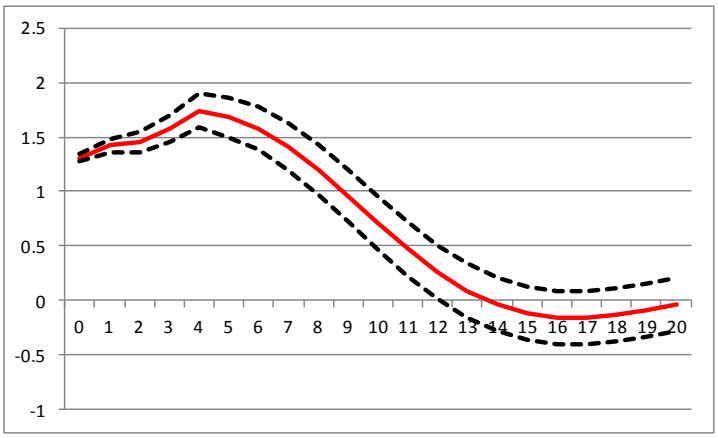
Summarizing the comparisons above, one may tentatively conclude that the relative size of spending multipliers in emerging European countries is determined by their distinct, common characteristics. Thus, being small open economies strongly decreases the size of the multiplier, while relatively low public debt and small (size of) automatic stabilizers pull it up.

4.2 Exchange rate regime and the size of government spending multipliers

The sample is now cut in two subsamples containing episodes of fixed and flexible exchange rates respectively. The results are summarized in Figures 3 and 4, and Table 2.

Figure 3

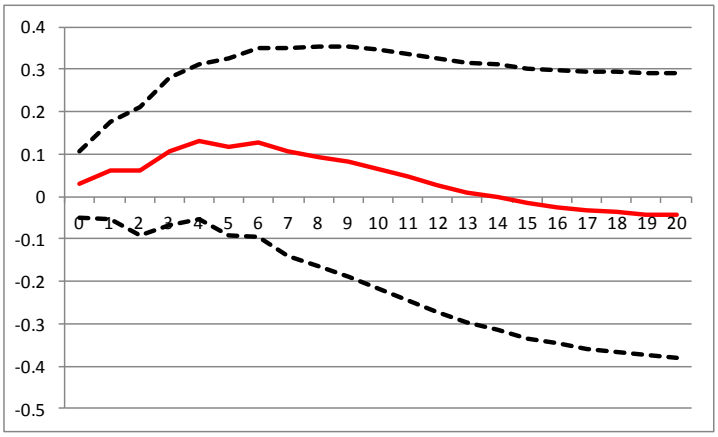
Expenditure multipliers under fixed exchange regime: impact and cumulative



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

Figure 4

Expenditure multipliers under flexible exchange rate regime: impact and cumulative



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

Table 2

	Impact	1st year (Q3) cumulative	Maximum (Q4) cumulative	Long-run (Q20) cumulative
Fixed exchange rates	1.31	1.58	1.74	zero
Flexible exchange rates	0.03*	0.11*	0.13*	zero

* Insignificantly different from zero

Under predetermined exchange rate,s we obtained precise estimates of cumulative expenditure multipliers, i.e. with very narrow confidence intervals (cf. Figure 3), as opposed to the corresponding estimates under floating exchange rates (cf. Figure 4).

As expected, we found relatively large multipliers under predetermined exchange rates. The impact multiplier was well above one (1.31), while the maximum cumulative multiplier was as high as 1.74, and achieved in five quarters. Cumulative multiplier stayed as high as 0.7 through 10th quarter, and subsequently dropped to zero. Multipliers' estimates under floating exchange rates are imprecise, i.e. with very wide confidence intervals, and they are all insignificantly different from zero (cf. Figure 4).

Comparable study of Ilzetzki et al. (2013) for a sample that includes high income and developing countries, finds that, under predetermined exchange rates, impact multiplier is significantly different from zero, albeit quite small: 0.15. The cumulative ones are much higher though, reaching 1 in about eight quarters, while in the long run are as high as 1.4. Thus although both sets of results show that spending multiplier increases under fixed exchange rate, the increase is less pronounced in a sample that beside high income countries also includes developing ones (cf. Ilzetzki et al. 2013).

Born et al. (2013) also reports larger spending multipliers under fixed exchange rate regime in a sample of developed OECD countries: 1.48 on impact for half a year, and 1.7 for a year. Roughly, comparable estimates for emerging Europe are respectively 1.42 (cf. Q1 Figure3) and 1.58 (cf. Table 2). Combining this with Ilzetzki et al. (2013) results, one yet again finds that spending multipliers in emerging Europe are more like those in high income countries than in the developing ones.

Under flexible exchange rates in emerging Europe, we obtained that government spending multipliers, both impact and cumulative, are not significantly different from zero. This concurs with Corsetti et al. (2012) findings for a panel of OECD countries showing also insignificant multipliers under floating while significantly different from zero under fixed exchange rate regime. Born et al. (2013), for a set of OECD countries, find some significant multipliers under floating, but still more than half the size of one under fixed exchange rate. Finally, Ilzetzki et al. (2013) for both developing and developed countries, obtain that both impact and cumulative multipliers are significantly negative.

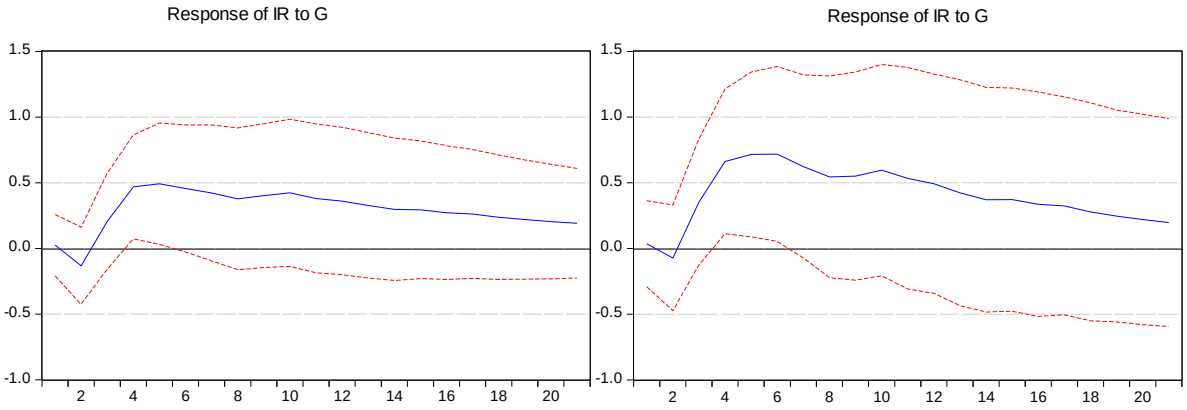
The difference in the size of multiplier across alternative exchange rate regimes can be explained by the difference in the monetary policy stance associated respectively with flexible and fixed exchange rates. Small open economies with high degree of capital mobility, such as emerging EU economies, can pursue independent monetary policy under floating, but hardly so under fixed exchange rate. In fact, all floaters in emerging EU have also been inflation targeters (except Slovenia), observing some form of Taylor rule and hence practicing non-accommodative monetary policy. Thus, upon government spending shock and consequent increase in demand, the central bank would raise policy interest rate to prevent inflation rise, and hence offsetting output increase. In contrast, under fixed exchange rates in emerging EU countries, the scope for independent monetary policy is severely limited, and therefore money supply (passively) accommodates government spending shock leading to high multipliers.

Evidence reported in Figure 4 confirms non-accommodative monetary policy stance under floating (inflation targeting) in emerging European economies, i.e. unexpected government spending shock led to an increase in interest policy rate. The estimated model (1) now also includes interest policy rate (IR) as an endogenous variable, i.e. $X_{n,t}$= ($G_{n,t}$, $Y_{n,t}$, $DEER_{n,t}$, $CA_{n,t}$,$IR_{n,t}$), and an exogenous variable YgapEU15. The results are presented for the whole sample and for the period of expansion.

Figure 5

Policy interest rate response to government spending shock under floating

Overall sample Expansion



Note: Impulse response functions (IRFs) of interest rate (IR) to 1% shock to government spending under flexible exchange rates. Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

The interest rate impulse response shows that, with a lag of two quarters, policy interest rate increases upon shock to government expenditure and remains above baseline value for an extended period of time. Moreover, in expansion, interest rate rises above the average for the whole sample, indicating tighter monetary stance during expansion and hence looser in the crisis.

Empirical evidence reported above showing large fiscal multipliers under fixed exchange rate and small under floating is consistent with the prediction of the Mundell-Fleming model. Thus, in this

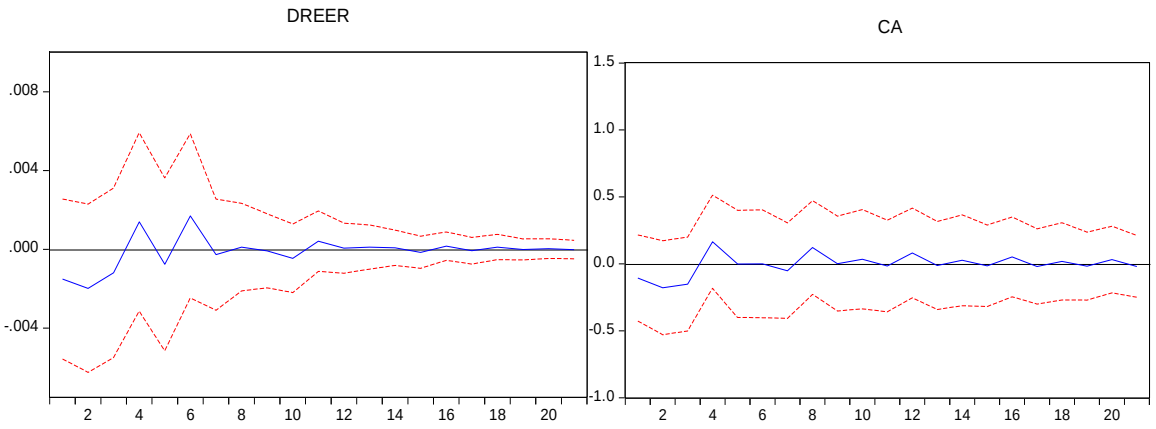
model, under floating exchange rate, increase in government spending leads to a rise in interest rate, causing capitals inflow, and hence appreciation of currency, which crowds out net export and offsets the effect of government spending on GDP. Under fixed exchange rate, the model predicts that money supply increases to prevent appreciation of currency, hence leading to rise in private demand along with public demand, leaving net export unchanged. Consequently the government spending multiplier exceeds one, as reported above.

However, there is hardly any empirical support in emerging Europe for the pattern implied by the Mundell-Fleming model, as impulse response estimates reported in Figure 6 show.

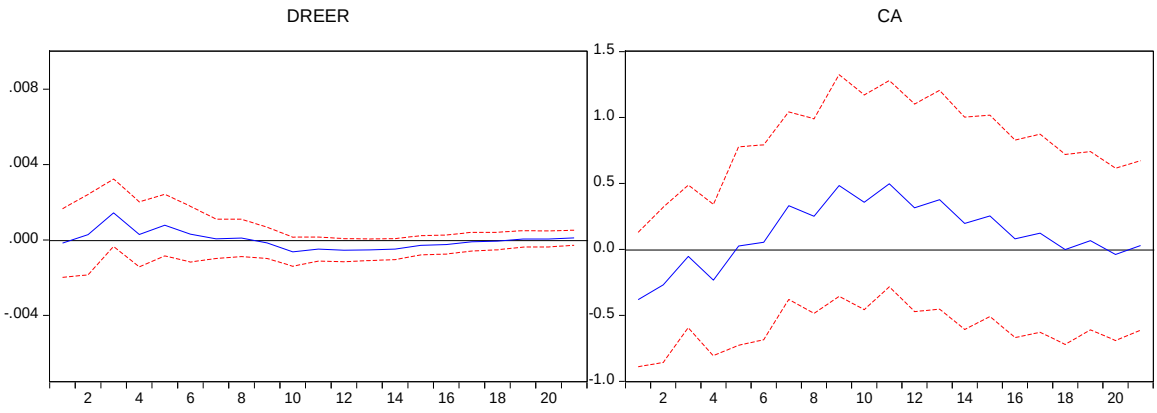
Figure 6

The response of real exchange rate (DREER) and current account (CA) to government spending shock

Flexible exchange rate



Fixed exchange rate



Note: Impulse response functions (IRFs) to 1% shock to government spending. Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

As all IRFs are not significantly different from zero, one may roughly conclude that the response of real exchange rate and current account across exchange regime does not differ. Nevertheless, closer inspection of IRFs, in spite of their insignificance, indicates that there is initially some real currency appreciation under flexible exchange rate regime and not under fixed one as suggested by Mundell-Fleming model. However, this does not translate into corresponding pattern of current account response. Namely, in both regimes, current account initially deteriorates, and contrary to Mundel-Fleming model, even more so under fixed exchange rate (cf. Figure 6). Hence, predictions of Mundell-Fleming model have not been born-out by the data in case for emerging EU economies, thus concurring with the previous findings for different sets of countries (cf. Ilzetzki et al. 2013, Born et al. 2013, and Corsetti et al. 2012).

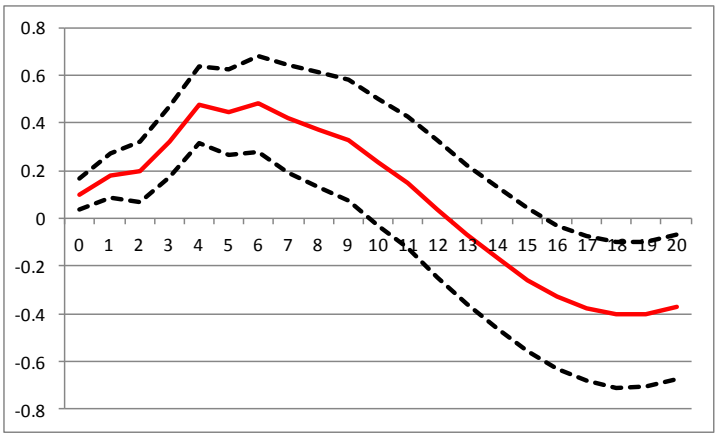
4.3 Spending multipliers in expansion and financial crisis

We now cut the sample at the start of financial crisis, i.e. the beginning of Q4 2008. The first part (1999Q1 – 2008Q3) coincides with years of expansion in emerging European countries, and the second part (2008Q4-2012Q3) to financial crisis (cf. section 2 above).

Results are reported in Figures 7 and 8, and Table 3.

Figure7

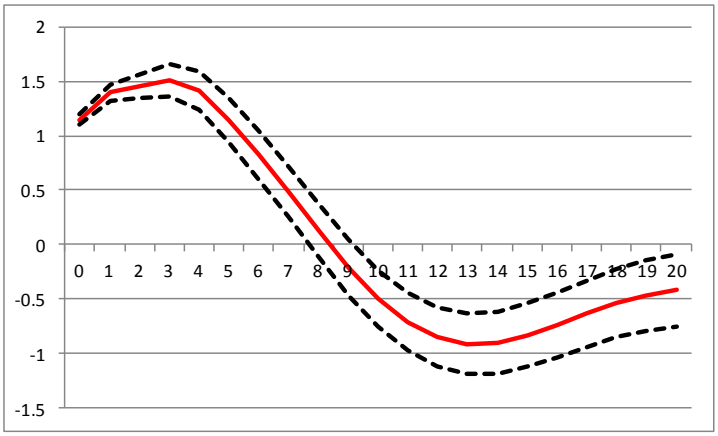
Expenditure multipliers in expansion: impact and cumulative



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

Figure 8

Expenditure multipliers in financial crisis: impact and cumulative



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

Table 3

	Impact	1st year (Q3) cumulative	Maximum cumulative	Long-run (Q20) cumulative
Expansion	0.10	0.32	0.48 (Q4 and 6)	-0.37
Downturn	1.15	1.51	1.51 (Q3)	- 0.42

All estimates are significantly different from zero, and multipliers are precisily estimated particularly those in downturn.Comaparing relevant multipliers: on impact, first year and maximum ones across expansion and downturn, one gets that the latter are three up to ten times larger than the former.

Like our study, IMF WEO (2012) and Blanchard and Leigh (2013) also have assessed spending multipliers in the Great Recession, however using different approach and a sample of 28 advanced and emerging economies. They found that the multipliers are in the range of 0.9-1.7, and 0.8-1.5 respectively. These estimates, Blanchard and Leigh (2013) suggest, are to be compared with the average pre-crisis multiplier in advanced economies of 0.5.

There are a number of other studies assessing the size of fiscal multipliers in recession and expansion albeit just for high income countries (cf. Mineshima et al., 2013). The findings are summarized in Table 4.

Table 4

	IMF WEO (2012), 28 Advanced and emerging economies	Blanchard and Leigh (2013),	Batini et al. (2012), Euro Area	Batini et al. (2012), USA	Auerbach and Gorodnichenko (2012b), USA	Baum et al. (2012), USA	Corsetti et al. (2012), OECD
Expansion		0.5	0.4	0.3	0.6	1.3	
Downturn	0.9 to 1.7	0.8 to 1.5	2.6	2.2	2.5	1.8	up to2

Our findings for emerging European countries put the spending multipliers during recession in the range of IMF WEO (2012) and Blanchard and Leigh (2013) estimates, and closer to their upper bound. This looks reasonable as IMF WEO (2012) and Blanchard and Leigh (2013) sample also includes emerging economies. Nevertheless, emerging Europe spending multipliers in recession are lower than the ones in euro area and US. Likewise in expansion, emerging Europe spending multipliers are somewhat smaller than those in advance economies.

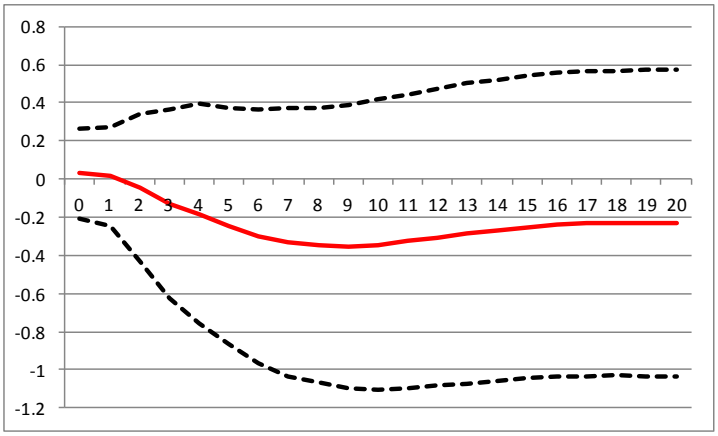
4.4 Government revenue multipliers

As explained in section 3 above, while assessing tax multipliers the SVAR model (1) is used with endogenous variables $X_{n,t} = (T_{n,t}, G_{n,t}, Y_{n,t})$, i.e. including also government consumption (G), and a set of exogenous variables (CA, REEX, Ygap EU15). A side result of this model is the parallel estimates of government spending multipliers acquired now while controlling for the response of tax policy to both government consumption and output shocks. Namely, spending multipliers reported above could be biased due to the omission of the tax revenue variable (cf. Ilzetzki et al. 2013). Nevertheless, the two sets of spending multiplier estimates turns out to be very similar, thus pointing to the robustness of the results reported in previous sections.

Turning to the tax revenue multipliers, the estimates are obtained for the over-all sample of emerging EU economies, as well as conditional on the exchange rate regime. The former results are reported in Figure 9, while the latter in Figures 10 and 11 below.

Figure 9

Tax multipliers: impact and cumulative - Overall sample



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

Estimated values of tax multiplier, reported in Figure 9 are as expected, albeit insignificant. Namely, revenue multipliers tend to be smaller than the spending multipliers, and they tend to build up slowly its impact (see Mineshima et al. 2013). In line with these predictions, we obtained that the tax impact multiplier is zero and cumulative multiplier is, in absolute terms, slowly rising (slower than expenditure one), reaching maximum in Q9 i.e. well after expenditure multiplier (Q4). Also, the maximum (absolute) value of government revenue multiplier (0.35) is well below the maximum cumulative value of expenditure one (0.58). However, obtained estimates are poor, i.e. with wide confidence intervals implying that tax multipliers are not significantly different from zero.

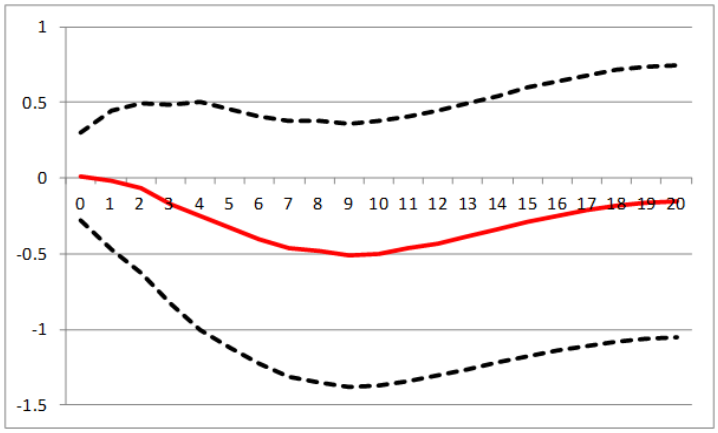
As with the spending multipliers above, a standard yardstick for comparisons is the positive value of the first-year (cumulative) tax multiplier (see Mineshima et al. 2013). In case of emerging EU economies we found it to be 0.13, albeit with wide 90% confidence interval: (-0.36, 0.63). The plausible range for revenue multipliers in developed Europe is found to be 0.1 to 0.2, while the whole range of revenue multiplier estimates runs from -0.5 to 0.7. When other high income countries are added (see Mineshima et al. 2013, Appendix 2), the respective intervals are: 0.1 to 0.3, and -1.5 to 1.4. Also, Boussard et al. (2012) show that government revenue multipliers are below 0.7 and frequently negative.

Thus the point estimate of government revenue multiplier in emerging EU economies (0.13) falls within plausible range both for the whole sample of high income countries and for Europe. Same as the spending multiplier, the revenue one is also at the lower end of the plausible interval for high income countries, and again, this can be explained by the large openness and small size of emerging EU economies. The interval estimate of revenue multiplier: (-0.36, 0.63) although showing that point estimate is imprecise, still falls between minimum and maximum multiplier found in high income countries.

We have found also some tentative evidence that government revenue multipliers are higher under fixed exchange rate than under flexible one. The results are depicted in Figure10 and 11.

Figure 10

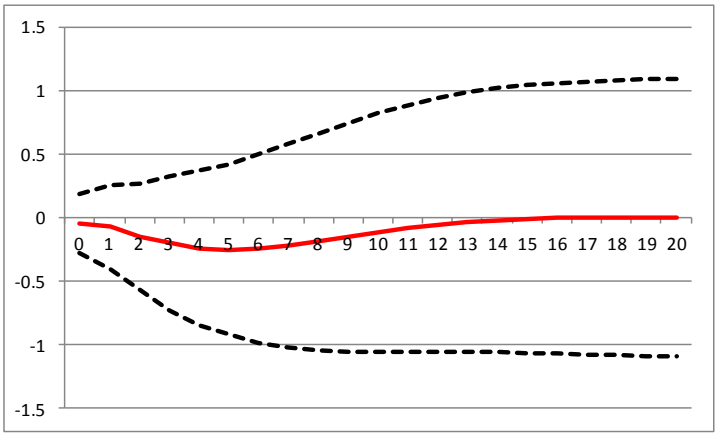
Tax multipliers: impact and cumulative –Under fixed exchange rates



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

Figure 11

Tax multipliers: impact and cumulative – Under flexible exchange rates



Note: Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

The (point estimate of) maximum cumulative multiplier under fixed exchange rate (0.51) is twice as large as the one under flexible exchange rate (0.25), while the estimate for the overall sample (0.35) lays in between. Again, important caveat is due, i.e. confidence intervals are very wide, and hence the results on tax multipliers should be taken just as provisional. This concurs with other empirical findings showing that "The results are generally less conclusive for revenue multipliers" (cf. Mineshima et al., 2013, p.14).

5. *Why spending multiplier varies across exchange rate regimes and business cycle: A role of private consumption response*

A summary of (maximum cumulative) spending multipliers estimates for various regimes in emerging EU economies is given in Table 6.

Table 6

Government spending multipliers in emerging EU economies

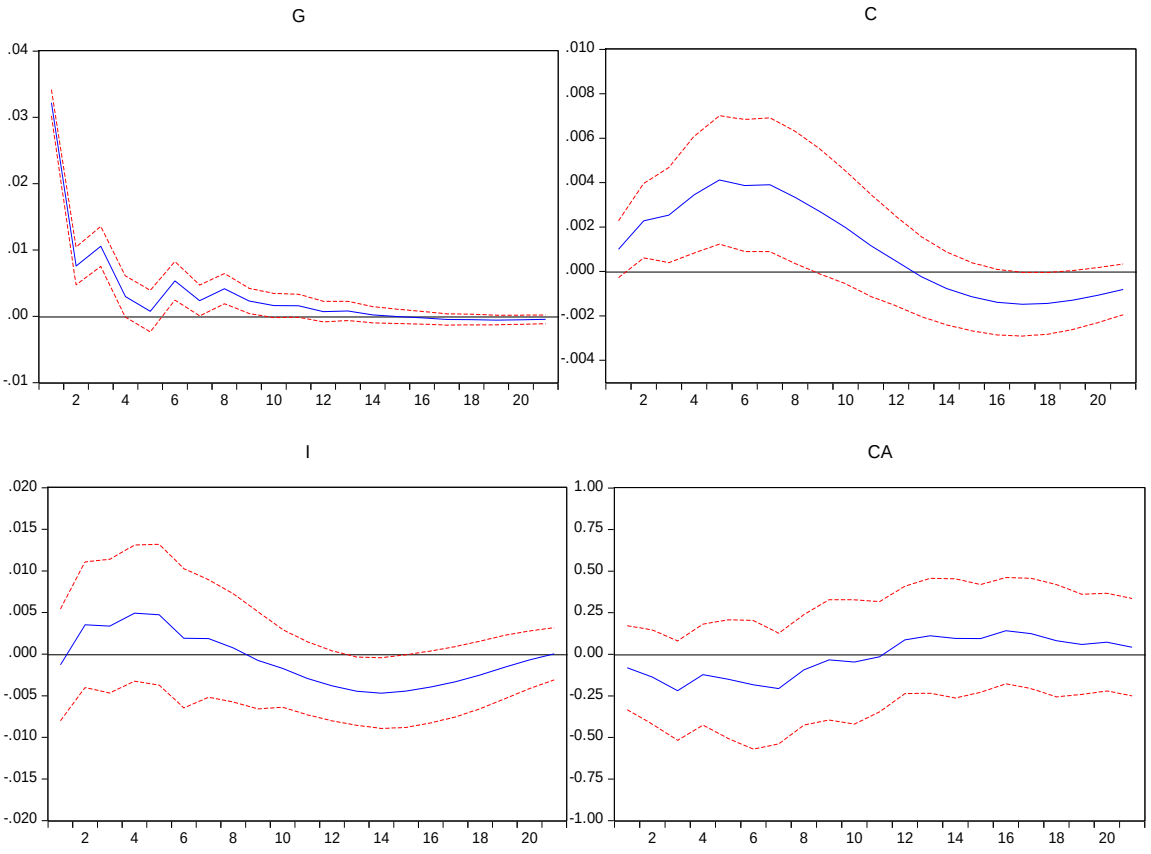
	Overall sample	Fixed exchange rate	Flexible exchange rate	Great recession	Expansion
Maximum cumulative	0.58 (Q4)	1.74 (Q4)	0.13 (Q4)	1.51 (Q3)	0.48 (Q4 and 6)

It has been shown (cf. section 4.2) that variations in multipliers reported in Table 6 cannot be explained by Mundell-Fleming model i.e. via adjustment in real exchange rate and consequent redirection in trade flows. Hence, we now turn to examining the response of the remaining two components of output: private consumption and investment, to government spending shock. The response of private consumption is of particular interest as it is quantitatively important for the response of the whole GDP, but also for the debate on the fiscal transmission mechanism. Namely, it serves to discriminate between traditional Keynesian and some version of new Keynesian models, where the response in private expenditure is positive, vs. neoclassical approach implying negative response.

Therefore, a SVAR model (1) is estimated with endogenous variables referring to components of GDP, i.e. $X_{n,t} = (G_{n,t}, C_{n,t}, I_{n,t}, CA_{n,t})$, and two exogenous, control variables: DREEX and YgapEU15. Impulse responses for endogenous variables upon government spending shock for the overall sample of emerging EU economies are reported in Figure 12.

Figure 12

Impulse responses upon government spending shock: Overall sample of emerging EU economies



Note: Impulse response to a 1% shock to government spending by private consumption (C), investment (I) and current account (CA). Dotted lines represent 90% confidence intervals based on Monte Carlo simulations.

The private consumption response to government spending shock is significantly positive over nine quarters, while the responses of investment and current account are respectively insignificant over the same horizon. Yet, although insignificant, investment response seems to be positive, whereas that of current account is negative. Comparison of these results with those for benchmark model (cf. section 4.1 and Figure 1) suggests that significantly positive response in private consumption is driving

increase in output, while deteriorating current account mitigates its impact. Thus, the evidence for emerging EU economies indicates that fiscal transmission from government spending to output goes via private consumption, while the great openness of these economies can account for the multiplier being lower than one.

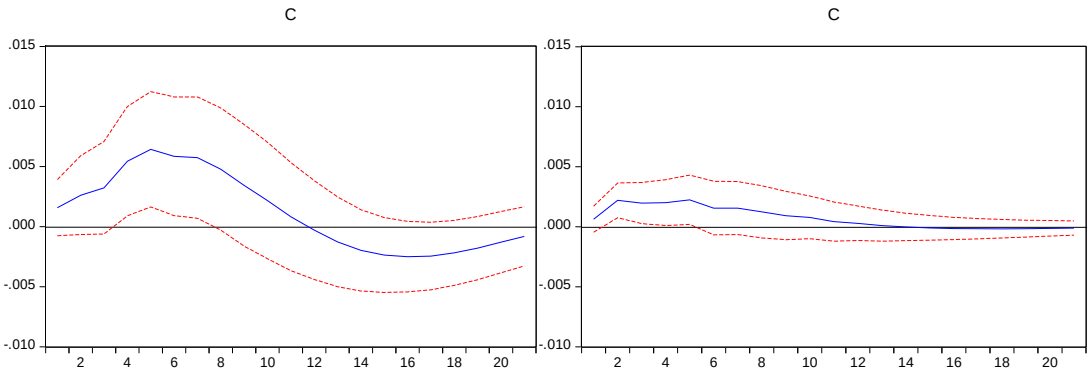
Exploration of the same model across exchange rate regimes and business cycle gives similar results, i.e. the response of private consumption is significantly positive (cf. Figure 13) and that of investment and current account insignificant.

Figure 13

Impulse responses in consumption to government expenditure shock across different regimes

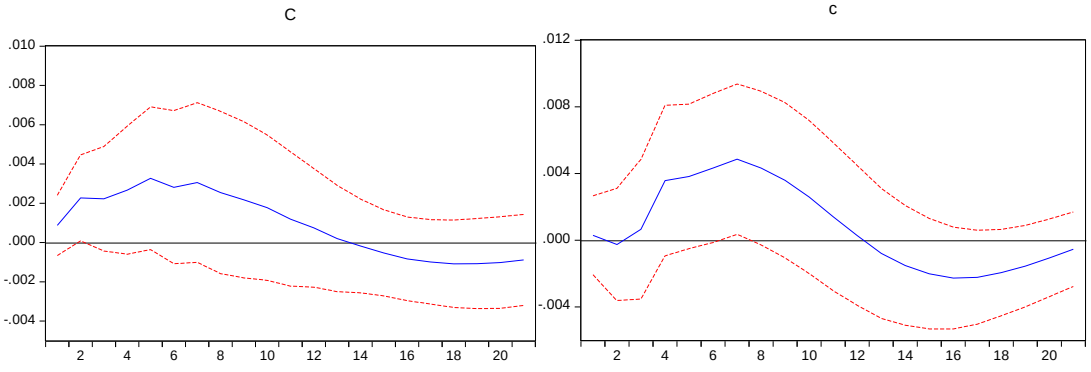
a. Exchange rate regime

Fixed Flexible



b. State of economy

Expansion Downturn



Note: IRFs upon 1% shock to government spending. Dotted lines represent 90% confidence intervals based on Monte Carlo simulations with 500 repetitions.

Although consumption response upon shock to government spending is uneven across various regimes, it follows the pattern of the corresponding output response i.e. the reported pattern of spending multipliers. Thus, consumption reacts more under fixed exchange rate regime and when economy is in downturn, and less under floating rates and in expansion. Approximately, consumption response is twice as large in the former (fixed and downturn) compared to the latter (flexible and expansion). Nevertheless, in all cases consumption response is significant albeit with varying persistence. Thus, even disaggregated (across various regimes) empirical evidence offered above strongly suggests that the effect of shock to government spending on output, i.e. fiscal policy transmission mechanism, runs via the response in private consumption.

These findings for emerging EU economies indicating that both output and private consumption increase upon an unexpected rise in government expenditure, concur with those for developed economies, specifically the US and some OECD countries (cf. Blanchard and Perotti, 2002, Fatas and Mihov, 2001, Perotti, 2005 and 2007, Gali et al., 2007, and Bilbiie et al., 2008). This led Gali et al. (2007) to conclude that "…the evidence (tends) to favor predictions of traditional Keynesian model over those of the neoclassical model" (p. 235), i.e. that upon government spending shock, private consumption increases rather than drops. Consequently, in order to explain these empirical findings, several versions of new Keynesian model are put-forward featuring liquidity constrained households, price and/or wage rigidities, and different monetary policy stance (cf. Gali et al., 2007, Bilbiie et al.,2008, and Born et al., 2013). The presence of liquidity constrained or rule of thumb households, i.e. those that consume their current income fully, together with asset holders that smooth their consumption over time is a key assumption that drives a positive consumption response. We shall use this new Keynesian framework with its accompanying features to account for the evidence obtained in emerging EU economies.

Accordingly, a much higher multiplier under fixed exchange rate (1.73) compared to the one under floating (0.13) and twice as large consumption response in the former case relative to the latter, can be explained by different monetary policy stances across exchange rate regimes. Specifically, monetary policy stance that sharply differs across regimes might account for a very different response in consumption and consequently that of output. This would happen even in the absence of liquidity constrained households, i.e. in neoclassical model with all households being asset holders, when consumption response is negative albeit less so under non-accommodative monetary policy stance, i.e. flexible exchange rate (cf. Borne et al. 2013). Concurring with model prediction, we have found that under flexible exchange rates non-accommodative monetary stance is held (cf. Figure 5, and ensuing comment) while the accommodative one is held under fixed exchange rates, and that the consumption response is much stronger under the latter than under the former. However, to take account of our finding that consumption response is positive under both monetary stances one needs a certain share of liquidity constrained households as well as some price rigidities to engineer a positive consumption response even under non-accommodative monetary policy (cf. Gali et al. 2008, and Borne et al. 2013). Moreover, it is reasonable to assume that the share of liquidity constrained households is approximately the same in both regimes, so that only monetary policy differs across fixed and flexible exchange rate regimes hence driving the difference in respective multipliers.

As to other empirical evidence, Ilzetzki et al. (2013) also found, for a joint sample of high income and developing countries, that the response of consumption to government spending shock is higher under predetermined exchange rate than under floating, albeit (significantly) positive in the former and negative in the latter case.

The size of multiplier also sharply differs across crisis (1.51) and expansion (0.48) and this is accompanied by the corresponding consumption response i.e. twice as large in the former case compared to the latter. A plausible explanation might be that the share of liquidity, and more specifically credit constrained households, considerably increased in financial crisis (cf. Coresetti et al. 2012), hence leading to the more pronounced response of private consumption, and consequently output, upon unexpected government spending shock. Moreover, there is some indirect evidence that the non-accommodative monetary stance of the floaters is less pronounced in crisis than during expansion, i.e. that they pursue looser monetary policy in crisis relative to the one in expansion (cf. Figure 5, above)[iii].

On the other hand, the very small and almost insignificant response of private expenditure (cf. Figure 13) and low multiplier during expansion may well be due to smaller share of liquidity (credit) constrained households and tighter monetary policy (cf. Figure 5) relative to those in crisis.

Findings for the over-all sample are consistent with those reported above for the two sample cuts. Specifically, the consumption response is significantly positive and is smaller than those under fixed exchange rate and crisis while larger compared to the consumption responses under flexible exchange rate and expansion (cf. Figures 12 and 13). The same pattern is observed for corresponding multipliers (see Table 6), i.e. the multiplier for the over-all sample (0.58) stands in-between those for fixed rates (1.71) and crisis (1.51) on one side and flexible rates (0.13) and expansion (0.48) on the other.

6. Conclusions and summary of findings

Spending multipliers in emerging European economies: 0.5 to 0.6 are found to be at the lower end of those in high income countries (cf. Mineshima et al. 2013*) and significantly higher than in developing countries (close to zero, cf.* Ilzetski et al. 2013*).*The relative size of spending multipliers in emerging European countries is determined by their distinct, common characteristics. It is large openness and small country factors that markedly drive multipliers down, while small automatic stabilizers and low public debt pull them up. Taking aside the small open economy factor, emerging European economies are like high income countries with respect to fiscal credibility, and concerning automatic stabilizers more like the developing ones.

The exchange rate regime markedly affects the size of spending multipliers in emerging EU, being high under the predetermined exchange rates and close to zero under the flexible ones. This concurs with previous empirical evidence for high income countries (Corsetti et al. 2012, and Born et al., 2013) and joint sample of developed and developing countries (Ilzetski et al. 2013). Moreover, emerging EU

economies offered an opportunity to assess the impact of exchange rate regime on multiplier in extreme environments, i.e. by confronting hard exchange rate fix (currency board and euro) vs. very flexible rates under inflation targeting, which was not the case in previous studies.

The difference in multiplier under flexible and fixed exchange rate regime can be traced back to different monetary policy stances across regimes. Same as Ilzetzki et al. (2013), we found evidence for the "monetary accommodation" channel. Thus, we found that, under flexible exchange rates, policy interest rate increases upon government spending shock indicating the non-accommodative monetary policy stance. This was expected as the floaters among emerging European economies are inflation targeters at the same time. A hard fix (currency board or euro) is practiced under predetermined exchange rate in emerging European economies, and being small open ones with high capital mobility, they are forced to pursue accommodative monetary policy.

Although the results are in line with the predictions of the Mundell-Fleming model, we found (same as in Corsetti et al. 2012, and Born et al., 2013, and Ilzetzki et al. 2013) that difference in multiplier across exchange rate regimes is not driven via net exports adjustments as the model implies. The Mundell-Fleming model implies that the crowding out under the flexible exchange rate, as opposed to the one under fixed exchange rate regime, should occur through a decrease in net export, thus resulting in observed smaller multiplier under the floating. Contrary to this Mundell-Fleming model's proposition, we found that in emerging EU economies, the current account deficit responds similarly in both regimes. This rejection of Mundell-Fleming model's proposition concurs with previous findings for other country samples (cf. Corsetti et al. 2012, Born et al., 2013, and Ilzetski et al. 2013).

As to the state of economy, we found that government spending multipliers in emerging EU economies markedly increased in the Great Recession of 2009-2012 relative to pre-crisis expansion, i.e. around five times. This concurs with previous findings obtained for different sets of countries and with alternative methodologies. Thus, both IMF WEO (2012) and Blanchard and Leigh (2013) assessed multipliers during the Great Recession, as we did, covering high income but also emerging market economies, some of which appear in our sample, while applying completely different methodology. Nevertheless, our estimates of multipliers in emerging EU countries during the Great Recession are within the range found in the above two studies. Comparisons with findings for a set for developed economies, using yet another methodology, show that both in downturn and expansion, emerging EU multipliers are respectively at the lower end of those e.g. in the US and euro area (cf. Batini et al., 2012, Auerbach and Gorodnichenko, 2012b, and Baum et al., 2012). As indicated above, the same holds for the over-all sample multiplier estimates.

We found that upon government spending shock, private consumption increases in emerging EU economies thus supporting predictions of traditional and new Keynesian models rather than those of the neoclassical one. It is found that positive shock to government spending triggers significant increase in private consumption under both exchange rate regimes, in downturn and expansion, and hence in the over-all sample of emerging EU economies. The reported findings for emerging EU economies concur with those obtained for the US and some OECD countries (cf. Blanchard and Perotti, 2002, Fatas and Mihov, 2001, Perotti, 2005 and 2007, Gali et al., 2007, and Bilbiieet al., 2008),

and is summarized by Gali et al. (2007) that evidence tends"… to favor predictions of traditional Keynesian model over those of the neoclassical model".

Moreover, we found that private consumption response is much more pronounced under fixed exchange rate and in downturn than under floating exchange rate and expansion, thus mimicking the corresponding pattern of spending multipliers acquired in this paper. This co-movement of private consumption and output responses upon government spending shock suggests that fiscal policy transmission mechanism, i.e. the effect of fiscal expansion on output, runs via the response in private consumption.

Some versions of new Keynesian model, containing liquidity constrained households, and price and/or wage rigidities while adding different monetary policy stance (cf. Gali et al., 2007, Bilbiie et al., 2008, and Born et al., 2013), can account for empirical findings in emerging EU economies reported above. Thus, non-accommodative monetary policy stance found under flexible exchange rate regime and the accommodative one under fixed, can explain weaker response of private consumption, and hence that of output, under former regime compared to the latter (cf. Born et al., 2013). However, to get a positive private consumption response, and hence that of output, under both regimes, one should include liquidity constrained households, and price and/or wage rigidities.

Likewise, the observed difference in multiplier across business cycle (downturn and expansion) can be explained by a significantly larger response of private consumption in downturn than in expansion found in emerging EU economies. The large consumption response in downturn may be due to likely strong rise in the credit constrained (hand-to-mouth) households and firms, triggered by the financial crisis of 2009-2012 and ensuing credit crunch in emerging EU economies. Consequently, an increase in government spending causes stronger increase in private consumption. In addition, we found that in downturn of 2009-2012, even floaters (inflation targeters) pursued looser monetary policy relative to the one in expansion, hence additionally enhancing private consumption and output responses to government spending shock.

The findings for government revenue multipliers in emerging EU economies are as expected: revenue multipliers are lower than the spending ones, and they are higher under fixed exchange rate than under the flexible one. Moreover, the size of revenue multiplier is within the range of those in developed economies, and on its lower side as was the case with spending multipliers. However, revenue multiplier estimates are tentative since confidence intervals are large making them insignificantly different from zero. Nevertheless, other empirical studies also indicates that that "the results are generally less conclusive for revenue multipliers" (cf. Mineshima et al., 2013, p.14), and they often vary from negative to positive values.

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Data Appendix

Ten emerging EU economies are analyzed: Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia, using quarterly data: 1999Q1-2012Q3.

Table 1

Variables	Description variables	Unit	Transformation of variables
GDP (Y)	GDP at market prices, domestic currency, volumes, seasonally adjusted and adjusted data by working days	Index 2005=100	Natural logarithms, de-trended (as deviation from quadratic trend)
Government consumption (G)	Final consumption expenditure of general government = government consumption of goods and services	Index 2005=100	Natural logarithms, seasonal adjustments by TRAMO-SEATS method, de-trended (as deviation from quadratic trend)
Net tax (T)	Net tax general government = total revenue –non tax revenue-social transfers – subsidies –interest	Domestic currency, millions	Natural logarithms, deflated by CPI, seasonal adjustments by TRAMO-SEATS method, de-trended (as deviation from quadratic trend)
Current account (CA)		Percentage of GDP	
Real Exchange Rates (REEX)	Real Effective Exchange Rate (deflator CPI - 41 trading partners)	Index 2005=100	Natural logarithms, first differences (DREEX)
YgapEU15	EU15 gap: Ygap=(Y-Y*)/Y*, Y actual GDP, seasonally adjusted and adjusted by working days, Y* potential GDP.	Index 2005=100	Natural logarithms of Y, Y* is quadratic trend.
Interest rate (IR)	Central Bank Discount Rates	% per annum	-
Private consumption (C)	Household and NPISH final consumption expenditure, volumes	Index 2005=100	Natural logarithms, seasonal adjustments by TRAMO-SEATS method, de-trended (as deviation from quadratic trend)
Investment (I)	Gross capital formation, volumes	Index 2005=100	Natural logarithms, seasonal adjustments by TRAMO-SEATS method, de-trended (as deviation from quadratic trend)
Inflation rate (CPI)	HICP	Index 2005=100	-

Source: Database Eurostat

[i] Thus in Ilzetzki et al. (2013) the Netherlands is the largest economy classified as small, and it has much larger BDP than Poland: 86% higher over our 1999 – 2012 sample, and even 56% by the end the period.

[ii]Cf.Ilzetzki et al. (2013) for both developed and developing countries, Kirchner et al. (2010) for euro area, Corsetti et al. (2012) for set of OECD countries, Nickel and Tudyka (2013) for a set of EU economies including Hungary and Bulgaria, etc.

[iii]We opted for this indirect evidence since the sample of floaters during the crisis is too small for reliable estimation.