GROWTH FORECAST ERRORS AND GOVERNMENT INVESTMENT AND CONSUMPTION MULTIPLIERS*

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ABSTRACT

We compare the government investment and government consumption multipliers in the advanced economies during the recent fiscal consolidation, using a modified version of the Blanchard and Leigh (2013) approach. We find that, in the highly-indebted countries, the investment multiplier is likely to be much higher than what has been assumed by the policy makers and much higher that the consumption multiplier. This has important implications for the design of the consolidation.

JEL classification: E52, E62, E63, G01

Keywords: fiscal consolidation, fiscal multiplier, public consumption, public investment, public debt

I. INTRODUCTION

Advanced economies are going through a fiscal consolidation. One of the main question for them is how to design the consolidation, in order to reduce the damage it will have on growth (see Lagarde, 2013). To do that, activities with lower impact on growth should be reduced more than activities with higher impact on growth.

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It is usually considered that the government investment multiplier is higher than the government consumption multiplier. For instance, the Golden Rule of public finance states that governments should borrow only for investment, not for consumption, since investment pays for itself, through the future tax revenues generated by the new capital stock (Perotti, 2004). Some economists have argued that the current fiscal consolidation should allow some support through public investment. Christina Romer, for instance, says: "There is simply no question that the United States needs to enact a comprehensive plan for long-term deficit reduction as soon as possible. But any such plan could and should include another substantial dose of fiscal expansion in the short run—ideally one oriented toward public investment." (Romer, 2012, p. 13). Similarly, Spilimbergo et al. (2008), when advising on the appropriate fiscal policy for the crisis, say: "[...] spending programs, from repair and maintenance, to investment projects delayed, interrupted or rejected for lack of funding or macroeconomic considerations, can be (re)started quickly" (Spilimbergo et al., 2008, p. 5).

Despite these recommendations, there is a very scarce evidence that the government investment multiplier is higher than the government consumption multiplier in the distressed economies. Hence, it may not come as a surprise that the fiscal authorities in these countries have ignored these suggestions, as a result of what investment spending has been cut more than consumption expenditure during the on-going consolidation (see Figure 1). In Greece, for instance, public investment in 2010 has been cut by 2.1 percent of GDP (relative to the previous three years), while public consumption has been cut by only 0.5 percent. And, it is not just Greece - public investment in 31 advanced economies in 2010 vs. the previous three years has been cut, on average, by 0.1 percent of GDP, while public consumption has been increased by 0.9% of GDP (see section III on the data sources).

1. The following advanced economies will be used in the analysis: Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK and US. The remaining four countries that the IMF classifies as advanced (Malta, San Marino, Singapore and Taiwan), are excluded, due to data unavailability.
This paper will aim to fill in that gap. It will compare the government investment and the government consumption multiplier in the advanced economies during 2011, using an approach similar to that of Blanchard and Leigh (2013) - the growth forecast errors for 2011 will be regressed on variables measuring government investment and government consumption in 2010. Since government consumption and government investment in 2010 were known when the forecasts for 2011 were prepared, the forecast errors should be uncorrelated with them, if the right multipliers were used. If the coefficients turn out to be positive and significant, that would imply that the multipliers are higher than those that were assumed. The analysis will distinguish between the highly-indebted and the non-highly-indebted countries, due to the conventional understanding that the fiscal multiplier may be lower, or even negative, in times of high debt.

The results point out that the consumption multipliers have been neither higher nor lower than those assumed by the forecasters, both for the countries with high debt and for the countries with not-so-high debt. However, the investment multipliers in the highly-indebted countries seem to be substantially higher, by more than one, than those that were assumed in the forecasts. Assuming that the consumption and investment multipliers that were used the forecasts are similar (a reasonable assumption, judging by Coenen et al., 2012, Table 3), these results suggest that the investment multiplier is much higher than the consumption multiplier.

The finding that the investment multiplier is higher than the consumption multiplier reiterates something that was known long ago, but was forgotten recently. Several explanations can be offered for the higher investment multiplier: public investment, besides the demand effects, has also supply-side effects; public investment is less likely to crowd-out private demand; public investment is less
likely to end up in imports or savings. The finding that the investment multiplier is higher for the highly-indebted countries comes at a surprise, however, since it is usually believed that high debt reduces the multiplier, through the expectations effect (higher probability for a default in the future). Our explanation for this finding is through an expectations effect, but in an opposite direction - if the public does not believe in austerity, i.e. expects the austerity to increase the public debt, instead of decreasing it (which may happen if it expects a high multiplier), the expectations effect may add up to the standard Keynesian effects.

The strong interpretation of these findings is that by increasing government investment and cutting government consumption more than proportionately, policy makers can achieve two goals at the same time - reduce the deficits and support the economy. The weak interpretation is that public investment should be the last on the list for cutting during the consolidation, as Alesina and Perotti (1997) suggested some time ago.

The rest of the paper is structured as follows. Section II discusses the related literature, section III describes the methodology and the data. Section IV presents the basic results as well as some robustness checks. Section V discusses the findings. Section VI concludes.

II. RELATED LITERATURE

Keynesian economics considers the public investment as the most effective fiscal policy instrument - it combines the short-run support of the government consumption with the long-term supply-side benefits (see Skidelsky, 2001). The Golden Rule of fiscal policy follows from the same logic, and argues that government investment can be financed by new debt, unlike government consumption, since it will pay for itself, by the tax revenues from the new capital stock. However, there is a very weak evidence in support of the claims that the government investment is more effective for growth than government consumption. On the contrary, Perotti (2004) shows that neither the short-run, nor the long-run multipliers from the government investment spending are higher than the multipliers from government consumption.

The vast literature on fiscal multipliers that has appeared recently has not overlooked this issue entirely. Eggertsson (2011) analyses what fiscal policy is likely to be effective in the current situation, with zero lower bound and insufficient demand, using a Dynamic Stochastic General Equilibrium (DSGE) model. He finds that temporary increase in government spending targetted at goods which
are imperfect substitutes with private consumption, like public infrastructure, is one of the most effective measures. Coenen et al. (2012) compare the effects of different forms of fiscal stimulus using seven DSGE models used by leading policy-making institutions. They also find that the government investment spending has stronger effects on the GDP than the government consumption, but only marginally (see Table 3, p. 46). Auerbach and Gorodnichenko (2012b) compare the consumption and investment multipliers in the US, using a Smooth Transition Vector Autoregression (VAR) that allows the multipliers to differ in recessions and expansions. They find out that the investment multiplier is much higher than the consumption multiplier, particularly in recessions (the cumulative investment multiplier in recessions is 4.3, while the corresponding consumption multiplier is 1.3). They also find that the multipliers, in general, are likely to be much larger in recessions than in expansions.

The dependence of the multiplier on the state of the business cycle has been analysed by other researchers, too, like Battini et al. (2012), Baum et al. (2012b) and Caprioli and Momigliano (2013). All these papers apply a similar technique (regime-switching VAR) and arrive at similar conclusions - that the multipliers are likely to be bigger when the economy is in a downturn. The explanation is simple - in recessions, government spending is less likely to crow-out private spending.

Another strand of literature has investigated the relationship between the fiscal multiplier and the level of the public debt. The conventional wisdom argues that with high level of public debt the multiplier is likely to be lower, since the positive demand effects are off-set by negative expectations effect - the level of debt increases with the spending, and so does the probability for default. The recent literature investigating this relation unanimously finds that the level of debt reduces the multiplier; see Auerbach and Gorodnichenko (2012a), Ilzetzki et al. (2013), Kirchner et al. (2010), Nickel and Tudyka (2013).

Because the current situation in most of the advanced economies is characterized both by a depressed economy with zero interest rates and high public debt, it is not straightforward to assess the size of the current multipliers, since the first attribute pushes for high multipliers, while the second for low. Blanchard and Leigh (2013) investigate whether the multipliers that have been used by the International Monetary Fund (IMF) and other professional forecasters recently have been correct or not. They use a simple, yet very smart proposition - if the multipliers have been correct, there should be no correlation between the growth forecast errors (the difference between the realized and forecasted GDP growth) and the planned fiscal policy measures, since the planned measures have been known when the forecasts have been prepared. Thus, by regressing the growth forecast errors on the planned
fiscal consolidation, one can assess whether the models that have been used for the forecasts are correct or not. In other words, if one finds significant coefficients for the planned consolidation, that would imply that the multipliers assumed\(^2\) in the models are incorrect. That is what they find - that the models have underestimated the multipliers, i.e. that the multipliers in the advanced countries in the current situation are likely to be high.

III. METHODOLOGY AND DATA

The methodology that is used in this paper is a modified version of Blanchard and Leigh (2013) and is based on regressing the differences between realized and forecasted GDP growth (the growth forecast errors) on variables measuring the fiscal policy during the previous year. If the models that are used for producing the forecasts are correct, the growth forecast errors should be uncorrelated with any relevant data that have been known when the forecasts have been prepared, since that data has been taken into account when the forecasts have been made. Hence, a regression of the growth forecast errors for year \(t+1\) on variables measuring fiscal decisions made during year \(t\) should produce insignificant coefficients. If the coefficients turn out to be significant, that would indicate that the effect of the fiscal decisions on the growth has been either overestimated (if the coefficients are negative) or underestimated (if the coefficients are positive).

We extend the analysis of Blanchard and Leigh (2013) in two ways. First, instead of using a measure of the overall fiscal stance, we will distinguish between government consumption and government investment, in order to evaluate the proposals for supporting the economy through public spending\(^3\). Second, we will allow the multipliers to differ for the highly indebted countries, given the widespread belief that the multipliers are lower, or even negative, when the debt is high. Therefore, our basic regression will be:

\[
\text{Forecast Error of GDP Growth for 2011}_i = \beta_0 + \beta_1 \times \text{Government Consumption in 2010}_i \\
+ \beta_2 \times \text{Government Investment in 2010}_i + \beta_3 \times \text{Government Consumption in 2010}_i \times \text{High Public Debt}_i \\
+ \beta_4 \times \text{Government Investment in 2010}_i \times \text{High Public Debt}_i + \epsilon_i
\]

Where the subscript \(i\) indexes the countries.

2. Since the forecasts from the models are a result of many different factors, it is incorrect to speak about certain values of multipliers assumed in the models. We will, nevertheless, use this word, for ease of exposition.

3. The third component of public spending, the public transfers, are excluded from the analysis, due to data unavailability.
The forecast errors for the GDP growth are calculated as a difference between the realized real GDP growth in 2011 and the projected growth for 2011 at the end of 2010. We take the October 2010 World Economic Outlook (WEO) projections as our baseline, since these are the latest projections made in 2010. It is true that at the time when the October projections are made, the fiscal stimulus made during the last quarter of the year is not known. Although it is hard to imagine that some of the advanced countries engaged in massive unexpected fiscal support or retrenchment during the last quarter of 2010, we will still use the projections from the April 2011 WEO, as a robustness check.

Government consumption is defined as the difference between the government consumption in 2010, as a percent of GDP, and the average government consumption for 2007-2009. Government investment is defined analogously. We take the difference from the average for the period 2007-2009, instead of from a value for a single year (e.g. 2009), to avoid potential base effects - since GDP in 2009 in many of these countries was lower than usual, due to the recession, the share of government consumption and investment in GDP may have been higher than usual in 2009, which may overestimate the fiscal contraction in 2010. For robustness purposes, we will use alternative definition of the fiscal variables - as a difference between the value in 2010 and in 2009, as a percent of the potential GDP\(^4\).

High public debt is a dummy variable which takes value of one for countries with gross public debt above 95% of GDP in 2010. The 95% threshold is chosen after Baum et al. (2012a). We will also use the much-debated 90% threshold (see Herndon et al., 2013), as well as a threshold of 80%.

Data on GDP growth and government consumption are from the World Development Indicators database of the World Bank (WDI). Data on government investment are calculated from Gwartney et al. (2012), who, in their Economic Freedom of the World database, provide data on government investment as a share of total investment for around 180 countries. These value are then multiplied with the share of gross fixed capital formation in the GDP, from WDI. The forecasted GDP growth is from the October 2010 and April 2011 editions of the WEO. Public debt is from the April 2013 edition of the WEO.

IV. Results

We first estimate the regression for the economies that the IMF classifies as "advanced" (see footnote 1 for a list of the countries). Table 1, column 1 presents these results. All the variables in

\(^4\) The potential GDP is obtained using the output gaps from the April 2013 WEO.
the regression are insignificant, except the cross-product of the high debt dummy and the government investment, which is significant at the 1% level. The insignificance of the government consumption and government investment variables points out that the multipliers implied in the forecasts are unlikely to differ from the actual ones, for the countries without high debt. The insignificance of the cross-product of the government consumption with the high debt dummy points out that the consumption multiplier is likely to be similar for countries with high and countries with low level of debt. On the other hand, the significance of the cross-product of the high debt dummy and the government investment points out that the investment multiplier in the highly-indebted countries\(^5\) is likely to be higher than in the non-highly-indebted countries by 2.7. Its sum with the government investment coefficient gives the difference between the investment multiplier implied in the forecasts and the actual ones, for the countries with high debt. The sum is significant at the 1% level, pointing out that the actual investment multiplier for the highly indebted countries is likely to be higher than the one used in the forecasts by around 2.

In the next two columns of Table 1, we check whether the results change if alternative threshold is used for the level of debt. In column 2, we use 90% as a threshold for the high debt, in column 3 we use 80%\(^6\). As can be seen, results change very little - the sum of the investment and its cross-product with the high debt dummy is now around 1.7, instead of 2, its p value is slightly above 1%.

Next, we check the sensitivity of the results with respect to the definition of the forecast errors and the fiscal variables. In column 4, we use the growth forecasts from the April 2011 WEO, instead of the October 2010. Results are materially the same, the only small difference is that the government investment variable is now negative and on the verge of significance, with p value of 10%. In column 5, we define the government consumption and investment differently - as the change between 2010 and 2009, measured as a percent of potential GDP. The results are qualitatively similar, although they become insignificant, which is due to the lower number of observations (26 vs. 31), because of what the effect of the outliers is stronger\(^7\).

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5. Five of these 31 countries have debt above 95%: Belgium, Greece, Italy, Japan and US.
6. Three additional countries have debt above 90%: Iceland, Ireland and Portugal, and three additional have debt above 80%: Canada, France and Germany.
7. A robust regression estimate, following Andersen (2008) yields a significant coefficient for the cross product of the high debt dummy and the government investment, with a coefficient of -3.55 and a p value of 0.078.
### Table 1: Baseline results and alternative definition of variables

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<td>gov_con{}</td>
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<td>-0.45</td>
<td>-0.38</td>
<td>-0.07</td>
</tr>
<tr>
<td>(0.67)</td>
<td></td>
<td>(0.42)</td>
<td>(0.31)</td>
<td>(0.25)</td>
<td>(0.95)</td>
</tr>
<tr>
<td>gov_inv{}</td>
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<td>-1.52</td>
<td>-1.69</td>
<td>-1.26*</td>
<td>-1.95</td>
</tr>
<tr>
<td>(0.41)</td>
<td></td>
<td>(0.13)</td>
<td>(0.11)</td>
<td>(0.10)</td>
<td>(0.25)</td>
</tr>
<tr>
<td>hi_debt_gov_con{}</td>
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<tr>
<td>(0.93)</td>
<td></td>
<td>(0.90)</td>
<td>(0.77)</td>
<td>(0.60)</td>
<td>(0.73)</td>
</tr>
<tr>
<td>hi_debt_gov_inv{}</td>
<td>2.74***</td>
<td>3.24**</td>
<td>3.32**</td>
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<tr>
<td>(0.01)</td>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.00)</td>
<td>(0.17)</td>
</tr>
<tr>
<td>Constant</td>
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<td>0.16</td>
<td>0.14</td>
<td>0.07</td>
<td>-0.75**</td>
</tr>
<tr>
<td>(0.69)</td>
<td></td>
<td>(0.77)</td>
<td>(0.80)</td>
<td>(0.83)</td>
<td>(0.04)</td>
</tr>
</tbody>
</table>

| Observations               | 31   | 31   | 31   | 31   | 26   |
| R-squared                  | 0.29 | 0.37 | 0.38 | 0.51 | 0.32 |
| gov_inv + hi_debt_gov_inv  | 2.022| 1.721| 1.629| 2.036| 0.912|
| (p value)                  | 1.15e-05| 0.0128| 0.0179| 8.47e-08| 0.509|

Robust pval in parentheses. *** p<0.01, ** p<0.05, * p<0.1

We next investigate the sensitivity of the results to the choice of countries and investigate if they are maybe driven by outliers. Column 2 of Table 2 replicates the analysis using the set of countries classified as 'high income countries' by the World Bank. With this, we obtain 5 more observations - Barbados, Croatia, Hungary, Poland and United Arab Emirates. In column 3, we further add the EU countries which are still classified as emerging markets - Bulgaria, Lithuania and Romania. Results are virtually identical, the only difference being the slightly worse fit with the higher number of countries. In the next two columns, we explore the possibility that our results are driven by certain outliers. In column 4, we estimate the equation using quantile regression, which uses the median of the variables, unlike the OLS. In column 5, we estimate the equation using the robust regression technique of Andersen (2008). No important changes appear, again.
Next, we add certain controls in the baseline regression. It is possible that certain factor, correlated with the growth forecast error and the fiscal support, may be driving the results, like some factors that push for expansionary fiscal policy and higher than expected growth at the same time. Also, by including additional controls, we, in a certain way, control for possible errors in the forecasts regarding the effects of the other variables on the GDP. We start by adding the trade and financial flows experienced in 2011 (exports, FDI and portfolio flows). Unexpected flows, caused by fiscal decision from the previous year, may bias the results. Column 2 of Table 3 shows these results. They are almost the same as the baseline. In column 3, we add the monetary policy stimulus during 2010, by including the interest rate and the expansion of the M1. If both the monetary and fiscal policy are expansionary, and the forecasters have underestimated the effect of the monetary policy on growth, then the significance of the fiscal variables may be capturing the effect of the monetary policy. This does not seem to be the case, since the monetary policy variables are insignificant and the fiscal policy variables remain unchanged. In column 4, we add certain variables for the banking system - the share of capital in the total assets and the share of non-performing loans in 2010. These variables are likely to be correlated with the fiscal policy, due to the bank bailouts, for instance, and if their effect on GDP growth has not been accounted for well, then the significance of the fiscal variables may be due
to their omission. Again, this does not seem to be the case. Next, we include the level of public debt and the fiscal balance in 2010 - high debt (or deficit) may be correlated with the fiscal policy, and is likely to affect growth, too. The results remain unchanged, again. Last, we include the current account balance - external imbalance may be related to fiscal policy (twin deficits) and may affect growth at the same time. However, the results remain stable once again.
As a final robustness check, we do a Bayesian Model Averaging (BMA) exercise, by which we try to see which of the discussed explanatory variables is likely to be the most robust determinant of the
growth forecast errors. BMA is appropriate for situations when large number of candidate explanatory
variables exists, and the researcher does not know a priori what is the correct theoretical model. It
estimates all the possible model combinations, using Bayesian techniques, weights them according to
their goodness of fit, and calculates the weighted average of the models for every variable. Inference
in BMA is normally based on the Posterior Inclusion Probability (PIP), which is the probability that
the variable is a robust determinant of the dependent variable. For a thorough elaboration of BMA,
see Hoeting (1999), or for a short applied exposition, see Jovanovic (2012). The BMA results are
shown in Table 4. We use four different priors for the model coefficients (hyper, empirical Bayes local
(EBL), unit information prior (UIP) and benchmark prior*) and a uniform prior for the model size.
Each column of Table 4 presents results obtained by one prior. For clarity, we will present only the
PIPs, the other statistics are available upon request. 

Table 4: Results of the BMA analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>BRIC PIP</th>
<th>UIP PIP</th>
<th>hyper PIP</th>
<th>EBL PIP</th>
</tr>
</thead>
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<tr>
<td>hi_debt_gov_inv</td>
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<td>0.42</td>
<td>0.35</td>
<td>0.29</td>
</tr>
<tr>
<td>gov_inv</td>
<td>0.33</td>
<td>0.70*</td>
<td>0.81*</td>
<td>0.88*</td>
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<td>fdi</td>
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<td>0.63</td>
<td>0.76</td>
<td>0.85</td>
</tr>
<tr>
<td>exports</td>
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<td>0.33</td>
<td>0.47</td>
<td>0.56</td>
</tr>
<tr>
<td>ir</td>
<td>0.16</td>
<td>0.39</td>
<td>0.46</td>
<td>0.51</td>
</tr>
<tr>
<td>npl</td>
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<td>0.30</td>
<td>0.37</td>
<td>0.40</td>
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<tr>
<td>portfolio</td>
<td>0.13</td>
<td>0.27</td>
<td>0.35</td>
<td>0.40</td>
</tr>
<tr>
<td>budget</td>
<td>0.19</td>
<td>0.23</td>
<td>0.26</td>
<td>0.27</td>
</tr>
<tr>
<td>gov_cons</td>
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<td>0.17</td>
<td>0.25</td>
<td>0.29</td>
</tr>
<tr>
<td>capital</td>
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<td>0.19</td>
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<tr>
<td>m1</td>
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<td>0.11</td>
<td>0.13</td>
<td>0.14</td>
</tr>
<tr>
<td>debt</td>
<td>0.06</td>
<td>0.09</td>
<td>0.12</td>
<td>0.14</td>
</tr>
</tbody>
</table>

The figures in the table are the Posterior Inclusion Probabilities (PIP), which can be interpreted as
a measure of significance. * indicates the variable with the highest PIP.

The most significant variable in the estimation with the BRIC prior is the cross product of the high
debt dummy and the government investment, while the most significant variable in the other three
estimations is the government investment. It should be noted that half of the models in the BMA

8. The hyper prior has been proposed by Liang et al. (2008), the EBL prior by Hansen and Yu (2001), the UIP prior
9. The BMA analysis has been implemented in R, using the BMS library, developed by Feldkircher and Zeugner
(2009).
analysis do not feature the cross product of the high debt dummy and the government investment, as a result of what its effect in these models is captured by the government investment variable. Therefore, it can be said that the results of the BMA analysis point out at the government investment as the most likely variable to be significant for the explanation of the growth forecast error.

V. DISCUSSION

Two main messages, in our opinion, should be taken from this analysis. The first one is that policymakers have underestimated the effect of the government investment on growth. Why? Probably because they have assumed the government investment multiplier to be similar to the government consumption multiplier. Evidence from Coenen et al. (2012) suggest that this is likely to be the case - they examine the growth effects of government consumption and investment in the main workhorse models used by the leading policy institutions in the world, finding that the investment multiplier is only marginally higher than the consumption multiplier. Our study is not the only recent study to suggest that the investment multiplier is likely to be higher than the consumption multiplier - Auerbach and Gorodnichenko (2012b) also find that the investment multiplier is much larger than the consumption multiplier (for example, in recessions, their consumption multiplier is 1.4, while the investment multiplier is 4.3).

Why would the investment multiplier be higher than the consumption multiplier? The first reason is due to the supply-side effects - public investment, in addition to the main demand effect, increases the capital stock, i.e. the potential GDP. However, this effect is unlikely to be the main driving force behind our results, since this effect primarily refers to the long run. Second reason may be the smaller crowding-out of the government investment. Government investment is usually focused on goods which are imperfect substitutes with private consumption, therefore, they are unlikely to crowd out private expenditure (see Eggertsson, 2011, for instance). Third, public investment has fewer "leakages" than public consumption - it is more labour-intensive, so less likely to end up in imports than public consumption (see Spilimbergo et al. 2009, p. 2-3).

The second message from the analysis is that, contrary to the widespread belief, the (investment) multiplier is likely to be higher, not lower in the indebted countries. One explanation for this is that the indebted countries may have, at the same time, low level of public capital (relative to the optimal level), as a result of what its marginal product is high. Similar logic, though in the opposite version,
is proposed by Perotti (2004), for his findings that the investment multiplier does not differ from the consumption multiplier in US, UK, Canada, Germany and Australia (he says that these countries may have too high level of capital, which makes the investment multiplier low). However, while this may sound reasonable for two of the indebted countries (Greece and Italy), it is hard to justify for the remaining three countries (Belgium, Japan and United States).

Another explanation is through the confidence effects. The confidence effects are usually used to justify non-Keynesian effects of fiscal expansion. Hellwig and Neumann (1987, p.137-138), for instance, say: "The direct demand impact of slower public expenditure growth is clearly negative. [...] The indirect effect on aggregate demand of the initial reduction in expenditure growth occurs through an improvement in expectations if the measures taken are understood to be part of a credible medium-term program of consolidation". Baxter and King (1993) show that fiscal expansions can produce a negative response in economic activity, when they are financed by taxes, since they increase the expected future tax burden (see also Bertola and Drazen, 1993). The empirical evidence about the validity of the expansionary fiscal contraction hypothesis is mixed - Giavazzi and Pagano (1990), Alesina and Perotti (1995), Alesina and Perotti (1997), Alesina and Ardagna (2009) and Broadbent and Daly (2010) find some evidence for the hypothesis, while IMF (2010, Chapter 3), Guajardo et al. (2011) and Perotti (2011), argue that consolidations are always contractionary. However, it is conventionally believed that consolidations may be effective when the debt is high - in high-debt countries, a fiscal correction may reduce the likelihood of public sector default, thus improving confidence and increasing consumption and investment (see e.g. Giavazzi, Jappelli, Pagano, 2000). Blanchard (1990) and Perotti (1999) develop theoretical models in which this happens

But, suppose agents expect that contractionary fiscal policy will increase the debt, hence the probability of default. Then the confidence effects may add-up to the Keynesian effects, resulting in higher multiplier when the debt is higher. Why would this happen? If agents perceive that the (investment) multiplier is above than one. In that case they would expect that cutting public investment will decrease the GDP more than it will decrease the debt, as a result of what the debt-to-GDP ratio will increase further, instead of decreasing. In this way, fiscal contractions may increase the probability for a default, instead of decreasing it. Hence, our finding may be interpreted as a sign that agents

10. The importance of the expectations for the fiscal policy effects has been recently emphasized again by Cimadomo et al. (2011), who point out that the response is likely to depend on agents’ expectations about the future policy actions - if agents expect decrease in government expenditure in the future, fiscal expansion can have positive effects on growth and reduce debt, if fiscal expansion is accompanied by expectations about persistent increase in government spending, it has negative effects on growth and increases debt.
do not believe in austerity. Assuming a high multiplier, they expect that austerity will hurt growth, as a result of what the debt will increase, not fall. Romer (2012) offers some evidence that this may indeed be the case - she finds that bad news about growth are the second most important factor driving increases in the Spanish government bond rate in the period April 2011-April 2012, after news about the response to the European crisis.

Our findings about the higher multiplier in the highly-indebted countries is not necessarily at odds with the existing literature (Auerbach and Gorodnichenko, 2012a, Ilzetzki et al., 2013, Kirchner et al., 2010, Nickel and Tubyka, 2013), because these studies actually exclude the recent consolidation. The shocks in Auerbach and Gorodnichenko (2012a) end in 2008 or 2009 (see Figure 3), the data in Ilzetzki et al. (2013) end in 2009 (see Tables A1 and A2), the data in Kirchner et al. (2010) end in 2008Q4, while those of Nickel and Tudyka (2013) - in 2010.

Alternative explanation for the multiplier increasing with the level of debt is along the lines of Corsetti et al. (2009). They show that when fiscal expansion is followed by spending reversal, i.e. with credible plan debt stabilization in the future, the multiplier can be higher even with rising debt. However, this explanation would be hard to justify for the indebted countries in our sample (Belgium, Greece, Italy, Japan, United States). It is hard to argue that they had a credible plan in 2010. In addition, this logic is as likely to hold for consumption as it is for investment, which we do not find in the data.

What are the implications of these findings? If one strongly believes in them, i.e. if the investment multiplier is really that higher than the consumption multiplier, that would suggest that by cutting public consumption and increasing public investment less than proportionately, one can, at the same time, lower the budget deficit and stimulate growth. However, the results may be imprecisely estimated for such a strong interpretation – there are just 31 observations, and data variability might be low. Also, the multiplier is likely to be different for every country, so, the averages we estimate do not have to hold for every analysed country. The weaker interpretation is, thus, that since in the indebted countries the investment multiplier is likely to be higher than the consumption multiplier, the public investment should come last on the list for cutting, as Alesina and Perotti (1997) argued long time ago. This has not been the practice during the recent consolidation, as was shown on Figure 1. Figure 2 shows a similar picture - looking at the change in the real government consumption and investment in 2010 vs. 2009, one can see that investment was cut in 23 of the 31 countries, while consumption - in only 11 (see Figure 2).
VI. Conclusion

Fiscal consolidation has dominated discussions among researchers and policy-makers recently. With this paper, we join the discussion, offering some new evidence on the size of the government consumption and government investment multipliers, in the highly-indebted and the less-indebted advanced economies. We find some evidence that the investment multiplier is likely to be higher than the consumption multiplier, and than the multiplier assumed by the policy-makers, in the highly-indebted countries. This suggests that the consolidation should be accompanied by increased public investment.

REFERENCES


Table 5: Definitions of the additional variables used in the analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>The way it is constructed</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Exports</td>
<td>Exports of goods and services in 2011, as % of GDP, minus average value for 2007-2010.</td>
<td>WDI</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign direct investment, net inflows, as % of GDP, minus the average for 2007-2010.</td>
<td>WDI</td>
</tr>
<tr>
<td>Portfolio</td>
<td>Portfolio Investment, net incurrence of liabilities (excluding exceptional financing) in 2011, as % of GDP, minus the average for 2007-2010. The original data is in USD, so is divided by the nominal GDP.</td>
<td>IFS</td>
</tr>
<tr>
<td>M1</td>
<td>Monetary aggregate M1 (‘money’ series in WDI), in 2010, as % of GDP, minus the average for 2007-2009. The original series is in local currency units, so it is divided by the nominal GDP.</td>
<td>WDI</td>
</tr>
<tr>
<td>IR</td>
<td>The discount rate of the central bank in 2010, minus the average for 2007-2009</td>
<td>IFS</td>
</tr>
<tr>
<td>Capital</td>
<td>Bank capital to asset ratio in 2010</td>
<td>WDI</td>
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<tr>
<td>NPL</td>
<td>Bank nonperforming loans to total loans</td>
<td>WDI</td>
</tr>
<tr>
<td>Debt</td>
<td>General government gross public debt in 2010, % of GDP</td>
<td>WEO April 2013</td>
</tr>
<tr>
<td>Budget</td>
<td>General government structural balance in 2010, % of potential GDP</td>
<td>WEO April 2013</td>
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<tr>
<td>CA balance</td>
<td>Current account balance, % of GDP</td>
<td>WEO April 2013</td>
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Table 6: Descriptive statistics of the variables used in the analysis

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<th>budget</th>
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<td>max</td>
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