Fiscal spending multiplier calculations based on Input-Output tables – with an application to EU members

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Abstract: *Fiscal spending multiplier calculations have been revived in the aftermath of the global financial crisis. Much of the current literature is based on VAR estimation methods and DSGE models. This, at least implicitly, involves assumptions about the response of monetary policy. The aim of this paper is not a further deepening of this literature but rather to implement a calculation of multipliers which does not necessitate assumptions about the working of monetary policy. Multipliers derived on this base might be especially relevant for judging the prospect of budget consolidation in the EU member states, provided that monetary policy is operating on the expansionary frontier. For the calculations input-output tables are used as by this means the import intake of domestic demand components can be isolated in order to get an appropriate base for the calculation of the relevant import quotas. Multipliers thus derived are comparably high, ranging between 1.4 and 1.8 for many members of the European Union. GDP drops due to budget consolidation might therefore be substantial if monetary policy is not able to react in an expansionary manner.*

1 Introduction

The purpose of this paper is to calculate fiscal spending multipliers for open economies in an environment where monetary policy is accomodative. Recently there have been a number of studies which present empirical estimates for fiscal spending multipliers under circumstances like the financial crisis. In this contribution we tie in with some studies which revived an older debate about the fiscal spending multiplier in open economies and the special role of imports and exports in this context.[1] There are two novel aspects of this study. Firstly, we perform fiscal spending multiplier calculations based on Input-Output calculus as this method seems to be especially suitable for considering multiplier effects in open economies like EU members states.

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[1]See Laski et al. (2010) and Palley (2009). The topic is however older. Palley (2009, 311) mentions early contributions from the 1970s.

Secondly, we calculate fiscal spending multipliers for different spending categories which is rarely done in the literature.

The paper is structured as follows. In section 2 we give a short overview of the empirical fiscal spending multiplier literature. Recent research inspired by the debate about the stimulus package implemented by the current US administration in early 2009 shows that wider economic environment and in particular the stance of monetary policy affect the fiscal multiplier by shaping the effect of a fiscal expansion on interest sensitive consumption and investment. The fiscal multiplier estimates of our paper are computed by holding interest sensitive private spending constant. Hence our computations constitute conservative estimates of the fiscal multiplier during deep, demand driven recessions. This, of course, are precisely the periods when action to stabilise the economy is needed most. Furthermore, we compute fiscal multipliers for open economies and take some care to correctly calculate the import propensity. This is appropriate since we want to compute multipliers for European Union countries. In section 3 we introduce our model of fiscal spending multiplier calculation which controls for the effect of export induced imports. Empirical calculations based on this model are performed in section 4 for Germany and France, as well as other EU member states (at the end). In order to disentangle the relevant fractions of aggregate demand we make use of Input-Output calculus. The results thus derived are compared with values for the textbook fiscal spending multiplier. Section 5 then summarizes the results and concludes.

2   Literature review

The literature on the size of the fiscal spending multiplier is big and has reached divergent conclusions. We first consider the literature studying the effect of increase in government spending on output in dynamic general equilibrium models with nominal price and/or wage rigidities, also referred to as "New Keynesian" models. Following that, we will discuss results from empirical studies estimating vector auto regression (VAR) models.

In New Keynesian models without liquidity constrained consumers, a fiscal expansion will increase output, inflation and the real interest rate, thus crowding out consumption, while the effect on investment may depend on the precise calibration and other assumptions. The resulting multiplier is therefore typically smaller than one. Gali et al. (2007) show that in the presence of a sufficiently large fraction of liquidity constrained households which simply consume their disposable income, consumption may increase in response to a government spending increase and the multiplier may be significantly

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larger than one. For instance, if the share of liquidity constrained households reaches 50%, the impact multiplier equals about 1.8. However, the precise calibration of this share and correspondingly the question whether government spending crowds in consumption or not has remained controversial.

The onset of the financial crisis has drawn attention to the effect of the economic environment and the monetary policy stance in particular on the size of the fiscal spending multiplier. Christiano et al. (2009) show that if monetary policy is constrained by the zero lower bound on nominal interest rates (ZLB) and thus keeps the nominal interest rate constant, even in the absence of liquidity constrained agents the multiplier can be much larger than one. The increase in government expenditure increases output and inflation, thus lowering the real interest rate and crowding in consumption and investment. For instance, in a medium sized DSGE model estimated on US data if ZLB binds for 8 quarters and government spending increases during this period, the multiplier varies between 1.9 and 3 during those 8 quarters. Christiano et al. (2009) also show that the multiplier increases in the fraction of government spending which comes online while the ZLB is binding, the time span monetary policy remains constrained by the zero lower bound and the output cost of being in the ZLB state.

Using the IMF's Global Integrated Monetary and Fiscal (GIMF) model, Freedman (2009) confirm that with sufficient monetary accommodation the government spending multiplier can be close to 2 or larger. They also show that if monetary policy is constrained by the zero lower bound, the introduction of a financial accelerator along the lines of Bernanke et al. (1999) and Christiano et al. (2010) increases the multiplier and the persistence of the output response. Erceg & Linde (2010) qualify these results by allowing the duration of the ZLB to be endogenously determined. This implies that the multiplier declines in the size of the increase in government spending since a fiscal expansion increases the output and inflation trajectory and thus shortens the time monetary policy remains constrained by the zero lower bound.

Until very recently, the VAR literature estimating the effect of government spending shocks on output also reached sharply varying conclusions depending on the method used to separate genuine unexpected shocks to government spending from spending changes expected by economic agents. The approach preferred by Blanchard & Perotti (2002) and Gali et al. (2007) draws on institutional information on taxes, transfers and spending.[2] They find that consumption rises in response to a fiscal expansion and that the

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[2]For instance, they assume that that there is no discretionary response of government spending and taxes to output, allowing for the fact that fiscal policymakers are typically slow to respond to changes in the economic environment.

peak multiplier ranges from 0.87 to 2.5. By contrast, Ramey (2010) and Ramey (1998) use "war dates" and spending news distilled from the newspaper business week to identify unforecasted movements in defence spending after showing that the "shocks" identified in the approach of Blanchard and Perotti can be forecasted using Ramey's spending news variable. They find that an increase in government spending crowds out consumption and the multiplier is typically below one.

The theoretical literature discussed above suggests that controlling for the state of the economy when estimating the VAR might resolve this controversy. For instance, a possible explanation of the lower multiplier estimate of Ramey (2010) is that during some of the military buildups following Ramey's post WWII war dates monetary policy was not constrained by the zero lower bound due to a booming economy. Hence, crowding out of private expenditure might be expected.[3] Auerbach (2010) and Almunia et al. (2010) present evidence that this is indeed the case. Auerbach (2010) estimate a smooth transition VAR (STVAR) which allows the lag polynomial as well contemporaneous effects of spending shocks to vary according to an indicator variable. The indicator is a seven quarter moving average of past output growth rates. They consider various identification schemes, including the news variable of Blanchard & Perotti (2002) and Ramey (2010) as well as several alternative specifications featuring forecasts of government spending. Defining the multiplier as the sum of the output response to a government spending shock over 20 quarters divided by the sum of the government spending response over 20 quarters, they find that the general government spending multiplier equals 2 or more during recessions but is below one ore negative during expansions. Interestingly, controlling for predictable components of government spending tends to increase the size of the multiplier during recessions, with a multiplier of 3.8 when the news variable of Ramey (2010) is used.

Almunia et al. (2010) estimate a VAR featuring defence spending, GDP, government revenues and the discount rate on a panel of 27 countries using annual data from 1925-1939, a period during which monetary policy was constrained first by a desire to defend a fixed exchange rate and later by the zero lower bound. Their baseline estimate of the impact multiplier is 2.5. This estimate is at the upper end of what is usually found in the VAR

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[3]Ramey identifies 4 "war dates": the Korean War (1950 Q3), the Vietnam war (1965 Q1), the Carter-Reagan buildup (1980 Q1) and the terrorist attacks of September 11, 2001 (2001:Q3). The military buildups following the first two of these dates are times during which the US output gap as measured by the CBO is strongly positive, hence the increase of defence spending would be expected to crowd out private expenditure. The third date is situated at the beginning of the Volcker disinflation, a time when monetary policy was deliberately inducing a recession in order to bring down inflation.

literature. While their main identification strategy is close to Blanchard & Perotti (2002), their result is robust against using an identification strategy close in spirit to Ramey (2010).

Hence both the applied theoretical and the empirical literature suggest that the wider economic environment and in particular the stance of monetary policy affect the fiscal multiplier. Whether the central bank responds to the increase in inflation associated with a fiscal expansion by increasing the nominal and real interest rate or whether it holds nominal rates constant, thus allowing the real interest rate to fall determines whether private interest sensitive expenditure is crowded out or crowded in. The fiscal multiplier estimates of our paper are computed by holding interest sensitive consumption and investment constant. Hence our computations constitute conservative estimates of the fiscal multiplier during deep, demand driven recessions. This, of course, are precisely the periods when action to stabilise the economy is needed most. Furthermore, we compute fiscal multipliers for open economies and take some care to correctly calculate the import propensity. Most of the above-mentioned studies consider the US economy precisely because this allows to abstract from open economy considerations without too much harm. Finally, our paper distinguishes between three different categories of government spending, which is rarely done in the literature.

3 Our model of fiscal spending multiplier calculation

In this section we explain how and why our method of calculating the fiscal multiplier of the open economy income-expenditure model differs from the textbook approach. The fiscal multiplier in the basic open economy income expenditure model is typically calculated by assuming that consumption C and imports M are fixed fractions of GDP, denoted as c_p and m, respectively. Hence we have $C = c_p Y$ and $M = mY$, where Y denotes GDP and is given by the familiar identity $Y = C + I + G + X - M$, where I, G and X denote investment, government spending and exports, respectively. The fiscal multiplier[4] is then given by:

$$\frac{dY}{dG} = \frac{1}{1 - c_p + m}. \tag{1}$$

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[4]The fiscal spending multiplier of eq. (1) goes back to Samuelson (1948). Usually the textbook literature refers to marginal consumption quotas and autonomous spending categories, which we do not overtake for our paper. The calculations could be improved in this direction. For the demonstration of differences in magnitude between the different multiplier concepts applied here, this is however not important.

This multiplier can be calculated using national accounts data in a straightforward fashion by calculating $m = \frac{M}{Y}$ and $c_p = \frac{C}{Y}$.

However, assuming that imports depend on GDP is not as plausible as it might seem. This assumption implies that imports are proportional to domestic absorption, i.e. $C + I + G$, on the one hand and net exports $X - M$ on the other. C, I and G all represent quantities of final goods: Assuming that some of them come from abroad or that their domestic production requires a fraction of imported inputs might be a plausible first approximation. However, $X - M$ is not a final good. It is not clear why it should be *net* exports which drive the demand for imported inputs of the export goods producing sector rather than its' final output, namely X. Hence a more consistent approach would be to assume that imports of the home country are a fixed fraction m' of final demand of the home country plus goods produced at home but exported to the rest of the world, i.e. $M = m' \left(C + I + G + X \right)$. Just as m, m' can be easily calculated using national accounts data. Under this assumption multiplier is given by:

$$\frac{dY}{dG} = \frac{1 - m'}{1 - cp \left(1 - m' \right)}. \tag{2}$$

Since the output of final goods $C + I + G + X$ exceeds Y, $m' = \frac{M}{C+I+G+X} < m = \frac{M}{Y}$ and thus the multiplier of eq. (2) will differ as well. Laski et al. (2010) argue that if the home economy is very open, i.e. if both the share of exports and imports in GDP is large, the traditional approach will underestimate the multiplier by overestimating the effect of domestic demand on imports. This overestimation arises because assuming that imports are a fraction of GDP does not sufficiently account for the fact that some imports are used in the production of exported goods rather than domestically absorbed goods.

However, assuming that imports depend on exports and domestic absorption (DA) in the same way might be too restrictive. Zeddies (2010) and Ludwig & Brautzsch (2008) provide evidence that the development of international production networks tends to reduce the fraction of the value added domestically in the value of final exported goods. This would imply that the import quota of exports might be substantially higher than the import quota of DA. To account for this evidence, we postulate the following more general model of import demand:

$$M = m_{Cp}C + m_I I_p + m_G G + m_X X, \tag{3}$$

where m_{Cp}, m_I, m_G and m_X denote the import quotas of private consumption, private investment, government spending and exports, respectively. These import quotas are not equal in general. However, for the purpose

of our paper we assume at first that all components of DA have the same import quota, i.e. $m_{DA} = m_{Cp} = m_I = m_G \neq m_X$, where m_{DA} is the import quota of DA.[5] Hence we have $M = m_{DA} \cdot (C_p + I_p + G) + m_X X$, implying that the multiplier is given by:

$$\frac{dY}{dG} = \frac{1 - m_{DA}}{1 - cp\,(1 - m_{DA})}. \tag{4}$$

Clearly, if the import quota of exported goods exceeds the import quota of DA, i.e. if $m_X > m_{DA}$, then the value of m' obtained from the data will exceed m_{DA} and thus (2) will give a downward-biased estimate of the multiplier. However, unlike m', m_{DA} can not be calculated on the basis of national accounts data alone. In this paper we draw on information contained in the input-output tables to calculate the quantity of imports induced by domestic absorption M_{DA}. Since in the model we have $M_{DA} = m_{DA} \cdot (C_p + I_p + G)$, we can then calculate $m_{DA} = \frac{M_{DA}}{(C_p + I_p + G)}$.

To calculate M_{DA} we proceed as follows. The vector of export goods in gross value from the various industries of the economy, which is denoted as x, can be written as $x = y_x - \mathbf{A} \cdot y_x$,[6] where y_x denotes the vector of output in the various industries induced by the production of export goods (including the value of imports used in the production process, though), $\mathbf{A}$ is the input-output matrix of domestic production and the negative term $-\mathbf{A} \cdot y_x$ secures that inputs are not double counted. Both $\mathbf{A}$ and x can be obtained from the input-output tables. Next we solve for y_x:

$$y_x = (\mathbf{Id} - \mathbf{A})^{-1} \cdot x,$$

where $(\mathbf{Id} - \mathbf{A})^{-1}$ denotes the Leontief inverse and $\mathbf{Id}$ the identity matrix. We now use y_x and the input-output matrix for imported inputs $\mathbf{A_M}$, which is also part of the intput-output tables, to calculate the vector of imports used for the production of exported goods μ_x:

$$\mu_x = \mathbf{A_M} \cdot y_x. \tag{5}$$

Summing up all the entries of μ_x yields the value of imported goods used in the production of exports M_X. Hence we can calculate M_{DA}[7]:

$$M_{DA} = M - M_X - M_{RX},$$

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[5]In the following section we relax this assumption and also present calculations for the specific fiscal spending multiplier of government consumption.

[6]See Ludwig & Brautzsch (2008). For an introduction into input-output analysis see also Holub & Schnabl (1994, chapter 6.4).

[7]Some of the imported goods are used for direct re-export. These do not show up in eq. (3) and (5). However, they are accounted for in the ensuing calculations and not included in the import quota of DA.

substracting also the value of imports used for direct re-export (M_{RX}) and we can calculate the import quota of DA:

$$m_{DA} = \frac{M_{DA}}{(C_p + I_p + G)}.$$

For the purpose of our study it is interesting that eq. (3) can be modified in order to calculate multipliers of specific categories of government spending. To this end we have to drop the assumption $m_{DA} = m_{Cp} = m_I = m_G$ and use specific (generally unequal) import quotas of the different spending categories, e.g. the import quota m_{CO} of public construction works (CO). If this is inserted into the equation determining equilibrium GDP (resulting from the multiplier process):

$$Y = cpY + AU + CO - cp \cdot m_{Cp}Y - m_{CO}CO - m_{AU}AU, \qquad (6)$$

where AU denotes autonomous (or exogenous) spending components and m_{AU} their import quota, then a derivation by CO yields the specific multiplier, e.g. of public construction works:

$$\frac{dY}{dCO} = \frac{1 - m_{CO}}{1 - cp\left(1 - m_{Cp}\right)}. \qquad (7)$$

Spending multipliers for other components of public spending can be derived similarly. In the following we will proceed with the calculation of the DA multiplier and more specific spending multipliers.

4 Calculation of fiscal spending multipliers

We now apply the fiscal spending multiplier calculation method which we introduced above. For reasons of clarity we first perform the multiplier calculation only for two countries, namely Germany and France. Furthermore, to check the stability of results we focus on the evolution of the multiplier over time. Apart from calculating the multiplier of general government spending in subsection 4.1., we also compute the output effects of changing three sub-categories of government spending: government consumption, government construction expenditure and welfare expenditures. The input-output tables contain data allowing us to compute the import propensities of these components of domestic absorption.

Government consumption (the value of goods produced by the state except investment, mainly education and social services) is by far the largest fraction of government spending – the percentage of GDP in the time span

from 2000 till 2009 was 19% in Germany and 23% in France. Multipliers for government consumption are calculated in subsection 4.2.

Government investment is less important in size than government consumption – its mean value from 2000 till 2009 was 1.6% of GDP in Germany whereas it was 3.2% of GDP in France. However, public investment is highly relevant as a means of fiscal stimulus because it can be reverted (which is probably more complicated for reasons of politics in the case of public consumption). Figures for this spending category are not available in input-output tables, which do not distinguish between private and public investment. As a proxy, we calculate instead the multiplier of construction investment. This will be done in subsection 4.3.

Before we proceed to calculate fiscal multipliers for those EU members states for which input-output tables are available in the last subsection 3.5., in subsection 3.4. we will also calculate a fiscal multiplier for welfare spending.

4.1 The general government spending multiplier

In this subsection we demonstrate the crucial difference of the fiscal spending multiplier based on input-output calculus as compared to the textbook fiscal spending multiplier. To this end we compare the values of the textbook multipliers with the DA multipliers as introduced above for the two largest economies in the Eurozone, i.e. Germany and France (empirical results for other EU states are given in subsection 3.5.). This also includes a calculation of spending multipliers for consecutive years to check for stability of results. The comparison starts with the DA concept which we introduced above. Below, we proceed with more specific spending categories of DA.

Table 1 shows a certain degree of volatility of multipliers thus calculated. From their peak values in 2002 and 2003, respectively, the conventional multiplier and the multiplier of DA for Germany have decreased by 11% and 8% in 2006. For France, these decreases are somewhat lower, 5% and 3%. We argue that this volatility partly stems from shifts in GDP composition in the considered time frame. For example, Germany experienced a strong increase of export demand after 2000. Accordingly, a contributing source of a strongly decreasing textbook multiplier might be a relatively high import intake of exports. In the case of the DA multiplier a high import intensity of investment – highly volatile in the business cycle – might play a role in explaining volatility. In line with this, peak values of the DA multipliers for Germany and France can be found for 2003, close to a business cycle trough, decreasing afterwards.

There are pros and cons for considering the DA multiplier as a relevant concept for economic policy. Here we can make reference to the German

	Germany				France			
	Textbook		DA concept		Textbook		DA concept	
	m	$mult$	m_{DA}	$mult$	m	$mult$	m_{DA}	$mult$
2000	0.31	1.37	0.19	1.52	0.26	1.43	0.18	1.53
2001	0.30	1.38	0.18	1.55	0.26	1.45	0.18	1.54
2002	0.29	1.40	0.17	1.58	0.24	1.48	0.17	1.57
2003	0.29	1.40	0.17	1.59	0.23	1.51	0.17	1.59
2004	0.31	1.36	0.18	1.56	0.24	1.49	0.17	1.57
2005	0.33	1.32	0.19	1.53	0.26	1.46	0.18	1.55
2006	0.37	1.24	0.20	1.47	0.27	1.44	0.18	1.53
Decrease from peak		11%		8%		5%		3%

Table 1: Import quotas and multipliers for Germany and France; source: Eurostat, own calculations

example, an economy which shows a high degree of specialization in manufacturing of motorvehicles and investment goods. If world demand for the latter category of goods plummets, it is doubtful that the state steps in and buys machinery for the production of private goods. Actually what Germany experienced after the financial crisis hit in 2008 was higher public investment in construction and subsidies for the private purchase of new cars. Thus, not every component of private spending is subject to state activity in a recession but some might well be, for which the car purchase subsidy is an example.

4.2 The spending multiplier of government consumption

As a first more specific fiscal spending multiplier we shall calculate fiscal spending multipliers for government consumption which include specific import intensities of the aggregate demand components. To this end we relax the assumption $m_{DA} = m_{Cp} = m_I = m_G$ and replace it by the more general case of eq. (3). For the calculation of public consumption multipliers only the values of m_{Cp} and m_{PC} are relevant where PC denotes public consumption (the derivation is however similar to the DA multiplier). These values can be obtained with the same method as used above for the calculation of the import intensity of exports. In Table 2 we have listed estimated results for the public consumption multipliers of Germany and France.

What can be seen from Table 2 is that the multipliers of public consumption show a lower degree of volatility especially for Germany; during the last

	Germany			France		
	cp	m_{PC}	$mult$	cp	m_{PC}	$mult$
2000	0.57	0.08	1.73	0.57	0.08	1.70
2001	0.58	0.08	1.74	0.57	0.08	1.70
2002	0.58	0.08	1.75	0.57	0.08	1.71
2003	0.58	0.08	1.76	0.57	0.08	1.72
2004	0.58	0.08	1.74	0.57	0.08	1.71
2005	0.58	0.08	1.71	0.57	0.09	1.69
2006	0.57	0.09	1.68	0.57	0.09	1.68
Decrease from peak	1%		5%	-		3%

Table 2: Private consumption quotas, import quotas and public consumption multipliers for Germany and France; source: Eurostat, own calculations

business cycle they have decreased by 5% in Germany and 3% in France. This development might reflect changes of consumption spending patterns in the business cycle (the German consumption quota cp decreased by 1% from 2003 to 2006, see table 2) or other sources like a higher weight of imported goods in public and private consumption due to globalisation. However, the variation is fairly limited. In general the values of public consumption multipliers seem to be higher than the multipliers of DA and the textbook fiscal spending multipliers introduced earlier.

4.3 The multiplier of government spending on construction

The input-output tables do not distinguish between public and private investment. As a proxy we therefore compute the multiplier of overall construction investment. On this base an import quota of construction and the multiplier can be calculated as introduced above. Values for Germany and France are shown in table 3, where the import quota of construction expenditure is denoted as m_{CO}.

What can be seen from table 3 is that construction multipliers are slightly higher than multipliers of public consumption. However, usually much of construction work in European high income countries is done by companies, subcontractors and workers from abroad. Therefore the mean consumption quota which we used for the calculation of the multiplier might be too high in this case due to remittances of foreign workers to their home countries.

	Germany		France	
	m_{CO}	$mult$	m_{CO}	$mult$
2000	0.06	1.76	0.06	1.73
2001	0.06	1.78	0.06	1.74
2002	0.06	1.79	0.06	1.75
2003	0.06	1.79	0.06	1.76
2004	0.06	1.78	0.06	1.75
2005	0.06	1.75	0.07	1.73
2006	0.07	1.72	0.07	1.72
Decrease from peak		4%		3%

Table 3: Import quotas and multipliers of construction for Germany and France; source: Eurostat, own calculations

Thus, the calculated multipliers indicate the upper margin in this case. This would bias the computation of the multiplier upwards.

4.4 The multiplier of government spending on welfare

As a last example of specific fiscal spending multipliers we want to calculate a fiscal multiplier for welfare spending. In order to do this we used means-tested benefits data supplied by Eurostat as one item for which we can reasonably assume a consumption quota out of welfare income (WI) of 100%. This however implies that we cannot keep up our initial assumption of a mean consumption quota in eq. (7) which is why we calculate a consumption quota cp^* net of effects due to welfare-induced consumption:

$$cp^* = \frac{C - WI}{Y - WI}, \tag{8}$$

which is the consumption quota out of income not supplied by welfare ($Y - WI$).[8] This consumption quota is lower and contributes to lower multipliers of welfare spending. Another factor contributing to lower welfare spending multipliers is a higher leakage due to imports in the first spending round as the import quota of private consumption is generally higher than the import quota of public consumption or construction.

Results for Germany and France are shown in table 4 (where m_{Cp} denotes the import quota of private consumption). Cyclicality of welfare spending

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[8]The relevant size of consumption for this quota is consumption net of consumption by welfare recipients ($C - WI$) in the nominator of eq. (8).

	Germany		France	
	m_{Cp}	$mult$	m_{Cp}	$mult$
2000	0.19	1.50	0.19	1.46
2001	0.19	1.51	0.19	1.46
2002	0.18	1.53	0.19	1.48
2003	0.18	1.53	0.18	1.49
2004	0.18	1.51	0.19	1.48
2005	0.19	1.47	0.20	1.45
2006	0.20	1.44	0.20	1.43
Decrease from peak		6%		4%

Table 4: Import quotas and multipliers of welfare spending for Germany and France; source: Eurostat, own calculations

multipliers is somewhat higher than the figures for the fiscal spending multiplier of public consumption (table 2) and construction (table 3) as the last line of table 4 shows. Welfare spending multipliers were highest in the business cycle trough 2003 (as with the other multipliers introduced earlier) and decreased thereafter.

4.5 Fiscal spending multipliers for EU members

Calculations of fiscal spending multipliers for EU members in 2005 are shown in table 5 (most EU members supply input-output tables at least every five years).[9] These include the textbook multiplier, the DA concept and the different spending multipliers which we have introduced earlier. The latter are especially interesting as different member states of the EU are facing different pressures to government spending, e.g. the high debt consolidation countries face a different situation as compared to Germany or France.

The effects of refinements of multiplier calculation beyond the textbook concept are quite substantial, as can be seen from table 5. In all European countries for which input output tables are available the DA multiplier is higher than the conventional fiscal spending multiplier. In general the values of public consumption multipliers seem to be higher than the multipliers of general government spending (DA). The reason might be that especially investment goods, which are part of DA and GDP in any case, have a global

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[9]ISO Country codes are AT: Austria, BE: Belgium, CZ: Czech Republik, DE: Germany, ES: Spain, EO: Estonia, FR: France, GR: Greece, HU: Hungary, IE: Ireland, IT: Italy, LT: Lithuania, PL: Poland, PT: Portugal, RO: Romania, SE: Sweden, SI: Slovakia.

	cp	Textbook		DA concept		PC concept		Construction		Welfare	
		m	$mult$	m_{DA}	$mult$	m_{PC}	$mult$	m_{CO}	$mult$	m_{Cp}	$mult$
AT	0.57	0.48	1.10	0.25	1.30	0.12	1.57	0.09	1.61	0.24	1.33
BE	0.51	0.74	0.81	0.28	1.13	0.12	1.39	0.10	1.41	0.29	1.12
CZ	0.49	0.69	0.83	0.34	0.97	0.19	1.21	0.14	1.29	0.33	1.00
DE	0.58	0.33	1.32	0.19	1.53	0.08	1.71	0.06	1.75	0.19	1.47
ES	0.61	0.30	1.44	0.21	1.54	0.11	1.72	0.08	1.77	0.21	1.50
EO	0.60	0.81	0.82	0.39	0.97	0.18	1.34	0.15	1.39	0.35	1.07
FR	0.57	0.26	1.46	0.18	1.55	0.09	1.69	0.07	1.73	0.20	1.45
GR	0.76	0.30	1.85	0.22	1.90	0.09	2.26	0.11	2.21	0.22	1.92
HU	0.57	0.67	0.91	0.29	1.18	0.15	1.44	0.12	1.48	0.28	1.21
IE	0.45	0.70	0.81	0.30	1.03	0.14	1.27	0.16	1.23	0.30	1.00
IT	0.60	0.25	1.54	0.18	1.62	0.07	1.81	0.06	1.84	0.19	1.57
LT	0.65	0.65	1.00	0.32	1.24	0.13	1.54	0.08	1.63	0.33	1.19
PL	0.64	0.36	1.37	0.24	1.49	0.09	1.82	0.07	1.86	0.21	1.57
PT	0.67	0.36	1.45	0.24	1.58	0.09	1.85	0.11	1.81	0.25	1.51
RO	0.70	0.44	1.34	0.29	1.42	0.18	1.74	0.10	1.91	0.24	1.59
SE	0.47	0.37	1.12	0.22	1.22	0.11	1.40	0.06	1.47	0.23	1.21
SI	0.58	0.63	0.95	0.33	1.11	0.15	1.43	0.14	1.44	0.30	1.16

Table 5: Consumption quotas, Import quotas and different multipliers for EU members in 2005; source: Eurostat, own calculations

market with the result of a higher import quota for these goods. Construction multipliers are the highest in most cases (except Greece, Ireland and Portugal). Welfare multipliers are below government consumption multipliers, but in most cases well above one (except Czech republic, Estonia and Ireland).

Some empirical conclusions can be drawn for the prospect of budget consolidation in the EU. First, the spending component with the highest multiplier in most countries is construction. Thus, if fiscal stimulus is withdrawn in the construction sector, there might be substantial negative impulses to GDP. Effects are probably especially high for less developed EU members due to lower involvement of construction companies from abroad.

Cutbacks in government investment are probably only the smaller part in countries with high budget consolidation needs. In these cases a look on the other fiscal spending multipliers is interesting. In most countries the multiplier of public consumption is almost as high as the construction multiplier. Thus, there is a risk of a considerable effect of budget consolidation on GDP even if it is not driven by reductions in public investment. For example, this

is the case for France and Germany with public consumption multipliers in the magnitude of approximately 1.7. Greece, Spain and Portugal as countries under pressure of financial markets also reveal relatively high multipliers of approximately 2.3, 1,7 and 1.9, respectively (less so Hungary with a public consumption multiplier of 1.4). By contrast, the multpliers of welfare spending are generally lower due to higher leakage effects in the first spending round implied by the import propensity of private consumption.

Finally, our calculations suggest that fiscal consolidation might involve substantial output losses even in small and very open economies. As can be seen from Table 2, the case is slightly different for countries like the Czech Republic and Ireland with rather low fiscal spending multipliers.

5   Conclusion

The aim of this contribution is a calculation of fiscal spending multipliers for open economies when monetary policy is accomodative. The model-based and empirical literature on this issue is not vast and more specifically does not cover single EU members. However, some of the studies estimate rather high values for fiscal multipliers. At this junction, our study yields two advances. Firstly, we reconsider the fiscal multiplier calculation for open economies using input-output calculus which enables us to look at multipliers for different spending categories. Secondly, using this method we can calculate multipliers for 17 EU members. Some interesting results can be drawn from these calculations for the judgement of fiscal stimulus and budget consolidation in the EU. Firstly, the fiscal spending multiplier for construction is the highest for many EU members, ranging between 1.3 and 2.2. Secondly, also for fiscal spending on public consumption we could find rather high multipliers, ranging from 1.2 to 2.3. Thirdly, fiscal spending multipliers for welfare spending are low in comparison with other spending multipliers, ranging from 1.0 to 1.9. Furthermore it is interesting to note that smaller EU members can have high fiscal spending multipliers, especially in the case of construction multipliers and public consumption multipliers. Thus, fiscal consolidation is not going to be an easy walk just because of the smallness of domestic markets.

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