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Editorial

The euro crisis remains at the centre of the economic policy debate. The member states of the European Monetary Union have adopted fiscal austerity programmes which imply a very restrictive overall fiscal stance for the years to come. Stefan Ederer argues in the Forum section of this issue that the current reforms are largely missing the point and neglect the structural causes of the crisis. Ederer pleads for a better coordination of fiscal policies, based on public expenditure paths rather than uniform deficit targets. A more balanced approach for fiscal policies and vigorous stabilisation measures on the financial markets are prerequisites for the return to longer term economic stability and the reduction of unemployment. The Forum section is completed by an interview with Malcolm Sawyer.

The Article section contains a special issue on »Economic policies in times of financial instability and rising public debt« edited by Torsten Niechoj, Özlem Onaran and Sabine Reiner. Sheila C. Dow, Jörg Bibow, Thomas I. Palley, Jesus Ferreiro/Maribel García del Valle/Carmen Gómez and Toralf Pusch have contributed articles to this special issue. Besides, the Article section contains a contribution by Fritz Helmedag on »Principles of capitalist commodity production«.

We would like to thank the guest editors for their effort to put this special issue together, and we would also like to thank Katharina Sass and Rory Tews for their assistance in the editing process.

The managing editors

Editorial

Die Euro-Krise steht weiter im Mittelpunkt der wirtschaftspolitischen Debatte. Die Mitgliedsländer des Euroraums sind für die nächsten Jahre auf einen Konsolidierungskurs in den öffentlichen Haushalten festgelegt. Im Forumsteil der vorliegenden Ausgabe argumentiert Stefan Ederer, dass die derzeitigen Reformmaßnahmen an den tieferen Ursachen der Krise der Währungsunion vorbeigehen. Ederer plädiert für eine koordinierte Fiskalpolitik und öffentliche Ausgabenpfade anstelle von einheitlichen Defizitvorgaben. Eine ausgewogenere fiskalpolitische Strategie wäre neben entschlossenen Maßnahmen zur Stabilisierung der Finanzmärkte Voraussetzung für die Rückkehr von Stabilität und den Rückgang der Arbeitslosigkeit im Euroraum. Komplettiert wird der Forumsteil durch ein Interview mit Malcolm Sawyer.

Der Artikelteil enthält einen von Torsten Niechoj, Özlem Onaran und Sabine Reiner herausgegebenen Schwerpunkt mit dem Titel »Economic policies in times of financial instability and rising public debt«. Er beinhaltet Aufsätze von Sheila C. Dow, Jörg Bibow, Thomas I. Palley, Jesus Ferreiro/Maribel García del Valle/Carmen Gómez und Toralf Pusch. Neben dem Schwerpunkt findet sich im Artikelteil ein Beitrag von Fritz Helmedag über »Principles of capitalist commodity production«.

Wir bedanken uns bei den Gastherausgeber/inn/en für die Zusammenstellung des Artikelschwerpunkts und bei Katharina Sass und Rory Finch für die technische Aufbereitung des Hefts.

Die Redaktion

Fiscal spending multiplier calculations based on input-output tables – an application to EU member states

*Toralf Pusch**

Fiscal spending multiplier calculations have attracted considerable attention in the aftermath of the global financial crisis. Much of the current literature is based on VAR estimation methods and DSGE models. In line with the Keynesian literature we argue that many of these models probably underestimate the fiscal spending multiplier in recessions. The income-expenditure model of the fiscal spending multiplier can be seen as a good approximation under these circumstances. In its conventional form this model suffers from an underestimation of the multiplier due to an overestimation of the import intake of domestic absorption. In this article we apply input-output calculus to solve this problem. Multipliers thus derived are comparably high, ranging between 1.4 and 1.8 for many member states of the European Union. GDP drops due to budget consolidation might therefore be substantial in times of crisis.

JEL classifications: fiscal spending multiplier, input-output calculus, income-expenditure model, European Union, EU
Keywords: B22, C67, E12, E62

1. Introduction

The purpose of this paper is a reconsideration of fiscal spending multiplier calculation in the income-expenditure model. Our starting point is the observation that many of the current empirical multiplier estimations are based on the assumption that the effects of

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fiscal stimulus can be judged symmetrically under circumstances of economic slumps or booms. We argue that this assumption is not realistic if a Keynesian model background is considered. Alternatively, fiscal spending multipliers can be calculated using the income-expenditure model of macroeconomic textbooks. However, as Laski, Osiatynski and Zieba (2010) and Palley (2009) have shown recently, these multipliers are usually underestimated when the import quota of export goods production is not properly accounted for. Laski, Osiatynski and Zieba (2010) and Palley (2009) based their calculation of modified import quotas on rough estimates. In this contribution we propose a better solution for that problem: input-output calculus can be used to disentangle the fractions of imports used for different demand categories.

Next to the issue of a modified fiscal spending multiplier calculation technique there are two novel aspects of this study. First, we give a comprehensive overview of fiscal multipliers in a number of EU member states which is based on a uniform calculation method. These results can be especially useful for judging possible recessionary threats of austerity policy as it is advocated by many European officials even in the course of prolonged economic crisis. Second, our method enables us to calculate 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. In the following section 3 we introduce our model of 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). The results thus derived are compared with values for the textbook fiscal spending multiplier. Finally, section 5 summarizes the results and concludes.

2. Literature background

The empirical fiscal spending multiplier literature is vast and an extensive overview is beyond the scope of this contribution. Instead of this, we can refer to the results of some recent contributions which are fruitful for the judgment of our own way of multiplier calculation. To this end, we give an overview of the literature field and some of its open questions by making reference to a recent Journal of Economic Literature (JEL) issue on this topic. Moreover, results of some contributions which are of special interest in the light of our research question are described.

A good overview of the recent strands of the empirical fiscal spending multiplier literature is given in a recent JEL contribution of Ramey (2011). This comprises the major lines of development in the last two decades. It is interesting to note that even in a neoclassical model context fiscal spending multipliers can arise as a result of wealth effects, intertemporal substitution and distortions to first order conditions. While fiscal multipliers in the older Keynesian tradition were connected to the reasoning of the Keynesian cross diagram where the marginal propensity to consume plays a crucial role for the determination of the size of

the multiplier, New Keynesian models can be seen as a »sticky price edifice on a neoclassical foundation« (also in their recent form called DSGE models). It is therefore not surprising that »neoclassical effects tend to mute the Keynesian multiplier« in this theoretical strand (see Ramey 2011: 675; estimates can be well below unity). In the latter model class a number of modifications have been developed recently, some of them reintroducing elements of the older Keynesian models such as rule-of-thumb-consumption (having a similar effect as the use of consumption quotas in the income-expenditure model) and demand-determined employment. Fiscal spending multipliers tend to be higher in those models.

After the financial crisis there has been a general upswing in the analysis of fiscal spending multipliers. While the discussion about fiscal stimulus was clearly a backwater theme before that time and monetary policy dominated the macroeconomic policy debate, since then things have changed a bit (Ramey 2011). From a practical perspective it became clear that monetary policy soon reached the limits of its action space in the big slump following the Lehman collapse. Interest rates could not be lowered beyond the zero line. This point was reached fast in the USA, UK and Japan (while the ECB refrained from lowering interest rates that far) and it was the time for fiscal stimulus programs around the world. In the scientific sphere the topic highlighted as fiscal policy at the »zero lower bound« constraint. A number of contributions have found higher multipliers (2 or even larger) in such a scenario, many of them formulated in a New Keynesian framework (see references in Ramey 2011: 676, Parker 2011: 708).

The argument of the New Keynesian zero lower bound literature can however be made much more general. We argue that if there is slack in the economy – and not only when the zero lower bound is effective – it is reasonable to expect a considerable fiscal spending multiplier. This line of argument can be linked to older Keynesian thoughts (tracing back to the General Theory of Keynes). In dynamic Post Keynesian models (see Setterfield 2006 as an example) prices and/or inventories of firms are reacting when planned production and actual effective demand do not match in any considered period. It can be argued that this is normally the case. Even without considering the ensuing adaptations of short run and/or long run expectations in the business sector and their effects on output, larger fiscal spending multipliers can be expected in a slack scenario as additional government demand can be met by firms easily without raising prices (otherwise more inventories and/or price reductions would occur). As opposed to this, higher fiscal spending in the situation of a boom is accompanied by larger price increases and – by this – possibly higher imports due to price competition. Both effects tend to mute the multiplier.

Large parts of the literature, however, assume a symmetric working of fiscal spending multipliers in business cycle upturns and downturns. This phenomenon has been discussed at length in a recent JEL contribution by Parker (2011) under the heading of linear estimates of fiscal multipliers. The problem that multipliers are estimated as a linear approximation of effects over the entire business cycle is present in the majority of empirical studies. Parker mentions DSGE studies and VAR studies (the latter having no firm theoretical

anchor).[1] Our own method of multiplier calculation, which is introduced next, is robust to this critique as it does not force the data into a symmetric framework of multiplier estimation.

3. Our model of fiscal spending multiplier calculation

Our approach of fiscal spending multiplier calculation is related to the Keynesian strand of the multiplier literature. Similar to the models of Laski, Osiatynski and Zieba (2010) and Palley (2009) we assume that underutilized production capacity and ample labour supply are normal features of capitalist economies – even more so in business downswings and times of crisis. In our point of view this makes the income-expenditure model of the fiscal spending multiplier a good approximation of the effects of fiscal stimulus especially during downturns.

Laski, Osiatynski and Zieba (2010) and Palley (2009) have shown that fiscal spending multipliers based on the standard (textbook) income-expenditure model are too low, especially under circumstances where the import intake of exported goods is higher than that of goods which are produced and used domestically (that is: domestic absorption). To demonstrate this we begin our consideration of the fiscal spending multiplier (Δ) with the familiar textbook[2] concept:

$$\Delta = \frac{dY}{dG} = \frac{1}{1 - c + m} \quad , \tag{1}$$

where Y is output (GDP), G government spending, c the marginal propensity to consume and m the marginal propensity to import. In the following we will use average values for c and m which are easier to calculate.

The derivation of the fiscal spending multiplier is based on accounting identities and simple algebra. Specifically, a relation for the import quota

$$m = \frac{M}{Y} \tag{2}$$

is assumed with M for total imports. For the purpose of fiscal spending multiplier calculation the recent contributions of Palley (2009) and Laski, Osiatynski and Zieba (2010) modify this relation and assume a proportional relation between imports that serve domestic absorption $DA = C + I + G$ and changes of their size. Thus, imports are not entirely used for the purpose of aggregate demand from the inland. Imports which serve the production of export goods or (direct) reexport can be regarded as exogenous factors because those depend largely on world demand.[3]

1 There are, however, exceptions as the above-mentioned zero lower bound DSGE literature and some VAR studies using an extended modelling strategy which allows for regime shifts of the multiplier over the business cycle (see Baum/Koester 2011, Auerbach/Gorodnichenko (forthcoming)).

2 The fiscal spending multiplier of equation (1) goes back to Samuelson 1948.

3 This relation might be complicated by reactions of the exchange rate to fiscal expansions or contractions. This is however not relevant for the purpose of comparison of the textbook fiscal spending multiplier and the domestic absorption concept.

List of symbols	
A	Autonomous spending
A	Input-output matrix of domestic production
A_M	Input-output matrix of imported inputs
B	Public construction works
C	Private consumption
c	Consumption quota
c^*	Consumption quota (income net of means-tested benefits)
DA	Domestic absorption
Δ	Multiplier (various concepts, see subscripts of m in this table)
G	Government spending
GC	Public consumption
I	Private investment
Id	Identity matrix
M	Imports
M_{DA}	Imports induced by DA
M_X	Imports induced by $X - RX$
M_{RX}	Imports used for reexport
m	Import quota of Y (textbook concept)
m_A	Import quota of A (input-output concept)
m_B	Import quota of B (input-output concept)
m_C	Import quota of C (input-output concept)
m_{DA}	Import quota of DA (input-output concept)
m_G	Import quota of G (input-output concept)
m_{G*}	Import quota of G^* (input-output concept)
m_I	Import quota of I (input-output concept)
m_X	Import quota of X (input-output concept)
RX	Reexports (not produced domestically)
rx	Vector of reexported goods (not produced domestically)
W	Welfare income
X	Exports
x	Vector of export goods (domestic production)
y	Vector of (domestic) production induced by exports
Y	GDP
z	Vector of imports used for the production of x

This partial independence of import demand components is retained in the following equation:

$$M = m_C C + m_I I + m_G G + m_X (X - RX) + RX \quad , \tag{3}$$

where m_C, m_I, m_G and m_X are import quotas of private consumption C, private investment I, government spending G and exports X (net of reexports RX).[4] These import quotas are not equal in general. However, for the purpose of our paper we just make one differentiation in the first step and assume that:

$$m_{DA} = m_C = m_I = m_G \neq m_X \quad , \tag{4}$$

which means that the import quota of fiscal spending has the same size as the import quota of domestic absorption which however differs from the import quota of exports. This inequality is related to a finding of the international trade literature which points to an increasing fragmentation of trade in the recent years.[5] Under these circumstances a naive calculation of import quotas as in equation (2) might lead to an over- or underestimation of the relevant import quota for the fiscal spending multiplier. One of the novel aspects of this paper is that we use input-output analysis as a tool to disentangle the fractions of imports of equation (3).

Input-output calculus was first developed by Wassily Leontief as part of economic planning efforts in the USA during World War II (Miller/Blair 2009: 731). Today it is applied in many fields of economics even though it is not a mainstream method. For example, there are a number of studies using input-output calculus for a wide range of issues like the effects of taxation on the regional level, employment multipliers, labour-force qualification contents of manufactured goods, environmental topics etc.

The method applied here is close to the Type I and Type II income multiplier of input-output textbooks (see Miller/Blair 2009: chapter 6). It involves several stages. The first step is to calculate the vector of domestically produced inputs y necessary for the production of the vector of exported goods x (net of reexports; see Ludwig/Brautzsch 2008). The vector of export goods produced domestically in the various industries of the economy (gross nominal value) can be written as:

$$x = y - A \cdot y \quad , \tag{5}$$

where A is the input-output matrix of domestic production and the negative term $-A \cdot y$ secures that inputs are not double counted. Both A and x can be obtained from the input-output tables. Next we solve for y by applying matrix algebra:

$$y = (Id - A)^{-1} \cdot x \quad , \tag{6}$$

4 The import quota of RX is 1 by definition because those are not subject to the domestic production process.

5 See Zeddies 2012 and Ludwig/Brautzsch 2008.

where *Id* is the identity matrix. The vector *y* thus contains the value of domestic input goods used for production of exports, sorted by branches of economic activity (e.g. farming or production of motor vehicles). These inputs are then multiplied with the input matrix for imported inputs A_M to obtain the vector of import intake *z* of domestically produced exported goods:

$$z = A_M \cdot y \ . \tag{7}$$

The last step in the calculation of the imports induced by domestic absorption M_{DA} is to aggregate the value of these export-induced imports and the value of imports used for reexports (sum of the entries of the vector of reexported goods *rx*) of all branches 1...*n* and subtract them from the gross import value *M*:

$$M_{DA} = M - \sum_{i=1}^{N} z_i - \sum_{i=1}^{N} rx_i \ , \tag{8}$$

where the vector of reexports can be extracted from the input-output table. Based on the value of M_{DA} the import quota of domestic absorption can be obtained:

$$m_{DA} = \frac{M_{DA}}{(C + I + G)} \ . \tag{9}$$

As Laski et al. (2010) we make the assumption that domestic absorption can be scaled up by the government in its given composition (this will be relaxed, subsequently). We assume that imports which are induced by domestic absorption develop proportionately to the evolution of domestic absorption:

$$M_{DA} = m_{DA} \cdot (C + I + G) \ . \tag{10}$$

If we account for the different purposes of imports which serve domestic absorption (M_{DA}), exports (M_X) as well as reexports (M_{RX}) and insert equation (10) into the equation for the components of GDP, we arrive at the following relation:

$$Y = cY + I + G + X - m_{DA}(cY + I + G) - M_X - M_{RX} \ , \tag{11}$$

where *C* has been substituted by *cY*. This equation can be differentiated with respect to *G* (assuming *I* and *X* as given or autonomous expenditure) and thus finally we get the fiscal spending multiplier of domestic absorption (Δ_{DA}):

$$\Delta_{DA} = \frac{dY}{dG} = \frac{1 - m_{DA}}{1 - c(1 - m_{DA})} \ . \tag{12}$$

This formula is similar to the conventional open economy multiplier of equation (1), where the differences are due to the two distinct concepts of the import quota (eq. 2 and 9).

It is interesting to note that equation (12) can be modified in order to calculate more specific fiscal spending multipliers which will be done subsequently. To this end, we have

to drop the assumption $m_{DA} = m_C = m_I = m_G$ and use specific (generally unequal) import quotas of the different spending categories, e.g. the import quota m_B of public construction works B. If this is inserted into the equation determining equilibrium GDP (resulting from the multiplier process), it yields the following equation:

$$Y = cY + A + B - c \cdot m_C Y - m_B B - m_A A \ , \tag{13}$$

where A denotes autonomous (or exogenous) spending components and m_A their import quota. Partial derivation by B then yields the specific multiplier of public construction works (Δ_B):

$$\Delta_B = \frac{dY}{dB} = \frac{1 - m_B}{1 - c\left(1 - m_C\right)} \ . \tag{14}$$

Spending multipliers for other components of public spending can be derived similarly. In the next section we calculate different versions of the fiscal spending multiplier in this vein and compare them with the textbook multiplier.

4. Calculation of fiscal spending multipliers

This section is an application of the fiscal spending multiplier calculation method which we have introduced above. For reasons of clarity and also to check the stability of results we first perform calculations just for Germany and France (2 large economies which are comparable in size). The section concludes with a discussion of fiscal spending multiplier results for the EU member states which supply input-output table data.

4.1 A comparison of the textbook fiscal spending multiplier with the multiplier of domestic absorption

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. As a first step we compare the values of the textbook multipliers with the *DA* multipliers as introduced in section 3 for the two largest economies in the Eurozone, i.e. Germany and France (empirical results for other EU member states are listed at the end of this section). This also includes a calculation of spending multipliers for consecutive years to judge the cyclical movements of multipliers.

Table 1 shows a certain degree of volatility of multipliers thus derived. From their peak values in 2002 and 2003, respectively, the conventional multiplier and the multiplier of domestic absorption for Germany have decreased by 13 per cent and 9 per cent in 2007. For France, these decreases are somewhat lower – 5 per cent and 4 per cent. 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,

Table 1: Import quotas (m: textbook concept, m_{DA}: DA concept) and multipliers (Δ: textbook concept, Δ_{DA}: DA concept) for Germany and France

	Germany				France			
	Textbook		*DA* concept		Textbook		*DA* concept	
	m	Δ	m_{DA}	Δ_{DA}	m	Δ	m_{DA}	Δ_{DA}
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
2007	0.37	1.22	0.20	1.44	0.27	1.43	0.19	1.52
Decrease from peak		13%		9%		5%		4%

Source: Eurostat, own calculations

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 expenditure – highly volatile in the business cycle – might play a role in explaining volatility (insofar, as the common import quota m_{DA} is just an approximation). Nevertheless, volatility of multipliers is not surprising. As we have mentioned in the literature section, it can be expected in Keynesian models. In line with this, peak values of textbook and *DA* multipliers for Germany and France can be found in 2003 – which is close to a business cycle trough.

There are pros and cons of considering the *DA* multiplier as a relevant concept for economic policy. To demonstrate this, we can make reference to the German example – an economy which shows a high degree of specialization in manufacturing of motor vehicles 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.

Thus, a focus on broad categories of government spending is one side of the picture but it can be made more specific. The input-output method of multiplier calculation introduced in the preceding section is flexible enough to go into detail of spending categories. In this contribution we want to focus on some components of government spending. Government consumption (value of goods produced by the state except investment; mainly education

and social services) is by far the largest fraction of government spending – its share of GDP in the time span of Table 1 was 21 per cent in Germany and 26 per cent in France (based on input-output data supplied by Eurostat). The size of government investment is lower – its mean value from 2000 till 2009 was 1.6 per cent of GDP in Germany whereas it was 3.2 per cent of GDP in France (based on aggregate Eurostat data). However, public investment is highly relevant as a means of fiscal stimulus because it can be reverted more easily (which is probably complicated for reasons of politics in the case of public consumption). Figures for this spending category are not available in input-output tables where both public and private investment are conflated. We do not calculate a fiscal spending multiplier for overall investment because we deem (mostly) private investment in machinery to rely on highly internationalized markets with large import shares. In our point of view a consideration of investment in construction allows to calculate a government investment multiplier which is closer to the reality of public investment (even though only conflated private and public construction investment data are available in the input-output tables).

4.2 The spending multiplier of government consumption

As the first more specific fiscal spending multiplier we calculate a government consumption multiplier. To this end, we relax the assumption of equation (4) and calculate the import intensities as they were used in equation (3). For the calculation of public consumption multipliers only the values of m_C and m_{GC} are necessary where GC denotes public consumption.[6] These values can be obtained with the method used earlier in section 3 for the calculation of the import quota of exports.

If we split up imports following equation (3) and modify equation (11) accordingly, we can derive the multiplier of public consumption:

$$\Delta_{G^*} = \frac{dY}{dG^*} = \frac{1 - m_{G^*}}{1 - c\left(1 - m_C\right)} , \tag{15}$$

where m_{GC} and m_C are calculated using the vectors of public consumption and private consumption from the input-output tables of Eurostat. In Table 2 we have listed 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 somewhat lower degree of volatility especially for Germany; during the last business cycle they have decreased by 7 per cent in Germany and 3 per cent in France. This development might reflect changes of consumption spending patterns in the business cycle (the German consumption quota c decreased markedly from 57.8 per cent in 2003 to 55.3 per cent in 2007) or other sources like a higher value of the multiplier during times of economic downturn. Generally, the values of public consumption multipliers seem to be higher than the multipliers of domestic absorption and the textbook fiscal spending multipliers introduced earlier.

6 In equation (3) G was considered which is split up for the purpose at hand.

Table 2: Import quotas (m_{GC}) and multipliers (Δ_{GC}) of public consumption for Germany and France

	Germany		France	
	m_{GC}	Δ_{GC}	m_{GC}	Δ_{GC}
2000	0.08	1.73	0.08	1.70
2001	0.08	1.74	0.08	1.70
2002	0.08	1.75	0.08	1.71
2003	0.08	1.76	0.08	1.72
2004	0.08	1.74	0.08	1.71
2005	0.08	1.72	0.09	1.69
2006	0.09	1.67	0.09	1.68
2007	0.09	1.64	0.09	1.67
Decrease from peak		7%		3%

Source: Eurostat, own calculations

4.3 The multiplier of government spending on construction

The next example of a specific fiscal spending multiplier is the construction multiplier. For this demand category we can only use conflated values of public and private investment in construction in the input-output tables. On this base an import quota of construction m_B and the multiplier can be calculated as introduced above. Values for Germany and France are shown in Table 3.

Table 3: Import quotas (m_B) and multipliers (Δ_B) of construction for Germany and France

	Germany		France	
	m_B	Δ_B	m_B	Δ_B
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	1.76	0.07	1.73
2006	0.06	1.72	0.07	1.72
2007	0.06	1.69	0.07	1.71
Decrease from peak		6%		3%

Source: Eurostat, own calculations

What can be seen from Table 3 is that construction multipliers are slightly higher than multipliers of public consumption (see Table 2). However, usually much of construction work in European high income countries is done by companies, subcontractors and workers from abroad. Thus, the consumption quota which we used for the calculation of the multiplier might be far too high in this case due to remittances of foreign workers to their home countries. In our point of view the calculated multipliers indicate the upper margin in this case.

4.4 The multiplier of government spending on welfare

We end our overview of specific fiscal spending multipliers by calculating a fiscal multiplier for welfare spending. In order to do this, we used means-tested benefits data supplied by Eurostat which are denoted as welfare income W in the following. For this income category we can reasonably assume a consumption quota of 100 per cent. Thus, in the first spending round there are only leakages to imports which can be measured by the import quota of private consumption m_C (this has already been used in the earlier calculations). While in the first spending round all income is consumed, spending in the subsequent rounds is treated as in the income-expenditure model. The only difference is that we slightly modify the mean consumption quota to capture the general case of differing consumption quotas of this multiplier case. The mean consumption quota c^* of income, which is not means-tested, is calculated as a share of consumption net of consumption out of means-tested benefits ($C - W$) and income net of means-tested benefits ($Y - W$):

$$c^* = \frac{C - W}{Y - W} \ . \tag{16}$$

The combined effect of consumption spending out of means-tested benefits and subsequent spending rounds yields the following multiplier of welfare spending:

$$\Delta_W = \frac{dY}{dW} = \frac{1 - m_C}{1 - c^* \left(1 - m_C\right)} \ . \tag{17}$$

Results for Germany and France are shown in Table 4. Multipliers of welfare spending are lower as compared to the multipliers introduced earlier. A factor contributing to this effect is a higher leakage due to imports in the first spending round because the import quota of private consumption is generally higher than the import quotas of public consumption or construction. Moreover, the modified consumption quota of later spending rounds is lower than the average consumption quota c which was used in earlier calculations.

Cyclicality of welfare spending multipliers is somewhat higher than the figures for the fiscal spending multiplier of public consumption (Table 2) and construction (Table 3). Welfare spending multipliers were highest in the business cycle trough 2003 (as with the other multipliers introduced earlier) and decreased thereafter – which is in line with the hypothesis that multipliers are higher in times of economic downturns. In the next subsection we discuss the results of multiplier calculations for EU member states.

Table 4: Import quotas of private consumption (m_C) and multipliers of welfare spending (Δ_W) for Germany and France

	Germany		France	
	m_C	Δ_W	m_C	Δ_W
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	1.43	0.20	1.43
2007	0.20	1.41	0.20	1.42
Decrease from peak		8%		5%

Source: Eurostat, own calculations

4.5 Fiscal spending multipliers of EU member states

Calculations of fiscal spending multipliers for EU member states in 2005 are shown in Table 5 (most EU member states supply input-output tables at least every five years). These include the textbook multiplier, the *DA* multiplier and the specific spending multipliers which we have introduced in the preceding subsections. 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 are in a different situation as compared to Germany or France.

The effects of our refinement 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 those of *DA* multipliers. The reason might be that especially investment goods, which are part of domestic absorption and GDP in any case, have a global market with the result of a higher import quota for these goods. Construction multipliers are the highest in most countries (except Greece, Ireland and Portugal). Finally, 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 government spending is withdrawn in the construction sector, there might be substantial negative impulses to GDP. Effects are probably especially high

for less developed EU member states due to supposable lower involvement of construction companies from abroad.

Table 5: Average rates of private consumption (c), import quotas (m, m_{DA}, m_{GC}, m_B, m_C) and multipliers (Δ, Δ_{DA}, Δ_{GC}, Δ_B, Δ_W) for EU member states in 2005

		Textbook		*DA* concept		*GC* concept		Construction		Welfare	
	c	m	Δ	m_{DA}	Δ_{DA}	m_{GC}	Δ_{GC}	m_B	Δ_B	m_C	Δ_W
Austria	0.57	0.48	1.10	0.25	1.30	0.12	1.57	0.09	1.61	0.24	1.33
Belgium	0.51	0.74	0.81	0.28	1.13	0.12	1.39	0.10	1.41	0.29	1.12
Czech Rep.	0.49	0.69	0.83	0.34	0.97	0.19	1.21	0.14	1.29	0.33	1.00
Estonia	0.60	0.81	0.82	0.39	0.97	0.18	1.34	0.15	1.39	0.35	1.07
France	0.57	0.26	1.46	0.18	1.55	0.09	1.69	0.07	1.73	0.20	1.45
Germany	0.58	0.33	1.32	0.19	1.53	0.08	1.71	0.06	1.75	0.19	1.47
Greece	0.76	0.30	1.85	0.22	1.90	0.09	2.26	0.11	2.21	0.22	1.92
Hungary	0.57	0.67	0.91	0.29	1.18	0.15	1.44	0.12	1.48	0.28	1.21
Ireland	0.45	0.70	0.81	0.30	1.03	0.14	1.27	0.16	1.23	0.30	1.00
Italy	0.60	0.25	1.54	0.18	1.62	0.07	1.81	0.06	1.84	0.19	1.57
Lithuania	0.65	0.65	1.00	0.32	1.24	0.13	1.54	0.08	1.63	0.33	1.19
Poland	0.64	0.36	1.37	0.24	1.49	0.09	1.82	0.07	1.86	0.21	1.57
Portugal	0.67	0.36	1.45	0.24	1.58	0.09	1.85	0.11	1.81	0.25	1.51
Romania	0.70	0.44	1.34	0.29	1.42	0.18	1.74	0.10	1.91	0.24	1.59
Slovenia	0.58	0.63	0.95	0.33	1.11	0.15	1.43	0.14	1.44	0.30	1.16
Spain	0.61	0.30	1.44	0.21	1.54	0.11	1.72	0.08	1.77	0.21	1.50
Sweden	0.47	0.37	1.12	0.22	1.22	0.11	1.40	0.06	1.47	0.23	1.21

Import quotas – m: textbook concept, m_{DA}: *DA* concept, m_{GC}: import quota of public consumption, m_B: import quota of construction, m_C: import quota of private consumption.
Multipliers – Δ: textbook concept, Δ_{DA}: *DA* concept, Δ_{GC}: multiplier of public consumption, Δ_B: multiplier of construction, Δ_W: multiplier of welfare spending.

Source: Eurostat, own calculations

Cutbacks in government investment are probably only the smaller part in countries undergoing budget consolidation. In these cases a look on the other fiscal spending multipliers is interesting. For most countries the multiplier of public consumption is almost as high as the construction multiplier. Thus, there is a risk of considerable effects of budget consolidation on GDP even if it is not driven by reductions in public investment. For example, this can be the case for France and Germany with public consumption multipliers in the magnitude of approximately 1.7. Greece, Spain, Portugal and Italy as countries under pressure of financial markets also reveal relatively high public consumption multipliers of approximately 2.3,

1.7, 1.9 and 1.8, respectively (less so Hungary with a public consumption multiplier of 1.4). Multipliers of welfare spending are a bit lower, mainly due to a higher leakage into imports in the first spending round.

The last result which we can infer is that budget consolidation is not going to be an easy walk even in small countries. A smaller domestic market does not necessarily mean low fiscal spending multipliers and budget consolidation risks (for example, see the high multipliers of Austria, Greece, Portugal and Romania). As can be seen from Table 5, 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 was a reconsideration of fiscal spending multipliers calculation in the income-expenditure model. The model-based and empirical literature for EU member states is not vast and does not give a comprehensive overview of fiscal spending multipliers in the EU member states. Moreover, many of the empirical studies have drawbacks in that they probably underestimate fiscal spending multipliers by employing linear estimation techniques for time series data. As opposed to this specification strategy, in a Keynesian model context higher fiscal spending multipliers can be expected in a business cycle slump as compared to the situation of a boom.

In order to address this problem, we made use of data which reflect the production structure in each year. Input-output calculus was applied to calculate the import intake of different categories of domestic absorption and use these data in a modified income-expenditure model of the fiscal spending multiplier. We could show that fiscal spending multipliers calculated on this base are generally higher for EU member states if they are compared to the standard textbook version of the income-expenditure model. Thus, the standard textbook approach leads to downward-biased results of the fiscal multiplier.

Our empirical results for EU member states can be summarized as follows. First, the fiscal spending multiplier for construction is the highest multiplier in many EU member states (ranging between 1.3 and 2.2). Second, also for fiscal spending on public consumption we could find rather high multipliers (ranging from 1.2 to 2.3). Third, fiscal spending multipliers of welfare spending are lower in comparison with other spending multipliers (ranging from 1.0 to 1.9). Nevertheless, these values can still be regarded as rather high.

The threat of recessionary effects of fiscal austerity is therefore substantial in the European Union. This is even more so, as we did not consider any cross-border spillover effects or possible feedback-loops on the state of expectations of private businesses. Under these circumstances our calculations may represent rather conservative estimates of actual multipliers.

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