Fiscal austerity and the multiplier in times of crisis[1]

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Abstract

In order to address concerns about the sustainability of public debt, most industrialized countries shifted towards fiscal austerity after 2010. A popular concern is that austerity is self-defeating, because fiscal multipliers can be large. Specifically, a number of recent studies find that multipliers tend to be large during financial crises and/or if monetary policy is constrained by the zero lower bound. However, public debt crises tend to have an offsetting effect by making multipliers smaller than during normal times. Consequently, while austerity is no cure for all, it is unlikely to be literally self-defeating when sovereign risk is high.

Keywords: fiscal multiplier, self-defeating austerity, sovereign risk, crisis
JEL codes: E62, E32

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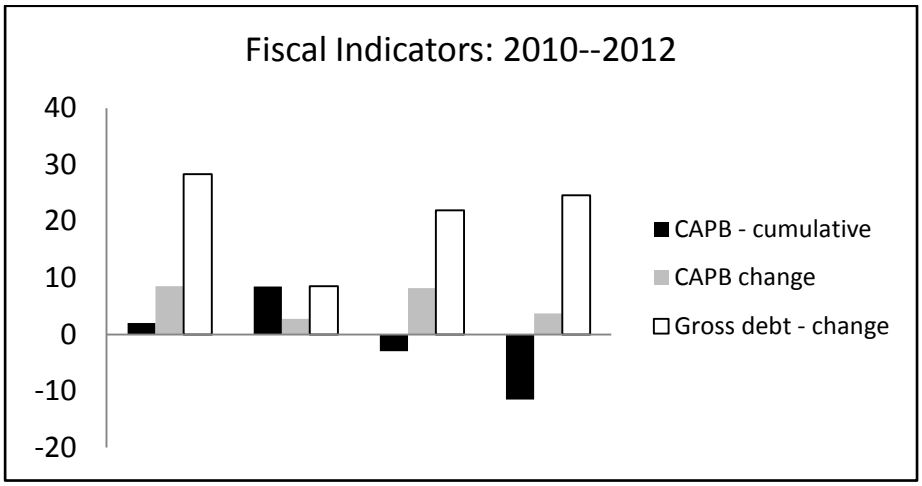
1. Introduction

In the years following the global financial crisis, most advanced countries have been implementing sizeable austerity measures in order to address mounting concerns about the sustainability of public debt or outright solvency issues. These measures are expected to exert a significant recessionary impulse in an environment of low output growth. Moreover, worries abound that fiscal austerity might turn out to be self-defeating: it may cause such a strong decline of economic activity that fiscal indicators actually deteriorate (e.g., Krugman 2011, Gros 2011, Holland and Portes 2012). In this paper, I ask whether fiscal austerity is indeed likely to be self-defeating and, if so, under which circumstances.

Some of the most widely discussed austerity measures are implemented in Europe where they are accompanied by dismal growth performance and spiraling debt-to-GDP levels. Figure 1 displays data for Greece, Italy, Portugal, and Spain. For each country the left bar represents the cumulative cyclically adjusted primary budget balance over the period 2010–2012, measured in percent of potential output. According to this measure, Greece and Italy implemented saving measures, while Portugal and Spain continued to borrow over the period 2010–2012. Yet, given high deficits to begin with, the direction of change is perhaps more adequate to convey a sense of austerity. In this regard, the second bar represents the change of the cyclically adjusted primary balance. It is positive in all four countries, reflecting the shift towards austerity. Despite this shift, a fiscal indicator of particular interest deteriorated sharply in all four countries under consideration: debt levels expressed in percent of actual GDP rose sharply over the period 2010–2012. The change is displayed by the third bar in figure 1. Given these observations, one may be tempted to infer that austerity contributed to the build-up of debt levels (at least relative to GDP) – despite aims to the contrary end– and, hence, that austerity has indeed been self-defeating.

Yet, notwithstanding the co-movement between austerity measures and the growth of public debt, it remains a poor substitute for a systematic analysis of whether austerity measures actually cause the relevant fiscal indicator to deteriorate. Two aspects of such an analysis are particularly controversial. First, it is contentious which fiscal indicator to use to assess whether fiscal austerity is successful. While government deficits and debt levels are natural candidates, it is less clear whether they should be related to current or potential output. I return to this issue in section 2.



Notes: left, middle, and right bar measure a) cumulative cyclically adjusted primary government balance, expressed in percent of potential GDP (CAPB) 2010—2012, b) the change of CAPB over the same period, and c) the change in gross public debt in percent of actual output, respectively; source: OECD.

Second, irrespective of the specific fiscal indicator in question, the success of austerity will depend on the fiscal multiplier because it determines how strongly discretionary fiscal policy impacts economic activity. Formally, the multiplier measures the percentage change of output caused by an expansionary fiscal measure equal to one percent of GDP. Other things being equal, fiscal austerity is more likely to be self-defeating if the multiplier is large. Strictly speaking, however, there is no such thing as "the" multiplier. Instead, it varies across economic environments. The discussion of the likely effects of the expansionary fiscal measures implemented in the early stage of the crisis has made this clear. Initially, interest centered on the question of whether the multiplier exceeds unity because this may help to discriminate between different views of the business cycle (e.g., Barro and Redlick 2011).

In due course, various contributions highlighted the state-dependence of fiscal multipliers, that is, the fact that the multiplier changes with the economic environment. From a theoretical point of view, a number of recent studies based on modern business cycle models have made clear that the multiplier is likely to be large if monetary policy is constrained by the zero lower bound (e.g. Eggertsson 2011 and Woodford 2011). Similarly, the exchange rate regime has a first order effect on the multiplier. While this is a prediction of the traditional Mundell-Fleming model, it has only recently been confirmed by time-series studies (Ilzetzki et al 2012, Corsetti et al 2012a, Born et al 2013). Auerbach and

Gorodnichenko (2012), in turn, have documented that multipliers tend to be considerably larger during recessions than in booms.

In the second part of the paper (sections 3 and 4), I therefore focus on the fiscal multiplier, and how it changes with the economic environment. For analytical convenience, I limit my analysis to government spending cuts rather than considering tax increases.[2] Specifically, my analysis draws on two earlier studies. First, I review the study of Corsetti et al (2012a). It conducts a time-series analysis for a panel of 17 OECD countries and provides evidence of the different effects of government spending in different economic environments. Specifically, multipliers tend to be quite small if an economy operates a flexible exchange rate regime and is characterized by a benign financial and fiscal environment. In contrast, the multiplier is larger if countries fix their exchange rate and in the context of a financial crisis. However, if public debt or the public deficit is high, multipliers tend to be smaller and may even turn negative. Second, I adopt a somewhat more theoretical perspective and briefly summarize the analysis of Corsetti et al (2013). This analysis is conducted within a standard (New Keynesian) business cycle model featuring a "sovereign risk channel". Through this channel, changes in the fiscal outlook impact borrowing conditions in the private sector. This, in turn, alters borrowing and lending decisions and hence aggregate demand, to the extent that it cannot be offset by central bank policies. A key result of the analysis helps to rationalize the earlier finding of Corsetti et al (2012a) that multipliers are smaller if fiscal strain is pervasive.

Taken together, these results suggest a) that multipliers can be quite high, so it may be wise to delay austerity measures under certain circumstances (see also Corsetti et al 2010); b) yet, in times of fiscal stress – that is, when austerity measures are often implemented – multipliers are probably smaller, such that austerity is unlikely to be self-defeating in this case.

[2]Erceg and Lindé (2013a) provide a detailed analysis of the effects of fiscal consolidations based on tax hikes vs. spending cuts.

2. Austerity and fiscal indicators

In this section, I discuss briefly the possibility of an adverse impact of austerity measures on fiscal indicators. Depending on the indicator in question, a specific measure may be judged "self-defeating" or not. "Self-financing fiscal policy" (De Long and Summers 2012) and "fiscal free lunch" (Erceg and Lindé 2013b) are closely related concepts, as they pertain to expansionary fiscal measures which do not bring about a deterioration of fiscal indicators. As stressed above, I focus on cuts of government spending and abstract from tax increases in order to simplify the analysis.[3] In each instance, the government spending multiplier plays a pivotal role in determining the "success" of austerity, irrespective of the specific fiscal indicator under consideration.

First, I consider the primary government budget deficit relative to potential output (see also Denes et al. 2013). In this case, a cut of government spending is a self-defeating austerity measure if it raises the deficit. Formally, letting ΔD and ΔG denote the change of the primary budget deficit and government spending, both measured relative to potential output, we have

$$\Delta D_t = (1 - \tau m) \Delta G_t. \qquad (2.1)$$

Here τ captures the semi-elasticity of tax revenues with respect to economic activity and m measures the government spending multiplier on output; that is, it measures the percentage change of economic activity, given an increase of government spending by one percent of GDP. According to relation (2.1), austerity is self-defeating if the term τm exceeds unity.

Plausible values for the semi-elasticity of tax revenues cluster between one third and one half, given OECD estimates (see Girouard and André 2005). Instead, the range of values for the multiplier which have been put forward is much wider. Therefore, I will provide a more detailed discussion of the size of the multiplier in the following sections. For now, I simply stress that multipliers need to be very large for austerity to be self-defeating in the (narrow)

[3]Regarding the consequences of tax measures, it may be particularly important to account a) for incentive effects giving rise to a Laffer curve (Uhlig and Trabant 2011) and b) for inflationary consequences which may be particularly damaging at the zero lower bound (Denes et al 2013).

sense specified above: for instance, assuming a relatively high value for τ of 1/2, the multiplier needs to exceed 2.

A second fiscal indicator which is frequently considered in the debate on austerity is the ratio of public debt to current output (see, e.g., Gros 2011, Hollande and Portes 2012, Erceg and Lindé 2013a and 2013b). It is instructive to see how it evolves over time, given the flow budget constraint of the government. Formally, letting B_{t+1} denote the amount of nominal discount bonds issued by the government at the end of period *t*, r_t the nominal interest rate, P_t the price level, and T_t tax revenues, we have

$$(1+ r_t)^{-1}B_{t+1} = B_t + P_t (G_t - T_t). \qquad (2.2)$$

Defining the debt-to-GDP ratio $b_t = B_t/(P_tY_t)$, an approximation of equation (2.2) around a steady-state debt-to-GDP ratio *b* yields

$$b_{t+1} \approx b_t + b(r_t - \pi_t - x_t)+ (G_t - T_t)/Y, \qquad (2.3)$$

where π_t and x_t measure the inflation rate and the growth rate of real GDP, Y denotes steady-state output.[4]

Expression (2.3) illustrates that – provided one examines the debt-to-GDP ratio – an increase of the primary deficit does not necessarily render austerity self-defeating. In addition, if the initial debt ratio *b* is large, the interest rate, inflation, and output growth are also of first order importance for the evolution of the debt-to-GDP ratio. Received wisdom suggests that all three factors tend to decline in response to a government spending cut. A priori, it is thus difficult to assess the overall impact of a spending cut on the debt-to-GDP ratio. It is noteworthy, however, that the government spending multiplier plays again a key role. Not only does it determine how the primary deficit adjusts to the spending cut, it also directly impacts the debt-to-GDP ratio by altering output growth.

[4] To simplify the exposition, I assume that there is no inflation and output growth in steady state. Moreover, for the same reason, I assume that the steady-state interest rate is sufficiently close to zero for (2.3) to capture to dynamics of the debt-GDP ratio adequately.

A third indicator is the government budget in the long run (see, e.g., Krugman 2011 and De Long and Summers 2012). Austerity today may have different long-term consequences for the budget depending on whether cyclical downturns reduce potential output. In case there are such hysteresis effects, it is possible that a spending cut today causes – by reducing output permanently – a reduction of future tax revenues. Hence, even in cases when government spending cuts reduce debt levels permanently, the subsequent shortfall in future tax revenues may offset the reduced debt service costs. In sum, austerity today, even if it reduces the deficit and the debt-to-GDP ratio, can have adverse long-term budgetary consequences. Eventually, these consequences hinge critically on the strength of hysteresis effects and, again, on the size of the government spending multiplier.

Comparing the three indicators, it appears that all of them have some merit. In the absence of a full-fledged model of sovereign default, however, one cannot settle on one specific indicator. In the following, I will therefore focus on the government spending multiplier because it is pivotal for whether austerity is self-defeating irrespective of the specific indicator under consideration.

3. Time-series evidence on the multiplier

The multiplier has been a topic of intensive empirical research over the last decade or so. In the first part of this section, I briefly review the main controversies pertaining to identification. I then turn to the results of studies that estimate linear time-series models to gauge the unconditional effect of government spending shocks. Finally, I discuss more recent results which illustrate that the multiplier is likely to be state-dependent. My discussion draws largely on Corsetti et al (2012a).

3.1. Identification

Most of the existing empirical work on fiscal policy transmission employs structural vector autoregression (VAR) models to gauge the impact of spending shocks on the economy, in particular the size of the government spending multiplier. Following the lead of Blanchard and Perotti (2002), several authors have based identification on the assumption that discretionary government spending is subject to certain decision and/or implementation lags that prevent policymakers from responding to contemporaneous developments. According

to this idea, significant parts of government spending are determined by past information only. Government consumption and investment, in particular, are unlikely to be responsive to current economic conditions because (unlike transfers) they normally do not contain any automatic cyclical component.

An alternative estimation strategy is suggested by Ramey and Shapiro (1998). They consider a small number of events in postwar U.S. fiscal policy, including the military build-up for the Korean and Vietnam wars, that were arguably exogenous (with respect to economic conditions). Thus, they provide natural experiments for the effect of a sudden surge in government spending. Subsequent studies have used this approach within a VAR context, notably Ramey (2011). Her study also considers a richer data set of military events[5] and an alternative identification strategy using forecast errors compiled on the basis of surveys of professional forecasters. Ramey (2011) highlights differences between her results and those obtained under the Blanchard-Perotti identification scheme and argues that they most likely reflect the wrong timing of shocks under the Blanchard-Perotti approach. Specifically, the government spending shock picked up by the econometrician may well have been *anticipated* by economic agents. Thus, the adjustment may already be underway by the time the shock is diagnosed. However, Corsetti et al (2012c) find fairly similar results under Ramey's approach and those obtained under the Blanchard-Perottti approach for a sample of more recent U.S. time-series data.

Finally, Mountford and Uhlig (2009) have put forward an identification scheme based on sign restrictions: they identify government spending shocks within estimated VAR models by imposing the sign of the response of certain variables for which theoretical predictions are fairly uncontroversial. While Mountford and Uhlig (2009) focus on domestic variables, Enders et al (2011) derive sign restrictions on the basis of a richly specified open economy

[5] A related strand of the literature has focused squarely on the multiplier for defense spending, by regressing output growth on the change in government spending and possibly some additional control variables. Identification rests again on the assumption that military spending is largely unresponsive to the state of the economy; see Barro and Redlick (2011) and Hall (2009) for recent contributions along these lines. An important caveat is that military expenditure might rise systematically with command-type interventions in the economy, thus causing a downward bias in the estimated multiplier; see Hall (2009). More generally, it is unclear whether the estimated macroeconomic effects of higher military expenditure can readily be extrapolated to other types of government spending.

business cycle model to analyze the international transmission of government spending shocks.

3.2 Estimates of unconditional multiplier effects

The results of VAR estimates are typically summarized by impulse response functions which characterize the dynamic effects of an exogenous variation in the variable of interest. As such, they provide a fairly rich characterization of the fiscal transmission mechanism. It turns out that results tend to differ substantially across identification schemes. With regard to the response of private consumption, for instance, studies adopting the Blanchard-Perotti identification typically report a positive estimate. Studies drawing on the Ramey-Shapiro approach, in turn, often report a decline in consumption. Yet, in quantitative terms, only a weak effect occurs. Lastly, while using different identification strategies, neither Mountford and Uhlig (2009) nor Barro and Redlick (2011) or Hall (2009) find a significant response of consumption to a deficit-financed government spending shock or to an increase in defense spending, respectively.

Table 1: Selected estimates of spending and tax multipliers on output

	Data	Spending	Taxes
Blanchard/Perotti 2002	U.S.	1.3	0.78
Mountford/Uhlig 2009	U.S.	0.61	3.57
Romer/Romer 2010	U.S.		3.0
Ramey 2011	U.S.	1.1	
Barro/Redlick 2011	U.S.	0.7	1.1
Beetsma/Giuliodori 2011	EU	1.5	

While the differences in the response of consumption have received large attention, notably in order to discriminate between competing views of the business cycle, they do not matter much for the overall response of output to a government spending shock. In fact, estimates for the output multiplier tend to be both fairly similar across identification schemes and

independent of the specific multiplier concept under consideration (impact effect, maximum effect, etc.). Table 1 reports estimates of a number of influential studies, both for multipliers resulting from changes in government spending as well as taxes. While the latter case generates a rather wide range of estimates, estimates for spending multipliers cluster somewhere around unity. Given the discussion in section 2, these multiplier estimates do not suggest that austerity measures are self-defeating, at least as far as government spending is concerned.

3.3. Accounting for the economic environment: the state-dependence of the multiplier

The active use of fiscal policy since the start of the global financial crisis has revived longstanding policy debates and drawn attention to an important insight: "the" fiscal multiplier does not exist. Instead, the multiplier will generally depend on current circumstances as well as underlying economic structures and policy regimes.[6] Accordingly, one cannot assess the impact of fiscal policy without proper consideration of the key factors characterizing the economic environment across countries and over time.

From a practical point of view, the simple linear structure of standard VARs severely constrains any analysis of conditional dynamics in fiscal policy transmission, irrespective of the specific identification scheme. The most VAR studies allow for is to examine differences in transmission across a small number of distinct subsets of the data through appropriate sample splits. Ilzetzki et al (2012), for instance, estimate panel VARs for different subgroups of countries distinguished by income, the level of foreign debt, the exchange rate regime, openness, and the degree of capacity utilization.[7] In order to preserve sufficiently large data sets, however, the authors cannot isolate the importance of more than one such dimension at a time. In addition, one can hardly account for time-varying attributes, such as the presence of a financial crisis, within the framework developed by Ilzetzki et al. (2012). At the same time, the panel VAR setup imposes significant homogeneity on the structure of fiscal policy-making across countries in a given subset of the data.[8]

[6] The recent survey on the fiscal multiplier by Illing and Watzka (2014) gives due weight to this point.

[7] See also Beetsma, Giuliodori, and Klaassen (2008) for a distinction of countries by openness within a European sample.

[8] Regarding the sign restriction approach, Canova and Pappa (2011) develop a new strategy which accounts for the possibility that the effects of fiscal policy differ across economic environments. Specifically, they investigate whether the estimated responses to a government spending shock change if additional sign restrictions are

In response to these limitations, Corsetti et al (2012a) pursue a two-stage estimation strategy similar to the one proposed by Perotti (1999).[9] In the first step, they estimate a fiscal policy rule which is meant to describe the statistical process of government spending and provide estimates of spending shocks. The fiscal policy rule links government spending to important macroeconomic aggregates. It is thus quite similar to the structure embedded in fiscal policy VARs. The fiscal policy rules are estimated for one country at a time, thus allowing for heterogeneity in national policy-making. In the second step, they use the estimated policy shocks as a regressor to trace the impact of government spending on key macroeconomic variables, including output and its components. A flexible specification is chosen to account for the effects of spending shocks in different economic environments, that is, under pegged vs. flexible exchange rates, with sound vs. strained fiscal positions, and during normal times vs. times of financial crisis. As discussed in detail in Corsetti et al (2012a), all three dimensions are expected to be particularly relevant for the fiscal multiplier.

In the following, I summarize the main results of Corsetti et al (2012a). They obtain their results on the basis of annual time-series data, covering a maximum period from 1975 through 2008 and 17 OECD countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom, and the United States. The classification of exchange rate regimes is based on Ilzetzki et al. (2009): countries incategories 1–8 of the fineclassification scheme (operating a de facto crawling band that is narrower than or equal to +/-2% or a tighter currency regime) are defined as fixed exchange rate regimes or "pegs". They specify the financial crisis dates in line with Reinhart and Rogoff (2008) and Reinhart (2010). Finally, the definition of weak public finances requires government debt in excess of 100 percent of GDP or net government borrowing above 6 percent of GDP.

To assess how the multiplier changes with the economic environment, it is useful to define a baseline scenario: an economy which operates a flexible exchange rate regime and enjoys

imposed. As an example, they find that fiscal multipliers tend to be larger when a decline in the real interest rate accompanies the positive spending shocks.

[9]Perotti (1999) focuses on the response of private consumption rather than on the output multiplier.

normal, or rather benign times characterized by the absence of financial crisis and fiscal strain. One may then compute how variations along one of the three dimensions alter the multiplier. Table 1 reproduces the results of Corsetti et al (2012a) for alternative measures of the multiplier. The first column reports the impact effect on output of an increase in government spending by one percent of GDP, the second column indicates the maximum effect over the six year period following the initial impulse. The right panel gives an account of cumulative multipliers over various horizons. Here, in each case, the cumulative response of output is scaled by the cumulative response of government spending.

Table 2. Government Spending Multiplier on Output

	Impact[a]	Maximum[b]	Cumulative Multiplier[c]		
			2 years	4 years	6 years
Baseline	0.0	0.0	-0.2	-1.1	-1.5
Currency peg	0.6	0.6	0.6	0.2	0.0
Financial crisis	2.3	2.9	2.2	2.5	2.6
Weak public finances	-0.7	0.2	-1.2	-1.1	-0.8

[a]Impact multiplier is the response of output during the first year (measured in percent) given an increase of government spending by one percent of GDP.

[b]Maximum multiplier indicates maximum value of output response over the first six years.

[c]Cumulative multipliers are obtained by cumulating the output effects and normalizing them by the cumulative response of government spending over the same period (2, 4, or 6 years).

Source: Corsetti et al. (2012)

Differences across economic environment are quite stark, irrespective of the measure of the multiplier. For the baseline scenario, there is no effect of government spending on output, that is, the multiplier is zero. While this result squares well with the predictions of the traditional Mundell-Fleming model, it is hard to reconcile with the predictions of modern business cycle models. Both international real business cycle models and New Keynesian open economy models predict a positive multiplier, see Corsetti et al (2012a) for further discussion.

Relative to the baseline scenario the estimate for the multiplier increases to 0.6 for those countries which operate a peg, but still experience benign times. This is a relatively

moderate number, but the direction of change is in line with both the predictions of the traditional Mundell-Fleming and those of the New Keynesian model (see Corsetti et al 2012b). Born et al (2013) consider a different sample and obtain larger multipliers for fixed exchange rate regimes.

The estimate for the multiplier rises above 2 and reaches almost 3 during financial crises. Put differently, fiscal measures during financial crises are likely to impact economic activity strongly. The result is particularly noteworthy given the policy measures implemented during the global financial crisis (see Corsetti and Müller (2011) for an overview). Moreover, in light of the discussion in section 2 above, the result suggests that austerity measures during financial crises may well be self-defeating. As a caveat, however, it should be stressed that the notion of a "financial crisis" is somewhat opaque. In general terms, one may think of financial crises as episodes where constraints on households, firms, and financial intermediaries as well as those on policy makers become tighter. Historically, these somewhat tighter constraints have come in quite different ways. Corsetti et al (2012a) provide a more detailed discussion of alternative mechanisms through which a financial crisis may change the multiplier.

In any case, the result which is most relevant for the issue pursued in the present paper is that multipliers decline substantially if fiscal strain is high. Indeed, according to the estimates reported in table 2, the multiplier is small or even negative if public finances are weak; that is, if high debt levels and/or deficits occur. Presumably, these conditions are likely to be met precisely when governments are implementing austerity measures to address solvency concerns. Against this background, worries about self-defeating austerities appear less justified. Note also that the result of reduced multipliers under fiscal strain is consistent with evidence put forward by Perotti (1999) for private consumption. He reports that consumption tends to increase rather than to decline in response to spending cuts in times of fiscal stress.

In sum, there is evidence for the multiplier to be state-dependent. Two results stand out. First, multipliers can be large, presumably large enough for austerity to be self-defeating in times of financial crisis. Second, multipliers are likely to be smaller or even negative at times

when fiscal indicators look poor. Austerity measures are thus not very likely to be self-defeating provided that they are implemented at times of fiscal stress.

4. Why is the multiplier state-dependent?

In this section, I offer a more structural perspective on the multiplier and, importantly, why it changes with the economic environment. I focus on two dimensions which are particularly pertinent given the macroeconomic environment in the wake of the global financial crisis. First, I review arguments for why the multiplier is likely to increase relative to normal times if monetary policy is constrained by the zero lower bound on interest rates. Second, I argue why the multiplier is likely to decline in times of fiscal stress. Throughout, I rely on the New Keynesian model as the conceptual framework for my (largely informal) discussion (see Gali 2008 for a textbook treatment). My discussion draws on Corsetti et al (2013). It relates to – but does not provide a full account of – the evidence discussed in the previous section.

4.1 Constraints on monetary policy

Recently, a number of contributions have highlighted the role of the zero lower bound for the fiscal transmission mechanism and, hence, for the multiplier within the New Keynesian framework (see, e.g., Woodford 2011). To see why the zero lower bound plays such an important role, it is useful to consider the following expression: it links aggregate demand, y_t, to government spending, g_t, both measured in percent of GDP at time *t* relative to trend (steady state), and the sum future short-term real interest rates, given by the difference between the nominal interest rate i_t (policy rate) and next periods inflation π_{t+1}:

$$y_t = g_t - E_t \sum_{j=0}^{\infty} \left(i_{t+j} - \pi_{t+j+1} - r \right) . \qquad (3.1)$$

Here, r denotes the real interest rate in steady state and E_t the expectation operator.[10] The sum of current and future real interest rates can be interpreted as the long-term real interest rate. It is governing the level of private expenditure relative to trend within the New Keynesian model.

[10]Expression (3.1) is derived from the linearized equilibrium conditions which are often referred to as the "canonical form" of the model by forward iteration. The equation holds in equilibrium, provided that there are no permanent shocks. It is not a model solution, but provides useful insights into the transmission mechanism.

Consider an exogenous and temporary increase of government spending which is financed either through debt or lump-sum taxes.[11] Government spending directly raises economic activity to the extent that prices cannot be fully adjusted and firms meet higher public demand by increasing production. This in turn raises marginal costs and inflation. During normal times, at least under standard assumptions, monetary policy responds to these developments by raising nominal interest rates more than one-for-one with inflation. As a result, the long-term real interest rate rises and private expenditure declines. Expression (3.1) illustrates that government spending alters aggregate demand in two ways. First, it directly adds to aggregate demand. Second, there is an indirect effect operating via its effect on long-term real interest rates and, hence, private expenditure. During normal times (in terms of the conduct of monetary policy) the model predicts a reduction of private expenditure via higher long-term real interest rates ("crowding-out") such that the multiplier is smaller than one.[12]

Things are different if the economy is stuck at the zero lower bound, that is, nominal interest rates are basically zero and cannot be reduced further even though policy makers would prefer to engineer a more accommodating stance. In such an environment, the inflationary impulse of higher government spending is not met by higher policy rates and therefore reduces real interest rates. As a result, private expenditure rises jointly with public expenditure. Quantitatively, the effect can be quite strong: a multiplier of 2 or even 3 may be obtained in standard business cycle models at the zero lower bound (see Christiano et al 2011). In this regard, the length for which the zero lower bound is expected to be a binding constraint on monetary policy constitutes a crucial determinant of the multiplier. Expression (3.1)illustrates this, as not only current, but also future real interest rates govern the adjustment of private expenditure to the fiscal expansion.

Clearly, these results provide a rationale for delaying austerity as long as the economy is stuck at the zero lower bound and expected to remain so for an extended period. In this case, the multiplier is likely to be high and austerity self-defeating (see, e.g., Krugman 2011).

[11] The choice between these financing instruments is irrelevant in the basic New Keynesian model, as Ricardian equivalence obtains.

[12] Private expenditure may rise if the increase of government spending is partly compensated by lower government spending in the future. Such an anticipated "spending reversal" reduces, all else equal, long-term real interest rates, see Corsetti et al (2012c).

Moreover, Corsetti et al (2010) find that a credible commitment to future austerity, once the economy has left the zero lower bound, may stimulate economic activity during the zero-lower-bond episode. A credible commitment to future austerity may therefore help to improve fiscal indicators immediately via increased output and tax revenues.

4.2 Fiscal crisis

During fiscal crises, however, governments typically lack the ability to commit credibly to future austerity measures. In fact, a defining feature of fiscal crises is that governments (feel they) have no option but to implement austerity measures immediately because financing conditions are deteriorating sharply. Corsetti et al (2013) account for such a scenario within an otherwise standard New Keynesian model and explore the implications for the fiscal transmission mechanism.

Specifically, the analysis features a "sovereign risk channel", which emerges as a result of two assumptions. First, government debt is not riskless. Accordingly, the price of government debt reflects default risk and, importantly, the sovereign risk premium increases non-linearly in the probability of default. Second, the risk premium paid by the government spills over into financial intermediation and affects borrowing conditions faced by private creditors adversely.[13] As discussed in Corsetti et al (2013) there is ample evidence in support of both assumptions, and alternative mechanisms can be invoked to rationalize them.

A simplified version of the setup gives rise to a modified version of relation (3.1):

$$y_t = g_t - E_t \sum_{j=0}^{\infty} \left(i_{t+j} - \pi_{t+j+1} + \omega\left(def_{t+j+1}\right) - r \right). \qquad (3.2)$$

Here, function ω captures an interest rate spread over the policy rate which increases as the expected government deficit increases. The relationship will be stronger, the worse the initial fiscal position, as measured by the debt-to-GDP ratio, reflecting the non-linear, convex relationship between public debt levels and the risk premium faced by the government. It is assumed to spill over into private borrowing conditions with a constant factor of

[13] In the absence of spillovers, allowing for default risk of government debt merely increases debt service costs but is of limited consequence for the dynamics of the model; see also Denes et al (2013).

proportionality. Importantly, if initial public debt is high, a further deterioration of the fiscal outlook will induce a sharper rise in the interest rate spread than if initial debt is low.

Two conditions need to be satisfied for the sovereign risk channel to be operative. First, a change in government spending is not met by discretionary change in taxes so that it affects the budgetary outlook. Second, monetary policy is constrained in offsetting movements in the interest rate spread. Both conditions are assumed to be satisfied in the analysis of Corsetti et al (2013). While monetary policy neutralizes the effect of the interest rate spread on private demand by adjusting the policy rate if it is able to so, the zero lower bound prevents it from doing so. Specifically, Corsetti et al (2013) assume an environment in which the zero lower bound is expected to last for an extended period, and they analyze a change of government spending during that period. Once the episode is over, government spending shifts back to normal (i.e. steady-state level).

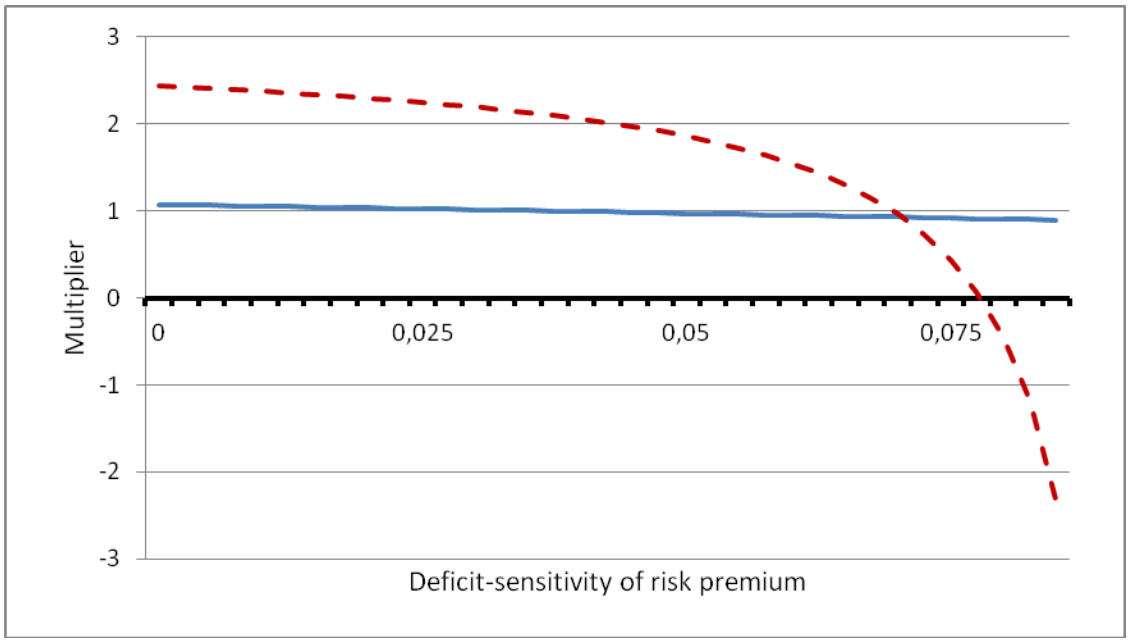
Turning to multiplier, two offsetting effects of higher government spending on effective long term interest rates occur. Depending on which effect dominates, private expenditure may rise or fall in response to higher government spending. First, as discussed above, there is the inflationary impulse of higher government spending. At the zero lower bound it works, all else equal, toward reducing effective long-term real rates. The strength of this effect increases in the expected duration of the zero-lower-bound episode. Second, higher expected deficits will – via the sovereign risk channel – raise effective real interest rates. The strength of this effect increases in the initial debt level.

Figure 2 illustrates these relationships graphically for specific parameter values.[14] The solid line displays the multiplier, assuming that the expected duration of the zero-lower-bound episode is four quarters. The dashed line displays the multiplier in case the duration is 7.5 quarters. In both instances, the multiplier is measured along the vertical axis as a function of the sensitivity of the risk-premium with respect to the fiscal output outlook (measured along the horizontal axis). It is itself a function of the initial debt level. For low values of the sensitivity of the risk premium, the effect of the sovereign risk channel is negligible. In this case, a large multiplier exists, provided that the expected duration of the zero-lower-bound

[14]See the working paper version of Corsetti et al (2012d).

episode is large. It easily exceeds 2 in the specific example under consideration. For a short expected duration of the zero-lower-bound episode, the multiplier also exceeds unity if the sovereign risk channel is negligible, but only marginally so.

Figure 2: State-dependent multiplier



Notes: vertical axis measures multiplier, horizontal axis measures deficit-sensitivity of risk premium; solid (dashed) line: expected duration of zero-lower-bound episode 4 (7.5) quarters; see Corsetti (2012d) for details and parameterization.

As the sensitivity of the risk premium with respect to the fiscal outlook gets larger, the multiplier declines. The effect is generally moderate in case the zero-lower-bound episode is expected to be short-lived. This reflects the assumption that monetary policy will accommodate an increased interest premium through lower policy rates, once it is able to do so. If, instead, the expected duration of the zero-lower-bound episode is longer (dashed line), the reduction of the multiplier due to the sovereign risk channel becomes stronger. In fact, given the parameter values used in Corsetti et al (2012d), the multiplier changes sign and turns negative if the expected duration of the zero-lower-bound episode equals about 7.5 quarters and the deficit sensitivity of the risk premium exceeds the value 0.075. Through a series of back-of-the-envelope calculations, Corsetti et al (2012d) find this value to be associated with an initial debt level of about 130 percent of GDP. Overall, the sovereign risk channel and the zero-lower-bound constraint interact in a non-linear way. The former does

not operate in case the latter is absent. The latter in isolation tends to raise the multiplier, while the former reduces the multiplier strongly if the former is also severe.

These results are obtained within an extension of the basic New Keynesian framework, which is frequently used for the analysis of monetary and fiscal policy. The results reviewed above illustrate a simple, but important point: the multiplier is bound to change with the economic environment. As the multiplier is the key factor for the "calculus of austerity" presented above in section 2, whether or not austerity is self-defeating will also depend on the economic environment. To the extent that austerity is likely to be conducted in case of high debt levels, the sovereign risk channel is likely to be operative. If, in addition, monetary policy is constrained in reducing borrowing rates, the fiscal multiplier is likely to be moderate and austerity measures are unlikely to be self-defeating. That said if sovereign risk is moderate, good reasons exist to delay austerity until monetary policy can accommodate the deflationary impulse by reducing policy rates accordingly.

5. Conclusion

Is fiscal austerity likely to be self-defeating? As self-defeating austerity causes deterioration of fiscal indicators, the choice of indicator is critical in addressing the question. In section 2 above, I have reviewed a range of indicators including deficit and debt levels relative to potential or actual GDP. However, irrespective of the indicator that is ultimately viewed as the most relevant, the fiscal multiplier will always be decisive for whether austerity is self-defeating.

As discussed above, a number of time-series studies provide estimates for government spending multipliers close to 1. Such a value is most likely too small for austerity to be self-defeating. However, recent contributions have highlighted that no such thing as "the" multiplier exists. Linear time-series models yield multiplier estimates which average across quite a variety of circumstances and economic environments. Depending on alternative states of the economy, Corsetti et al (2012) find that multipliers do indeed vary, notably with the exchange rate regime, the state of public finances, and with the state of the financial system. During financial crises, in particular, estimated multipliers turn out to be large. Conversely, for times of fiscal stress, multipliers tend to be small or even negative.

These empirical findings can be rationalized to some extent within a variant of the New Keynesian framework. While there is currently no consensus on how to model financial crises within this framework, a number of analyses have highlighted that multipliers will generally increase if monetary policy is constrained by the zero lower bound on the central bank's policy rate. This zero-lower-bound problem has been one important feature of the macroeconomic environment in the wake of the global financial crisis. Hence, under these circumstances, austerity may indeed become self-defeating, and delaying austerity may therefore be appropriate (see also Corsetti et al 2010).

Things turn out differently, however, once the notion of sovereign default risk is incorporated into the model. Corsetti et al (2013) show that if a) monetary policy is constrained and b) the sovereign risk premium is sensitive to the fiscal outlook, fiscal multipliers tend to be lower than during normal times and may even become negative in extreme scenarios. The reason is that expansionary fiscal policy can drive up sovereign risk premia, with adverse consequences for funding costs in the broader economy. Under these conditions, austerity is once again unlikely to be self-defeating.

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