Fiscal multipliers in downturns and the effects of Eurozone consolidation

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The literature on the effect of fiscal shocks on macroeconomic variables has expanded a great deal since the outbreak of the Global Crisis. From a policy perspective, the most interesting part of this increase is that it is driven by recent contributions which either question whether fiscal impulses are effective at all during economic downturns(Cogan et al. 2010) or ask whether their effectiveness increases in downturns relative to 'normal' circumstances (Auerbach and Gorodnichenko 2012). As a result, according to our count, the number of contributions that estimate the effectiveness of fiscal policy increased from 56 in 2008 to 149 in 2013.

This is a problem of major practical concern to policymakers. A survey of the state-contingent nature of fiscal policy multipliers, what they depend on, and how they vary between different spending categories or taxes, therefore, has special value in improving the quality of the policy advice that we can offer. It enables us, for example, to evaluate the impact of austerity measures in the Eurozone on growth and public deficits based on a more reliable set of parameters.

The magnitude of the literature and the fact that fiscal multiplier estimates can vary wildly from one study to another render a conventional literature survey of fiscal multiplier magnitudes and the factors determining them a challenging task with a high probability of inconclusive, and hence unsatisfactory results. Gechert and Rannenberg (2014) have conducted a meta-regression analysis of fiscal multipliers from a broad set of empirical reduced-form models. The aim was to identify and quantify their cyclical dependence and their dependence on the economic circumstances in the period in which the multiplier was estimated. This is done for a range of different fiscal policy instruments, controlling for model uncertainty and sample uncertainty. To summarise the results:

- The meta-analysis finds that the fiscal multiplier estimates are *significantly* higher during economic downturns than in average economic circumstances or in booms.

For example, the multiplier of unspecific government expenditures on goods and services robustly rises by an average of 0.6 to 0.8 units during a downturn. And for some specific instruments, for instance fiscal transfers, the multiplier increases by much more, turning transfers from the second least effective expenditure instrument into the most effective one. Part of the strong increase of the transfer multiplier might be explained by an increase in the share of liquidity constrained private households in downturns. Importantly, and by contrast, there does not appear to be *any* such regime dependence in the impacts of tax changes. In fact, the spending multipliers exceed tax multipliers by about 0.3 units across the board in normal times and even more so in recession periods. Furthermore, during average economic times and in boom periods, the fiscal multipliers are not only lower than in downturns but also tend to vary less across different fiscal instruments. This combination of results is consistent with the presence of active monetary policy during such periods that neutralises the effect of demand shocks, but a more accommodative monetary policy during downturns (e.g. Woodford 2011, Christiano et al. 2011, Coenen et al. 2012).

Based on these findings, one can also investigate for which instruments the cumulative multipliers exceed ones during economic downturns by taking simple averages across estimation techniques and sample specific characteristics. Gechert and Rannenberg (2014) find that for all expenditure categories other than increases in unspecified government spending, the cumulative multipliers robustly exceed one in the downturn regime. These results extend the analysis of earlier surveys (Gechert 2013) that did not control for the effects of different economic regimes. Nevertheless, it is possible to confirm a number of results obtained in other studies, such as:

- Spending multipliers tend to be larger than tax multipliers,

- Identification methods and model class play an important role for the multiplier estimate,

- More open economies have significantly lower multipliers than more closed economies, and

- The multipliers generally vary significantly across spending and tax categories, so that studies which look at the strength of general fiscal multipliers (or deficit multipliers) on average can produce very misleading results.

Methodology

The dataset extends the one employed by Gechert (2013), adding studies that control for a regime dependence of the multiplier, but focusing on reduced-form empirical estimates. This means the dataset takes into account 98 studies published between 1992 to 2013, providing a sample of 1882 observations of multiplier values (after excluding some outliers). The majority of the papers in the sample have been published after the Crisis and subsequent policy action.

A key question is how the multiplier is measured. Multiplier values are drawn from standardised fiscal impulses (e.g. one percent of GDP, or one currency unit) which allow for comparable input-output responses. Fiscal multipliers are usually calculated either as the peak response of GDP at some horizon after some initial change in a specific fiscal instrument, or as the cumulated response of GDP divided by the cumulated policy changes over a specified horizon.

Table 1 provides basic statistics for the reported multipliers under different fiscal impulses, model classes, and regimes. From the impulses analysed in earlier studies, one can distinguish unspecified public spending impulses (SPEND); public consumption (CONS); public investment (INVEST); or military spending (MILIT). Other impulses could be transfers (TRANS) or changes in taxation (TAX).

Table 1.   Descriptive statistics of reported multiplier values

| | fiscal impulse | | | | |
	TOTAL	SPEND	CONS	INVEST	MILIT
Mean	0.83	0.90	0.89	1.22	1.12
Median	0.74	0.84	1.00	1.10	0.85
Std. dev.	1.01	0.80	1.19	1.37	1.10
Max	5.00	3.60	4.84	5.00	4.79
Min	-3.14	-2.00	-3.06	-2.72	-0.43
DH p	0.00	0.00	0.00	0.43	0.00
N	1882	664	524	188	73

| | fiscal impulse | | |
	TAX	TRANS	DEF
Mean	0.44	0.54	0.35
Median	0.30	0.50	0.21
Std. dev.	0.69	1.16	0.50
Max	3.70	4.54	1.79
Min	-1.50	-3.14	-0.40
DH p	0.00	0.00	0.00
N	318	36	79

| | model class | | regime | | |
	SEE	VAR	RAV	RUP	RLO
Mean	0.86	0.83	0.75	0.39	1.37
Median	0.67	0.75	0.68	0.50	1.38
Std. dev.	0.97	1.02	0.96	0.77	1.08
Max	4.79	5.00	4.55	3.20	5.00
Min	-3.14	-3.06	-3.14	-1.80	-1.80
DH p	0.00	0.00	0.00	0.01	0.00
N	273	1609	1078	355	449

Since the goal is to understand whether fiscal multipliers are higher in downturns or upturns, the regression controls for the economic regime under which the recorded multiplier was estimated. They distinguish an average regime (RAV), a lower regime (RLO) and an upper regime (RUP). The lower and upper regimes comprise multiplier values whose estimation allowed the multiplier to be state dependent. Such estimates may, for instance, be generated by allowing for two lag-polynomials in a vector autoregression (VAR), a 'recession' and an 'expansion' polynomial, as in Auerbach and Gorodnichenko (2012b). However, the lower/upper regime labelling may also apply to values where the estimation method did not allow state dependence, but where there is clear indication that the estimated value represented a specific regime (see, for example Almunia et al. 2010 or Acconcia et al. 2011).

Conditioning variables

To determine the influence of different sample characteristics and the state dependency of the size of multipliers, reported multipliers are regressed on characteristics as shown in table 2.

Table 2. Total sample (Dependent variable: Multiplier)

	(1) base[a]	(2) all[a]	(3) no inter[a]	(4) no dum[a]	(5) cumulative[a]
κ	0.587(0.279)**	0.406(0.155)**	0.636(0.33)*	0.697(0.091)***	0.717(0.221)***
regime					
RUP	-0.049(0.097)	-0.006(0.141)	-0.197(0.091)**	-0.166(0.083)**	0.005(0.093)
RLO	0.0769(0.143)***	-653(0.126)***	0.755(0.12)***	0.633(0.158)***	0.723(0.155)***
fiscal impulse					
CONS	-0.159(0.196)	0.312(0.238)	-0.122(0.171)	0.081(0.199)	-0.114(0.195)
INVEST	0.788(0.263)***	0.471(0.28)*	0.474(0.305)	0.704(0.28)**	0.728(0.233)***
MILIT	-0.467(0.328)	-0.678(0.358)*	-0.122(0.293)	-0.068(0.136)	-0.641(0.449)
TAX	-0.328(0.126)***	-0.297(0.131)**	-0.46(0.112)***	-0.368(0.106)***	-0.266(0.145)*
TRANS	-0.287(0.136)**	-0.348(0.234)	-0.239(0.154)	-0.443(0.212)**	-0.147(0.085)*
DEF	-0.087(0.086)	0.315(0.138)**	-0.176(0.089)**	-0.532(0.179)***	-0.071(0.093)
interaction of impulse and regime					
RUP*CONS	0.005(0.266)	-0.163(0.244)		-0.37(0.324)	-0.029(0.269)
RLO*CONS	0.484(0.248)*	0.024(0.233)		0.109(0.241)	0.51(0.249)*
RUP*INVEST	-1.166(0.25)***	-0.948(0.21)***		-1.061(0.278)***	-1.225(0.217)***
RLO*INVEST	-0.364(0.243)	-0.008(0.168)		-0.45)0.341)	-0.466(0.218)**
RUP*MILIT	-0.343(0.322)	-0.768(0.441)*		-0.834(0.203)***	-0.38(0.349)
RLO*MILIT	1/059(0.429)**	1.048(0.221)***		0.469(0.275)*	1.048(0.483)**
RUP*TAX	0.023(0.154)	0.037(0.198)		0.000(0.157)	-0.073(0.155)
RLO*TAX	-0.744(0.235)***	-0.664(0.224)***		-0.756(0.214)***	-0.753(0.255)***
RLO*TRANS	1.378(0.138)***	1.196(0.13)***		1.002(0.279)***	1.205(0.094)***
RUP*DEF	0.023(0.107)	1.03(0.234)***		-0.168(0.228)	
RLO*DEF	-0.677(0.15)***	-0.365(0.126)***		-0.495(0.438)	-0.563(0.16)
model and identification					
VARRA	-0.029(0.079)	0.26(0.175)	-0.052(0.074)	0.028(0.101)	-0.155(0.108)
VARSR	-0.409(0.031)***	-0.553(0.204)***	-0.425(0.028)***	0.011(0.112)	-0.434(0.079)***
VARNAR	-0.01(0.117)	-0.101(0.275)	0.058(0.106)	0.221(0.298)	-0.092(0.11)
VARWAR	-0.542(0.107)***	-0.287(0.231)	-0.609(0.115)***	-0.634(0.137)***	-0.806(0.102)***
SEENAR	0.833(0.232)***	-0.231(0.413)	0.888(0.229)***	0.403(0.146)***	0.804(0.208)***
SEEWAR	0.956(0.357)***	0.815(0.89)	0.891(0.256)***	-0.295(0.203)	1.025(0.401)**
SEECA	-0.07(0.244)	-1.089(0.282)***	0.015(0.236)	-0.481(0.176)***	-0.065(0.211)
SEEIV	0.232(0.27)	1.44(0.227)***	0.222(0.273)	0.165(0.156)	-0.192(0.156)
further controls					
PEAK	0.379(0.103)***	0.389(0.115)***	0.376(0.099)***	0.31(0.099)***	
HOR	0.019(0.012)	0.019(0.012)	0.02(0.012)*	0.017(0.011)	0.017(0.014)
HOR^2	-0.0002(0.0003)	-0.0002(0.0003)	-0.0003(0.0003)	-0.0003(0.0003)	-0.0001(0.0003)
M/GDP	-0.026(0.007)***	-0,028(0.007)***	-0.025(0.007)***	-0.02(0.004)***	-0.029(0.008)***
LOGOBS	0.013(0.053)	0.049(0.051)	0.028(0.051)	0.012(0.066)	-0.002(0.059)
N	1882	1882	1882	1882	1432
DF	1752	1709	1763	1849	1309
R^2	0.394	0.448	0.350	0.269	0.383
AIC	4703.1	4614.3	4812.5	4862.6	3606.9

[a] reference: RAV, SPEND, VARBP, CUM
*, **, *** indicate significance at the 10, 5, 1 per cent level, std. ers. in parentheses

How to interpret the regression results? The meta-analysis identifies best practice specifications for each multiplier and takes them as a reference specification (κ) for the influence of different characteristic or state dependency on that type of multiplier. The reference specification for a particular multiplier is then a cumulative multiplier value (CUM) from a general public spending impulse (SPEND) taking place in average economic circumstances (RAV). If the multiplier stems from a VAR model with Blanchard-Perotti identification (BP), with mean import quota and mean horizon, such a specification then reports an average multiplier value of 0.59 when controlling for other influences. This value is significantly different from zero.

Coefficients of the conditioning variables then show deviations from the reference value when the condition is 'switched on'. For example, INVEST shows the difference of the multiplier of public investment impulses as compared to unspecified spending impulses while the reference specification holds in all other terms. RLO shows the difference of general spending multipliers in the recession/crisis regime as compared to the average regime. Interaction terms apply between the groups of mutually exclusive dummy variables (for instance, each regime interacted with each kind of fiscal impulse). For example, while INVEST marks the difference of the public investment multiplier to the unspecified spending multiplier in the average regime, and RLO the difference of spending multipliers from the average regime, RLO*INVEST+INVEST represents the specific impact of investment multipliers in the lower regime as compared to general spending multipliers in the same regime.

Column (1) of table 2 represents our preferred specification, where we take into account the interaction between fiscal impulses and regimes. Column (2) additionally interacts all other groups of variables to show the robustness of the selective choice of interactions in column (1). There are some issues with this specification since not all combinations have a representation in the data set and the respective coefficients of the interactions are naturally omitted in such a case. By contrast, column (3) provides a specification without any interaction terms. The model in column (4) repeats the exercise of column (1), this time without controlling for the fixed effects of the dummy terms. Column (5) uses the baseline specification for a reduced sample where only the cumulative multipliers are taken into account, leaving out the peak multipliers.

Results

It turns out that multipliers of general government spending in the average regime vary between 0.4 and 0.7 across the various specifications and are all significantly different from zero. Spending multipliers stemming from circumstances where the economy is running well are generally close to the average regime multipliers or slightly below. In recessions or crisis situations, however, they exceed the multipliers in the average regime by 0.6 to 0.8.

Disaggregating, public consumption multipliers are in line with unspecified public spending multipliers. Public investment multipliers are significantly higher in the average regime, by about 0.5 to 0.7 units. Tax and transfer multipliers are about 0.4 units lower than the unspecified spending multipliers, and significantly so. Military spending shocks induce GDP effects which are by and large insignificantly lower than general spending multipliers. The most indeterminate measure of fiscal impulses – public deficit (DEF) – provides a very big variance of multiplier results, resulting in an insignificant difference to the reference specification. Hence, multipliers from studies that look only at a broad measure of the public deficit may not provide a clear picture of the strength or effectiveness of fiscal policy.

Interesting results can also be seen from the interaction terms. Most strikingly, the strong average investment multiplier turns out to be much lower in upswings; moreover, its relative magnitude appears muted in downturns because other spending categories produce high GDP effects in those circumstances as well. As compared to unspecified spending, military build-ups have smaller effects in booms, but much stronger multipliers in recessions. On the other hand, the tax multipliers show no specific behaviour in upturns as compared to spending multipliers, but they are much lower in the downturn – the opposite result compared to spending multipliers. Thus, and in contrast to spending increases, tax reliefs are less efficient at countering a recession. Transfers, however, are much more efficient in a downswing.

The lower rows of table 2 show the coefficients of the remaining control variables. Plausibly, peak multipliers are significantly higher by about 0.35 units than cumulative multipliers. The horizon of measurement and its quadratic term show plausible, if insignificant coefficients, reflecting a slight inverse U-shape of the multiplier effects with growing multipliers for shorter horizons turning somewhat lower on longer horizons. Basically, there are no signs of a quick phase-out of multiplier effects. The import-to-GDP ratio of the country-sample under investigation of the studies in the dataset has a plausible and significant negative coefficient: The results are robust to variations in the sample size, definition of the multiplier, adding further interaction terms or looking at the median multiplier observation in each paper only.

Absolute magnitudes

We now focus on the absolute magnitude of the multiplier values across different economic regimes. Figure 1 plots the cumulative multipliers of the various impulses under the baseline specification and the all-interactions specification. As expected from the above discussion, for most impulses, the multiplier increases as the economy moves from the upper to the lower regime. The only exception is the tax multiplier, which varies only marginally across regimes. Furthermore, the multiplier itself differs less across instruments in the upper regime than in the lower regime. Under the plausible conjecture that the lower regime typically coincides with a more accommodative monetary policy, while the upper regime is associated with a restrictive monetary policy able and willing to neutralise the effect of demand shocks, these reduced-form results are in line with simulations of fiscal stimuli in standard structural monetary macroeconomic models, e.g. Coenen et al. (2012).

Figure 1.   Compound cumulative multipliers of fiscal impulses for different regimes, full sample.
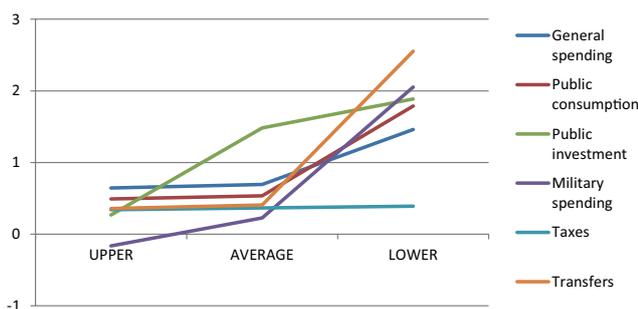
Note: Baseline specification: blue-bold bars, based on column (1) of table 2. Specification with all possible interactions: green-striped bars, based on column (2) of table 2.

Under our baseline specification for all impulses other than tax changes, the multiplier is smaller than one in the upper regime but strongly exceeds one in the lower regime. Among the various types of expenditure multipliers, transfers have the highest lower-regime multiplier, followed by military spending, investment, consumption, and general spending. This result is surprising, as a fraction of the increase in transfers would be expected to be saved by households, suggesting a lower multiplier than increases of government demand for goods and services. We suggest the explanation might be that the share of liquidity-constrained or credit-constrained consumers rises strongly during downturns and that, in our sample, the transfer increases occurring during downturns tend to be especially well-targeted. A high marginal propensity to spend out of government transfer increases during downturns is suggested by Broda and Parker (2014), who investigate the effect of the 2008 stimulus payments of the US government on household consumption.

Furthermore, by alleviating situations of poverty arising during downturns, transfer increases may also lift consumer sentiment, thus inducing first round spending increases exceeding the size of the impulse (Bachmann and Sims 2012).

The Eurozone's fiscal consolidation

We now apply the multiplier estimates presented in Figure 1 to assess the impact of the fiscal consolidation in the Eurozone over the period 2011-2013. For that purpose, we draw on an official estimate of the magnitude of the discretionary measures (European Commission 2012). Of course, the results of such an exercise have to be treated with caution, not least because the impulse responses of fiscal instruments associated with the multiplier estimates in our database will in general not equal the changes implemented over the 2011-2013 period in the Eurozone.

Table 3.   Consolidation actions in the EMU - Cumulative discretionary measures, % of GDP

	2011	2012	2013
Consumption taxes	0.3	0.7	0.9
Labour taxes	0	0.3	0.3
Corporate taxes	0.1	0.1	0.1
Social Security Contributions	0.2	0.2	0.2
Total revenue	0.6	1.3	1.5
Transfers	1	1.2	1.5
Consumption expenditure	0.2	0.4	0.5
Gross fixed capital formation	0.2	0.4	0.4
Total expenditure	1.4	2	2.4
All measures	**2**	**3.3**	**3.9**

Source: European Commission (2012), own calculations

Table 3 presents the cumulative ex-ante budget balance effect calculated from these estimates. The table says that, in 2011, consumption tax rates were increased such that consumption tax revenue increased ex-ante by 0.3% of GDP, then there was a further increase in 2012 raising the increase to 0.7%, and a further increase of 2013 such that the total increase over the period 2011-2013 implied an increase in revenue of 0.9% of GDP. Similarly, transfers were cut by 1% of GDP in 2011 and by a total of 1.5% of GDP over the full 2011-2013 period. Clearly, consolidation measures focused on the expenditure side, with the expenditure cuts in turn being dominated by transfer cuts.

Table 4.   Estimated cumulative GDP and deficit effect of the Eurozone's fiscal consolidation, % of GDP

	2011	2012	2013
Total Revenue	**-0.5**	**-1.0**	**-1.2**
Transfers	-3.0	-3.5	-4.5
Consumption expenditure	-0.4	-0.9	-1.1
Gross fixed capital formation	-0.5	-0.9	-0.9
Total expenditure	-3.9	-5.3	-6.5
All measures	**-4.3**	**-6.4**	**-7.7**
Overall effect on Budget balance	**-0.1**	**-0.2**	**-0.2**

In Table 4, we have applied the cumulative multipliers from Figure 1 to the cumulative changes of the fiscal instruments. As we do not distinguish between different types of tax multipliers, the different types of tax changes are multiplied with an identical multiplier. Furthermore, we account for the fact that the share of imports from non-Eurozone countries differed from the average in the sample on which the baseline specification is estimated.

According to this simple exercise, the fiscal consolidation in the Eurozone reduced GDP by 4.3% relative to a no-consolidation baseline in 2011, with the deviation from the baseline increasing to 7.7% in 2013. Thus, the austerity measures came at a big cost. By far the biggest contribution to this GDP decline comes from transfer cuts, which is not surprising given their high multiplier and the high share of transfers in the overall consolidation effort.

The ultimate goal of the Eurozone's fiscal consolidation was to achieve fiscal sustainability. To gauge the consolidation's effect on the budget balance, we apply an estimate of the semi-elasticity of the budget balance with respect to GDP to the estimated GDP decline caused by the fiscal consolidation and subtract this number from the discretionary consolidation effort. Girouard and Andre (2005) estimate the semi-elasticity of the budget balance as 0.48. As Table 4 shows, due to the big decline in GDP caused by fiscal consolidation, the improvement in the budget balance is marginal, especially if compared to the estimated GDP loss associated with fiscal consolidation.

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