

Fiscal policy relaxation in a depressed economy

Can there be a “Free Lunch” for Greece?

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Summary of views & key findings

- ❑ This study leans on the literature on *regime-dependent* fiscal multipliers and the existence of *hysteresis* effects to demonstrate that, under certain conditions, a further relaxation of the agreed fiscal targets for Greece could not only benefit the country's growth outlook, but might also lead to improved (rather than worsened) fiscal dynamics in the medium- and long-run.
- ❑ This, rather counter-intuitive, argument is based on the assumption that fiscal multipliers are higher (and more persistent) than usual when the economy features a massive output gap as a result of a severe recession and also that a cyclical boost in output caused by an expansionary fiscal policy move may have a permanent positive effect on future potential output.
- ❑ Although quite diverse views continue to exist among professional economists and policy makers as regards the quantitative and qualitative effects of fiscal policy, a more recent strand of the relevant literature appears to support the *regime-dependence* of fiscal multipliers i.e., higher effects on output due to discretionary policy shocks in periods of deep economic contractions than in normal economic times or expansions.
- ❑ As regards *hysteresis*, i.e. the notion that in a depressed economy featuring ample cyclical unemployment and excess capacity, an expansionary fiscal policy shock could prove *self-financing*, i.e. instigate both an improvement in the future potential output and a decline in the debt to GDP ratio in the medium- and long-term (and vice versa for the case of a contractionary fiscal policy shock), the literature has proposed a host of mechanisms to substantiate the existence of such effects.
- ❑ In the case of a fiscal policy-induced cyclical downturn in an economy already featuring a sizeable negative output gap, such effects may include, inter alia, reduced labor force attachment on the part of the long-term unemployed, scarring effects on young workers who have trouble beginning their careers, lower physical and human capital investments, reduced R&D expenditure, and changes in managerial attitudes.
- ❑ In Greece, an unprecedented in size (and heavily front-loaded) fiscal consolidation programme has been implemented since 2010 to engineer an *internal* devaluation and correct the earlier acute macroeconomic imbalances. This facilitated a huge improvement in the country's fiscal accounts, but it has broadly failed so far to stabilize public debt dynamics. And this, despite the aforementioned fiscal adjustment as well as any beneficial effects stemming from the PSI operation and the broadly concessional interest rates currently paid on official-sector loans.
- ❑ Indeed, over the period 2010-2016, the general government primary fiscal balance has improved by c. 14ppts-of-GDP (and by 19.2ppts-of-GDP in cyclically adjusted terms), while the gross public debt to GDP ratio has increased by 52.3ppts. Furthermore, real GDP losses amounted to c. 25ppts, while real potential output was at the end of 2016 lower by 13.7ppts relative to its end-2009 level (AMECO data).

Summary of views & key findings (*continued*)

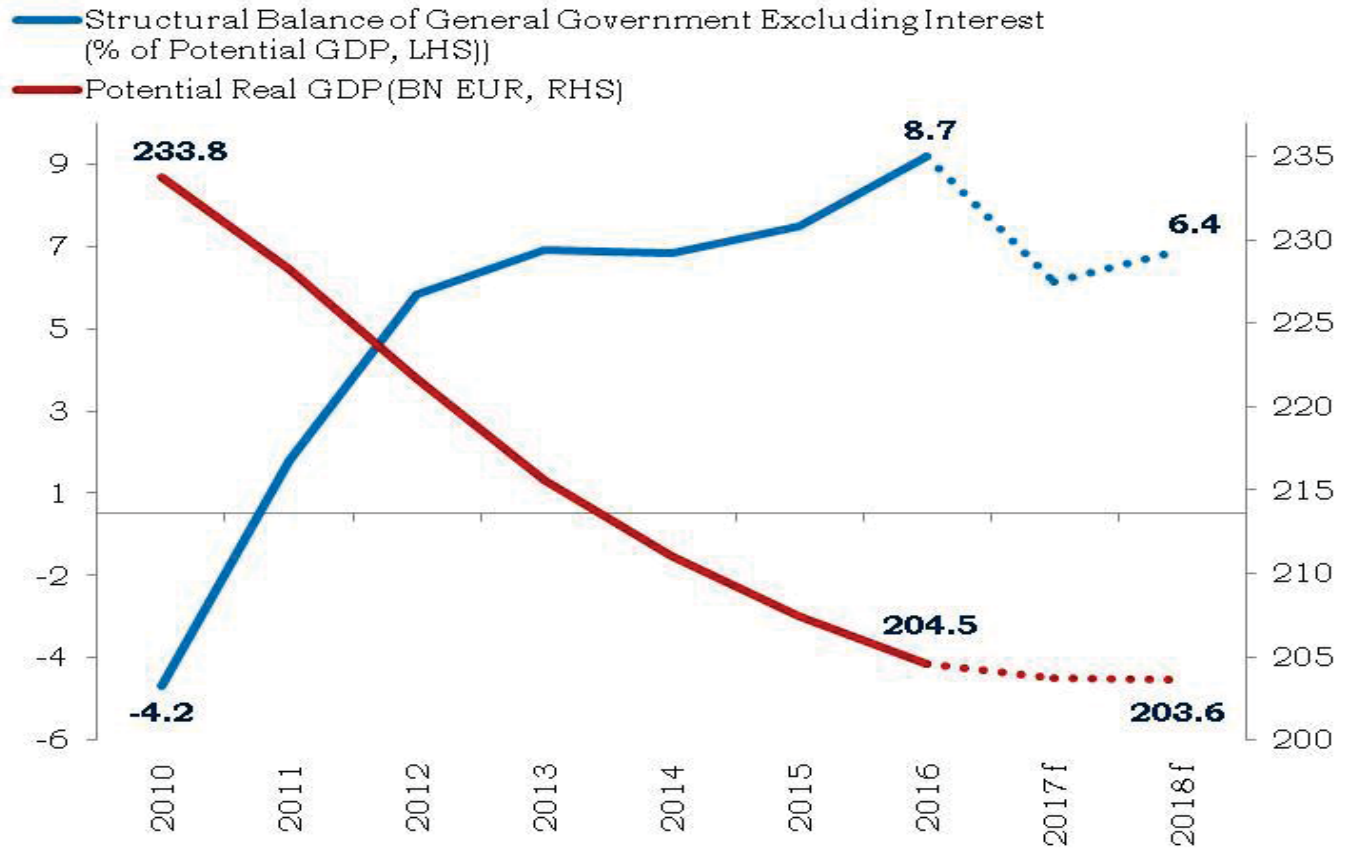
- ❑ In view of the aforementioned, the study provides a quantitative assessment of a number of scenarios for the evolution of Greece's GDP and other important variables such as the general government fiscal balance and the gross public debt ratio under a hypothetical *permanent* relaxation of the agreed target for the primary surplus, to 2.2%-of-GDP from 2018 onwards.
- ❑ Assuming a range of (plausible) values for the short-term (impact) fiscal multiplier and for some other key parameters used in the exercise (e.g. multiplier persistence and hysteresis coefficients), the study demonstrates that, under certain conditions, the said fiscal policy intervention (relaxation of the primary surplus target) could lead to both higher GDP levels and a lower debt to GDP ratio in the medium- and long-term relative to the current, no-policy-change baseline.
- ❑ It is important to note that in the self-financing fiscal relaxation scenarios presented in the study, the assumed values for the above mentioned parameters broadly fall in the acceptable range of values for crisis episodes used in some recent empirical studies conducted by the European Commission.
- ❑ Furthermore, the assumed values for the short-term multipliers are broadly in line with the multipliers for crisis-hit economies reported in some recent empirical studies, including the ones published earlier by Eurobank Economic Research (to our knowledge, the most comprehensive empirical studies for regime-dependent fiscal multipliers in Greece published thus far).
- ❑ Although the empirical estimation of fiscal multipliers and the existence or not of hysteresis effects remain highly debatable topics in leading academic and policy circles, we believe that the present study constitutes a valuable addition to the relevant debate.
- ❑ From a policy standpoint, we see value in revisiting/re-evaluating the agreed short-, medium- and long-run fiscal policy path in Greece, with a view to minimizing the negative macroeconomic effects implied by the (still-demanding) targets for the general government primary surplus.

Part I

Fiscal policy relaxation in a depressed economy

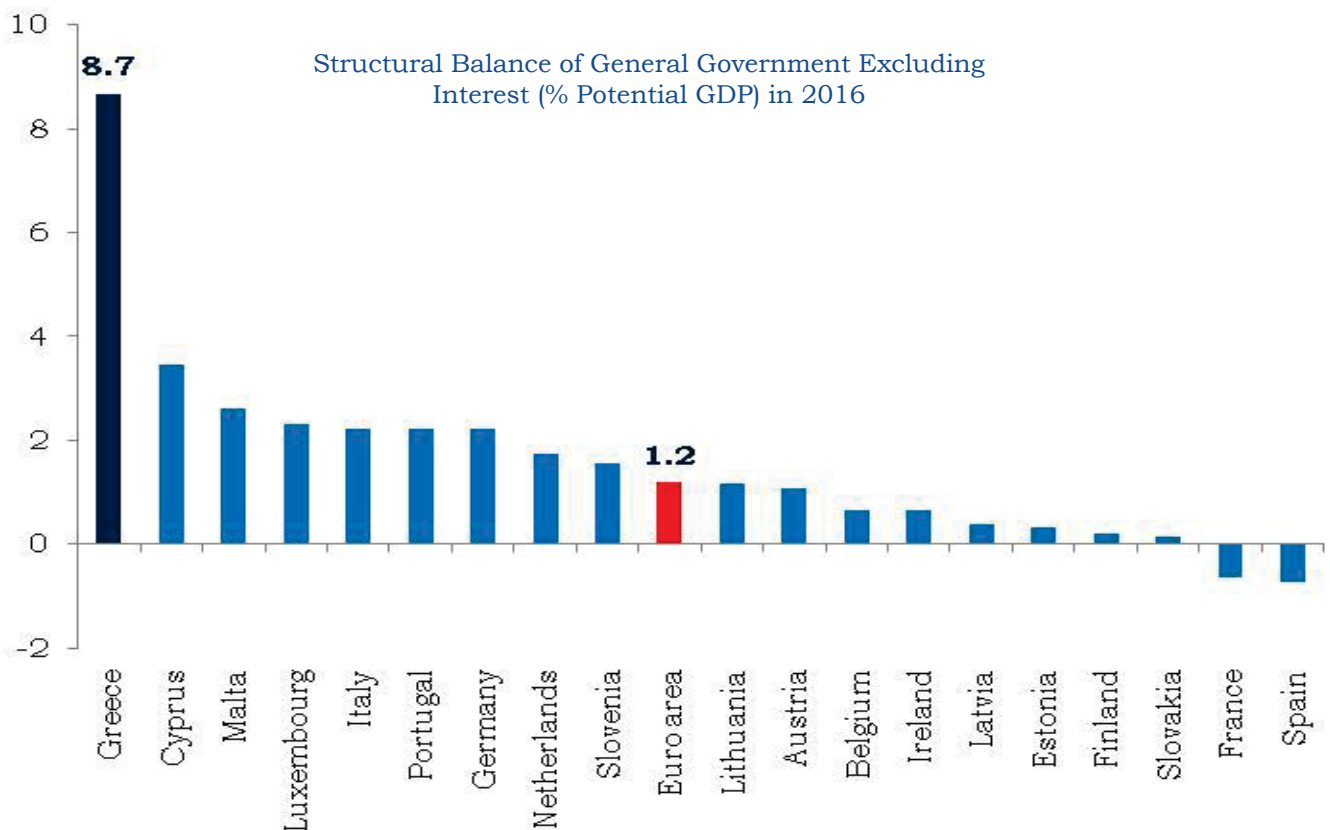
Can there be a “Free Lunch” for Greece?

An unprecedented (and front-loaded) fiscal adjustment that inescapably exacerbated the huge contraction of domestic output



Source: AMECO (European Commission)

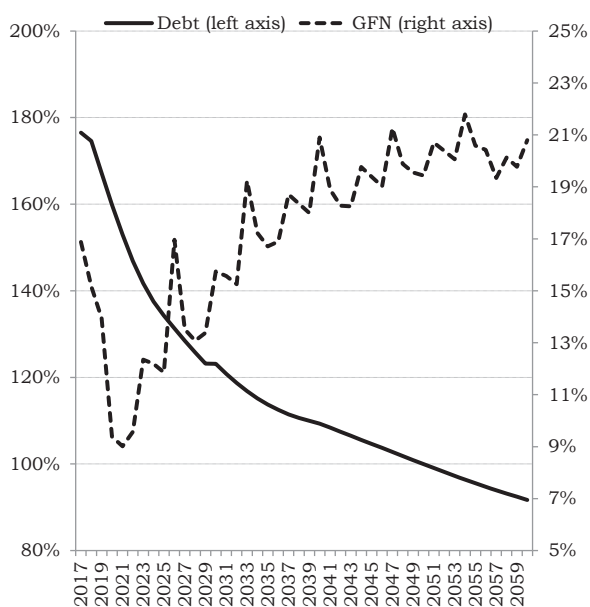
Greece currently features the highest structural fiscal balance in the EA



Source: AMECO (European Commission)

European Commission's baseline DSA scenario for Greece

Gross public debt & gross financing needs (*) (% of GDP)



EC baseline scenario Key assumptions

Nominal GDP growth	between 4.3% and 4.0% in 2018-2030; 3.2% afterwards
General government primary surplus (% GDP)	3.5% in 2018-2022; 3.0% in 2023; 2.5% in 2024; 2.2% afterwards
Privatization revenue (full, projection horizon)	€17bn
Set aside for bank recap needs (EUR bn)	none
Market refinancing rates (%)	5.10% in 2019; 5.50% 2021; slowly converging thereafter towards 4.3% by 2060

(*) The depicted evolution of the public debt & GFN ratios may deviate somewhat from what is projected in the Commission's DSA due to differences in some underlying assumptions

Source: EC Compliance Report - The Third Adjustment Programme for Greece, Second Review (Jun. 2017), Eurobank Economic Research

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How a fiscal policy intervention may affect the evolution of the debt ratio

Let us assume that a discretionary fiscal policy shock is implemented by the domestic authorities in the current period e.g. the fiscal authority introduces measures aiming to improve (increase) the primary general government balance by one unit.

The aforementioned intervention influences the debt to GDP ratio in the current period (and, maybe, in future periods if the ensuing fiscal drag shows a certain degree of persistence) via the following three (3) channels:

- **1st numerator effect:** fiscal intervention causes a *one-to-one* increase in the primary fiscal balance;
- **2nd numerator effect:** the aforementioned effect is partially offset (and, in certain instances, more than outweighed) by the impact of automatic stabilizers e.g. lower tax revenues/higher unemployment benefits due to the ensuing economic contraction (fiscal drag);
- **denominator effect:** fiscal intervention causes a decline in economic activity and thus, it reduces the denominator of the debt-to-GDP.

The first of the above mentioned effects tends to reduce the debt to GDP ratio, while the latter two tend to increase it.

- In periods when **1st numerator effect < 2nd numerator effect + denominator effect**, the fiscal consolidation is *self-defeating*.
- In periods when the above relationship holds for a fiscal relaxation, the said policy intervention is *self-financing*.
- In the case of Greece, the public debt to GDP ratio increased by c. 69.5ppts-of-GDP between 2008 and 2016, despite the PSI exercise and the sharp improvement in the primary fiscal balance (by 9.3ppts-of-GDP) over that period.
- Clearly, the aforementioned analysis suggests that the fiscal consolidation programmes implemented in Greece over the last several years have so far failed to stabilize the country's public debt dynamics.

In the following pages, we present the projected evolution of Greece's gross public debt to GDP ratio under four (4) hypothetical scenarios, denoted S1, S2, S3 & S4.

- All scenarios assume that the official target for the general government primary balance (as % of GDP) is adjusted to 2.2%, from 2018 onwards (i.e., over the full projection horizon 2018-2060).
- For simplicity, the said intervention (in our case, fiscal relaxation vs. the assumed baseline) is hypothesized to be *exogenous, discretionary* and of *permanent* nature i.e., not to be reversed by an offsetting policy move in the future.
- This compares with the following path for the primary balance to GDP ratio agreed at the Eurogroup of 15 June, 2017: FY-2017: 1.75%; period 2018-2022: 3.5%; FY-2023: 3.0%; FY-2024: 2.5%; period 2025-2060: 2.2%.
- Crucially, the scenarios under examination incorporate different assumptions regarding: the first-year (impact) multiplier, the degree of multiplier persistence and the long-run impulse response of GDP to fiscal consolidation (herein, a proxy for the existence of “hysteresis” effects).
- Furthermore, the market interest rate for refinancing Greek debt is assumed to increase by 3bps per 1ppt deviation of the debt-to-GDP ratio from the 60% threshold. This is in line with what is assumed in the EC's latest (June 2017) baseline DSA analysis for Greece.
- In all scenarios under examination, the reaction of automatic stabilizers to the change in output growth caused by the hypothesized policy intervention (herein, a permanent reduction in the primary balance to GDP target from 3.5% to 2.2% from 2018 onwards) is captured by a cyclical semi-elasticity of government balance to the output gap of 0.42. This is in line with the European Commission services' calculations, as presented in Boussard et al., (2012).

Key parameter values used in the simulation exercise

- Fiscal multipliers are assumed to follow the convex, autoregressive decay path presented in page 10 of this document.
- The first-year (impact) multiplier is assumed to take the following discrete value: **0.75** (low), **1.5** (intermediate), **2.0** (high) and **2.5** (very high). These are in line with the values assumed in some recent papers published by the European Commission services (see e.g. Bousard et al., 2012) as well the estimates found in a couple of relevant empirical studies for Greece, see e.g. Monokroussos, P. and D. Thomakos, 2012 & 2013 (see also technical appendix of this document).
- α (persistence parameter): **0.30** (low), **0.60** (intermediate), **0.80** (high) and **0.90** (very high).
- β (long-run impulse response of GDP to fiscal consolidation): **0.30** (high), **0.10** (intermediate), **0.0** (no long-term impact).
- Parameters α and β are assumed to follow a normal distribution with the assumed values falling within the respective ranges for crisis episodes reported in Boussard et al., (2012).

Source: Eurobank Economic Research, Bousard, J., Castro F. and Salto M. “Fiscal Multipliers and Public Debt Dynamics in Consolidation”
European Commission Economic Papers 460/July 2012

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Greece: simulation exercise**Assumed fiscal multipliers & key parameter values**

scenario acronym	Scenario characteristics	m1 first-year (impact) multiplier	α persistence parameter	β long-run impulse response of GDP to fiscal consolidation	fiscal target adjusted to 2.2% of GDP from 2018 onwards
S1	high impact multiplier value/ high multiplier persistence / positive long-run GDP response to fiscal relaxation	2.0	0.80	0.30	2.2%
S2	high impact multiplier value/ high multiplier persistence / positive long-run GDP response to fiscal relaxation	2.5	0.90	0.30	2.2%
S3	intermediate impact multiplier value/ intermediate multiplier persistence / positive long-run GDP response to fiscal relaxation	1.5	0.60	0.10	2.2%
S4	low impact multiplier value/ low multiplier persistence / no long-run GDP response to fiscal relaxation	0.75	0.30	0.00	2.2%

Source: Boussard et al. (2012); EC (2013), Eurobank Economic Research

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Technical highlights

In order to incorporate multiplier persistence & hysteresis in our simulation exercise we follow Boussard et al. (2012)¹ and European Commission (2013)² and assume:

Fiscal multipliers follow the following convex, autoregressive decay path:³

$$m_{t,i} = (m_1 - \beta)a^{i-t} + \beta, \text{ with } t=1, \dots, \tau \text{ and } i = t, t+1, \dots, T$$

where,

m_1 is the impact (i.e., first year) multiplier;

$m_{t,i}$ is the fiscal multiplier applying at time i to the fiscal consolidation/relaxation done in year t ($i \geq t$);

a : persistence parameter ($0 < a < 1$);

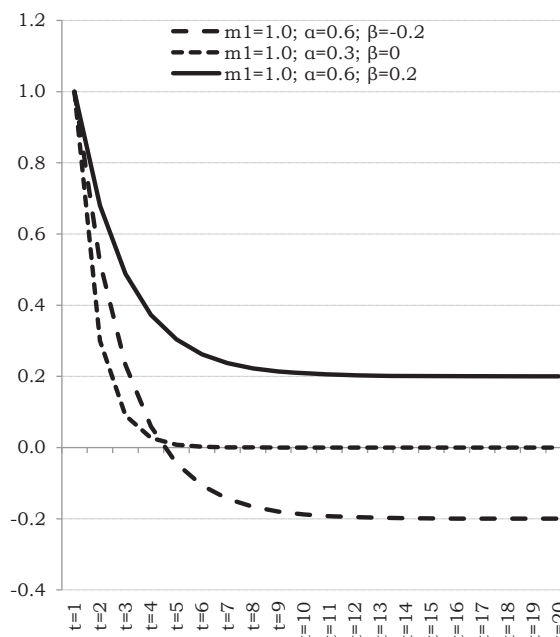
β : hysteresis parameter, representing the long-run impulse response of GDP to fiscal consolidation/relaxation (no assumption on the sign of β)

A *negative* value of β indicates that “hysteresis” effects are present (see e.g. de Long and Summers, 2012); such a situation may arise when e.g. a cyclical downturn today (vs. the assumed baseline) casts a shadow (has a negative impact) on future potential output.

By the same logic, a *positive* value of β represents a situation in which a cyclical upturn boosts future potential output.

For $\beta = 0$, it is assumed that there are no hysteresis effects.

Stylized paths of GDP impulse responses used in the simulation



1. “Fiscal Multipliers and Public Debt dynamics in Consolidations”
2. “Effects of fiscal consolidation envisaged in the 2013 Stability and Convergence Programmes on public debt dynamics in EU Member States”

3. This decay function reproduces relatively well the shape of the impulse-response function by typical DSGE models for most of the permanent fiscal shocks (see Bussard et al., 2012).

Source: Boussard et al. (2012); EC (2013), Eurobank Economic Research

Simulation analysis - Scenarios S1, S2, S3, S4

Evolution of nominal GDP & gross public debt to GDP ratio

Green-shaded areas indicate a self-financing fiscal expansion

		2017	2018	2019	2020	2021	2022	2030	2040	2050	2060
European Commission baseline (June 2017)	Debt-to-GDP ratio (%)	176.5	174.6	167.2	159.9	153.0	146.8	123.1	109.3	99.9	91.7
	Nominal GDP (€ bn)	181.2	187.7	195.2	203.0	210.9	219.2	287.8	397.7	545.0	746.8
Scenario S1 high impact multiplier/high multiplier persistence / positive long-run GDP response to fiscal relaxation	Debt-to-GDP ratio (%)	176.5	170.5	164.3	158.1	152.3	147.3	123.3	108.5	98.7	90.4
	Nominal GDP (€ bn)	181.2	192.6	199.5	206.7	214.2	222.1	289.1	398.6	545.8	747.5
Scenario S2 high impact multiplier/high multiplier persistence / positive long-run GDP response to fiscal relaxation	Debt-to-GDP ratio (%)	176.5	169.1	162.7	156.3	150.4	145.1	120.6	106.1	96.8	88.9
	Nominal GDP (€ bn)	181.2	193.8	200.8	208.1	215.6	223.4	290.0	399.0	545.9	747.6
Scenario S3 intermediate impact multiplier/intermediate multiplier persistence / positive long-run GDP response to fiscal relaxation	Debt-to-GDP ratio (%)	176.5	171.8	166.6	161.0	155.5	150.7	127.0	111.9	101.6	92.8
	Nominal GDP (€ bn)	181.2	191.4	197.5	204.5	211.9	219.8	288.0	398.0	545.3	747.0
Scenario S4 low impact multiplier/low multiplier persistence / no long-run GDP response to fiscal relaxation	Debt-to-GDP ratio (%)	176.5	173.8	168.8	163.0	157.4	152.4	128.4	113.2	102.8	93.8
	Nominal GDP (€ bn)	181.2	189.5	195.8	203.2	211.0	219.2	287.8	397.7	545.0	746.8

Part II

Technical Appendix & related literature

Fiscal multipliers

Key definitions

The term fiscal multiplier refers to the ratio of a change in output (ΔY) to an exogenous change in the fiscal balance, be it a change in government spending (ΔG) or a change in government revenue (ΔT) or a combination of the two.¹

Depending on the time horizon considered, there are several relevant ratios that fit the term fiscal multiplier:

- The *impact* multiplier, defined as the ratio of a contemporaneous change in output (at time t_0) to an exogenous change in the fiscal balance at time t_0 i.e., $\Delta Y(t_0) / \Delta G(t_0)$.
- The multiplier at some future point in time (say, N period from now), defined as the ratio of a change in output at time t_0+N to an exogenous change in the fiscal balance at time t_0 i.e., $\Delta Y(t_0 + N) / \Delta G(t_0)$.
- The *cumulative* multiplier, defined as the ratio of the cumulative change in output over an exogenous change in the fiscal balance over a time horizon of N periods i.e., $\Delta Y(t_0 + i) / \Delta G(t_0 + i)$, with $i = 0, 1, \dots, N$.
- The *peak* or *maximum* multiplier, defined as the ratio of the largest change in output over any time horizon N to an exogenous change in the fiscal balance at time t_0 , i.e., $\max \Delta Y(t_0 + N) / \Delta G(t_0)$, for every N .

1. For a more extensive note on the relevant definitions and the determinants of fiscal multipliers see e.g. Spilimbergo et al. (2011), IMF Staff Position Note (09/11).

Prior theoretical and empirical work on the response of main macroeconomic aggregates to exogenous fiscal shocks has shown that the size and, in certain instances, the sign of the fiscal multiplier can be country-, estimation method-, and economic conditions-specific. In general, it appears that quite diverse views continue to exist among economists and policy makers as regards the quantitative and qualitative effects of fiscal policy.

As noted in e.g. Berti et al. (2013)¹, many factors influence the size of fiscal multipliers. They can be grouped as follows: *i)* the composition of the fiscal intervention and its credibility, as well as the fiscal rules adopted by the government; *ii)* the effects of monetary policy on interest rates and the perceived riskiness of the sovereign; *iii)* the access of households and companies to finance; *iv)* other economic factors, like price and wage flexibility, the exchange rate regime in which the country operates and external demand.

Based on the existing literature, Berti et al. (2013) note that in case of financial crises fiscal multipliers tend to be larger than usual (see, for instance, Auerbach and Gorodnichenko, 2011). In particular, fiscal multipliers tend to be higher when monetary policy is constrained by the liquidity trap (Christiano et al., 2011), economic agents are financially constrained (Galí et al., 2007), important nominal price and wage rigidities are in place (Woodford, 2011; Andrés et al., 2012), economies are relatively closed (Corsetti and Müller, 2012, and Ilzetzki et al., 2012), and exchange rates are irrevocably fixed, as in the Euro Area (see, among others, Ilzetzki et al., 2012, Corsetti et al., 2012, and Erceg and Lindé, 2012). When this is the case, fiscal consolidation possibly entails short-term increases in the public debt-to-GDP ratio of the consolidating countries, due to its short-term negative impact on economic activity. The higher the initial debt ratio and the greater the budget elasticity to the cycle, the more likely this is.

One should anyway also consider that, as underlined in the literature, another key driver behind the impact of fiscal consolidation is given by financial markets' perception of the possibility for a certain country to default on its sovereign. In this sense, multipliers applying to consolidation efforts would not be large in instances where fiscal policy action lowers the probability of default perceived by financial markets (see, for instance, Ilzetzki et al., 2012, Corsetti et al., 2012, and Hernández de Cos and Moral Benito, 2013).

1. Berti K., F. Castro and M. Salto (2013) "Effects of fiscal consolidation envisaged in the 2013 Stability and Convergence Programmes on public debt dynamics in EU Member States", European Commission, Economic Papers 504/September 2013.

Are fiscal multipliers regime-dependent?

Findings of a recent meta regression analysis

Gechert, S. and A. Rannenberg (2014) "Are Fiscal Multipliers Regime-Dependent? A Meta Regression Analysis" IMK Macroeconomic Policy Institute, WP 139/Sept. 2014.

The study analyzes whether estimated multiplier effects are systematically higher if the economy suffers a downturn.

For that purpose, a meta-regression analysis is conducted based on a unique data set of 98 empirical studies with more than 1800 observations on multiplier effects.

Controlling for regime dependence of the multiplier, the Study finds that multipliers significantly increase (by about 0.6 to 0.8 units) during a downturn.

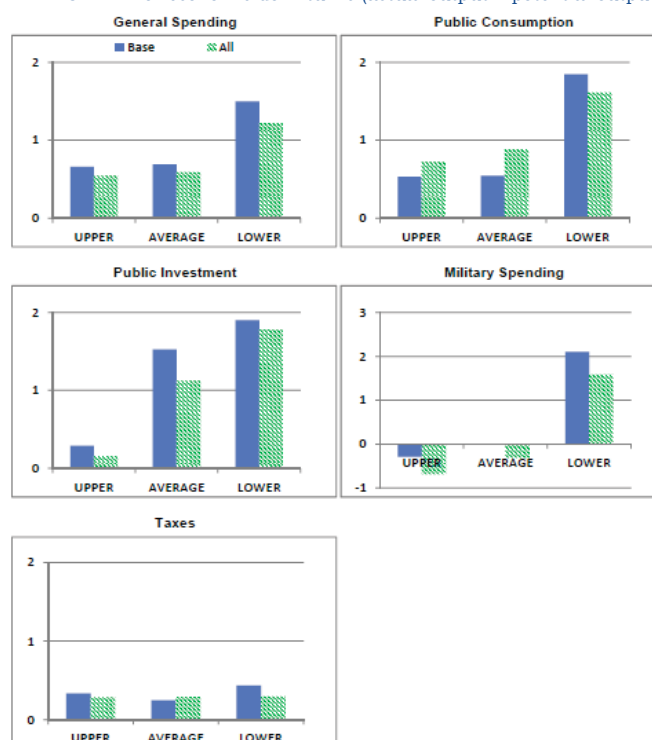
Moreover, spending multipliers significantly exceed tax multipliers (by about 0.3 units) in normal times and even more so during recessions.

Based on a broad array of empirical evidence, the study concludes that in order to limit the adverse consequences for growth, fiscal consolidation should take place during the recovery and should be primarily tax-based.

On the right side of this page, see relevant figure presented in the aforementioned study

Compound cum. multipliers of fiscal impulses for different regimes (*)

"UPPER" for economic upturns (actual output > potential output)
 "AVERAGE" (actual output in line with potential output)
 "LOWER" for economic downturns (actual output < potential output)



(*) blue-bold bars: baseline specification; green-striped bars: specification with all possible interactions

In two recent empirical studies on the macroeconomic effects of exogenous fiscal shocks in Greece, *regime-dependent* fiscal multipliers are estimated for a range of key government revenue and expenditure categories; see **Monokroussos, P. and D. Thomakos, 2012¹ & 2013²**.

Monokroussos, P. and D. Thomakos (2013) employ a Multivariate Threshold Autoregressive Model (TVAR) to investigate the *time-* and *regime-*dependent properties of Greece's fiscal multipliers. Some of the most important findings of the aforementioned study are summarized below:

- The response of real output to discretionary shocks in government current spending on goods and services and/or government tax revenue depends on the regime in which the shock occurs as well as on the size and direction (expansionary vs. contractionary) of the initial shock.
- In general, expansionary or contractionary shocks taking place in lower output regimes (economic downturns) appear to have much larger effects on output - both on impact and on a cumulative basis - than shocks of similar sign and size occurring in upper regimes (economic expansions).
- In lower regimes, the contractionary effects on output from a negative fiscal shock (spending cut or tax hike) rise with the absolute size of the shock. The same applies for expansionary fiscal shocks (spending hikes or tax cuts). Similar effects apply for fiscal shocks taking place in upper output regimes, though to a much lesser extent.
- Regarding the current fiscal adjustment programme in Greece, our empirical results appear to support the case for a more gradual implementation profile of the agreed austerity package for 2013-2016. This is especially because, the aforementioned programme is heavily front-loaded, relying mainly on steep cuts in government expenditure items that are understood to have large fiscal multipliers e.g. wages and pensions.
- Given the overall size of Greece's fiscal adjustment programme, our multiplier estimates suggest that Greek GDP will decline by up to €1.89 cumulatively over a three-year period per €1 discretionary decrease in real government spending on goods and services.
- Furthermore, our estimates argue in favor of higher public investment spending in the current depressionary environment as a means of boosting short- and medium-term economic growth. In particular, our GIRF estimates imply among others that for a 5% YoY positive discretionary shock in the public investment programme, real output rises by between €2.91 and €3.99 cumulatively over a 12 quarter period per €1 increase in real investment expenditure.

1. Monokroussos, P. and D. Thomakos (2012) "Fiscal Multipliers in deep economic recessions and the case for a 2-year extension in Greece's austerity programme" Eurobank Economic Research, October 2012.
2. Monokroussos, P. and D. Thomakos (2013) "Greek fiscal multipliers revisited: Government spending cuts vs. tax hikes and the role of public investment expenditure" Eurobank Economic Research, March 2013.

How big (small?) are fiscal multipliers in Greece?

Findings of some recent empirical studies

Output response to government current expenditure shocks

(G: real government spending on goods and services; T: real government taxes net of transfers & property income; Y real output)

(G;T;Y) - G shock						
Impact multiplier						
Shock Size	1.5%YoY		3% YoY		5% YoY	
Shock Sign	pos.	neg.	pos.	neg.	pos.	neg.
Lower regime	0.59	-0.59	1.18	-1.18	2.00	-2.00
Upper regime	0.09	-0.09	0.18	-0.18	0.30	-0.30
Cumulative multiplier (4 quarters)						
Shock Size	1.5%YoY		3% YoY		5% YoY	
Shock Sign	pos.	neg.	pos.	neg.	pos.	neg.
Lower regime	0.54	-0.54	1.07	-1.07	1.82	-1.78
Upper regime	0.39	-0.39	0.78	-0.78	1.28	-1.35
Cumulative multiplier (8 quarters)						
Shock Size	1.5%YoY		3% YoY		5% YoY	
Shock Sign	pos.	neg.	pos.	neg.	pos.	neg.
Lower regime	0.87	-0.85	1.66	-1.73	2.84	-2.81
Upper regime	0.49	-0.52	0.97	-1.04	1.67	-1.79
Cumulative multiplier (12 quarters)						
Shock Size	1.5%YoY		3% YoY		5% YoY	
Shock Sign	pos.	neg.	pos.	neg.	pos.	neg.
Lower regime	0.92	-0.92	1.82	-1.89	3.13	-3.05
Upper regime	0.54	-0.55	1.01	-1.12	1.78	-1.93

Source: Monokroussos, P. and D. Thomakos (2013) "Greek fiscal multipliers revisited: Government spending cuts vs. tax hikes and the role of public investment expenditure" Eurobank Economic Research, March 2013.

The specter of self-defeating consolidations was initially raised in Gros (2011)¹, where a simple framework was utilized to show that austerity could indeed increase the debt ratio in the short-run. In a similar vein, Delong and Summers (2012)² suggest that in a depressed economy even a small amount of “hysteresis” - i.e., a small impact on potential output due to the economic downturn – means, by simple arithmetic, that expansionary fiscal policy is likely to be self-financing. Although the authors clarify that their argument “does not justify unsustainable fiscal policies, nor does it justify delaying the passage of legislation to make unsustainable fiscal policies sustainable” it is clear that the notion of hysteresis takes particular importance for fiscal consolidations undertaken during deep economic downturns, where multipliers are likely to be both high and persistent i.e., their recessionary effects stretch well beyond the year when the fiscal adjustment is applied.

A number of mechanisms have been suggested in the literature to substantiate the notion of *hysteresis*. Some of these include (see Delong and Summers, 2012):

- reduced labor force attachment on the part of the long-term unemployed;
- scarring effects on young workers who have trouble beginning their careers;
- reductions in government physical and human capital investments as social insurance expenditures make prior claims on limited public financial resources;
- reduced investment both in research and development and in physical capital;
- reduced experimentation with business models and informational spillovers, and changes in managerial attitudes;
- other effects.

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1. Gros, Daniel, 2012, “Can Austerity Be Self-defeating?” CEPS, Intereconomics : review of European economic policy.- Berlin : Springer, ISSN 1613-964X, ZDB-ID 2066476X. - Vol. 47.2012, 3, p. 175-184.
 2. Delong, J. Bradford & Summers, Lawrence H., 2012, “Fiscal Policy in a Depressed Economy “Brookings Papers on Economic Activity, Spring 2012, The Brookings Institution.

Can an expansionary fiscal policy in a depressed economy be self-financing?

“In a depressed economy, with short-term nominal interest rates at their zero lower bound [or with monetary policy being constrained because of the institutional arrangements of the euro area - phase within brackets is our addition], ample cyclical unemployment, and excess capacity, increased government purchases would be neither offset by the monetary authority raising interest rates nor neutralized by supply-side bottlenecks. Then even a small amount of hysteresis—even a small shadow cast on future potential output by the cyclical downturn—means, by simple arithmetic, that expansionary fiscal policy is likely to be self-financing. Even if it is not, it is highly likely to pass the sensible benefit-cost test of raising the present value of future potential output. Thus, at the zero bound, where the central bank cannot or will not but in any event does not perform its full role in stabilization policy, fiscal policy has the stabilization policy mission that others have convincingly argued it lacks in normal times. Whereas many economists have assumed that the path of potential output is invariant to even a deep and prolonged downturn, the available evidence raises a strong fear that hysteresis is indeed a factor. Although nothing in our analysis calls into question the importance of sustainable fiscal policies, it strongly suggests the need for caution regarding the pace of fiscal consolidation.”

Delong and Summers (2012)¹

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1. Delong, J. Bradford & Summers, Lawrence H., 2012, “Fiscal Policy in a Depressed Economy “Brookings Papers on Economic Activity, Spring 2012, The Brookings Institution.

In line with Delong and Summers (2012)¹, let us assume:

A temporary increase in government spending by ΔG , measured in percentage-point -of-potential-GDP-years.

A reduction of the present period's output gap, Y_n ("n" for "now") by an amount ΔY_n (also measured in percentage point-years), due to the aforementioned policy intervention:

$$(1) \quad \Delta Y_n = \mu * \Delta G, \text{ where } \mu \text{ is the short-term (impact) multiplier coefficient}$$

Financing this expansion of government purchases requires increasing the national debt by an amount ΔD , also measured in percentage-point-of-potential-GDP-years. Given μ as before and assuming a baseline marginal tax-and-transfer rate τ , the required increase in the national debt is then:

$$(2) \quad \Delta D = (1 - \mu\tau) * \Delta G.$$

If now the economy's long-run growth rate is g and the real government borrowing rate is r , this additional debt ΔD imposes on the government an annual financing burden in percentage points of a year's potential GDP of:

$$(3) \quad (r-g) * \Delta D = (r-g) * (1 - \mu\tau) * \Delta G, \text{ if it is to maintain a stable long-run debt-to-GDP ratio.}$$

Assume next that in future periods production is determined by supply and that there is no gap between real aggregate demand and potential output. Then, in a typical future period, potential and actual output Y_f (where "f" stands for "future") will be reduced by a hysteresis parameter η times the depth by which the economy is depressed in the present:

$$(4) \quad \Delta Y_f = \eta * \Delta Y_n = \eta * \mu * \Delta G.$$

A fiscal expansion undertaken to prevent hysteresis thus creates a fiscal dividend; it raises future tax collections by an amount:

$$(5) \quad \tau * \Delta Y_f = \tau * \eta * \mu * \Delta G.$$

Equations (3) and (5) together imply that if:

$$(6) \quad (r-g) * (1 - \mu\tau) - \eta * \mu * \tau \leq 0,$$

then at the margin, transitory expansionary fiscal policy is self-financing.

Rearranging equation 6, we can show that this net future fiscal dividend from the present-period fiscal expansion ΔG arises as long as r satisfies:

$$(7) \quad r \leq g + \eta * \mu * \tau / (1 - \mu\tau)$$

1. Delong, J. Bradford & Summers, Lawrence H., 2012, "Fiscal Policy in a Depressed Economy " Brookings Papers on Economic Activity, Spring 2012, The Brookings Institution.

Critical Values for the real effective interest rate on debt for a fiscal expansion to be self-financing

In line with Delong and Summers (2012)¹,

Parameter values for base case		
Parameter	Interpretation	Value range
μ	Present-period government spending multiplier	0-2.5
r	Real government borrowing rate & social rate of time discount, per year	0.025-?
g	Trend growth rate of potential GDP, per year	0.0095-0.0125
τ	Marginal tax-and-transfer rate	0.33-0.40
η	Hysteresis: proportional reduction in potential output from a temporary downturn	0.0-0.2

Critical Values of the Real Treasury Rate for Fiscal Expansion to Be Self-Financing						
Critical real Treasury interest rate for individual value of multiplier μ (% per year)						
Hysteresis η	$\mu = 0$	$\mu = 0.5$	$\mu = 1.0$	$\mu = 1.5$	$\mu = 2.0$	$\mu = 2.5$
0.000	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
0.025	1.00%	1.53%	2.35%	3.76%	6.83%	18.50%
0.050	1.00%	2.06%	3.69%	6.53%	12.67%	36.00%
0.100	1.00%	3.12%	6.38%	12.05%	24.33%	71.00%
0.200	1.00%	5.24%	11.77%	23.11%	47.67%	141.00%

1. Delong, J. Bradford & Summers, Lawrence H., 2012, "Fiscal Policy in a Depressed Economy " Brookings Papers on Economic Activity, Spring 2012, The Brookings Institution.