

Fiscal Multipliers in Practice



Marcos Poplawski-Ribeiro

Meeting of the Advisory Panel on Macro-economic Models and
Methods – Norway Ministry of Finance

Oslo, June 3, 2013

Introduction: Definition



“One of the few positive effects of the recent financial crisis has been the revival of interest in the short-run macroeconomic effects of government spending and tax changes.” (Ramey, 2011)

- Fiscal Multipliers (FMs) measure the **impact of fiscal policy** (structural shock) **on output**, relative to baseline

$$\text{Multiplier at horizon } i = \frac{\Delta Y(t + i)}{\Delta G(t)}$$

- Tax, spending, “overall” FMs
- FMs capture not only first-round effects, but also **non-fiscal endogenous factors** (monetary policy response, price adjustments etc)



- I. Introduction
- II. Methodology
- III. Literature
 - I. Mineshima et al.(2013)
 - II. Survey on Non-linear Fiscal Multipliers
 - III. Literature Survey on Asia
- IV. Estimation
 - I. Baum, Poplawski-Ribeiro, and Weber (2012)
- V. Use
- VI. Conclusions
- VII. Appendices

Introduction: Motivation (1)



- The use of fiscal multipliers at the Fund is **heterogeneous**
 - Average 1-year multiplier = 0.5
- Heterogeneity is to be expected
 - FMs estimates not available for most EMs and LICs
 - In financial programming, not all countries (in particular LICs) model feedback from fiscal to real sector
 - Country teams implicitly take into account fiscal policy in their growth projections

Introduction: Motivation (2)



- **More systematic use of FMs could be beneficial:**
 - May improve the accuracy of **growth projections** (Blanchard and Leigh, 2013; Beetsma et al. 2010)
 - May improve **policy advice** and program design. Underestimating FMs creates risks: unachievable targets; negative feedback loops of repeated tightening-slow growth-deflation

■ Step 1: How is the right Fiscal Multiplier selected?

Three main options:

- Estimate via (S)VAR or DSGE
- Use existing estimates if (i) available, (ii) meet certain quality standards, (iii) take into account amplifying factors of current environment
- Guesstimate with “bucket” approach (in particular for EMs and LICs). Can also serve as cross-check

- **Step 2: How are Fiscal Multipliers incorporated into macro projections?**
 - Not straightforward how to integrate Fiscal Multipliers in the financial programming framework
 - However, there are alternative methods to account for fiscal policy in growth forecasts
 - Additional option: incorporate FMs via a template

How to get Multipliers “Off-The-Shelf”? (1)



- Two types of estimates in the literature: (i) empirical; (ii) model-based
- Recent **empirical** literature on advanced economies
 - (S)VAR using country-specific data
 - Important to specify clearly the identification strategy
 - Reflect average output response over the past
 - Time-varying multipliers? (Cimadomo & Bénassy-Quéré, 2012)
 - May fail to measure correctly exogenous fiscal shocks
 - Also how to account for other shocks (monetary) and spillovers
- **Model:** DSGE estimates (e.g., GIMF, or EC or OECD models)
 - Describe whole economy, more variables (Coenen et al., 2012)
 - Results partly pre-determined; less cross-country dispersion of FMs

How to get Multipliers “Off-The-Shelf”? (2)



Advanced economies

- Mineshima, Poplawski-Ribeiro, and Weber (2013) broad review of **past literature** (empirical and model):
 - Average 1-year Fiscal Multipliers < 1
 - 0.5-0.9 for G; 0.1-0.3 for T
 - → based on current exp-rev mix, this gives an overall FM of 0.6
- **More recently:** Fiscal Multipliers may be larger in current environment:
 - i. downturn;
 - ii. less supportive external environment; and
 - iii. policy interest rate close to the *zero lower bound*

Table 1. Size of Government Spending Fiscal Multipliers (Linear Approach)

a. Size of Government Spending Fiscal Multipliers

	All Samples		United States		Europe	
	VAR	DSGE 2/	VAR	DSGE 2/	VAR	DSGE 2/
Mean	0.8	0.7	1.0	0.7	0.8	0.6
Median	0.8	0.6	1.2	0.8	0.8	0.5
Maximum	2.1	1.7	2.1	1.6	1.8	1.2
Minimum	0.1	0.0	0.3	0.0	0.3	0.2
Plausible range 1/	0.5–0.9		0.7–1.1		0.5–0.7	

1/ The upper and lower values of the mid-30 percent ranges, including VAR and DSGE, f

2/ Excluding top 35 percent and bottom 35 percent of the samples

b. Size of Government Revenue Fiscal Multipliers

	All Samples		United States		Europe	
	VAR	DSGE 2/	VAR	DSGE 2/	VAR	DSGE 2/
Mean	0.2	0.3	0.7	0.5	0.1	0.2
Median	0.1	0.2	0.9	0.3	0.1	0.1
Maximum	1.4	1.3	1.4	1.3	0.7	0.7
Minimum	-1.5	0.0	-0.7	0.0	-0.5	0.0
Plausible range 1/	0.1–0.3		0.3–0.7		0.1–0.2	

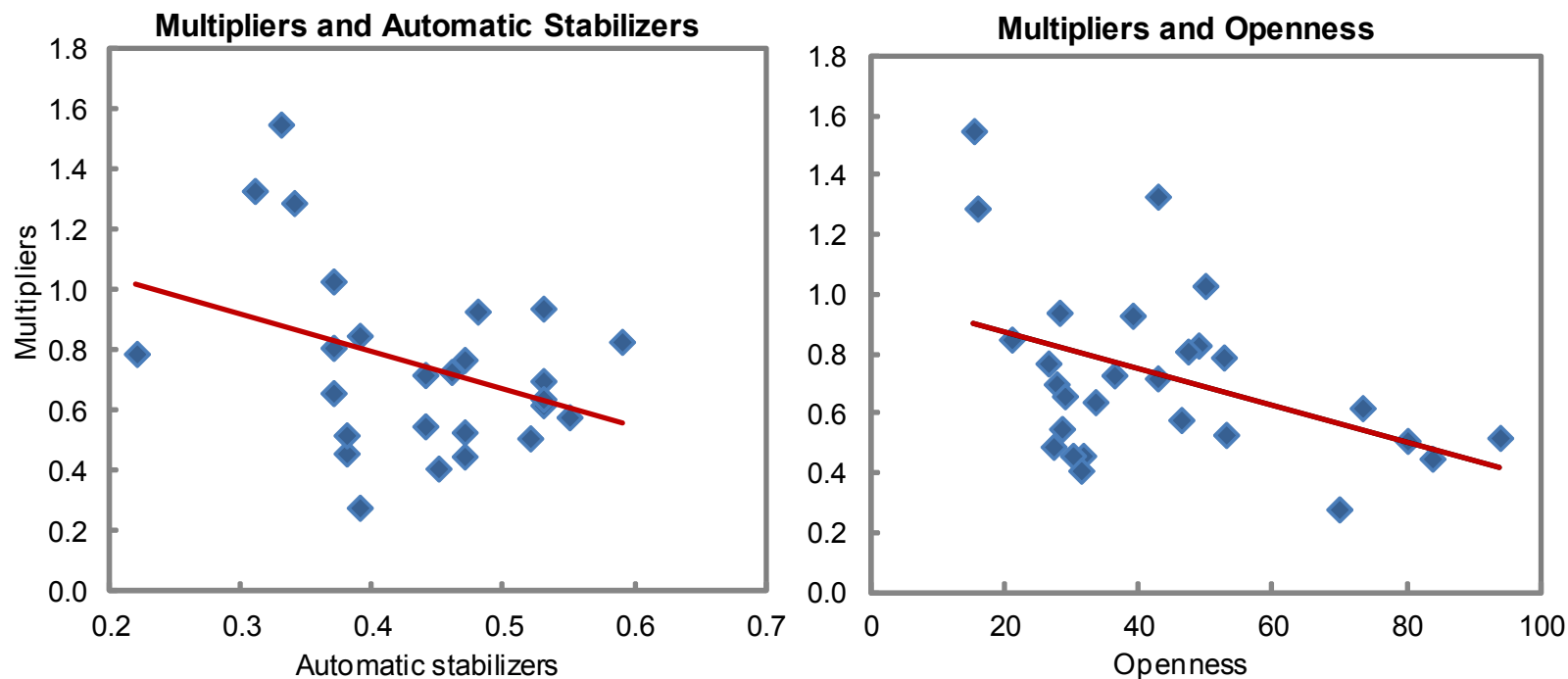
Table 2. Fiscal Multipliers in Economic Recessions vs. Expansions

	Country	Methodology	Expansion	Recession
Auerbach-Gorodnichenko (2012b)	The U.S.	VAR	0.6	2.5
Batini et al (2012)	The U.S.	VAR	0.3	2.2
	Euro Area	VAR	0.4	2.6
Baum-Koester (2011)	Germany	VAR	0.3-0.4	1-1.3
Baum et al (2012)	The U.S.	VAR	1.3	1.8
	Japan	VAR	1.5	2.0
Canzonen et al (2011)	The U.S.	DSGE	0.9	2.2

Table 3. Fiscal Multipliers and the Monetary Policy Stance

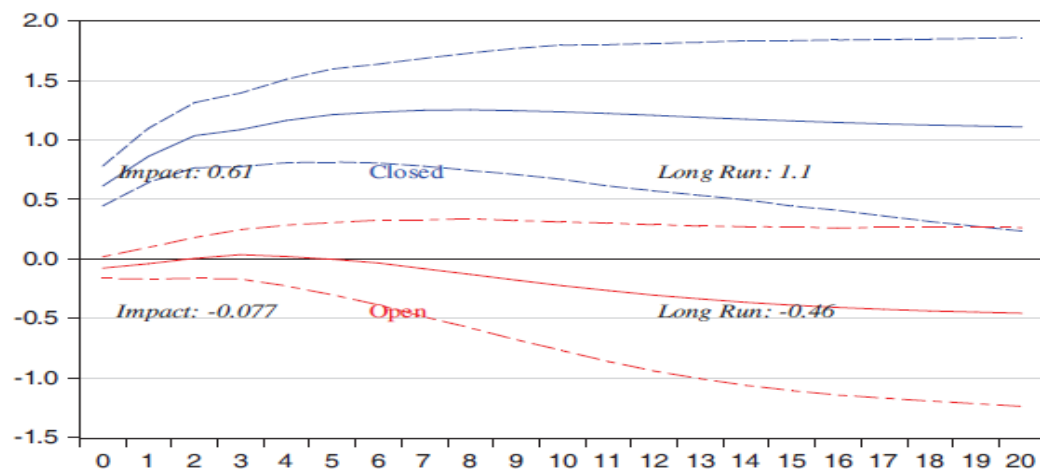
	Country	Methodology	No zero-bound	Zero-bound
Christiano et al (2009)	The U.S.	DSGE	0.7	3.7
Eggertsson (2006)	The U.S.	DSGE	0.5	3.8

Figure 1. Country Characteristics and Multipliers



Sources: IMF, Fiscal Affairs Department Fiscal Rules database and Fiscal Transparency database; Organization for Economic Cooperation and Development (OECD); and IMF staff estimates.

Note: Multipliers are based on the OECD (2009). Openness is measured by import penetration, that is the 2008–11 average of $\text{Imports}/(\text{GDP} - \text{Exports} + \text{Imports}) \times 100$. Automatic stabilizers are measured as the semielasticity of the budget balance and are extracted from André and Girouard (2005). The negative correlations in the panel are robust to outliers being removed using an automated Stata procedure.



Multiplier and Openness

Fig 7: Cumulative multiplier: The effect of total trade to GDP. Ratio of the cumulative increase in the net present value of GDP and the cumulative increase in the net present value of government consumption, triggered by a shock to government consumption. Impulses from top to bottom: countries with an average ratio of total trade (imports plus exports) above 60% and those with this ratio being below 60%. Dotted lines represent 90% confidence intervals based on Monte Carlo simulations

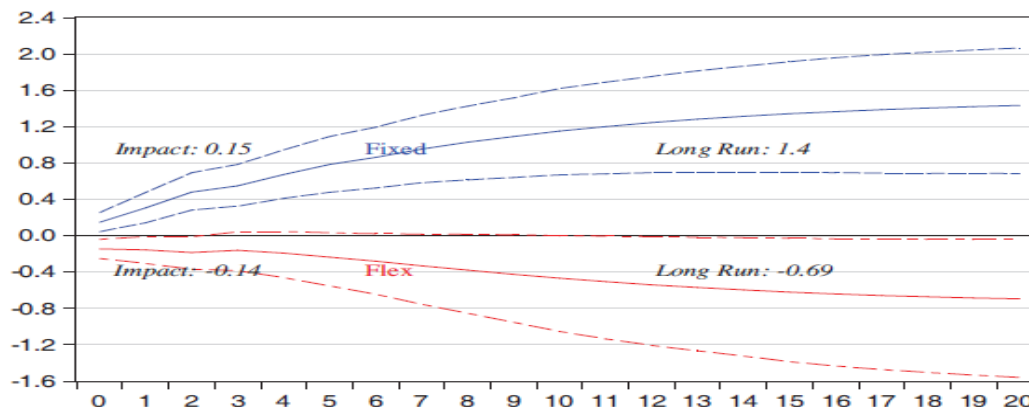


Fig. 4: Cumulative multiplier: Predetermined (fixed) and flexible (flex) exchange arrangements. Ratio of the cumulative increase in the net present value of GDP and the cumulative increase in the net present value of government consumption, triggered by a shock to government consumption. Impulses from top to bottom: episodes of countries under fixed exchange rates; episodes of countries under flexible exchange rates. Exchange regime classification based on Ilzetky, Reinhart, and Rogoff (2008). Dotted lines represent 90% confidence intervals based on Monte Carlo simulations

Multiplier and Exchange Rates



Emerging economies and LICs

- **Limited evidence** (Ilzetzki 2011, Ilzetzki et al. 2011)
- FMs seem to be **smaller than in advanced economies**
- Maybe due to more open economies, higher spreads, supply and capacity constraints, precautionary savings?
 - Fiscal policy implementation in LICs: Lledó & Poplawski-Ribeiro (2012) and Guerguil and others (2013).

IMF Literature Review on Asia (1)



■ Model based estimates from OECD and IMF

	Model Based Estimates (1-year)								
	OECD (2009)		OECD (2012)		IMF (2009)		Ducanes and others (2006)		
	G*	T*	G*	T*	G**	T**	G (increase)	G (decrease)	T
Australia	0.8	0.4							
Bangladesh							0.4	0.8	0.1
China							0.3	1.6	0.4
Indonesia							0.2	0.8	0.2
Japan	0.8	0.4	1.2/1.3	0.5	1.5	0.2			
Korea	0.5	0.2							
New Zealand	0.7	0.3							
Philippines							0.3	0.7	0.0
Emerging Asia					1.0	0.5			

*Averages of expenditure (excl. transfers) and tax instruments

** G = investment; T = labor income tax

IMF Literature Review on Asia (2)



■ Empirical estimates from ADB, country-specific studies

	Empirical Estimates (impact multiplier)				
	ADB (2010)		Wang and Wen (2013)	Rafiq and Zeufack (2012) ***	
	G*	T*	G **	G****	T
China			1.7/2.8		
Indonesia	-0.3	0.4			
Malaysia	0.2	0.4		2.7 / 2	0.1/0.2
Philippines	0.4	0.1			
Singapore	-0.2	0.5			
Thailand	-0.4	1.0			

*Average of estimate across different VAR specifications

** Consumption

*** Peak multiplier; accounts for cycle (downturn/upturn)

**** Investment

How to Estimate or Calibrate FMs? (1)



- Several approaches to (S)VAR **estimation**:
 - Linear (e.g. Blanchard-Perotti (BP), 2002)
 - Non-linear (e.g. Auerbach-Gorodnichenko, 2011, 2012; Batini et al, 2012; Baum et al, 2012)
- Identification:
 1. Standard VAR: Choleski decomposition: govt. spending first (BP, 2002)
 2. Structural VAR: identify tax shocks using endogenous part of taxes and transfers (BP, 2002)
 3. Military spending (Hall, 1980, Barro, 1981)
 4. Narrative method (Romer & Romer, 1989; WEO, 2010)
 - The effect of anticipations (Ramey, 2011)
- Model-based calibration:
 - GIMF is an example of **calibrated** DSGE

Literature Survey on Non-linear Fiscal Multipliers



- **Even though some empirical studies have looked at non-linear effects of fiscal policy on output, but gaps remain:**
 - Single-Country only: Germany: Baum and Koester (2010), US: Fazzari et al (2011), Auerbach and Gorodnichenko (2012a).
 - Cross Country: Afonso, Baxa, and Slavik (2011) , Auerbach and Gorodnichenko (2012b), Batini and others (2012)
 - Former uses public debt to measure fiscal policy, does not distinguish between revenue and expenditure measures. Financial stability used as threshold variable.
 - Auerbach and Gorodnichenko (2012 b) use semi-annual OECD panel data set. Threshold is not endogenously chosen. Only look at spending measures.
 - Batini and others (2012) uses output growth as threshold variable and among the G7 countries do not include Canada and Germany.
- All studies report significant non-linearities and generally conclude that spending multipliers are larger in recessions than expansions

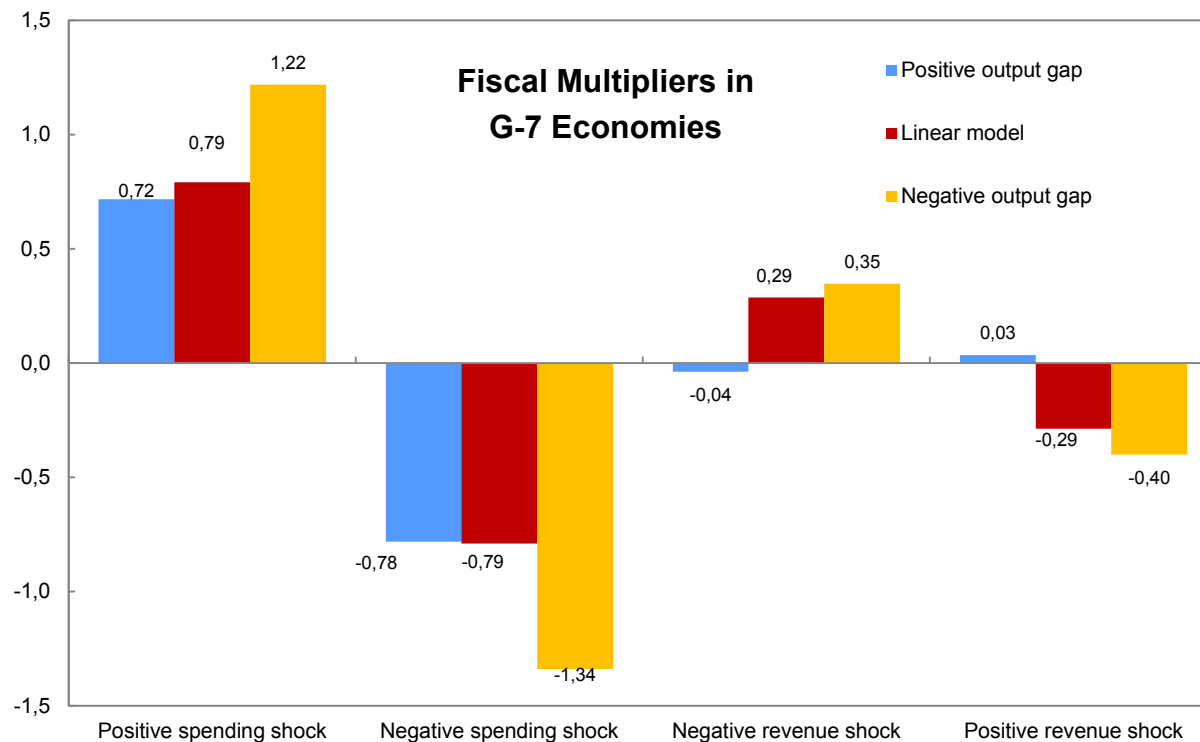


- **Aim is to provide country-by-country estimations that allow for non-linear fiscal policy effects on growth, depending on whether the output gap is above or below a threshold chosen to maximize the fit of the model:**
 - Structural threshold VAR using quarterly data for 6 of the G7 economies: Canada, France, Germany, Japan, UK and US since 1970s
 - Three variables: real GDP, real net revenue and real net expenditure
 - Data sources vary across countries: OECD and national sources
 - We provide “cleaned” series of net revenue and expenditures by excluding episodes in which there is a discrepancy between the policy record and changes in the cyclically adjusted balance due to one off factors (WEO, October 2010, Chapter 3).
 - Identification of structural shocks based on the methodology developed by Blanchard and Perotti (2002)
 - Develop generalized impulse response functions (GIRFs) reflecting the nonlinearity of our model

Baum et al. (2012) – Average Fiscal Multipliers



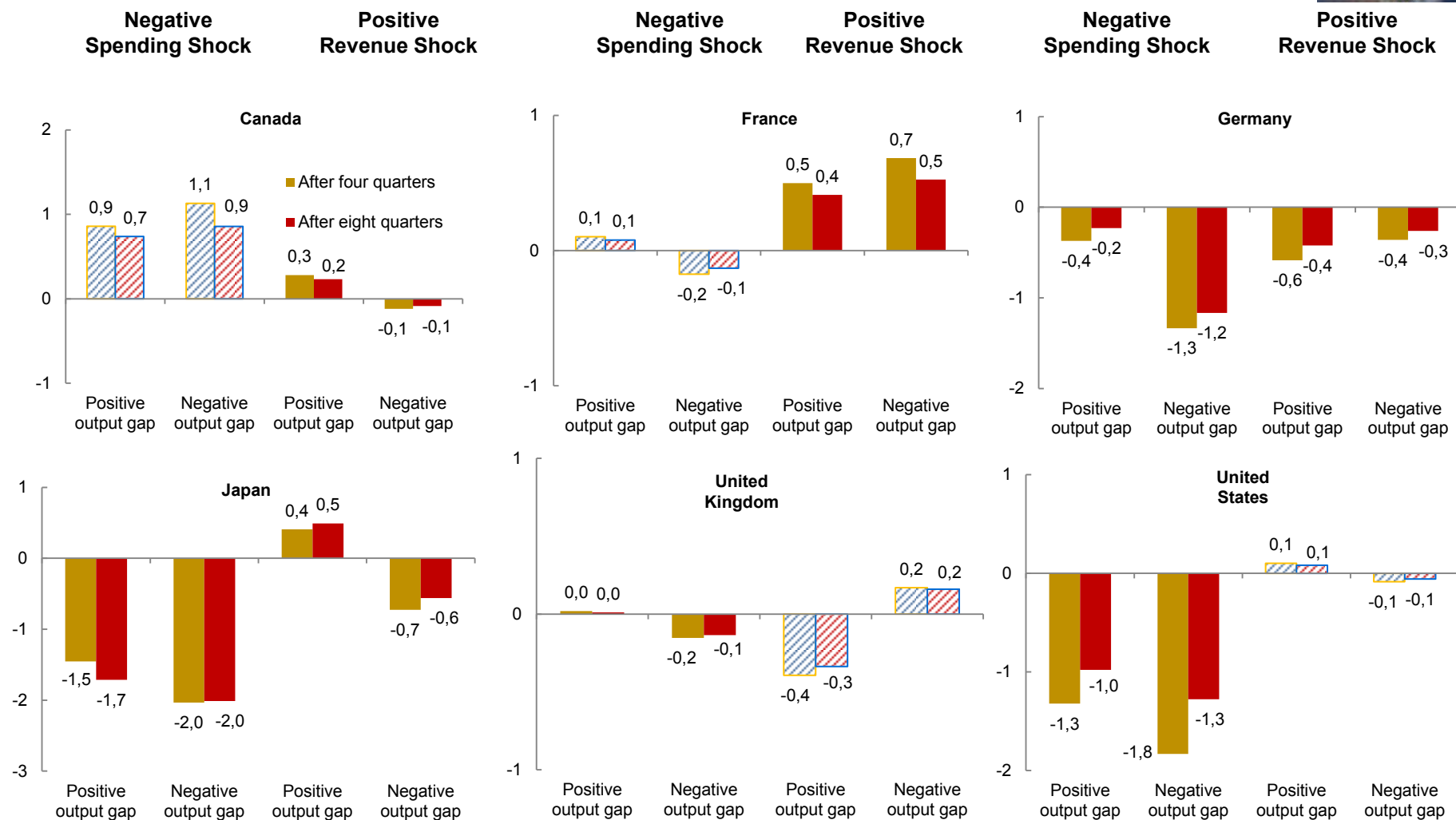
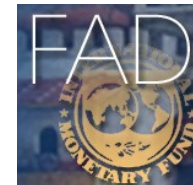
- Fiscal Multipliers are larger in downturns than expansions:



Source: IMF staff calculations.

Note: Cumulative multipliers are standardized multipliers over four quarters. Only statistically significant multipliers are included in the average. Average revenue multipliers exclude France, for which the outliers are large and data limitations are particularly severe. Italy is not included in the G7 average.

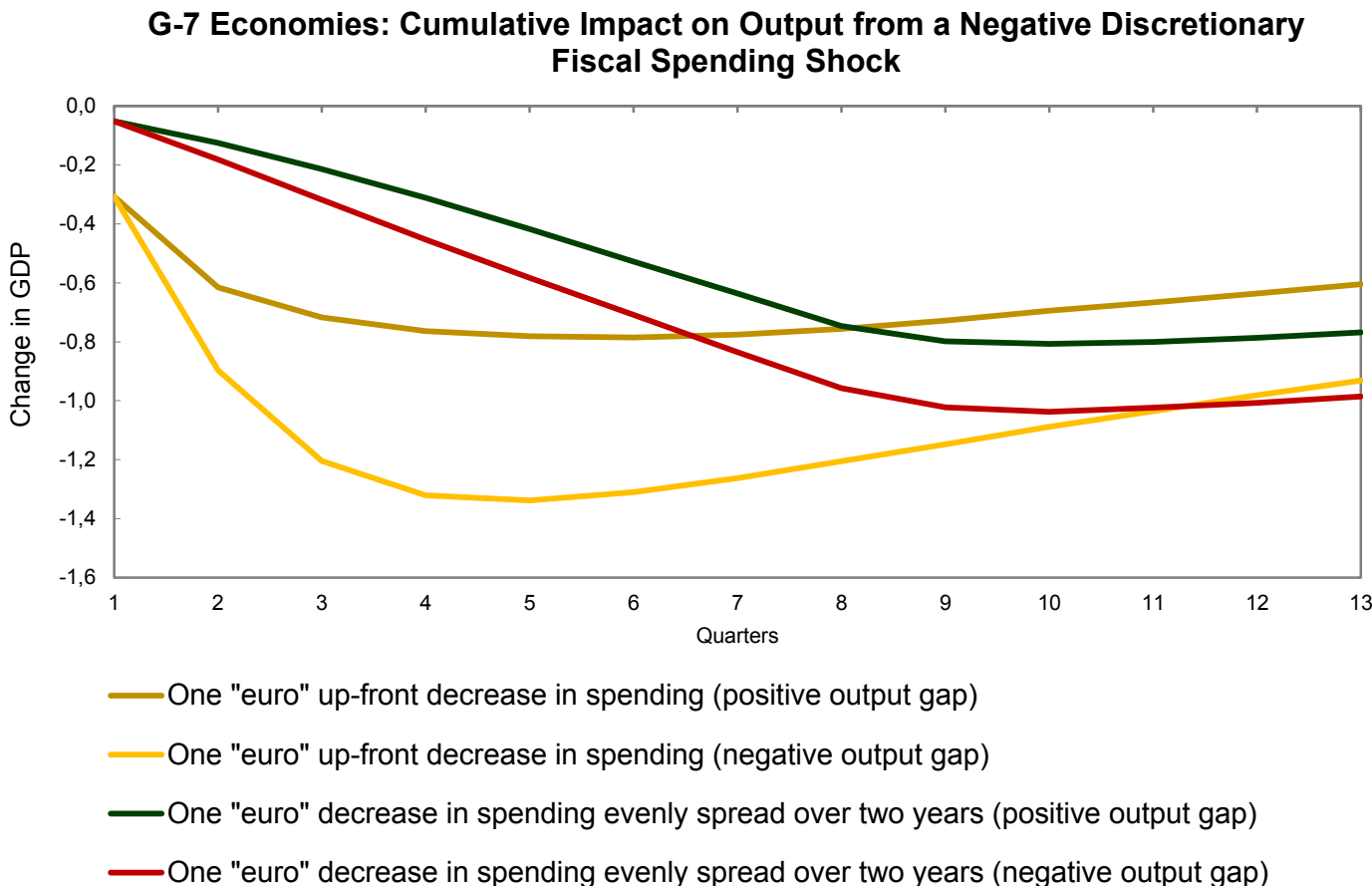
Baum et al. (2012) – Cross-country heterogeneities



Source: IMF staff estimates.

Note: The striped bars correspond to those measures for which no significant impact multiplier is found.

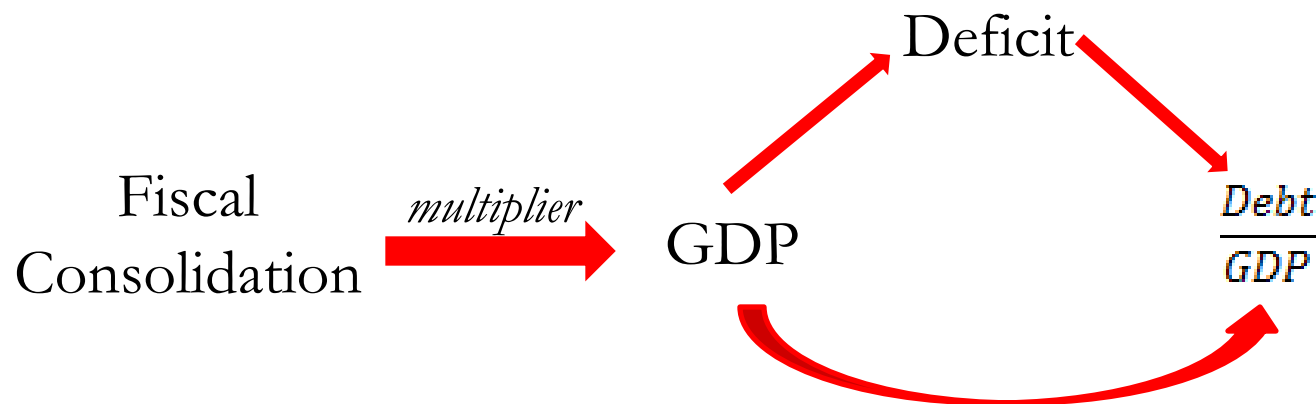
Baum et al. (2012) – Upfront vs. Gradual Adjust.



Sources: National sources; and IMF staff estimates .

Note: The figure shows average multipliers for G7- countries with significant impact multipliers.

- Nexus between fiscal consolidation, growth, and debt reduction:
 - The debt ratio does not decrease one-for-one with fiscal tightening because of the fiscal multiplier



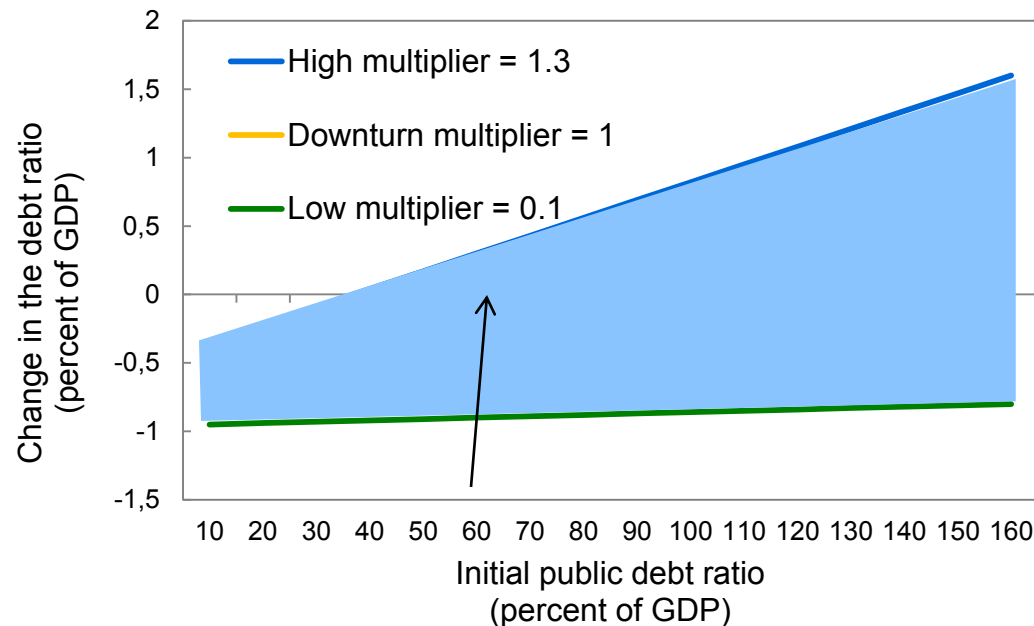
$$\Delta \left(\text{debt}_1 / Y_1 \right) * 100 = -1 + \text{mult}_1 \left(\text{debt}_1 / Y_1 + \text{Rev}_1 / Y_1 \right)$$

Eyraud and Weber (2012) – Debt increasing consolidation



- With multiplier of 1, fiscal consolidation is likely to raise the debt ratio in the first year in countries with debt ratio above 60% of GDP

Impact on the Debt Ratio of a 1 percent of GDP Discretionary Tightening In the First Year (Relative to Baseline)



Expansionary Fiscal Consolidations? (I)



Fiscal consolidation may have a positive impact on growth (lower interest rate because of a lower sovereign risk premium and lower expected taxation; negative multiplier)

Fiscal stabilization in Ireland and Denmark

	Pre-stabilization period 1979–82	Stabilization period 1983–86
<i>Denmark</i>		
Net government borrowing (% of GDP)	5.3	2.5
Average real consumption growth	−0.8	4.2
Average real investment growth	−6.3	11.1
Average real GDP growth	1.3	3.7
<i>Ireland</i>		
	1983–86	1987–90
Net government borrowing (% of GDP)	10.4	4.2
Average real consumption growth	2.6	3.8
Average real investment growth	−4.9	5.3
Average real GDP growth	1.9	5.7

Source: Barry and Devereux, 2003, *Journal of Macroeconomics*

Expansionary Fiscal Consolidations (II)



Alesina and Ardanga (1998):

Expansionary fiscal consolidations emphasize expenditure cuts (transfer programs and the government wage bill)

- Countries that mainly used tax hikes had contractions.
- Contrasts with findings on multipliers (higher for expenditure)

Moderation in salary growth can be important

- Economy-wide salary agreements in some expansionary cases (Australia, Belgium, Italy), but in none of the contractionary cases.

Real depreciation / competitiveness

More recently, the WEO (October 2010) and Perotti (2011) present a more negative analysis of past experiences.

Baum et al. (2012) – Conclusions



- Impact of fiscal policy on economic activity varies with the business cycle.
 - Fiscal multipliers for the six economies analyzed are on average larger in times of negative output gaps than when the output gap is positive.
- The value of multipliers differs noticeably across countries.
 - Spending shocks tend to have a larger effect on output when the output gap is negative. The results are generally less conclusive for revenue multipliers.
 - This heterogeneity of the multipliers calls for a tailored use of fiscal policies and a country-by-country assessment of their effects.
- The finding that the impact of fiscal policy on output depends on the underlying state of the economy has important implications for the choice between an upfront fiscal adjustment versus a more gradual approach.

How to Estimate Multipliers? (2)



- If don't have data, one option is to use some sort of categorized (“bucket”) approach
- Idea: **size of FM is related to a set of characteristics identified by the literature.** For a given country, these combined characteristics suggest a possible multiplier range
- The ranges could be based on:
 - **structural country characteristics** that influence the economy's response to fiscal shocks in “normal times”
 - **conjunctural/temporary characteristics** (cyclical or policy-related phenomena) that make FMs deviate from “normal” levels

- Several options to assess the growth impact of fiscal measures **outside the financial programming framework**:
 - Full-fledged model – needs resources and data; feasible for AEs, but not for many countries
 - Demand side approach on real sector – need to assess the effects on several items (private consumption and investment, exports and imports). Does not take into account second round effects
 - **Fiscal multiplier in separate template** – a possible approach for EMs and LICs

- Fiscal Multipliers are key inputs for assessment of the short-term macroeconomic impact of fiscal policy
- The use of FMs in country teams is still heterogeneous.
- Estimate or calibrate (model-based) fiscal multipliers explicitly may bring several benefits
 - Importance of the econometric procedure and identification for their empirical estimation.
- The use of a multiplier template could complement the macro framework (but it is not a substitute for it or for the DSA)

Additional research on multipliers



- Industry analysis
 - Perotti (2008, NBER Annual), Aghion et al. (2009), Nekarda & Ramey (2011)
- Regional data
 - Davis, Loungani, and Mahidhara (1997), Nakamura & Steinsson (2011)
- Different fiscal instruments
 - Fiscal transfers: Oh and Reis (2011)
- Developing countries
 - Identification via (official creditors) lending (Kray, 2012).



Thank you!

Appendix 3: Baum et al (2012) Using Output Growth as Threshold Variable



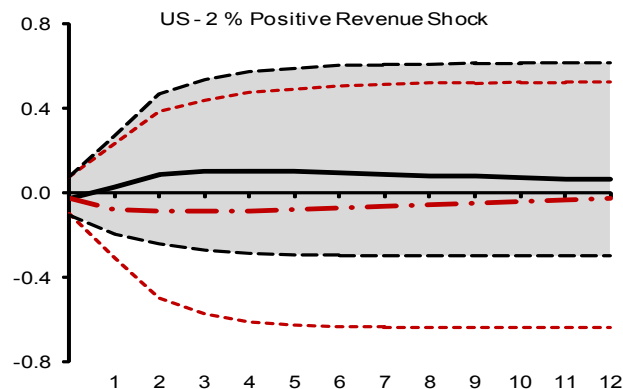
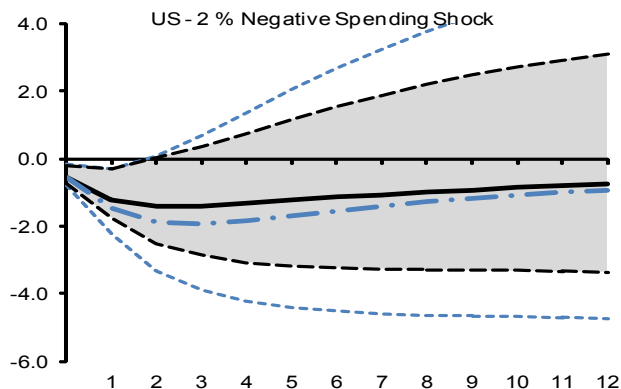
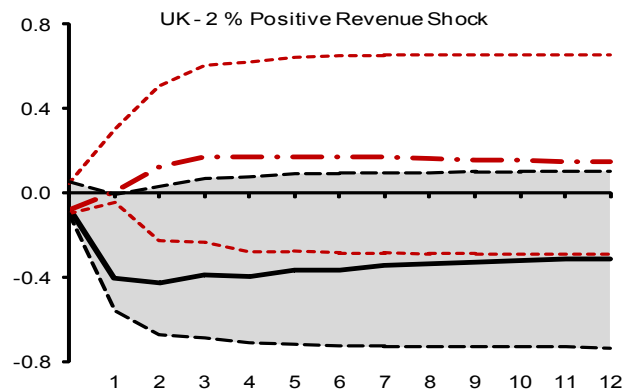
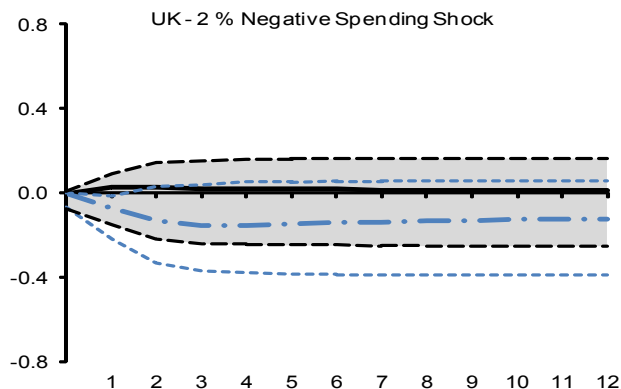
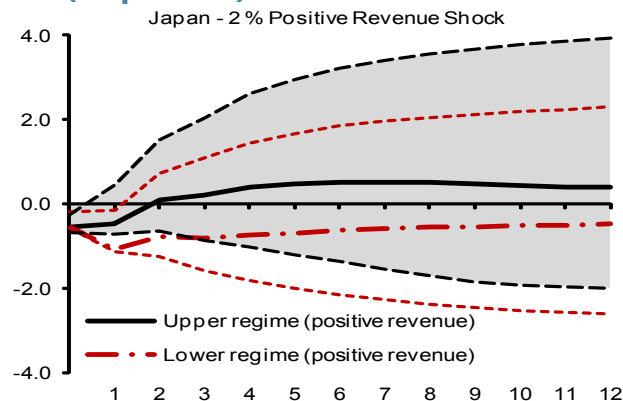
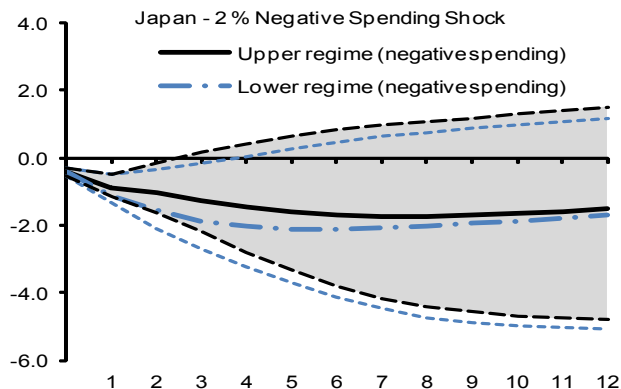
G7 Selected Countries: Comparison of Multipliers Estimated Using Output Gap or GDP Growth as Threshold Variable, 1965Q2–2011Q2

Country	Regime	4 quarters				8 quarters			
		Spending Shock		Revenue Shock		Spending Shock		Revenue Shock	
		Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Canada	Positive output gap	-0.9	0.9	0.3	-0.3	-0.7	0.7	0.2	-0.2
	<i>Positive GDP growth</i>	-0.8	0.9	0.2	-0.5	-1.1	1.2	0.2	-0.6
	Negative output gap	-1.1	1.1	-0.1	0.1	-0.9	0.9	-0.1	0.1
	<i>Negative GDP growth</i>	-2.7	3.0	-0.2	0.2	-3.3	3.9	-0.2	0.3
France	Positive output gap	-0.1	0.1	0.5	-0.5	-0.1	0.1	0.4	-0.4
	<i>Positive GDP growth</i>	1.7	-1.8	-0.7	0.6	2.1	-2.3	-0.9	0.7
	Negative output gap	0.2	-0.2	0.7	-0.7	0.1	-0.1	0.5	-0.5
	<i>Negative GDP growth</i>	-0.7	1.0	-1.6	1.6	-1.1	1.6	-2.2	2.2
Germany	Positive output gap	0.2	-0.4	-0.6	0.7	0.1	-0.2	-0.4	0.5
	<i>Positive GDP growth</i>	0.4	-0.5	-0.6	0.5	0.4	-0.6	-0.8	0.6
	Negative output gap	1.0	-1.3	-0.4	0.5	0.8	-1.2	-0.3	0.4
	<i>Negative GDP growth</i>	1.0	-1.0	-0.5	0.6	1.3	-1.3	-0.6	0.7
Japan	Positive output gap	1.4	-1.5	0.4	-0.5	1.9	-1.7	0.5	-0.5
	<i>Positive GDP growth</i>	0.9	-1.0	0.6	-0.9	1.3	-1.2	0.4	-0.6
	Negative output gap	2.0	-2.0	-0.7	0.5	2.4	-2.0	-0.6	0.3
	<i>Negative GDP growth</i>	1.6	-1.4	0.2	-0.4	1.8	-1.5	-0.2	-0.2
United Kingdom	Positive output gap	0.0	0.0	-0.4	0.4	0.0	0.0	-0.3	0.4
	<i>Positive GDP growth</i>	0.1	-0.1	0.0	0.1	0.1	-0.1	-0.1	0.1
	Negative output gap	0.2	-0.2	0.2	-0.2	0.1	-0.1	0.2	-0.2
	<i>Negative GDP growth</i>	-0.1	0.1	0.1	-0.1	-0.1	0.1	0.1	-0.1
United States	Positive output gap	1.3	-1.3	0.1	-0.1	1.0	-1.0	0.1	-0.1
	<i>Positive GDP growth</i>	1.8	-1.6	-0.4	0.4	2.4	-2.0	-0.5	0.5
	Negative output gap	1.7	-1.8	-0.1	0.1	1.2	-1.3	-0.1	0.1
	<i>Negative GDP growth</i>	1.9	-2.1	-0.2	0.2	2.4	-2.9	-0.3	0.3

Source: Authors' calculations.

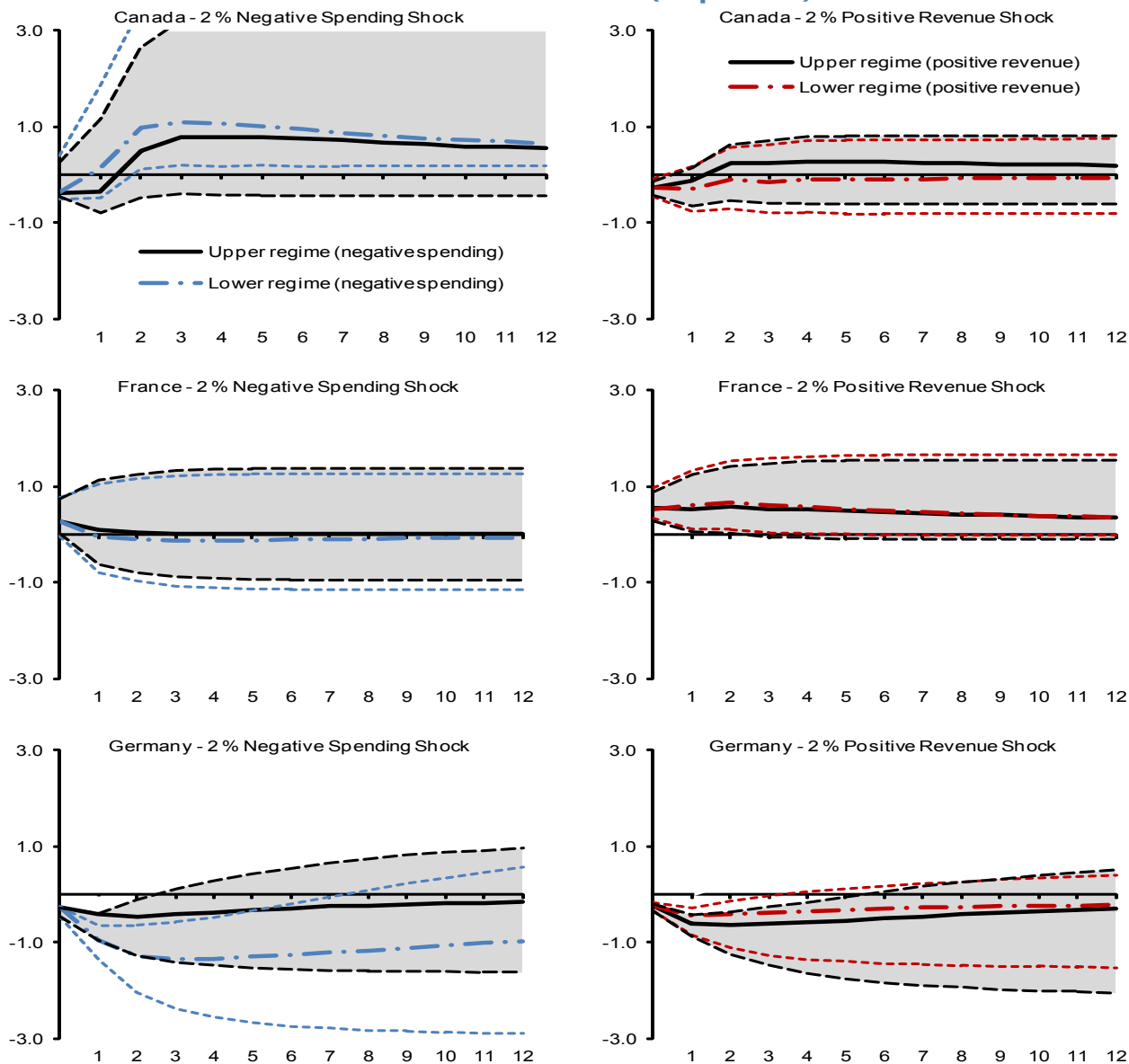


Fiscal Contraction: Cumulative Global Impulse Response Functions and Confidence Bands (68 percent)



Source: Authors' calculations.

Fiscal Contraction: Cumulative Global Impulse Response Functions and Confidence Bands (68 percent)



Source: Authors' calculations.