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Karel Mertens

The Effects of Fiscal Policy: What Have We Learned?

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The Effects of Fiscal Policy: What Have We Learned?

Karel Mertens[1,2]

Cornell University[1], CEPR[2]

Dubrovnik, June 2012

Introduction

Macro-empirical research on fiscal policy is booming since 2008.

Branches:

1. **National government spending shocks**

   Excellent recent surveys. US: Ramey (JEL 2011); EU: Beetsma (EJ 2011)

2. **National tax policy shocks**

   This talk

3. **Regional fiscal shocks** (e.g. US state level)

   Ongoing research, see Ramey (JEL 2011) for an overview.

4. **Fiscal Consolidations**

   Ongoing research, see Alesina and Ardagna (2002), Guajardo, Leigh, and Pescatori (2012)

5. **Fiscal Devaluations**

   Almost non-existent. de Mooij and Keen (2012) for the EU

Claims

Based on recent (mostly US) evidence, I will defend the following:

1. Tax changes have large effects on economic activity.
2. Balanced budget tax cuts are expansionary.
3. Anticipated tax cuts (increases) are contractionary (expansionary) prior to implementation.
4. Different tax instruments have different effects.

Overview of 'Peak Tax Multiplier Estimates' for the US

Study	Identification	Innovation to	Peak	Period
Blanchard and Perotti (2002)	Coefficients	Total Revenues/GDP	0.78	6-th quarter
Mountford and Uhlig (2009)	Sign	Total Revenues/GDP	3.41	12-th quarter
Romer and Romer (2010)	Narrative	Total Liabilities/GDP	3.08	10-th quarter
Mertens and Ravn (2011)	Narrative	Total Liabilities/GDP	2.00	10-th quarter
Favero and Giavazzi (2011)	Narrative	Total Liabilities/GDP	1.00	10-th quarter
Barro and Redlick (2011)	IV with Narrative	AMTR	1.1	first year

AMTR: Average Marginal Tax Rates (Personal Income)

Conclusions:

1. Everyone agrees on the sign!
2. Disagreement about the size. (two outliers, confidence intervals)

Main Empirical Approaches

1. **Fiscal Structural Vector Autoregressions (SVARs)**

   Coefficient Restrictions: Blanchard and Perotti (2002)

   Sign Restrictions: Mountford and Uhlig (2009)

2. **Event Study or Narrative Regressions**

   Romer and Romer (2010), Ramey and Shapiro (1998)

First Approach: SVARs

Stationary observables Z_t with **VAR representation**

$$Z_t = \delta' X_t + u_t,$$

where $X_t = [Z'_{t-1}, ..., Z'_{t-p}]'$.

One-Step-Ahead Forecast Errors u_t are

$$u_t = \mathcal{B}\varepsilon_t$$

ε_t are i.i.d. **structural shocks** with $E[\varepsilon_t \varepsilon'_t] = I$ such that $E[u_t u'_t] = \mathcal{B}\mathcal{B}'$.

Tax shocks ϵ_t^T are elements of ε_t.

Blanchard and Perotti (2002) SVAR

Suppose Z_t: total tax revenues T_t and output Y_t.

$$\begin{aligned} u_t^T &= \theta_Y u_t^Y + \sigma_T \epsilon_t^T \ , \\ u_t^Y &= \zeta_T u_t^T + \sigma_Y \epsilon_t^Y \ . \end{aligned}$$

Objective is to estimate $\partial Y_{t+j}/\partial \epsilon_t^T \ , \ j = 0, 1, ...$

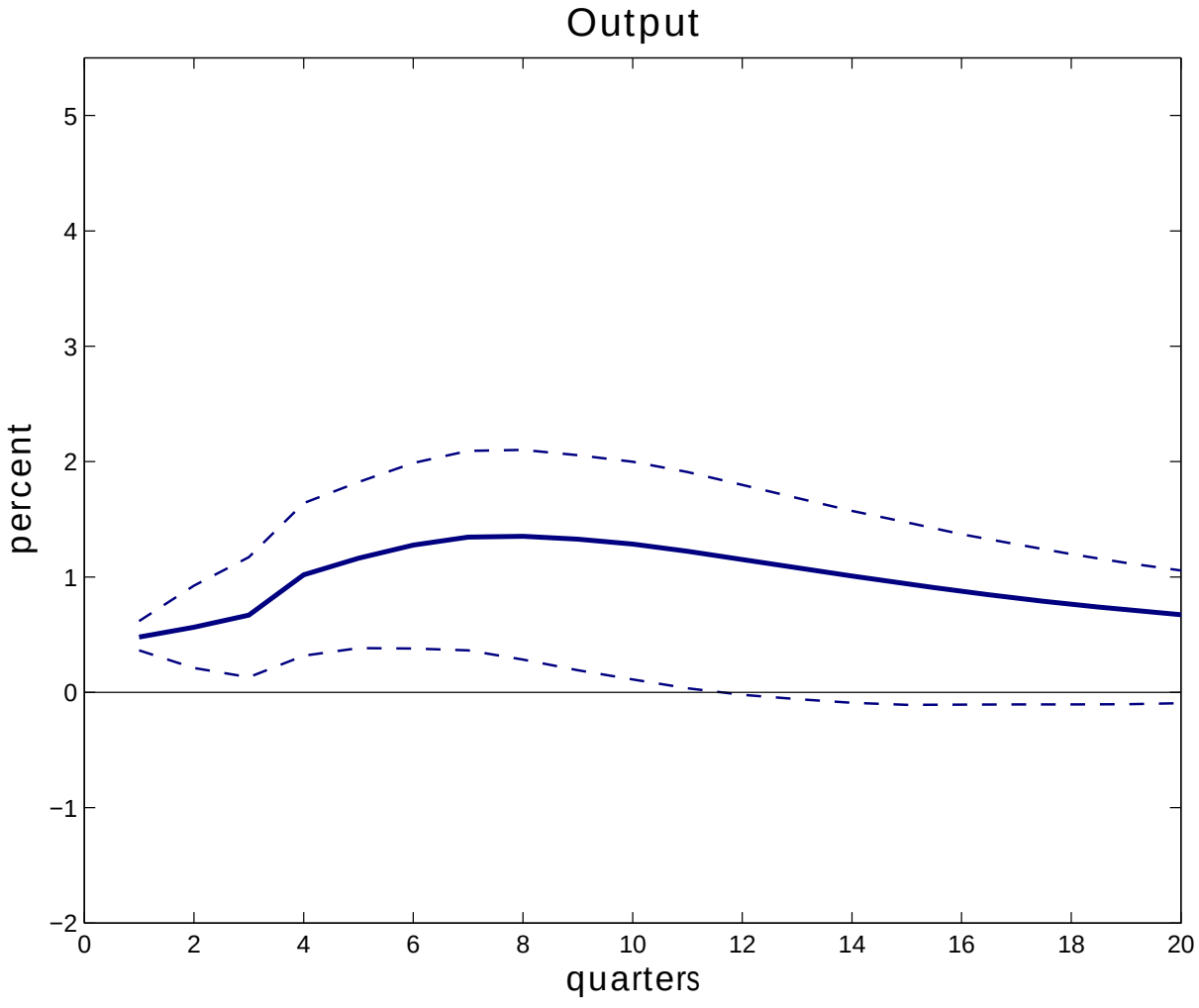
4 unknowns: θ_Y, ζ_T, σ_T and σ_Y.
3 independent restrictions from $E[u_t u_t'] = \mathcal{B}\mathcal{B}'$.

We need one more identifying restriction.

Solution proposed by Blanchard and Perotti (2002):

Output elasticity of tax revenues $\theta_Y = 2.08$ (OECD, CBO, IMF,...)

Sample: US 1950Q1-2006Q4, 95% Confidence intervals



Tax multiplier is relatively small.

Second Approach: Narrative Regressions

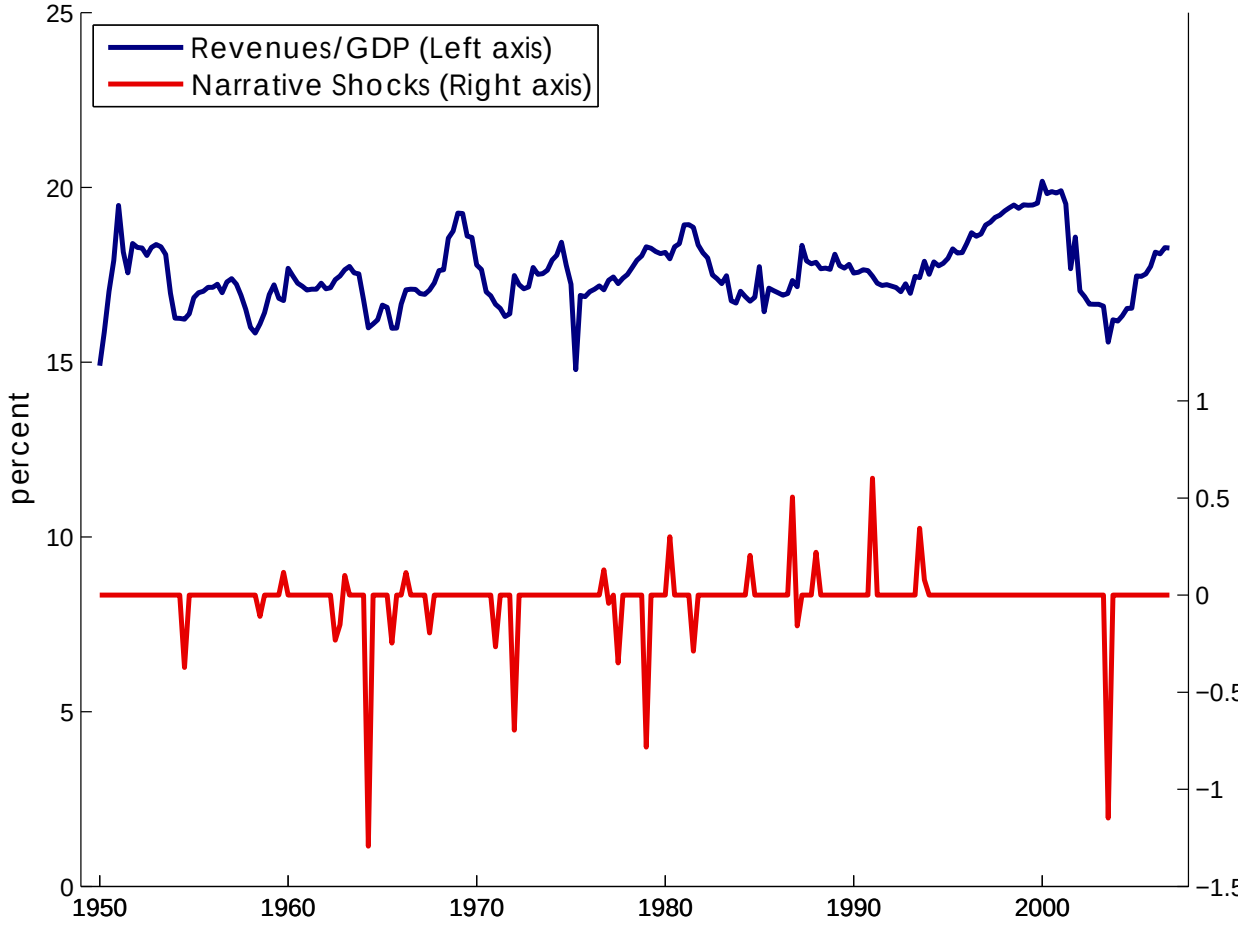
$$Y_t = \lambda_0 \tau_t + \lambda_1 \tau_{t-1} + ... + \lambda_k \tau_{t-k} + w_t$$

where $\tau_t, \tau_{t-1}, ...$ are direct measures of ϵ_t^T, $\epsilon_{t-1}^T, ...$

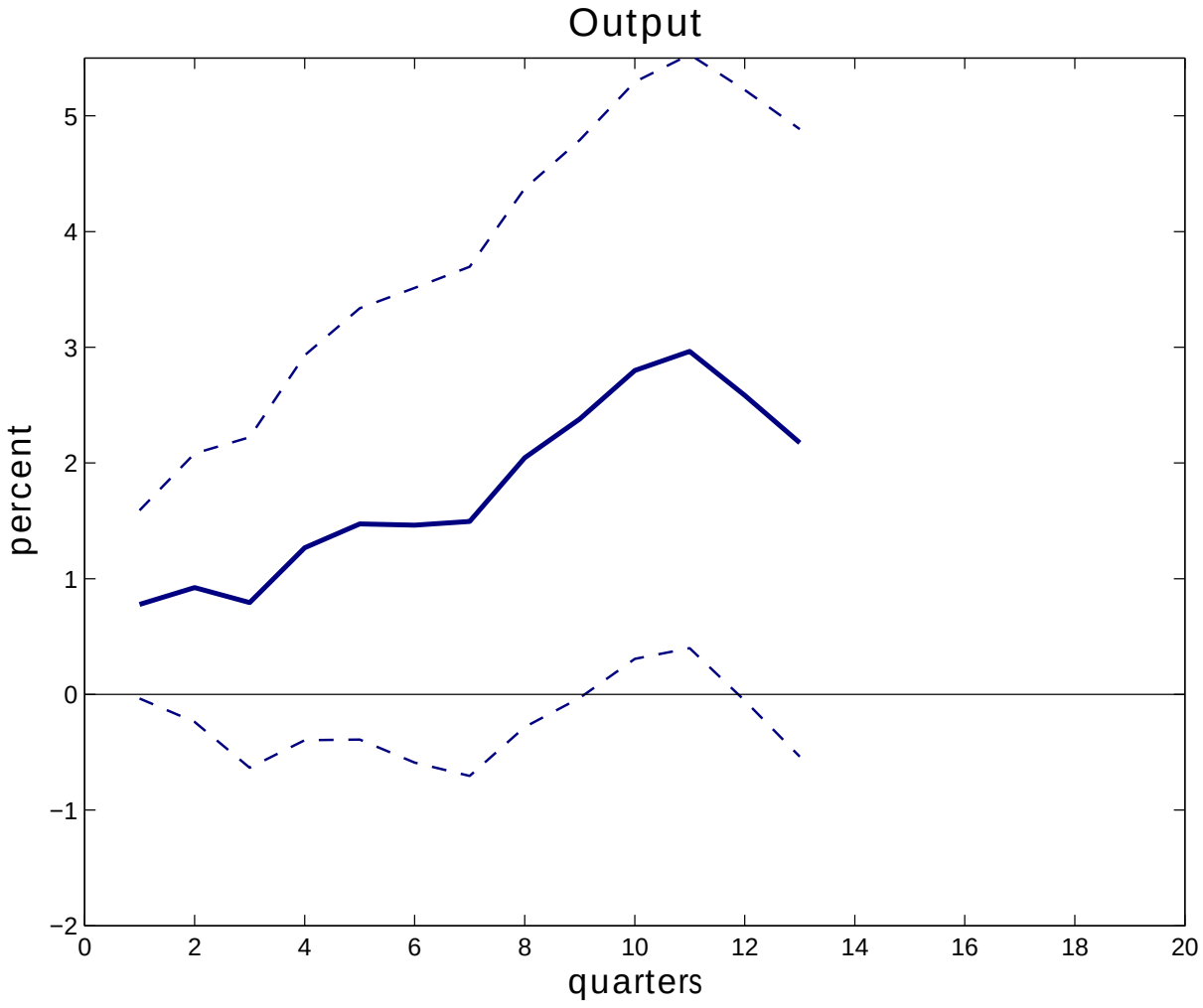
If τ_t **exogenous**, $\lambda_j = \partial Y_{t+j} / \partial \epsilon_t^T$.

Romer and Romer (2010) construct measures τ_t for the US:

1. Record of 50 legislative actions for 1947-2007 concerning federal tax code.
2. Projected liabilities changes at implementation dates (73 obs) Economic Report, US Budget, Treasury Reports, Congressional Record, CBO, ...
3. Exogenous tax changes (48 obs)
4. Implementation lag less than 1 quarter, cfr. Mertens and Ravn (2012), (27 obs)


Revenues/GDP (Left axis)
Narrative Shocks (Right axis)
percent
25
20
15
10
5
0
1
0.5
0
−1
1950
1960
1970
1980
1990
2000

Sample: US 1950Q1-2006Q4, 95% Confidence intervals



Tax multiplier is very large.

Two approaches give very different quantitative answers.

Issues:

1. *Measuring θ_Y*
   Many problems with cyclical adjustment procedures
2. *Quality of Narrative Measures*
   Measurement error is very likely.
3. *Fiscal foresight*
   Many tax changes anticipated/pre-announced.
4. *Diversity of tax instruments.*
   Personal income, corporate income, VAT, payroll, ...
5. *Simultaneous Tax Changes*
   Different tax instruments changed at the same time.

Reconciling Existing Tax Multiplier Estimates

Proxy SVAR: Use narrative measures for identification in SVARs.

$$\begin{aligned} u_t^T &= \theta_Y u_t^Y + \sigma_T \epsilon_t^T \ , \\ u_t^Y &= \zeta_T u_t^T + \sigma_Y \epsilon_t^Y \ . \end{aligned}$$

1) Estimate ζ_T using τ_t as instruments.

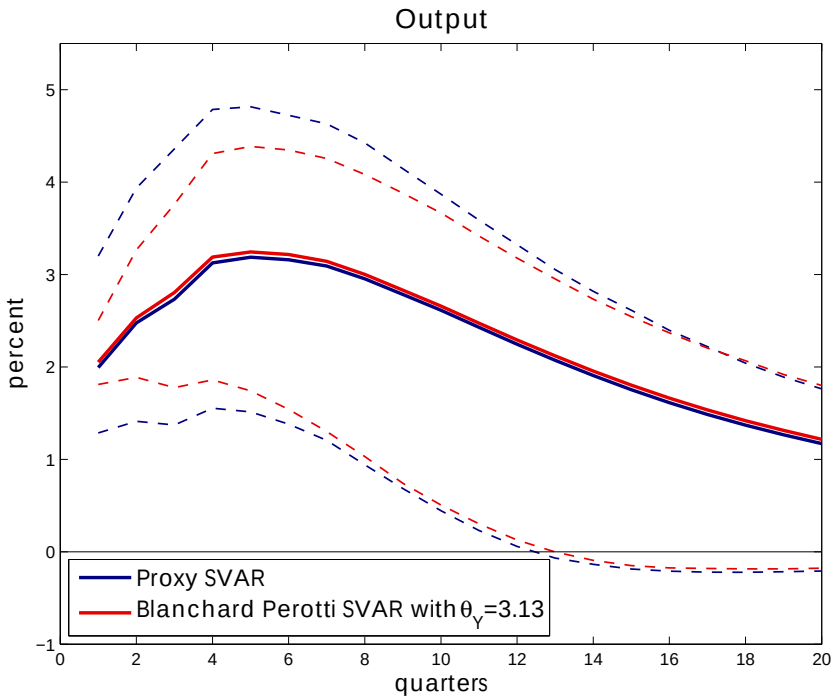
2) **Estimate** θ_Y using $u_t^Y - \zeta_T u_t^T$ as instruments.

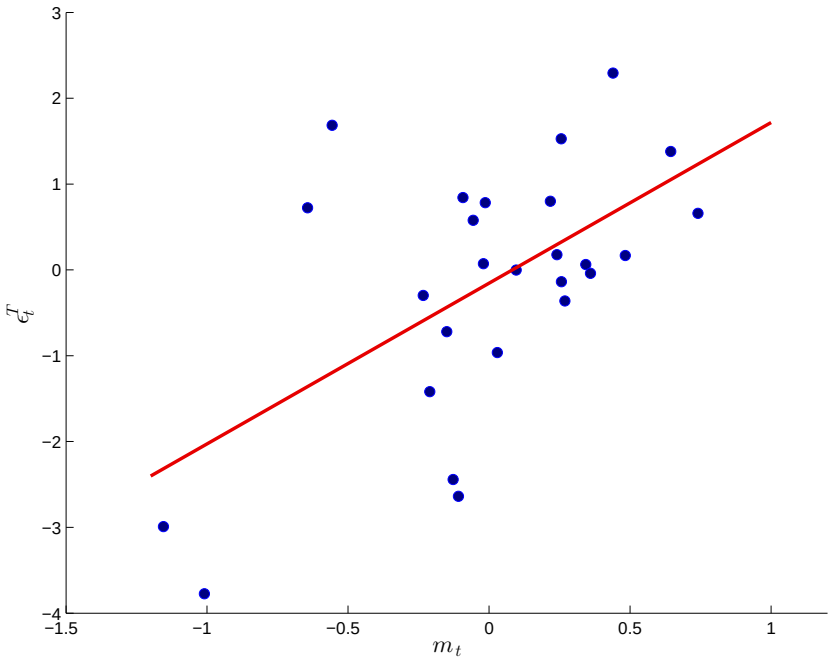
τ_t are 'proxies' (Mertens and Ravn, 2012) or 'external instruments' (Stock and Watson, 2012) instead of direct observations of ε_t^T.

Key advantages:

- No need to measure θ_Y.
- Robust to measurement error. (Explains Favero-Giavazzi 2012)
- Weaker exogeneity assumptions.

Proxy SVAR estimates cyclical elasticity of $\theta_Y = 3.13$ and rejects BP value of 2.08.





Claim 1: Tax changes have large effects on economic activity.

cfr. Romer and Romer (2010) and Mountford and Uhlig (2009).

Valerie Ramey (2011): "*I assess the likely range of multiplier values for the experiment most relevant to the stimulus package debate: a temporary, deficit-financed increase in government purchases. I conclude that the multiplier for this type of spending is probably between 0.8 and 1.5.*"

Tax multipliers appear to be in the 2.0-3.0 range, hence

Claim 2: Balanced budget tax cuts are expansionary.

cfr. Mountford and Uhlig (2009)

Anticipated vs. Unanticipated Tax Changes

Consider 'augmented' VAR:

$$Z_t = \delta' X_t + \Sigma_{j=0}^{k} \lambda_j \tau_{t-j}^{u} + \Sigma_{j=0}^{k} \gamma_j \tau_{t-j,0}^{a} + \sum_{i=1}^{K} \xi_i \tau_{t,i}^{a} + u_t$$

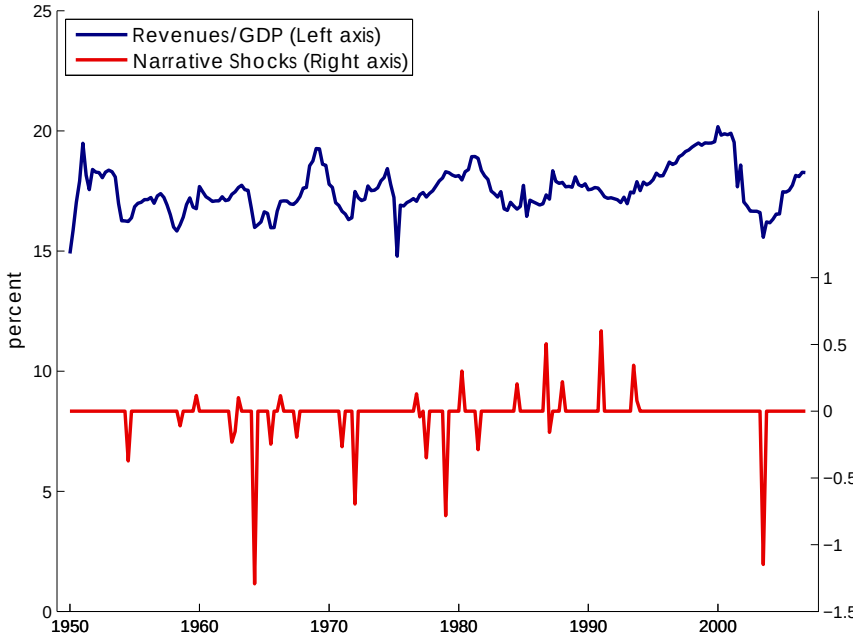
τ_t^u : **Unanticipated tax changes** implemented at date t

$\tau_{t,i}^a$: **Anticipated tax changes** "known" at date t and implemented at date $t+i$

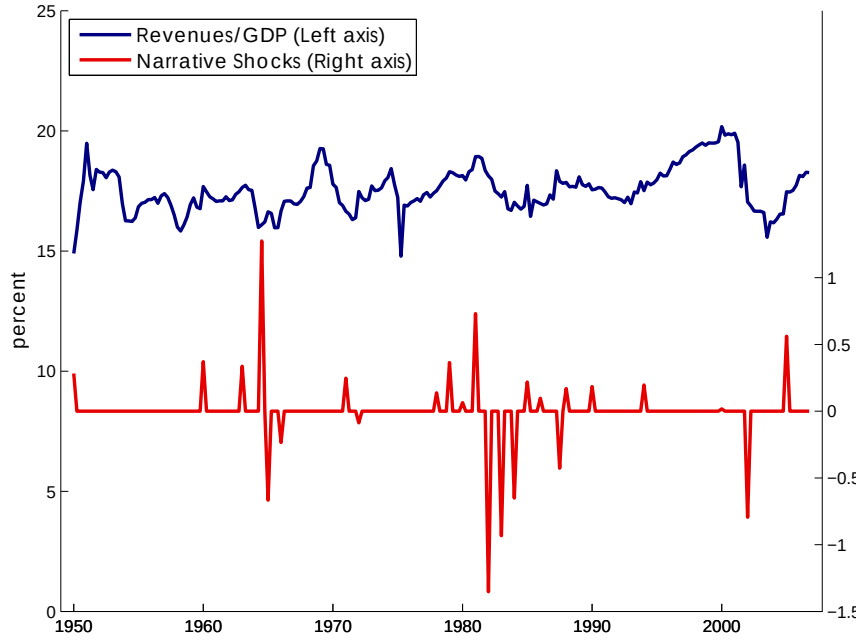
K : Maximum anticipation horizon that we allow for

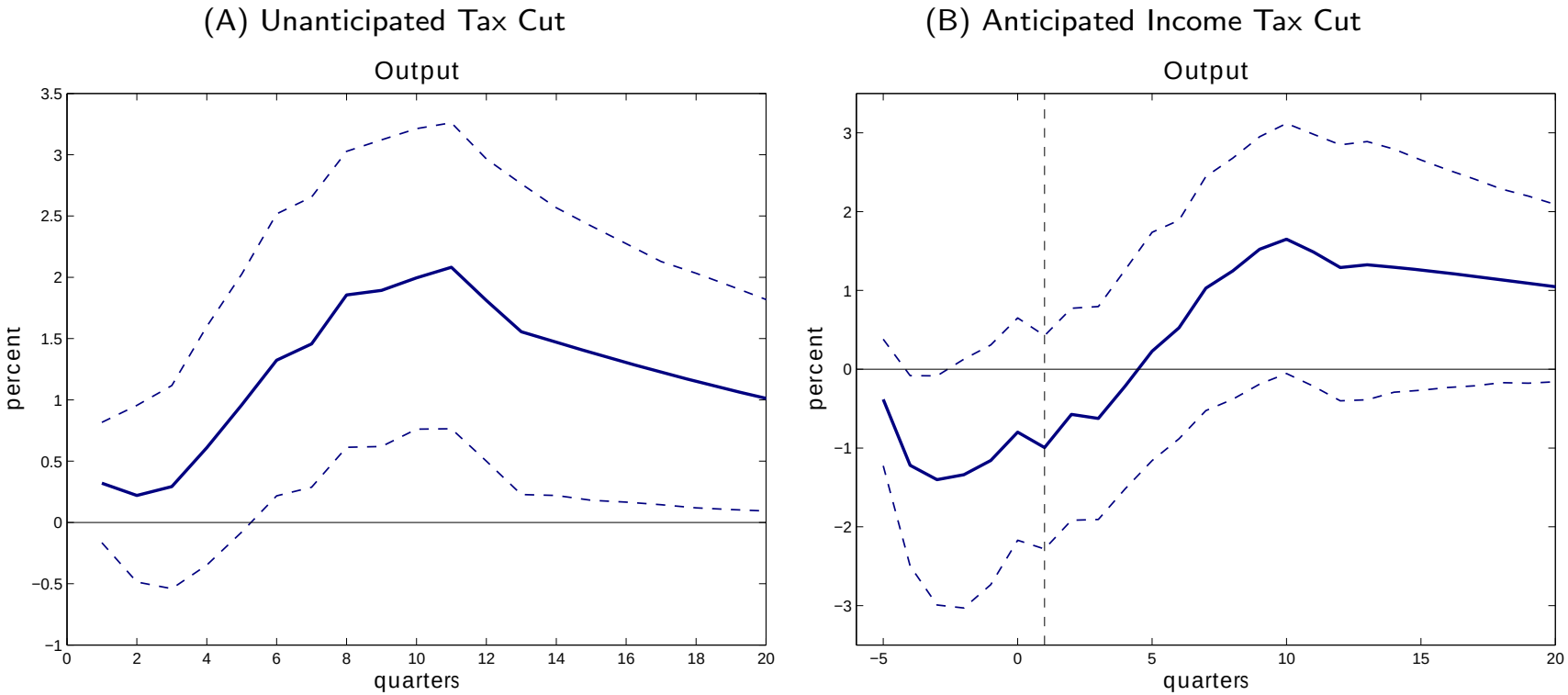
Classification based on difference between date of legislation and implementation.

(A) Unanticipated Tax Changes



(B) Anticipated Tax Changes





Claim 3: Anticipated tax cuts (increases) are contractionary (expansionary) prior to implementation.

cfr. Leeper, Walker and Yang (2012)

Personal vs. Corporate Income Tax Changes

Variables Z_t: average tax rates T_t^{PI} and T_t^{CI} and output Y_t.

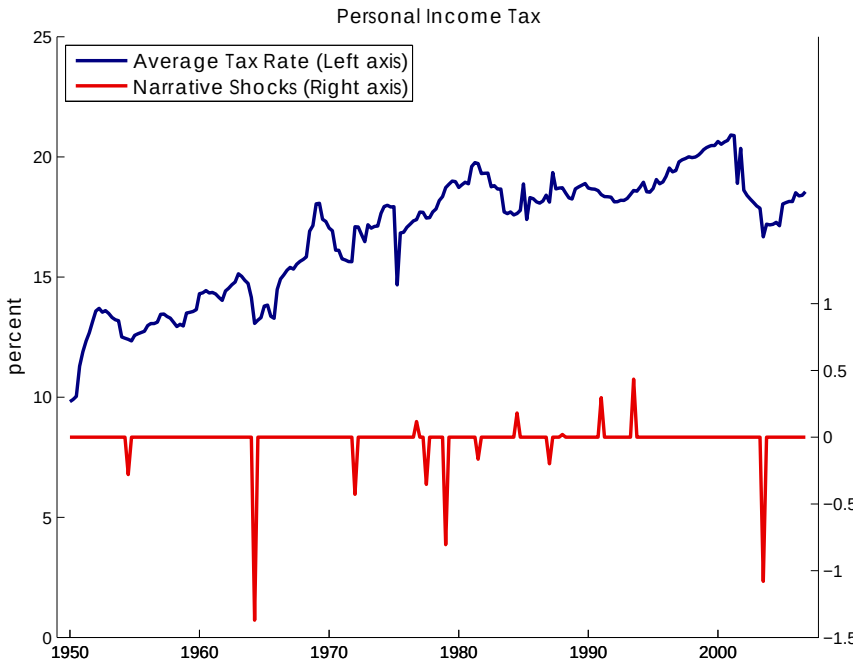
$$\begin{bmatrix} u_t^{PI,T} \\ u_t^{CI,T} \end{bmatrix} = \theta_Y u_t^Y + \Sigma_T \begin{bmatrix} \epsilon_t^{PI,T} \\ \epsilon_t^{CI,T} \end{bmatrix},$$

$$u_t^Y = \zeta_T \begin{bmatrix} u_t^{PI,T} \\ u_t^{CI,T} \end{bmatrix} + \sigma_Y \epsilon_t^Y .$$

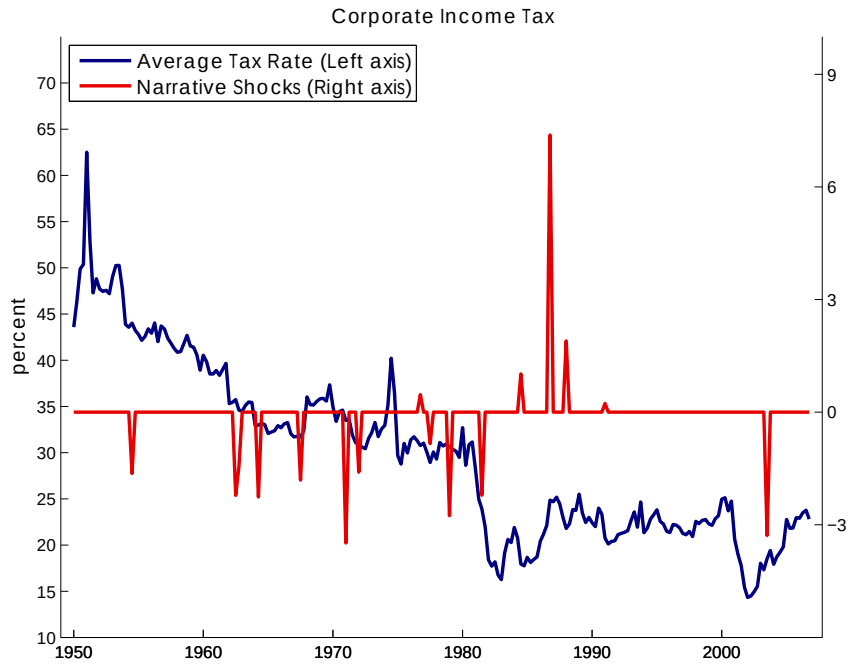
Now possible interaction between tax instruments (off-diagonal elements of Σ_T are not necessarily zero.)

We construct narrative measure for unanticipated Personal Income (PI) and Corporate Income (CI) tax shocks and use these in a proxy SVAR.

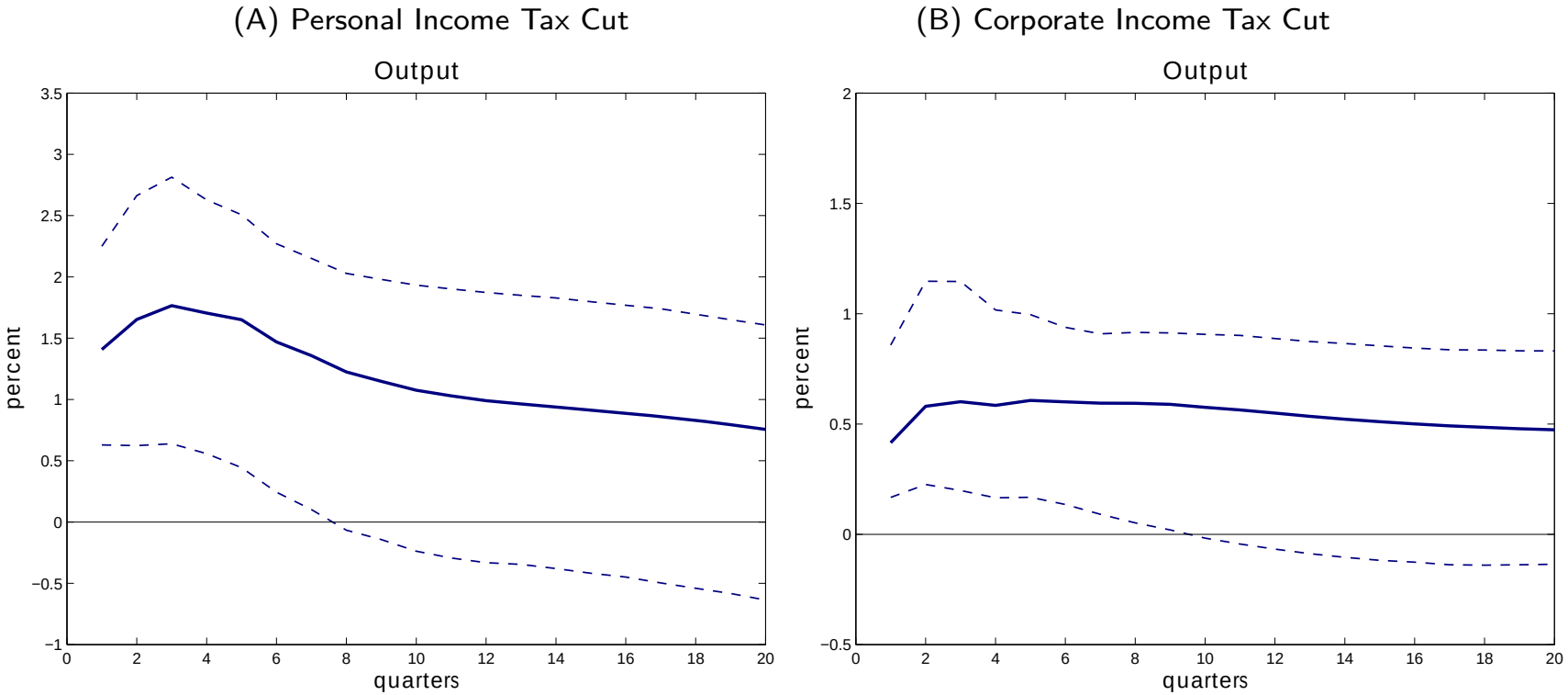
(A) Personal Income Tax



(B) Corporate Income Tax



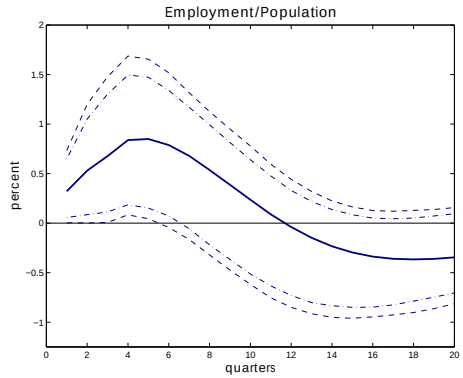
Sample: US 1950Q1-2006Q4, 95% Confidence intervals

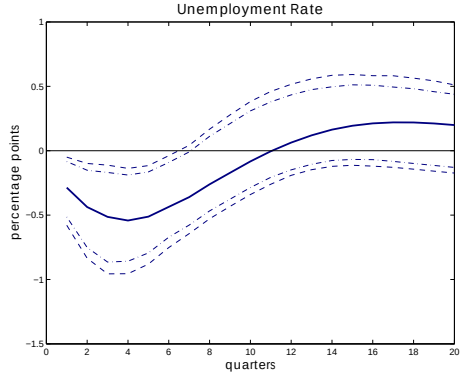


Note: responses to 1 pp cuts in tax rates (not to be interpreted as multipliers).

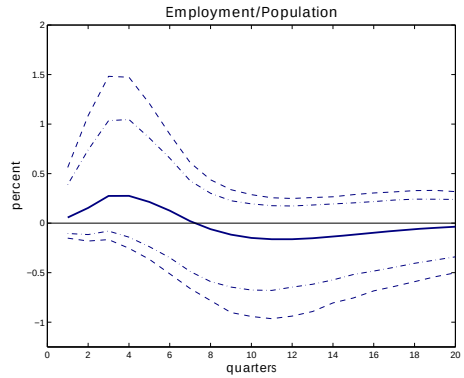
Output effects remain large (claims 1 and 2)

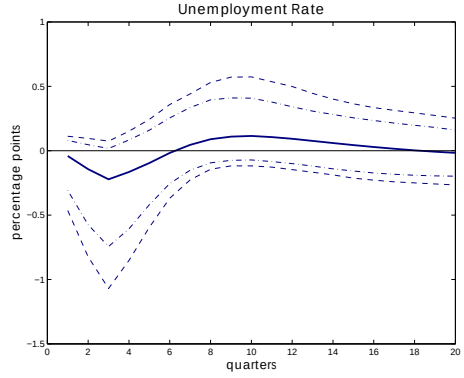
(A) Personal Income Tax Cut





(B) Corporate Income Tax Cut





▸ Labor Force Participation ▸ Private vs. Public Sector Employment

Claim 4: Different tax instruments have different effects.

Tax Stimulus:

PI tax cuts lead to job creation, increases in consumption and investment, but have negative budgetary impact

CI tax cuts primarily affect investment and seem to have no strong budgetary impact.

Raising revenues:

PI tax hikes generate revenues but are costly in terms of job losses and lower activity.

CI tax hikes unlikely to generate significant revenues.

Recent International Evidence on Tax Shocks

Much more limited than studies of spending shocks

e.g. Perotti (2005), Ravn, Schmitt Grohe and Uribe (2007), Beetsma (2011), Ilzetski, Mendoza and Vegh (2012),...

1. **Fiscal VARs Structural Vector Autoregressions (SVARs)**

   Coefficient Restrictions: Perotti (2005); Ilzetski (2011)

2. **Event Study Regressions**

   UK: Cloyne (2012) , Germany: Hayo and Uhl (2011)

International SVAR results on tax multipliers:

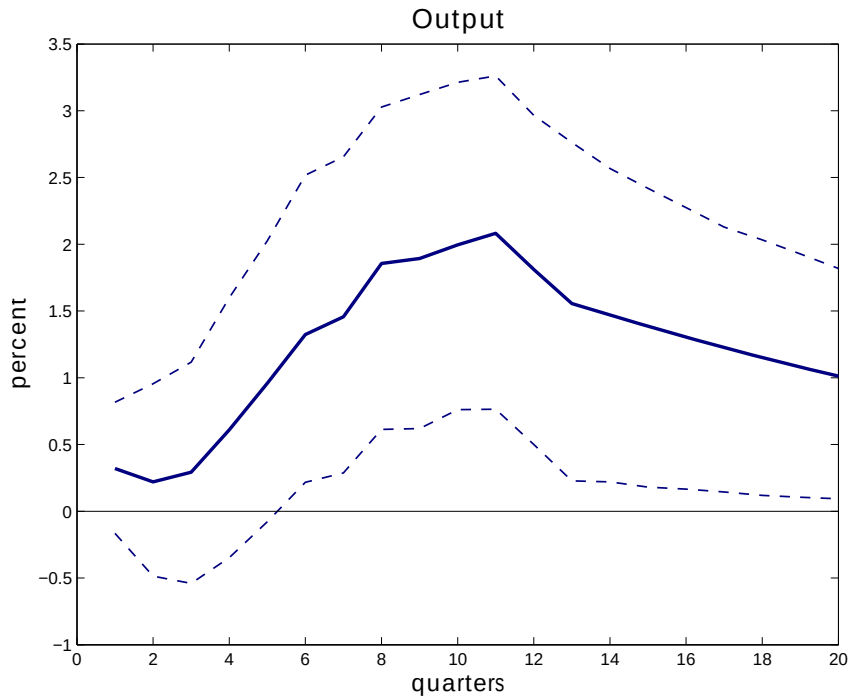
- As for the US, BP approach yields relatively small tax multipliers, less than spending multipliers. (see Perotti 2005, Ilzetzki 2011)
- Ilzetzki (2011) concludes based on the BP approach in a panel: *In developing countries, the tax multiplier is 0.3 on impact and close to 0.8 in the long run.*
- Heterogeneity: openness, debt-to-GDP, exchange rate regime, GDP per capita, ...

Same problems as for the US: need to measure the cyclical elasticity θ_Y.

- Brueckner (2011) finds large values for θ_Y using rainfall as instrument
- Cloyne (2012) finds much larger value of θ_Y for the UK using tax narrative.

Cloyne (2012)

(A) United States



(B) United Kingdom

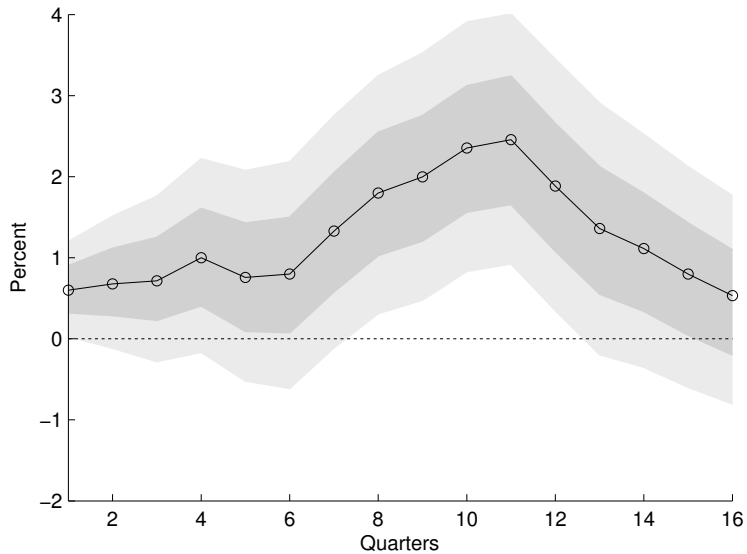


FIGURE 3. RESPONSE OF GDP TO 1 PERCENT OF GDP CUT IN TAXES

Conclusion

For the United States:

1. Tax changes have large effects on economic activity.
2. Balanced budget tax cuts are expansionary.
3. Anticipated tax cuts (increases) are contractionary (expansionary) prior to implementation.
4. Different tax instruments have different effects.

For other countries:

- Evidence is limited
- (Narrative) alternatives to cyclical adjustment procedures of international organizations are badly needed!