UNIVERSITY *of* GREENWICH

Cash based measures of aggregate expenditures and fiscal multipliers

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Motivation

- imputations and sectoral reclassifications serve many purposes:
  - levelling out institutional differences across countries (imputed rentals)
  - measuring "implicit" market transactions (FISIM)
  - allocating income on accrual basis (treatment of social security in household disposable income)
- For which purposes useful? For which purposes less useful?
- Keynesian perspective: economy demand constrained
  → **how we measure demand becomes crucial**

Motivation

"Do imputations which impact our estimate of aggregate demand and thus GDP affect the estimation of fiscal multipliers?"

• Why fiscal multipliers?

→ part of macro directly tied to aggregate demand

Clarification

- I am not saying official statistics from ONS or BEA are wrong
- "Right" and "wrong" depends on how we want to use the data

Claim:

If we want to understand income and expenditure flows between sectors, some of the discussed imputations might be introducing noise.

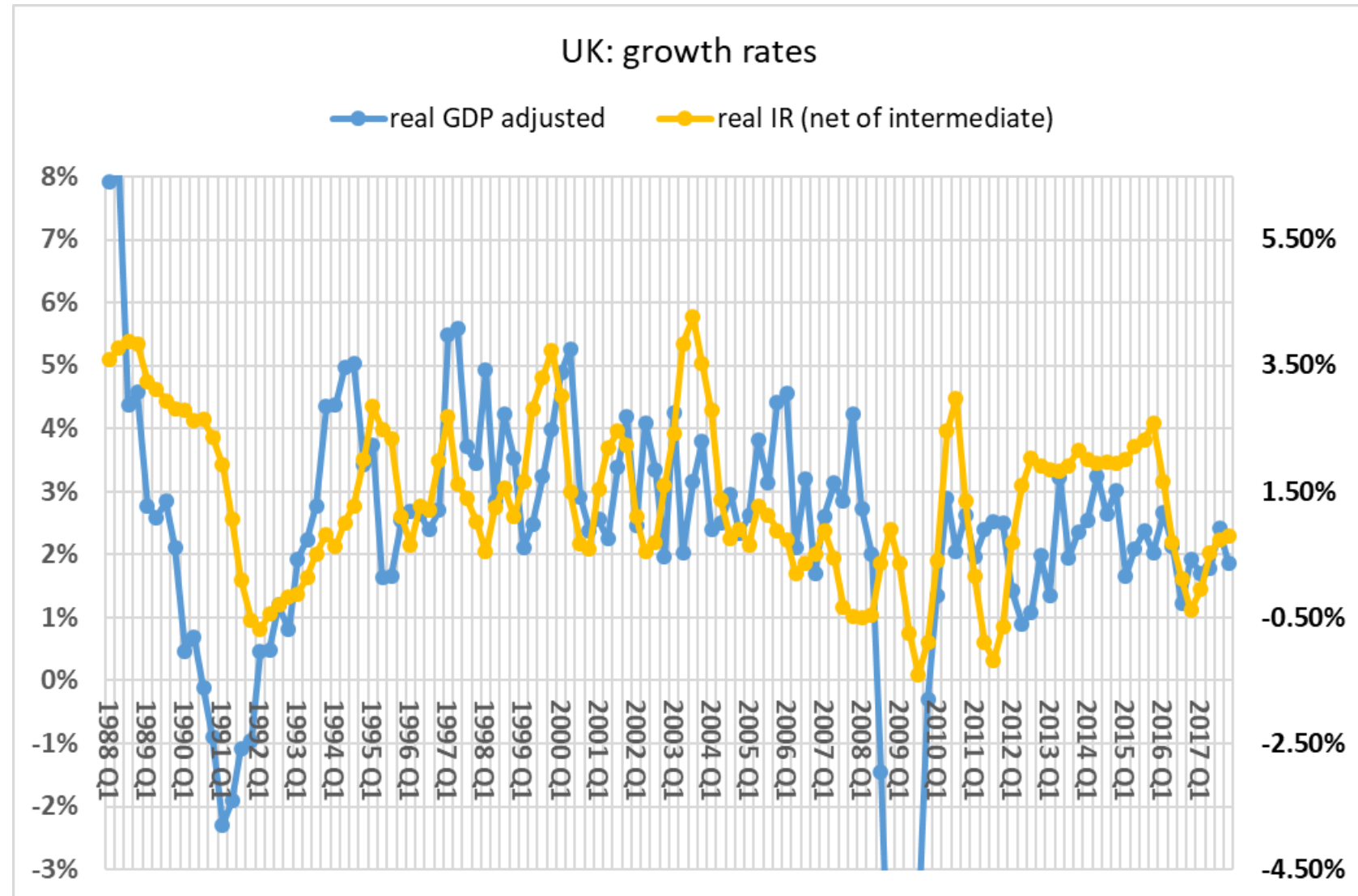# Imputations and Fiscal Multipliers

Connection between fiscal multipliers and imputed rentals (IR)?

- Why imputed rentals?
  - biggest
  - for the US only did IR: NIPA vs SNA

- Why could it be that IR has an impact on our estimates of fiscal multipliers?
  1. IR less volatile than GDP → underestimate elasticity of GDP with respect to G
     - Why less volatile?
       - owner occupier housing reacts slow to fiscal stance
       - stable ownership rates
  2. IR strongly driven by real estate dynamics (long swings): overstate influence of such "bubbles"

Imputed rentals and macroeconomic volatility
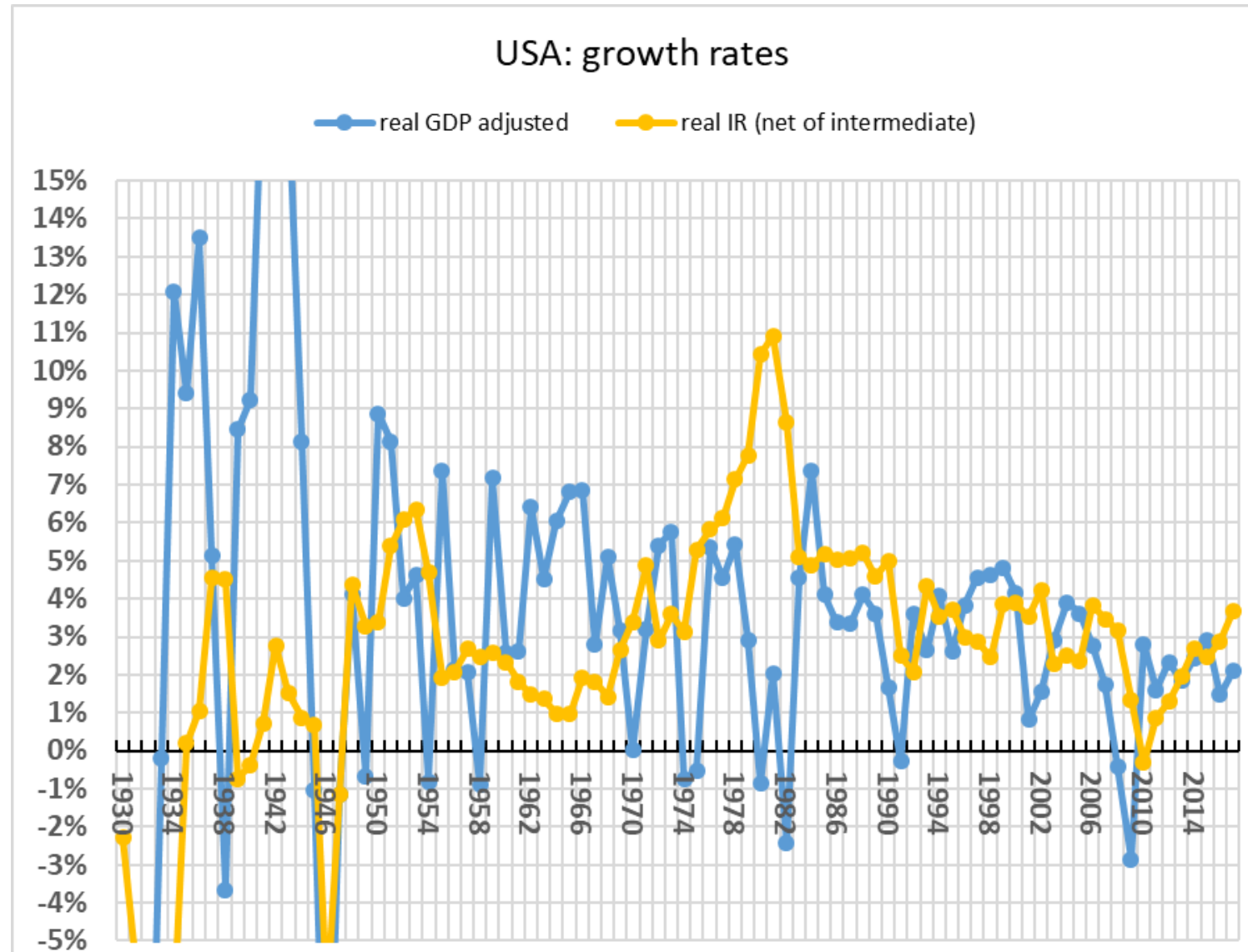
standard deviations:

- real GDP adj.: 2.2%
- real IR: 1.3%

UK: growth rates

real GDP adjusted — real IR (net of intermediate)

Imputed rentals and macroeconomic volatility

standard deviations:

- real GDP adj.: 5.1%
- real IR: 3.6%

USA: growth rates

Let's test that: proceed in three steps

1. Estimate fiscal multipliers based on original data
2. Re-estimate model based on adjusted data
3. Compare

Open questions
→ **What kind of model? Which country?**
→ **Which imputations do we adjust for?**

Model and Data

Standard Approach to Fiscal Multiplier Estimation

- For our baseline rely on:
  Blanchard and Perotti (2002) "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output" *QJE*.
- What do they do?
  - estimate tax and spending multipliers for the US
  - 1960Q1 – 1997Q4
  - 3-dimensional system:
    - Net-taxes
    - Government current spending
    - GDP
  - Structural Vector Autoregression (SVAR)

2 key points about VARs

- focus on exogenous shocks
  - changes in government spending not related to other variables in system
  - fundamental feature of dynamic systems (otherwise VARX)
- specifying contemporaneous relationships key element of identifying the model
  - identification means the shocks we study are uncorrelated (or we allow for specific form of correlation)
  - such that we know "what is what" (i.e. an increase in gov spending is not due to a previous tax cut or an increase in growth)

→ contemporaneous relations crucial for model outcome

Empirical Strategy of B&P 2002

(how to replicate their dataset with current data)

- net taxes =
    - current receipts (personal taxes, taxes on production, taxes on corporate income, contributions for government social insurance, income from assets, current transfer receipts, current surplus of gov enterprise)
    - - transfers paid to persons
    - - interest payments
- current spending =
    - government consumption
    - + gross investment (structures and equipment only, no IPP)
    - + sales to other sectors

Empirical Strategy of B&P 2002

- identification strategy for the contemporaneous shocks rests on the following key assumptions
  - no contemporaneous effect from spending on tax,
  - no contemporaneous effect from GDP on spending due to implementation lags of spending and quarterly data
  - no contemporaneous effect from tax on spending due to implementation lags of spending and quarterly data
  - but contemporaneous effect from GDP on tax
  - contemporaneous effects from spending and tax on GDP

$$\begin{bmatrix} 1 & 0 & b_{13,0} \\ 0 & 1 & b_{23,0} \\ b_{31,0} & b_{32,0} & 1 \end{bmatrix} \begin{pmatrix} u_t^{tax} \\ u_t^{gov} \\ u_t^{gdp} \end{pmatrix}$$

The thought experiment of a spending shock in a VAR

Estimating and using the VAR

- impulse represents a **1$ initial** increase in government spending, which is **<u>independent</u>** from the state of the economy
  - so standard fiscal policy VARs do not model counter-cyclical policy
- responses scaled to **$ units**
- responses relative to the (exponential) trend in the model (i.e. IRF at 0 means system is back to (trending) steady state)
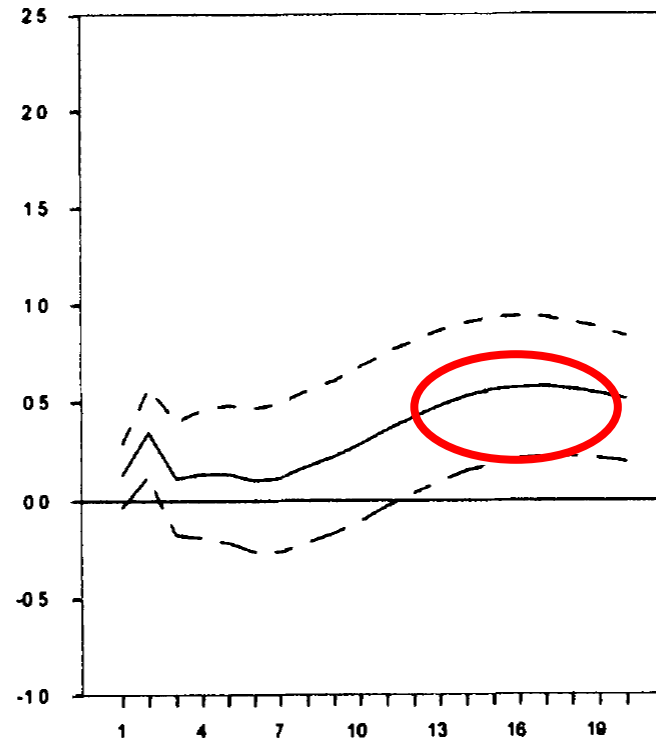 - so fiscal policy does not affect the trend

The thought experiment of a spending shock in a VAR

- impulse represents a **1$ initial** increase in government spending
  - however spending is persistent and is up at quarter 16 still by **0.5$**
  - together with taxes being up by **0.5$** after 16 quarters
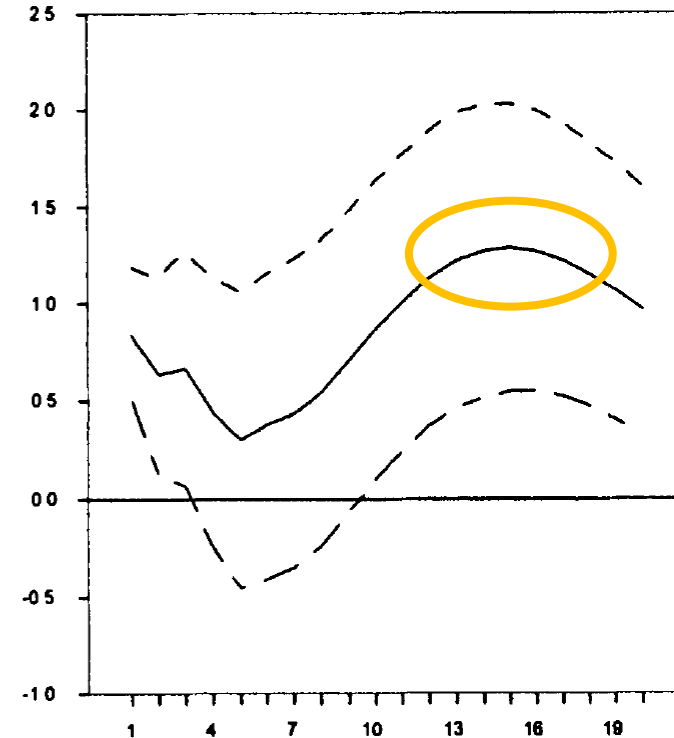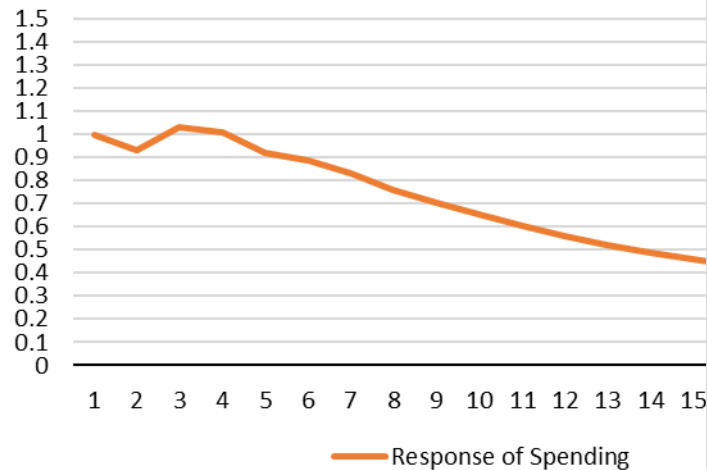- overall result: after 16 quarters **GDP is up by 1.25$**

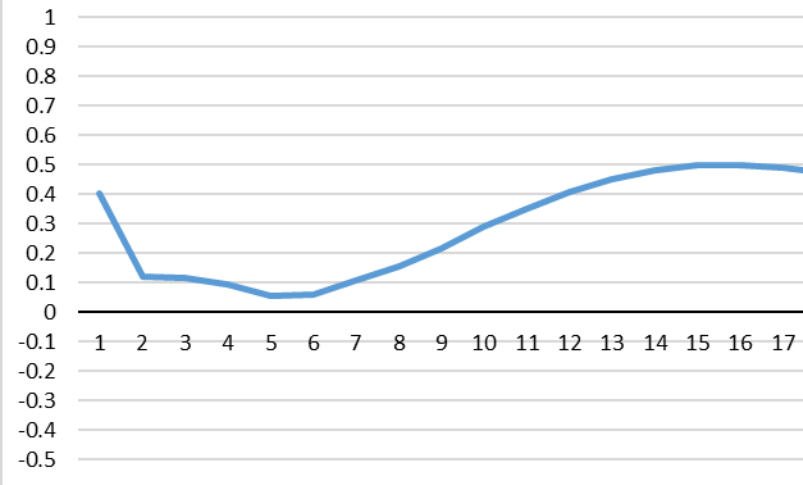source: Blanchard & Perotti (2002), Figure V

Replicating B&P2002

Replicating B&P2002's results

- use their dataset from the author's homeage
  - (that is data from around 1997; several revisions since then)
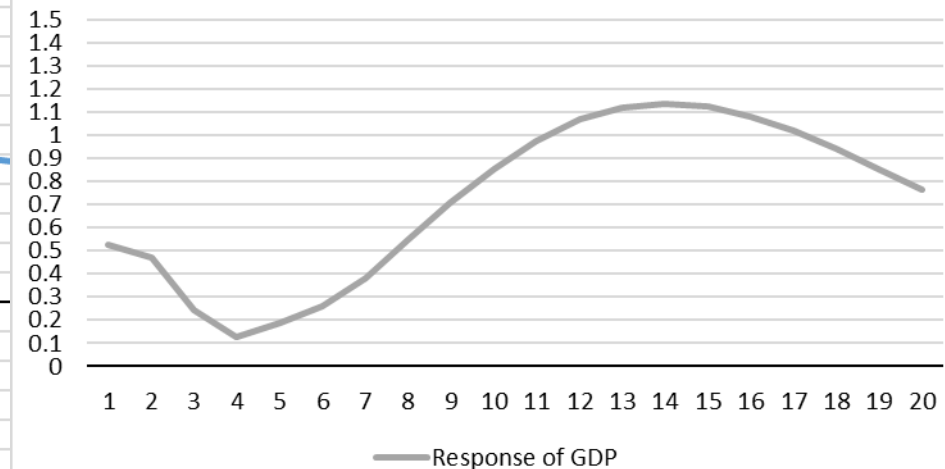- demonstrate we can apply the same method to generate our baseline
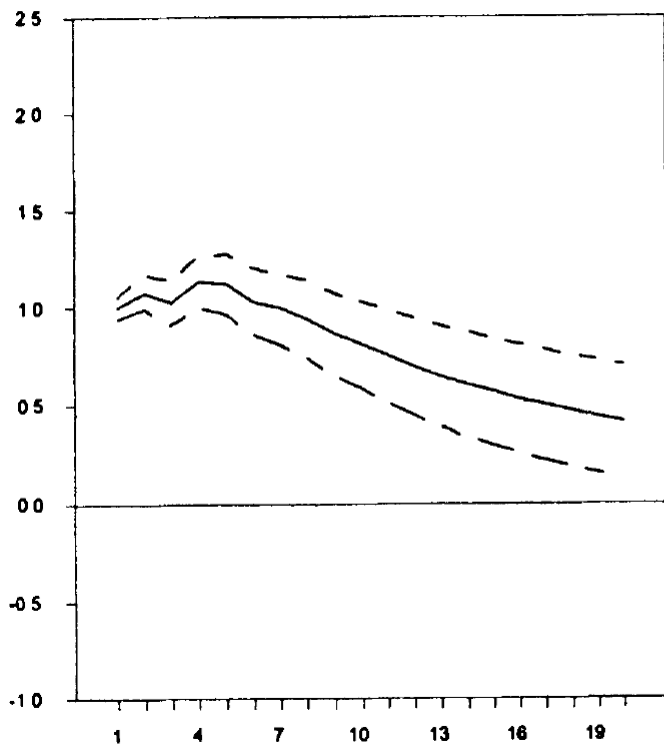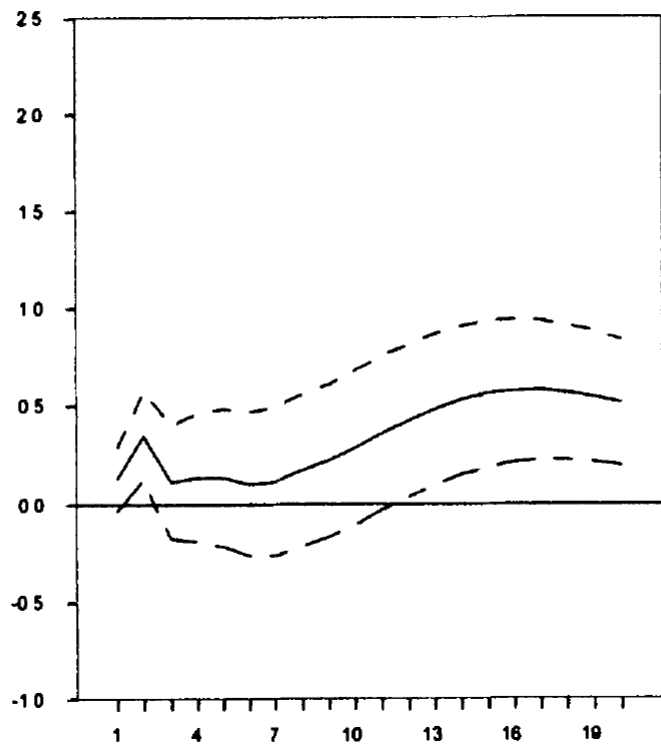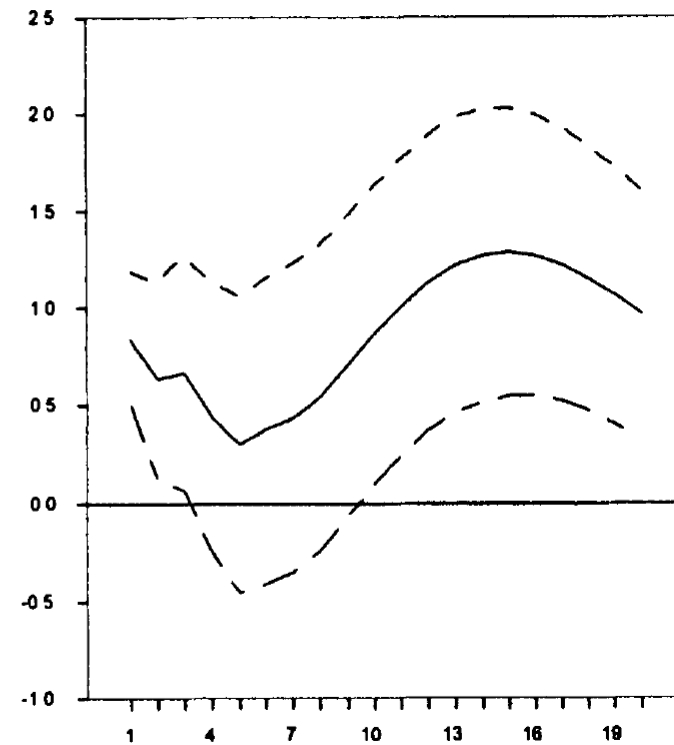
Response of Spending

Response of Net Tax

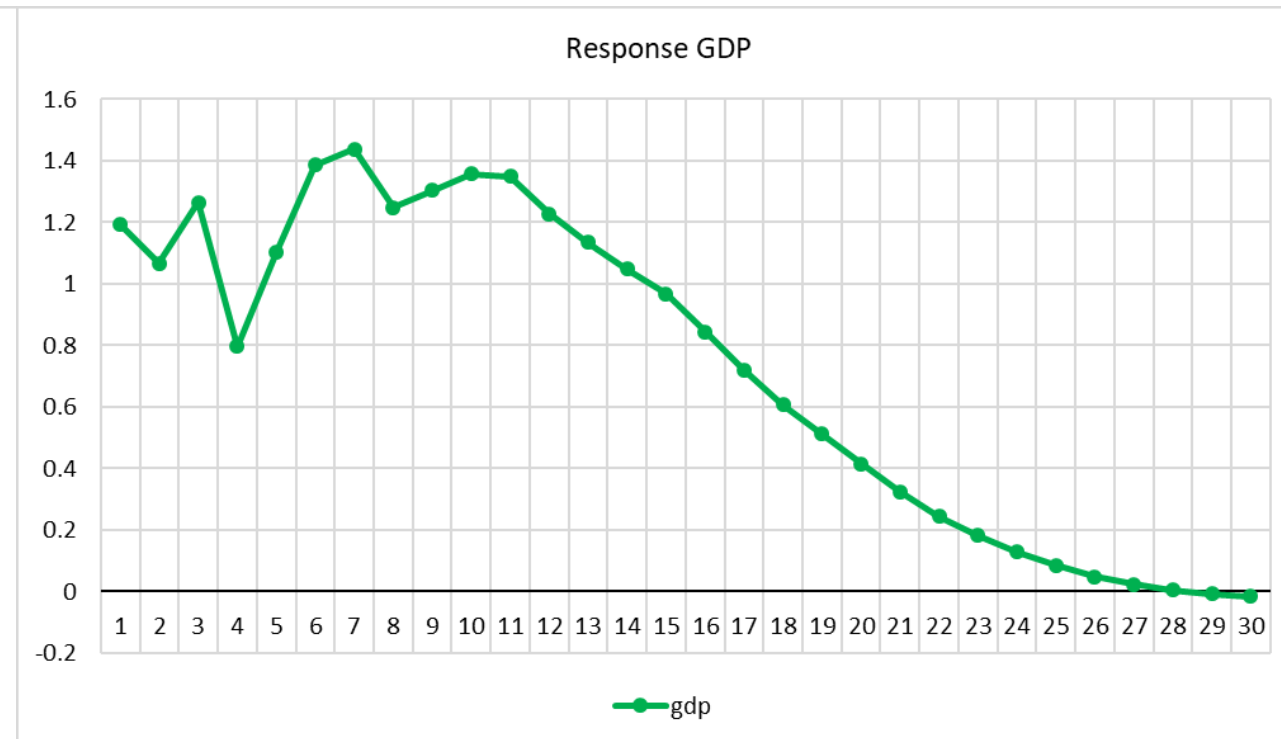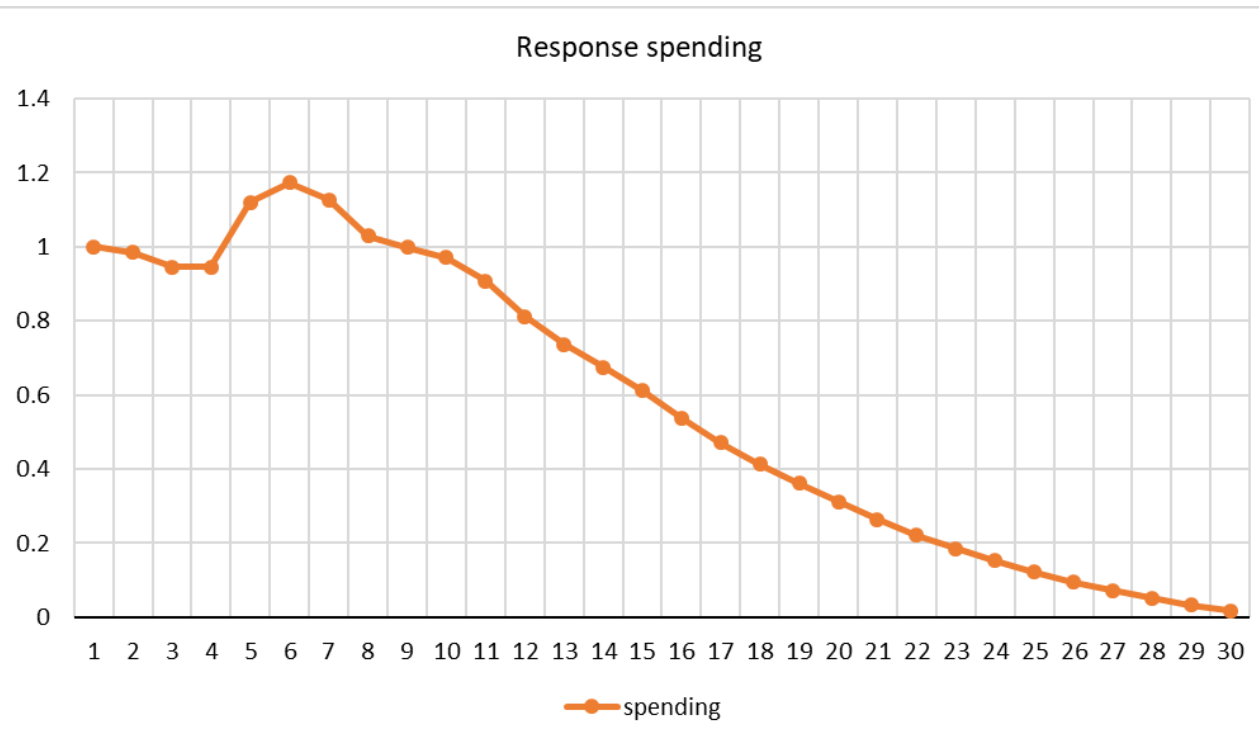Response of GDP

resp. of spe, DT

resp. of tax, DT

resp. of gdp, DT

Our baseline: US 1960Q1 to 2005Q2

- slight deviation from B&P: no contemporaneous effect of tax on GDP
- Why US not UK: does not "work" (more later)

Baseline summary (averages over 4 quarters)

- effect on impact: 1$ of gov spending translates into 1.19$ of GDP
- end of year 1: spending up 1.12$ and GDP up 1.06$
- end of year 2: spending up 1.00$ and GDP up 1.34$
- end of year 3: spending up 0.74$ and GDP up 1.27$
- end of year 4: spending up 0.47$ and GDP up 0.89$
- end of year 5: spending up 0.26$ and GDP up 0.46$
- end of year 6: spending up 0.12$ and GDP up 0.16$
- end of year 7: spending up 0.03$ and GDP up 0.02$

Quick look at the UK: reduced form VAR

- all variables in logs: coefficients represent elasticities

- sum of coefficients over all 4 lags:
  - taxes extremely sensible to GDP
  - negative elasticity of GDP with respect to spending
  - spending much more responsive to taxes

→ more time needed to understand UK data

	baseline UK			baseline US		
dep. var	tax eq.	spend. eq.	GDP eq.	tax eq.	spend. eq.	GDP eq.
net tax	0.62	0.033	-0.0007	0.93	0.003	0.0016
spending	-0.38	0.97	-0.017	0.01	0.94	0.019
GDP	2.71	0.18	0.99	-0.05	0.03	0.90

Excluding Imputed Rentals

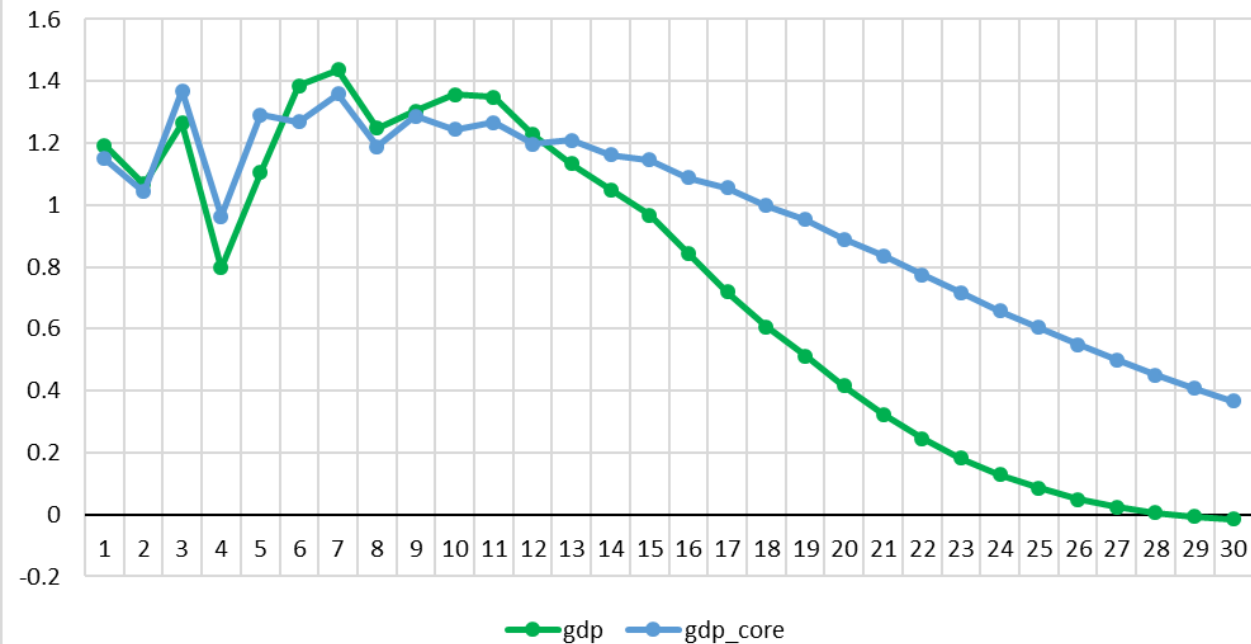# US 1960Q1 to 2005Q2: Excluding Imputed Rentals

- Rerun baseline model:
  - IR excluded from GDP
  - new GDP deflator excluding IR
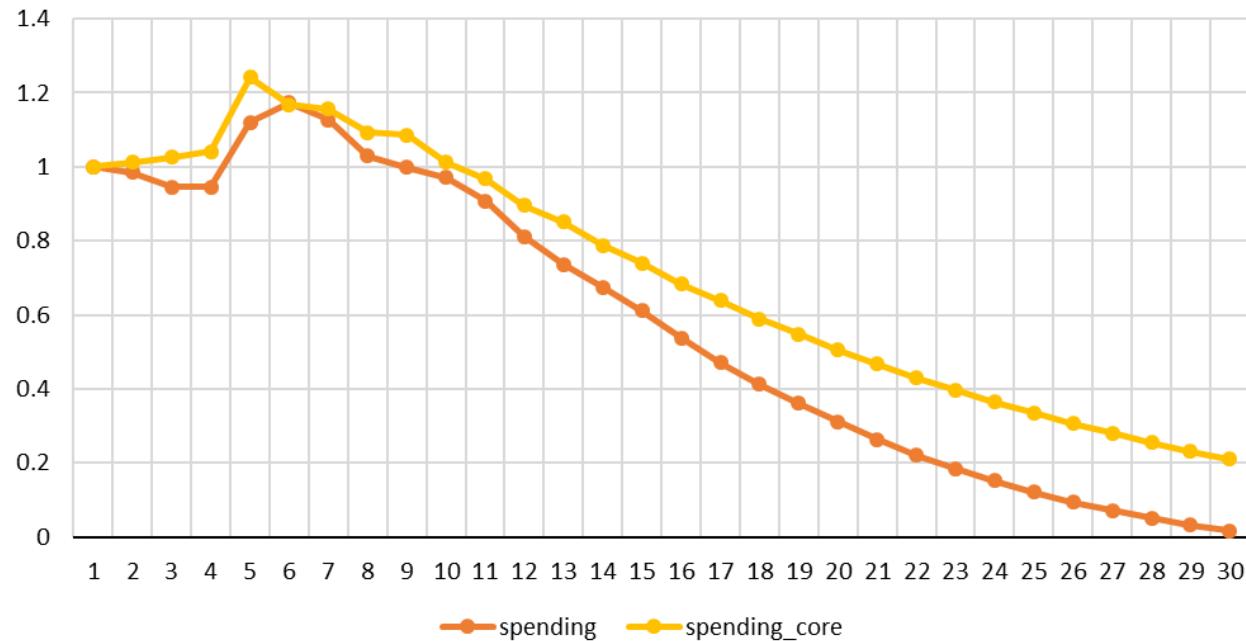
IR exclusion model summary
(grey baseline, in blue excl. IR, averages over 4 q)

- impact: 1$ of gov spending translates into 1.19$ of GDP vs. 1.15$

- end of year 1: spending up 1.12$ and GDP up 1.06$ vs. 1.17$

- end of year 2: spending up 1.00$ and GDP up 1.34$ vs. 1.28$

- end of year 3: spending up 0.74$ and GDP up 1.27$ vs. 1.23$

- end of year 4: spending up 0.47$ and GDP up 0.89$ vs 1.11$

- end of year 5: spending up 0.26$ and GDP up 0.46$ vs 0.92$

- end of year 6: spending up 0.12$ and GDP up 0.16$ vs 0.69$

- end of year 7: spending up 0.03$ and GDP up 0.02$ vs. 0.48$

IR exclusion model

interim conclusion:

- impact effects very similar

- generally very similar for first 4 years

- then shows that both spending but especially GDP much more persistent

- Why is that? compare reduced form summary of VAR

Compare reduced form VAR as data summary

- all variables in logs: coefficients represent elasticities

- sum of coefficients over all 5 lags
  - baseline VAR
  - VAR with adj. GDP

- (main driver of differences since, contemporaneous effects very similar)

dep. var	baseline			GDP adj.		
	tax eq.	spend. eq.	GDP eq.	tax eq.	spend. eq.	GDP eq.
net tax	0.93	0.003	0.0016	0.93	-0.001	0.0004
spending	0.01	0.94	0.019	0.01	0.94	0.015
GDP	-0.05	0.03	0.90	-0.08	0.05	0.90

Conclusion

Conclusion

- removing imputed rentals
  - increases responsiveness of GDP to fiscal policy
  - in particular makes effects lasting longer (year 5 average: 0.46$ vs 0.92$)
- important implications
  - did we misjudge how long fiscal policy effects last?
  - more fundamentally: how we measure impacts on our results → need to pay more attention to national accounts
- "side issue" we ran into:
  revisions more frequently and more substantial than I was aware
  - any data (in the UK) available on government taxes based on cash accounting?
  - seasonality patterns due to collection lags and potentially differences between fiscal year and calendar year)