Macro Reading Group:
The Dynamic Effects of Personal and Corporate Income Tax Changes in the United States
&
A Reconciliation of SVAR and Narrative Estimates of Tax Multipliers

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Research Questions

What is the impact of an unanticipated change in taxes on the economy? Issues:

- Identification problem: fiscal instruments are endogenous to output.
- Multiple instruments: are total revenues what we want to look at?

The two papers:

1. Mertens and Ravn (2013a) present a new solution identification problem and compare multiple taxes.
2. Mertens and Ravn (2013b) compare the technique to other methods in the literature.

VAR identification regimes for tax shocks

- SVAR with external information on the tax elasticity - Blanchard and Perotti (2002)
- Narrative measure of tax shocks unrelated to economic conditions - Romer and Romer (2010)
- Sign restrictions - Mountford and Uhlig (2009)

Conclusion: Taxes are contractionary but size of the effect varies across approaches.

The proxy SVAR (I)

IDEA: use the narrative series as a (poorly measured) proxy for the true structual shock. Define the SVAR:

$$Y_t = \beta(L) Y_{t-1} + u_t,\ u_t \sim N(0, \Sigma_u)$$

$$u_t = B e_t,\ e_t \sim N(0, I_N) \tag{1}$$

The identification problem: there is not enough information in $BB' = \Sigma_u$ to get B. Lets say you want to identify some subset of the shocks of size k: $e_t = [e_{1t}', e_{2t}']'$:

$$u_t = B_1 e_{1t} + B_2 e_{2t}$$

What we need is B_1.

The proxy SVAR (II)

If there is exists a proxy of size k, denoted m_t, which satisfies:

$$Cov(m_t, e_{1t}') = \Phi,\ Cov(m_t, e_{2t}) = 0$$

Then:

$$\Phi B_1 = \mathbb{E}(mu)$$

We can partition B_1 :

$$B_1 = [B_{11}', B_{12}']'$$

Then:

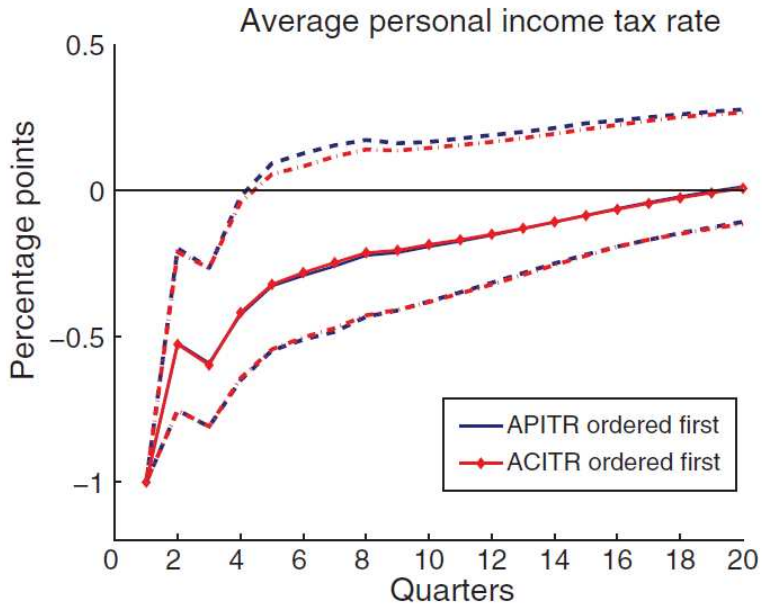
$$B_{12} = \left[\mathbb{E}(mu_1')\right]^{-1} \mathbb{E}(mu_2')B_{11}$$

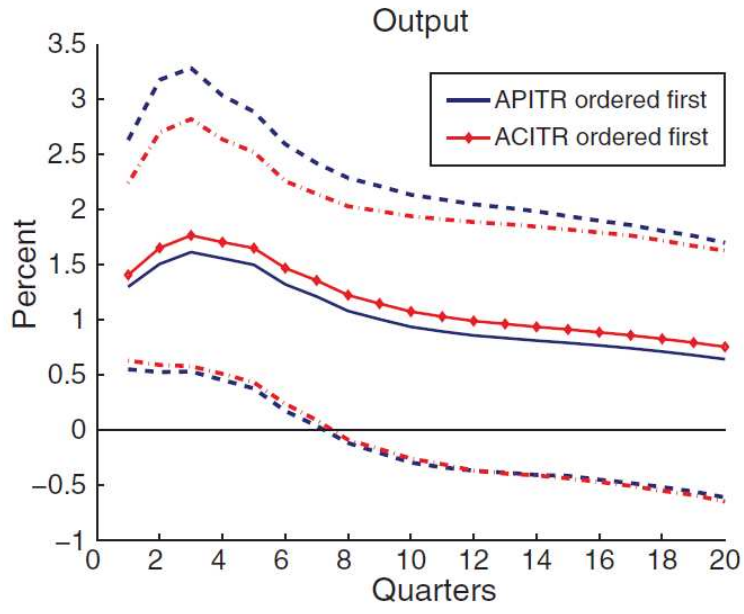
Implementation

- First get u from the reduced form and then $\mathbb{E}(mu_2)$ and $\mathbb{E}(mu_1)$ are estimable.
- Remaining issue is to impose restrictions on B_{11} - the model is only identified up to a scaling assumption. So if $k = 1$ you can set $B_{11} = 1$.
- In the context of taxes:
  - $k = 2$
  - m is Romer and Romer (2010) measures of narrative series of corporate and income taxes.
  - B_{11} is restricted to be lower triangular - i.e. different tax rates have a Cholesky ordering.
- This is almost the same as using the proxy as an instrument for the shock (cf. Stock and Watson (2012); Olea et al. (2012)). The main difference is that Φ is not diagonal and you are restricted to one instrument per shock.

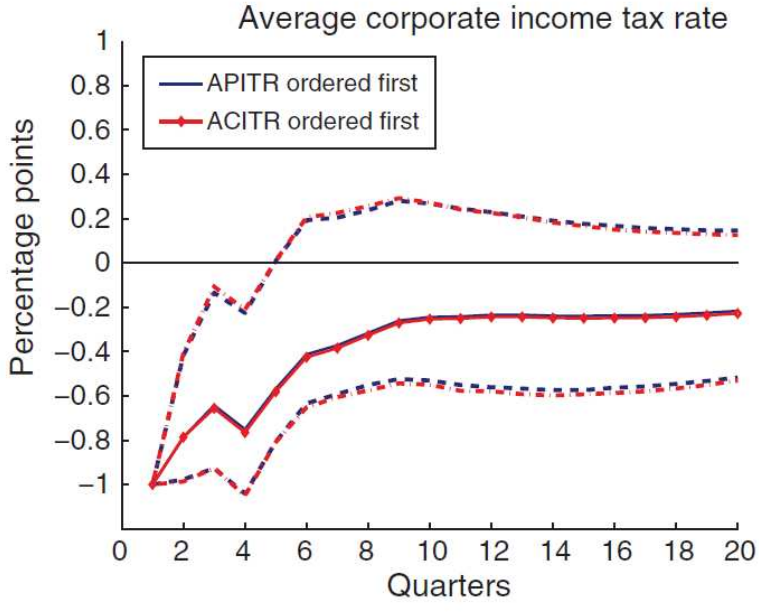
Results

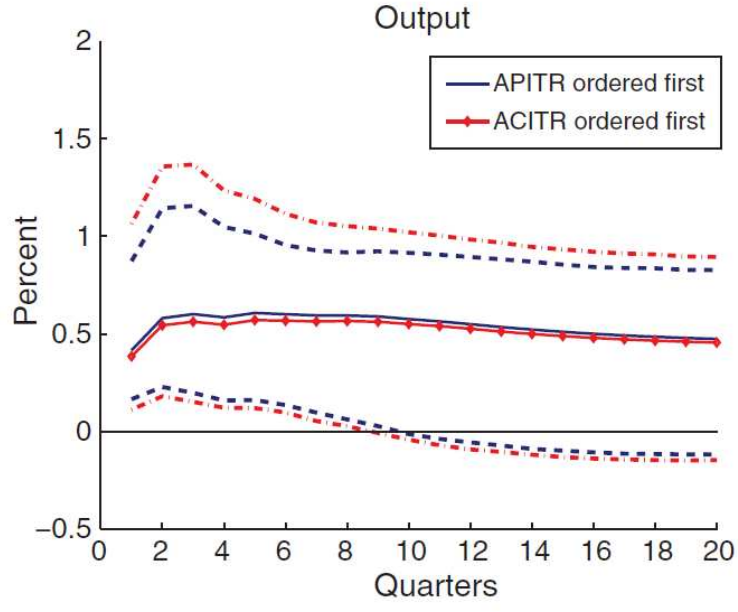
Income taxes





Corporate taxes





The weak proxy problem

Since this is basically IV we are worried about weak instruments; if $\Phi \rightarrow 0$ then the analysis will breakdown. How well measured is the proxy?

$$m_t = D_t(\Gamma e_{1t} + v_t)$$

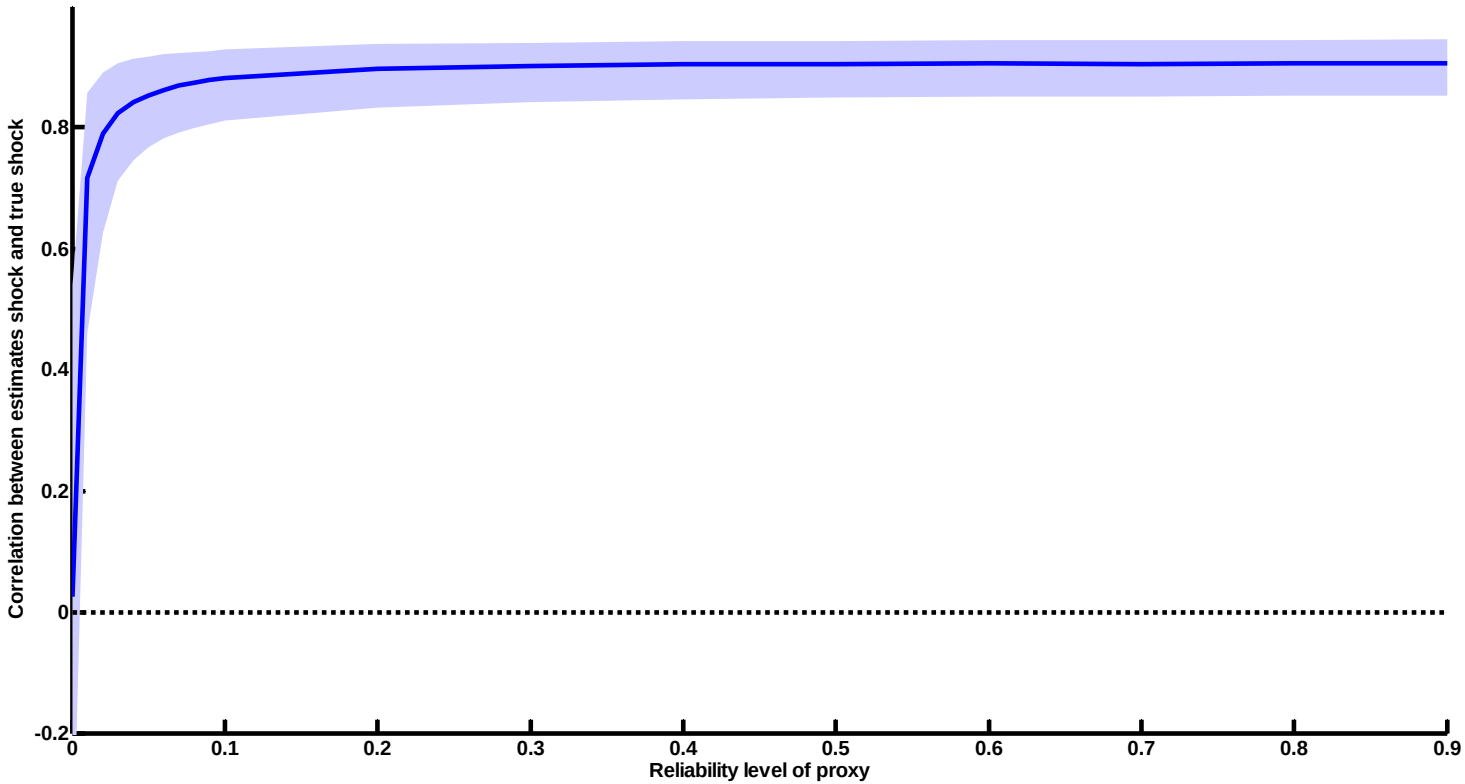
Under random censoring, Mertens and Ravn (2013a) define a reliability measure:

$$\Lambda = \mathbb{E}(D)\left[\mathbb{E}(mm^{'})\right]^{-1}\mathbb{E}(mu_1)\Gamma\Gamma'$$

This is the proportion of the variance of non-censored proxy observations explained by the reduced form residuals. They report figures between 0.27 and 0.62.

Reliability study

Figure : Correlation between true and identified shocks under different reliability assumptions



Notes - From Bahaj (2013): chart shows the correlation between true and identified shocks under different reliability assumptions using a Monte Carlo study. The correlation is computed as the correlation between median of the estimated shocks from the sampler versus the true simulated shock. Solid blue line is the median correlation of 1000 simulations, the shaded are corresponds is the middle 95% of simulations. Y-axis is truncated at -0.2 for visual clarity.

Comparison with other approaches

From Mertens and Ravn (2013b):

- Blanchard and Perotti (2002): The SVAR restrictions are justifiable but one needs to choose the right tax elasticity. The original paper's was too low and may have relied on endogenous relationships.
- Favero and Giavazzi (2012)/Romer and Romer (2010): Narrative in the VAR directly. But: tax narratives are poorly measured; small changes are not included, the exact increase is hard to verify. Estimates suffer from attenuation bias reducing the tax multiplier. Proxy SVAR specifically accounts for this.
- Results are consistent with sign restrictions - Mountford and Uhlig (2009).
- A further issue is scaling; is it the increase in the average tax rate or the revenue base. This can make a large difference.

Issues

- Foresight:
  - If you go through the online appendix it is clear there is no anticipation.
  - Including forward looking variables can give the VAR an invertible MA representation.
  - BUT: The proxy is correlated with both tax changes today and future news about policy. Not every tax change has the same dynamic path.
- Can we aggregate taxes to this level?
- How exogenous is are these measures to output; is not mentioning the economy in a speech enough?
- How much can we learn from 12-15 observations?
- Is B really $N \times N$? If every variable has a current exogenous component, and a shock to its future path then maybe not. The world does not have a fundamental VAR representation the question is how problematic this is. Sims (2012) has some work on this.

Future research

- The weak proxy problem needs more general solutions (Olea et al. (2012))
- Embed Proxy SVAR state of the art reduced form model:
  - Allow for stochastic volatility
  - Time varying slope coefficients etc.
- Lots of applications: monetary shocks, spending shocks etc.
- Dealing with news shocks.

References

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