

# How large is the US tax multiplier?

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*Christina and David Romer have recently produced new estimates of the tax multiplier by using the narrative record to identify exogenous tax changes. This column says that their estimates assume that tax changes are orthogonal to shifts in other macroeconomic variables, such as productivity, taxes, and monetary policy. Relaxing that assumption yields much smaller estimates of the tax multiplier.*

Tax cuts have been extensively used in the US and elsewhere as a measure to counter the impact of the financial crisis. The dimension of the tax multiplier (i.e. the percentage response of output growth to a given shift in the tax/GDP ratio) is a crucial magnitude to understand how appropriate the fiscal intervention has been.

So far the received-wisdom estimate is:

- The multiplier is 1.0, four quarters after the shift in taxes;
- The peak- level is slightly above 1.0 and comes after two years; after that the effect levels off.
- There is also evidence that such an effect is weaker over the period 1980-2006 than in the previous 25 years.

These estimates were typically obtained in the context of vector autoregressive (VAR) models applied to quarterly data (see, e.g. [Blanchard](#) and [Perotti](#), 2002 and [Perotti](#) 2008).

In a recent paper [Christina and David Romer](#) (forthcoming) find a much larger multiplier. According to their estimates, a tax cut equivalent to 1% of US GDP raises output just over 1% within a year, but the magnitude amplifies in the following periods to reach an effect of nearly 3% after three years. The effect is highly statistically significant and stable over time.

## Estimating tax multipliers: Three key issues

The most crucial issue in the estimation of tax multipliers is the identification of truly exogenous shifts in taxes, thus excluding changes in government revenues that are not legislated at all, but occur automatically because the tax base varies with the overall level of income.

[Romer and Romer](#) solve this problem brilliantly, in a manner distinct from existing empirical papers. Applying to fiscal policy a method they have extensively applied to analyse the effects of shift in monetary policy, they identify exogenous shift in taxes analysing the narrative record. They use things like Presidential speeches and Congressional reports, which allows them to identify the size, timing, and principal motivation for all major post-war tax policy actions. This allows them to distinguish between legislated changes made for reasons related to prospective economic conditions and those adopted for more exogenous reasons – for instance for philosophical reasons or to reduce an inherited budget deficit. Their estimates of the effects on output of shifts in taxes use only these more exogenous changes. Thus they avoid the bias in measurement that would be generated by the use of aggregate measures of tax changes, many of which – as we said – are not legislated at all, but occur automatically because the tax base varies with the overall level of income, or because of changes in stock prices, inflation, and other non-policy forces.

## Previous attempts to separate endogenous and exogenous policy shifts

Previous attempts at identifying exogenous shifts in taxes (Blanchard and Perotti, 2002, Perotti 2008, Mountford and Uhlig, 2002 Fatàs and Mihov, 2001) estimated reduced-form VAR models and mapping the innovations generated by such models into structural shocks using institutional information about the tax and transfer systems and the timing of tax collections. This procedure (which some authors also applied to spending) allowed the authors to identify the automatic response of taxes (and/or spending) to economic activity, and, by implication, to infer truly exogenous shifts in fiscal policy. The tax multipliers estimated using this procedure are much smaller than those found by Romer and Romer.

Romer and Romer suggest that these differences are the result of the failure of structural VARs to identify truly exogenous shifts in taxes.

The estimation of tax multipliers poses a second issue, however, beyond that of identification: the specification of the empirical model used to obtain such estimates. Traditional fiscal VARs were multiple equation models in which all the variables (output growth, government revenues and spending, inflation, nominal interest rates) relevant to determine the effect on growth of a shift in taxes were jointly modelled. Romer and Romer instead evaluate the multiplier estimating a single equation in which growth is a function of contemporaneous and lagged shifts in taxes.

A third issue emerges when one starts thinking about the nature rather than the dimension of the empirical model that is most appropriate to estimate tax multipliers. Both the Romer and Romer model and the traditional fiscal VARs are linear in the relevant variables. However, there is a natural source of non-linearity among the variables included in a fiscal VAR, which arises from the government intertemporal budget constraint.

Whether the government budget constraint belongs in a fiscal VAR depends on whether the level of the debt-to-GDP ratio enters the model. Bohn (1998), using a century of US data, finds a positive correlation between the government surplus and the federal debt – a result that suggests that US fiscal policy reacts to the level of the debt ratio. But if fiscal variables respond to the level of the debt, then the estimation of tax multipliers should be conducted by explicitly recognising a role for debt and the for the stock-flow identity linking debt and deficits and thus describing how the debt ratio evolves over time following a fiscal shock.

## **Results: There is no conflict in our evidence on tax multipliers**

In a recent paper (Favero and Giavazzi, 2009), we assess the robustness of the evidence of a large tax multiplier using the same measure of exogenous shifts in taxes constructed by Romer and Romer but a different econometric specification.

We show that the equation Romer and Romer estimate to compute the effects of a shift in taxes can be interpreted as the moving average representation of the equation for output growth in a traditional fiscal VAR which includes a larger set of variables – along with output growth, government revenues and spending, inflation, and nominal interest rates. This representation however is truncated along two dimensions: (i) the number of lags is finite and (ii) no other shocks than shifts in taxes are included. Such an approach relies on the assumption that tax shocks are not only orthogonal to each other, but that they are also orthogonal to any other macro shock – productivity shocks, shifts in government spending, in monetary policy, etc.

When we relax this assumption, we find a tax multiplier much smaller than that estimated by Romer and Romer and similar to the size of the multiplier estimated in the traditional fiscal VARs. When we split the sample in two sub-samples (1950-1979 and 1980-2006) we find, before 1980, a multiplier whose size is never greater than one; after 1980 a multiplier not significantly different from zero.

We then extend the empirical model by explicitly recognising a role for debt and the stock-flow identity linking debt and deficits. In other words, we estimate the multiplier associated with the Romer and Romer tax shocks, keeping track of the effect that such shocks exert on the path of the debt ratio and allowing for a response of taxes, spending, output, and interest rates to the level of

the debt. We find no major difference between a non-linear model with an explicit debt dynamics equation and a VAR that excludes debt and the debt dynamics equation. We suggest that the reason why overlooking this non-linearity does not appear to be important – or at least as important as overlooking the simultaneity between tax shocks and other macro shocks – may be that the variables entering the budget constraint already enter (albeit linearly) the equation of a fiscal VAR that excludes debt. Non-linearity, however, appears to make a difference whenever – as in happens in the US after 1980 – the response of fiscal variables to the level of the debt is particularly strong.

## References

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