Asymmetric Effects of Exogenous Tax Changes

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ABSTRACT

We study whether output responds symmetrically to tax increases and decreases in postwar US data, using the identification strategy in Romer and Romer (2010). We find evidence of important asymmetries: the output response to a tax increase is statistically insignificant, but output shows a significantly positive and permanent increase following a tax decrease. We show that this asymmetry appears to be driven by individual-income tax changes, and is transmitted to the economy through asymmetric response in aggregate consumption to tax increases and tax decreases. We also present a simple model that rationalizes our empirical findings, and illustrates how asymmetric output and consumption responses to sign-based tax changes can be generated by plausible consumption-adjustment costs.

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1. Introduction

Understanding how tax changes affect aggregate economic activity is central to fiscal policy analysis. As a result, a large literature has studied how tax changes affect economic variables such as output, investment, consumption and labor supply.[1] However, it is common in this literature to assume that the effects of tax changes are symmetric, i.e., tax increases and tax decreases have essentially equal but opposite effects on aggregate economic variables. In this paper, we test and reject the hypothesis of a symmetric response of output to sign-based tax changes. We also study possible channels for this asymmetry. In particular, we find that there is an asymmetric response of consumption, and not investment, to sign-based tax changes, suggesting a possible transmission mechanism driving the asymmetric output response. Finally, we provide a way to rationalize our empirical findings, by showing how asymmetric effects of sign-based tax changes can result from asymmetric consumption-adjustment costs in an otherwise standard dynamic stochastic general equilibrium (DSGE) model.

The fundamental challenge in identifying the effect of tax changes on economic activity is that a tax policy can change in response to economic conditions, so that the explanatory variable of interest is generally endogenous. To mitigate these endogeneity concerns, we use the exogenous tax changes identified via a narrative approach by Romer and Romer (2010) (henceforth R & R). We categorize the exogenous tax changes in R & R, measured as the change in tax liabilities relative to GDP, based on their sign: *Tax increase* if the tax liabilities rise and *Tax decrease* if the tax liabilities reduce.

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  [1] See Romer and Romer (2010) for more details and references therein.

Empirical investigation of the hypothesis of symmetry of exogenous tax increase and decrease on macroeconomic variables is further prone to two additional challenges. First, the underlying data generating process is unknown and therefore a misspecified model may render parameter estimates inconsistent. Second, linear impulse responses (which are simply linear combinations of estimated coefficients of the model) are unable to isolate asymmetric responses that are driven by reasons other than the sign of tax changes (such as history and size of the tax changes). Therefore, one needs to depart from linear impulse responses which in our context are known to bias the dynamics of the variable of interest (Gallant et al., 1993; Koop et al., 1996). Following the methodology proposed by Kilian and Vigfusson (2011) we account for these challenges: we use a non-linear regression model that encompasses all specifications and therefore provides consistent estimates regardless of whether the true data generating process is symmetric and regardless of the precise form of asymmetry. We also compute non-linear impulse responses which account for both the size and the history of tax changes.

In particular, we regress real output growth on contemporaneous and lagged measures of both tax increases and tax decreases, and lagged observations of output growth. For computation of impulse responses in our non-linear specification, we allow for full history and magnitude of both tax increases and decreases to affect output to correctly compute history and magnitude dependent non-linear impulse responses. These responses are computed using a three step procedure. The first step estimates and stores the coefficient and residuals from our regression. In the second step, a random consecutive series of a specified length of tax increases and decreases are drawn from the data which in combination with the information from first step is used to simulate a history dependent path of output. The last step then repeats the second step, with one change: the first observation in the randomly drawn tax change series is changed to a constant and a new path of output is simulated in this step. The magnitude of the constant accounts for the size of the change that hits the system. The difference between the two simulated series provides the impulse response of output to some constant shock size and a common history of tax changes. Repeating this process with various possible histories and sizes of the tax changes and averaging across such difference in the dynamic paths of output then accounts for all possible histories and size of the tax changes – both of which are well known to matter for the dynamics of the variable of interest especially in the asymmetric model.

Using the specification and procedure described, our baseline result establishes a significant asymmetric response of output to sign-based unanticipated tax changes. In particular, output increases significantly in response to an unanticipated tax cuts, whereas the output response to an unanticipated tax increase is insignificant. Formal tests reject symmetry. Our results therefore suggest that policy makers should be cautious in assuming that the effects of sign-based tax changes are symmetric.

To understand the transmission mechanism behind asymmetric output responses to sign-based tax changes, we augment our empirical analysis in two ways. First, following Mertens and Ravn (2013) we classify the R & R exogenous tax changes into individual-income tax changes and corporate-income tax changes. We find evidence for asymmetric effects on output only for individual-income tax changes, whereas corporate-income tax changes have symmetric effects on output. Second, we investigate how aggregate consumption, labor and investment respond to these sign-based tax changes, and find that consumption and labor have asymmetric responses whereas investment responds symmetrically. In particular, consumption does not decrease after a tax increase, whereas the labor supply does not adjust downwards in response to a tax cut. Our analysis therefore indicates that asymmetric responses in output are driven primarily by asymmetric responses in aggregate consumption and labor decisions to sign-based tax changes.

Finally, we show that our empirical results can be rationalized in a simple DSGE model where households face asymmetric consumption-adjustment costs. Such adjustment costs could be due to non-psychological factors such as pre-commitment to existing consumption plans (e.g., housing, phone contracts, insurance, education). With such adjustment costs household's ability to adjust consumption downwards is limited, and they instead adjust their labor supply in response to tax increase. As a result, aggregate output does not fall in response to a tax increase, but increases significantly after a tax cut (exhibiting the asymmetric responses to sign-based tax changes in our empirical analysis).

A number of previous studies have looked at the effects of tax changes on output without taking into account possible sign-based asymmetries. Blanchard and Perotti (2002) use a structural vector autoregression (VAR) approach and institutional information on changes in fiscal policy, and estimate a fiscal policy multiplier for output of approximately 1%.[2] Romer and Romer (2010) use narrative records to document all post-war US-legislated tax changes and divide them into endogenous and exogenous tax changes based on the motivation for each tax bill. They estimate a much larger elasticity of output (of about 3%) with respect to tax changes.[3] Mertens and Ravn (2011) use narrative tax changes and distinguish between unanticipated and anticipated changes in tax liabilities. Using a VAR approach, they estimate that an unanticipated tax cut gives rise to a significant increase in output, consumption, and investment. In particular, a 1% tax cut is associated with a 2% peak increase in output per capita. Our estimate for the effect of a tax decrease on output lies between these previous estimates, while we find no significant effects of a tax increase on output.

Our methodological approach to determine possible asymmetric effects is similar to various studies in the literature on asymmetric effects of monetary policy, such as Ravn and Sola (2004) and Cover (1992). By comparison, the literature studying asymmetric effects of tax changes is limited, and primarily concentrates on state-dependent effects of fiscal changes. For example, Auerbach and Gorodnichenko (2012) use a regime-switching model to show fiscal policy is more

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[2] Blanchard and Perotti (2002) explain the small multiplier through opposite effects observed for different components of output: private consumption rises while exports and imports fall and investment crowds out because of an increase in spending.

[3] The authors suggest that a strong negative response of investment is the primary explanation for the large negative output responses to a tax change.