Project Narrative: Measuring the Effects of Fiscal Stimulus on the Economy
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Abstract

Government spending, one of the major components of Gross Domestic Product (GDP), is composed of government consumption, investment, and transfer payments. Fiscal stimulus is additional government spending to stimulate economic activity whereas fiscal austerity is a cut in government spending to limit the budget deficit. The fiscal multiplier measures the change in a country's GDP due to a change in government spending. Many recent studies have focused on identifying parts of economy that responds more to a stimulus under variety of circumstances. The type of government spending, persistence of the change in spending, and how it is financed have been found to affect the size of multipliers. I use the dataset from the Bureau of Economic Analysis for the USA from 1947 to 2019 and a linear Vector Auto Regression (VAR) model with standard Blanchard-Perotti specification to estimate the multiplier. I find it to be approximately one for full sample.[1] Then, I divide the dataset into two samples and found multiplier is larger when the economy is in the recession. This provides evidence that fiscal stimulus is more effective during the time of recession. However, since this model assumes linearity between the variables, symmetry of responses of the economy to an increase in spending during recessions and expansions as well as a specific underlying relationship it may over or under-estimate the true size of the multiplier. Recent studies use non-parametric methods to compute multipliers. Nonparametric models provide more accurate estimation of fiscal multiplier. Hence, I will adopt non-parametric approach in this research to estimate the effects of fiscal stimulus.

Background and Significance

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[1] Vector Auto Regression is a linear regression technique using vectors of time series variables. Blanchard & Perotti (2002) used an identification assumption that government spending does not respond to macroeconomic variables within the same quarter. This means policy variable will be placed at the top of a VAR model.

Accurate estimation of government spending multiplier is important because fiscal policy has been used to stimulate a flagging economy or act as a break for a booming economy. For example, if fiscal multiplier is positive and larger, then additional spending may be more effective. Most studies have found multipliers to be modest and often smaller than one. If multipliers are much smaller than one and close to zero, they find that government spending increases do not stimulate aggregate demand and fiscal contractions are not likely to affect private activity (Ramey & Zubairy, 2018).

However, it is not the aggregate spending multiplier that has been a focus of recent studies. Boehm (2020) used a Dynamic Stochastic General Equilibrium (DSGE) framework to examine the size of investment and consumption multipliers. He reports that private investment is more inter-temporally substitutable than the private consumption. This is the channel that makes investment multiplier smaller in magnitude than the consumption multiplier.

In fact, it is inaccurate to estimate aggregate multiplier directly because composition of total purchase is not constant. Since aggregate multiplier is approximately weighted average of disaggregated multipliers, a change in the composition of spending may lead to a change in aggregate multiplier (Boehm, 2020). A major stream of recent literature has estimated the magnitude of multiplier under alternative assumptions and find it can be larger than one given different assumption i.e., if the economy is in the recession (Auerbach & Gorodnichenko, 2012), if nominal interest rate is restricted by the zero lower bound (ZLB) (Christiano et al., 2011, Eggertsson, 2011), or if government spending is financed with cash (Gali, 2020).[2]

Research Question

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[2] Zero Lower Bound (ZLB) occurs when short-term interest rate is at or near zero, limiting central bank's ability to stimulate economy with conventional monetary policy.

I want to estimate the size of the government consumption and investment multipliers under two distinct scenarios. First, when the economy is in either a recession or an expansion. Second, when the nominal policy rate is either at or away from the zero lower bound (ZLB). Ramey & Zubairy (2018) used quarterly historical US data from 1889 to 2015 to discover total government spending multipliers are less than one at and away from the ZLB, but multipliers are higher in the ZLB state than in the normal (non-ZLB) state. On the other hand, Boehm (2020) used a quarterly OECD panel dataset from 2003 to 2016 to find government consumption and investment multipliers are larger than one at the ZLB and smaller than one at the non-ZLB.[3] Also, investment multiplier is higher than the consumption multiplier at the ZLB, but much smaller at the non-ZLB.

Boehm (2020) followed Ramey & Zubairy (2018) to estimate multipliers and both studies are consistent on the finding that multipliers are larger at the ZLB than away from the ZLB. However, Boehm (2020) reports much larger multipliers than Ramey & Zubairy (2018) and much variation is observed between the investment and consumption multipliers at and away from the ZLB. Ramey & Zubairy (2018) used larger US dataset (1889-2015) but did not separate the consumption and investment spending. On the other hand, Boehm (2020) separated the multipliers, but used smaller OECD panel data from 2003 to 2016. Based on my knowledge, no other studies have used a non-parametric local projection method for the US data to estimate both the consumption and investment multipliers at and away from the ZLB. My research will use a larger US dataset from 1947 to 2019 to estimate both the multipliers. Also, although Ramey & Zubairy (2018) estimated total spending multiplier at and away from the recession state, my research will estimate both multipliers.

Specific Aims

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[3] The Organization for Economic Co-operation and Development (OECD) is an inter-governmental economic organization with 37 member countries.

The first objective of this research is to see if the predictions from Boehm (2020) hold while using Jordà's (2005) local projection method on larger US data from 1947 to 2019. This method provides much less constraint on the data. I want to check if the investment multiplier is smaller than the consumption multiplier for a short-lived shock and if it changes when the nominal interest rate is at and away from the ZLB. My second objective is to test whether the estimated consumption and investment multipliers match with the aggregate spending multiplier reported by Ramey & Zubairy (2018) at and away from the recession state. I plan to present the draft of this research paper at the Fordham Macroeconomics Seminar in the next academic year as well as local and national conferences. After getting feedback, I plan to submit it to a high-quality field journal for publication.

Hypothesis

I want to test the following hypotheses:

Hypothesis1: Both the government consumption and investment multipliers are not significantly different at and away from the ZLB.

Hypothesis 2: Multipliers are not significantly different with each other at and away from the ZLB.

Hypothesis 3: Multipliers are not larger during recession than expansion.

Hypothesis 4: Multipliers are not significantly different with each other during recession and expansion.

Research Design and Methods

Data I will use fiscal and macroeconomic aggregate data from the US Bureau of Economic Analysis (BEA). All data are available at quarterly frequency from 1947 to 2019. I will use standard identification assumption that government spending does not respond to macroeconomic variables within the same quarter following Blanchard & Perotti (2002). Also, I will use forecast

data to correct for the anticipated component of the shock generated from Blanchard-Perotti identification scheme as pointed out by Ramey (2011b).[4]

Empirical methodology I have already used impulse responses from linear VAR to compute the multipliers. However, parametric linear models ignore nonlinearity in the data, assumes symmetry, and are often vulnerable to misspecification. To deal with these problems, Jordà (2005) introduces a novel non-parametric approach that estimates impulse responses without specifying and estimating the underlying multivariate dynamic system. This approach uses local projections at each point to compute impulse responses as opposed to extrapolating information into distant points. There are several benefits of using local projections over linear VARs (1) they are simple to estimate with standard regression package (2) they are more robust to misspecification; (3) simple joint or pair wise analytic inference (4) they are able to incorporate highly nonlinear and flexible specifications (Jordà, 2005).

Timetable

I am currently finishing up the literature review for this research. I have enrolled in an Applied Econometrics course that focuses on non-parametric methods. Hence, I will be skilled in handling local projection method before the summer begins. By the end of June, I plan to complete data collection, cleaning and organization. I will spend most of July and August to analyze the data and compare my results with existing literature. Finally, I will have the first draft ready by the first week of September.

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[4] Much of the forecasts data is already converted into electronic form by Auerbach and Gorodnichenko (2012). For anticipated variables, I will use quarterly forecasts of fiscal and aggregate variables from the University of Michigan's RSQE macro econometric model. I will also use data from Survey of Professional Forecasters (SPF) and the forecasts prepared by the staff of the Federal Reserve Board (FRB) for the meetings of the Federal Open Market Committee (FOMC).

References

Aiyagari, S. R., Christiano, L. J., & Eichenbaum, M. (1992). The Output, Employment, and Interest Rate Effects of Government Consumption. *Journal of Monetary Economics, 30*(1), 73–86.

Aschauer, D.A. (1989a). Does public capital crowd out private capital? *Journal of Monetary Economics, 24* (2), 171–188.

Aschauer, D.A. (1989b). Is public expenditure productive? *Journal of Monetary Economics, 23* (2), 177–200.

Auerbach, A.J., & Gorodnichenko, Y. (2012). Measuring the output responses to fiscal policy. *American Economic Journal: Economic Policy, 4* (2), 1–27.

Blanchard, O., & Perotti, R. (2002). An empirical characterization of the dynamic effects of changes in government spending and taxes on output. *Quarterly Journal of Economics, 117* (4), 1329–1368.

Boehm, C.E. (2020). Government consumption and investment: Does the composition of purchases affect the multiplier? *Journal of Monetary Economics*, 115 (7), 1–19.

Bilbiie, F. (2011). Non-separable preferences, Frisch labor supply, and the consumption multiplier of government spending: one solution to a fiscal policy puzzle. *Journal of Money, Credit, &Banking, 43* (1), 221–251.

Calvo, G. (1983). Staggered prices in a utility-maximizing framework. *Journal of Monetary Economics*, *12* (3), 383–398.

Christiano, L., Eichenbaum, M., & Rebelo, S. (2011). When is the government spending multiplier large? *Journal of Political Economy, 119* (1), 78–121.

Davig, T., & Leeper, E.M. (2011). Monetary-fiscal policy interactions and fiscal stimulus. *European Economic Review, 55,* 211–227.

Galí, J. (2020). The effects of a money-financed fiscal stimulus. *Journal of Monetary Economics, 115(7),* 80-93.

Galí, J., López-Salido, J.D., & Vallés, J. (2007). Understanding the Effects of Government Spending on Consumption. *Journal of the European Economic Association, 5*(1), 227–70.

Jordà, O. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review, 95* (1), 161–182.

Leeper, E.M. (1991). Equilibria under 'active' and 'passive' monetary and fiscal policies. *Journal of Monetary Economics, 27* (1), 129–147.

Mountford, A., & Uhlig, H. (2009). What are the effects of fiscal policy shocks? *Journal of Applied Economics, 24* (6), 960–992.

Michaillat, P. (2014). A theory of countercyclical government multiplier. *American Economic Journal: Economic Policy,* 6 (1), 190–217.

Pereira, A.M. (2000). Is all public capital created equal? *The Review of Economic Studies, 82* (3), 513–518.

Ramey, V.A. (2011a). Can government purchases stimulate the economy? *Journal of Economic Literature, 49* (3), 673–685.

Ramey, V.A. (2011b). Identifying government spending shocks: it's all in the timing. *Quarterly Journal of Economics, 126* (1), 1–50.

Ramey, V.A., & Zubairy, S. (2018). Government spending multipliers in good times and in bad: evidence from US historical data. *Journal of Political Economy, 126* (2), 850–901.

Michaillat, P. (2014). A theory of countercyclical government multiplier. *American Journal: Macroeconomics, 6* (1), 190–217.