

## Research Statement

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My work seeks to understand the macroeconomic effects of fiscal policy. There are two core research agendas. The first is to explore the effects of productive government expenditure from the perspective of business cycles. The second is to understand how fiscal shock can be transmitted and amplified through financial market channel and input-output connection.

**Productive government expenditure.** There is a long tradition of studying the role of productive government expenditure in the literature of economic growth. But most researches focus on the wasteful public expenditure when focusing on issues of business cycles. For example, fiscal shock is totally an aggregate demand shock in a standard NK model. Fiscal multiplier is often limited in normal times. After the financial crisis of 2008, many countries stay in the circumstances of liquidity trap or zero lower bound (ZLB). In this case, fiscal policy shock, as an aggregate demand shock, could have significant effects. The fiscal multiplier can be very large. However, in reality, some countries have adopted fiscal policy in the form of infrastructural investment, which also affects aggregate supply simultaneously. One of my papers discusses the aggregate supply effect of fiscal stimulus in a standard NK model in the presence of ZLB.<sup>1</sup> I model the productivity of fiscal stimulus packages by introducing government expenditure into the production function. In this model, fiscal policy has effects on both aggregate supply and aggregate demand. The conclusion that fiscal multiplier must be large in liquidity trap situation doesn't hold any more. The basic mechanism is that marginal cost of production decreases when productive government expenditure rises, which leads inflation to fall. Because of the existence of ZLB, the real interest rate will rise, this will depress investment and consumption. So whether fiscal multiplier is large or not in the case of ZLB depends on the comparison of traditional aggregate demand effect with this new aggregate supply effect. By using Chinese macro quarterly data from 1998:1-2014:4, I find that the aggregate supply effect dominates, and fiscal multiplier is less than 1.

Generally speaking, the government will finance public investment through different ways such as collecting more taxes, cutting expenditure or borrowing more debts. In a non-Ricardian economy, each way of financing has distinct effects on the economy. Introspecting the effects and underlying mechanism of different financing schemes is not only interesting but also important. My joint work with Hu and Li discusses these issues

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<sup>1</sup> "The Forgotten Aggregate Supply: Does Fiscal Expansion Lead to Inflation Definitely?", *Economic Research Journal* (2016).

comprehensively.<sup>2</sup> We first compare the effects of different approaches of financing, and find that increasing distorted taxes, especially taxes on capital, has the most significant effect on the economy. Additionally, we also analyze the effects of increasing value-added tax (VAT), exercise tax, labor income tax. Finally, we employ Bayesian estimation technique to test which combination of financing schemes is supported by data. It shows that the model with the package of increasing VAT, capital tax and borrowing more debts fits the data best. Beyond above analysis, I also extend the model into a heterogeneous agents framework, which includes both Ricardian and non-Ricardian consumers. General equilibrium effect plays a more important role. In particular, the rule-of-thumb behavior mode of non-Ricardian consumers affects the Ricardian ones through its effects on aggregate economy, which will in turn reverse the direct effects of financing schemes on consumption-smoothing household. This finding implies that it would bias the conclusion if heterogeneity were ignored when analyzing the effects of public debt repayment.

In practice, the government often implements countercyclical fiscal policy in the hope of smoothing economic fluctuations. In other words, fiscal policy responds to economic situation systematically, and plays a role of auto-stabilizer. Although this is similar to progressive tax, there exists a fundamental departure between them. The size of auto-stabilization effect can be controlled by the government when implementing fiscal policy. If the government follows some fiscal policy rule, private sector will respond in advance when she observes the changes in relevant aggregate variables in rational equilibrium. Expectation plays a prominent role here. Another project by Hu and I discusses the effects of productive fiscal policy rule on consumption.<sup>3</sup> The basic tradeoff is between negative wealth effect and income effect induced by the expansion of productive government expenditure. As economic downturn happens, people anticipate that the government will take actions to fight against the recession. If infrastructural investment is the main measure to be adopted, on the one hand, future disposable revenue will decrease because of the increase of taxation. But, on the other hand, productive public investment will stimulate the production capacity of the economy, which will push the employment up, and raise revenue. These two effects affect private consumption in the opposite direction. The dynamics of consumption exhibit nonlinearities with respect to the strength of reaction of fiscal policy to the economy. In particular, when fiscal policy reacts more aggressively in early stages, the positive income effect dominates, while negative wealth effect becomes stronger later if the strength of reaction exceeds some threshold. Intuitively, there exists an inverse U-shape relationship between the impact

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<sup>2</sup> “Fiscal Expansion, Debt Repayments and Private Consumption”, *Management World* (2013).

<sup>3</sup> “Fiscal Policy Rule, Expectation and Private Consumption”, *Economic Research Journal* (2013).

response of private consumption and strength of fiscal policy reaction.

**Financial market distortion and input-output connection.** In emerging countries, the financial system is underdeveloped. Financial frictions play a more significant role in these economies. What has been demonstrated is that there are usually two types of firms in emerging countries, one is state-owned entrepreneur (SOE), the other is private-owned entrepreneur (POE). There are two additional characteristics through which one can differentiate between them besides ownership *per se*. The first one is their different positions in financial markets. General speaking, it is much easier for SOEs to obtain loans in financial market. This is not just because they are often guaranteed explicitly or implicitly by the government, the quality of assets and collaterals that they own is almost higher than POEs. So commercial banks are perfectly willing to lend to SOEs. The asymmetric positions in financial market between these two-type firms can be used to identify the role of financial friction. The other characteristic to discriminate SOEs against POEs is that they are generally located in different positions in input-output network. Most SOEs are concentrated in the upstream industries while POEs are mainly distributed in downstream industries. The input-output connection may be a potential propagation mechanism of real shocks.

It is a well-established fact that in many emerging countries, for example, in China, the government will realize the increase of public investment through SOEs. At the same time, commercial banks will also lend them quite a lot because public projects can be taken as collateral for borrowing by SOEs. For this reason, once productive fiscal policy is triggered, the amount of credit will expand tremendously together. There exist interactions between fiscal policy and monetary policy through financial market. Credit funds flow biasedly towards SOEs who would undertake the projects. In this sense, fiscal policy shock is also a financial shock. In a recent paper,<sup>4</sup> I consider the role of financial market distortion in amplifying fiscal policy shock. In my analysis, I introduce collateral constraints for both SOEs and POEs, the only difference is that positive fiscal shock will relax financial restriction on SOEs. In this setting, the famous Kiyotaki-Moore story becomes a strong mechanism to amplifying fiscal policy shock and leads to asymmetric effects on different firms.

In an extended paper, I consider the effects of productive government expenditure on different firms in a standard DSGE model with input-output connection.<sup>5</sup> When the government wants to pull the economy from

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<sup>4</sup> "Proactive Fiscal Policy, Financial Market Distortion and Private Consumption", *Journal of World Economy* (2016).

<sup>5</sup> "Fiscal Policy Expansion, Vertical Industrial Connection and Capacity Utilization in China", *Management World* (2016).

recession by building more infrastructure, the demand of intermediate goods such as steel, cement will increase dramatically. It will push their prices up, which means that the cost of final goods producers also increases. The rational response of final goods producer (firms in downstream industries) is to cut production, which in turn depresses the demand of intermediate goods produced by firms in upstream industries. In other words, public demand of intermediate goods crowds out demand of downstream firm. Initially, the former is much stronger than the latter, which pushes the price of intermediate goods up. As time flies, the latter effect dominates because stimulus package quits finally. In consequence, the price falls at last. Overall, price of intermediate goods exhibits hump-shape dynamics in response to fiscal policy shock, which is a regular empirical fact in the data of China and cannot be well explained in models without input-output connection.

**Future research.** The role of interactions between fiscal policy and monetary policy through financial market and more complicated networks in shaping the business cycles and effectiveness of stabilization policy is a very active and potential area of research. I plan to continue my work in this area as my priority for future research.