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Persistent government spending and fiscal multipliers: The investment-channel

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ABSTRACT

This paper inspects the mechanism shaping government spending multipliers in various small-scale DSGE setups with endogenous labor supply and capital accumulation. We analytically characterize the short-run investment multiplier, which in equilibrium can be either positive or negative. The investment multiplier increases with the persistence of the exogenous government spending process. The response of investment to government spending shocks strongly affects short-run multipliers on output and consumption.

1. Introduction

Policy debates related to stimulus packages and fiscal consolidation programs have renewed academic interest about the effects of government activity. The short-run government spending multiplier, i.e. the response of current GDP consecutive to a unit increase in government spending, has attracted considerable attention despite the large uncertainty surrounding its measurement (see Ramey, 2011 for a recent survey). Estimated values of the multiplier vary with many factors including the econometric approach, the identification strategy, the structural model, the nature and duration of the fiscal change, or the state of the economy (see among others, Cogan et al., 2010; Uhlig, 2010; Christiano et al., 2011; Ramey, 2011; Auerbach and Gorodnichenko, 2012; Coenen et al., 2012; Fève et al., 2013; or Erceg and Lindé, 2014).

Does the time profile of government spending affect fiscal multipliers? We revisit this classic question using a tractable business cycle model with physical capital accumulation, endogenous labor supply and stochastic government spending. Closed-form solutions for the equilibrium of that economy show that the persistence of government spending shapes short-run multipliers through the response of private investment.

The main contribution of this paper is to pin down the persistence of government spending for which a capital demand effect triggered by the increase in expected employment offsets the usual crowding-out effect on investment. This threshold

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persistence value also represents the equilibrium adjustment speed of consumption, which varies across economic environments. Should private investment increase, the output multiplier would be magnified compared to an economy where capital is held constant. Conversely, transitory fiscal stimuli do not provide any incentive to accumulate physical capital and give up a potentially important propagation mechanism.

Our analysis connects dynamic multipliers in an economy with capital accumulation to constant-capital multipliers. Constant-capital models are often used to deliver analytical results on fiscal multipliers, as in Hall (2009), Woodford (2011), Christiano et al. (2011) or Fève et al. (2013). In frictionless setups, constant-capital multipliers only result from the intra-temporal allocations (the marginal rate of substitution between consumption and leisure, the marginal productivity of labor and the aggregate resources constraint) but ignore expectations about the timing of government policy.[1]

We also connect our results with long-run (non-stochastic steady-state) multipliers which take into account full adjustment of physical capital. We show that long-run multipliers can be obtained as the limit case of dynamic multipliers after a permanent shock to government spending.

The model we use is sufficiently simple, given its functional forms on utility and production functions, to get analytical and insightful results. It nevertheless shares the key ingredients present in the DSGE literature: the utility is separable between consumption and leisure (consumption and leisure are deliberately maintained as normal goods), a constant return-to-scale technology combines labor and capital inputs, and the stochastic process of non-productive government spending is exogenous and persistent. These core assumptions are present in most current DSGE models (see Coenen et al., 2012 or Smets and Wouters, 2003, 2007). We show that our results still hold with capital adjustment costs, which makes the response of investment less sensitive to the persistence of government spending but does not modify the threshold value.

To extend our results, we extend our analysis to incorporate two key parameters of DSGE modeling: the intertemporal elasticity of substitution in consumption and the Frisch elasticity of labor supply. These two model versions nest our basic setup, making it simple to inspect the mechanism at work. The intertemporal elasticity of substitution in consumption only modifies the size of the constant capital multiplier, but does not alter the effects of the government spending driven by expectations. The elasticity of labor supply plays in two directions. First, when this elasticity is lower, the constant capital multiplier is smaller because the labor supply is less responsive after the negative income effect. Second, a smaller elasticity of labor supply reduces the adjustment speed of consumption (for a given level of physical capital). This implies that the threshold value of the autoregressive parameter on government spending must be higher to insure a positive response of saving.

Finally, we consider two types of market imperfections. First, we study external endogenous discounting, assuming that an increase in aggregate consumption makes agents more impatient (see Schmitt-Grohé and Uribe, 2003, in a small open economy setup). Endogenous external discounting reinforces the investment channel and magnifies our previous results. As government spending crowds out private consumption, households become more patient and thus save more. In this economy, the threshold value on the persistence parameter is smaller, making the government spending policy more effective. Second, we allow for imperfect financial markets and imperfect competition on the labor market under a particular form of hand-to-mouth consumers (see Galí et al., 2007). We make the special assumption that unions only consider the utility of savers when setting real wages. That assumption amplifies the response of aggregate labor supply, which is the initial driving force in our setup. The existence of hand-to-mouth consumers magnifies output multipliers. When the fraction of these households is large enough, total consumption may increase after a government spending shock. However, a positive response of consumption is neither necessary nor sufficient to obtain an output multiplier above unity.

Our results build on the existing literature and make progress on several dimensions. As compared to Aiyagari et al. (1992), Baxter and King (1993) and Campbell (1994), we extend the analysis in three directions. First, we determine analytically under which conditions private investment increases after a positive shock to government spending (we show how our threshold value depends on preferences and technology). Second, we shed new light on different multiplier concepts. We decompose the short-run multipliers of all aggregate variables (output, consumption and investment) into a static component, the constant capital multiplier, and a term related to expectations about future government spending policy. We also analyze in a unified framework long-run and dynamic multipliers. Third, we consider economies with market imperfections. Leeper et al. (2011) show quantitatively, as we do analytically, that the persistence of the government spending shock is essential for obtaining a large output multipliers in calibrated DSGE models. Our results show under which conditions a larger multiplier can be obtained. Leeper et al. (2011) also find that the fraction of hand-to-mouth consumers matters a lot for multipliers. Again, we are able to disentangle the two key mechanisms at work (intra-temporal and inter-temporal) when considering that a fraction of households has no access to financial markets and no weight in the wage-bargaining process.

The paper is organized as follows. In the second and third sections, we consider a prototypical model and derive closed-form solutions. We also consider adjustment costs on capital. In the fourth section, we extend the model in two directions: non-unit intertemporal elasticity of substitution in consumption and a finite elasticity of labor supply. In the fifth section, we consider two types of market imperfections and inspect how they modify multipliers. The last section concludes.

[1] This is not true a sticky price version in which expectations matters. See the discussion in Christiano et al. (2011).