6 Stimulus packages? Better be persistent!

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The financial and euro crises have reignited interest in whether fiscal stimulus is an effective policy to bring the economy back on trend. We show that the answer to this question crucially depends on how persistent the fiscal policy is. The interplay between expectations regarding future government spending and capital accumulation deeply affect the size of fiscal multipliers.

So-called (short-run) government spending multipliers, *i.e.* the response of current GDP to a unit increase in government spending, remain surrounded in empirical uncertainty (see Ramey 2011 for a survey) and vary with many factors such as the econometric approach, the identification strategy, the structural model, the state of the economy, and the nature and duration of the fiscal change (e.g. Cogan et al. 2010, Uhlig 2010, Christiano et al. 2011, Leeper et al. 2011, Auerbach and Gorodnichenko 2012, Coenen et al. 2012, Fève et al. 2013, Erceg and Lindé 2014, Canzoneri et al. 2016, Fève, and Sahuc 2016, Pappa et al. 2016, Ramey and Zubairy 2018).

Government spending forecastability shapes fiscal multipliers

Recent research has studied how the predictability of fiscal spending affects fiscal multipliers. Mc Kay and Reis (2016a, 2016b) focus on automatic stabilisers, such as unemployment insurance, which use stable rules to condition transfers to the state of economy. In Dupaigne and Fève (2016), we show that the forecastability of government purchases crucially shapes fiscal multipliers. Future predicted government spending drives investment following usual factor demand concerns, combined with crowding

out-like capital supply effects. A very short-lasting fiscal stimulus lacks any incentive to invest, as opposed to a more persistent stimulus. In the same vein, announced increases in government spending yield larger investment responses than unexpected ones.

The analytical tool we use to analyse the time profile of government spending is a relatively simple model including capital accumulation, elastic labour supply and stochastic government purchases. This model is sufficiently simple to get exact solutions that provide insightful analytical results. It nevertheless shares the key ingredients present in the dynamic stochastic general equilibrium (DSGE) literature (as in Coenen et al. 2012): the utility is separable between consumption and leisure (consumption and leisure are deliberately maintained as normal goods), a constant return-to-scale technology combines labour and capital inputs, and the stochastic process of non–productive government spending is exogenous and persistent.

With this laboratory in hand, we show that the persistence of government spending shapes short-run multipliers through the response of private investment. How does this investment channel operate? The fiscal stimulus, which acts as a drain on resources, has two opposite effects on investment. On the one hand, households want to smooth their consumption and eat into part of the existing capital (a crowding out-like effect). On the other hand, it stimulates employment (in our setup, through a standard negative wealth effect) and the marginal productivity of capital, increasing the demand for capital services. What matter for capital accumulation and investment are in fact the expectations of next-period labour input. The more persistent the shock, the larger is that expectation. Capital accumulation is therefore desirable when government spending and employment are highly persistent, while households facing very temporary □scal shocks exhibit negative savings. When the persistence parameter of government spending is equal to the degree of smoothing in equilibrium consumption, the crowding-out and crowding-in effects exactly cancel out. Conversely, highly persistent policy induces the crowding in to exceed the crowding out, and aggregate investment will increase.

We establish these analytical results under fully flexible prices. In this setup, fiscal stimulus first operates through labour supply. Turning to nominal rigidities as in the DSGE literature would have two consequences. First, a markup-induced shift in labour demand would magnify the response of employment to a government spending shock. Second, when monetary policy only targets price stability and prices are rigid, the real

interest rate would no longer increase after this shock. The usual crowding effect would disappear in this case, strengthening the investment channel.

The literature has progressed for analytics of fiscal multipliers, but in (repeated) static models with constant capital (as in Hall 2009, Woodford 2011, Fève et al. 2013). The resulting multiplier only results from the intra-temporal allocations (the marginal rate of substitution between consumption and leisure, the marginal productivity of labour and the aggregate resources constraint), and ignores expectations about the timing of government policy. In our more general setup, we first connect this concept of a constant capital multiplier to one in which expectations and adjustment of investment matter. We notably obtain that ignoring the investment channel and expectations about the profile of the fiscal stimulus may lead to underestimation of the true multipliers, especially when the policy is very persistent (as we observe with actual data).

Two thought experiments

We then enrich the analysis by considering two thought experiments. First, we single out the role of two key parameters of the model: how responsive (the growth of) consumption is to the real interest rate (the so-called intertemporal elasticity of substitution in consumption), and how sensitive hours worked are to the wage rate (the so-called Frisch elasticity of labour supply). The intertemporal elasticity of substitution in consumption only modifies the size of the constant capital multiplier, and does not alter the effects of the government spending driven by expectations. The elasticity of labour supply plays in two directions. First, when this elasticity is lower, the constant capital multiplier is smaller because the labour supply is less responsive after the negative income effect. Second, a lower elasticity of labour supply reduces the adjustment speed of consumption (for a given level of physical capital). This implies that the fiscal stimulus must persist for longer to ensure a positive response of saving.

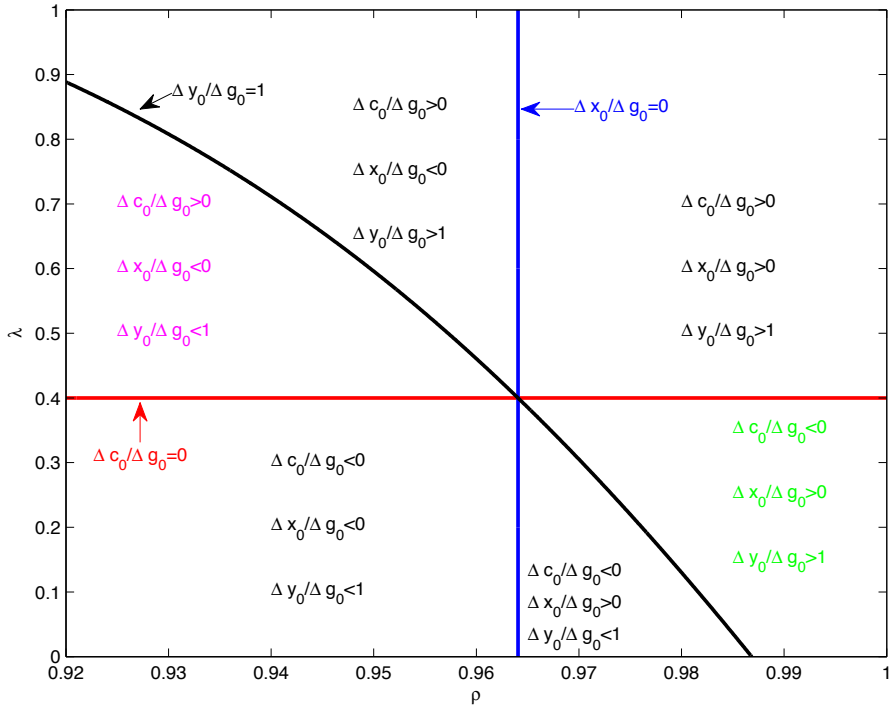
In our second experiment, we consider the existence of hand-to-mouth consumers (as in Gali et al. 2007), that is, agents who simply consume their income every period, as is observed in the data. We interpret this fact as a consequence of imperfections in financial markets. With this new setup, our previous results are magnified. When the fraction of these households is large enough, aggregate 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.

To see these results more precisely, Figure 1 represents the government spending multipliers of consumption, investment, and output for different combinations of fiscal stimulus persistence (ρ) and the share of hand-to-mouth consumers (λ). These multipliers are defined as the change in the corresponding variable – either consumption (Δc_0), investment (Δx_0), or output (Δy_0) – relative to the change in government spending (Δg_0) that originated the adjustment.

The black line displays all (λ, ρ) pairs such that the impact output multiplier equals unity. Below this line output reacts less than government spending, while above the line output reacts more. The red and the blue lines correspond to combinations of (λ, ρ) where the multiplier is zero for consumption and investment, respectively. Below these lines, the corresponding variable responds negatively to a government spending shock, while above these lines the response is positive. We see how the impact multiplier depends on both parameters, because the share of non-savers, λ, affects the constant capital multiplier and the persistence of government spending, ρ, shapes the impact response of investment. In the upper-right part of this locus, the short-run output multiplier exceeds unity. Two areas are interesting. In the lower-right part of the figure (in green), larger-than-unity output multipliers are obtained through increases in investment despite negative consumption multipliers. In contrast, the purple zone in the upper-left part features an increase in consumption. Yet, the output multiplier is below unity due to the negative response of investment triggered by a low persistence of government spending. Our analysis shows that a positive consumption multiplier is neither necessary nor sufficient to achieve an output multiplier above unity.

Figure 1 Persistence of government spending and non-Ricardian consumers affect fiscal multipliers



Conclusion

Our results have several implications for public policy.

First, they imply that short-lasting stimulus packages fail to stimulate one of the components of aggregate demand, namely, physical investment. It is interesting to note that for the estimated values of government spending persistence (i.e. the estimated first-order autoregressive coefficient), the response of investment is positive with our calibration. Hence, stimulus packages designed as increases in typical government spending should be preferred to specific, and shorter-lived, spending.

The second implication concerns the relevance of fiscal multipliers estimated using empirical approaches, such as structural vector autoregressions (SVARs). According to our results, structural models equipped to control for the persistence of the shock

deliver fiscal multiplier estimates which are useful for policy guidance (as in Leeper et al. 2011). Alternatively, assessing the effect of the persistence of government spending using natural and quasi-experimental identification strategies would constitute a fruitful avenue for future research.

References

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

Canzoneri, M, F Collard, H Dellas, and B Diba (2016), "Fiscal Multipliers in Recessions", *Economic Journal* 126(590): 75–108.

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

Coenen, G, C J Erceg, C Freedman, D Furceri, M Kumhof, R Lalonde, D Laxton, J Lindé, A Mourougane, D Muir, S Mursula, C de Resende, J Roberts, W Roeger, S Snudden, M Trabandt, and J In't Veld (2012), "Effects of fiscal stimulus in structural models", *American Economic Journal: Macroeconomics* 4: 22–68.

Cogan, J F, T Cwik, J B Taylor, and V Wieland (2010), "New Keynesian versus old Keynesian government spending multipliers", *Journal of Economic Dynamics and Control* 34: 281–295.

Dupaigne, M and P Fève (2016), "Persistent government spending and fiscal multipliers: the investment channel'', ADEMU Working Paper No. 2016/027.

Erceg, C and J Lindé (2014), "Is there a fiscal free lunch in a liquidity trap?", *Journal of the European Economic Association* 12: 73–107.

Fève, P, J Matheron, and J-G Sahuc (2013), "A pitfall with estimated DSGE-based government spending multipliers", *American Economic Journal: Macroeconomics* 5: 141–178.

Fève, P and J-G Sahuc (2016), "In search of the transmission mechanism of fiscal policy in the euro area", ADEMU Working Paper No. 2016/028.

Gali, J, J D Lopez-Salido, and J Valles (2007), "Understanding the effects of government spending on consumption", *Journal of the European Economic Association* 5: 227–270.

Hall, R E (2009), "By how much does GDP rise if the government buys more output?", *Brookings Papers on Economic Activity* 2: 183–228.

Leeper, E M, N Traum, and T B Walker (2011), "Clearing up the fiscal multiplier morass", NBER Working Paper No. 17444.

McKay, A and R Reis, (2016a), "The role of automatic stabilizers in the U.S. business cycle", *Econometrica* 84: 141-194.

McKay, A and R Reis, (2016b), "Optimal Automatic Stabilizers", NBER Working Paper No. 22359

Pappa, E, R Sajedi and E Vella (2016), "Fiscal Consolidation in a Disinflationary Environment: Price- vs. Quantity-Based Measures", ADEMU Working Paper No. 2016/003.

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

Ramey, V A and S Zubairy (2018), "Government Spending Multipliers in Good Times and in Bad: Evidence from U.S. Historical Data", forthcoming in *Journal of Political Economy*.

Uhlig, H (2010), "Some fiscal calculus", *American Economic Review* 100: 30–34.

Woodford, M (2011), "Simple analytics of the government expenditure multiplier", *American Economic Journal: Macroeconomics* 3: 1–35.

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