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# Trend productivity growth and the government spending multiplier



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## ABSTRACT

The paper analyzes the effects of government spending shocks under alternative rates of trend growth in a New-Keynesian model characterized by price and wage rigidity. We show that the presence of trend growth makes the impact on output and consumption of government spending shocks smaller but more persistent with a hump shaped impulse response. Our results imply that the impact government spending multiplier decreases while the cumulative multiplier increases with trend growth.

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## 1. Introduction

The use of massive fiscal stimulus packages in response to the recent global recession caused by the financial crisis of 2008 has resurrected the old academic and policy debate on the effectiveness of fiscal policy, and in particular, the size of the government spending multiplier (in short, the multiplier)—the ratio of the change in aggregate output to the change in government spending.

Parallel to the debate over the size of the multiplier policy discussions have raised concerns about a potential long-term effect of the crisis on the wider economy. For instance, in a Brugel policy brief [Pisani-Ferry and van Pottelsberghe \(2009\)](#) note that “the seeds of future growth performance are sown-or not-during crises,” emphasizing the role of crisis management measures in determining the prospects for economic growth. Similarly, in a European Commission policy brief [Koopman and Szekely \(2009\)](#) conjecture a permanently lower potential growth rate of GDP as a possible scenario saying that “failure to resolve the financial sector problems would almost certainly push the European Economy into this scenario.” Consistent with such a scenario [Haugh et al. \(2009\)](#) find that the protracted banking crisis in Japan in the 1990s may have been responsible for the reduction in that country’s long-term potential growth. In addition, according to the [OECD \(2012b\) Science, Technology and Industry Outlook](#) growth in R&D expenditure, due to financing constraints following the financial crisis, will be sluggish, thereby impacting innovation and in turn long-term growth.

A natural question is whether and how potential slowdown in trend growth as a result of the financial crisis matters for the effectiveness of government spending. The issue of trend growth and the multiplier is relevant from a policy perspective, as policymakers find it useful to know how effective government spending is an era of lower trend growth. Of particular

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interest is the fact that the ongoing policy debate about the macroeconomic effects of fiscal consolidation in many countries is highly influenced by the corresponding debate about the size and determinants of the fiscal multiplier. In light of this, [Blanchard and Leigh \(2013\)](#) argue that the disappointing economic performance (relative to forecasts) in a number of European economies undertaking fiscal consolidation measures may be related to an underestimation of the fiscal multiplier. In particular the drastic effects of the various austerity measures on economic activity were underestimated because the measures taken relied on pre-crisis estimates of the fiscal multiplier despite the fact that, as a result of the financial crisis, factors such as severe credit constraints and low capacity utilization may have increased the size of the multiplier. In light of the evidence provided by [Blanchard and Leigh \(2013\)](#) and the uncertainties about the long-term effects of the crisis our analysis implies that potential overestimation of trend growth contributes to an underestimation of the size of the government spending multiplier.

In dealing with the relationship between trend growth and the government spending multiplier the present paper also fills a gap in the literature on the determinants of the government spending multiplier, which typically abstracts from trend growth. For instance, using a New-Keynesian model with price rigidity [Woodford \(2011\)](#) and [Christiano et al. \(2011\)](#) show that the multiplier can be large when the zero lower bound for the nominal interest rate binds. [Ilzetzi et al. \(2011\)](#) study the role of the level of income, exchange rate regime, openness to trade, and public indebtedness.<sup>1</sup>

We look at two measures of the multiplier. The first is the impact multiplier—the ratio of the change in output to a change in government spending in the first period in which the government spending shock occurs. The second measure is the cumulative multiplier, which is the ratio of the cumulative change in output to cumulative change in government spending. The limit of the cumulative multiplier is the long-run multiplier, in which the time horizon considered is infinity (see, e.g., [Ilzetzi et al. \(2011\)](#)).

The model is of a New-Keynesian type with price and wage rigidities. However, we emphasize the interaction of nonseparable utility with trend growth. [Basu and Kimball \(2002\)](#) invoke balanced growth facts and long-run labor supply and argue that nonseparable utility (in particular the complementarity between consumption and hours worked) is consistent with the behavior of consumption in the data. [Guerron-Quintana \(2008\)](#) estimates a New-Keynesian model with price and wage rigidities as well as nonseparable utility and finds evidence in favor of consumption-work complementarity. In a standard New-Keynesian model, [Bilbiie \(2011\)](#) shows how consumption-work complementarity and sticky prices help generate a positive response of consumption to government spending shocks, as is observed in the data.<sup>2</sup> While making an important contribution,<sup>3</sup> [Bilbiie \(2011\)](#) assumes flexible wages, which matters when considering the role of trend growth. In this regard, [Colciago \(2011\)](#) analyzes the effect of wage stickiness on the propagation of government spending shocks in a setting with rule-of-thumb consumers but separable utility.<sup>4</sup> Both [Bilbiie \(2011\)](#) and [Colciago \(2011\)](#) abstract from issues related to trend growth. The role of trend growth has been analyzed in contexts other than government spending multiplier. [Amano et al. \(2009\)](#) study optimal inflation under trend growth but with separable utility and [Mattesini and Nistico \(2010\)](#) analyze optimal monetary policy but abstract from nominal wage rigidity. As will be shown below nonseparable utility and wage rigidity play key roles in our results.

We show that under consumption-work complementarity trend growth affects the dynamic responses of the economy to government spending shocks and the associated multipliers. In particular, we show that trend growth matters for optimal price setting by firms and wage setting by households, as well as for the link between wage dispersion and consumption decision of households. Here we emphasize the endogenous persistence in wage dispersion spilling over to aggregate hours and consumption. This channel is absent when utility is separable. Due to the presence of trend productivity growth that gives rise to trend wage growth the model has endogenous persistence due to wage dispersion and real wage, making the model analytically intractable. We thus resort to numerical analysis, where we calibrate the model following closely [Guerron-Quintana \(2008\)](#) who, as we noted above, estimates a New-Keynesian model with sticky prices and wages and nonseparable utility. The main result of our quantitative analysis is that the presence of trend growth makes the impact on output and consumption of government spending shocks smaller but more persistent with a hump-shaped impulse responses. Our results imply that the impact multiplier decreases while the cumulative multiplier increases with trend growth. To get a feeling of our results [OECD \(2012a\)](#) projects that for various structural reasons the potential GDP growth rate in a number of OECD countries over the period 2012–2017 compared to the period 2001–2007. For instance, potential growth rate is projected to be down from 3.0% to 0.6% in Greece, from 3.4% to 1.5% in Spain and from 2.4% to 1.6% in the U.K. In this case our model implies that the corresponding impact multiplier increases from 0.85 to 1.42 in Greece, from 0.75 to 1.4 in Spain and from 1.2 to 1.4 in the UK. While our model is stylized it shows that trend growth overestimation contributes to underestimation of the government spending multiplier, a result that reinforces the conclusion that [Blanchard and Leigh \(2013\)](#) draw regarding underestimation of the multiplier in official forecasts.

The paper is organized as follows. In Section 2 we lay out a New Keynesian model characterized by nonseparable utility and trend productivity growth, showing the key behavioral equations related to price setting of firms and wage setting and

<sup>1</sup> See [Hall \(2009\)](#) for a detailed survey of the recent and older literature.

<sup>2</sup> [Bilbiie \(2011\)](#) also shows that the degree of persistence of the government spending shock, monetary policy, and the degree of price stickiness play a role in putting restrictions on the degree of consumption-work complementarity necessary to generate a positive response of consumption to government spending shocks.

<sup>3</sup> In particular, in elaborating the limitations of flexible price models with consumption-work complementarity (e.g., [Linnemann \(2006\)](#)).

<sup>4</sup> [Colciago \(2011\)](#) shows that wage rigidity moderates the response of real wages and consumption to an increase in government spending.

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