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Guns, highways and economic growth in the United States

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ABSTRACT

Given its significant policy implications, the nexus between public expenditures and economic growth has been the subject of an extensive and often emotive theoretical and empirical debate. The nexus between two types of public expenditures and economic growth is examined in this paper using both linear and nonlinear causality tests. Both spending on highways and on defence are regarded, albeit with not the same intensity of conviction, as useful counter-cyclical policy instruments and as stimuli to economic growth. Findings reported herein from both linear and non-linear causality tests offer evidence in support for the growth enhancing properties of the former type of public spending but not so in the case of military expenditure.

1. Introduction

From Roosevelt's New Deal response to the Great Depression, to President Obama's multibillion spending package; government expenditures are widely regarded as an important tool of intervention during the inevitable downturns of the economic cycle, but this is not an unchallenged thesis. Given its significant public policy implications, the nexus between public expenditures and economic growth has been the subject of an extensive and often emotive theoretical and empirical debate. Although not universally accepted, government expenditures are widely regarded as an important fiscal stimulus to growth especially in periods of economic downturns (inter alia: Aschauer, 1989; Barro, 1990; Irmen and Kuehnel, 2009; Wu et al., 2010). During periods of economic contraction, government spending can offer the required boost to the economy through excess capacity utilisation and thus assist in the uphill road to economic recovery. However, different types of public spending can have a different effect on economic activity and growth. Hence, as pointed out by Barro (1990) in his seminal contribution, the composition of government spending is a crucial determinant of the impact such expenditure will have on the economy in general and economic growth in particular.

Within this context, the nexus between government spending and growth is examined here in the case of the US focusing on two specific and important components of government expenditure: namely infrastructure expenditure, and in particular spending on highway systems on the one hand, and military spending on the other. Albeit not with the same degree of intensity and conviction, the growth enhancing properties of both these two types of government spending have been the subject of intense debate and steadily growing empirical research. Infrastructure expenditure, and in particular spending on highway systems are widely thought to facilitate and promote growth and generally act as complementary to private sector economic activity. Indeed, Barro and Sala-i-Martin (1992) treat spending on road and highway networks as the quintessential form of productive public spending. Military spending on the other hand, is also regarded as having an aggregate demand stimulative impact on the economy and is seen as an effective counter-cyclical economic instrument (inter alia: Chang et al., 2011; d' Agostino et al., 2011; Heo, 2010; Pieroni, 2009; Cuaresma and Reitschuler, 2006; Mylonidis, 2008). At the same time, military induced technological advances through spill-over mechanisms into the civilian sector increase productivity and hence prop-up growth (Wang et al., 2012). Such beneficial demand and supply side effects are the main arguments that are advanced in a military Keynesianism framework wherein such government outlays are seen as having a positive economic impact. Such views are by no means unchallenged (Dunne, 2011; Pieroni et al., 2008). Critics of military Keynesianism argue with fervour that other forms of non-military government spending, for instance infrastructure expenditure, may very well have an equal if not greater positive impact on the economy (d' Agostino et al., 2011; Dunne, 2011; Dunne et al., 2005). Thus, the defence budget drains scarce resources and crowds out other forms of government outlays that are either more beneficial to the economy or are socially more preferable vis-à-vis military spending.

This issue is taken up by the present study that addresses the causality issue between the aforementioned types of government spending and

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economic growth in the case of the US. To the best of our knowledge, such a comparative causal analysis involving these two budgetary components has not been attempted before for the US. To this effect, both linear and nonlinear Granger causality tests are employed here. The use of nonlinear causality tests was prompted by the growing empirical evidence that suggests the existence of nonlinearities in GDP and the notion that government expenditures can potentially affect growth in a non-linear way as noted by Cuaresma and Reitschuler (2004, 2006). Thus, if non-linearities are involved, the power of the traditional Granger tests against nonlinear causal relations can be low, as demonstrated by Baek and Brock (1992), Hiemstra and Jones (1993) and Conway et al. (1997). Traditional Granger causality tests (Granger, 1988, 2003; Granger and Newbold, 1974) might overlook a significant nonlinear relation between the two types of expenditures used in this paper and GDP growth. The nonlinear Granger causality test employed here is a modified version of Baek and Brock (1992) by Hiemstra and Jones (1994). This testing procedure is based on nonparametric estimators of temporal relations within and across time series. Nonparametric modelling of time series does not require an explicit model a priori. This may be particularly useful given that the range of nonlinear models is very wide and that there has not been sufficient experience accumulated to decide which of these models is most appropriate in empirical studies.

2. An overview of the issues and the literature

In a growing number of papers, theoretical models have been developed that explicitly account for the impact of government expenditures and in particular spending on infrastructure such as roads and highways (inter alia: Barro and Sala-i-Martin, 1992; Futagami et al., 1993; Mourmouras and Lee, 1999).[1] As Chandra and Thompson (2000) and Mourmouras and Lee (1999) note, the core theoretical prediction of this strand of literature is that public spending in this type of infrastructure projects stimulates growth. Drawing on the findings of Aschauer (1989), Barro (1990) was the first to explicitly model government spending in a theory of endogenous growth. In particular, he argues that the impact of government spending on growth depends, among other things, on its composition, making a distinction between productive public spending and non-productive public spending. Although Barro (1990) does not provide in his work an explicit classification of what would be considered as productive and non-productive budgetary outlays by the government, Irmen and Kuehnel (2009), among others, observe that spending on infrastructure such as roads, ports and communication systems as well as on basic education and medical services is widely considered to fall within the productive category of government expenditure. As noted earlier, spending on roads and highways is regarded as the archetypal form of productive public expenditure (Barro and Sala-i-Martin, 1995). Consequently, the importance attached to this component of public spending has acted as the stimulus for a growing number of papers that attempt to investigate empirically, with a variety of methodologies and samples, the impact that this type of expenditure has on growth (inter alia: Aschauer, 1989; Cain, 1997; Holtz-Eakin and Schwartz, 1995; Wang, 2002; Glass, 2008; Demetriades and Mamuneas, 2000). Apart from the immediate effects in terms of increased employment and income generation caused by road building and/or maintenance and upgrading works for existing transport infrastructure, a range of other economic activities gain from such public spending. In particular, improved transport infrastructure reduces effective distances between different poles of economic activity, between centres of production and consumption, and reduces road congestion bringing about lower travel times and costs for both enterprises and passengers. Increased trade is a strong stimulus of growth. But the effects are not limited to trade. A cohort of other economic activities may reap the benefits from improved transportation including tourism, recreation and leisure travel with the concomitant impact on the regional or local economies that offer such services. Many studies have examined empirically the productivity effects of capital investments in transport for both developed and developing countries. In the case of the US, a number of studies have tried to establish whether highway spending induces growth both on a national as well as on a state level; a comprehensive review of which can be found in Chandra and Thompson (2000) as well as in Cain (1997) where the link between infrastructure investment and US development is examined from a historical perspective. In their study, focusing on non-metropolitan counties and regions in the US, Chandra and Thompson (2000) report findings that point to a differential impact of the interstate highway system across industries as well as counties. Some economic activities reap benefits from the interstate highway system while others appear to decline. The same applies to counties as a result of the changes to the spatial allocation of economic activity brought about by the construction of highways. However, such findings have been challenged by other studies such as, for example, that of Holtz-Eakin and Schwartz (1995) where they report findings that offer little support to the argument that increased infrastructure outlays boost productivity and growth.

Broadly similar arguments have also been advanced when it comes to military spending and its growth enhancing impact (inter alia: Wang et al., 2012; Chang et al., 2011; d' Agostino et al., 2011; Kollias and Paleologou, 2010; Pieroni et al., 2008; Cuaresma and Reitschuler, 2004, 2006; Pieroni, 2009; Mylonidis, 2008). As Dunne et al. (2005) observed, if an attempt is made to summarize the economic effects of defence expenditure on the economy, then these would include demand effects, supply effects and security effects. On the one hand, such expenditure may prop-up growth through Keynesian-type aggregate demand stimulation, acting as a revitalising injection in a slacking economic environment. Increased demand induced by higher military spending leads to increased utilisation of idle or underemployed capital stock and higher employment. This may bring about increases in the profit rate which in turn may induce higher investment thus generating short-run multiplier effects and higher growth rates (inter alia: Dunne, 2011; Dunne et al., 2005; Pieroni et al., 2008; Cuaresma and Reitschuler, 2006). Worth mentioning is that such an impact would probably be more evident in countries with a developed industrial base that can produce inputs for the defence sector rather than in countries that mostly or exclusively rely on imports to satisfy their needs for military inputs and hardware. The supply side effects mainly take the form of military induced technological advances from R&D programmes that often heavily rely on public funding. Such technological advances and innovations find, through spill-over mechanisms their way into the civilian sector, increasing productivity and hence stimulating growth (Wang et al., 2012). Finally, as Dunne et al. (2005) point out, to the extent that military spending buys increased security through the provision of stronger defence that acts as deterrence to adversaries, one can reasonably assume that a secure environment is conducive for investment activity with the concomitant impact on growth.

Worth stressing however, is the fact that such spending has also been shown by a number of studies to have growth retarding effects mainly through the crowding-out of growth promoting variables such as investment or, given the presence of possible budgetary constraints, a reduction in public funds that could be allocated in other uses – such as for instance investment in infrastructure – that can prove more beneficial to the economy and its overall performance.[2] As one would expect, in the case of the US, the defence expenditure and economic growth nexus has attracted considerable attention in the relevant literature with mixed findings,

[1] A comprehensive survey of this type of literature and the main issues associated with it, can be found in Irmen and Kuehnel (2009).

[2] For a comprehensive survey and critical discussion of the findings see Dunne et al. (2005) where it is pointed out that no robust empirical regularity, positive or negative, emerges from the results reported in the relevant literature with the scales tilting in favour of an insignificant or negative impact of such expenditures on growth in the case of developing countries and a comparatively stronger negative effect in developed countries.