



# On the Marriage between Public Spending and Growth: What Else Do We Know?

Blanca Moreno-Dodson, Senior Economist, Poverty Reduction and Economic Management Network

*While there are strong theoretical arguments for ways in which public spending influences growth, robust empirical links have been difficult to establish. More recently, many of the methodological problems that plagued the earlier literature have been overcome and interesting policy lessons drawn. The number of studies of developing countries using these new approaches is still limited, due to data scarcity and other comparability issues, but overall findings from the new literature are relevant for developing country policy makers and also open new venues for future research.<sup>1</sup> The objective of this note is to present these new empirical results together with the methodological improvements that support them, and to outline some of the issues that need deeper analysis and empirical study, particularly in developing countries.*

## 1. Theoretical Underpinnings

A *direct* effect of public spending on growth relates to an increase in the economy's capital stock (physical or human) reflecting higher flows of public funds, especially when they are complementary to those privately financed. In addition, public funds can also contribute to growth *indirectly* by increasing the marginal productivity of both publicly and privately supplied production factors.

Within the growth accounting framework evolved from the neoclassical Solow-Swan model, it is assumed that long-run growth is driven only by population growth and the rate of technical progress, which are exogenous. In this framework public spending has only a transitional impact on growth, by affecting the pace of capital accumulation. In contrast, endogenous growth models<sup>2</sup> consider that public spending<sup>3</sup> can affect the long-run growth rate and not only its transitional changes, by affecting not only the production factors but also total factor productivity (TFP). In both cases, the

relevant policy issues are as follows: what type of effects does public spending have on growth, how significant they are, how long they last, whether they should be considered as transitional or long term, and whether any nonlinear effects can be detected.

Section 2 of this note surveys some of the new empirical findings. Section 3 delves more deeply into recent methodological innovations in the analysis of fiscal policy and growth. Section 4 concludes by looking at remaining challenges and issues for future research. A fairly extensive bibliography is provided as a guide for interested World Bank staff, focusing in particular on the recent literature.

## 2. New Results and Policy Implications

The impact of public spending on growth depends in part on how it is financed. As the next section explains more fully, a key innovation of recent empirical studies is to take this budget constraint into account

when estimating the growth effects of public spending. The relatively few studies of this type for *developing countries*<sup>4</sup> find that under certain fiscal policy conditions, at least “productive” public expenditures do exhibit positive growth effects. Those conditions include, for example, low fiscal deficits or surpluses, low inflation, a relatively small government budget size, and using primarily nondistortionary taxes as a source of government financing, among others.

Some of these studies suggest that (always taking into account the government budget constraint) public expenditures on transport and communications, education, health, and housing are growth-enhancing, “when considered jointly.” Besides, a very strong and consistent effect on growth is found by most authors for public spending on education, when considered alone, always with a positive sign both in the short and the long run.

These econometric results have critical implications for the debate on the design of fiscal rules in a growth context.<sup>5</sup> Some economists have advocated the use of a “golden rule,” whereby the focus is on maintaining a balance or surplus on the current fiscal account (that is, current revenues less current expenditures), with net capital expenditure financed from government savings and borrowing (see Giavazzi and Blanchard, 2004).<sup>6</sup> A common criticism of this rule is that it is vulnerable to creative accounting. A preferential treatment of physical investment could bias expenditure decisions against spending on other potentially productive components, such as current expenditures in education and health—with a detrimental effect on growth. Some components of current spending, such as maintenance of roads, schools, and hospitals, may be equally important to maintain the quality of the services financed by public capital. The key question therefore is where to draw the line in designing growth-enhancing fiscal rules.

Recent studies for *developed countries* that also account for the fiscal budget constraint<sup>7</sup> conclude that there is a negative relationship between total government expenditure and

growth in the European Union, indicating that government size is likely to be detrimental to economic growth. An implicit common result in these studies seems to support the idea of the U-shaped relationship suggested by Barro, Tanzi, and others. This relationship shows that public spending may affect growth positively (after controlling for the negative effects associated with its financing) up to a certain point, after which additional spending may still lead to growth but at a decreasing speed and may make a negative contribution as the need for additional (and likely distortionary) financing increases. This result is particularly important for developing countries trying to draw lessons from more advanced ones, as increasing the size of the budget may be associated with efficiency losses.

Finally, several authors<sup>8</sup> find that only public investment has a positive impact on growth, while public consumption and social security affect it negatively. These results need, however, to be interpreted with caution since, as explained in the next section, the separation between capital and current spending may be in practice artificial and unrealistic, particularly in a developing country context.

### 3. Main Methodological Improvements

Panel data analysis seems to be a generally accepted framework to estimate the impact of public spending on growth, as long as there is some degree of homogeneity among the units in the sample.<sup>9</sup> This section presents the main methodological improvements that have been introduced in the empirical literature during the last decade using panel data analysis techniques, both static and dynamic.

#### *Country initial conditions and sample homogeneity*

Initial country conditions, such as life expectancy and/or human capital indexes, are important because they are likely to influence the effects of different public spending categories on growth.<sup>10</sup> Given the importance of initial conditioning variables,

omitting them in the analysis could distort the final results.<sup>11</sup> Yet, many empirical studies have failed to introduce the relevant variables in their function specifications, a problem that has been addressed in more recent studies.<sup>12</sup>

In addition, as Devarajan et al. (1996) have indicated, the effect on growth induced by public spending may depend on the initial level of (existing) public spending. For example, building basic physical and social infrastructure may trigger a much more significant growth effect in low-income, low-public-expenditure settings than in countries where a certain public infrastructure threshold already has been attained.

For that precise reason, subsequent work has not included developed and developing countries in the same panel. Using a “more homogeneous” country sample has been recommended as a better approach.<sup>13</sup>

### ***The overall budget constraint***

While some public spending may promote growth, the way that the government chooses to finance such spending (inflationary financing, distortionary taxes, public debt leading to high interest rates and crowding out of private investment, and so forth) may also influence growth. Because spending and financing are difficult to disentangle, the net impact of public spending on growth depends on its source of financing.<sup>14</sup>

Yet, empirical studies before the end of the 1990s did not include the implicit financial assumptions or the revenue side of the equation when testing for the impact of public spending on growth, producing results whose robustness has been questioned a posteriori. Since then, a “third generation” of models<sup>15</sup> has emerged, leading to more consistent results pointing towards a significant impact of public spending on growth, often contradicting the results obtained when the overall budget constraint was not internalized.

For example, Bose et al. (2003, 2007) find that when the overall budget constraint is ignored, total and investment spending in health and education, as well as overall capital spending, have positive impacts on

growth. However, when the financing side of the equation is incorporated, only education capital spending and total capital spending have a positive growth impact.

### ***Expenditure classification***

Since not all categories of public spending are expected to have the same growth impact, criteria may be needed to differentiate productive items from those whose growth impact is negligible. However, the available data does not always allow such classification.<sup>16</sup>

Different expenditure classifications have been used in recent empirical literature. However, regardless of the classification used, when the overall budget constraint is introduced, some public spending categories must be left out of the regression to avoid perfect collinearity. That means that the adjustment takes place through those expenses not included in the regression. For example, for an increase of “productive” expenditures to have a positive impact on growth, there would have to be an equivalent decrease in the “other” expenditures not included in the regression.<sup>17</sup>

Many studies use the government financial statistics (GFS) classification for functional expenditures; GSF distinguishes among economic<sup>18</sup> and social<sup>19</sup> expenditures.<sup>20</sup> In 2001, Bleaney, Gammel, and Kneller introduced a classification of expenditures that considers two categories, “productive”<sup>21</sup> and “unproductive,”<sup>22</sup> based on an a priori judgment regarding their expected impact on growth.<sup>23</sup>

Some authors distinguish between current and capital expenditures,<sup>24</sup> while others criticize this distinction, based on evidence that some categories of current spending are critical to ensure the profitability of investments. For example, operations and maintenance expenditures are critical to ensure the profitability of infrastructure investments, since they can facilitate access and prevent accidents, permitting citizens to travel safely to markets, schools, hospitals, or other destinations. Similarly, salaries of teachers, usually classified as current spending, are closely connected with the quality

of education provided. In addition, capital budgets often include, explicitly or implicitly, salaries and current spending items.<sup>25</sup>

### ***Endogeneity***

In addition to the effect of public spending on growth, it is also possible to consider the “reverse” impact of growth on public spending. As economies grow, the need for public spending in various categories may increase. For that reason, the endogeneity of public spending with respect to growth needs to be taken into account in econometric analysis, in order to ensure the robustness of the results.<sup>26</sup> Many previous studies did not address these problems of reverse causation, which therefore remained in the dark.<sup>27</sup>

The general method of moments (GMM) panel methodology<sup>28</sup> allows for a more rigorous treatment of the endogeneity of public spending with respect to growth in a dynamic context.<sup>29</sup> It offers the advantage that the effects of public spending on growth can be detected over multiple years, capturing both short- and long-term effects simultaneously.<sup>30</sup> Where endogenous relationships are suspected, a preferred solution would be to fully specify separate equations for both endogenous variables and test simultaneously, as suggested by Gemmell (2007).

### ***Transitional and long-term effects***

Several studies provide evidence about transitional effects of public spending on growth that can also be “long lasting” effects. Furthermore, a few papers have proved a long-term relationship between public spending and growth.<sup>31</sup> However, more research is needed to confirm the long-run impact of public spending on growth.<sup>32</sup>

### ***Nonlinearities***

Most of the papers mentioned so far assume linear relationships among the variables. But, as Barro (1990) indicated, these relationships could be nonlinear, in which case an analysis focused merely on a linear approximation may distort results. It is also possible that even in the presence of a strong linear relationship between

economic growth and public expenditures, such relationship may have some nonlinear components.

To resolve this issue, a squared term of productive expenditures can be added to the regression specification. While the coefficient of the linear term captures the direction of the link between economic growth and productive expenditures, a positive (negative) squared term indicates that the relationship is convex (concave). With a positive, convex relationship, in a country with a relatively low ratio of public spending to GDP, additional spending could contribute to higher growth at a faster pace. In a concave world, such additional spending would translate also into higher growth but at a decreasing pace. In both cases, the linear relationship between public spending and growth remains positive but in the second case an efficiency loss is observed with increasing public spending. Empirical studies conducted so far do not converge on the significance and/or shape of nonlinearities.<sup>33</sup>

### ***Cyclical effects***

From a theoretical viewpoint, government spending volatility is likely to increase macroeconomic uncertainty, leading to a negative impact on growth.<sup>34</sup> Several studies have looked at the ability of government spending restrictions to smooth economic fluctuations and also how temporary changes in public spending can affect growth.<sup>35</sup>

### ***Governance and political economy variables***

Given the importance of good governance for the growth impact of total public spending, fiscal analyses should also introduce and analyze the impact of political economy variables.<sup>36</sup> For developed countries, where it is easier to find reliable data on political economy variables for relatively long periods of time, there have been some recent studies that introduce a number of governance and political economy variables, particularly for EU countries.<sup>37</sup> This exercise is much more challenging in a developing country context.

## 4. Remaining Challenges and Issues for Future Research

### *Tracking spending*

Not all public spending is used according to budget allocations. Leakages or deviations from official figures could weaken or distort the relationship between public spending and growth.

Quantitative techniques such as public expenditure tracking surveys (PETS) that are being currently conducted in many developing countries show that the percentage of spending actually reaching the population is much lower than budgeted, due to leakages and inadequate budget implementation. Unfortunately, there is not at present a complete data series corresponding to the amounts actually spent in any given country, let alone data for cross-country comparisons.

### *Internalizing technical efficiency*

Inefficiencies reduce the actual share of public spending on new capital stocks (physical and human) that affect growth directly. This issue was raised by Pritchett in 1996 and 2000, who reckoned that only about 50 percent of public investments in developing countries contribute to creating new capital stock. Such inefficiencies were further studied and tested by Hurlin and Arestoff (2006). Thus, by considering total public spending alone, without any efficiency considerations, we may overestimate the impact of spending on growth.

A solution to this problem was suggested by Agénor, Nabli, and Yousef (2007) who calculated a coefficient of technical efficiency<sup>38</sup> of spending (or ICOR), based on the notion that not all public expenditures increase the stock of human/physical capital. However, it may be easier to calculate such a coefficient for expenditures on physical capital than for human capital expenditures. In any case, we still would not capture the effects of public spending on total factor productivity (TFP).

### *Impact of demographics*

An important issue to address in future research is what determines governments' decisions to allocate spending among vari-

ous components—in particular, the role of demographic factors and the nature of the political process. Surprisingly, much of the existing literature on the optimal allocation of public expenditure in a growth context ignores demographic and political considerations. There is robust evidence that the composition of public spending depends on both demographics and politics.

For instance, using data for a large group of industrial and developing countries, Shelton (2007) finds that the population aged 65 or older receives the majority of government expenditures on health care, public order, and safety—possibly a reflection of the ability of the “old” to exploit the political process. But such bias, to the extent that it is systematic, may result in large adverse effects on infrastructure investment and growth—and eventually adverse effects on the welfare of old and young generations alike.

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## Endnotes

1. Kneller and Bleaney (1999) and Bleaney and Kneller (2001) argue that the ambiguous nature of previous evidence reflected inadequate research methodologies and misinterpretation of results. Later studies appear to support this view, for example Padovano and Galli, 2002, Li and Sarte, 2004, Lee and Gordon, 2005, and Moreno-Dodson, 2008.
2. Such as those of Barro (1990); King and Rebelo (1990); and Barro and Sala-i-Martin (1992, 1995), Futagami *et al.* (1993), Devarajan *et al.* (1996), Kaas (2003), Kalyvitis (2003), Zagler and Durnecker (2003), Park and Philippopoulos (2003), and Ho and Wang (2005).
3. Some of these models focus on the impact of overall fiscal policy on growth, and not just public spending, analyzing simultaneously the effects of taxation as well.
4. Haque and Kim (2003), Bose *et al.* (2005), Adam and Bevan (2005), and Moreno-Dodson (2008).
5. See Agénor and Yilmaz (2006), and Servén (2007).
6. More precisely, under the Blanchard-Giavazzi rule, governments should borrow in net terms on a continuous basis only to the extent that this net

borrowing finances net public investment, that is, gross investment less capital depreciation (which counts as current spending). This rule therefore would allow gross borrowing for the purpose of refinancing maturing debt, thereby leaving net debt unaffected.

7. Folster and Henrekson (2002), Afonso and Furceri (2008).

8. See for example, Afonso and Gonzalez-Alegre (2008) for 27 EU countries. Similarly, de Ávila and Strauch (2003) report that current expenditures and transfers are both detrimental for growth. Gemmill (2007) also indicates that for OECD countries social security contributions are detrimental for growth.

9. The only exceptions are Blanchard and Perotti, 2002, and Albala-Bertrand and Mamatzakis (2001) who have used a VAR methodology. Also, opting for a different approach, Schuknecht and Tanzi (2005) have used descriptive statistics comparing pre and post-fiscal reforms.

10. For instance, Bloom, Canning, and Sevilla (2004) found that life expectancy has a sizable, positive effect on economic growth; a one-year improvement in the population's life expectancy contributes to an increase in the long-run growth rate of up to 4 percentage points. Sala-i-Martin, Doppelhofer, and Miller (2004) also pointed out that initial life expectancy has a positive effect on growth and that the initial level of human capital (as proxied by primary schooling enrollment rates) and initial GDP per capita were also significant.

11. Levine and Renelt, 1992.

12. For example Bose *et al.* (2003 and 2006) used initial GDP per capita, initial human capital, and initial life expectancy as initial conditions variables. Moreno-Dodson (2008) retained initial human capital in all function specifications.

13. In fact, all of the examples provided in the following sections actually refer to studies that have been undertaken for either developed or developing country groups, with clearly differentiated results.

14. In Barro's (1990) model, growth increases with expenditures and taxation at low levels, and then decreases as the distortionary effects of taxation exceed the beneficial effects of public spending. In addition, at higher levels of public spending inefficiency may increase. That is the main conclusion of Afonso *et al.* in reference to new EU members (forthcoming 2009).

15. This terminology is attributed to Gemmill, 2004.

16. While aggregated expenditures are easier to find on an annual basis for a relatively long period of time, not all the sectors report data every year and therefore functional classifications are not always possible. In addition, some countries have introduced recent changes in the budget nomenclature, which make sectoral comparisons less meaningful.

17. Some authors decide to leave out expenditures that a priori may not matter much; or at least it is not known *ex ante* what their impact would be because they are unclassified or unclear according to the nomenclature.

18. Economic public spending includes fuel and energy; agriculture, forestry, fishing, and hunting; mining, mineral resources, manufacturing, and construction; transportation and communication; and other economic affairs and services.

19. Social public spending includes education; health; social security and welfare; housing and community amenities; and recreational, cultural, and religious affairs.

20. The rest of the budget includes defense, general public services, and others.

21. Productive spending includes general public services; defense; education; health; housing; and transportation and communication.

22. Unproductive spending includes social security and welfare, recreation, and other economic services.

23. This separation is in line with the theory behind endogenous growth models according to which only "productive" spending should be expected to have an impact on growth. It has proven to be very useful to identify the different effects of public spending on growth and has been quoted subsequently in the recent literature.

24. For example, de Ávila and Strauch (2003) focus on the effects of current expenditures and transfers on growth. Bose *et al.* (2005) are able to simultaneously examine public expenditure by sector and type, differentiating between investment and consumption. Similarly, Afonso and Gonzalez-Alegre (2008) analyze the effects of public investment versus public consumption and social security

25. For a group of seven developing countries, Moreno-Dodson (2008) uses three different public expenditure classifications and compares the results in order to examine tradeoffs across expenditure functions, categories, and sectors. The classifications are (i) the traditional functional GFS classification, (ii) the Bleany *et al.* (2001) criteria, and (iii) a sectoral classification for health, education, and infrastructure. Unlike other studies, this analysis does not distinguish between capital and current public spending.

26. This is the main criticism of Perotti, who highlights the difficulty of identifying "exogenous" changes to fiscal policies (also called fiscal shocks) at the empirical level when using time series methods.

27. One strain of the literature focuses on indentifying fiscal shocks using time series either with structural VARs or event-like approaches, often based on cointegration analyses that do not say anything about causality. Other studies use instead

cross-sectional or panel regressions and introduce the lagged values of GDP per capita growth and public spending to GDP ratios as regressors, in order to isolate the effects of public spending on GDP per capita growth, and specifically disallow contemporaneous effects. Causality tests have also been used for the same purpose. But it is recognized in the literature that both techniques are imperfect.

28. The GMM technique was developed by Arellano and Bond (1991). It uses a dynamic panel and the lagged values of the endogenous and the predetermined variables as instruments.

29. However, in some country samples, data availability restricts the ability to use this methodology consistently. One option is to continue relying on more traditional methods, such as ordinary least squares (OLS) or SURE, and confirm the results obtained using GMM when possible.

30. For example, GMM is used by Afonso and Gonzalez Alegre (2008) for a set of EU fifteen countries and by Moreno-Dodson (2008) for a sample of seven fast-growing developing countries.

31. For example, using a static panel and decade averages for a set of thirty developing countries, Bose *et al.* (2007) conclude that government spending on education has long-lasting effects on economic prosperity. Using both static and dynamic panel techniques Moreno-Dodson (2008) indicates that “productive” spending has an impact on growth over the medium-run (defined as three years) in a sample of seven fast-growing developing countries.

32. In order to check specifically for long run effects, Bleany *et al.* (2001) use annual data that allows them to (i) determine the appropriate number of lags of the independent variables to pick up long-run effects, and (ii) estimate a dynamic (five-year) panel for 22 developed countries, isolating short- from long-run effects. They find that long-run effects take more than five years to come through and conclude that government spending has both temporary and permanent effects on growth. Using a different methodology, Gemmell (2007) applies the alternative econometric estimators proposed by Pesaran and Smith (1995, 1999)—mean group (MG) and pooled mean group (PMG) methods—to an updated dataset covering 17 OECD countries. The short- and long-run parameters are estimated for all countries, for each fiscal variable, and applied to each country.

33. In empirical papers, for example Adam and Bevan (2005) allow for nonlinearities only for the deficit variable. Gemmell (2007) introduces nonlinearities and finds that, on average, the sample countries are estimated to be at a convex curb and therefore still achieving a growth-maximizing fiscal combination (specifically with respect to public spending financed by distortionary taxes on the other side of the equation). Moreno-Dodson (2008) adds the nonlinear term to the regression equation and finds that the linear term of productive expenditures still has a positive coefficient and is statistically significant (although less than without the nonlinear term), while the coefficient of the square term of productive expenditures is negative (concave) but not statistically significant.

34. Business-cycle volatility is harmful for growth and its determinants as documented by Aghion *et al.* (2005), Fatas (2002) and Furceri (2007).

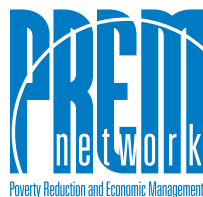
35. For example, Furceri (2007) shows that, for a panel of 99 countries, a 1 percent increase in public spending cycle volatility determines a decrease of 0.78 percentage points in the long-run growth rate. Furthermore, Afonso and Furceri (2008) analyze how volatility in the components of public spending affects growth for a set of OECD and EU countries, showing that public investment and consumption volatility have a sizeable, negative, and significant effect on growth.

36. For example, recent results for developing countries by Rajkumar and Swaroop (2008) show that governance can largely explain differences in the impact of public spending on human development indicators.

37. For example, Pina and Venes (2008) explain how politico-institutional variables—such as elections in current year, coalitions, minorities, ideology, and type of fiscal governance (commitment or fixed)—can affect fiscal prudence and cause errors in budget balance forecasts.

38. This concept of efficiency is defined as an input-output concept that focuses strictly on the contribution of public spending flows to creating stocks of human/physical capital.

*A full version of the note and references is available at <http://www1.worldbank.org/prem/premnotes.cfm>.*



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