An examining the impact of government spending shocks on total factor productivity: Testing Baumol's theory of unbalanced productivity growth in selected developing countries*

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Abstract

The primary objective of this paper is to examine the effects of government spending shocks on total factor productivity (TFP) while also testing Baumol's unbalanced productivity growth theory in a selection of developing countries over the period 2003–2019. In this study, TFP is measured using the Hicks-Moorsteen approach, and the Factor-Augmented Vector Autoregression (FAVAR) method is employed to analyze the effects of shocks.Given that sustainable economic growth is not only driven by increased investment and labor but also by productivity improvements—and considering that in many developing countries, the government plays a central role in the economy—government spending can significantly influence productivity. Therefore, it is essential to investigate the impact of government spending shocks on TFP.Impulse response functions derived from the estimated model indicate that a positive shock to current expenditures and subsidies leads to a decline in TFP. Additionally, the impulse response function of a positive shock to TFP initially stimulates government capital expenditures in the short run but, after the fourth quarter, results in their decline. This finding supports Baumol's unbalanced productivity growth theory, which suggests that rising TFP is associated with an increase in government spending on public goods production, ultimately leading to a reduction in capital expenditures by the government.

Keywords: Baumol's theory, Factor-Augmented Vector Autoregression, Government expenditure, Hicks-Moorsteen approach, Total Factor Productivity.

JEL Classification: H11, H23, D23, D24.

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1. Introduction

Total factor productivity (TFP) is defined as a measure of the efficiency of using all production factors (such as capital and labor) in the output produced. TFP is commonly utilized as a key variable in economic growth analyses and studies examining the effects of financial and economic shocks. It represents a portion of economic growth that cannot be explained by increases in the quantities of capital or labor, but instead indicates improvements in efficiency or technology. TFP is significantly influenced by fiscal and economic policies; financial shocks, such as increases or decreases in government spending, can have a notable impact on TFP, particularly through changes in private sector productivity. The performance of fiscal policies has always been a topic of discussion in macroeconomics, and one of the important economic variables affected by financial shocks is TFP. The government's presence, both quantitatively and qualitatively, in economic and social issues has been continuously increasing. In many developing countries, the government holds a substantial portion of the economy and has access to underground resources, making attention to fiscal policies and their impact on macroeconomic variables highly significant. In this context, this research aims to address the question of how TFP in the studied countries reacts to government spending shocks according to Baumol's theory and to what extent. Additionally, does this impact support Baumol's theory of uneven productivity growth, which argues that productivity growth between industrial and service sectors differs? Baumol contended that industrial sectors, which depend on technology and physical production, grow faster due to higher productivity than the service sector, which, due to its reliance on human labor and lack of technological capabilities, exhibits lower productivity growth. Specifically, this research will address two separate questions: a) Is there a significant relationship between government spending shocks and total factor productivity? and b) Does an increase in total factor productivity lead to an increase in the costs of producing capital goods?

2. Theoretical Framework

A central theme in Baumol's theory is the difference in the speed of productivity growth among various sectors of the economy. Industrial and manufacturing sectors typically benefit from technological innovations and investments in technology that lead to increased productivity in these areas. In contrast, sectors that rely on human labor, such as public services, education, and healthcare, exhibit lower productivity because they are less dependent on electronic technologies and still require human interaction. Generally, there are two distinct types of fiscal policy tools available to the government: revenue policies and expenditure policies. Revenue or taxation policies determine personal income tax rates, corporate profit tax rates, tax bases, indirect tax rates, and transfer payments, while expenditure policies govern

government payments or spending, including current and investment expenditures. From a financial expenditure perspective, expansionary fiscal policy positively affects total factor productivity. Overall, government expenditures can be categorized into productive and unproductive spending. Productive expenditures may include research and development, educational spending, and infrastructure investment. Increasing or shifting towards more productive spending enhances total factor productivity for fixed hours of labor and fixed physical capital inputs. Public research and development is a critical determinant of long-term returns. One of the channels through which public research and development influences TFP is its positive effect on private research and development costs.

3. Methodology

This study aims to conduct a comparative analysis of the effects of government spending shocks on total factor productivity in selected developing countries, alongside testing Baumol's theory of uneven productivity growth, during the period from 2003 to 2019, using the Factor-Augmented Vector Autoregression (FAVAR) method. The productivity of the studied countries will be calculated using the Hicks-Moorsteen method. This approach analyzes TFP as the ratio of output to input while considering changes in technology and various inputs. The output is represented by the total value of production (such as GDP), and inputs include factors of production like labor, capital, land, and other resources. To compute TFP using the Hicks-Moorsteen index, it is necessary to identify the values of eight different distance functions. Each distance function is obtained by solving a linear programming model, requiring the resolution of eight distinct models to compute the Hicks-Moorsteen productivity index.

4. Conclusion and Suggestions

This paper aims to investigate the effects of spending shocks on total factor productivity and to test Baumol's theory of uneven productivity growth for selected developing countries using the Panel-FAVAR approach. The results of the model estimation are reported and analyzed through impulse response functions and variance decomposition of forecasting errors. The analysis of impulse response functions to trace the effects of positive shocks from government spending revealed that a positive shock from current government expenditures leads to a short-term decrease in TFP, as resources are allocated to current expenditures rather than investments in infrastructure or innovations. However, over time, as economic sectors adapt to new conditions, productivity improves and returns to initial levels. Conversely, a positive shock from capital expenditures results in an increase in TFP because higher government capital spending leads to investments in the nation's infrastructure, which not only reduces production and transaction costs but also enhances the efficiency and productivity

of factors of production in the economy. While a positive shock from government subsidies temporarily boosts TFP due to increased investment and improved labor productivity, TFP eventually declines as firms become accustomed to government support and lose sufficient motivation for productivity and innovation. Furthermore, the analysis of Baumol's theory of uneven productivity growth demonstrated that a positive shock in TFP leads to an increase in government capital expenditures in the short run, as governments allocate more resources to support higher productivity sectors. However, over time, government capital expenditures decrease because, due to economic pressures and social needs, governments allocate a larger portion of resources to lower productivity sectors. These findings align with Baumol's hypothesis of uneven productivity growth, which argues that governments initially respond positively to productivity growth by increasing capital expenditures but later reduce them to support low-yield sectors and meet social requirements. This hypothesis is confirmed in this paper. Based on the findings, it is recommended that economic planners in the studied countries prioritize the expansion of capital expenditures over current expenditures and subsidies to enhance total factor productivity.

5. Ethical Considerations
5.1. Compliance with ethical guidelines
The present study has followed the scientific principles of research.

5.2. Funding

5.3. Authors' Contribution
According to the authors, this paper is an extract from a PhD thesis. As a result, the first author wrote the article with the guidance and supervision of the second author and the consultation of the third author.

5.4. Conflict of Interest
The authors declare no conflict of interest.

5.5. Acknowledgments