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The Composition of Public Expenditure: Does it Matter for Economic Growth?

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Abstract: In the past, a lot of studies put more emphasis on the aggregate government expenditure as the primary driver of social and economic growth which is in the short term. The studies did not capture expenditures on infrastructure, education, and defense which are the disaggregate government expenditure that sustains both social and economic growth in the long term.

The objective of this study is to determine how the demand and supply side of government expenditure can impact on social and economic growth using 45 both advanced and emerging countries. It also wants to establish the expenses that have a long-term effect on growth using balance panel dataset and estimate the relationship between the expenditures in different sectors. We use OLS model to evaluate the impact. The main result is that: when we consider a panel set using fixed effect on the leading indicators of economic growth, that the supply side of public spending on infrastructure, education, transport, communication, agriculture, etc. increases production and economic growth in the sampled countries. Besides, we used data from 1995-2015, and the finding will help us to understand the long-term effect of government expenditure that enhances production and growth while controlling for the demand side.

Introduction:

The [1]Fiscal systems of the public sector require government expenditure and raising government revenue which can be through borrowing or taxes. It is well known that most government spends their income on developing their countries and for other reasons which include the following: Firstly most governments want to provide the general public the kind of goods and services that the private sector or private individual cannot offer which are very important to the welfare of the citizens, these kinds of good include defense, roads and bridges; and merit goods, like hospitals and schools; and welfare payments and benefits, unemployment and disability benefit. Secondly, it can also be noted that another reason for this government expenditure is to increase the improvement on the supply-side of the aggregate macroeconomics objectives to improve labor productivity. Thirdly another vital reason for this fiscal policy is to enable the government to be able to solve the adverse externality problems such as pollution. Also, for the economy to grow or develop, the government need to subsidize infant industries which need financial support, which is not readily available from the private sector. Example include infrastructure and transport projects which cannot be executed by private sectors due to high risk and cost.

Some economist such as John Maynard Keynes believed that countries have to spend more for them to stimulate the economy and it is the critical option to successive governments. He also, argued that government spending should be increased when private spending and investment were inadequate. However, we have two main types of government expenditures:

Current expenditure is expenditure on factors of productions such as wages and raw materials. Current spending is short-term and has to be renewed each year, and it is sometimes known as recurrent expenditures.

On the other side we have capital expenditure, it is also known as social expenditure. This type of investment is mostly on physical assets examples such roads, bridges, hospital buildings and in some cases equipment. The effect of capital expenditure can last up to one year before

[1] Fiscal policy involves the government expenditure and revenue

depreciation takes place. It has the potential to increase the GDP growth of the economy in the long run thereby leading to sustain growth.

Economic growth, however, refers to the increase in the nation's capacity of the economy to produce various goods and services, which is compared to the base year or from one year to another one. Economic growth can be measured in real or nominal terms. Actual term takes into account inflation while the nominal terms do not. Aggregate economic growth concept is mostly measured using a gross National product(GNP) or gross domestic product approach(GDP). While government expenditure refers to the public spending on goods and services, street lights, roads and other capital goods.

A long-term and equitable economic growth is a primary objective of most public expenditure policy. This so because many government programs are focused on improving equitable and sustainable economic growth. However, some of these government expenditures have a very significant effect on the physical and human capital formation in the long run. For these expenditures, however, to be effective, it must be appropriately or accurately to increase economic growth. This can also happen in the short run when applying current expenditure in an appropriate way when it is limited to infrastructure.
Therefore, the effectiveness of government expenditures on growth can only be determined via public expenditure productivity. However, it is therefore imperative to measure those two components to determine their contribution to the government sector output to the economic growth and the elements that have the potential to yield more increase. So, therefore, we need to measure the two components to be able to point out a set of public sector outputs which are particularly conducive to economic growth, and also very useful with which the expenditures contribute to public sector production.

Governments in developing countries spend upwards of 40 percent of GDP on goods and services. The importance of government expenditures prompts a significant amount of research on the relationship between the size of government expenditure and economic growth in most countries. www.scielo.cl

The results of these empirical studies are not generally supportive of the notion that bigger government produces economic growth (see, for instance, Lindauer et al., 1992 and Fölster, et al., 2001). However, when government expenditures are disaggregated into their different

components, the results are not so clear. Studies show that in 21 Asian countries when you invest in the physical capital, the result correlates positively with GDP growth per capita (Hakro 2009). Also, in 15 European countries, government size which results from total expenditures or government consumption has an impact on the growth rates of income per capita (Romero-Avila et al. 2008). Recently there are studies on the growth rate of only public spending in the developed and developing countries. The result is that countries that use public spending for productive purpose experience significant economic growth (Bayraktar et al. 2010). Majority of

the researchers in these works of literature focus mainly on how the different aspect of public expenditure impact on a country's growth rate (Devarajan et al., 1996 and Sugata et al., 2008). Considered also, are the differences between productive and unproductive expenditures (Aschauer 1998 and Nurudeen et al. 2010). Nowadays this area of study is important especially since governments all over the world try to make feasible fiscal policy. The governments to achieve these, are making sure that the aspect of public expenditure that is seen as less efficient and less likely to result in higher economic growth, in the long run, is removed from the policy.

Thus, the primary object of this paper is to analyze the effect of productive government expenditure on economic growth. This is because growth is a component of main government objective and therefore it is essential to know how the different aspect of investment affect this objective. The idea will help the government to pursue other significant goals especially since income per capita is comfortable to measure compared to others.

We also focus on factors that lead to economic growth over time and analysis the forces that allow some economies to proliferate, some grow slowly and while others do not grow at all. However, we have different schools of thoughts with their views on economic growth; for example, Mercantilists emphasized a surplus balance of trade, Physiocrats stressed agriculture as the source of all wealth while the Cameralists favored taxation and state regulation for a strong economy (Lombardini, 1996).

Other schools of thoughts such as the Keynesians view demand as an essential tool for growth. By so doing, they came up with a conclusion which depicts that aggregate demand policies management improve the economic performance of the nation In the Keynesian model. It also increases government expenditure such as on infrastructures, education, health, defense. All these increments lead to higher economic growth. Contrary to the view of the Keynesian, on the

other side, we have the neo-classical growth models which argued that government fiscal policy does not have any effect on the growth of national output.

Different empirical studies have been carried out on the relationship between government expenditure and economic growth such as Barro (1990) models this regarding public services, a flow variable being in the economy's production function. He also went to shed more light on government spending in a simple model of endogenous growth by extending these models to include tax-financed government services that affect production or utility. Baro (1990), states that growth and saving rates have the potentials to fall with an increase in current or efficiency type of government expenditure.

Futagami et al. (1993) preferably used public capital as a stock variable, which is enough to give rise to transitional dynamics. (Ghosh and Roy 2004) Used public equity and public services as the primary components of production of final goods in an endogenous frame. They demonstrated ways in which the optimal fiscal policy of an economy does not depend on the tax rate only, but also on the proportion of the tax revenues allocated between the accumulation of public capital and the provision of public services.

There have been many studies on this very topic on the composition of government expenditure and economy growth, but none has been able to provide a conclusion on the direction towards the channel in which the government should increase or decrease its spending. The literature of this study will focus on the link between the level of public expenditure and economic growth, in this case, we derive conditions under which a change in the composition in spending leads to a higher steady-State growth rate of the economy. This depends not only on the physical productivity of different components of public expenditure but also on the initial shares.
Most of the governments in developing countries spend an average of about 40 percent of GDP on goods and services (world bank), however, much is less known about how the composition public expenditure affects a country's growth rate and also the direction towards the spending should be channeled. This may be a central question. First, the size and composition of public expenditure is a public choice issue which is open to policy discussion by the central government. In this case, we use the Cobb Douglas production function to distinguish between " rich" and " unproductive" public expenditure and show how a country can improve its economic performance

by changing the mix between the two. Using data from 45 countries both advanced and emerging nations over 21 years, from 1995 to 2015.

Besides, neither economic theory nor empirical evidence provides clear distinction answers to the question of how the composition of public expenditure affect economic growth, but the approach develops a rationale for government provision of goods, internalize externalities, and cover costs when there are significant economies of scale. Furthermore, when there is the failure in one market, government intervention in the related market can be justified.

On the empirical front, a few researchers have tried linking particular components of government expenditure to private-sector productivity and economic growth, but most of these efforts lack a rigorous theoretical framework (Diamond, 1989).

For example, Ram (1986) in an empirical study, observed 115 countries for the period between 1950 - 1980 to determine the relationship between government expenditure and economic growth using both cross-sectional and time series data. The result is that government expenditure correlates positively with economic growth.

Another primary objective of our study is to shed more light on the relationship between the share of productivity-budget ratios of various types of government expenditures and economic growth in an advanced and emerging economy. This objective contributes to the current literature in several ways: (i) it is built on the work of Devarajan et al. (1996) by actually estimating productivity to budget share ratios for different types of government expenditures and analyzing their impact on the selected set of countries comprising of Emerging and Advanced nations economic growth. The theoretical section of Devarajan et al. develops the analysis presented here, the empirical part of that paper only considers the effect on economic growth of budget-share ratios. Here, I estimate the productivity to budget share ratios conceived by Devarajan et al. and study their impact on real GDP per capita for both emerging and developing countries. Secondly, I also consider recent data from 1995 to 2015 for countries that are available.

Endogenous growth model.

Here, we provide a model that combines the empirical and the theoretical observation to derive a model that has two types of government expenditure, productive and unproductive. This model also expresses the difference between productive and unproductive expenditure and how a shift in one will affect the long-term economic growth. (Devarajan, et al., (1996)

Using the Cobb – Douglas production function as our point of departure with private capital stock, k and two types of government spending such as g1 and g2

This model is developed using constant elasticity, and at the end of the derivation of this model, we shall be able to distinguish what it means for g1 to be productive and g2 to unproductive.

$$y = f(k,g1,g2) = [\alpha k^{-\zeta} + \beta g^{-\zeta} + \gamma\, g^{-\zeta}]^{-1/\zeta} \quad (1)$$

Where,

$$\alpha > 0, \quad \beta \geq 0, \quad \gamma \geq 0, \quad \alpha + \beta + \gamma = 1 \quad \zeta \geq -1$$

From Barro (1990), It understands to say that government finances its expenditure through tax, τ.

Therefore, $\tau y = g1 + g2$. (2)

Given that ϕ is the share of government expenditure, and it lies $\phi(0 \leq \phi \leq 1)$,

Therefore, the share of government expenditure on g1 will be given as follows.

$$. g1 = \phi\tau y \quad \text{and} \quad g2 = (1-\phi)\tau y \quad (3)$$

Considering the government decision on tax and ϕ, the government is faced with a choice for consumption, c, and capital, k, to minimize its welfare.

$$U = \int_0^{\infty} u(c)e - ptdt \quad (4)$$

Subject to,

$$K = (1-\tau)\, y - c, \qquad (5)$$

P is the rate of time preference.

Let transform the utility function to Iso-Elasticity to get analytical solutions,

$$U(c) = \frac{c^{1-\sigma} - 1}{1-\sigma} \qquad (6)$$

To have the steady-state growth of consumption λ, we substitute (6) into (4), and we assumed that along the steady growth path, the tax rate is constant. Also, consider g/k is constant.

$$C^* = \alpha(1-\tau)\{\alpha + \left(\frac{g}{k}\right)^{-\zeta}\left[\beta\phi - \zeta + \gamma(1-\phi) - \zeta\right]\}^{-(1+\zeta)/\zeta} - p$$

$$C \qquad\qquad \sigma \qquad (7)$$

Substituting g/k in to (7) above we obtain our steady-state growth rate of consumption as,

$$\lambda = \alpha(1-\tau)\{\alpha\tau\zeta/[\tau\zeta - \beta\phi - \zeta + \gamma(1-\phi) - \zeta]\}^{-(1+\zeta)/\zeta} - p$$

$$\sigma \qquad (8)$$

From equation (8) it is possible to derive a relationship between the steady-state growth rate, λ, and the share of government expenditure directed to g1.

$$\frac{d\lambda}{d\phi} = \frac{\alpha(1-\tau)(1+\zeta)[\alpha\tau\zeta] - (1+\zeta)/\zeta\ [\beta\phi - (1+\zeta) - \gamma(1-\phi) - (1+\zeta)}{\sigma[\tau\zeta - \beta\phi - \zeta - \gamma(1-\phi) - \zeta]^{-1/\zeta}} \quad (9)$$

Productive component of the government expenditure is one in which an increase in its share will raise the steady-state growth rate of the economy. From equation (9) g1 is a productive share of government expenditure if $d\lambda/d\phi > 0$

Thus, a productive expenditure [6]is defined as one whose increase in its

share raises λ. From Equation (8), g_1 is considered productive if $d\lambda/df > 0$.

Having defined a productive expenditure, we used the model proposed by Devarajan, et al., (1996) to collapses to a situation in which the growth rate of an economy depends not just on the absolute productivity of different types of expenditures but also on the initial shares of these expenditures in the government's budget. (Devarajan, et al., (1996)

We organize the paper based on the following: section2 develops the literature framework that links productivity to budget share ratios of different types of public expenditures to economic growth. Section 3 presents the empirical model, including a brief description of the functional, industrial and department classifications that are made to distinguish between different types of government expenditures and also introduces the data and its sources. Section 4 empirical results and section 5 concludes. Appendix, A present sources of data and countries, list while the results presented in Appendix B.

Section 2

Empirical Literature.

The empirical analysis for this paper focuses on the link between various components of government expenditure and economic growth in developing and developed countries. The other emphasize will be on the distinction between public goods and services that enter into the household's utility function and those that complement private sector production. The former is a significant topic of debate. The argument is that if you include much of government consumption, it will have an adverse growth effect. This adverse growth effect provides utility to the households. In other wards, government consumption lowers growth due to the higher taxes. And besides, these higher taxes finance the consumption expenditure which reduces the return on investments and the incentives to invest.

The correlations that exist between fiscal policy and the main macroeconomic indicators for example in countries like Romania over the period 1990-2007. They used the ordinary least square regression technic, Granger causality, and interval analysis. They applied these econometric methodologies using the following variables: the percentage of government revenues in GDP, the economic growth rate of real GDP, an annual average of interest rate, unemployment rate and the portion of public debt in GDP. The findings concluded that total fiscal pressure is in an opposite relation with the real price of economic growth, the percentage of public debt in GDP, unemployment rate and inflation rate. Braoveanu, I., Braoveanu Obreja, L. and Pun, C., (2007)

On the empirical front, a few researchers have tried linking particular effect of different types of government expenditure on overall economic growth across 43 developing countries between 1980 and 1998 using OLS method and found a mixed result. In most developing countries such as Africa, the government spending on agriculture and health is particularly keen on promoting economic growth. Among all types of government expenditures, agriculture, education, and defense contributed positively to GDP growth in some countries in Asia. While in Latin America, health spending had a positive growth-promoting effect. Fan and Rao 2003, states that structural adjustment programs had a positive growth-promoting impact in Asia and Latin America, but not in Africa. (Fan and Rao (2003).

Devarajan et al. (1993) employed panel data for 14 Advanced countries (1970-1990) and used OLS method, 5-year moving average. They took various functional types of expenditure (health, education, transport, and others) as explanatory variables and their results show a positive and significant effect on health, , and communication, but defense and education seem to have the opposite impact on economic growth.

Some studies were done in the past on the relationship between aggregate productivity and stock and flow government-spending variables. The empirical results of the survey reveal that the nonmilitary public capital stock is more important in determining productivity than is either the flow of nonmilitary or military spending and that army capital does not show strong significant to productivity, and also that infrastructures such as streets, highways, airports, mass transit, sewers, water systems, etc. has most significant explanatory effect on productivity and economic growth. (David AlanAschauer,). Donald and Shuanglin (1993) employ a sample data of 58 countries to examine the different effects of different levels of expenditure on economic growth. The results of their studies show that public spending on education and defense has a positive impact on economic growth and that of welfare appeared insignificant and negative.
Bose et al. (2003), used a panel data of thirty developing countries over ten years from 1970 to 1980 to examine the growth effect of public expenditure with a particular focus on different sectors of the federal spending. They have a mixed result. Firstly, they noted a confident and robust correlation between the share of government capital expenditure in GDP with economic growth, but current spending shows an insignificant relationship. Secondly, when they employed a data at the sectoral level, government investment and total expenditures on education seem to be the only sector is significantly related to economic growth once the budget constraint and omitted variables are taken into consideration.

Laudau (1983) examined the effect of government expenditure on economic growth for a sample of 96 countries. This study shows an opposite relationship between government expenditure and the impact on real output or economic growth.

Similarly, Komain et al. (2007), employing the Granger causality test, examined the relationship between government expenditures and economic growth in Thailand and found that government expenditures and economic growth are not co-integrated. The result also suggested that a unidirectional relationship exist, as causality runs from government expenditures to growth.

However, the result demonstrated a significant positive effect of government spending on economic growth. Olugbenga and Owoeye (2007) use a sample data of 30 OECD countries to examine the relationship between public expenditure and economic growth. Their findings suggest a positive and a healthy relationship between government expenditure and economic growth. Also, there seems to be a one-way relationship from government expenditure to increase for 16 of the 30 OECD countries. However, this supports the fact of the Keynesian hypothesis of government intervention. But, on the remaining ten states it seems that causality runs from economic growth to government expenditure, which therefore confirms the Wagner's law. For the remaining countries, it shows a two-way relationship between government expenditure and economic growth. Akpan (2005) To examine the components of government expenditure in Nigeria, used a disaggregated method to estimate the parts of government expenditure that stimulate GDP growth. His studies did not reveal any statistically significant relationship with most components of government expenditure and growth.

Laudau (1983) examined the effect of government expenditure on economic growth for a sample of 96 countries. According to his findings, government expenditure has an adverse impact on real output. This shows there is a positive relationship between public spending and economic growth.

Santiago Acosta-Ormaechea and Atsuyoshi Morozumi in their article title "public spending reallocations and economic growth across different income levels", they examined the effects of federal spending reallocations on economic growth by introducing a disaggregated public spending dataset of 83 countries between 1970 to 2011. They find out that spending reallocations towards education, from health and social protection, have a significant effect on increasing growth in the economy and that income heterogeneity matters.

Some empirical studies such as Swaroop, and Zou (1996), revealed that public spending reallocation toward infrastructure is associated with low economic growth in the developing countries.

Gemmell, Misch, and Moreno-Dodson (2013), in their study, they point out that private production requires different types of government spending depending on the development level of the countries, this is as a result of potential heterogeneous growth effects of spending reallocations.

Blankenau and Simpson (2004) and Glomm and Ravikumar (1997) suggest that public on education has the potential to foster economic growth through promoting human capital accumulation. Gupta et al. (2005), they focus on 39 developing countries during the 1990s, their results show that a rise in capital spending has a positive effect on growth, when financed through budget deficits, but that a rise in current spending, particularly wages, has a negative effect on growth.

Easterly and Rebelo(1993) in their studies title" Fiscal policy and economic growth" revealed that public investment in transport and communications in developing countries leads to higher economic growth.

Norman Gemmell, Richard Kneller and Ismael Sanz (2015) In their work, they examined the long-run GDP impacts of changes in total government expenditure and in the shares of different spending categories for a sample of OECD countries since the 1970s, taking account of methods of financing expenditure changes and possible endogenous relationships. To support their studies, they provide lots of empiricals which are available for OECD countries and this supported their view that reallocating total expenditure towards components such as infrastructure and education is positive and significant for long term economic growth while the reverse is true when we reallocate government expenditure towards social welfare.

SECTION 3: Data and Sources

The studies use a total annual data on 45 countries, (refer to appendix A) of the 45 countries, 24 Advanced countries and 21 Developing countries, from 1995 to 2015 in order to analyze the relationship between components of government expenditure and economic growth.

Our panel data include total central government expenditures, expenditures for defense, education, health, agriculture, transport and communication.

In our model, we developed links between the shares of government expenditure and the long-term growth rate of the economy. In the analysis, we also, test whether the share allocated to different components of government expenditure is associated with higher economic growth. Here, the key explanatory variable is the share of each component in total government expenditure.

The study also controls for level effects by including the share of government expenditure in GDP, which also allows us to control for effects of financing government expenditure on growth. Also, due to uneven growth around the world, we include continent or region dummy to control for continent effects. The study also controls for shocks and other domestic policies and also black-market premium.

Lastly our dependent variable is a five year forward moving average of real GDP growth. The five year forward moving average helps to eliminate short term fluctuations in government expenditure, it also addresses the problem of joint endogeneity of two variable and the possibility of reverse causality.

The classification of government expenditure that I used for this study is the same as that in the international Monetary fund (IMF) government financial statistics which is based on the classification of expenditure according to their economic activities and functional expenditure which is based on the aim in which the expenditure is directed towards. The first classification can be sub divided into capital expenditure which involves expenditure on new or existing durable goods and current expenditure which refers to the expenditure on wages and salaries, expenditure on interest payment and expenditure on other goods and services. The latter refers to government expenditure on transport and communication, expenditure on electricity, expenditure on education, expenditure on health, and expenditure on defense.

Regression analysis

The method of Ordinary Least Squares (OLS) is used to estimate the following:

$GDP^{i}_{(i+1,t+5)} = \sum^{5}_{j=1} \alpha_j D_j + \alpha_1 (TE/GDP)^{i}_{j} + \alpha_2 BMP^{i}_{j} + \alpha_3 SHOCK^{i}_{j} +$
$\sum \alpha_k (Gk/TE)^{i}_{j} + u^{i}_{j}$

Where:

$GDP^{i}_{(i+1,t+5)}$: Five – year forward moving average of per- capita real GDP growth for country i. Dj : Continental dummy variables;j=1,2,3,4 and 5. TE/GDP = Share of government total expenditure on GDP for country i at time j. BMP^{i}_{j} Premium in the Black market for foreign exchange in country i at time t. SHOCK: The shock variable is a weighted average of changes in the world real interest rate(R) and the export price index(PX) and import price index (PM) for each country. Gk/TE : A vector of public expenditure ratios for country i at time t for the following functions: Ncur/Te = ratio of current expenditure to total expenditure. Cap/Te = ratio of capital expenditure to total expenditure Def/Te = ratio of defense expenditure to total expenditure. Hlth/Te = ratio of health expenditure to total expenditure. Ed/Te = ratio of education expenditure to total expenditure.

Section 4: EMPERICAL RESULTS

4.1 Regression results

The regression results presented here are based on equation (4) in table 2, 3, 4, 5, 6 and 7.

Table 2 reveals the results of the relationship between public expenditure and economic growth for all the countries in the sample both developed and developing nations and table 3 presented the same findings with fixed effects. However, the results revealed that total government expenditure as a ratio of GDP is positive and significant with or without fixed effects, but the sign is not consistency. Country and time fixed effects are included to control for unobserved heterogeneity across countries. Our spatial lag variable is time-variant.

There are a few notable points in Table 3 in equation 4. First, public expenditure on Agriculture and capital expenditure matters. The coefficients on agricultural spending as a ratio of total spending and that of capital expenditure are significantly positive indicating that capital expenditure and agriculture play an essential role in promoting economic growth. For instance, regression 3.4 suggests that ceteris paribus, a 1% increase in capital expenditure is associated with a 0.02% increase in economic growth. Spending on health, education, defense and transport and communication does not show any signs. But current expenditure is significant and negative.

Due to income heterogeneity, the sample is separated into two, high(Advanced) and low(developing) income countries. Table 4 shows results for advanced nations and table 6 shows the results for developed countries with fixed effects. Equation 4 in table 6 shows that expenditures on defense, education and agriculture matters in increasing economic growth with significant and positive signs. While total spending as a ratio of GDP and current spending appears to be substantial and negative. Expenditure on health is negative but not significant while that of transport and communication is positive but not significant. (see regression 4 in table 6)

Also, results in developing countries are presented in table 5 and 7. Table 5 shows results without fixed effects while table 7 shows results with fixed effects. In table 7 equation four shows that health expenditure as a ratio of total spending and expenditure on defense is significant and negative, they are modeled as government consumption expenditure. While public spending on education, agriculture, capital expenditure and transport and communication appeared to be substantial and positive. (see table 7 regression 4). This shows that these expenditures have the potential to increase economic growth and hence they are known as productive expenditure.

More importantly, there is substantial evidence supporting the fact that public spending has a significant impact on economic growth.

4.2) Robustness Checks and Extensions

Robustness checks

In this subsection, we provide robustness checks with alternative measures of economic growth, instead of using five years forward moving average of real GDP growth, we used real GDP growth as a percentage.

We report the findings with these alternative measures in Table 8,9,10, and 11 Table 8 and ten show results for Advanced countries without and with fixed effects respectively. The coefficients on total government expenditure from table 10 in regression equation 4 seem positive and significant in increasing economic growth and even that of agriculture as expected. But health expenditure, defense expenditure and expenditure on education are confident but not substantial while capital investment, current cost, and spending on transport and communication are negative. They are consistently negative and significant, indicating that an increase in such expenditures will not increase growth.

While in the developing countries, table 9 and 11 shows that total expenditure as a ratio of GDP is positive and significant. Agricultural spending is also positive and significant in increasing economic growth. This is because most developing countries rely on agricultural activities.

Section 5

Conclusion

This study examined how public expenditure affects economic growth in a sample set of developing and advanced countries from 1995 to 2015 period. Past studies show mixed results about how federal spending impact economic growth. Some expenses that may be considered productive in the developing countries may be unproductive in the developed countries and vice versa. Also, some spending that is deemed to be productive can become unproductive when it is in an excess amount. This study contributed to the research effort at empirical measure of the impact of public expenditure on economic growth. The data analysis shows that a relationship exists between government expenditure and economic growth as we expected. While some component shows some surprising negative results between public expenditure and economic growth others exerted positive effect. In the developing countries, government expenditure on health and defense appear to be cynical and statistically significant, however, this is expected especially for defense expenditure since they are public consumption expenditure and on health it can be argued that most developing countries are characterized by disease outbreak such as malaria, Ebola virus, etc. which has an adverse effect on human capital and economic growth. As expected, public expenditure on education, transport, and communication, agriculture, capital expenditure seem to be confident and significant. For example, a permanent one percentage point increase in transportation and communication share in total spending on average correlates with a long-run level of GDP per capita that is 14% higher than the counterfactual of an unchanged transport and communication spending share in the developing countries and 0.44% in advanced countries.

Surprisingly, in Advanced countries expenditure on health, total expenditure and current expenditure are negative and significant, but health is not significant. This is more surprising for integral expenditure component; this might be the case that there have been excess of current expenditure in total expenditure. On the other hand, spending on Agriculture, capital expenditure transport and communication appear to be positively related to economic growth.

These results are in line with our literature that expenditure that might be productive in developing countries might not be productive or efficient in advanced nations.

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Table 1: Summary Statistics

Variables	Observations	Mean	Standard Deviation	Min	Max
Total sample					
Real GDP	966	1.03E+12	2.28E+12	1.35E+09	1.66E+13
GDP growth	966	2.95E+00	3.867475	-36.7	25.5
Government Expenditure total expenditure	966	1380.077	23269.76	6.162525	598220.4
Health Expenditure	962	10.72402	4.519478	0.0037897	24.17613
Defense Expenditure	949	5.178298	4.009319	0.0074677	18.80819
Education Expenditure	940	13.70897	5.100354	0.0098309	36.73749
Agricultural Expenditure	966	2.542553	2.442991	0.0000228	13.75276
Transport and Communication	924	4.560471	3.142145	0.1492318	21.25039
ADVANCED COUNTRIES					
Real GDP	546	1.47E+12	2.79E+12	1.56E+10	1.66E+13
GDP growth	546	2.308242	2.798379	-9.1	25.5
Government Expenditure total expenditure	546	40.9987	12.56573	14.30417	65.49593
Health Expenditure	542	12.97437	4.059437	2.3	24.17613
Defense Expenditure	541	4.018578	2.912302	0.6290169	16.45634
Education Expenditure	541	12.31795	2.644559	7.337077	19.89141
Agricultural Expenditure	546	1.613106	1.62051	0.0388883	9.917496
Transport and Communication	546	4.642594	2.749464	0.1597891	18.34482
DEVELOPING COUNTRIES					
Real GDP	420	4.44E+11	1.13E+12	1.35E+09	8.91E+12
GDP growth	420	3.786667	4.79835	-36.7	19.7
Government Expenditure total expenditure	420	3120.88	35237.95	6.162525	598220.4
Health Expenditure	420	7.819992	3.250548	0.0037897	16.44812
Defense Expenditure	408	6.716063	4.693642	0.0074677	18.80819
Education Expenditure	399	15.59505	6.759329	0.0098309	36.73749
Agricultural Expenditure	420	3.750833	2.782175	0.0000228	13.75276
Transport and Communication	378	4.44185	3.635914	0.1492318	21.25039

Advanced Countries	Government Spending to GDP%	GDP growth rate (Quarterly)	GDP per Capita	Developing Countries	GDP growth(Annually)	GDP per capita
France	56.5	2.5	42013.3	Ghana	9.3	1707.7
Finland	56.1	2.7	45709.08	Ivory Coast	7.8	1563.4
Denmark	53.6	1.3	60268.2	China	6.8	6894.5
Belgium	53.3	1.9	45308.24	Tanzania	6.8	867
Austria	51.1	2.9	47703.9	Philippines	6.6	2753.3
Norway	51.1	1.4	89818.3	Botswana	6.5	7383.3
Sweden	50	3.3	56319.05	Ukraine	2.2	2905.86
Italy	49.6	1.6	34283.7	Burkina Faso	6.2	644
Greece	49	1.9	22736.5	Malaysia	5.9	11028.2
Hungary	47.5	4.4	14840.4	Central African Republic	4.5	325.7
Portugal	45.1	2.4	22347	Fiji	4.2	4402.3
Germany	44.3	2.9	45551.51	Togo	4.2	558.1
Netherlands	43.6	2.9	52111.47	Cameroon	4.1	1357.1
Spain	42.4	3.1	31449.6	Morocco	3.9	3196
United Kingdom	42.1	1.4	41602.98	Congo	3.5	387.4
Poland	41.3	5.1	15049	Zambia	3.4	1622.4
Japan	39.39	2	47607.7	Chile	3.3	15019.6
Cyprus	38.9	3.9	28325.44	Gabon	2.9	9569.5
Canada		2.9	50231.9	Brazil	2.1	10826.3
United States	37.8	2.6	52194.9	Tunisia	2	4265.4
New Zealand		2.9	36842	Nigeria	1.92	2457.8
Australia	36	2.4	55670.9	South Africa	1.5	7504.3
Bulgaria	35.5		7929.49	Algeria	1.4	4846.4
Sweden		3.3	56319.05	Russia	0.9	11099.2
Switzerland	33.6	1.9	75725.7	Zimbabwe	0.6	908.8
Ireland	28	8.4	66787.14	Chad	-3.4	859.6

APPENDIX A

Data

We collected annual data on 24 Advanced countries and 21 developing countries(country list below) for a 21years period from 1995 through 2015 for our analysis.

International Monetary Fund via Government Financial Statistics (GFS) was our primary source of data extraction for government expenditure. GFS is comprehensive for central government accounts.

Data sources

Government Finance Statistics(GFS), International Finance Statistics(IFS), and National Accounts(world bank Economic and social Database. From International Monetary Fund.

Word Development indicator.

Countries list

Austria Belgium Cyprus Finland France Germany Greece Ireland Italy Netherlands Portugal Spain Australia Canada Denmark Japan New Zealand Norway Sweden Switzerland the United Kingdom United States-China, P.R.: Mainland Fiji Malaysia Philippines Bulgaria Hungary Poland Russia Ukraine Algeria Morocco Tunisia Cameroon Central African Republic Cote d'Ivoire Togo Ghana Nigeria South Africa Brazil
Chile Tanzania Zambia Zimbabwe.

Appendix B: Empirical Empirical Results

Table 2: Baseline table for all the countries in the sample and five years forward moving average of real GDP growth as the dependent variable.

TABLE 2: GENERAL FOR ALL COUNTRIES				
VARIABLES	(1) GRPCGDP	(2) GRPCGDP	(3) GRPCGDP	(4) GRPCGDP
Hlth/Te	-0.161***	-0.0625***	-0.0626***	-0.0539**
	(0.0211)	(0.0230)	(0.0234)	(0.0229)
Ed/Te	0.0291	-0.00157	0.00828	0.0259
	(0.0203)	(0.0197)	(0.0202)	(0.0200)
Def/Te	0.0297	0.0306	0.0432	0.0207
	(0.0268)	(0.0257)	(0.0265)	(0.0261)
Agri/Te		0.388***	0.397***	0.402***
		(0.0432)	(0.0471)	(0.0461)
TaC/Te			-0.0100	0.00366
			(0.0330)	(0.0324)
Cap/Te				0.000160***
				-0.000256
Cur/Te				-0.000273
				-0.00319
Te/GDP	-0.00025	-0.00022	-0.00221	
	-0.000402	-0.000386	-0.000388	
Constant	4.206***	2.585***	2.448***	2.126***
	(0.375)	(0.402)	(0.412)	(0.407)
Observations	886	886	858	858
Adjusted R-squared	0.09866982	0.17309792	0.17900615	0.2156008
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

Table 3: Baseline table for all the countries in the sample and five years forward moving average of real GDP growth as the dependent variable with fixed effects.

TABLE 3: GENERAL RESULTS FOR ALL THE COUNTRIES WITH FIXED EFFECTS

	(1)	(2)	(3)	(4)
VARIABLES	GRPCGDP	GRPCGDP	GRPCGDP	GRPCGDP
Hlth/Te	-0.0385	-0.0224	-0.0217	-0.0211
	(0.0370)	(0.0368)	(0.0375)	(0.0358)
Ed/Te	-0.0395	-0.0414	-0.0352	0.0265
	(0.0296)	(0.0293)	(0.0301)	(0.0296)
Def/Te	0.0280	-0.0282	-0.0217	-0.0389
	(0.0554)	(0.0562)	(0.0567)	(0.0541)
Agri/Te		0.311***	0.310***	0.306***
		(0.0693)	(0.0718)	(0.0686)
TaC/Te			-0.0132	-0.00945
			(0.0536)	(0.0512)
Cap/Te				0.000206***
				(0.00233)
Cur/Te				-0.000242***
				(0.00275)
Te/GDP	-0.0017***	0.000171***	-0.000169***	
	(0.00373)	(0.00369)	(0.000369)	
Constant	3.819***	3.172***	3.119***	2.313***
	(0.539)	(0.552)	(0.554)	(0.538)
Observations	886	886	858	858
Adjusted R-squared	0.03027857	0.0071829	0.00832637	0.0802053
Number of countries	45	45	43	43

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table4: Advanced Countries

VARIABLES	(1) GRPCGDP	(2) GRPCGDP	(3) GRPCGDP	(4) GRPCGDP
Hlth/Te	-0.0300	0.00685	0.00675	0.0643**
	(0.0230)	(0.0250)	(0.0250)	(0.0270)
Ed/Te	0.164***	0.140***	0.139***	0.132***
	(0.0386)	(0.0387)	(0.0391)	(0.0377)
Def/Te	0.0376	0.0503	0.0479	0.00250
	(0.0368)	(0.0366)	(0.0378)	(0.0398)
Agri/Te		0.223***	0.213***	0.219***
		(0.0623)	(0.0728)	(0.0695)
TaC/Te			0.0103	0.00655
			(0.0400)	(0.0405)
Cap/Te				-0.00138**
				(0.000613)
Cur/Te				-0.00952***
				(0.000234)
Te/GDP	-0.0263***	-0.0213**	-0.0222**	
	(0.00883)	(0.00884)	(0.00943)	
Constant	1.620**	0.814	0.843	0.719
	(0.802)	(0.824)	(0.833)	(0.624)
Observations	518	518	518	518
Adjusted R-squared	0.10160598	0.12172866	0.12012448	0.14663848

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: This table reveals the results of developing countries and five years forward moving-average of real GDP growth as the dependent variable.

Table5: Developing Countries				
	(1)	(2)	(3)	(4)
VARIABLES	GRPCGDP	GRPCGDP	GRPCGDP	GRPCGDP
Hlth/Te	-0.226***	-0.133**	-0.140**	-0.144**
	(0.0572)	(0.0573)	(0.0596)	(0.0573)
Ed/Te	-0.00705	-0.0265	-0.0251	0.000898
	(0.0301)	(0.0290)	(0.0303)	(0.0296)
Def/Te	-0.0905**	-0.0730*	-0.0842*	-0.117***
	(0.0427)	(0.0411)	(0.0447)	(0.0435)
Agri/Te		0.366***	0.312***	0.325***
		(0.0639)	(0.0725)	(0.0698)
TaC/Te			0.118*	0.140**
			(0.0601)	(0.0580)
Cap/Te				0.000165***
				(0.000315)
Cur/Te				-0.0027***
				(0.000389)
Te/GDP	-0.0025***	-0.0022***	-0.00219***	
	(0.00495)	(0.0047)	(0.000486)	
Constant	6.425***	4.515***	4.363***	3.977***
	(0.577)	(0.646)	(0.674)	(0.653)
Observations	368	368	340	340
Adjusted R-squared	0.11513617	0.1861904	0.19397698	0.25426997
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Table 6: Advanced Countries with Fixed effects

Table 6: Advanced Countries with fixed effects				
VARIABLES	(1) GRPCGDP	(2) GRPCGDP	(3) GRPCGDP	(4) GRPCGDP
Hlth/Te	-0.0918***	-0.0551*	-0.0542*	0.0325
	(0.0327)	(0.0309)	(0.0311)	(0.0356)
Ed/Te	0.546***	0.445***	0.446***	0.551***
	(0.104)	(0.0979)	(0.0980)	(0.0971)
Def/Te	0.340***	0.220***	0.218***	0.183**
	(0.0868)	(0.0824)	(0.0831)	(0.0859)
Agri/Te		0.816***	0.820***	0.479***
		(0.0967)	(0.0989)	(0.112)
TaC/Te			-0.0130	0.0731
			(0.0584)	(0.0598)
Cap/Te				0.00474
				(0.00325)
Cur/Te				-0.000551***
				(0.0006)
Te/GDP	-0.204***	-0.191***	-0.191***	
	(0.0224)	(0.0210)	(0.0210)	
Constant	3.716**	3.101*	3.156*	-0.980
	(1.868)	(1.748)	(1.767)	(1.571)
Observations	518	518	518	518
Adjusted R-squared	0.2503771	0.34453983	0.34325854	0.32479302
Number of countries	26	26	26	26
Standard errors in parentheses				
*** p<0.01, ** p<0.05, * p<0.1				

Table 7: Developing Countries with five years forward moving-average of real GDP growth as the dependent variable with fixed effects.

Table 6: Developing Countries with Fixed effects				
	(1)	(2)	(3)	(4)
VARIABLES	GRPCGDP	GRPCGDP	GRPCGDP	GRPCGDP
Hlth/Te	0.122	0.129*	0.140*	0.143*
	(0.0749)	(0.0751)	(0.0796)	(0.0738)
Ed/Te	-0.0932**	-0.0931**	-0.0861**	-0.0230
	(0.0372)	(0.0372)	(0.0388)	(0.0371)
Def/Te	-0.0838	-0.105	-0.0966	-0.121
	(0.0749)	(0.0771)	(0.0790)	(0.0734)
Agri/Te		0.112	0.107	0.106
		(0.0955)	(0.101)	(0.0934)
TaC/Te			-0.0327	-0.0266
			(0.0837)	(0.0776)
Cap/Te				0.000200***
				(0.00278)
Cur/Te				-0.0023***
				(0.0032)
Te/GDP	-0.0017***	-0.00174***	-0.00172***	
	(0.00447)	(0.00447)	(0.00453)	
Constant	4.975***	4.642***	4.570***	3.605***
	(0.754)	(0.805)	(0.807)	(0.762)
Observations	368	368	340	340
Adjusted R-squared	0.00065886	0.00042443	0.00131954	0.13848363
Number of countries	19	19	17	17

Robustness check results

Table 8

Table 8: ADVANCED COUNTRIES, DEPENDENT VARIABLE = Real GDP growth				
	(1)	*(2)*	*(3)*	*(4)*
VARIABLES	*real GDP growth*	*real GDP growth*	*real GDP growth*	*real GDP growth*
Te/GDP	*-0.0108*	*-0.00510*	*-0.000342*	*0.0334**
	(0.0118)	*(0.0119)*	*(0.0127)*	*(0.0173)*
Hlth/Te	*-0.0248*	*0.0177*	*0.0183*	*0.0975***
	(0.0309)	*(0.0337)*	*(0.0336)*	*(0.0402)*
Ed/Te	*0.160****	*0.133***	*0.141****	*0.138***
	(0.0517)	*(0.0521)*	*(0.0525)*	*(0.0540)*
Def/Te	*0.0691*	*0.0838**	*0.0974**	*0.0409*
	(0.0494)	*(0.0492)*	*(0.0508)*	*(0.0537)*
Agri/Te		*0.256****	*0.311****	*0.326****
		(0.0838)	*(0.0978)*	*(0.0967)*
TaC/Te			*-0.0583*	*-0.0660*
			(0.0538)	*(0.0551)*
Cap/Te				*-0.00176***
				(0.000832)
Cur/Te				*-0.000131****
				(4.33e-05)
Constant	*0.753*	*-0.177*	*-0.342*	*-0.763*
	(1.075)	*(1.109)*	*(1.119)*	*(1.194)*
Observations	*520*	*520*	*520*	*520*
Adjusted R-squared	*0.04032649*	*0.0556678*	*0.05598467*	*0.08012836*
Standard errors in parentheses				
**** p<0.01, ** p<0.05, * p<0.1*				

Table 9

TABLE 9: DEVELOPING COUNTRIES WITH Real GDP as a dependent variable				
VARIABLES	*(1) real GDP growth*	*(2) real GDP growth*	*(3) real GDP growth*	*(4) real GDP growth*
Te/GDP	*-2.93e-05****	*-2.57e-05****	*-2.55e-05****	*0.000997****
	(6.72e-06)	*(6.56e-06)*	*(6.70e-06)*	*(0.000238)*
Hlth/Te	*-0.204****	*-0.0953*	*-0.0941*	*-0.117*
	(0.0777)	*(0.0786)*	*(0.0821)*	*(0.0803)*
Ed/Te	*-0.0478*	*-0.0705**	*-0.0747**	*-0.0682**
	(0.0408)	*(0.0399)*	*(0.0417)*	*(0.0413)*
Def/Te	*-0.0150*	*0.00540*	*-0.000117*	*0.00614*
	(0.0580)	*(0.0564)*	*(0.0616)*	*(0.0608)*
Agri/Te		*0.426****	*0.388****	*0.374****
		(0.0878)	*(0.0999)*	*(0.0976)*
TaC/Te			*0.0792*	*0.0693*
			(0.0828)	*(0.0811)*
Cap/Te				*7.83e-05**
				(4.59e-05)
Cur/Te				*-6.85e-05****
				(1.59e-05)
Constant	*6.444****	*4.217****	*4.126****	*4.346****
	(0.783)	*(0.888)*	*(0.929)*	*(0.915)*
Observations	*368*	*368*	*340*	*340*
Adjusted R-squared	*0.06463662*	*0.11935355*	*0.11982948*	*0.16181129*
*Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1*				

Table 10

TABLE 10: ADVANCED COUNTRIES WITH FIXED EFFECTS				
	(1)	*(2)*	*(3)*	*(4)*
VARIABLES	*Real GDP growth*	*Real GDP growth*	*Real GDP growth*	*Real GDP growth*
Te/GDP	*-0.0298*	*-0.0163*	*-0.0191*	*0.113****
	(0.0340)	*(0.0329)*	*(0.0328)*	*(0.0427)*
Hlth/Te	*-0.171****	*-0.127****	*-0.115***	*0.0173*
	(0.0497)	*(0.0484)*	*(0.0487)*	*(0.0552)*
Ed/Te	*0.371***	*0.255**	*0.260**	*0.220*
	(0.158)	*(0.154)*	*(0.153)*	*(0.151)*
Def/Te	*0.466****	*0.328***	*0.295***	*0.180*
	(0.132)	*(0.130)*	*(0.130)*	*(0.130)*
Agri/Te		*0.924****	*0.988****	*0.608****
		(0.152)	*(0.155)*	*(0.176)*
TaC/Te			*-0.186***	*-0.109*
			(0.0914)	*(0.0916)*
Cap/Te				*-0.00313*
				(0.00492)
Cur/Te				*-0.000582****
				(0.000134)
Constant	*-0.789*	*-1.417*	*-0.637*	*0.525*
	(2.841)	*(2.743)*	*(2.762)*	*(2.729)*
Observations	*520*	*520*	*520*	*520*
Adjusted R-squared	*0.00284318*	*0.07119437*	*0.07709395*	*0.1144684*
Number of countries	*26*	*26*	*26*	*26*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11

TABLE 11: DEVELOPING COUNTRIES WITH FIXED EFFECTS				
	(1)	*(2)*	*(3)*	*(4)*
VARIABLES	*Real GDP growth*	*Real GDP growth*	*Real GDP growth*	*Real GDP growth*
Te/GDP	*-2.24e-05****	*-2.23e-05****	*-2.22e-05****	*0.000922****
	(6.57e-06)	*(6.56e-06)*	*(6.62e-06)*	*(0.000219)*
Hlth/Te	*0.194**	*0.204**	*0.252***	*0.212**
	(0.110)	*(0.110)*	*(0.116)*	*(0.114)*
Ed/Te	*-0.212****	*-0.212****	*-0.207****	*-0.199****
	(0.0546)	*(0.0546)*	*(0.0568)*	*(0.0570)*
Def/Te	*0.0591*	*0.0261*	*0.0577*	*0.0571*
	(0.110)	*(0.113)*	*(0.116)*	*(0.113)*
Agri/Te		*0.172*	*0.181*	*0.180*
		(0.140)	*(0.147)*	*(0.143)*
TaC/Te			*-0.134*	*-0.141*
			(0.122)	*(0.119)*
Cap/Te				*7.56e-05**
				(4.41e-05)
Cur/Te				*-6.34e-05****
				(1.47e-05)
Constant	*5.398****	*4.884****	*4.763****	*5.066****
	(1.106)	*(1.181)*	*(1.180)*	*(1.174)*
Observations	*368*	*368*	*340*	*340*
R-squared	*0.00373734*	*0.00522002*	*0.0120446*	*0.06223124*
Number of countries	*19*	*19*	*17*	*17*
Standard errors in parentheses **** p<0.01, ** p<0.05, * p<0.1*				