Does Government Expenditure on Education Promote Economic Growth? Empirical Evidence from Ethiopia

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Abstract

The main purpose of this study is to examine the effect of government educational expenditure on economic growth over the sample period between 1998Q1-2015Q4 in Ethiopia. Using Jordas (2005) local projection method, generalized impulse response functions are generated to examine the effect of government educational expenditure on economic growth in Ethiopia. The impulse responses indicate that one standard deviation shock increase in government expenditure on education leads to a positive and statistically significant increment on output in the whole period considered. That is, one standard deviation shock in government expenditure on education leads to around 0.9 per cent increment in output at the eighth quarter. As to the effects of our control variables, output also increases significantly in response to the labour force shock. The effects of inflation and real effective exchange rate shocks on output, however, are negative and statistically significant.

Keywords: Economic growth, Ethiopia, Government expenditure on education, Local projection.

1. INTRODUCTION

Education has both intrinsic and instrumental value: it is desirable not only for the individual but also for the society as a whole (Sen Amartya, 1999). Education is a key factor for boosting a country's economy and is considered as one of the necessary conditions to achieve better outcomes on social welfare. The social benefits of education provide a powerful set of arguments in favor of public investment to achieve the social optimum (Harsha, 2004). As a crucial subject matter of public finance, public expenditure on education and subsequently economic growth has found much attention of economists and researchers.

In the existing view of modern economic growth theory, education is an important key to economic prosperity. Economic growth is driven by new ideas, by discoveries that result in better products and more efficient production technologies. Human capital is the engine of this process: a better educated labour force increases the return on research and development and ensures that discoveries are more readily absorbed in the productive structure of the economy. At the end, more education equals more economic growth. On the other hand, fiscal policy of government affects the long-term growth rate through decisions on public spending in the process of budget announcement. As education is an important index of socioeconomic development, public financing on education has been a priority for governments in developing countries.

A lot of research has been devoted to the analysis of the effects of education on economic growth. Academic research in this area, however, is characterized by a certain degree of technical complexity and results often differ across studies depending on the methodology used, the sample considered, or how education is measured. Most of the literatures measure education in terms of outcomes (e.g. enrolment rates, literacy rates, and years of schooling in the workforce) rather than expenditure. A recent meta-analysis study by Sefa *et al.* (2017) considered 29 papers that specifically look at the impact of government educational expenditures on economic growth. Of these 29 studies, 14 reports a positive and statistically significant effect of government educational expenditure on growth, 12 reports a negative effect, and 3 report no statistically significant effects.

In Ethiopia, like many other developing countries, the government is trying to improve the human capital by pumping more investments in education. Government expenditure on education, total (% of GDP) in Ethiopia was 4.74 as of 2015. Its highest value over the past 33 years was 5.57 in 2012. In practice, researchers and policymakers, however, have often questioned the effective aggregate return of spending on education for this economy and other developing countries.

Using the vector error correction mechanism, Tsadiku (2012), Wendwesen (2012) and Fitsum (2013) examined the impacts of expenditure on education and road construction on economic growth. Berihun (2014) investigated the impact of government expenditure on economic growth in Ethiopia over the period 1975ó2013, with a particular focus on sectoral expenditure on agriculture, defense, health and education sectors. Endale (2007) assessed the effect of defense expenditure on economic growth based on the Hausman test of random effect estimator and a study by Garoma and Bersisa (2018) examined the effect of aggregate social sector expenditure

on growth. However, most of these studies overlook the separate effect of government educational expenditure on economic growth in Ethiopia. This paper, therefore, analyses the distinct effect of government educational expenditure on economic growth rather than the effect of aggregate social sector expenditure on growth using Jordas (2005) local projection method which has some benefits than the impulse responses computed from vector autoregressive model.

This paper is organized as follows. The literature review is presented in section two. The data and methodology is presented in section three. Results are presented and discussed in section four. In section five, conclusions and policy relevance are presented.

2. REVIEW OF RELATED LITERATURE

The relationship between education expenditure with economic growth has attracted much attention of economists through both theoretical and empirical studies. Numerous attempts to explain the contribution of education to economic growth have been made by development theories. By incorporating human capital in their econometric techniques so many endogenous growth models were developed, though they yielded inconclusive results (Daren, 2017).

Theoretically from Keynesians view, public expenditure can boost economic growth by increasing aggregate demand. Keynesians argue that the main tool to increase aggregate demand is expansionary fiscal policy through increased government spending on infrastructure, unemployment benefits and education. Hence, according to Keynesians, increase in government spending maintains full employment, brings an increase in profitability and investment through multiplier effects on aggregate demand. As a result, expenditure multiplier effect enhances output (Bexheti and Mustafi, 2015).

Solow (1956) emphasized on government policies, institutional arrangements, and the accumulation of human capital and revealed that not only capital, labour, and technology are the crucial ingredients of economic growth but also education is one of the prime factors to push economic growth. In a neoclassical life-cycle model, Sheng Cheng Hu (1976) presented a continuous general equilibriums model allowing for investment not only in tangible capital, but in education as well and concluded that investment in education is a critical factor in moving an economy towards a steady state.

The aggregative analysis of Denison (1962) estimated the contribution of education expenditures to national income. According to Denison's study the role of human input on economic growth depends on education (years of schooling of the employed person and quality of education). However, the quality of education in return is affected by public expenditure on education. Hence, he concluded that increasing public expenditure on education is one of the imperatives of any program for accelerated economic growth and development.

Endogenous growth model by Lucas (1988) came with an emphasis on human capital as one of the major factors for economic growth. He argued that economic growth is directly tied to productivity that in return depends on innovations and investments on human capital both from government and private sector. Investments on human capital generate skilled labour force that easily cope up new technologies and actively involves in research and development which

fosters economic growth. Accordingly, educational expenditure has positive effect on economic growth. In the very recent Gregory Mankiw, David Romer and David Weil (1990) developed and evaluated the empirical implications of the Solow model and concluded that, ‑education too was a major factor in the process of economic growthø

Michaelowa (2000) also examined the micro and macro impact of education on economic growth using diagrams and concludes that beyond an increase in the individualøs earning potential, more educated individuals made better parents and wealthier economy through õripple effectö.
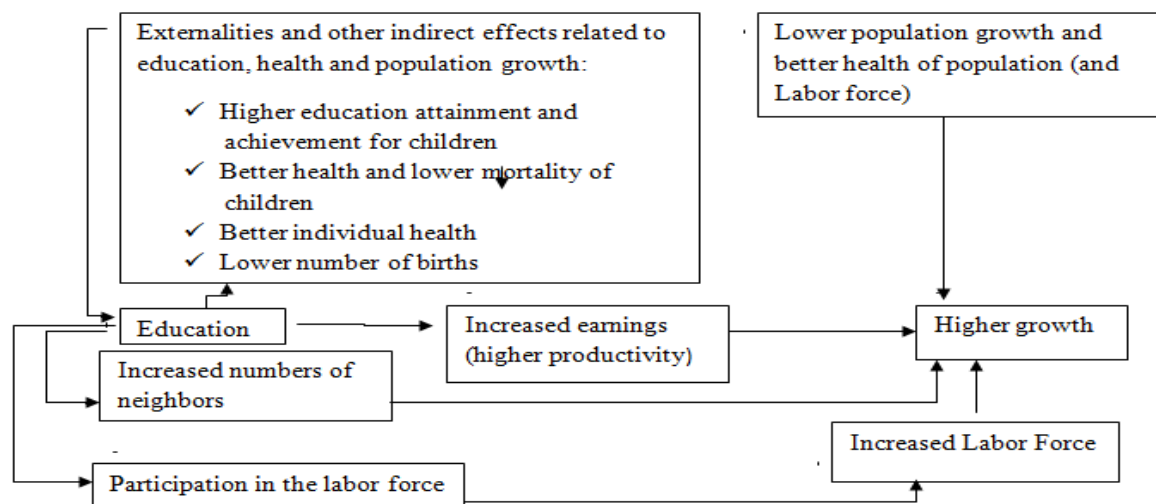
Source: Michaelowa, Katharina (2000), "Returns to Education in Low Income Countries"; Evidence for Africa

Figure 1: Micro and Macro Level Effects of Education and Economic Growth

The following presents the paradoxical empirical outputs of different studies conducted in different countries. Although some studies reveal a positive linkage between public expenditure on education and economic growth, some others disclose negative linkage. Even some others come with insignificant effect of educational expenditure of governments on economic growth.

A positive relationship between education expenses and economic growth was found in the Turkish economy for the period 1970-2012 using bounds test approach and a greater allocation of resources on education expenses is recommended by Mercana and Sezer (2014). Mallick *et al.* (2016) used balanced panel data from 1973 to 2012 for selected 14 major Asian countries and empirically tested the dynamics of expenditure on education and economic growth. His result show that a positive and statistically significant impact of education expenditure on economic growth of all the 14 Asian countries (Bangladesh, China, Hong Kong, India, Japan, Nepal, Pakistan, Malaysia, The Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand, and Turkey). In addition, Amaghionyeodiwe (2017), Wasti *et al.* (2017) and Chandra (2010) also revealed a strong positive and significant influence of education expenditure and real output (economic growth).

Ayeni (2018) investigated educational expenditure and economic growth in Nigeria via the Autoregressive Distributed Lag (ARDL). The study concludes that educational expenditure on real GDP mainly depends on the expenditure type in Nigeria. While recurrent expenditure impacts economic growth positively and significantly, the effect of educational capital expenditure on economic growth was insignificant.

Using logarithmic multiple regression model, Bexheti and Mustafi (2015) investigated the link between public spending on education and economic growth in Macedonia and found negative significant effect of public spending on education on economic growth. Kouton (2018) proved the existence of a negative and significant long term effect of government education expenditure on economic growth of Côte d'Ivoire for the period from 1970 to 2015 and insignificant positive effect of government education expenditure on economic growth in the short term. Hence, the study concludes that government education expenditure does not stimulate economic growth in Côte d'Ivoire. Abdullah (2013) also found negative relationship between education expenditure and economic growth in Malaysia.

The above empirical literatures indicate that the impact of public spending of education on economic growth depends on economic type and differs from country to country. A single conclusion and decision about the public spending on education cannot be applied in all economies in which it may bring deviations in impact. Hence, there is no justification for that of the more education brings the more growth.

We find a few studies in the Ethiopian context. Studies by Tsadiku (2012), Wendwesen (2012) and Fitsum (2013) revealed positive short run impacts of government expenditures on education and road construction on economic growth using the vector error correction mechanism, while government expenditures on health, agriculture and non-poverty sectors had negative and insignificant effect on GDP growth in Ethiopia.

An empirical results of Berihun (2014) that investigated the impact of government expenditure on economic growth in Ethiopia over the period 1975ϭ2013, with a particular focus on sectoral expenditure on agriculture, defense, health and education sectors showed that expenditure on agriculture and defense negatively affected economic growth but that on the health and education sectors positively affected economic growth.

Endale (2007) assessed the effect of defense expenditure on economic growth based on the Hausman test of random effect estimator. His empirical results showed that defense burden is destructive to real GDP. Garoma and Bersisa (2018) examined the impact of government sectoral expenditure on economic growth in Ethiopia over the period 1975ϭ2015 and found that general services expenditure has a negative and significant effect on economic growth.

3. DATA AND METHODOLOGY
3.1. Data Ttype and source
We used quarterly data that extends from the period 1998Q1 to 2015Q4. The reason to use quarterly data is that it makes the vector autoregressive zero restrictions theoretically grounded. Because in a quarterly data, variables are less likely to respond for a given shocks. But had it

been annual data, the restrictions might not be theoretical grounded. Besides, it gives the possibility for larger sample so as to avoid the vanishing degrees of freedom in estimation. The sample period as well as control variables are chosen solely based on availability of data. The variables of interest in our estimated model are real gross domestic product as dependent variable and government expenditure on education as main independent variable. Other control variables such as labour force, inflation and real effective exchange rate are included in the study. The inflation rate is the quarterly first difference of the logarithm of consumer price index. Data are seasonally adjusted when it is found appropriate to do so. Variables are also transformed into natural logarithms except government expenditure on education which is as a percent of gross domestic product. The data are obtained from Ministry of Finance and Economic Development and National Bank of Ethiopia.

We apply the logarithm to all series and employ the standard unit-root methodology, i.e., the augmented Dickey-Fuller and Phillips-Perron tests. Hence, we specify the number of augmentation lags to account for serial correlation in the Dickey-Fuller regressions, for which we employ the Schwartz information criterion (SIC). Table 1 shows the results for the unit root tests. The values indicate that the series are non-stationary by accepting the null hypothesis of the existence of a unit root except for inflation. While real GDP, government expenditure on education and real effective exchange rate are found to be stationary after first difference, labour force is stationary after second difference.

Table 1 Unit-root tests

	ADF			Phillips-Perron	
	Lags (SIC)	t-statistic	p-value	t-statistic	p-value
Real GDP	1	0.916457	0.1998	1.188064	0.1999
Government expenditure on education	1	-2.502922	0.1190	-2.282520	0.1803
Labour force	1	0.940822	0.9998	4.156978	1.0000
Inflation	0	-7.313129	0.0000	-7.405961	0.0000
Real effective exchange rate	0	-0.790686	0.9614	-0.992534	0.9382

H_0: Series has a unit root

3.2. Econometric strategy

To examine the effect of government educational expenditure on economic growth in Ethiopia, Jordas (2005) local projection method is used. The local projection method requires running a sequence of predictive regressions of a variable of interest on a structural shock for different prediction horizons. The impulse response is then obtained from the sequence of regression coefficients of the structural shock (Aye and Harris, 2019). Therefore, the method can produce the response of output to government expenditure on education at different horizons. As clearly

explained in Auerbach and Gorodnichenko (2013), Ramey and Zubairy (2014) and Aye and Harris (2019), this method has some advantages compared to vector autoregressive impulse responses. First, the estimation relies on robust standard errors and is simple to implement. Second, it is robust to misspecification of the data generating process. Third, joint or point-wise analytic inference is simple. Last but not least, impulse responses from the local projection are consistent and asymptotically normal.

According to Hamilton (1994) and Koop *et al.* (1996), impulse responses function, the difference between two forecasts, is a drive in a dynamic system used to scale the impact of shocks on expected or future value of economic variables at time horizon. According to Koop *et al.* (1996), the generalized impulse response function of y_t at horizon h is defined as follows:

$$IR(t, h, \delta, \Omega_{t-1}) = E(y_{t+h} | v_t = \delta, \Omega_{t-1}) - E(y_{t+h} | v_t = 0, \Omega_{t-1}); \quad h = 0,1 \dots H \tag{2}$$

Where, δ is an $n \times 1$ vector representing shocks, 0 is an $n \times 1$ vector matrix of zeros v_t is an $n \times 1$ vector of additive random shocks, Ω_{t-1} is the information block of value of the variables up to $t-1$, and $E(.|.)$ is a mean predictor. Jordà (2005) proposed to recover the multiplier from the set of regression coefficients β_j^h associated with the following set of h-step-ahead predictive regressions:

$$y_{t+h} - y_{t-1} = \alpha^h + \sum_{i=1}^{I} \gamma_i^h y_{t-i} + \sum_{j=1}^{J} \beta_j^h x_{t-j} + \sum_{m=1}^{M} \vartheta_k^h z_{t-m} + v_{t+h|t-1}; h$$
$$= 0,1 \dots . H \tag{3}$$

Real gross domestic product, the endogenous variable interest, is represented by y_t; x_t is the shocks from government expenditure on education, with mean zero and variance δ_x^2; and z_t represents the vector of control variables which may include shocks other than government expenditure on education shock (x_t). And v_{t+h} is a prediction error term with variance δ_x^2. The coefficient β_j^h provides us the impulse response function that shows the impact of government expenditure on education shock on output at horizon $h = 0 \dots . H$, keeping all other variables constant.

4. RESULTS AND DISCUSSION

We identify structural shocks in a vector autoregressive model and impulse response functions are generated from our local projection model. Schwarz information criterion is used in order to determine the vector autoregressive lag length and one lag is chosen by the criterion. The generalized impulse response function over 10 horizons for the effect of government educational expenditure on economic growth is provided in Figure 2. Each shock is the size of one standard deviation and the confidence bands in the graphs are 68% wide. The blue lines represent the point estimates of the mean of the impulse response while the red lines are the 32th and 68th percentiles from standard errors calculated from local linear projections. The vertical axis

indicates changes in the response variable to shocks and the horizontal axis represents the impulse response horizon.

To begin with our main variable of interest, it is observed that government expenditure on education has positive and statistically significant effect on output over the whole horizon considered. In response to one standard deviation shock in public spending on education, output increases consistently up to its peak to around 0.9 percent at the eighth quarter before it turned back to steady state after the eighth quarter. This implies that government spending on education through its impact on human capital development does have significant positive impact on enhancing economic growth in Ethiopia. Precisely, this result supports other studies where government expenditure on education does cause economic growth and is consistent with the theoretical views of Keynesian, Solow (1956) growth model and most of endogenous growth theories which predicts a positive relationship between economic growth and education. Our result also confirms to the empirical results of Mercana and Sezer (2014), Mallick et al, (2016) Amaghionyeodiwe (2017), Wasti *et al.* (2017) and Chandra (2010).

Output also increases significantly in response to the labour force shock. The whole horizon period of the study has yielded a positive and increasing level of output as a result of labor force shock in the country. The positive consistent improvement in output reached about 1.2 per cent for one standard deviation shock in labor force in the eighth quarter before it turned back to steady state after the eighth quarter. This result could imply positive effect of government education spending on output too: via its impact on improvement of labour force quality. The more educated labour force hired the more output yielded.

The effect of inflation shock on output however is negative and significant. One standard deviation shock in inflation results a reduction on output for about 0.2 percent (the maximum reduction) in the third quarter. This might be because of its effect on investorsø decision. Investors invest more in a stable economy than in inflationary one. The more inflationary the economy is the least is invested and produced.

Other control variable, real effective exchange rate has no statistically significant effect on output in this small open economy within the study period. Lastly, output shock is persistent.
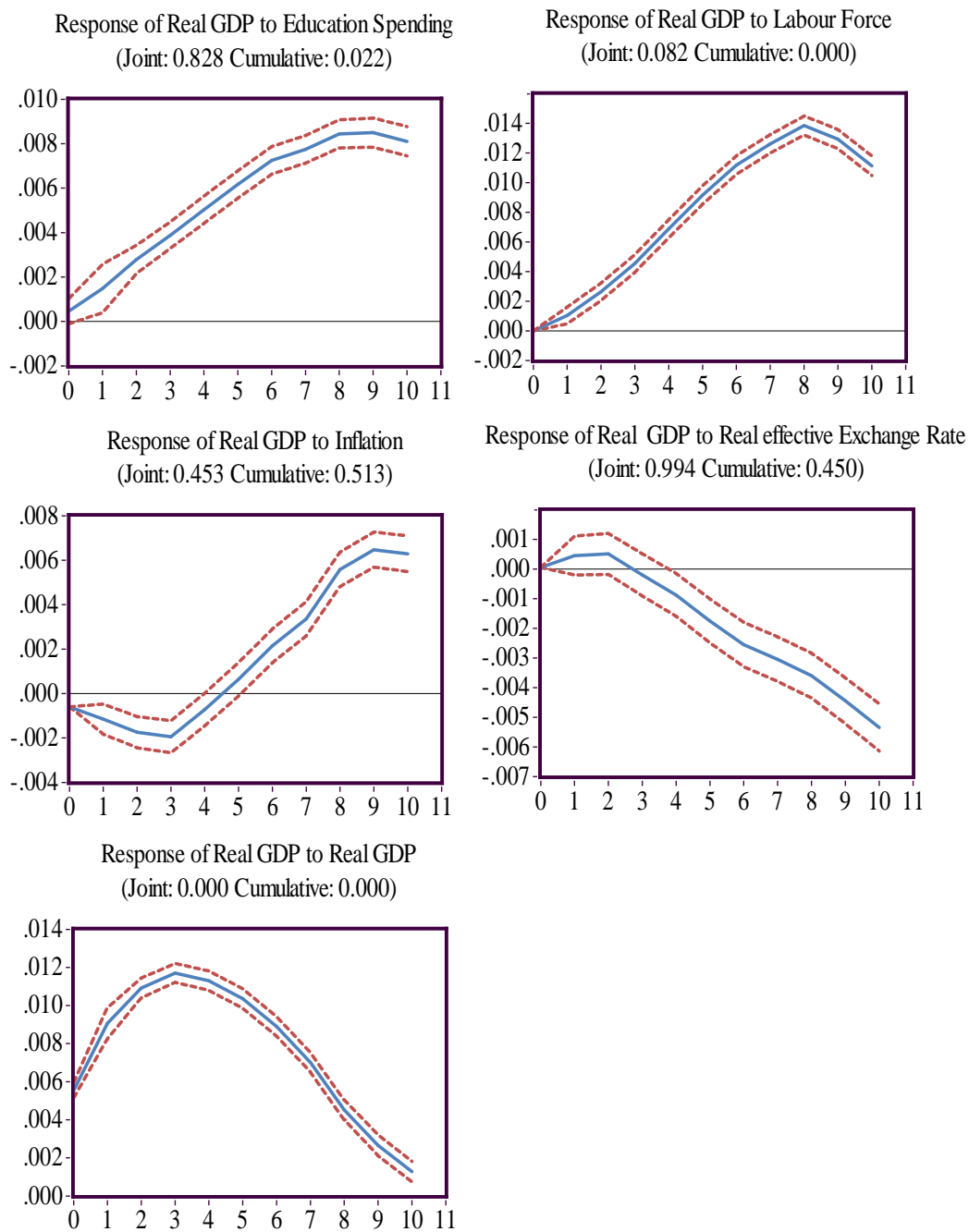
Figure 2: Response of output to generalized one standard deviation shocks with 68 per cent conditional confidence bands

5. CONCLUSIONS AND POLICY IMPLICATIONS

This study investigates the effect of government educational expenditure on economic growth for the Ethiopian economy over the period 1998Q1-2015Q4. To achieve this objective, Jordas (2005) local projection method is employed and generalized impulse response functions are generated to see the effect of our variable of interest, namely government expenditure on education on the dependent variable (real output).

The findings suggest that one standard deviation shock increase in public spending on education leads to positive and statistically significant increment on output in the whole horizon considered. In response to one standard deviation shock in public spending on education, output increases to around 0.9 percent at the eighth quarter. Output also increases significantly in response to the labour force shock. The effects of inflation and real effective exchange rate shocks on output, however, are negative and statistically significant.

This result has an important implication for policy makers in Ethiopia and other similar developing countries. As Ethiopia is a country with large population size, it seems appropriate for the government to pump more investments in education as improved level of education resulting from more education spending promotes economic growth in the country.

Finally, our empirical analysis can be strengthened along at least two lines. First, causality analysis can be conducted on the effect of government educational expenditure on economic growth. Second, the indirect effect of government educational expenditure on growth can also be examined. That is, if education outcomes affect growth, and educational expenditure affects education outcomes, then expenditure also has an indirect effect on growth.

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