Conference Paper

Fixed Investments and Human Investments for Economic Growth – A case study of Aceh Province - Indonesia

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Abstract

Under endogenous growth theory, education as part of human investments has become one of the key drivers of economic growth. Many recent studies have put an increasingly strong emphasis on human investments as opposed to physical fixed investments. More attention has been paid to find evidence of whether government intervention through education spending has a positive contribution to educational outcomes, labor market outcomes and hence economic growth. This study is aimed at making a comparative analysis of whether human investments have a greater impact on the economic growth than fixed investments, by taking Aceh province, Indonesia, as a case. A static linear panel data model was utilized to gauge the impact of the two types of investments on economic growth. The panel data from all 23 districts within Aceh Province from 2008 to 2011 were collected. Based on statistical testing for model selection, random effects model was selected as the appropriate approach to explaining the relationship among the following variables; fixed investments, education spending and economic growth. The results of the study have shown that both types of investments have statistically positive impacts on the economic growth of a regional economy. Moreover, fixed investments have well greater impact than education spending on economic growth. Therefore, subnational governments, particularly those with special fund allocation to education, should optimally manage the use of their education funds in a more effective way in order to achieve a certain targeted rate of economic growth.

Keywords: education spending, economic growth, panel data

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1. Introduction

A number of studies have shown a positive association between educational spending and economic growth. Studies conducted in the early period by Schultz (1961), Psacharopoulos (1987) and Lucas (1988) proved that the accumulation of human capital obtained from education and training could increase per capita income. Although using different approaches, studies conducted by Barro and Lee (1993) and Benhabib and Spiegel (1994) also found similar results in which the accumulation of human capital has become a key determinant to economic growth.

Recent studies using more advanced econometric models also confirm similar conclusions that the quality of skilled labor can accelerate economic growth. Leoning

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(2002) applying Error Correction Model and Babatunde and Adefabi (2005) using co-integration testing both prove that more educated workforces have higher contribution than those less educated workers to economic growth, both as a factor of production and as a factor of technological progress (total factor productivity). Gupta and Chakraborty (2004) using endogenous growth model also concluded that the accumulation of human capital is a source of economic growth.

More interestingly, a series of research topics have put efforts to measure at which education level the economic growth has the greatest impact on economic growth. Labor's education level has a contribution to economic growth with no clear pattern, depending on the status and structure of a country's economy. Petrakis and Stamatakis (2002) found that in developing countries primary and secondary education has become primary factor that promotes growth, whereas in developed countries economic growth heavily lies on higher education. For the case of India, for example, Self and Grabowski (2004) found that the primary education has a strong causal relationship with economic growth, but it is not the case with secondary education. Meanwhile, Papageorgiou (2003) estimated that basic education only focuses on output production while secondary and higher education contribute to technological innovation.

This study is looking into another perspective on the importance of the effect of public spending in the education sector, as a proxy of human investment,on the economic growth. To distinguish from the previous studies, this research is aimed at making a comparative analysis of whether human investments have a greater impact on the economic growth than fixed investments. This does not necessarily mean to conclude that one type of investment is better than the other. This is merely to demonstrate statistically which type of investments has greater effect on growth, hence policy makers can set their development priorities based on which of the two exertsthe greatest positive impact. For the case of Algeria, for example, Mekdad, Dahmani and Louaj (2014) found that even though government education spending and capital investments have positive impact on the economic growth, the former has a greater effect.

2. Methods

The study used panel data for three variables, i.e.real gross domestic products as a proxy of economic growth (RGDP), gross fixed capital formation (FINV) measured as fixed/physical investments, and districts government budget for education (EDUEXP) as a measure of human investments. RGDP and FINV data were obtained from Statistics of Indonesia and EDUEXP data collected fromProvincial Planning and Development Board and PECAPP (Public Expenditure Analysis and Capacity Strengthening Program – a Banda Aceh based program initiated by the World Bank.

We consider a static linear panel data model in a log form as follows;

$$\mathrm{LRGDP_{it}} = \beta 0_{it} + \beta 1 \mathrm{LFINV_{it}} + \beta 2 \mathrm{LEDUEXP_{it}} + \mathrm{u_{it}} \tag{1}$$

where LRGDP is the natural logarithm of GDP, LFINV is the natural logarithm of FINV, LEDUEXP is the natural log of EDUEXP. Equation 1 was estimated for a sample of 23
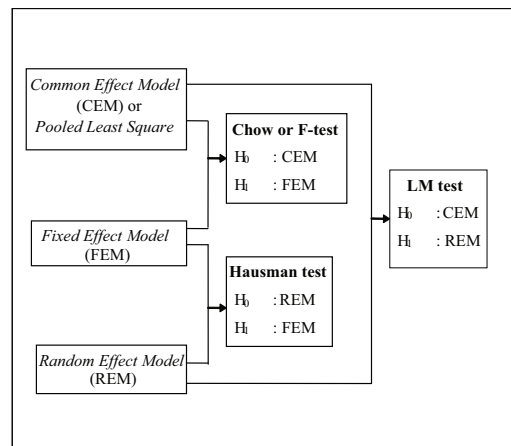
Figure 1: Statistical testing for model selection of panel model.

districts within Aceh Province using series data from 2008 to 2011. We give preferenceto a log form in order to find a simple measure of the contribution of each type of investments by looking at estimated parameters as elasticity measurements, rather than as corresponding slopes.

s we dealt with a model of panel data, the following statistical testing of model selection was undertaken to select the appropriate model as summarized in Figure 1. The three candidate models – CEM, FEM, and REM were selected by running Chow or F test for CEM or FEM, Hausman test for FEM or REM and finally LM test for CEM or REM.

3. Results

Unlike other provinces, three special provinces of Indonesia, i.e. Aceh, Papua and Papua Barat have special autonomy rights from the central government in several areas, among which the most important one being education. For Aceh, the enactment of Aceh's special autonomy Act No. 18 of 2001 which was later amended by Act No. 11 of 2006 has given the province a substantial increase in additional revenues from oil and natural gas and special autonomy funds. The Government of Aceh has earned a large amount of funding from the central government, including a stipulation that it must allocate up to 30 percent of the total transfers to education sector. The annual amount of fund is usually greater than what is nationally mandated allocation to education of 20% of the total budget. Compared with amount of funding in 2000, the period prior to special autonomy, there has been a sharp increase in the education fund, both for the province and districts, from only a total of IDR 128 million to IDR 5.6 trillion in 2012 (see Figure 2).

This challenge is that the province and the district governments have to manage the funds efficiently and effectively to achieve better educational outcomes at all levels of schooling, districts, and province. However, it is still questioned whether the abundant education fundinghave significant effects to educational outcomes, labor market outcomes and hence economic growth.
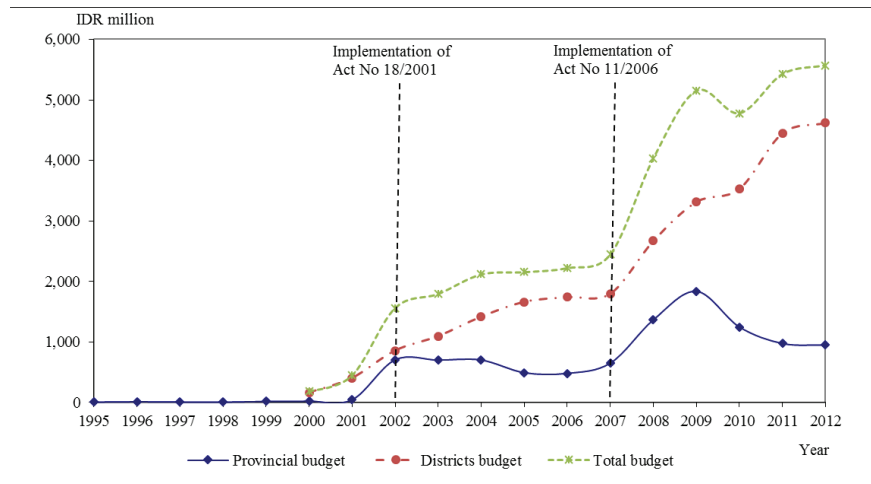
Figure 2: Provincial and districts budget for education sector in Aceh, 1995-2012. Source: Provincial planning and development Board and PECAPP. Note: districts data for 1995-1999 not available.

	common effect model		fixed effect model		random effect model	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
C	-0.765396	-1.948889[b]	4.839771	28.23817[a]	4.307555	26.60291[a]
LFINV?	0.609257	8.946396[a]	0.137316	3.638583[a]	0.248854	7.126399[a]
LEDUEXP?	0.700960	7.133276[a]	0.084920	4.798048[a]	0.075619	4.321882[a]
Total observations	92		92		92	
R²-adjusted	0.792819		0.997688		0.391093	
DW- Statistic F-Statistic	0.460003 175.1150[a]		1.301994 1636.874[a]		0.518027 30.22405[a]	
Note: [a] significant at α 5%; [b] significant at α 10%.						

TABLE 1: Estimation results of the three candidate models

Three models were employedusing panel data; common effect model, fixed effect model and random effects model. The estimation results for the three models are presented in Table 1. Under all models, both fixed and human investments are statistically significant inexplainingthe variation in economic growth. Unfortunately, at this stage we can notyet conclude the relationships among the selected variables as we have not selected which model is the best model.

Therefore, we need to select the appropriate model by applying statistical testing as shown in Table 2. Based on the criteria for each statistical testing, we confirm that the best model selected is the random effect model. Therefore, a 1% increase in fixed investments can boost economic growth by 0.25%. While an increase in education spending by 1% contributes only 0.08% to economic growth. This implies that public spending for education sector has less impact on economic growth.

Statistical testing	Model selection	Criteria	t-Statistics
Chow test	CEM or FEM	Chi-square statistics	102.038171[a]
Hausman test	FEM or REM	Cross-section F	359.399296[a]
LM test	CEM or REM	Breusch-Pagan	60.32126[a]

TABLE 2: Estimated statistical criteria for model selection

4. Discussion

Since the result of the above shows that the best selected model is the random effect model, then it can be concluded that the variation across the districts in Acehin real GDP are basically random and uncorrelated with the log fixed investments (LFINV) and the log education spending (EDUEXP). In other words, the error terms for the individual entity (district) are correlated. Time-invariant LFINV and EDUEXP variables are not unique to the individual district and are correlated with other districts' characteristics. Each district is not different, and therefore the district's error term and the constant (which captures individual district characteristics) are correlated with the others.

Hence, this implies that differences across districts have some influence on the log real GDP. Because random effects assume that the district's error term is not correlated with the LFINV and EDUEXP, thissuggeststhat time-invariant variables (LFINV and EDUEXP) play a role in explaining the variation in real GDP. However, the effect of fixed investments on economic growth is around three times that education spending (human investments).

Why does human investments as measured by public spending on education sector have less impact on the economic growth than fixed investments on economic growth?. The most possible explanation is that in a developing region like Aceh in which the avarage education level is relatively low, an increase in education spending may not result in a direct increase in productivity. Furthermore, public spending in education may also be wrongly targeted, thereby would not directly boost the skills of the labor force.

Also, the impacts of education spending on educational outcomes have been sub-optimal, particularly when education funding is allocated in the services that are not directly related to improving the quality of learning and improving the skills useful for the labor force.

5. Conclusions

Fixed investments have greater positive effects on economic growth, compared with human investments as measured by education spending. Therefore, fixed investments in the form of physical infrastructure (road, seaports, airports, public utilities, etc.) should be increased to a substantial level because not only they will attract private investments, they will also provide better public services, and hence improves the social welfare directly. Meanwhile, in order to effectively use education funding from the Otsus and Migas stipulated allocation, the districts in Aceh as well as the provincial

government of Aceh should adopt a policy that shifts from currently weakly targeted general spending to vocational training and areas in education that would directly improve learning and outcomes of education and training.

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