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A COMPARATIVE ANALYSIS OF ODA AND GROWTH IN EAST ASIA PACIFIC AND SUB-SAHARAN AFRICA

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ABSTRACT

This paper reports a comparative empirical analysis on the role of official development assistance (ODA) in influencing growth in East Asia Pacific (EAP) and Sub-Saharan Africa (SSA) regions. The distinct difference in growth patterns between these two regions in the past five decades motivates our research to examine what factors contributed to the difference in growth. This study examines, from the financial gap perspective, the role of foreign aid in promoting growth in the two regions. On this basis, our study constructs a theoretical framework by specifying a behavioral equation to examine the relationship between foreign aid and growth supported by capital formation and human resource development. The empirical inquiry uses: two-stage least square instrumental variable estimator; and the generalized method of moments (GMM) estimation of dynamic panel data model. The analytical results induce two conclusions: ODA impacts positively on economic growth in the EAP region but with time lagged effects, and ODA influences economic growth differently by region. The results from the dynamic GMM approach have shown that ODA contributed positively to economic growth in the EAP region but not in the SSA region. Hence, donors, recipients, and aid practitioners must reexamine aid effectiveness especially in the SSA region.

Keywords: East Asia Pacific, Sub-Saharan Africa, ODA, generalized method of moments, financial gap.

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1. INTRODUCTION

Since 1950s, among the newly independent states, one group of countries in East Asia Pacific (EAP) has achieved extraordinary economic development whereas another group of countries in the Africa continent remains languished in the world's economic backwaters. The phenomenal economic performance demonstrated by many countries in EAP have attracted enormous attention from policymakers and economists around the world to enquire the secret of superior performances in Japan, South Korea, Taiwan, Hong Kong, Singapore and other Southeast Asian countries (Barro & Saka-i-Martin, 1997; Basnet, 2013; Djankov, Montalvo, & Reynal-Querol, 2008; Elboiashi,

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2015; Fukase, 2010; Hansen & Tarp, 2001; Hatemi-J & Irandoust, 2005; Liew, Mohamed, & Mzee, 2012; Knack, 2001; Kosack & Tobin, 2006; Krugman, 1994; Lewis, 1954; Lindtnerova, 2014; Moreira, 2005; Morrison, 2014; Nelson & Pack, 1999; Rodrik, 1992; Romer, 1989, 1994; Soesastro, 2004; UNCTAD, 2014a, 2014b; World Bank, 1993, 2014b; Xu, 2012; Yin & Lau, 2013).

On the other hand, most countries in the Sub-Saharan Africa (SSA) today are still troubled with serious development issues such as abject poverty, poor child mortality rate and maternal health, HIV, malaria and other diseases, gender inequality, and poor infrastructures that impede economic development (Adam & O'Connell, 1999; Adams, 2009; Africa Check, 2014; Alesina & Dollar, 2000; Arndt, Jones, & Tarp, 2010; Bacha, 1990; Basnet, 2013; Boone, 1996; Chenery & Strout, 1966; Development Initiatives, 2013; Djankov, Montalvo, & Reynal-Querol, 2006, 2008; Easterly, 1999, 2006a, 2006b, 2009; Easterly, Levine, & Roodman, 2004; Gilanders, 2010; Hansen & Tarp, 2000, 2001; Ludgren et al., 2013; Karras, 2006; Knack, 2001; Kosack & Tobin, 2006; Kersan-Škabić, 2015; Lindtnerova, 2014; Lewis, 1954; MOFA, 2013, 2015; Moreira, 2005; Mosley, 1986; OECD, 1994, 2013; Rajan & Subramanian, 2008; Reality of Aid, 2005; UNCTAD, 2014a, 2014b; United Nations, 2014a, 2014b; World Bank, 1998, 2013, 2014c, 2014d, 2015a, 2015b; Yin & Lau, 2013).

EAP as a whole has developed impressively from 1965. The average annual Gross Domestic Products (GDP, current USD) growth rate was 10.1% between 1965 and 2019, whereas SAA grew 7.2% in the same period (World Bank, 2021). In terms of Gross National Income (GNI, constant 2010 USD) per capita, EAP, on average, grew 7.8% in 2000-2019, but SAA was 1.8%[1]. The economy in EAP in the last five decades was driven mainly by Japan, South Korea, Hong Kong, Taiwan, Singapore, Malaysia, Indonesia, Thailand, Vietnam, and China. On the other hand, the growth pattern in SSA varies across the continent where resource-rich countries grew faster than their non-resources-rich counterparts. Economic power is mostly concentrated in South Africa, Nigeria and Angola which are resource rich. These countries have contributed hugely to the SSA's regional growth.

Why some countries in EAP have grown impressively but not those in SSA? This study seeks the answer from key issues pertaining to the problem of resource-gap OECD (1994, 2013, 2015a, 2015b, 2015c). The development process requires a great deal of resources including human resources, natural resources and most importantly capital resources to relieve financial constraints for promoting economic development. Capital resources are mobilized by domestic savings or/and by foreign savings. The former includes migrant remittances whereas the latter encompasses two major sources such as foreign direct investments (FDI) and foreign aid. Foreign aid explicitly aims to promote economic development.

Against this background, this study conducts a comparative empirical analysis on the role of official development assistance (ODA) in influencing economic growth in EAP and SSA. An analytical framework based on development economics theories and econometric techniques is formulated. This empirical study hypothesizes that ODA influences economic growth per capita in two aspects. Firstly, the direct influence in strengthening gross capital formation such as industrial parks, ports and airports, roads and railways, power plants and telecommunications etc., which in

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[1] The figures are from the latest in WDI 2020. Data in 2020 are not appropriate for comparison because of Covid-19 outbreak spanning the globe. Also, because we conducted the analysis in 2015, data in the rest of this paper is in or before 2014.

turn facilitates higher level of FDI inflows. Secondly, ODA indirectly support the recipients' government to improve social development dimensions such as literacy, life expectancy which in turn enhance human capital.

Because of data limitation, this analysis focuses on 11 developing EAP countries — Cambodia, China, Fiji, Indonesia, Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Thailand, and Vietnam — and 15 developing SSA countries — Cameroon, Central African Republic, Benin, Botswana, Burkina Faso, Ethiopia, Guinea, Kenya, Mali, Mauritania, Madagascar, Mauritius, Niger, Rwanda and Togo (United Nations, 1945). For this purpose, with data from the World Development Indicator data base, this study creates two sets of panel data from 1980 to 2013 (World Bank, 2014a, 2015b). The analysis uses Stata/SE 13.1.

2. LITERATURE REVIEW

Capital is the only constraint to economic growth. Lewis (1954, p. 145) correctly said: "If unlimited labour is available, while capital is scarce….". Harrod (1939, 1948) and Domar (1946) show that economic development is solely determined by rapid capital formation and its productivity, since labor supply is abundance. Therefore, the Harrod-Domar model (HD) elucidates that the availability of capital and labor — whichever is lower — determines the output in an economy. HD is expressed as $Y_t = \min \{aK_t, bL_t\} = aK_t$. Y_t, K_t, and L_t is the total output, the capital, and the number of employees at time t, respectively, whereas a is the constant representing the marginal product of capital.

HD model explains the concept of increment capital output ratio (ICOR), which is the ratio of investment required to achieve a certain level of growth. Simply put, ICOR measures the productivity of the investment. A smaller ICOR means less capital is needed to produce one unit of output. HD model gives two crucial implications for a country: the needs to increase national savings; or the needs to improve the efficiency of capital. Notwithstanding, in developing countries, national savings level is constrained by their low income. Therefore, there exists a financing gap in every developing country.

Even with its limitation, HD model has stimulated two new theories. The first theory is derived from GDP identities in expenditure and in distribution. This establishes saving-investment gap is equal to the sum of government expenditure balance and trade balance. Chenery and Strout (1966) show that trade balance is influenced by foreign exchange gap because trade imbalance is the difference between export and import. The trade deficit is the result of high volume of import but low volume of export. It creates current account imbalance, which influences foreign exchange fluctuation. The second directly relates to the size of tax revenue to offset government expenditure (Bacha, 1990; Taylor, 1990).

Sachs (2005) expounds that low national savings level has caught many countries in Africa with low or negative growth rates. Unlike their counterparts, such as countries in EAP where livelihoods improved, mass people in Africa continent live in abject poverty. In a poor country, there is a serious shortage of proper infrastructures, institutions and organizations, unskilled labor forces that impede economic take off. The impediments are caused by scarce capital and low literacy rate compounded by insufficient nutrition, which in turn create a vicious cycle of low absorptive capacity in driving development. Hence, Sachs argues, the world is politically, economically, and morally responsible to help developing countries to break the cyclical poverty trap. External assistance equates to the magnitude of 0.7 percent of national income of all countries in Development Assistance Committee (DAC) every year. The scale in 2019 is approximately USD3.6 trillion (OECD, 2015c). However, Easterly (2006b, p. 100) counters: "(1) aid has been the highest as a percent of income in Africa, but the African growth is the lowest of any continent, (2) aid has risen over time as a percent of income in poor countries, but their growth rate has fallen over time". The debate is not conclusive yet.

HD model has substantiated that capital accumulation is the key determinant to economic growth. However, many developing countries are unable to achieve national savings level that is required to propel high growth rate. This is clearly the biggest obstacle. Works by Chenery and Strout (1966); Bacha (1990); and Taylor (1990) underline that — because the financial gap in government and external sectors — developing countries inevitably must rely on foreign savings to fill the financial gap for driving higher growth rates. Foreign savings comprise official development assistance (ODA) and other form of aid from private enterprises and not-for-profit organizations in richer countries.

From the studies of Domar (1946); Harrod (1939, 1948); Chenery and Strout (1966); Bacha (1990); and Taylor (1990), this paper conceptualizes: Financial gap in savings-interment, foreign exchange gap, and fiscal gap bridge those insufficient resources in capital formation and human resources development, which in turn enhances ICOR (namely, capital efficiency) that raises national output.

Rajan and Subramanian (2008) use cross-sectional and panel estimations with instrumented variables to examine 84 aid-recipient developing countries over the period 1960-2000. Their estimated results show there is no systematic effect of aid on growth regardless of the estimator. Similarly, the analytical findings of Djankov, Montalvo, and Reynal-Querol (2006) also confirm that aid generates negative effects on rent seeking in natural resource rich developing countries. Their investigation disaggregated the component of ODA into loan and grant in 5-year interval from 1960-1999.

By and large, empirical studies on aid effectiveness have mainly focused on the relationship between aid and macroeconomic indicators. The estimated results have shown either positive or negative relationships between dependent and independent variables. Arndt et al. (2010); Asteriou (2009); Basnet (2013); Gillanders (2011); Hatemi-J and Irandoust (2005); Karras (2006); Moreira (2005); and Nushiwat (2007) have confirmed positive impacts of foreign aid on economic growth. On the other hand, Alesina and Dollar (2000); Chirino et al. (2006); and Djankov et al. (2006) countered with estimated evidence that showed foreign aid has no significant effect on economic growth. Likewise, Liew et al. (2012) and Lindtnerova (2014) show negative effect of aid on growth in developing countries that is statistically significant.

Arndt et al. (2010) revisited the study by Rajan and Subramanian (2008) by employing various econometric approaches on the dataset used by Rajan and Subramanian (2008). Their estimated findings showed a statistically significant long-run positive effect of foreign aid on growth. Their study also shows there is no disparity between the micro and macro levels too. Thus, the study supports the "micro-macro paradox" as claimed by Mosley (1986).
Likewise, Moreira (2005) also attempted to clarify the inconclusive relationship between foreign

aid and growth underlying the "micro-macro paradox". Assuming aid is an endogenous variable, an autoregressive distributed lag (ADL) relation between aid and growth is incorporated in the study to account for non-linearity of aid to growth. The dynamic panel data is tested based on the generalized method of moments (GMM) estimator expounded by Arellano and Bond (1991). This methodological approach deals with the endogeneity of aid in the context of panel data with 48 developing countries covering the period from 1970 to 1998. Their empirical results supported foreign aid has a positive impact on growth, and the impact in the long run is stronger than that in the short run. Their study elucidates that the law of diminishing return of aid, and the time lags effect of aid on growth must not be neglected in examining aid effectiveness in the empirical investigations.

Selaya and Sunesen (2012) decompose aid components in examining different aid purposes such as social economic infrastructures and physical capital. Their study applies two-stage least-squares (2SLS), difference GMM (D-GMM) and system GMM (S-GMM) methods in analyzing 99 aid-recipient countries of five-year interval from 1970 to 1999. Their findings show that aid directed to inputs that complement physical investment such as social economic infrastructures will draw in foreign investments on the one hand, aid directly invested in physical capital tends to crowd out private foreign investment on the other. Their results suggest that even the net effect of all types of aid is positive on growth, the composition of aid is crucial to determine the overall level of efficiency.

3. MODEL SPECIFICATION

Equation (1) is the general model: *Y* represents gross domestic products (GDP); *ODA* is the foreign aid in a form of official development assistance; *FDI* is foreign direct investment inflows; *FCF* is fixed capital formation; *ECONOP* is the economic openness; and lastly *GE* denotes the government expenditure.

$$Y = f\,(ODA, FDI, ECF, ECONOP, GE) \tag{1}$$

Equation (1) is expressed in Equation (2), which allows the estimation of time-series cross section data sets. *i* and *t* indicates the associated country and point of time respectively; the dependent variable is $GDPPC_{it}$, which is the real GDP per capita; independent variables comprise $ODAPC_{it}$, which is the net real ODA received per capita for country; $FDIGDP_{it}$ is net real FDI inflow per GDP; $GFCFGDP_{it}$ is the real gross fixed capital formation per GDP; $ENOPGDP_{\mathrm{it}}$ is the economic openness, which in the sum of export and import per GDP; $GFCGDP_{it}$ is the general government final consumption expenditure per GDP; α_{it} is the country specific fixed effect, which is constant over time; β_1, …, β_5 are the estimated coefficient for their respective variables; v_i is the time-invariant unobserved country-specific effects; and ε_{it} is the time-varying error term.

$$GDPPC_{it} = \alpha_{\mathrm{it}} + \beta_1 ODAPC_{it} + \beta_2 FDIGDP_{it} + \beta_3 GFCFGDP_{it} + \beta_4 ENOPGDP_{\mathrm{it}} + \beta_5 GFCGDP_{it} + \upsilon_{\mathrm{i}} + \varepsilon_{\mathrm{it}} \tag{2}$$

The empirical test focuses on how ODA influences economic growth from the socioeconomic perspective. It does not directly examine human development per se. Instead, the estimation uses a proxy for human development pertaining to ODA. This analysis argues that physical factors — ODA, FDI, and fixed capital formation economic — are key contributory factors to economic growth. Thus, ODA and FDI are endogenous in the regression model, whereas capital formation is the key determinant of growth. In this specification, each estimator $ODAPC_{it}$, $FDIGDP_{it}$, $GFCFGDP_{it}$, and $ENOPGDP_{it}$, respectively, is expected to give a positive coefficient to the dependent variable ($GDPPC_{it}$), but estimator $GFCGDP_{it}$, is expected to give a negative coefficient. These are the hypotheses in this regression. Moreover, as mentioned in earlier section, ODA is instrumental to three social development variables, namely, life expectancy, school enrollment (primary), and the access to improved water.

4. ENDOGENEITY OF AID AND INSTRUMENTAL VARIABLES

An endogenous problem occurs when one or more explanatory variables are correlated with the error term. Boone (1996); Burnside and Dollar (2000); and Hansen and Tarp (2001) show that endogeneity is problematic in aid-growth estimations. The endogeneity causes biased estimation, which creates inconsistent estimator because of measurement error, autoregression, and omitted variable. Alesina and Dollar (2000) elucidate that it is difficult to dismiss the chances that aid allocation decision is made relying on level of growth of the recipient country. Hence, their findings imply that if aid transfer was indeed dependent on the growth level of the recipient country, then aid must be treated as an endogenous variable instead of exogenous variable in the analysis. Otherwise, the estimator is inefficient.

This estimation applies instrumental variables (IV) estimator to the endogenous variable(s) in a panel context. Instrumental variables resolve endogeneity as they remove the correlation between endogenous variables with the error term (Arellano & Bond, 1991; Arellano, 1993; Baum, Schaffler, & Stillman, 2003, 2007; Blundell & Bond, 1998; Davidson & MacKinnon, 1993; Hadri, 2000; Hatemi-J & Irandoust, 2005; Holtz-Eakin, Newey, & Rosen, 1988; Im, Pesaran, & Shin, 2003; Jamshidian & Jalal, 2010; Sargan, 1958; Shimeles, Rebei, & Ndikumana, 2009; StataCorp, 2015; Roodman, 2009). Instrumental variables do not correlate with the error term, but they correlate with the endogenous variable in the model. As explained in earlier section, this study uses life expectancy, school enrollment in primary education, and the access to improved water as instrumental variables for ODA (i.e., *ODAPC)*. These social development activities in the recipient country allow the full use of ODA in improving basic physical infrastructures and human resources development through education and health. Building a stronger healthcare was one of the main goals in the Millennium Development Goals.

5. RESULTS AND DISCUSSION

Before the estimation, this study transforms Equation (2) to natural logarithm. In a cross-country analysis, relative changes (in percentage changes) give a clearer comparison than absolute changes (in unit changes). The estimation uses two panel data sets, but they are unbalanced because several independent variables have missing data. The missing values were largely caused by poor data collection system or difference in reporting practices (World Bank, 2015b). Thus, there is no fixed pattern for the missing values. This implies the missing values are completely random. This statement is confirmed by the work of Little and Rubin (cited in Jamshidian and Jalal, 2010), and Jamshidian and Jalal (2010) show that if the missing data was completely at random and missing at random, the results of the estimation using the incomplete data set are then valid (Jamshidian & Jalal, 2010). Table 1 compiles the descriptive statistics. This study added a time lagged of GDP per capita as an independent variable because previous period of GDP per capita (i.e., GDPPC_1) influences the present period of GDP per capita. Then Equation (2) with the added GDPPC_1 is transformed to natural logarithm as shown in Equation (3).

$$\begin{aligned} LG\_GDPPC_{it} = {} & \alpha_{it} + \beta_1 LG\_GDPPC\_1 + \beta_2\, LG\_ODAPC_{it} + \beta_3\, LG\_FDIGDP_{it} \\ & + \beta_4\, LG\_GFCFGDP_{it} + \beta_5\, LG\_ENOPGDP_{it} + \beta_6\, LG\_GFCGDP_{it} + \upsilon_i \\ & + \varepsilon_{it} \end{aligned} \tag{3}$$

The estimations use Equation (3). The first estimation uses two-stage least square instrumental variable (2SLS-IV) with fixed effects. This estimator is appropriate because: It is able to control for country-specific effects; It can eliminate the endogenous problem caused by the endogenous aid variable; It can handle an unbalanced panel data set. LEB (life expectancy), SEP (enrollment rate in primary education), and IWS (accessed to improve water) are instrumented aid variable (ODAPC).

For the EAP panel data set (see Table 2): For LG_GDPPC_1, the estimated coefficient is statistically significant at 1%. The previous period of LG_GDPPC increases 1% causes 0.95% reduction of LG_GDP. Hence, LG_GDPPC_1 gives negative estimated coefficient. The estimated coefficient of LG_ODAPC is negative, and it is statistically significant at 10%. The result means 1% increase in LG_ODAPC causes 0.01% reduction in LG_GDPPC in EAP.

The *z*-statistic is -1.66, which means 0.4% probability that other countries in EAP are doing worse than the those in the data set. Therefore, it is reasonable to argue that the LG_ODAPC has no direct impact on LG_GDPPC. The estimated coefficient of LG_FDIGDP and LG_GFCFGDP is, respectively, statistically significant at 1%. The rise of 1% in LG_FDIGDP and LG_GFCFGDP, respectively, causes 0.13% and 0.66% increase in GDPPC. The estimated coefficient of LG_ENOPGDP is statistically significant at 5%, which implies 1% rise causes 0.04% increase in LG_GDPPC. However, the estimated coefficient of LG_GFCGDP is statistically significant at 1%, which means 1% rise brings down 0.68% of LG_GDPPC. The estimated coefficients of LG_GDPPC_1 and LG_ODAPC are negative, which oppose the anticipated signs before estimation. However, other estimated coefficients are the same as the hypothetical signs before the analysis. Also, the high coefficient of LG_GFCFGDP illustrates its strong influence on LG_GDPPC.

Table 1: Descriptive Statistic

Variables	Observation(s)	Mean	Standard Deviation	Minimum Value	Maximum Value
East Asia Pacific					
Dependent Variable					
GDPPC	318	2.9238	0.4661	1.8751	3.8450

Table 1: continued

Independent Variables					
ODAPC	358	0.9994	1.0057	-3.4191	3.2677
FDIGDP	319	-1.6705	0.5855	-5.8185	-0.3440
GFCFGDP	318	-0.6223	0.1684	-1.2091	-0.1834
ENOPGDP	341	-0.1995	0.4468	-2.5103	0.3432
GFCGDP	297	-0.9607	0.1681	-1.4608	-0.5800
Instrumental Variables					
LEB	374	1.8162	0.0477	1.4715	1.8794
SEP	355	0.0300	0.0555	-0.9390	0.3261
IWS	249	-0.1290	0.1262	-0.6676	-0.0017
Sub-Saharan Africa					
Dependent Variable					
GDPPC	503	2.7193	0.3981	2.0564	3.8730
Independent Variables					
ODAPC	510	1.6669	0.4892	0.1053	3.6661
FDIGDP	451	-2.0865	0.7122	-5.8772	-0.4287
GFCFGDP	499	-0.7349	0.1591	-1.1949	-0.2295
ENOPGDP	502	-0.2530	0.2027	-0.9687	0.1595
GFCGDP	501	-0.8635	0.1488	-1.1962	-0.3439
Instrumental Variables					
LEB	510	1.7237	0.0633	1.4275	1.8719
SEP	474	-0.1449	0.2118	-0.7622	0.1760
IWS	345	-0.2542	0.1569	-0.8794	-0.0009

Notes: GDPPC denotes GDP per capita, ODAPC is ODA per capita, FDIGDP is FDI per GDP, GFCFGDP is fixed capital formation per GDP, ENOPGDP is economic openness, GFCGDP is government expenditure per GDP, LEB is the life expectancy at birth, SEP is school enrollment for primary education; and IWS is the population with access to improved water source. All the variables are in logarithm form.

For the SAA panel data set (see Table 2): The estimated coefficient of LG_GDPPC_1 is positive and statistically significant at 1%. This means 1% increase of LG_GDPPC_1 causes 0.96% rise in LG_GDPPC. The estimated coefficient of LG_ODAPC and LG_ENOPGDP, respectively, is statistically significant at 1% and 5%. Each respectively shows 1% increase causes the reduction of 0.006 and the rise of 0.038 in LG_GDPPC. The estimated coefficient of LG_ODAPC is the opposite, whereas the estimated coefficient of LG_ENOPGDP is similar to the hypothetical sign before the analysis. Other independent variables are statistically insignificant.

In addition, the analysis also provides a F-statistic for each data set. The p-values of the F-statistics for both EAP and SSA panels are accounted at 1% (i.e., 0.0000), which imply that the specification is a good fit. To ensure the robustness of 2SLS-IV estimator, the analysis conducts diagnostic tests to check on the validity of the regression with instrumental variables. First, the Davidson and MacKinnon (1993) test of exogeneity is statistically insignificant for both EAP and SSA panel data. Therefore, the test results reject the null hypothesis, which states that the degree of endogeneity in the system does not compromise the efficiency of the estimation. 2SLS-IV estimator does not yield more efficient estimation.

The first stage goodness-of-fit test presents the reduced form regression for verifying its goodness of fit. The F- statistics yielded from the first stage regression from both panel data sets have p-values that are statistically significant at 1%. Therefore, it is reasonable to conclude that the additional instruments have significant explanatory power for the endogenous variable, LG_ODAPC, after controlling for the effect of the included instruments.

Table 2: 2SLS-IV with fixed effects

Panel I: Estimated Results		
	East Asia Pacific	**Sub-Saharan Africa**
LG_GDPPC_1	-0.9474 (0.000)***	0.9578 (0.000)***
LG_ODAPC	-0.0077 (0.096)*	-0.0057 (0.645)
LG_FDIGDP	0.1281 (0.000)***	0.0032 (0.107)
LG_GFCFGDP	0.6627 (0.000)***	0.0169 (0.345)
LG_ENOPGDP	0.0377 (0.023)**	0.0380 (0.025)**
LG_GFCGDP	-0.6382 (0.000)***	-0.0190 (0.111)
Observations	171	290
Centered R-squared 50	0.9889	0.9306
Uncentered R-squared	0.9889	0.9306
F-Statistic (*p*-value)	2309.25 (0.000)***	603.29 (0.000)***
Panel II: Post-estimation Results		
Davidson-MacKinnon Test of Exogeneity	1.878 (0.1725)	0.608 (0.4362)
First stage Goodness-of-Fit Statistic	7.97 (0.0000)***	9.11 (0.0000)***
Stock-Yogo Weak Instrument test	11.748	3.641
Sargan Over-identification test	5.569 (0.0617)*	8.890 (0.0117)**
Under-identification test	30.143 (0.0000)***	10.807 (0.0128)**
Instrumented:	LG_ODAPC	
Included Instruments:	LG_FDIGDP, LG_GFCFGDP, LG_ENOPGDP, LG_GFCGDP	
Excluded Instruments:	LG_LEB, SEP, IWS	

Notes: In logarithm form, LG_GDPPC denotes GDP per capita, LG_ODAPC is ODA per capita, LG_FDIGDP is FDI per GDP, LG_GFCFGDP is fixed capital formation per GDP, LG_ENOPGDP is economic openness, LG_GFCGDP is government expenditure per GDP, LG_LEB is the life expectancy at birth, LG_SEP is school enrollment for primary education, LG_IWS is the population with access to improved water source. All the variables are in logarithm form. ***, ** and * indicate 1%, 5% and 10% significance level, respectively. The figures in parentheses are the *p*-values. Variables with "_1" indicate the variable is taken in lag of *t*-1. The figures in parentheses are the *p*-values. The test statistics used for Davidson-MacKinnon and first-stage test are *F*-statistic. Sargan test applies the *J*-statistic and the test statistic for under-identification test is chi-square. The Stock and Yogo (2005) weak instrument test' critical values for 20%, 10% and 5% relative bias is 6.46, 9.08 and 13.91, respectively.

Nevertheless, Stock and Yogo (2002) recommend that the *F*-statistic should exceed 10 when using the 2SLS estimator with one endogenous regressor. Furthermore, Stock and Yugo (2005) propose the use of Stock-Yogo weak instrument test to confirm that the instruments used are not weak. The critical values for 2SLS relative bias are the critical values for the test that the instruments are weak based on the bias of the 2SLS estimator relative to the bias of the OLS estimator. This study accepts a tolerance level at 10%, which means when the test statistics greater than the critical values for a relative bias of 10%, that is 9.08, then it implies that the instruments are not weak. On this basis, the result shows that the instruments are not weak for the EAP panel data as 11.748 > 9.08. But the test statistic for the SSA model indicates that the instruments are weak as 3.641 < 9.08.

The Sargan's over-identification test reports a significant test statistic for both EAP and SSA panel data sets, therefore the excluded instruments are not valid instruments, for example, the excluded instruments are uncorrelated with the error term, and they are appropriately excluded from the model specification. Moreover, the over-identification test also acts as the test of fixed effects versus random effects. The over-identification test statistics clearly show that the fixed effects model is more efficient compared to the random effects as the test statistic in both panel data sets are statistically significant. Therefore, these results justify the use of fixed effects.

The test statistics in under-identification test for both EAP and SSA panel models have yielded test statistics which are statistically significant. Although it is proven that the EAP and SSA data sets are not under-identified, empirical evidence show that these two panel data sets suffer from over-identified problem. The Sargan over-identification measures two different things at one time. One is whether the instrument is correlated to the error term in the model. The other is whether the equation is mis-specified because it excludes instruments in the specification. The Sargan *J*-statistic for the EAP data set has *p*-value that is statistically significant at 10% level, whereas the SSA data set's test is statistically significant at 5%. These results imply that the null hypothesis of valid instruments is rejected and thus the instruments used are invalid instruments that are not correlated with the error term and the equation is correctly specified.

To summarize, although both EAP and SSA data sets have satisfied the first-regression goodness of fit test and the under-identification tests, which support that the instruments are valid, and the estimations are consistent. However, test statistics generated failed to prove that the estimations are not suffering from weak instruments, over-identification, and inefficiency problem according to the results of the Stock-Yogo's test, Sargan's test and the Davidson Mac-Kinnon's test. Consequently, the fixed-effects IV estimators are likely to be biased in the way of the OLS estimators with the presence of weak instruments (Fukase, 2010; Kosack & Tobin, 2006). Furthermore, the 2SLS-IV estimator does not take the potentially serial correlation in the model into account.

Because of the limitation of 2SLS-IV estimator in this analysis, it is therefore reasonable to employ the dynamic GMM panel model. The model is first proposed by Holtz-Eakin et al. (1988). The dynamic GMM estimator allows the use of lagged levels of the endogenous regressors instead of using only the exogenous instruments in the fixed effects 2SLS-IV model. The dynamic GMM estimator comes with a few advantages that are compatible to this particular study. Essentially, both difference GMM and system GMM estimators have several advantages such as endogeneity variables, control for time-invariant country-specific effects, permit a dynamic growth regression model, and are also able to handle heteroscedasticity and autocorrelation within error terms. Nevertheless, the system GMM estimator is proven to be more efficient as it optimally gathers information on a cross-country variation in levels with that on within-country variation in differences.

The dynamic GMM approaches, both first-difference GMM (D-GMM) and the system GMM (S-GMM), are employed to estimate the model in this study and the results are reported in panel I of Table 3. The estimations are implemented under a few specifications. Firstly, time dummy variables are added in the estimations. The rationale of incorporating time dummies in the estimation is that because the Arellano-Bond autocorrelation test and the robust estimators on standard errors based on the assumption of non-correlation across individuals in the idiosyncratic disturbances. The inclusion of the time dummy variables therefore removes such correlation and enhances the consistency of the estimations (Roodman, 2009).

Secondly, the robust estimates of the coefficient standard errors are employed. The Arellano-Bond robust estimator is applied so that the resulting standard errors are consistent with panel-specific autocorrelation and heteroscedasticity in one-step estimation. This is especially important for the consistency of the post-estimation tests which are based on the estimated standard errors. In fact, the Sargan/Hansen test only produces asymptotic Chi-squared distribution if the error term was homoscedastic. Moreover, Arellano and Bond (1991) show that the one-step Sargan/Hansen test over-rejects when heteroscedasticity is present. Hence, the robust standard error option will disable asymptotic condition of homoscedastic error term in a Sargan/Hansen test. The first lag of the dependent variable, LG_GDPPC is included in the model as regressors.

Thirdly, the LG_FDIGDP and LG_GFCFGDP are treated as endogenous variables. Besides LG_ODAPC the LG_GDPPC_1, LG_FDIGDP and LG_GFCFGDP are also treated as endogenous variables in the dynamic GMM analysis. This approach is consistent with the studies of Elboiashi (2015); Fukase (2010); Kersan-Škabić, (2015); Kosack and Tobin (2006); and Xu (2012). These studies confirm that the financial development variables should be treated as endogenous variables as these financial development variables may be the determinants of economic growth but at the same time the reverse may be true as well.

Fourthly, there are two types of instruments used in the estimations, namely the GMM-type and the standard instruments. The GMM-type instruments are the potentially endogenous variables, whereas the standard instruments including the strictly exogenous variables and the additional instrumental variables. For both the D-GMM and S-GMM estimations the lag of the LG_GDPPC and the endogenous variables (LG_GDPPC_1, LG_ODAPC, LG_FDIGDP, and LG_GFCFGDP) are included as the GMM type instrument variables in the difference equation. Also included in the difference equation are the difference additional instruments which are LEB, SEP, IWS and time dummy variables. S-GMM consists of both difference equation and a level equation. The levels equation in the S-GMM estimation in this study consists of the first lag of the endogenous regressors in the model as the GMM type instruments. Meanwhile, the standard instruments in the level's equation of the S-GMM estimation include the external instruments and the time dummies.

Lastly, the lags of some of the regressors are used as the explanatory variables. The correlation matrix shows that LG_ODAPC displays a time lag impact on economic growth for the EAP panel data set, hence the estimation adopted the lags of LG_ODAPC from lag one to four to accommodate such potential time lag effect. Likewise, the lags of economic openness, LG_ENOPGDP, are also included for assessing the impact on growth through the promotion of efficient allocation of resources, which in turn influences the comparative advantage over time. Thus, the study has fixed the lagged of LG_ENOPGDP ranging from period one to three. Furthermore, Arpaia and Turrini (2008) suggest that it is necessary to take into consideration cyclical adjustment on government expenditure for two advantages: first, to better isolate the analysis from short-term dynamics due to business cycle fluctuations and to focus the analysis on relations of structural nature of government expenditure on GDP per capita; second, to reduce the issue of reverse causation. Additionally, this study reveals that the speed of adjustment of government consumption to its long run relationship with output is averagely three years. Hence, the lagged three periods of LG_GFCGDP are used in the estimation instead.

Table 3 shows the results from D-GMM for the EAP panel data set indicate that the estimated coefficients for LG_ODAPC in the first two lagged periods are insignificant. In fact, the estimated coefficient is very small, 0.0005 and -0.0032 for LG_ODAPC_1 and LG_ODAPC_2, respectively. Furthermore, the estimated coefficient for LG_ODAPC_2 has a negative sign, which implies that ODA has potential adverse impact on economic growth in the beginning of the aid disbursement. On the other hand, the estimated coefficients for LG_ODAPC_3 and LG_ODAPC_4 are positive and statistically significant at 1%, which imply that the lagged three and four years of LG_ODAPC contribute to GDP per capita positively. 1% rise of LG_ODAPC_3 and LG_ODAPC_4, respectively, pushes up 0.0056% and 0.0062% of LG_GDPPC. These results show an additional year lagged (i.e., LG_ODAPC_4) contributes additional 10.7% of extra growth than LG_ODAPC_3 in LG_GDPPC. This suggests that the positive impact of ODA on economic growth would become larger with the passage of time.

Correspondingly, the results S-GMM for EAP data set also resonates with the results obtained in the D-GMM estimation, whereby the LG_ODAPC only contributes positively to LG_GDPPC after three to four years of ODA received because the estimate coefficient of LG_ODAPC_3 and LG_ ODAPC_4 is statistically significant at 5%, respectively. However, in the S-GMM estimation, the first lagged of LG_ODAPC is negative but statistically significant at 10% in the sense that the effect of LG_ODAPC one year lagged on LG_GDPPC is negative. Nevertheless, the estimated coefficients of the LG_ODAPC variables remain small (each coefficient of LG_ODAPC_1, LG_ODAPC_2, LG_ODAPC_3, and LG_ODAPC_4 is -0.0038, -0.0057, 0.0067 and 0.0039, respectively). The results imply that the impact of ODA on GDP per capita is very small after all. For instance, if LG_ODAPC_3 increased by 1%, *ceteris paribus*, then the LG_GDPPC merely increased by 0.007%.

Empirical evidence from both the D-GMM and S-GMM also show that FDI and fixed capital formation are statistically significant in EAP region. The estimated coefficient for LG_FDIGDP and LG_GFCFGDP is, respectively, statistically significant at 5% and 1%. These positive values are consistent to the hypothetical signs before the estimation. The estimated results of LG_GFCGDP (capital formation) on economic growth in EAP are both statistically significant at 1% in both the estimators. D-GMM estimator gives a higher growth rate than S-GMM (i.e., 0.0710 % and 0.0422 %, respectively).

The estimated coefficients for the three years lagged in economic openness (i.e., LG_ENOPGDP_1, LG_ENOPGDP_2, and LG_ENOPGDP_3) are mixed with respect to LG_GDPPC in EAP region. LG_ENOPGDP_1 in both GMM estimators is, respectively, statistical insignificant. However, two years lagged is statistically significant at 10% in D-GMM estimator but not in S-GMM. On the contrary, three years lagged gives statistically significant at 1% in S-GMM but not in D-GMM. The estimated coefficients that are statistical significance are consistent with the hypothetical signs before the estimation. Although the three years lagged in government expenditure (or consumption) is represented by LG_GFCGDP_3 is positive and significant at 1% in the D-GMM estimation. It induces 0.276% of LG_GDPPC after three years. The estimated coefficient of S-GMM is statistically insignificant.

The dynamic GMM estimations on the SSA panel data set show that the impact is different from the results of the EAP. Among the lagged variables for LG_ODAPC, only the LG_ODAPC_2 is statistically significant at 10% with an estimated coefficient of 0.0064 under the D-GMM estimator. The estimated coefficient for four years lagged of LG_ODAPC (i.e., LG_ODAPC_4) even shows a negative sign which implies that LG_ODAPC in the past four years have negatively influenced the economic growth in SSA. When S-GMM estimator is applied, all the lagged in LG_ODAPC are statistically significant, which mean that the ODA did not to stimulate economic growth in SSA, despite the intension of the donor countries. Note that the estimated coefficient of LG_ODAPC_1, respectively, in D-GMM and S-GMM is statistically significant at 1%. It respectively induces 0.869 % and 1.006% of LG_GDPPC. This result suggests that previous year of LG_GDPPC influence positively to the present year in the SSA region.

The results show that the LG_FDIGDP and LG_GFCFGDP are statistically insignificant in SSA in the D-GMM estimator. However, evidence from the S-GMM estimator proves that the LG_GFCFGDP has positively contributed to the economic growth in the region. The coefficient of LG_GFCFGDP is 0.0256 and is statistically significant at 1% level, whereas the estimated coefficient for LG_FDIGDP is positive but statistically insignificant based on the S-GMM results. The estimated coefficients for LG_ENOPGDP also show statistically insignificance in both D-GMM and S-GMM estimations for the SSA panel data set. This suggests that SSA countries have not benefited from economic openness because the share of total trade in GDP is low. Likewise, the government expenditure variable, denoted by LG_GFCGDP, also failed to reject the null hypothesis in both D-GMM and S-GMM estimators. Therefore, government expenditure did not influence economic growth in the SSA region.

Table 3: Panel 1 (One-step Difference) and Panel 2 (Post-estimation)

Panel 1: One-step Difference GMM and System GMM Estimation Results

Independent Variables	East Asia Pacific		Sub-Saharan Africa	
	Difference GMM	***System GMM***	***Difference GMM***	***System GMM***
LG_GDPPC_1	0.8339 (0.000)***	0.9930 (0.000)***	0.8687 (0.000)***	1.0066 (0.000)***
LG_ODAPC_1	0.0005 (0.680)	-0.0038 (0.077)*	0.0004 (0.929)	-0.0028 (0.439)
LG_ODAPC_2	-0.0032 (0.283)	-0.0057 (0.126)	0.0064 (0.089)*	0.0041 (0.236)
LG_ODAPC_3	0.0056 (0.003)***	0.0067 (0.038)**	0.0045 (0.184)	0.0033 (0.365)
LG_ODAPC_4	0.0062 (0.000)***	0.0039 (0.040)**	-0.0026 (0.493)	-0.0032 (0.234)
LG_FDIGDP	0.0070 (0.010)**	0.0141 (0.000)***	0.0020 (0.153)	0.0013 (0.331)
LG_FCFGDP	0.0710 (0.000)***	0.0422 (0.000)***	0.0170 (0.254)	0.0256 (0.006)***
LG_ENOPGDP_1	-0.0105 (0.375)	-0.0037 (0.612)	0.0193 (0.293)	0.0123 (0.439)
LG_ENOPGDP_2	0.0107 (0.070)*	0.0165 (0.117)	-0.0197 (0.425)	-0.0315 (0.221)
LG_ENOPGDP_3	0.0033 (0.716)	-0.0377 (0.000)***	-0.0085 (0.542)	0.0055 (0.749)

Table 3: continued

LG_GFCGDP_3	0.2757 (0.001)***	-0.0088 (0.343)	0.0221 (0.193)	0.0075 (0.306)
Constant	-	0.0731 (0.0230)**	-	-0.0039 (0.768)
Wald χ^2 stat.	15618.51 (0.000)***	62950.14 (0.000)***	4939.87 (0.000)***	168.83 (0.000)***
No. of Obs.	148	166	254	290
No. of Inst.	148	166	254	290
Instrumented Variables	GDPPC_1, ODAPC, FDIGDP, GFCFGDP			
Instrumental Variables	LEB, SEP, IWS			
Panel II: Post-estimation Results				
Hansen test	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Arellano-Bond AR(1) test	-2.020 (0.043)**	-1.800 (0.072)*	-2.830 (0.005)***	-2.800 (0.005)***
Arellano-Bond AR(2) test	-1.300 (0.192)	-1.160 (0.248)	0.04 (0.968)	0.310 (0.755)

Notes: GDPPC denotes GDP per capita; ODAPC is ODA per capita, FDIGDP is FDI per GDP, GFCFGDP is fixed capital formation per GDP, ENOPGDP is economic openness, GFCGDP is government expenditure per GDP; LEB is the life expectancy at birth; SEP is school enrollment for primary education; IWS is the population with access to improved water source. All the variables are in logarithm form. ***, ** and * indicate 1%, 5% and 10% significance level respectively. "_" indicates the lag of the variable followed by the period of the time lag. The figures in parentheses are the t-values. The figures in brackets are the p-values. The test statistics and standard errors are asymptotically robust to heteroscedasticity. Time dummies are used but are not displayed here.

The Wald chi-squared (χ^2) test for the goodness-of-fit of the regression model shows that the model is correctly specified for both the EAP and SSA panels as the χ^2 produced estimators for both regions are statistically significant at 1% and that the null hypothesis of all coefficients is rejected in D-GMM and S-GMM estimators. The lagged dependent variable LG_GDPPC_1 is statistically significant in both estimators for EAP and SSA panel data sets. Hence, the results indicate that the model specification is indeed a dynamic one, which justified the use of dynamic GMM estimation.

It is worthy to note that the estimated coefficients from the D-GMM are different from those in S-GMM. The changes between the estimated coefficients in two estimators are because the additional moment conditions derived from the level equation in the S-GMM gives more useful information to the estimation. Studies by Arellano and Bover (1995) and Blundell and Bond (1998) have verified that the lagged levels are often weak instruments for first-difference variables. Therefore, the modified framework which contains lagged levels as well as lagged differences can improve the efficiency of the original estimator. Since the S-GMM estimation has higher efficiency, this study draws its conclusion based on the analytical results in S-GMM estimator.

6. CONCLUSION

The distinct difference in economic growth patterns between East Asia Pacific (EAP) and Sub-Saharan Africa (SSA) in the past five decades makes one wonders what has contributed to such a distinctive performance.

This study uses resource gap approach with special focus on the role of foreign aid in promoting economic growth in EAP and SAA. Aid effectiveness is a hotly debated topic among the economists, researchers and policymakers in international cooperation and others. Despite large volume of accumulated studies on aid-growth, the existing literature on the impact of foreign aid on economic growth has yet to give a reasonable conclusion to end this debate. Many theories have attempted to explain how foreign aid stimulates growth, but the most frequently cited theory is the financial gap model that expounds foreign aid influences economic growth by filling up financial gaps in developing countries.

Building on this financial gap model, this study has constructed a theoretical framework for specifying a behavioral equation in examining the relationship between foreign aid and economic growth supported by capital formation and human resources development. Previous empirical studies have provided useful insights pertain to research methodology and data selection for conducting econometric estimations. This study has adopted the instrumental techniques in a fixed effects IV and a dynamic GMM framework that reflect the potentially endogenous aid variable and other possible statistical problems related to panel data sets. The estimated results clarify that the impact of foreign aid is different in EAP and SAA. Foreign aid exhibits a positive impact on economic growth in the EAP region but with time lagged effects. On the other hand, the analytical results illustrate that there is no aid-growth relationship in SSA.

GDP per capita in the EAP region has grown sixfold from US$981 in 1960 to US$6,032 in 2012 (World Bank, 2014a). In addition, extreme poverty has reduced drastically from 58.2% in 1990 to 7.9% in 2011 (World Bank, 2013). On the contrary, the SSA region did not make much progress in the last five decades, and many Sub-Saharan countries remain troubled by a spectrum of social economic problems created by the extreme poverty trap. Poor health, low literacy rate, inferior infrastructures and basic human needs. GDP per capita did not make much progress in the region, whereby the regional income per capita only raised from US$676 in 1960 to US$1,005 in 2012 (World Bank, 2014a). More seriously, in the past decades, SSA region merely reduced extreme poverty from 56% to 47% in 2011 (World Bank, 2014a).

In spite of receiving relatively moderate amount of ODA (around US$30 billion a year between 1960 and 2014), the EAP region has grown impressively in the past few decades. On the other hand, countries in SSA continue to suffer from severe development problems although they had received relatively large scale of ODA. From this perspective, one can easily argue that foreign aid has been more effective in EAP than in SSA. However, there are insufficient empirical evidence to support this judgement. For this reason, hence, this study has examined the impact of foreign aid on economic growth in EAP and SSA based on the estimation of a set of macroeconomic variables, as shown in this paper.

Drawing from the analytical results and discussions, this paper draws two conclusions. Firstly, ODA impacts positively on economic growth in EAP but with time lagged effects. Secondly, ODA has influenced economic growth differently by region whereby empirical evidence derived from the dynamic GMM approach has shown that ODA contributed positively to economic growth in EAP but has no effect on economic growth in SSA. These analytical findings strongly suggest that donors, recipients, and aid practitioners in the international community and the like must reexamine aid deliveries for enhancing aid effectiveness especially in the SSA region.

The analytical findings have substantiated that ODA has contributed positively on economic growth in EAP. More specifically, ODA has strengthened economic and social infrastructures, which in turn enhanced the investment environment for attracting FDI that caused output expansion, income generation, technology and knowledge transfer, and other positive social economic progress in countries in the EAP region. On the other hand, there is still insufficient empirical evidence to verify that ODA has contributed to economic growth in the SSA region. Consequently, countries in SSA have grown far slower than their counterparts in EAP in the last half a century. Hence, this study deduces following suggestions from the empirical evidence.

In order to improve the aid effectiveness in recipient countries, policymakers and practitioners in donors, recipients, and international aid institutions must allocate resources to sectors that are productive or conducive to the economic growth. Economic infrastructures include transportation and communication networks, storage and warehouse facilities, power and other utilities, production sectors and capacity building for human resources and business services over time undoubtedly must receive higher priority. These efforts improve the attractiveness in luring FDIs which ultimately drive economic development. The analytical results of this study testify that donors can also strengthen aid impacts by strengthening open regional cooperation and integration. Japan has contributed enormously in this aspect. While assisting the countries in EAP in boosting their economic performance, Japan has significantly promoted mutual understandings, and she has also shared basic values with many countries in EAP and beyond. Such commendable efforts have and will still contribute to regional stability, which directly cements intra-Asia Pacific cooperation in trade, investment, people-to-people, and cultural exchanges.

ODA has played limited role in promoting economic growth in SSA. Hence, policymakers in the SSA countries must refrain from relying on foreign aid as the primary tool to promote economic growth. Instead, they must focus on initiatives that stimulate homegrown development. Specifically, instead of trusting the foreign aid framework to improve economic performances in the SSA countries, they must channel those resources and efforts in expanding fixed capital formation. In this respect, giving incentives to stimulate capital accumulation is one of the highest priorities. The growth experience in EAP attests the effectiveness of quality investments.

Easterly (2009) argues that why the “transformative” approach has ended in disappointment in achieving its intended objectives. He emphasizes that the “marginal” approach has had more successes than the “transformative” approach mainly because that it is generally easier to conduct monitoring and the evaluation of the “marginal” initiatives’ effect. Evaluation process can be easily achieved by controlled experiments or simple case studies, but “transformative” approach promoted by the UN’s Millennium Development Goals is basically hard to evaluate its actual impacts. Easterly (2006a, 2006b) demonstrate that “marginal” measures such as a vaccination campaign, partnership in eradicating guinea worms, providing clean water and the like are in general more successful. Easterly also proposes that an efficient feedback system has to be incorporated in order to monitor the performance of the piecemeal approach. Particularly, creating incentive for aid agencies such as independent evaluation of aid projects is essential in ensuring the outcome of the aid projects. Such incentives thus can be derived from prompt feedbacks from the intended beneficiaries, so that the designated aid agency in charge will take full responsibility when negative feedbacks are obtained (Easterly, 1999, 2006a, 2006b; Easterly et al., 2004). Therefore, the aid institutions and donors must put priority on piecemeal aid projects rather than large scale aid programs and installation of the afore mentioned feedback system to prevent inefficient and ineffective aid efforts. Equally important, aid agencies must cooperate closely with local talents, especially social entrepreneurs, who are more familiar with the needs of the local community by investing in ideas and experimental projects. By doing so, the recipient countries can shape their own homegrown development anytime soon in the near future.

This study has contributed to drawing conclusion on the aid effectiveness by comparing the estimated results of two groups of developing regions. The comparative analysis is possible because this study uses dynamic GMM estimator. Consequently, the estimated results give a clearer picture on the regional differences of aid effectiveness. Furthermore, although economic analysis regarding growth and development are well-documented in existing literature, but empirical examination on the role of ODA on promoting economic growth is still limited. Above all, the analysis in this field by dynamic panel method is scarce. Therefore, the use of dynamic panel approach to the aid-related literature is a significant contribution of this study. Moreover, the analytical approach can generate additional study either on other region, or in a smaller group of countries, which are relevant on economic or foreign aid policy.

At the same time, this study has a few limitations: Firstly, the insufficiency of data from the data source as many indicators on most of the developing countries are generally missing due to the poorly established data collection. Such data non-availability problem has limited the scope of the analysis in exploring the aid-growth nexus with a larger sample size and thus the econometric estimations have missed the chance of discovering more meaningful findings; Secondly, the financial gap model that focuses on the basis of the theoretical framework in this study has limitations too. Easterly (1999) claims that the model is too simplified. He contends that investment is not the prerequisite for growth, therefore the theory of filling the savings-investment gap with aid is flawed. Consequently, the analytical approach to examine the role of foreign aid on economic growth based on aggregate variables is insufficient. Aid effectiveness at micro level in terms of social economic dimension and their links to the overall economic growth at macro level has to be addressed. These two aspects are our future research.

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