



ISSN: 2288-7709 © 2023 KODISA
 JEMM website: <https://acomis.kisti.re.kr/jemm>
 doi: <http://dx.doi.org/10.20482/jemm.2023.11.3.25>

The Influence of Foreign Aid on Public Sector Efficiency: A Panel Data Analysis

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Received: April 30, 2023. Revised: May 17, 2023. Accepted: June 05, 2023.

Abstract

Purpose: This paper examines whether foreign aid influences public sector efficiency in policy areas of administration, education, and stability. **Research design, data and methodology:** The study uses panel data of 77 aid recipient developing countries over the period 2000-2020 and employs various panel data techniques to estimate. **Results:** We found that a percentage change in foreign aid increases administrative efficiency by 0.02 to 0.04 on average *ceteris paribus* in the short run. On the other hand, a percentage increase in foreign aid decreases education efficiency by 0.005 to 0.006 on average. While the impact of foreign aid on the policy area of stability is insignificant. **Conclusions:** The empirical results of this study have important implications for both donors and aid recipient countries. It suggests that to get positive influence from foreign aid, in the area of education and stability, the recipient countries need to increase accessibility of secondary schools with quality education especially; technical and vocational. Also, the donor should provide a minimum threshold amount of foreign aid to developing countries for reforming the institutions' capacity building.

Keywords: Foreign Aid, Public Sector Efficiency, Panel Data, Difference GMM, System GMM,

JEL Classification Code : F35, F62, O47, C33

1. Introduction

The significance of public sector efficiency is considered a key component of growth and has received a lot of attention in developing countries. The impact of foreign aid on economic growth remains a controversial issue in economic analysis, attracting considerable attention from economists and policy analysts. Despite numerous empirical studies and a strong theoretical background, no common direction has been found (Adedokun, 2017; Mahembe & Odhiambo, 2019; Yahyaoui & Bouchoucha, 2020; Yiew & Lau, 2018). However, due to high resource

constraints, the importance of foreign aid continues to be a top priority in many developing countries. In this context, this research tries to find the impact of foreign aid on public sector efficiency in the area of administration, education, and stability rather than economic growth. The motivation of the paper is to provide an alternative way to examine the impact of foreign aid on growth. Empirical research on the influence of foreign aid on public sector efficiency has not been founded. However, there is a fair amount of research on the relationship between governance and public spending (De la Croix & Delavallade, 2009), and governance and public sector efficiency (Hwang & Akdede, 2011).

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In other words, the prior research neglected the linkage of foreign aid and public sector efficiency which is a major element of growth. This research uses cross-country data to examine the impact of foreign aid on public sector efficiency. As long as the efficiency relates to the output-to-input ratio, it is easy to examine whether a relationship between foreign aid and public sector efficiency exists. The paper used a reference to Hwang and Akdede (2011) who measured public sector efficiency which is based on four policy areas; administration, infrastructure, education, and stability. They used data provided by Angelopoulos et al. (2008) and are calculated based on the methodology of Afonso et al. (2005). They defined public sector efficiency as the ratio of output measures to input related to public spending.

Foreign aid can have a positive impact on public sector administration, education systems, and stability in recipient countries. In terms of administration, aid provides financial resources, technical assistance, and capacity-building support, enabling governments to strengthen administrative systems, and enhance transparency as well as governance. Aid can also be directed towards education, including building schools, training teachers, developing educational resources, reducing gender disparities, and enhancing instruction quality thereby improving the number of enrollments in secondary school. Moreover, foreign aid can contribute to stability by addressing the root causes of instability, such as inflation and unemployment. By investing in economic development, social programs, and infrastructure projects, aid helps stabilize fragile states, fostering an environment conducive to effective public sector efficiency. This study computes the public sector efficiency data which are based on three policy areas; administration, education, and stability based on the methodology used by Angelopoulos et al. (2008).

To evaluate the influence of foreign aid on the public sector, the study employs panel data from 77 aid-recipient developing countries over the period 2000-2020. We employ panel data techniques like pooled OLS, fixed effect model, random effect model, and generalized method of movement to get the empirical result. The result suggests that a percentage change in ODA increases the administrative efficiency by 0.02 to 0.04 on average *ceteris paribus* in the short run. However, the impact of foreign aid on policy areas of education is negative; indicating that a percentage increase in ODA decreases by 0.005 to 0.006 on average. while the impact of foreign aid on the area of stability is insignificant.

The empirical results of this study have important implications for both donors and aid recipient countries. It suggests that to get positive influence from aid, in the area of education and stability the recipient countries need to focus on quality education especially technical and

vocational education on the other side, the donor should provide a minimum threshold amount of aid for reforming the educational institutions capacity building to developing countries. Also, further research is needed to identify the ideal avenues via which foreign aid can have a positive impact on all public sector efficiency.

The rest of this paper is structured as follows. Section 2 reviews the theoretical and empirical study. The empirical technique, including the empirical specification and data descriptions, is described in Section 3. Section 4 delves into the empirical results derived from cross-section analysis. Section 5 discusses the policy implications of the empirical findings, and section 6 concludes the paper.

2. Literature Review

Foreign aid refers to financial assistance provided by one country or international organizations to another country to reduce poverty and improve socioeconomic conditions while public sector efficiency refers to the ability of the government and its institutions to allocate resources, implement policies, and deliver public services effectively and efficiently. The theoretical framework that explores the relationship between foreign aid and public sector efficiency includes the Aid-Effectiveness framework. The framework focused on factors that contribute to the effectiveness of foreign aid, including governance, policy environment, institutional capacity, and recipient country ownership This framework suggests that improving governance, transparency, accountability, and institutional quality can enhance public sector efficiency and the effectiveness of aid in achieving development goals (Alesina & Dollar, 2000; Hoda, 2013; Knack, 2001; Mauro, 1995; Rajan & Subramanian, 2008).

Theoretical frameworks that explore the relation ship between GDP per capita and public sector efficiency include the Modernization Theory, the Human Capital Theory, and the Institutional Theory These theories suggested that as countries experience economic development and higher GDP per capita, they also undergo societal changes that lead to more efficient and effective public sectors According to this theory, higher income levels can contribute to improved education, knowledge, skill, infrastructure, technological advancements, and institutional development, which in turn enhance public sector efficiency. Also, advocated that countries with higher income levels and stronger institutions tend to have more effective and efficient public sectors. (Barro, 2001; Inglehart, 2005; Knack & Keefer, 19).

The theoretical background that explores the relationship between population density and public sector efficiency includes the theory of urbanization. Theory

suggests that as population density increases in urban areas, economies of scale and agglomeration effects can lead to improved public sector efficiency. Higher population density in cities can foster better access to public services, infrastructure, and amenities, as well as better communication, coordination, and information sharing among government agencies which may result in more efficient public sector operations and service provision (Glaeser, 2012; Henderson, 2003)

Trade liberalization refers to the removal or reduction of barriers to international trade, such as tariffs, quotas, and trade restrictions. The theoretical perspective suggests that trade liberalization can enhance public sector efficiency by promoting competition, market access, and efficiency gains through specialization. Increased competition from foreign firms can spur domestic firms to improve their efficiency and productivity (Krugman, 1979)

The study does not uncover empirical research related to the research topic. However, a few relevant works were closely examined during the study and are presented below. Herrera and Pang (2005) estimated the efficiency of public spending on the health and education sector through the non-parametric method. Based on the data from 140 nations, the paper found, countries achieved substantially higher health and education output levels on average. Feeny and Rogers (2008) examined the efficiency of public sector expenditure and foreign aid of Small Island Developing Countries (SIDS). They estimated public sector efficiency by using a stochastic production function (SPF) in policy areas of health and education. They employed life expectancy as an outcome for health and to measure educational achievement using combined gross primary and secondary school enrolment. They found that efficiency to improve life expectancy has diminished while improving school enrollment has increased. Hwang and Akdede (2011) examined whether governance quality matters in public sector efficiency. By analyzing cross-country data through the 3SLS method, estimated governance quality is positively and significantly influenced by public sector efficiency in the area of administration and stability whereas, the education sector didn't affect it.

Fonchamnyo and Sama (2016) analyzed the public spending efficiency in the area of health and education in Cameroon, Chad, and the Central African Republic. By using the data over the period 2000-2012, calculated public sector efficiency through the non-parametric data envelopment analysis (DEA) method. The result indicated Chad and the Central African Republic are less efficient in public spending in the health and education sectors than in Cameroon. Shah and Hwang (2022) empirically examined the impact of foreign aid on the growth of 6 South Asian countries using time series annual data over the period 1980-2019. By applying variance decomposition and impulse

response function, the result shows that Bhutan and India have a positive impact on growth while Bangladesh, Nepal, Pakistan, and Sri Lanka have a negative impact in the short run.

3. Empirical Specification and Variables Description

The study used pane data of 77 developing countries over the period 2000-2020. The main purpose of the study is to determine how foreign aid influence s public sector efficiency indices in the policy areas of administration, education, and stability. Therefore, the empirical regression is expressed as follows.

$$PSE_{it} = \beta_0 + \beta_1 ODA_{it} + \beta_2 LPGDP_{it} + \beta_3 LPOPD_{it} + \beta_4 TGEX_{it} + \beta_5 OPEN_{it} + \varepsilon_{it} \quad (1)$$

In the above equation, the subscript 'i' shows countries included in the model ($i = 1, 2, 3, \dots, 77$) while the subscript 't' indicates the time (2000-2020). P public sector efficiency (PSE) stands for administration (ADM), education (EDU), and stability (STB), i.e., [PSE = ADM, EDU, STB], respectively. The data of PSE is calculated by the ratio of output and input. Here output refers to the achievement of a particular sector by public spending in a related field. The policy area of ADM is calculated by dividing control of corruption (COC) by public spending on goods and services (GEXG). The policy area of EDU is measured by the ratio of secondary school enrolment (SEE) to public spending in education (GEXE). Finally, the policy area of STB is measured by the average of inflation (INF) and Unemployment (UEMP) by total government expenditure (TGEX). The calculated efficiency of ADM, EDU, and STB is presented in Appendix 1.

It is assumed that the input is used to achieve that output and obtained as a percentage of the respective average (normalized to be 1) and considered higher ratings signifying more efficiency in the public sector (Angelopoulos et al., 2008). The key independent variable is official development assistance (ODA) with control variables such as GDP per capita (LPGDP), population density (LPOPD), total government expenditure (TGEX), and trade openness (OPEN). $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4,$ and $\beta_5,$ are parameters to be estimated and ε_{it} is the idiosyncratic error term. The variables like ODA, COC, and INF data are converted into positive values by adding 1, 2, and 20 respectively for the convenience of interpretation and understanding. The variables GDP per capita and population density are expressed in natural logarithmic form among variables used by the study. Further, Table 1 provides a

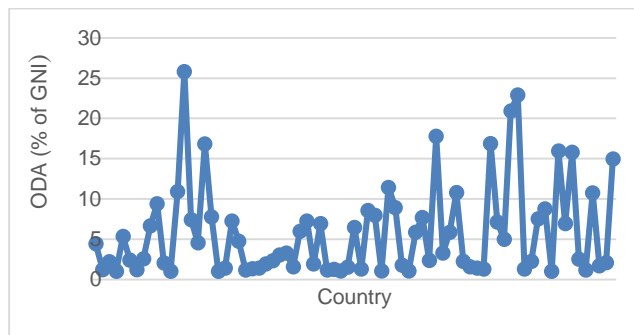
summary of variables, proxy, measurement, and source of data.

Table 1: Summary of variables

Variable	Proxy	Measurement	Source
Government Expenditure on Goods and Services	GEXG	General government final consumption expenditure (% of GDP)	World Bank (WDI)
Corruption of Control	COC	Estimate of governance (ranges from approximately - 2.5 (weak) to 2.5 (strong) governance performance)	The Worldwide Governance Indicators (WGI)
Government Expenditure on Education	GEXE	Government expenditure on education, total (% of GDP)	World Bank (WDI)
Secondary School Enrollment	SSE	School enrollment, secondary (% gross)	World Bank (WDI)
Total Government Expenditure	TGEX	Total government expenditure (% of GDP)	International monetary fund (WEO)
Inflation Rate	INF	Inflation, GDP deflator (annual %)	World Bank (WDI)
Unemployment rate	UEMP	Unemployment, total (% of the total labor force)	World Bank (WDI)
Foreign aid	ODA	Net ODA received (% of GNI)	World Bank (WDI)
Population Density	POPD	Population density (people per sq. km of land area)	World Bank (WDI)
Per capita Income	PGDP	GDP per capita, PPP (current international \$)	World Bank (WDI)
Trade Openness	OPEN	Trade (% of GDP)	World Bank (WDI)

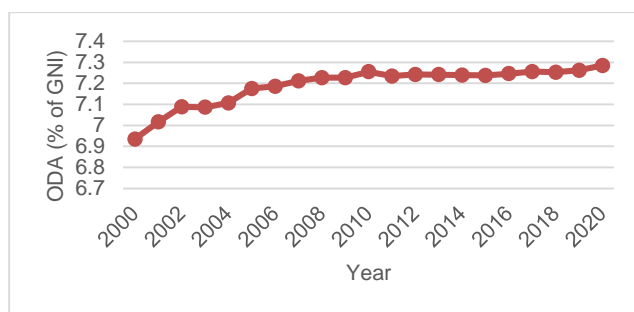
Note: The Data obtained from World Development Indicators, World Bank, World Economic Outlook Database, and The Worldwide Governance Indicators can be downloaded from <https://databank.worldbank.org>, <https://www.imf.org>, and <https://info.worldbank.org/governance/wgi>, respectively

Figures 1 and 2 illustrate the trend of net official development assistance received as a percentage of GNI for 77 aid recipient countries over the period 2000-2020. Figure 1 shows that the average ODA received by each country is not equal and fluctuates from country to country (appendix 2). However, figure 2 depicts that the average ODA flow each year by donors is consistent with slightly upward trends. However, before 2010 it is increasing but after remains stationary.



Note: The net ODA (% of GNI) is depicted 21-year average ODA of individual countries over the period 2000-2020, data obtained from the world bank.

Figure 1: Country-wise aid flow



Note: The net ODA (% of GNI) is depicted annual average ODA of 77 aid recipient countries, obtained from the world bank.

Figure 2: Year-wise aid flow

This paper uses sophisticated panel data techniques to predict the outcomes. Various types of panel modeling techniques can be classified into two major categories, called static estimator and dynamic estimator. The most classically estimated static models are pooled least square (POLS), fixed effects model (FEM), and random effects model (REM). While the Hausman test is conducted to determine an effective model between FEM and REM.

Pooled OLS is not considered appropriate in panel data since some of the fundamental assumptions, particularly the zero-correlation and ignorance of individual characteristics. But, using the FEM model will overcome these limitations. Particularly, FEM allows individual dummy variables for each entity and develop over time for countries-specific effect but not time-specific effects. Whereas REM is also known as the error components model, entity heterogeneity is considered in the error term rather than being defined as a dummy variable, allowing for a common intercept. Hence the estimation of REM is assumed more appropriate than FEM as it improves efficiency. However, FEM/REM have some problems of their own. First, because they are static models, they do not address the issue of dynamism. Then there's the possibility of reverse

causality. In such a case, the consistency of parameter estimates suffers greatly (Galiani et al., 2017)

The generalized method of moment (GMM) model is an estimating framework that adequately addresses the concerns stated above. Because the cross-sectional entity is larger than the time dimension, the model can be used in this empirical analysis. Under the framework of GMM, there are two estimate methods based on how variables are instrumented to account for issues such as endogeneity and serial correlation. One is known as difference GMM, and it was created by Arellano and Bond (1991) The difference GMM approach uses independent variable levels that are at least two periods lagged. Even if the model is considered well-fitted to address the above problem. However, some researchers claimed that when the persistence of variables is detected, there is an issue with different GMM estimations (Alonso-Borrego & Arellano, 1999). The second approach, known as system GMM, was developed by Arellano and Bover (1995) and Blundell and Bond (1998) to take into consideration the issue of weak instruments. System GMM includes endogenous variable lags in addition to level variable lags. The system GMM's additional moment conditions also increase the effectiveness. Particularly, two-step GMM is more efficient and robust to heteroscedasticity and autocorrelation than to one-step GMM (Roodman, 2009)

The study uses both static and dynamic estimators to find deeper insight. The probability of 't' statistics is strongly significant in two-step GMM estimation, showing that the models are significant mutually. Additionally, the number of instruments used in this model is less than the group. The first-order autoregression AR (1) does not reject the null of serial correlation but second-order autoregression AR (2) is rejected. In terms of the over-identification test, Hansen's results reject the over-identification of the null hypothesis.

Table 2: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Obs.
ADM	1	0.367	0.099	2.639	1617
EDU	1	0.524	0	3.648	1617
STB	1	0.432	0.075	6.863	1617
ODA	5.778	6.454	0.357	45.87	1617
LPGDP	8.544	0.909	6.166	10.27	1617
LPOPD	4.005	1.308	0.46	7.159	1617
TGEX	26.43	11.788	8.674	131.721	1617
OPEN	73.569	32.237	20.964	220.407	1617

Note: (i) The summary is based on 77 aid recipient countries over the period 2000–2020. (ii) The variables like ODA, COC, and INF data are converted into positive values by adding 1, 2, and 20 respectively for the convenience of interpretation and understanding.

Table 2 represents the result of the descriptive analysis. The summary analysis is based on 1617 observations. The result shows that the Public efficiency; ADM, EDU, and STB variables' mean value is 1 with a

standard deviation of 0.367, 0.572, and 0.432, respectively indicating less variability. The foreign aid mean value is reported as 5.77 percent which shows the lower inflow of aid for developing countries. Other control variables' statistics are normal as the standard deviation is lower than the mean value meaning that the coefficient of variance is lower than one. The value is consistent with a lower variation.

Table 3: Matrix of correlations

	ADM	EDU	STB	ODA	LPGD P	LPOD D	TGEX	OPEN
ADM	1.00							
EDU	0.21	1.00						
STB	0.19	0.13	1.00					
ODA	0.23	-0.41	-0.10	1.00				
LPG DP	0.20	0.46	-0.04	-0.48	1.00			
LPO PD	0.28	0.25	0.04	-0.06	-0.05	1.00		
TGE X	-0.39	-0.10	-0.50	0.04	0.21	-0.13	1.00	
OPE N	-0.08	-0.01	-0.18	-0.04	0.21	-0.21	0.29	1.00

Note: The correlations matrix is prepared based on 77 aid recipient countries over the period 2000–2020.

Table 3 shows the simple correlation analysis matrix. In terms of correlation among explanatory variables are not severely correlated. A positive correlation is found between ADM and ODA whereas a negative correlation is seen between EDU and ODA along with STB and ODA and so on.

4. Empirical Result

Table 4 shows the empirical result of various panel estimators. All empirical results found that ODA has a positive and significant impact on ADM. It calculates a percentage increase in ODA increases the administrative efficiency by 0.02 to 0.04 an average in the short-run ceteris paribus. This implies that a country with a higher level of ODA has a higher level of public sector efficiency. Also, GDP per capita income has a positive and significant impact on public efficiency. However, total government expenditure has a negative impact on public efficiency. A percentage increase in total government expenditure reduces public efficiency by 0.01. These empirical results are consistent in all panel estimators, increasing their validity.

Table 5 reported the regression results that show the relationship between ODA and public efficiency in the area of education. The empirical result shows that ODA has a negative and significant impact on education efficiency. It implies that a percentage increase in ODA reduces education efficiency by 0.005 - 0.008 on average. Also, total

government expenditure has a negative impact on education efficiency. However, GDP per capita has a positive impact on education efficiency.

Table 4: Administrative Efficiency (ADM)

	Pooled OLS	Fixed Effect Model (FEM)	Random Effect Model (REM)	Difference GMM	System GMM
ODA	0.023* (1.870)	0.037*** (4.251)	0.021*** (3.871)	0.040*** (3.265)	0.040*** (3.955)
LPGDP	0.123*** (9.113)	0.135*** (6.191)	0.087*** (5.155)	0.087** (2.460)	0.017* (1.845)
LPOPD	0.070*** (12.217)	0.176*** (3.341)	0.036* (1.786)	0.088 (0.974)	0.008* (1.891)
TGEX	-0.01*** (-15.82)	-0.09*** (-8.836)	-0.010*** (-10.235)	-0.04*** (-3.173)	-0.02*** (-2.817)
OPEN	0.000 (1.576)	-0.000 (-0.472)	-0.000 (-0.143)	0.001 (1.173)	0.000 (0.434)
ADM (-1)				0.998*** (10.631)	0.853*** (20.771)
Constant	0.227** (1.996)	0.836*** (4.404)	0.408*** (2.610)		0.026*** (3.372)
Obs.	1,617	1,617	1,617	1,463	1,540
R ²	0.789	0.677	0.620		
AR (1)				0.00	0.00
AR (2)				0.13	0.12
Hansen				0.22	0.37

Notes: (i) t-statistics are provided in parentheses based on White's heteroskedasticity-consistent standard errors and covariance. (ii) (***), (**), and (*) refers significant at 1%, 5%, and, 10% levels respectively.

Table 5: Education Efficiency (EDU)

	Pooled OLS	Fixed Effect Model (FEM)	Random Effect Model (REM)	Difference GMM	System GMM
ODA	-0.005*** (-2.747)	-0.005** (-2.504)	-0.006*** (-3.085)	-0.008* (-1.878)	-0.007** (-2.474)
LPGDP	0.268*** (16.901)	0.048* (1.777)	0.053** (2.449)	0.032 (0.474)	0.018* (1.946)
LPOPD	0.101*** (12.455)	0.381*** (5.883)	0.127*** (4.469)	0.008** (2.058)	0.008* (1.988)
TGEX	-0.007*** (-7.370)	-0.011*** (-9.430)	-0.011*** (-9.490)	-0.004*** (-2.993)	-0.001*** (-2.767)
OPEN	-0.000 (-0.436)	0.001** (1.974)	0.001** (2.181)	-0.000 (-0.081)	0.000 (1.177)
EDU (-1)				0.900*** (7.619)	0.919*** (33.344)
Constant	-1.45*** (-10.606)	0.153 (0.653)	0.303 (1.506)		-0.086 (-1.347)
Obs.	1,617	1,617	1,617	1,463	1,540
R ²	0.321	0.474	0.313		
AR (1)				0.00	0.00
AR (2)				0.14	0.72
Hansen				0.34	0.36

Notes: (i) t-statistics are provided in parentheses based on White's heteroskedasticity-consistent standard errors and covariance. (ii) (***), (**), and (*) refers significant at 1%, 5%, and, 10% levels respectively.

Table 6 shows the empirical result associated with ODA and stability efficiency. The result stated that no significant impact of foreign aid on stability efficiency. All the panel estimators calculated insignificant beside Pooled. Similarly, other variables such as LPGDP, LPOPD, and OPEN have not found significant and consistent outcomes with stability efficiency. However, total government

expenditure has a negative and significant impact on stability efficiency.

Table 6: Stability Efficiency (STB)

	Pooled OLS	Fixed Effect Model (FEM)	Random Effect Model (REM)	Difference GMM	System GMM
ODA	-0.005** (-1.989)	-0.001 (-0.391)	-0.001 (-0.590)	-0.008 (-0.889)	-0.008 (-1.654)
LPGDP	0.009 (0.427)	0.024 (0.735)	0.047** (2.092)	0.116 (0.992)	0.030 (0.789)
LPOPD	0.012* (1.945)	0.205*** (2.633)	0.010 (0.506)	0.242 (0.815)	0.005 (0.333)
TGEX	-0.018*** (-11.792)	-0.021*** (-14.662)	-0.020*** (-15.812)	-0.013** (-2.096)	-0.010** (-2.388)
OPEN	-0.001** (-2.279)	0.001** (2.360)	0.001 (1.375)	-0.001 (-0.706)	-0.001 (-1.439)
STB (-1)				0.178** (2.048)	0.235** (2.065)
Constant	1.530*** (9.305)	0.459 (1.631)	1.056*** (5.071)		1.374*** (4.189)
Observations	1,617	1,617	1,617	1,463	1,540
R-squared	0.260	0.426	0.248		
AR (1)				0.00	0.00
AR (2)				0.72	0.16
Hansen				0.36	0.47

Notes: (i) t-statistics are provided in parentheses based on White's heteroskedasticity-consistent standard errors and covariance. (ii) (***), (**), and (*) refers significant at 1%, 5%, and, 10% levels respectively.

Table 7, the Hausman test indicates that the fixed effect model is suitable for analyzing the result for administration efficiency and stability efficiency, while the random effect model is appropriate for examining education efficiency

Table 7: Hausman Test

	ADM	EDU	STB
Chi-square	26.62	5.24	13.71
Prob (Chi-square)	0.00	0.38	0.01
Remarks	FEM is appropriate	REM is appropriate	FEM is appropriate

The estimated coefficient of ODA has positive and significant in the case of ADM. This implies that the inflow of aid influences the ADM efficiency, maybe because, the government follows some pre-condition and guidelines made by donors and consequently helps to reduce corruption and enhance the governance. But in the case of EDU efficiency, ODA has a negative and significant impact. The result may be because enrollment in secondary school does not only depend on education expenditure but also on factors like social, cultural, and economic reasons. The key dominant reason behind the diminishing efficiency of policy areas of education is the "school dropout" problem in developing countries. The most common causes are child labor and early marriage practices. According to UNICEF's estimation, one in ten children are a victim of child labor whereas, four out of 10 teenage girls get marriage in developing countries Besides this, higher tuition fee, safety

problem; not safe to send girls, non-availability of secondary school nearby, and so on. On the other hand, STB efficiency has a negative but insignificant impact may be due to the absorptive capacity of the recipient countries especially, utilizing and managing foreign aid under limited institutional capacity and bureaucratic inefficiencies. Also, foreign aid inflows can lead to an appreciation of the recipient countries' currency and an adverse impact on their competitiveness that may fail to maintain the inflation and unemployment rate.

However, TGEX has a negative and significant impact on PSE. The result may be because a high level of government expenditure leads to crowding out private investment and reduces productivity in the economy. Also, public spending may be associated with wasteful expenditure, mismanagement, or corruption. PGDP has a positive and significant impact on ADM and EDU sectors, implying that higher availability of the financial resource for the government enables investment in infrastructures, technology, human capital and so on which enhance efficiency. The estimated coefficient of LPOPD has a positive and significant impact on ADM and EDU. The result may be higher POPD may reduce the cost of public spending and consequently, enhances efficiency.

5. Policy Implication

The direct relationship between foreign aid and economic growth is not appropriate since, the growth rate is highly affected by several factors such as government plans and policies, institutional quality, management skill, and socioeconomic factors. Therefore, it is important to examine, whether foreign aid helps to increase the public sector efficiency or not as long as economic growth is associated with public efficiency. The empirical evidence identified that the inflow of foreign aid has a different impact on public efficiency depending on the policy areas. This recommended that the utilization of foreign aid should be approached differently depending on the particular policy areas. Since public efficiency is measured through the establishment of achievement (output) and public spending (input). It is important to identify the sectoral efficiency, that helps to proper utilization of foreign aid for maximum achievement.

This study identified that foreign aid has a positive and significant impact on a policy area of administration. This is because donor agencies interfere with the policies of aid recipient countries that may bring improvement and help to enhance governance. However, the impact of foreign aid in the policy area of education is negative and statically significant. This is because secondary school enrollment is related to socioeconomic conditions rather than the inflow

of foreign aid. The policy area of education may directly affect socio-economic causes such as child labor, early marriage, availability, and accessibility of secondary school. This calls for immediate policy intervention to execute human rights in practice. Besides, the foreign aid, LPOPD has a positive and TGEX has a negative influence on public efficiency which is very natural and expected. Higher population density may reduce the cost of public spending and increases efficiency. On the other hand, high public expenditure reduces public efficiency since PSE is measured by the output-input ratio.

6. Conclusion

This paper examines the influences of foreign aid on public sector efficiency in policy areas of administration, education, and stability. The study employs panel data from 77 aid-recipient developing countries over the period 2000-2020. We found that foreign has a positive and significant effect on administration in the short run. But, the impact of foreign aid on policy areas of education is negative. While the impact of foreign on the area of stability is insignificant.

The estimated coefficient of ODA has positive and significant in the case of ADM. This implies that the inflow of aid influences the ADM, which may be because government follows some pre-condition and guidelines made by donors and consequently helps to reduce corruption. But in the case of EDU, ODA has a negative and significant impact. The result may be because enrollment in secondary school does not only depend on education expenditure but also on factors like social, cultural, and economic reasons. However, TGEX has a negative and significant impact on PSE. The result may be because PSE is measured by the output-input ratio, meaning that TGEX has a lower level of efficiency. The estimated coefficient of LPOPD has a positive and significant impact on ADM and EDU. The result may be higher POPD may reduce the cost of public spending and consequently, enhances efficiency.

The empirical results of this study have important implications for both donors and aid recipient countries. It suggests that to get positive influence from aid, in the area of education and stability the recipient countries need to focus on quality education especially technical and vocational education on the other side, the donor should provide a minimum threshold amount of aid for reforming the educational institutions capacity building to developing countries. Also, further research is needed to identify the ideal avenues via which foreign aid can have a positive impact on all public sector efficiency.

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Appendixes

Appendix 1: Country-wise Average Efficiency

S.N.	Country	ADM	EDU	STB	S.N.	Country	ADM	EDU	STB
1	Albania	1.10	1.48	0.85	40	Kazakhstan	0.93	1.94	1.17
2	Algeria	0.76	0.87	0.76	41	Kyrgyz Rep.	0.44	0.94	0.75
3	Angola	0.43	0.58	1.28	42	Lao PDR	0.86	1.23	1.00
4	Argentina	1.02	1.21	1.14	43	Malaysia	1.60	0.88	0.69
5	Armenia	1.13	1.92	1.12	44	Mali	0.77	0.54	1.02
6	Bangladesh	1.52	1.58	1.60	45	Mauritania	0.83	0.67	1.20
7	Belarus	0.86	1.17	0.89	46	Mauritius	1.47	1.33	0.91
8	Belize	1.05	0.72	0.64	47	Mexico	1.21	1.08	0.79
9	Benin	1.29	0.81	1.06	48	Moldova	0.68	0.95	0.71
10	Bhutan	1.41	0.58	0.54	49	Mongolia	0.99	0.96	0.80
11	Botswana	0.96	0.56	0.86	50	Morocco	0.83	0.64	0.70
12	Brazil	0.87	1.16	0.65	51	Mozambique	0.66	0.25	0.79
13	Burkina Faso	1.05	0.31	0.82	52	Namibia	0.89	0.50	0.98
14	Burundi	0.39	0.30	0.72	53	Nepal	1.38	0.93	1.13
15	Cambodia	1.46	1.29	0.89	54	Niger	0.69	0.27	0.95
16	Cameroon	0.68	0.87	1.05	55	Pakistan	1.01	0.80	1.12
17	Central African Rep.	0.79	0.58	1.30	56	Paraguay	0.88	1.20	1.28
18	Chad	0.98	0.50	0.98	57	Peru	1.25	1.65	0.88
19	China	0.93	1.18	0.78	58	Philippines	1.21	1.67	0.95
20	Colombia	1.04	1.18	0.85	59	Rwanda	1.34	0.42	0.76
21	Comoros	1.02	1.09	1.36	60	Senegal	1.24	0.44	0.95
22	Congo, Rep.	0.51	0.97	1.17	61	Serbia	0.74	1.30	0.83
23	Costa Rica	1.51	0.97	1.32	62	Sierra Leone	1.08	0.62	1.32
24	Dominican Rep.	1.15	1.76	1.39	63	Solomon Islands	0.69	0.25	0.61
25	Ecuador	0.97	2.03	0.67	64	South Africa	1.09	1.07	1.22
26	Egypt, Arab Rep.	1.17	1.21	0.91	65	Sri Lanka	1.27	2.67	1.16
27	El Salvador	0.91	1.12	0.77	66	Tajikistan	0.64	1.30	1.18
28	Eswatini	0.90	0.63	1.20	67	Tanzania	1.32	0.48	1.21
29	Fiji	1.16	1.02	0.71	68	Thailand	0.98	1.31	0.75
30	Gabon	0.80	0.98	1.37	69	Timor-Leste	0.18	0.73	0.23
31	Georgia	1.39	2.00	1.13	70	Togo	0.76	0.73	0.91
32	Ghana	1.91	0.61	1.86	71	Tonga	0.78	1.27	0.68
33	Guatemala	1.16	0.86	1.34	72	Tunisia	1.01	0.75	0.98
34	Guinea	0.85	0.83	1.75	73	Turkey	1.25	1.55	0.85
35	India	1.35	0.93	0.77	74	Uganda	0.92	0.65	1.52
36	Indonesia	1.35	1.38	1.28	75	Ukraine	0.51	1.00	0.71
37	Iran, Islamic Rep.	0.97	1.26	1.99	76	Uzbekistan	0.52	0.88	1.18

38	Jamaica	1.09	0.96	0.91	77	Vanuatu	1.20	0.55	0.63
39	Jordan	1.01	1.12	0.79					

Note: The efficiency value is an average value of the period 2000-2020 and normalized to 1. Hence, value >1 refers to higher efficiency and <1 is lower.

Appendix 2: Country-wise Net ODA Received

S.N.	Country	ODA	S.N.	Country	ODA
1	Burundi	25.82	40	Eswatini	3.054
2	Solomon Is.	22.90	41	Belize	2.569
3	Sierra Leone	20.94	42	Tunisia	2.513
4	Mozambique	17.79	43	Bangladesh	2.420
5	Rwanda	16.88	44	Morocco	2.373
6	C. African Rep.	16.85	45	El Salvador	2.320
7	Timor-Leste	15.97	46	Sri Lanka	2.243
8	Tonga	15.80	47	Pakistan	2.242
9	Vanuatu	14.95	48	Angola	2.200
10	Mali	11.45	49	Uzbekistan	2.076
11	Burkina Faso	10.91	50	Botswana	2.068
12	Niger	10.79	51	Guatemala	1.948
13	Uganda	10.76	52	Egypt, Arab Rep.	1.930
14	Bhutan	9.40	53	Mauritius	1.786
15	Mauritania	8.93	54	Ukraine	1.698
16	Tanzania	8.77	55	Paraguay	1.556
17	Kyrgyz Rep.	8.58	56	Gabon	1.554
18	Lao PDR	7.99	57	Jamaica	1.527
19	Chad	7.77	58	Ecuador	1.430
20	Mongolia	7.70	59	Colombia	1.420
21	Tajikistan	7.52	60	Peru	1.401
22	Cambodia	7.43	61	Dominican Rep.	1.352
23	Ghana	7.27	62	Kazakhstan	1.310
24	Comoros	7.26	63	South Africa	1.306
25	Senegal	7.15	64	Philippines	1.287
26	Guinea	6.93	65	Indonesia	1.272
27	Togo	6.92	66	Belarus	1.210
28	Benin	6.67	67	Algeria	1.199
29	Jordan	6.46	68	Turkey	1.191
30	Georgia	5.98	69	Costa Rica	1.177
31	Moldova	5.87	70	India	1.164
32	Nepal	5.86	71	Iran, Rep.	1.050
33	Armenia	5.35	72	Malaysia	1.043
34	Serbia	4.98	73	Mexico	1.037
35	Congo, Rep.	4.73	74	Argentina	1.034

36	Cameroon	4.56	75	China	1.034
37	Albania	4.42	76	Brazil	1.033
38	Namibia	3.28	77	Thailand	0.996
39	Fiji	3.28			

Note: The net ODA received (% of GNI) is an average value for the period 2000-2020. The list of the country presented is based on receiving aid from highest to lowest.