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Foreign Aid and Direct Effect of Poverty Reduction in Thailand

Hiroaki Sakurai[1]

Abstract

This study examines the effects of foreign aid on poverty reduction in Thailand dividing into ways. One is the direct effect of poverty reduction and the other is the indirect effect of economic growth. Dividing the effect of foreign aid into the direct effect of poverty reduction and the indirect effect through economic growth will contribute to a more efficient way of providing foreign aid by adjusting its purpose and method of foreign aid. The estimation results are summarized as follows: First, the relationship between the infant mortality rate, as a substitute for poverty reduction, and foreign aid from 1961 to 2022 was not significantly estimated using OLS or VAR (Vector Autoregression) models. Second, the relationship between the poverty ratio and foreign aid from 1988 to 2020 for every other year was also insignificant, although economic growth was estimated to be significantly positive. Based on these results, it can be inferred that foreign aid has no direct effect on poverty reduction in Thailand; rather, the indirect effect seems more important.

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[1] Gakushuin Women's College.
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1 Introduction

Whether foreign aid improves lifestyle in recipient countries remains under discussion. In this regards, main idea of foreign aid has an impact on economic growth as long as recipient countries have good policies shown by Burnside and Dollar (2000), and Collier and Dollar (2002) extends to the poverty reduction. Another idea is shown that the foreign aid itself does not affect to the economic growth (Easterly 2004), meaning that most economists do not believe that foreign aid itself is not necessarily effective to the economic growth directly.

The reason why the effect of foreign aid toward the economic growth is that the economic growth contributes to the poverty reduction. It is strongly supported that economic growth reduces poverty and raises the living standard (Borensztein et al. 1998). Therefore, relationships between the foreign aid and the economic growth is important for the poverty reduction.

Next, the way from foreign aid to the economic growth is important for knowing what kind of foreign aid we should do. This effect divides into the direct effect and the indirect effect. Indirect effect means that foreign aid contributes to the economic growth by way of the capital accumulation as shown in the Solow model. Empirics shows that foreign aid helps to build up the social infrastructure and invites private companies as a vanguard effect is one facility (Hsiao and Hsiao 2006, Kimura and Todo 2010). The indirect effect is considered to main route of effect of foreign aid.

Another way is direct effect from foreign aid to poverty reduction. This is important for poverty people since foreign aid helps poverty people directly whereas the indirect effect means trickle down of income increase from the richer people. Although the concept is easily understandable, the way of measurement is not necessarily easy partly due to the lack of statistics if measuring the macroeconomic point of view. The first uses the infant mortality ratio instead of poverty reduction and the impact of foreign aid, together with social policies (Mosley et al. 2004, and Mosley and Suleiman 2007). As an extended version, government expenditure is included (Gomanee et al. 2005a, 2005b) or seen as an effect in the agricultural sector (Kaya et al. 2013). The second way is to use the poverty gap index and examine the relationship between foreign aid and the poverty gap (Alvi and Senbeta 2012). These factors have a direct impact on the poor, rather than on economic growth.

In Thailand, it is known that inequality was bigger during the rapid growth in the late 1980s (Kurita and Kurosaki 2011, Townsend 2011). Previous studies have shown that the financial shortage of poverty-stricken people is one of the reasons for the increase in inequality. Sakurai (2021, 2023) shows that foreign aid to Thailand helped economic growth using the economic growth model and productivity of social infrastructure. Thus, the main impact of foreign aid on poverty reduction is through channels of economic growth rather than policies for poverty reduction.

This study examines the effect of foreign aid on poverty reduction in Thailand by focusing on social policies in two ways. As previously seen, the effect of foreign aid in Thailand appears to have occurred mainly through the direct effect of economic growth. First, the relationship between infant mortality rate and foreign aid was examined. Second, the relationship between the poverty ratio under 6.38 USD in a middle-income country and foreign aid is examined. Although the mortality rate is published for longer time, the it is relatively rough to measure the direct effect. In contrast, using poverty gap is more sensitive although the time is short.

Rest of this paper is as follows. Section 2 presents the theoretical background of the study in two ways. Section 3 presents the data, methodology, and estimation results for the poverty ratio. Section 4 presents the data, methodology, and estimation results regarding expenditure on social welfare. Finally, section 5 concludes the paper.

2 Theoretical Background

This section presents the analytical background of the direct effect, following Mosley et al. (2004) and Alvi and Senbeta (2012). Burnside and Dollar (2000) suggests the effect of foreign aid, and Mosley et al. (2004) divided the effects of foreign aid into direct and indirect effects. The direct effect means that foreign aid reduces poverty directly, whereas the indirect effect implies foreign aid reduces poverty through economic growth or policy regime changes. Alvi and Senbeta (2012) depict the effect of foreign aid as an element of poverty reduction, economic growth, and economic disparity. In this regard, the direct effect of foreign aid on poverty reduction was measured in another way. The following subsections describe each of these methods.
Burnside and Dollor (2000) denotes the effect of foreign aid toward the economic growth as the equation (1):

$$g_{it} = y_{it}\beta_y + a_{it}\beta_a + \boldsymbol{p'}_{it}\boldsymbol{\beta}_p + a_{it}\boldsymbol{p'}_{it}\boldsymbol{\beta}_p + \boldsymbol{z'}_{it}\boldsymbol{\beta}_t + g_t + \varepsilon_{it}^{g} \quad (1)$$

where
g_{it}: per capita GDP growth in country i in year t
y_{it}: logarithm of initial real per capita GDP in country i in year t
a_{it}: aid receipts relative to GDP in country i in year t
$\mathbf{p}_{it}$: policies affecting to growth in country i in year t
$\mathbf{z}_{it}$: other exogenous variables to affect growth and allocation of aid in country i in year t

Although the equation (1) shows the effect to the economic growth, it does not show the poverty reduction itself. Mosley et al. (2004) describe that the effect of foreign aid is divided into the direct effect, indirect effect through policy, and indirect effect through policy change for receiving foreign aid, as shown in equation (2).

$$\frac{\partial P_{it}}{\partial A_{it}} = \alpha\frac{\partial P_{it}}{\partial A_{it}} + \beta\left(\frac{\partial Y_{it}}{\partial A_{it}} + \frac{\partial Y_{it}}{\partial \theta_{it}}\frac{\partial \theta_{it}}{\partial A_{it}}\right) + \gamma\frac{\partial P_{it}}{\partial \theta_{it}}\frac{\partial \theta_{it}}{\partial A_{it}} + \mu_{it} \quad (2)$$

where
Y_{it}: per capita GNP in country i in year t
P_{it}: Poverty ratio in country i in year t
A_{it}: Foreign aid in country i in year t
θ_{it}: Policy in the country i in year t

α shows the direct effect of foreign aid whereas results of previous literature provide significantly positive β.

α shows the magnitude of the direct effect of foreign aid on poverty reduction and β shows the indirect effect through economic growth. The Thailand case is expected to see bigger significantly positive β and small or insignificant α from previous studies.
Alvi and Senbeta (2012) divided the effect of poverty reduction into economic growth, economic disparity, and foreign aid.

$$lnP_{it} = \beta_0 + \beta_1 lnP_{it-1} + \beta_2 lnY_{it} + \beta_3 lnG_{it} + \beta_4 lnAID_{it} + X'\theta + u_t \quad (3)$$

where
i: country, t: year
P_{it}: poverty ratio, Y_{it}: GDP per capita, G_{it}: Gini coefficient, AID_{it}: Foreign aid, X': indirect effect

Previous studies show that it may be estimated to be insignificant in Thailand, since Thailand experienced both rapid economic growth and economic inequality in the late 1980s.

3 Direct Effect of Foreign Aid

This section includes an estimation of the direct effects of foreign aid, as discussed in section 2. The first half used ordinary least squares (OLS) and the last half used time-series analysis.

3.1 Data

This study uses seven indicators: mortality, per capita GDP, urban-rural ratio, foreign aid, openness, and age dependency ratio. Explanatory variables including indirect effects are referred from Alvi and Senbeta (2012) and Gomanee et al. (2005a). All the indicators were obtained from the World Development Indicators of the World Bank. Since the poverty ratio in Thailand has been surveyed every other year since 1988, the mortality rate under five years of age converted into a logarithm is used in this study. Foreign aid uses a net base and is converted into logarithms. Since the net base of foreign aid was negative in the 21st century, converted into 1, or zero. The urban-rural ratio is the population growth rate in urban areas divided by that in rural areas. This is a substitute for income disparity, since income in urban areas is supposed to be higher than that in rural areas. Openness is the ratio of trade (total exports and imports) to GDP. The hypothesis is that trade profits arise from distributing income. The age-dependency ratio is the proportion of individuals under 15 and over 65 years of age in the total population, as labor can earn income. Openness and age-dependency ratio facilitate the indirect effect of foreign aid.

Table 1: Data description

	lnMORTALITY	lnGDP_PC	URBAN/RURAL	lnAID	OPENNESS	AGE
N	61	61	61	61	61	61
mean	3.551	7.754	0.384	16.312	0.801	0.365
std	0.861	0.734	2.545	7.694	0.378	0.077
max	4.952	8.772	6.004	21.254	1.404	0.482
min	2.116	6.416	-5.786	0.000	0.333	0.280

Notes
ln MORTALITY : logarithm of the mortality rate in children under 5 years of age.
ln GDP_PC : logarithm of per-capita GDP
URBAN/RURAL : urban population growth/rural population growth
OPENNESS : (export + import)/GDP
AGE : (people under 15 years + people over 65 years)/population

3.2 Methodologies

We estimate the OLS shown in (3) using the following processes:
First, we check the unit root tests of all variables to determine whether equation (3) should be used in the level series or first difference. If one or more variables have a unit root, as a result of the unit root test, the estimation should be used by the first difference.
Next, we estimate ordinary least squares (OLS), as shown in equation (4). If all variables are I(1), the error term should be checked as I(0) for cointegration. If the error term is I(1), we consider the equation as spurious regression.

$$lnMORTALITY_t = \beta_0 + \beta_1 lnGDP\_PC_t + \beta_2 URBAN/RURAL_t + \beta_3 lnAID_t + \beta_4 OPENNESS_t + \beta_5 AGE_t + u_t \quad (4)$$

where
ln $MORTALITY_t$: logarithm of the mortality rate under 5 years of age
ln GDP_PC_t : logarithm of per-capita GDP
$URBAN/RURAL_t$: ratio of urban population growth/rural population growth
$OPENNESS_t$: (export + import)/GDP
AGE_t : (people under 15 years + people over 65 years)/population

Finally, we use the vector autoregression (VAR) model to examine the effect of foreign aid, as shown in equation (5). This model was used to trace the impact of the shock, and the Granger causality test was used to examine the chase of each variable.

$$\begin{bmatrix} D(lnMORTALITY)_t \\ D(lnGDP\_PC)_t \\ D(URABN/RURAL)_t \\ D(lnAID)_t \\ D(OPENNESS)_t \\ D(AGE)_t \end{bmatrix} = \begin{bmatrix} \alpha_{1t} \\ \alpha_{2t} \\ \alpha_{3t} \\ \alpha_{4t} \\ \alpha_{5t} \\ \alpha_{6t} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} & \beta_{36} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & \beta_{46} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} \end{bmatrix} \begin{bmatrix} D(lnMORTALITY)_{t-1} \\ D(lnGDP\_PC)_{t-1} \\ D(URBAN/RURAL)_{t-1} \\ D(lnAID)_{t-1} \\ D(OPENNESS)_{t-1} \\ D(AGE)_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \end{bmatrix} \quad (5)$$

where
ln $MORTALITY_t$: logarithm of the mortality rate under 5 years of age
ln GDP_PC_t : logarithm of per-capita GDP
$URBAN/RURAL_t$: ratio of urban population growth/rural population growth
$OPENNESS_t$: (export + import)/GDP
AGE_t : (people under 15 years + people over 65 years)/population
D(--) indicates the first difference.

3.3 Estimation Results

We first conduct a unit root test for all variables using The augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests. As Table 2 shows, all variables except foreign aid are I(1). As most variables are I(1), we use the first difference or check the error term to determine whether I(0).

Table 2: Estimation Results of the Unit Root Test

ln(MORTALITY): I(2)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-2.068	-0.881	0.727	-2.888
first difference	-2.152	-1.520	-2.512	-1.986
Second difference	-13.270***	-14.136***	-13.270***	-15.846***
ln(GDP_PC): I(1)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-1.854	-0.920	-2.058	-0.513
first difference	-4.779***	-5.160***	-4.792***	-5.160***
URBAN/RURAL: I(1)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-2.549	-3.655**	-2.323	-3.534**
first difference	-10.612***	-10.521***	-12.194***	-12.098***
ln(AID): I(0)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-3.153**	-3.645**	-3.060**	-3.627**
first difference	-10.500***	-10.417***	-10.853***	-10.751***
OPENNESS: I(1)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-0.869	-1.727	-0.844	-1.685
first difference	-7.936***	-7.879***	-7.935***	-7.876***
AGE: I(2)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-3.690***	-0.835	-1.197	0.140
first difference	-	-2.931	-0.932	-2.345
second difference		-3.585**	-2.404	-3.775**

Note
***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.
ln $MORTALITY_t$: logarithm of the mortality rate under 5 years of age
ln GDP_PC_t : logarithm of per-capita GDP
$URBAN/RURAL_t$: ratio of urban population growth/rural population growth
$OPENNESS_t$: (export + import)/GDP
AGE_t : (people under 15 years + people over 65 years)/population

Next, we estimated the OLS. The estimation results of the level series are judged to be spurious regressions because the error term is I(1). In addition, the previous period of the mortality rate could not be estimated because of a near-singular matrix error. The other estimation results for the first difference are listed in Table 3. D(--) in variables mean the first difference and (-1) shows the previous period.

Table 3: Estimation Results of OLS

Dependent Variable: D(lnMORTALITY)			
Estimation Period: 1962-2022			
	①	②	③
D(lnGDP)	0.0122	0.0023	0.00229
	(0.0162)	(0.0171)	(0.0141)
D(URBAN/RURAL)	-0.0004	-0.0005	-0.0004
	(0.0003)	(0.0004)	(0.0006)
D(lnAID)	0.0001	0.0000	0.00000
	(0.0001)	(0.0000)	(0.0000)
D(OPENNESS)	0.0071	0.0140	
	(0.0078)	(0.0046)***	
D(AGE)	0.8520	0.9422	
	(0.1491)***	(0.4148)**	
C	-0.0454	-0.0440	-0.04324
	(0.0008)***	(0.0023)***	(0.00454)***
AR(1)		0.9204	0.96237
		(0.1084)***	(0.0573)***
MA(1)		-0.4522	-0.44640
		(0.1791)**	(0.18273)**
Adjusted R^2	0.333	0.684	0.607
Durbin Watson ratio	0.652	2.202	2.067

Note
***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.
ln MORTALITY : logarithm of the mortality rate in children under 5 years of age.
ln GDP_PC : logarithm of per-capita GDP
URBAN/RURAL : ratio of urban population growth/rural population growth
OPENNESS : (export + import)/GDP
AGE : (people under 15 years + people over 65 years)/population

Estimation results show the following two points. First, that neither foreign aid nor per capita GDP are significantly estimated as shown in all equations from ① to ③, inferring that the direct effect of foreign effect does not seen. Second, the age in the equation ① and ②, and openness in the equation ② are significantly estimated, meaning that the mortality rate is decreased by the higher living standard or economic growth. From these results, it is difficult to judge whether foreign aid has a relationship with infant mortality rate as a substitute for improving living standards.

Finally, the VAR estimation and Granger causality tests were examined. Since some variables have the unit root as shown in Table 2, the estimation should be in the first difference. In addition, only VAR model is shown in the result since cointegrated VAR model is not estimated. The estimation results are presented in Tables 4 (VAR model) and 5 (Granger causality tests). D(--) in variables mean the first difference and (-1) shows the previous period.

Estimation results are summarized for the following two points. First, per capita GDP and the openness are significantly estimated to the mortality rate in the time series analysis, meaning that the economic growth contributes to the mortality rate. Second, foreign aid does not have relationship with the mortality rate whereas foreign aid causes openness in the Granger causality test at the 10% significance level in Table 5, inferring that the foreign aid plays a role for mainly indirect effect for strengthen the industry rather saving poverty people directly. From the estimation results of VAR model and Granger causality tests, it is inferred that foreign aid in Thailand contributes mainly from indirect effect.

Table 4: Estimation Results of VAR Model

	D(lnMORTALITY)	D(lnGDP_PC)	D(URBAN/RURAL)	D(lnAID)	D(OPENNESS)	D(AGE)
D(lnMORTALITY(-1))	0.562	0.930	24.553	-120.764	-2.072	-0.075
	(0.102)***	(1.114)	(53.010)	(205.434)	(2.365)	(0.017)***
D(lnGDP(-1))	-0.013	0.355	3.825	-5.448	0.165	0.001
	(0.012)	(0.131)***	(6.252)	(24.228)	(0.279)	(0.002)
D(URBAN/RURAL(-1))	0.000	-0.001	-0.267	-0.053	0.006	0.000
	(0.000)	(0.003)	(0.123)**	(0.477)	(0.005)	(0.000)*
D(lnAID(-1))	0.000	0.000	-0.012	-0.349	0.003	0.000
	(0.000)	(0.001)	(0.034)	(0.132)**	(0.002)*	(0.000)
D(OPENNESS(-1))	-0.011	-0.026	-10.186	-17.680	-0.163	0.001
	(0.006)*	(0.069)	(3.266)***	(12.655)	(0.146)	(0.001)
D(AGE(-1))	0.305	-2.777	-16.697	79.239	-2.177	1.060
	(0.140)**	(1.529)*	(72.719)	(281.812)	(3.244)	(0.023)***
C	-0.019	0.061	1.024	-5.108	-0.095	-0.003
	(0.005)***	(0.051)	(2.444)	(9.471)	(0.109)	(0.001)***
Adj. R-squared	0.609	0.149	0.174	0.048	0.048	0.983

Note
***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.
ln MORTALITY : logarithm of the mortality rate in children under 5 years of age.
ln GDP_PC : logarithm of per-capita GDP
URBAN/RURAL : ratio of urban population growth/rural population growth
OPENNESS : (export + import)/GDP
AGE : (people under 15 years + people over 65 years)/population

In summary, both OLS and VAR model estimates show that foreign aid does not necessarily have a direct relationship with mortality as a substitute for poverty reduction.

Table 5: Estimation Results of Granger Causality

Null Hypothesis:	Obs	F-Statistic
D(lnGDP_PC) does not Granger Cause D(lnMORTALITY)	59	4.637**
D(lnMORTALITY) does not Granger Cause D(lnGDP)	59	0.038
D(URBAN/RURAL) does not Granger Cause D(lnMORTALITY)	59	1.447
D(lnMORTALITY) does not Granger Cause D(URBAN/RURAL)	59	0.541
D(lnAID) does not Granger Cause D(lnMORTALITY)	59	2.208
D(lnMORTALITY) does not Granger Cause D(lnAID)	59	0.079
D(OPENNESS) does not Granger Cause D(lnMORTALITY)	59	5.544**
D(lnMORTALITY) does not Granger Cause D(OPENNESS)	59	2.336
D(AGE) does not Granger Cause D(lnMORTALITY)	59	10.327
D(lnMORTALITY) does not Granger Cause D(AGE)	59	16.935***
D(URBAN/RURAL) does not Granger Cause D(lnGDP)	59	0.671
D(lnGDP) does not Granger Cause D(URBAN/RURAL)	59	0.036
D(lnAID) does not Granger Cause D(lnGDP)	59	0.003
D(lnGDP) does not Granger Cause D(lnAID)	59	0.272
D(OPENNESS) does not Granger Cause D(lnGDP)	59	0.002
D(lnGDP) does not Granger Cause D(OPENNESS)	59	0.331
D(AGE) does not Granger Cause D(lnGDP)	59	2.882*
D(lnGDP) does not Granger Cause D(AGE)	59	0.000
D(lnAID) does not Granger Cause D(URBAN/RURAL)	59	0.001
D(URBAN/RURAL) does not Granger Cause D(lnAID)	59	0.066
D(OPENNESS) does not Granger Cause D(lnURBAN/RURAL)	59	10.340***
D(URBAN/RURAL) does not Granger Cause D(OPENNESS)	59	1.208
D(AGE) does not Granger Cause D(URBAN/RURAL)	59	0.518
D(URBAN/RURAL) does not Granger Cause D(AGE)	59	1.060
D(OPENNESS) does not Granger Cause D(lnAID)	59	2.488
D(lnAID) does not Granger Cause D(OPENNESS)	59	3.379*
D(AGE) does not Granger Cause D(lnAID)	59	0.183
D(lnAID) does not Granger Cause D(AGE)	59	0.144
D(AGE) does not Granger Cause D(OPENNESS)	59	2.103
D(OPENNESS) does not Granger Cause D(AGE)	59	0.013

Note
***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.
ln MORTALITY : logarithm of the mortality rate in children under 5 years of age.
ln GDP_PC : logarithm of per-capita GDP
URBAN/RURAL : ratio of urban population growth/rural population growth
OPENNESS : (export + import)/GDP
AGE : (people under 15 years + people over 65 years)/population

4 Poverty reduction and income disparity

We examined poverty reduction and foreign aid every other year from 1988 to 2020 using more appropriate statistics. The first half used ordinary least squares (OLS) and the last half used time-series analysis. Explanatory variables including indirect effects are referred from Alvi and Senbeta (2012) and Gomanee et al. (2005a) similar to section 3.

4.1 Data

Data were obtained from the World Development Indicators of the World Bank. This study employs the poverty ratio and Gini coefficient, although the available time is shorter (from 1988 to 2020, every other year). These data are presented in Table 6. Since Thailand has become a middle-income country, the poverty ratio is defined as the poverty headcount ratio at $6.85/day (2017 PPP) (% of population). Openness is defined as the total imports and exports divided by the GDP. The age dependency ratio is the ratio of those under 15 to those over 65 years. Because net foreign aid has become negative in the 21st century, the logarithm is converted to zero if it is negative.

Table 6: Data Description

	POV	GINI	lnGDP_PC	lnAID	OPENNESS	AGE
N	17	17	17	17	17	17
mean	42.488	41.071	8.327	14.226	1.094	0.303
std	20.587	3.315	0.304	9.213	0.236	0.022
min	13.200	35.000	7.679	0.000	0.674	0.280
max	76.200	47.900	8.754	21.016	1.404	0.356

Note
POV : Poverty ratio
GINI : Gini coefficient
lnGDP_PC : per-capita GDP (logarithm)
lnAID : foreign aid (logarithm)
OPENNESS : (export + import)/GDP
AGE : (under 15 years + over 65 years)/total population

4.2 Methodologies

Similar to Section 3.2, we examine the OLS and VAR models.

$$lnPOV_t = \beta_0 + \beta_1 lnGDP\_PC_t + \beta_2 lnGINI_t + \beta_3 lnAID_t + X'\theta + u_t \quad (6)$$

Where

POV_t: Poverty ratio, GDP_PC_t: GDP per capita, $GINI_t$: Gini coefficient, AID_t: Foreign aid,

X': indirect effect, t: year

We use the indirect effect as the OPENNESS and AGE (Age Dependency Ratio), which is the same as in the previous estimation. Equation (7) defines the VAR model.

$$\begin{bmatrix} D(POV)_t \\ D(lnGDP\_PC)_t \\ D(GINI)_t \\ D(lnAID)_t \\ D(OPENNESS)_t \\ D(AGE)_t \end{bmatrix} = \begin{bmatrix} \alpha_{1t} \\ \alpha_{2t} \\ \alpha_{3t} \\ \alpha_{4t} \\ \alpha_{5t} \\ \alpha_{6t} \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} \\ \beta_{21} & \beta_{22} & \beta_{23} & \beta_{24} & \beta_{25} & \beta_{26} \\ \beta_{31} & \beta_{32} & \beta_{33} & \beta_{34} & \beta_{35} & \beta_{36} \\ \beta_{41} & \beta_{42} & \beta_{43} & \beta_{44} & \beta_{45} & \beta_{46} \\ \beta_{51} & \beta_{52} & \beta_{53} & \beta_{54} & \beta_{55} & \beta_{56} \\ \beta_{61} & \beta_{62} & \beta_{63} & \beta_{64} & \beta_{65} & \beta_{66} \end{bmatrix} \begin{bmatrix} D(POV)_{t-1} \\ D(lnGDP\_PC)_{t-1} \\ D(GINI)_{t-1} \\ D(lnAID)_{t-1} \\ D(OPENNESS)_{t-1} \\ D(AGE)_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \\ \varepsilon_{6t} \end{bmatrix} \quad (7)$$

4.3 Estimation Results

First, the unit root tests are examined whether spurious regression may occur or not. Table 7 presents the results of the unit-root tests. Because all the variables are I(1), the first difference is used. If we use a level series in the OLS estimation, the error term should be I(0) to prove the relationship as the cointegration.

Table 7: Estimation Results of the Unit Root Tests

POV: I(1)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-0.883	-2.319	-0.883	-1.736
first difference	-3.230**	-3.217	-3.236**	-3.225
second difference		-5.148***		-7.237***
GINI: I(1)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-0.209	-3.757**	0.535	-3.768**
first difference	-4.861***	-4.781***	-7.095***	-7.702***
ln(GDP_PC): I(1)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-2.464	-3.476*	-2.464	-3.186
first difference	-5.232***	-4.923**	-3.466**	-3.665*
lnAID: I(1)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-2.237	-3.876**	-2.226	-2.378
first difference	-2.998*	-	-4.458***	-4.362**
second difference	-5.906***			
OPENNESS: I(2)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	-1.796	0.892	-1.798	1.373
first difference	-2.920*	-2.603	-3.047*	-4.270**
second difference	-4.734***	-4.293**	-10.558***	
AGE: I(2)				
	ADF		**PP**	
	intercept	**Intercept & trend**	**intercept**	**Intercept & trend**
level	0.177	3.131	-4.057***	0.790
first difference	2.061	-1.545	-	-1.545
second difference	-2.632	-3.817*		-2.296

Note

***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.

POV : Poverty ratio
GINI : Gini coefficient
lnGDP_PC : per-capita GDP (logarithm)
lnAID : foreign aid (logarithm)
OPENNESS : (export + import)/GDP
AGE : (under 15 years + over 65 years)/total population

Next, the OLS estimation is examined in both the level series and the first difference, as shown in Table 8. D(--) in variables mean the first difference and (-1) shows the previous period. Level-series equations with I(1) in the error terms were eliminated since these equations are judged as the spurious regression. Level series are estimated with the previous poverty ratio in the equation ① and without in the equation ②. Autoregressive (AR) and moving average (MA) model is added on the equation ③. In contrast, first difference is estimated with and without ARMA model as the equation ④ and ⑤ since previous poverty ratio is eliminated at the first difference,

The results of the OLS estimation using the poverty ratio are summarized as follows: First, economic growth is expected to reduce poverty according to equations ① to ③. Even this result may be changed since equations ④ and ⑤ are insignificantly estimated. Second, foreign aid does not necessarily reduce poverty directly, because all estimation equations are insignificant. Third, almost no relationship was observed when the first difference was used. Poverty reduction and economic growth are estimated to be insignificant in the first difference. Based on these estimation results, the relationship between poverty reduction and foreign aid is not direct.

Table 8: OLS Estimation Results

Dependent Variable: POV				**Dependent Variable: D(POV)**		
Sample (adjusted): 1990 2020				**Sample (adjusted): 1990 2020**		
Variable	**Coefficient**	**Coefficient**	**Coefficient**	**Variable**	**Coefficient**	**Coefficient**
	(Std. Error)	**(Std. Error)**	**(Std. Error)**		**(Std. Error)**	**(Std. Error)**
	①	②	③		④	⑤
POV(-1)	0.603		0.911	D(LNGDP)	-3.174	5.236
	(0.268)*		(0.192)***		(13.721)	(16.502)
LNGDP	-25.354	-53.214	-34.825	D(GINI)	0.462	0.271
	(18.109)	(11.386)***	(10.057)**		(0.526)	(0.784)
GINI	-0.141	1.689	-2.636	D(AID)	0.089	0.076
	(0.861)	(0.583)**	(0.819)**		(0.095)	(0.2029)
AID	0.061	0.072	-0.055	D(OPENNESS)	17.825	16.945
	(0.119)	(0.137)	(0.061)		(9.483)*	(11.124)
OPENNESS	11.763	-8.167	11.781	D(AGE)	310.501	330.604
	(13.843)	(13.736)	(8.597)		(183.695)	(271.602)
AGE	168.789	-136.175	185.359	C	-2.697	-3.261
	(202.868)	(196.802)	(141.686)		(1.182)	(2.959)
C	167.000	465.362	331.571	AR(1)		-0.440
	(209.761)	(174.279)**	(116.381)**			(0.653)
AR(1)			-0.861	MA(1)		1.000
			(0.181)			(28014.42)
MA(1)			-1.000	Adjusted R-squared	0.089	0.030
			(24263.85)	Durbin-Watson stat	1.690	1.969
Adjusted R-squared	0.980	0.974	0.993			
Durbin-Watson stat	2.142	2.207	2.187			

Note

***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.

POV : Poverty ratio
GINI : Gini coefficient
lnGDP_PC : per-capita GDP (logarithm)
lnAID : foreign aid (logarithm)
OPENNESS : (export + import)/GDP
AGE : (under 15 years + over 65 years)/total population

Finally, the VAR model and Granger causality tests were examined to check the effects. Since all variables have the unit root as shown in Table 7, the estimation should be in the first difference. Since cointegrated VAR model is not estimated, only VAR model is estimated. The estimated results of the VAR model are shown in Table 9, and the Granger causality tests are presented in Table 10. D(--) in variables mean the first difference and (-1) shows the previous period.

Table 9: Estimation Results of the VAR Model

	D(POV)	D(ODA)	D(GINI)	D(LNGDP)	D(OPENNESS)	D(AGE)
D(POV(-1))	0.023	0.625	0.141	-0.002	-0.011	0.000
	(0.292)	(1.329)	(0.201)	(0.008)	(0.010)	(0.000)
D(ODA(-1))	-0.056	-0.333	0.010	0.001	-0.002	0.000
	(0.094)	(0.430)	(0.065)	(0.003)	(0.003)	(0.000)
D(GINI(-1))	-0.191	-1.221	-0.277	0.005	0.006	0.000
	(0.505)	(2.296)	(0.347)	(0.014)	(0.018)	(0.000)
D(LNGDP(-1))	-35.813	3.720	-3.988	-0.130	-1.053	0.009
	(12.901)**	(58.696)	(8.878)	(0.363)	(0.459)**	(0.007)
D(OPENNESS(-1))	-6.228	6.186	-3.228	-0.113	-0.296	0.000
	(10.875)	(49.476)	(7.484)	(0.306)	(0.387)	(0.006)
D(AGE(-1))	-33.624	-3.496	-105.281	-5.853	-15.729	1.062
	(190.850)	(868.296)	(131.337)	(5.370)	(6.796)**	(0.097)***
C	-1.394	0.823	-0.292	0.040	-0.013	0.001
	(1.550)	(7.052)	(1.067)	(0.044)	(0.055)	(0.001)
Adj. R-squared	0.290	-0.510	-0.421	-0.298	0.306	0.939

Note
***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.
POV : Poverty ratio
GINI : Gini coefficient
lnGDP_PC : per-capita GDP (logarithm)
lnAID : foreign aid (logarithm)
OPENNESS : (export + import)/GDP
AGE : (under 15 years + over 65 years)/total population

Table 10: Estimation results of the Granger Causality tests

Null Hypothesis	Obs	F-Statistic	Null Hypothesis	Obs	F-Statistic
D(AID) does not Granger Cause D(POV)	15	0.000	D(AGE) does not Granger Cause D(AID)	15	0.056
D(POV) does not Granger Cause D(AID)	15	0.432	D(AID) does not Granger Cause D(AGE)	15	1.015
D(GINI) does not Granger Cause D(POV)	15	1.885	D(LNGDP) does not Granger Cause D(GINI)	15	0.163
D(POV) does not Granger Cause D(GINI)	15	0.364	D(GINI) does not Granger Cause D(LNGDP)	15	0.134
D(LNGDP) does not Granger Cause D(POV)	15	14.641***	D(OPENNESS) does not Granger Cause D(GINI)	15	0.053
D(POV) does not Granger Cause D(LNGDP)	15	0.430	D(GINI) does not Granger Cause D(OPENNESS)	15	0.003
D(OPENNESS) does not Granger Cause D(POV)	15	0.231	D(AGE) does not Granger Cause D(GINI)	15	0.387
D(POV) does not Granger Cause D(OPENNESS)	15	3.133	D(GINI) does not Granger Cause D(AGE)	15	0.073
D(AGE) does not Granger Cause D(POV)	15	1.589	D(OPENNESS) does not Granger Cause D(LNGDP)	15	0.005
D(POV) does not Granger Cause D(AGE)	15	2.301	D(LNGDP) does not Granger Cause D(OPENNESS)	15	0.507
D(GINI) does not Granger Cause D(AID)	15	0.253	D(AGE) does not Granger Cause D(LNGDP)	15	2.767
D(AID) does not Granger Cause D(GINI)	15	0.395	D(LNGDP) does not Granger Cause D(AGE)	15	2.066
D(LNGDP) does not Granger Cause D(AID)	15	0.102	D(AGE) does not Granger Cause D(OPENNESS)	15	4.575*
D(AID) does not Granger Cause D(LNGDP)	15	0.726	D(OPENNESS) does not Granger Cause D(AGE)	15	1.897
D(OPENNESS) does not Granger Cause D(AID)	15	0.108			
D(AID) does not Granger Cause D(OPENNESS)	15	0.125			

Note
***, **, and * indicate the significance level at 1%, 5%, and 10%, respectively.
POV : Poverty ratio
GINI : Gini coefficient
lnGDP_PC : per-capita GDP (logarithm)
lnAID : foreign aid (logarithm)
OPENNESS : (export + import)/GDP
AGE : (under 15 years + over 65 years)/total population

Estimation results of VAR model and Granger causality tests are summarized as follows. First, the VAR model in Table 9 shows almost no relationship between the variables, including foreign aid and economic growth. Second, the results of the Granger causality tests in Table 10 show that GDP has a significant effect on poverty. In addition, the age-dependency ratio for openness was estimated at a 10% significance level.

In summary of the estimation results of the OLS, VAR, and Granger causality tests show that it is difficult for foreign aid to have a direct effect on poverty reduction at the country level.

5 Conclusion

This study examined the direct effect of foreign aid on poverty reduction in Thailand in two ways: using the mortality rate as a substitute of the poverty ratio in the longer term and using the poverty ratio itself in shorter term. The estimation results are summarized as follows: First, the relationship between the infant mortality rate, as a substitute for poverty reduction, and foreign aid from 1961 to 2022 was not significantly estimated using OLS or VAR models. Second, the relationship between the poverty ratio and foreign aid from 1988 to 2020 for every other year is insignificant, although economic growth is effectively estimated to be positive. Based on these results, it is inferred that foreign aid has no effect of the direct effect on poverty reduction in Thailand. This conclusion is consistent with previous studies and history in Thailand since Thailand has used foreign aid mainly for constructing social infrastructure and has invited private companies to enhance the national income. Although poverty ratio has been decreased as a result, the channel is mainly by increasing the income from their work, meaning indirect effect.

References

Alvi, A., and Senbeta, A. (2012). Does foreign aid reduce poverty? Journal of International Development, 24(8), 955–976.

Borensztein, E. J., De Gregorio, J., and Lee, J-W. (1998) How does foreign direct investment affect economic growth? Journal of International Economics, 45, 115-135.

Burnside, C., and Dollar, D. (2000). Aid, policies and growth. American Economic Review, 90(4), 847–868.

Collier, P., and Dollar, D. (2002). Aid allocation and poverty reduction, 46, 1475-1500.

Easterly, W., Levine, R., and Roodman, D. (2004) Aid, policies, and growth: comment. American Economic Review, 94(3), 774-780.

Gomanee, K., Girma, S., and Morrissey, O. (2005a). Aid, public spending, and human welfare: evidence from quantile regressions. Journal of International Development, 17(3), 299–309.

Gomanee, K., Morrissey, O., Mosley, P., and Verschoor, A. (2005b). Aid, government expenditure, and aggregate welfare. World Development, 33(3), 355–370.

Hsiao, F. S. T., and Hsiao, MC. W. (2006) FDI, exports, and GDP in East and Southeast Asia – panel data versus time series causality analysis, World Development, 69, 31-43.

Kaya, O., Kaya, I., and Gunter, L. (2013). Foreign aid and the quest for poverty reduction: Is aid to agriculture effective? Journal of Agricultural Economics, 64(3), 583–596.

Kimura, H, and Todo, Y., (2010) Foreign aid a vanguard of foreign direct investment? A gravity-equation approach, World Development, 38(4), 482-497.

Kurita, K. and Kurosaki, T. (2011). Dynamics of Growth, Poverty, and Inequality: A Panel Analysis of Regional Data from Thailand and the Philippines, Asian Economic Journal, 25(1), 3-33.

Mosley, P., and Suleiman, A. (2007). Aid, agriculture and poverty in developing countries. Review of Development Economics, 11(1), 139–158.

Mosley, P., Hudson, J., and Verschoor, A. (2004). Aid, poverty reduction and the 'new conditionality'. The Economic Journal, 114(496), F217–F243.

Sakurai, H. (2021). Effects of foreign aid: Evidence from Thailand. New frontiers in regional science: Asian perspectives 50, Springer.

Sakurai, H. (2023). Vanguard effect of foreign aid in Thailand. Bulletin of Applied Economics, 10(1), 157-168.

Townsend, R. T. (2011). Financial Systems in Developing Economies. New York: Oxford University Press.