Jurnal Ekonomi Malaysia 56(3) 2022 29 - 44
http://dx.doi.org/10.17576/JEM-2022-5603-02

Structural Transformation, Income Inequality and Government Expenditure: Evidence from International Panel Data

(Transformasi Struktur, Ketaksamaan Pendapatan dan Perbelanjaan Kerajaan: Bukti daripada Data Panel Antarabangsa)

Wannaphong Durongkaveroj
Faculty of Economics, Ramkhamhaeng University

ABSTRACT

In the past few decades, several developing countries have experienced a notable increase in income inequality along the path of economic development. Widening income inequality has been accompanied by growing demand for redistributive policy measures. The purpose of this paper is to examine the government spending and income inequality nexus in the context of structural transformation using an international panel data set covering 51 countries over the period 1990 to 2018 and an analytical framework that draws on Kuznets (1955). The system GMM estimates show that an expansion of government expenditure first generates rising income inequality but falling at the later stage, suggesting an inverted U-shaped relationship. Compared to developed nations, this inequality-reducing effect of government expenditure is more pronounced in developing countries. In addition, the relationship also varies by specific types of government expenditure and sample composition. For instance, inequality–reducing effect of government spending in Asian countries is only limited to health expenditure, indicating that the redistributive impacts of government expenditure may partly depend on the extent to which the primary beneficiaries of such spending are low-income people.

Keywords: Structural change; inequality; fiscal policy; government spending; Asian countries
JEL: D30, D63, H50, O15

Received 30 June 2022; Revised 20 October 2022; Accepted 27 October 2022; Available online 30 October 2022

ABSTRAK

Dalam beberapa dekad yang lalu, beberapa negara membangun telah mengalami peningkatan ketara dalam ketidaksamaan pendapatan di sepanjang laluan pembangunan ekonomi. Ketidaksamaan pendapatan yang semakin meluas telah disertai dengan permintaan yang semakin meningkat untuk langkah dasar pengagihan semula. Tujuan kertas kerja ini adalah untuk mengkaji hubungan perbelanjaan kerajaan dan ketidaksamaan pendapatan dalam konteks transformasi struktur menggunakan set data panel antarabangsa yang meliputi 51 negara sepanjang tempoh 1990 hingga 2018 dan rangka kerja analisis yang menggunakan Kuznets (1955). Sistem anggaran GMM menunjukkan bahawa pengembangan perbelanjaan kerajaan menjana ketidaksamaan pendapatan yang meningkat pada peringkat permulaan tetapi menurun pada peringkat kemudian, menunjukkan hubungan berbentuk U terbalik. Berbanding dengan negara maju, kesan pengurangan ketidaksamaan perbelanjaan kerajaan ini lebih ketara di negara membangun. Selain itu, hubungan juga berbeza mengikut jenis perbelanjaan kerajaan dan komposisi sampel tertentu. Sebagai contoh, kesan pengurangan ketidaksamaan perbelanjaan kerajaan di negara-negara Asia hanya terhad kepada perbelanjaan kesihatan, menunjukkan bahawa kesan pengagihan semula perbelanjaan kerajaan sebahagiannya mungkin bergantung pada sejauh mana penerima utama perbelanjaan tersebut adalah golongan berpendapatan rendah.

Kata kunci: Perubahan struktur; ketidaksamaan; polisi fiscal; perbelanjaan kerajaan; negara-negara Asia

INTRODUCTION

Developing countries have achieved rapid and sustained economic growth in the past few decades alongside massive poverty reduction. Economic growth led by structural transformation among developing Asian countries occurred in the 1980s and 1990s with the rise of export-led manufacturing industries. This has been also accompanied by an improvement in human development and a fall in inequality (Asadullah et al. 2021; Fei et al. 1979; Watkins 1998). During the same period, some of these countries have benefited from the so-called "developmental state" where public policy played a prominent role in ensuring growth with

redistribution. Despite this, income inequality remains a policy challenge in developing Asia, raising questions about the roles and limits of governments in further reducing income inequality. The present study aims to investigate the impact of government expenditure on income inequality with a specific focus on structural transformation.

Structural transformation, which is defined as the movement of labourers from agriculture to manufacturing and services, is a key feature of economic development in several countries, especially in East Asia. This economic development path has received due attention from development economists in the 1950s and 1960s including Kuznets and Lewis (Sen 2019). Several recent studies also seek to understand such phenomenon using different theoretical views (Duarte & Restuccia 2010; McMillan et al. 2017). The empirical studies on this subject draw on Kuznets (1955) i.e. at the beginning of structural transformation, income inequality rises and then falls later. While this relationship is popularly known among scholars as the "Kuznets inverted U-curve hypothesis", the results of the cross-country econometrics analysis are inconclusive, however (Fields 2002; Galor & Tsiddon 1996; Mun et al. 2022; Voitchovsky 2009).

Recently, the Kuznets hypothesis has seen a revival of interest due to an attempt to measure structural transformation by the shift of the labour force out of the low-productivity sector—that is, the agricultural sector. One of the first studies in the literature is Angeles (2010) exploring the relationship between income inequality and the share of workers in the non-agricultural sector. The results still do not support Kuznets' hypothesis. Several recent papers explore this relationship by utilising annual disaggregated data on employment in four sectors: agriculture; manufacturing industry; non-manufacturing industry (construction, mining, and utilities); and services (Baymul & Sen 2020; Durongkaveroj 2021). They find that the shift of employment from agriculture to manufacturing reduces income inequality at all stages of economic development. Such inequality-reducing impact is larger for structurally underdeveloped countries. The findings also indicate that the movement of workers from the agricultural sector to services first worsens income inequality and then improves it.

However, previous studies pay little attention to the role of fiscal policy or redistributive policy measures in reducing inequality in the context of structural transformation. After the Second World War, government expenditure increased remarkably (Mauro et al. 2015). In the U.K., government spending as a percentage of GDP rose from 37.34% to 52.53% between 1950 and 1980. Over the same period, Japan saw an increase in this indicator from 16.14% to 36.46%. An increase in government expenditure on education, health, national defense, and social security has contributed to this phenomenon (Maitra & Mukhopadhyay 2012; Tanzi & Schuknecht 2000). Nevertheless, such growth of government spending has slowed down after 1980, especially in advanced economies.

Government expenditure across countries varies by the degree of economic development measured by gross national income (GNI) per capita (Table A1 in the Appendix). Government expenditure expressed as a percentage of GDP in richer countries is higher than that in poorer countries. In addition, middle-income countries have high health expenditure as a share of GDP. The bivariate relationship between government expenditure and income inequality coefficient can be briefly examined here. Richer countries tend to have higher Gini coefficient and higher government spending to GDP ratio. This suggests that middle- and top-income groups disproportionately enjoy the benefits of government spending, resulting in increasing income inequality. Interestingly, Asian countries tend to have a lower Gini coefficient compared to the world average while government spending is higher than in low- and middle-income countries. Total government expenditure and social expenditure on health and education have also increased remarkably since the 1990s. These patterns in the aggregate data suggest that government expenditure may have helped curb income inequality in Asian countries.

Asian countries deserve special attention because many are developing nations which are yet to undergo structural transformation and have a low level of government spending, especially in health and education. As seen in Figure A1 in the Appendix, health expenditure as a percentage of GDP for several Asian countries is less than 5%, much lower compared to high-income countries. In populous Asian countries such as India, Pakistan, and Bangladesh, expenditure is even lower compared to Southeast Asian nations. Education spending is also low compared to OECD nations. Yet the growth of government expenditure on health and education is critical for progress in achieving the Sustainable Development Goals (SDGs). Empirical evidence has shown a significant negative relationship between social government expenditure for health and education and a wide range of development outcomes, for instance, poverty headcount ratio, poverty gap, infant mortality, and the ratio of female to male primary school enrolment in South Asia (Asadullah et al. 2020). This correlation is also supported by previous studies (e.g., Fan et al. 2000; Hidalgo-Hidalgo & Iturbe-Ormaetxe 2018; Jha et al. 2007), highlighting the important role of government expenditure on development outcomes in Asian countries.

Given the above patterns, this paper explores how government expenditure impacts on income inequality in the context of structural transformation by using a new dataset on economic structural transformation covering 51 countries from 1990-2018. The analytical framework

is drawn on the Kuznets hypothesis of income inequality first rising and then falling with structural transformation following long-term economic development (Anand & Kanbur 1993a; Kuznets 1955; Sen & Baymul 2020). The results from the system GMM estimator suggest the association between total government expenditure and the Gini coefficient is non-linear. To be specific, government expenditure first increases inequality and then reduces it after reaching a certain threshold. The threshold of government expenditure as a percentage of GDP is 18%. The threshold is larger for developing countries, suggesting that governments in these countries need to spend more before materializing an inequality-reducing effect of government expenditure. In addition, empirical evidence shows a U-shaped relationship between education spending and income inequality. This indicates that an inequality-reducing effect of education expenditure occurs only when its share in national output is not too large (6%). In addition, there exists an inverted U-shaped relationship between health spending and income inequality in Asian countries.

The rest of the paper is in six sections: Section 2 briefly explains the relationship between structural transformation and income inequality drawn on the Kuznets hypothesis and the role of public policy in reducing inequality. After that, the role of government expenditure in income inequality is examined. In Section 3, the model, data, and econometrics technique used to perform an empirical analysis are outlined. Section 4 shows the empirical results. The last section concludes and discusses future research.

ECONOMIC DEVELOPMENT, INCOME INEQUALITY, AND PUBLIC POLICY

This section explains the structural transformation and income inequality nexus using the analytical framework drawn on Kuznets (1955). Then, how public policy affects income inequality is explained.

THE KUZNETS HYPOTHESIS

As pointed out in Anand and Kanbur (1993a) and Baymul and Sen (2019, 2020), 'structural transformation' is an underlying mechanism of the Kuznets hypothesis. It is defined as the shift of employment from the agricultural sector to the non-agricultural sector (e.g., manufacturing and services).

Total inequality for a given society consists of between-sector inequality and within-sector inequality. Assume that each worker in a given sector is paid by the average income of that sector. When all workers work in one sector, between-sector inequality is zero. Between-sector inequality starts to have a positive value when workers are in different sectors (i.e., manufacturing and services) because each worker now receives a different level of income.

The second component of total income inequality is within-sector inequality. It refers to how equal each worker is in a given sector. Kuznets (1955) explains that total inequality tends to increase when workers move from a sector characterised by low within-sector inequality (e.g., agriculture) to one with greater within-sector inequality (i.e., manufacturing and services). The Kuznets process of total inequality is shown in Figure 1.

Assume that the economy consists of two sectors: agriculture and non-agriculture. From Figure 1, the horizontal axis is x, which is the share of labour force in non-agriculture. 1- x is thus the share of workers in agriculture. The vertical axis is total inequality which has two components: between-sector inequality and within-sector inequality. The dashed line is the within-sector inequality while the solid line is the between-sector inequality.

As explained in Anand and Kanbur (1993) and Durongkaveroj (2021), two assumptions play a key role in understanding the Kuznets hypothesis. First, the average income of non-agriculture is greater than that in agriculture. Second, within-sector inequality is relatively low in agriculture compared to non-

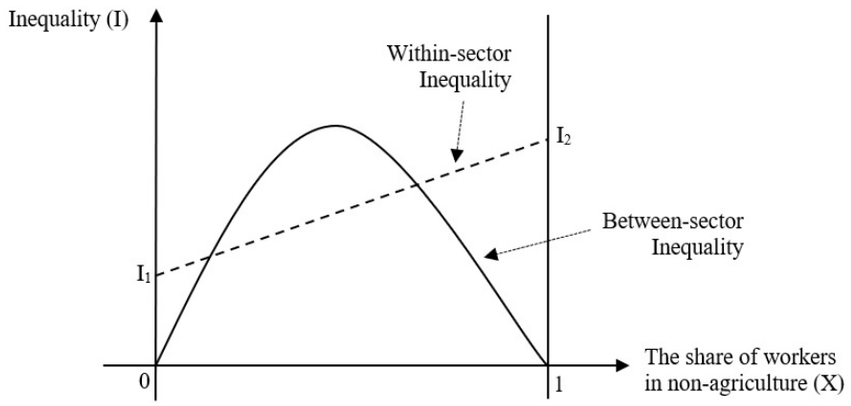

FIGURE 1. Components of total inequality
Source: Anand and Kanbur (1993a)

agriculture. The implications are that the movement of labourers from the agricultural sector to the non-agricultural sector initially results in rising between-sector inequality. After a certain level of x, between-sector inequality starts to decrease. The reason is that, at the beginning of the development process, only a few workers can move out of agriculture and then receives a higher mean income in non-agriculture. A substantial proportion of workers still receives relatively low income in agriculture. Such difference in mean income drives between-sector inequality. At the later stage of the process, between-sector inequality falls because of a large share of workers in non-agriculture. As shown in Figure 1, between-sector inequality has an inverted U-shaped curve. For within-sector inequality, the slope of the curve is positive, implying that within-sector inequality rises as the share of employment in non-agriculture increases. This is because the share of people in the more unequal sector increases.

These two components of inequality determine the degree of total inequality. When workers start moving out of agriculture, total inequality increases because both between- and within-sector inequalities increase. However, after a certain point along the process of structural transformation where between-sector inequality reaches its maximum, total inequality depends on whether a decrease in between-sector inequality can offset a continual increase in within-sector inequality.

THE ROLE OF PUBLIC POLICY IN REDUCING INCOME INEQUALITY

The literature on inequality and its impact on society and economy has long been studied. Many studies find the detrimental effects of high income inequality such as human rights (Beato 2004; Landman & Larizza 2009), conflict and trust (Delhey & Dragorov 2014; Hong & Bohnet 2007), and democracy (Kapstein & Converse 2008; Fukuyama 2011). As such, redistributive policies have been widely viewed as a tool of reduce income inequality (Claus et al. 2014; Moldogaziev et al. 2018; Sands 2017). However, empirical evidence on redistributive policy measures is controversial in two aspects: its impacts on economic growth and its effectiveness in reducing inequality.

On the one hand, redistribution through higher taxes and subsidies may hurt economic growth because they reduce incentives to work and invest (Barro 1990; Jaimovich & Rebelo 2017; Okun 1975). The effectiveness of income redistribution also depends on costs and efficiencies of redistributive policies and ideologies of the ruling political parties (Guzi & Kahanec 2018). On the other hand, numerous papers find that redistributive policies do not harm economic growth. Using a panel dataset covering about 100 countries, Dollar and Kraay (2004) suggest that an increase in government consumption is not correlated with changes in economic growth. Foellmi and Oechslin (2008) show that progressive redistribution toward the poorest part of the population can boost economic growth while redistributing towards the middle may retard growth through rising capital costs. In addition, Berg et al. (2018) suggest redistribution can contribute to economic growth only when redistribution is not very large.

Moreover, how government expenditure drives income inequality is yet to be settled. A survey over 84 studies by Anderson et al. (2017) describes income inequality-reducing effect of government spending. However, the magnitude and direction of the relationship are sensitive to the estimation method and control variables included in the model. Lustig et al. (2013) describe that more progressive government transfer can reduce income inequality among countries in Latin America. A study by Goni et al. (2011) analyses the redistributive impact of fiscal systems among Latin American and Western European countries and finds a consistent result. Guzi and Kahanec (2018) analyze the relationship between income inequality and the size of government through fixed-effect estimator and instrumental variable estimation techniques. They suggest that redistributive policies can reduce income inequality, and the estimated effects are larger when correcting the endogeneity issue. Their results are consistent with Doerrenberg and Peichl (2014), Kahanec and Zimmerman (2014), and Battisti and Zeira (2018). A recent paper by Furceri et al. (2022) provides evidence drawn from 103 developing countries in support of higher government spending in reducing inequality.

Nevertheless, several studies reach the opposite conclusion. By using a large cross-country dataset, Dollar and Kraay (2002) find an insignificant relationship between the income share of the bottom quintile and government consumption as a share of GDP. Using panel household survey data among 26 post-Communist countries between 1990 and 2005, Milanovic and Ersado (2012) do not find a statistically significant association between government expenditures and inequality (measured by income shares of the bottom deciles). Baymul and Sen (2020) also do not find that the growth of government expenditure leads to a reduction in income inequality. Cevik and Correa-Caro (2020) investigate how public policy affects income inequality in China and find that government spending increases inequality while taxation reduces it. A recent paper by Turnovsky and Erauskin (2022) finds that a country's level of economic development is important in understanding how government expenditure affects income inequality. Specifically, the growth of productive government expenditure is associated with rising income inequality in poorer countries while inequality later falls as a country develops and GDP increases given the size of government spending. In addition, how to finance redistributive policies matters as well. Doumbia and

Kinda (2019) find that redistribution of social protection and infrastructure lowers income inequality only if it is financed through a decrease in defense spending.

The relationship between government expenditure and income inequality is complex (Anderson et al. 2017). The size and direction of the relationship depend on several factors, for example, income inequality measures, a certain type of government expenditure, and econometrics technique. While early studies find an insignificant effect of government spending on income inequality (Dollar & Kraay 2002; Dollar et al. 2013), several studies suggest that specific types of government expenditure (e.g., on education and health) can bring income inequality down (Abdullah et al. 2013; Claus et al. 2012; Ho et al. 2021). Education and health are fundamental part of increasing the quality of the workforce, resulting in higher productivity and economic growth. From neoclassical economics theories, this in turn benefits almost all sectors of society including poorer people. Budget allocation to these types of government expenditure is also expected to increase access to healthcare and education among poor people, thereby reducing income inequality among people (O'Donnell et al. 2007; Sharp & Broomhill 2002). Examples of an expansion of social expenditure are a universal health care system and free basic education.

However, income inequality-reducing effects of increased government expenditure depend on whether the benefits are received by low-income people. While Abdullah et al. (2013) suggest that education lowers the income share of the rich and raises the income share of poor people (thus reducing income inequality), Anderson et al. (2017) describe that government expenditure on education and health tends to affect the middle class mostly. The results from econometric literature seem to be inconclusive and the current literature from developing countries is scarce. Lee and Lee (2018) suggest that increased social benefit expenditures contribute to more equal income distribution. Using the generalized method of moments (GMM) regression method, Ho et al. (2021) find that education spending can reduce income inequality in Vietnam. Nevertheless, beneficiaries of public education are concentrated among wealthier households in the case of Thailand (Cuesta and Madrigal 2014). For public spending on health, health-related spending reduces income inequality in the Asia-Pacific region (Wong 2016).

METHODOLOGY

THE MODEL

The present study aims to examine the impacts of government expenditure on income inequality in the context of structural transformation. The model used in this paper is drawn on recent studies by Baymul and Sen (2020) and Durongkaveroj (2021). The model takes the following form:

$$\begin{aligned} INQ_{it} = {} & \alpha + \beta_1 MFG_{it} + \beta_2 MFG_{it}^2 \\ & + \beta_3 NMFG_{it} + \beta_4 NMFG_{it} + \beta_5 SERV_{it} \\ & + \beta_6 SERV_{it}^2 + \beta_7 GEX_{it} + \beta_8 GEX_{it}^2 \\ & + \beta_9 OPEN_{it} + \beta_{10} LGDP_{it} + \beta_{11} HCI_{it} \\ & + \delta_i + \rho_t + \varepsilon_{it} \end{aligned} \quad (1)$$

where the subscripts i is country and t is year. *INQ* is income inequality measured by the net Gini coefficient. *MFG* is the share of employment in manufacturing. *NMFG* is the share of employment in non-manufacturing employment. *SERV* is the share of employment in services. *GEX* is government expenditure expressed as a percentage of national output. *OPEN* is the trade-to-GDP ratio. *LGDP* is per capita GDP measured in the real term. *HCI* is the human capital index. $\alpha$is a constant term. δ and ρ are country fixed effects and time fixed effects, respectively. Lastly, ε is a random error term.

From Equation (1), income inequality is measured by the net Gini coefficient. The economy comprises four sectors: agriculture (*AGR*); manufacturing industry (*MFG*); non-manufacturing industry (mining, utilities, and construction) (*NMFG*); and services (*SERV*). Agricultural employment share is regarded as the reference category. Equation (1) includes the squared term of employment share to examine the non-linear relationship between structural transformation and income inequality. The coefficient of the squared term of each employment share demonstrates the slope of the regression line when the value of sectorial employment share reaches a certain level. For the Kuznets process, the coefficients of sectoral employment share and its squared term are expected to be positive and negative, respectively.

The variable of interest is government expenditure (*GEX*). This variable indicates the overall involvement of the government in the economy (Battisti & Zeira 2018). It is a comprehensive measure of public policy which affects both taxes and transfers. While a greater amount of government expenditure can be allocated to poor people (and thus reducing inequality), it could be used improperly, resulting in higher corruption. The expected sign of the coefficient is thus ambiguous. A squared term of government expenditure (GEX^2) is included to test the quadratic association between government expenditure and inequality. Numerous papers find the non-linear association between income inequality and public spending such as Guzi and Kahanec (2018) and Sidek (2021). For a robustness check, total government expenditure is disaggregated into education (*EDU*) and health care (*HEALTH*). As discussed by Anderson et al. (2017), different types of government spending may have different effects on income inequality. Both size and direction of the association between any particular

type of government expenditure and income inequality are influenced by a wide range of factors such as income inequality metrics, the number of countries and periods included, and the estimator used. Therefore, their expected signs are ambiguous.

For other control variables, trade openness (*OPEN*), proxied by the trade-to-GDP ratio, is included to test whether openness to international trade has a direct impact on inequality. Most of the previous studies do not find a significant impact of trade openness on equity (Dollar & Kraay 2004; Baymul & Sen 2020). This is presumably because the impact of trade openness to inequality occurs through economic growth put in the regression equation. Since there could be winners and losers from economic globalisation depending on the degree of trade openness and the feature of trade and investment policy regime, the expected sign of the coefficient on trade openness is ambiguous. An additional impact of economic growth over and above the movement of workers out of agriculture is captured through real GDP per capita (*LGDP*). The expected sign of this variable is ambiguous, depending on the stage of economic development. Finally, I include human capital (*HCI*) in the model because it may directly affect inequality over and above through the effect of government expenditure on education. A country with a higher share of a more educated and healthier population may have a smaller gap between its population. Therefore, the expected sign of this variable is positive.

DATA

A balanced panel dataset which covers 51 countries between 1990 and 2018 is used to estimate Equation (1). Table A2 in the Appendix shows the full list of countries. The definitions of each variable and their sources are reported in Table 1. The data on employment share are taken from the latest dataset on structural transformation, namely, the Economic Transformation Database (ETD) taken from de Vries et al., 2021. Economic sectors are disaggregated into 12 sectors using the International Standard Industry Classification

TABLE 1. Variable definition and data source

Variable	Definitions	Data sources
INQ	The net Gini index1 is used to measure income inequality.	World Income Inequality Database (WIID)
MFG	Manufacturing employment as a percentage of total employment. The definition of manufacturing is based on the ISIC Rev 4.0	ETD
SER	Services employment as a percentage of total employment.	ETD
NMFG	Non-manufacturing employment as a percentage of total employment. Non-manufacturing includes three sub-sectors: utility, mining, and construction.	ETD
OPEN	The trade-to-GDP ratio.	World Bank
LGDP	GDP per capita at chained PPPs (in million 2011 USD). It is measured in the log form.	Penn World Table (PWT) 9.0
GEX	Government expenditure expressed as a share of GDP.	PWT
HCI	The mean years of schooling and return to education are used to calculate this index.	PWT

TABLE 2. Summary statistics

	Obs.	Mean	S.D.	Min	Max
Gini coefficient	306	48.96	10.03	30.32	77.09
Employment share in agriculture (%)	306	40.12	25.91	0.17	93.33
Employment share in manufacturing industry (%)	306	11.27	6.14	1.21	30.64
Employment share in non-manufacturing industry (%)	306	6.78	3.53	0.5	15.99
Employment share in services (%)	306	41.83	19.38	4.61	87.99
Trade/GDP ratio (%)	300	74.41	64.45	15.57	425.16
GDP per capita (million USD)	306	699,490	1,829,439	2,577.93	18,900,000
Human capital index	306	2.18	0.6	1.04	3.89
Total government expenditure/GDP (%)	306	15.02	5.36	0.72	37.18
Health expenditure/GDP (%)	196	5.28	1.97	2.06	10.7
Education/GDP (%)	241	4.09	1.79	0.99	11.89

(ISIC) Rev 4.0. See de Vries et al. (2021) for details on economic sector and country coverage in this study. Following the standard practice of the literature on income inequality, I use 5-year averaged data because the data on the Gini coefficient are available for some years. Summary statistics are reported in Table 2.

ESTIMATION METHOD

To address endogeneity issues in panel settings, a system generalized method of moments (GMM) estimator is used to estimate Equation (1). This estimator uses internal instruments which utilises some lags of regressors as instruments (Arellano & Bover 1995; Blundell & Bond 1998; Windmeijer 2005). The main identifying assumption is that the estimators have a first-order serial correlation. However, there is no second-order serial correlation. Also, there is no over-identified instrumentation. While the estimates are sensitive to lag length, the system GMM is more appropriate to estimate Equation 1 than other estimators (e.g., fixed-effect estimator and difference GMM) mainly because exogenous features of the instruments for public policy (proxied by government expenditure) are not available. It is therefore not possible to estimate the model using the instrument variable (IV) estimator. For these reasons, the system GMM seems the most appropriate estimator for the subject at hand.

RESULTS

This section shows the empirical evidence on the relationship between government expenditure

TABLE 3. Determinants of income inequality, system GMM estimator (full sample)

	1	2	3	4	5	6
Manufacturing (*MFG*)	0.472	0.515	0.256	0.230	1.038**	0.806*
	(0.355)	(0.338)	(0.329)	(0.334)	(0.439)	(0.434)
Manufacturing squared (MFG^2)	-0.014	-0.017	-0.008	-0.007	-0.028**	-0.022*
	(0.011)	(0.011)	(0.010)	(0.010)	(0.013)	(0.013)
Non-manufacturing (*NMFG*)	-0.144	-0.150	-0.382	-0.384	-0.282	-0.264
	(0.496)	(0.475)	(0.452)	(0.458)	(0.622)	(0.614)
Non-manufacturing squared ($NMFG^2$)	0.008	0.011	0.014	0.014	0.014	0.014
	(0.024)	(0.023)	(0.021)	(0.022)	(0.028)	(0.028)
Services (*SERV*)	0.007	0.005	0.197	0.196	-0.263	-0.152
	(0.144)	(0.137)	(0.139)	(0.141)	(0.212)	(0.209)
Services squared ($SERV^2$)	-0.002	-0.002	-0.003**	-0.003**	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Trade openness (*OPEN*)	-0.007	-0.007	-0.024**	-0.023**	-0.004	-0.007
	(0.010)	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)
Ln GDP (*GDP*)	-0.821	-0.802	-1.212**	-1.135**	-0.227	0.008
	(0.615)	(0.588)	(0.562)	(0.572)	(0.836)	(0.836)
Human capital (*HCI*)	1.435	1.149	0.658	0.635	1.399	0.312
	(1.303)	(1.248)	(1.142)	(1.155)	(1.615)	(1.653)
Government expenditure (*GEX*)	0.111*	0.622***				
	(0.065)	(0.196)				
GEX squared (GEX^2)		-0.017***				
		(0.006)				
Health expenditure/GDP (*HEALTH*)			-0.445**	0.199		
			(0.222)	(0.668)		
Health expenditure/GDP squared ($HEALTH^2$)				-0.049		
				(0.049)		
Education expenditure/GDP (*EDU*)					-0.074	-1.341**
					(0.244)	(0.636)
Education expenditure/GDP squared (EDU^2)						0.113**
						(0.052)
Constant term	29.15**	28.87***	49.17***	45.54***	13.39	15.80
	(11.44)	(10.74)	(10.86)	(11.11)	(11.76)	(11.41)
Threshold (Fiscal policy)	N/A	18.29	N/A	2.03	N/A	5.93
Observation	200	200	196	196	169	169

Notes: ***, **, * indicate significant at 1%, 5%, and 10% level, respectively. All model specifications include lagged measures (first and second) of the dependent variables.

and income inequality in the context of structural transformation. The results are reported for the total sample, and separately for developing countries and developing Asian countries.

Column 1 of Table 3 shows the estimation results without the squared term of government expenditure. The coefficient on government expenditure variable (*GEX*) is positive and statistically significant at the 10% level. A one percentage point increase in government expenditure as a percentage of GDP is associated with a 0.11-point increase in the Gini coefficient. However, it is found that each employment share and its squared term have no significant impact on income inequality.

Column 2 of Table 3 reports the estimation results after including the squared term of government expenditure. The coefficient on GEX^2 is negative and statistically significant at the 1% level. This indicates an inverted U-shaped relationship between government expenditure and income inequality. Inequality first increases and then falls as government expenditure increases. This means that government expenditure can lower inequality after it reaches a certain level. This certain level is known as a threshold or a turning point. From Table 2, the threshold is 18.29. This implies that the reducing-inequality effect of government expenditure occurs when the government spends at least 18% of GDP. As shown in Table 2, the mean government expenditure as a percentage of GDP is 15.02%. The figure is lower in Asian countries (14.05%). This means that there is still room for the government to increase

TABLE 4. Determinants of income inequality, system GMM estimator (Developing countries)

	1	2	3	4	5	6
Manufacturing (*MFG*)	0.760	0.857*	0.285	0.309	1.728**	1.372*
	(0.538)	(0.513)	(0.502)	(0.514)	(0.804)	(0.803)
Manufacturing squared (MFG^2)	-0.024	-0.028	-0.009	-0.012	-0.053	-0.041
	(0.021)	(0.020)	(0.020)	(0.020)	(0.033)	(0.033)
Non-manufacturing (*NMFG*)	-0.053	-0.123	-0.317	-0.343	-0.571	-0.494
	(0.544)	(0.520)	(0.495)	(0.508)	(0.671)	(0.668)
Non-manufacturing squared ($NMFG^2$)	0.008	0.014	0.016	0.018	0.022	0.019
	(0.027)	(0.026)	(0.024)	(0.025)	(0.031)	(0.031)
Services (*SERV*)	0.065	0.043	0.155	0.193	-0.387*	-0.269
	(0.182)	(0.175)	(0.173)	(0.180)	(0.221)	(0.222)
Services squared ($SERV^2$)	-0.003	-0.003	-0.003*	-0.004*	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Trade openness (*OPEN*)	-0.032*	-0.028	-0.026	-0.028	0.003	0.004
	(0.019)	(0.018)	(0.017)	(0.017)	(0.022)	(0.022)
Ln GDP (*GDP*)	-0.486	-0.410	-0.668	-0.536	0.495	0.659
	(0.600)	(0.575)	(0.558)	(0.581)	(0.760)	(0.760)
Human capital (*HCI*)	1.255	0.615	1.219	0.959	0.538	-0.959
	(1.765)	(1.708)	(1.582)	(1.631)	(2.187)	(2.275)
Government expenditure (*GEX*)	0.136*	0.652***				
	(0.073)	(0.210)				
GEX squared (GEX^2)		-0.017***				
		(0.007)				
Health expenditure/GDP (*HEALTH*)			-0.462*	0.739		
			(0.251)	(0.935)		
Health expenditure/GDP squared ($HEALTH^2$)				-0.097		
				(0.073)		
Education expenditure/GDP (*EDU*)					-0.147	-1.324**
					(0.281)	(0.649)
Education expenditure/GDP squared (EDU^2)						0.103**
						(0.051)
Constant term	20.47	19.78	39.89***	33.09**	11.07	14.48
	(13.28)	(12.41)	(12.73)	(13.52)	(11.56)	(11.26)
Threshold (Fiscal policy)	N/A	19.18	N/A	3.81	N/A	6.43
Observation	152	152	152	152	128	128

Notes ***, **, * indicate significant at 1%, 5%, and 10% level, respectively. All model specifications include lagged measures (first and second) of the dependent variables.

its government spending to materialise the inequality-reducing effects of government expenditure. However, there are differences in the current level of government expenditure across Asian countries. While Japan and South Korea have already passed this threshold, government expenditure in numerous Asian countries (e.g., Indonesia and Malaysia) is still less than 15%. An expansion of total government expenditure can be done by expanding the tax base and borrowing.

As shown in columns 4-5 of Table 3, when health expenditure and its squared terms are included in the model, greater health expenditure can reduce inequality (Column 4). However, health expenditure has no significant impact on inequality after including its squared term. This implies that health expenditure does not have an inequality-reducing effect. As shown in Columns 4 and 5, there are significant impacts of trade openness and real GDP per capita on the Gini coefficient. Both variables are found to reduce income inequality.

Columns 5-6 of Table 3 show the results after including education expenditure and its squared term. It suggests a U-shaped relationship between education spending and income inequality. The threshold is 5.93. This indicates that an increase in education expenditure can decrease income inequality when it is not too large. As shown in Table 2, the mean government spending on education is 4.07%. Asian countries have lower level of this indicator (about 3.2%). This suggests that there is a fiscal space for these countries to increase

TABLE 5. Determinants of income inequality, system GMM estimator (Developing Asian countries)

	1	2	3	4	5	6
Manufacturing (*MFG*)	0.908	1.282	0.662	-0.036	-0.309	-0.460
	(0.783)	(0.804)	(0.787)	(0.795)	(1.804)	(1.884)
Manufacturing squared (MFG^2)	-0.029	-0.044	-0.024	-0.003	0.017	0.023
	(0.028)	(0.029)	(0.028)	(0.027)	(0.068)	(0.071)
Non-manufacturing (*NMFG*)	0.144	0.357	0.383	0.174	0.938	1.029
	(0.740)	(0.752)	(0.714)	(0.648)	(0.974)	(1.014)
Non-manufacturing squared ($NMFG^2$)	-0.001	-0.007	-0.017	-0.003	-0.033	-0.037
	(0.032)	(0.032)	(0.033)	(0.030)	(0.043)	(0.045)
Services (*SERV*)	-0.001	-0.143	-0.185	-0.034	0.095	0.129
	(0.341)	(0.341)	(0.340)	(0.323)	(0.615)	(0.638)
Services squared ($SERV^2$)	-0.001	-0.002	-0.001	-0.002	-0.004	-0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)
Trade openness (*OPEN*)	-0.020	-0.014	-0.032	-0.021	-0.032	-0.030
	(0.023)	(0.023)	(0.024)	(0.022)	(0.025)	(0.025)
Ln GDP (*GDP*)	0.614	0.770	-0.289	-0.201	0.738	0.580
	(1.075)	(1.050)	(1.133)	(1.019)	(1.158)	(1.205)
Human capital (*HCI*)	-2.375	-2.058	2.197	1.591	-6.113	-5.485
	(4.409)	(4.306)	(5.016)	(4.467)	(5.773)	(5.983)
Government expenditure (*GEX*)	-0.014	0.635				
	(0.099)	(0.414)				
GEX squared (GEX^2)		-0.021				
		(0.013)				
Health expenditure/GDP (*HEALTH*)			-0.750*	4.577**		
			(0.440)	(2.105)		
Health expenditure/GDP squared ($HEALTH^2$)				-0.635**		
				(0.256)		
Education expenditure/GDP (*EDU*)					-0.496	-2.640
					(0.892)	(3.095)
Education expenditure/GDP squared (EDU^2)						0.325
						(0.473)
Constant term	21.570	13.830	22.030	17.290	26.630	29.710
	(14.030)	(14.870)	(13.960)	(13.070)	(18.250)	(19.620)
Threshold (Fiscal policy)	N/A	15.119	N/A	3.604	N/A	4.065
Observation	56	56	56	56	48	48

Notes: ***, **, * indicate significant at 1%, 5%, and 10% level, respectively. All model specifications include lagged measures (first and second) of the dependent variables

expenditure on education without increasing income inequality. In addition to increasing government revenue, the government can increase this social expenditure by reallocating the budget to education. The finding is consistent with Sylwester (2002) who finds that public education expenditure has an inequality-reducing impact. A greater increase in inequality when education expenditure is too large may happen due to the reallocation issue. An increase in education is at the expense of cuts in other types of welfare such as infrastructure, health, and social security which may worsen the lives of the poor. Alternatively, an attempt to increase the quality of education through increasing public expenditures on education may not be able to close the income difference between the affluent and the poor despite the indifferent quality of schools across all individuals in an economy as suggested by Glomm and Ravikumar (2003).

Also, there is a quadratic association between manufacturing employment share and the Gini coefficient (Columns 5 and 6 of Table 3). This indicates that income inequality first increases and then decreases with the shift of employment from the agricultural sector to manufacturing. The results are different from Baymul and Sen (2020) using another dataset on structural transformation covering the period 1960-2012 who find that manufacturing employment share reduces the Gini coefficient, irrespective of the stage of economic development.

I re-estimate Equation (1) by using a sample for developing countries which are referred to low- and middle-income countries using the World Bank's country classifications. Table 4 shows the results. The findings are largely consistent with those presented in Table 3. Interestingly, the size of the effect is larger for developing countries. This indicates a bigger inequality-reducing effect of government expenditure for relatively poor countries. In addition, the threshold for total government expenditure is 19.78, higher than that for the full sample. This suggests that government in developing countries has to spend more to see the significant effect of government spending in reducing income inequality.

Table 5 reports the results for developing Asian countries. According to Table A2 in the Appendix, this group of countries excludes Chinese Taipei, Hong Kong, Israel, Japan, Singapore, and South Korea. The coefficients on total government expenditure and its squared term are insignificant, suggesting that there is no significant relationship between total government expenditure and income inequality. This indicates that the benefits of increased government spending may not be concentrated on a particular group of the population.

The estimated coefficient on government spending on health is negative and statistically significant at the 10% level (Column 3 of Table 5). In particular, a one percentage point increase in health expenditure expressed as a share of GDP is associated with a decrease in the Gini coefficient by 0.75 percentage points. This indicates that much of the benefits of social expenditure on health reach low-income people. However, the relationship between health expenditure and the Gini coefficient is not linear. The Gini coefficient first increases and then falls with an increase in expenditure on health (Column 4 of Table 5). Income inequality starts to fall when government expenditure on health expressed as a percentage of GDP is at 3.6%. While government expenditure on health in Thailand and Malaysia has passed this threshold, there are few Asian countries in which their spending on health is relatively low such as Bangladesh, India, Indonesia, and Laos. Additionally, the coefficient on government expenditure on education is negative but not statistically significant (Columns 5 and 6 of Table 5).

DISCUSSION: POLICY LESSONS FOR ASIAN COUNTRIES

One surprising finding of our analysis is that there is no relationship between total government expenditure and income inequality in Asian countries. Nevertheless, social expenditure on health has an inequality-reducing effect when government expenditure on health is large enough (about 3.6%). In addition, sectoral employment shares are not found to reduce inequality at later stages of structural transformation as suggested by the Kuznets hypothesis. In this section, we further discuss some of the mechanisms underlying the results.

First, the null effect of structural transformation and income inequality may be driven by the period under study, the country composition of the sample, and some omitted variables. The period under this study is between 1990 and 2018, which encompasses the Millennium Development Goals (MDGs), a comprehensive global development agenda ranging from poverty reduction to universal primary education. The adoption of the MDGs in 2000 has created a strong emphasis on reducing poverty at the global level and has affected national economic and social development strategies (Hulme 2015). However, structural transformation in some Asian countries occurred mostly in the 1970s and 1980s. Therefore, variations in sectoral employment shares may fail to explain changes in income inequality in more recent decades. In addition, the literature on income inequality suggests that much of the income inequality reduction between 1990 and 2018 occurred through poverty reduction. Asadullah and Savio (2018) find that the MDGs adoption and state capacity can reduce poverty significantly. State capacity is about the role of states and their institutional capabilities to deliver public policies that benefit their citizen. It demonstrates an ability to collect revenue and establish the legal framework that secures the contractual environment.

The full set of explanatory variables used in the present study (e.g., government expenditure on health and expenditure) does not consider the role of state capacity. This is relevant to South Asian countries where a tax-to-GDP ratio is lowest in the world and agricultural sector is large relative to Southeast Asia (Asadullah et al. 2020). With a fall in foreign aid inflows, enhancing state capacity to raise revenue is thus important to the region's pursuit of comprehensive development agenda like the Sustainable Development Goals (SDGs). State capacity also may improve following structural transformation because the economy moves to higher value-added sectors including manufacturing and services, and this is likely to be true for many Southeast Asian nations.

Second, the analysis of the present study is based on cross-country analysis; we could not fully explore country-specific heterogeneity in the inequality-reducing effect of government expenditure. Several Asian countries have successfully undergone a structural transformation over the past 50 years such as Indonesia, Malaysia, and Thailand. The share of employment in agriculture in these countries has declined remarkably. Take Malaysia as an example. From 1990 to 2018, the share of agricultural employment fell from 25% to 11%. While the share of workers in manufacturing was constant during the past 30 years, the share of workers in trade services and business services rose significantly. During this period, Malaysia's Gini coefficient decreased continually, from 46.2% in 1989 to 41.1% in 2015 (See Figure 2). There was a short period of rising inequality after the 1997 Asian Financial Crisis. This evidence is consistent with the findings shown in Table 5, showing the negative relationship between the share of employment in services and income inequality. Moreover, Malaysia saw an increase in government expenditure on health from 1.17% in 2000 to 1.99% in 2019. Such increased spending on health coincided with a fall in income inequality in the last two decades.

For Thailand and Indonesia, both countries have also undergone a structural transformation as the share of workers in agriculture fell from about 60% in 1990 to less than 30% in 2018. The share of manufacturing employment increased by the same amount (about 4%). However, the Gini coefficient in these two countries follows a different path, especially between 2000 and 2010. While inequality in Thailand gradually declined, Indonesia saw a continuous increase. This could be due to several factors, e.g., trade openness and labour market conditions. The data also reveal that government expenditure on health and education gradually increased in the two countries since 2000, but such changes in government expenditure on health alone were not enough to influence changes in the Gini coefficient in Thailand and Indonesia. This suggests that there is much country-specific heterogeneity capturing variations in income inequality.

Third, the findings also show the association between inequality and public social spending on health and education. This social expenditure directly contributes to human-centered development. In the literature of economic development, human development also in turn contributes to economic growth and structural transformation (Bye & Faehn 2022; Fleisher et al. 2010; Siddiqui & Rehman 2017). Numerous papers also suggest the inequality-reducing effects of human capital (Abrigo et al. 2018; Lee & Lee 2018; Sehrawat & Singh 2019). Malaysia and China are relevant examples. Both countries have excelled in achieving growth with equal distribution following structural transformation. This achievement has been driven by human development-focused public policy. In the 1970s and 1980s, Malaysia outperformed countries with a similar level of living

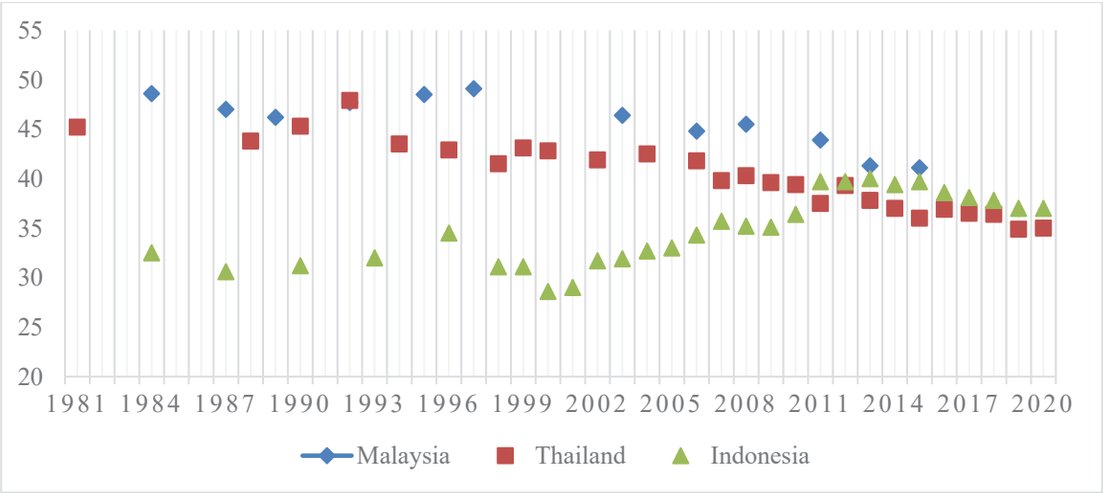

FIGURE 2. Long-term inequality trends in 3 Asian countries, 1981-2020
Source: World Bank (2022)

standards in many human development indicators, for instance, access to basic education and infant mortality, thanks to its emphasis on the investment in education and health, together with development of infrastructure (Asadullah et al. 2021). In sum, there are multiple development paths for growth with equity and this calls for additional country case studies on the relationship between a specific type of government expenditure and income inequality.

CONCLUSION

Following the seminal paper by Kuznets (1955), how economic growth affects income inequality is always of economists' interest and has attracted a generation of economists to examine the issue. Recently, Kuznets' hypothesis has received revival interest after an attempt to test the hypothesis directly, focusing on the movement of the population from agriculture to other sectors.

This paper has attempted to add the role of public policy and its implications for reducing income inequality in the context of structural transformation using a new panel dataset on economic structural transformation covering 51 countries from 1990 to 2018. The results from a system GMM estimator to address endogeneity concern indicate an inverted U-shaped association between government expenditure and the Gini coefficient, meaning that income inequality first rises and then falls as government spend more over time. The estimated certain level of total government expenditure is 18%. This threshold is higher for developing countries, meaning that more resources are needed for these countries to materialize income inequality-reducing impact of government spending. Governments in developing countries can increase their spending by expanding the tax base, collecting taxes and fees, and borrowing. However, this is much more challenging for developing countries (e.g., Thailand and Indonesia) with a large informal sector. Also, the inequality-reducing effect of education expenditure occurs when government expenditure on education is not very high. An excessive amount of education spending may worsen income inequality presumably because the primary beneficiaries of such increased spending may not be low-income students. Lastly, health expenditure has no statistically significant impact on income distribution except among Asian countries. Governments in these countries should therefore ensure that budget allocated to healthcare is sufficient and inclusive.

Overall, the results from this paper call for additional efforts to investigate how fiscal policies succeed in reducing income inequality. Further research could shed light on specific types of education expenditure such as basic education and higher education. For developing countries, expenditure on basic education aimed at expanding access to fundamental knowledge and skills could have a bigger impact on inequality.

NOTES

The net Gini coefficient is a measure of income inequality in the country excluding taxes and transfers. This measure is arguably a better indicator of the actual income distribution, and it also captures the indirect effects of structural transformation through the political channel (Baymul & Sen 2020). The empirical findings do not change when the gross Gini coefficient is used as a dependent variable.

ACKNOWLEDGEMENT

I would like to thank the special issue Editor, M Niaz Asadullah, for his thoughtful comments on an early draft of the paper. I am also indebted to two anonymous referees for their helpful and constructive comments on the manuscript. This work (Grant No. RGNS 64-197) was supported by the Office of the Permanent Secretary, Ministry of Higher Education, Science, Research and Innovation (OPS MHESI), Thailand Science Research and Innovation (TSRI), and Ramkhamhaeng University.

REFERENCES

Abdullah, A., Doucouliagos, H. & Manning, E. 2013. Does education reduce income inequality? A meta-regression analysis. *Journal of Economic Surveys* 29(2): 301-316.

Abrigo, M.R.M., Lee, S.-H. & Park, D. 2018. Human capital spending, inequality, and growth in middle-income Asia. *Emerging Markets Finance and Trade* 54(6):1285-1303.

Asadullah, M.N., Mansor, N. & Savoia, A. 2021. Understanding a "development miracle": Poverty reduction and human development in Malaysia since the 1970s. *Journal of Human Development and Capabilities* 4(22): 551-576.

Asadullah, M.N. & Savoia, A. 2018. Poverty reduction during 1990-2013: Did millennium development goals adoption and state capacity matter? *World Development* 105: 70-82.

Asadullah, M.N., Savoia, A. & Sen, K. 2020. Will South Asia achieve the sustainable development goals by 2030? Learning from the MDGs experience. *Social Indicators Research* 152: 165-189.

Anand, S. & Kanbur, S.M.R. 1993a. Inequality and development: A critique. *Journal of Development Economics 41*(1): 19-43.

Anand, S. & Kanbur, S.M.R. 1993b. The Kuznets process and the inequality—development relationship. *Journal of Development Economics 40*(1): 25-52.

Anderson, E., D'Orey, M.A.J., Duvendack, M. & Esposito, L. 2017. Does government spending affect income inequality? A meta-regression analysis. *Journal of Economic Surveys* 31(4): 961-987.

Angeles, L. 2010. An alternative test of Kuznets' hypothesis. *Journal of Economic Inequality 8*(4): 463-473.

Barro, R.J. 1990. Government spending in a simple model of endogenous growth. *Journal of Political Economy* 98(5): 103-125.

Battisti, M. & Zeira, J. 2018. *Inequality and public policy.* CEPR Discussion Paper13134.

Baymul, C. & Sen, K. 2019. Kuznets revisited: What do we know about the relationship between structural transformation and inequality? *Asian Development Review 36*(1): 136-167.

Baymul, C. & Sen, K. 2020. Was Kuznets right? New evidence on the relationship between structural transformation and inequality. *Journal of Development Studies*.

Beato, L.B. 2004. Inequality and human rights of African descendants in Brazil. *Journal of Black Studies* 34(6): 766-786.

Berg, A., Ostry, J.D., Tsangarides, C.G. & Yakhshilikov, Y. 2018. Redistribution, inequality, and growth: New evidence. *Journal of Economic Growth* 23: 259-305.

Bye, B. & Faehn, T. 2022. The role of human capital in structural change and growth in an open economy: Innovative and absorptive capacity effects. *The World Economy* 45(4): 1021-1049.

Claus, I., Martinez-Vazquez, J. & Vulovic, V. 2014. Government fiscal policies and redistribution in Asian countries. In: Kanbur, R., Rhee, C. & Zhuang, J. (eds.) *Inequality in Asia and the Pacific.* London: Routledge.

Cevik, S. & Correa-Caro, C. 2020. Growing (un)equal: Fiscal policy and income inequality in China and BRIC+. *Journal of the Asia Pacific Economy* 25(4): 634-653.

Cuesta, J. & Madrigal, L. 2014. Equity in education expenditure in Thailand. *Development Policy Review* 32(2): 239-258.

Delhey, J. & Dragolov, G. 2014. Why Inequality makes europeans less happy: The role of distrust, status anxiety, and perceived conflict. *European Sociological Review* 30(2): 151-165.

Dollar, D. & Kraay, A. 2002. Growth is good for the poor. *Journal of Economic Growth* 7: 195-225.

Dollar, D. & Kraay, A. 2004. Trade, growth and poverty. *Economic Journal 114*(493): F22-F49.

Doerrenberg, P. & Peichl, A. 2014. The impact of redistributive policies on inequality in OECD countries. *Applied Economics* 46(17): 2066-2086.

Doumbia, D. & Kinda, T. 2019. *Reallocating public spending to reduce income inequality: Can it work?* IMF Working Paper WP/19/188.

Duarte, M. & Restuccia, D. 2010. The role of structural transformation in aggregate productivity. *Quarterly Journal of Economics* 125(1): 129-173.

Durongkaveroj, W. 2021. *Structural transformation and inequality: Does trade openness matter?* ACDE Working Paper No. 2021/10.

Fei, J.C., Ranis, G. & Kuo, S.W.Y. 1979. *Growth with Equity: The Taiwan Case.* New York: Oxford University Press.

Fields, G. 2002. *Distribution and development: A new look at the developing world.* Cambridge, MA: MIT Press.

Fleisher, B., Li, H. & Zhao, M.Q. 2010. Human capital, economic growth, and regional inequality in China. *Journal of Development Economics* 92(2): 215-231.

Foellmi, R. & Oechslin, M. 2008. Why progressive redistribution can hurt the poor. *Journal of Public Economics* 92(3-4): 738-747.

Furceri, D., Ge, J., Loungani, P. & Melina, G. 2022. The distributional effects of government spending shocks in developing economies. *Review of Development Economics.*

Galor, O. & Tsiddon, D. 1996. Income distribution and growth: The Kuznets hypothesis revisited. *Economica 63*(250): 103-117. https://doi.org/10.2307/2554811

Glomm, G. & Ravikumar, B. (2003). Public education and income inequality. *European Journal of Political Economy* 19(2): 289-300.

Goni, E., Lopez, J.H. & Serven, L. 2011. Fiscal redistribution and income inequality in Latin America. *World Development* 39(9): 1558-1559.

Guzi, M. & Kahanec, M. 2018. *Income inequality and the size of government: A causal analysis.* IZA DP No. 12015.

Hong, K. & Bohnet, I. 2007. Status and distrust: The relevance of inequality and betrayal aversion. *Journal of Economic Psychology* 28(2): 197-213.

Ho, C.M., Le, Q.T.-T., Vo, A.T., Vo, D.H., & Ha, D.T.-T. 2021. Does government spending on education affect provincial income inequality in Vietnam? *Singapore Economic Review* 66(4): 1105-1123.

Hulme, D. 2015. *Global poverty: Global governance and poor people in the post-2015 era.* London: Routledge.

Jaimovich, N. & Rebelo, S. 2012. Non-linear effects of taxation on growth. *Journal of Political Economy* 125(1): 265-291.

Kapstein, E.B. & Converse, N. 2008. Poverty, inequality, and democracy: Why Democracies fail. *Journal of Democracy* 19(4): 57-68.

Kuznets, S. 1955. Economic growth and income inequality. *American Economic Review 45*(1): 1-28.

Landman, T. & Larizza, M. 2009. Inequality and human rights: Who controls what, when, and how. *International Studies Quarterly* 53(3): 715 - 736.

Lee, J.-W. & Lee, H. 2018. Human capital and income inequality. *Journal of Asia Pacific Economy* 23(4): 554-583.

Lewis, A. 1954. Economic development with unlimited supplies of labour. *Manchester School 22*(2): 139-191.

Lustig, N., Lopez-Calva, L.F. & Ortiz-Juarez, E. 2013. Declining inequality in Latin America in the 2000s: The cases of Argentina, Brazil, and Mexico. *World Development* 44: 129-141.

McMillan, M., Rodrik, D. & Verduzco-Gallo, I. 2014. Globalization, structural change, and productivity growth, with an update on Africa. *World Development* 63(1): 11-32.

Mauro, P., Romeu, R., Binder, A. & Zaman, A. 2015. A modern history of fiscal prudence and profligacy. *Journal of Monetary Economics* 76: 55-70.

Milanovic, B. 2016. *Global Inequality: A New Approach for the Age of Globalization.* Cambridge, MA: Harvard University Press.

Milanovic, B. & Ersado, L. 2012. Reform and inequality during the transition: An analysis using panel household survey data, 1990-2005. In: Roland, G (ed.) *Economies in Transition* (pp: 84-108). Studies in Development Economics and Policy. Palgrave Macmillan: London.

Moldogaziev, T.T., Monogan, J.E. & Witko, C. 2018. Income inequality and the growth of redistributive spending in the United States (US) states: Is there a link? *Journal of Public Policy* 38(2): 141-163.

Mun, H.W., Hook, L.S., Mazlan, N.S. (2022). Does recomposed institutions quality alleviate extreme income inequality? *Jurnal Ekonomi Malaysia* 56(2).

Okun, A.M. 1975. Equality and efficiency: The big trade-off. Washington: Brookings Institute Press.

Ostry, J.D., Berg, A. & Tsangarides, C.G. 2014. *Redistribution, inequality, and growth.* IMF Staff Discussion Note SDN/14/02.

Sen, K. 2019. Structural transformation around the world: Patterns and drivers. *Asian Development Review* 36(2): 1-31.

Sehrawat, M. & Singh, S.K. 2019. Human capital and income inequality in India: Is there a non-linear and asymmetric relationship? *Applied Economics* 51(39): 4325-4336.

Sands, M.L. 2017. Exposure to inequality affects support for redistribution. *PNAS* 114(4): 663-668.

Siddiqui, A. & Rehman, A. 2017. The human capital and economic growth nexus: In East and South Asia. *Applied Economics* 48(28): 2697-2710.

Sidek, N.Z.M. 2021. Do government expenditure reduce income inequality: Evidence from developing and developed countries. *Studies in Economics and Finance* 38(2): 447-503.

Sylwester, K. 2002. Can education expenditures reduce income inequality? *Economics of Education Review* 21(1): 43-52.

Turnovsky, S.J. & Erauskin, I. 2022. Productive government expenditure and its impact on income inequality: Evidence from international panel data. *Review of World Economics* 158: 331-364.

Voitchovsky, S. 2009. Inequality, growth and sectoral change. In W. Salverda, B. Noland & T.M. Smeeding (Eds.), *Oxford handbook of economic inequality* (pp. 549-574). New York: Oxford University Press.

Watkins, K. 1998. *Economic growth with equity.* Oxford: Oxfam.

Wong, M.Y.H. 2016. Globalization, spending and income inequality in Asia Pacific. *Journal of Comparative Asian Development* 15(1): 1-18.

World Bank. 2022. World development indicators. https://databank.worldbank.org/source/world-development-indicators (access 10 August 2022).

Wannaphong Durongkaveroj
Faculty of Economics
Ramkhamhaeng University
Bangkok, THAILAND.
Email: wannaphong@ru.ac.th

APPENDIX

TABLE A1. Government expenditure vs inequality by country groups, 1990-2020

	Country group	1990	1995	2000	2005	2010	2015	2020
Government Expenditure								
Total government expenditure (% of GDP)	LI	12.56	13.46	15.52	13.37	13.13	14.35	14.21
	LMI	16.45	13.43	15.89	13.93	16.95	16.57	15.33
	UMI	15.48	14.79	15.65	16.90	17.35	19.00	20.69
	HI	18.11	19.04	18.57	18.31	19.39	19.19	21.19
	South Asia	10.98	11.08	11.20	11.25	10.89	11.58	13.26
	East Asia	12.79	11.56	20.27	14.12	18.54	16.97	18.49
	World	16.21	15.76	16.72	16.22	17.45	17.87	18.73
Health expenditure (% of GDP)	LI			1.43	1.35	1.12	1.25	
	LMI			1.91	2.11	2.12	2.27	
	UMI			3.26	2.99	3.45	3.73	
	HI			4.40	4.63	5.12	5.22	
	South Asia			1.62	1.36	1.48	1.79	
	East Asia			1.75	1.77	2.15	2.64	
	World			3.01	3.03	3.28	3.45	
Education expenditure (% of GDP)	LI	2.75	3.15	3.26	2.58	3.25	3.45	3.70
	LMI	4.39	3.95	4.31	4.39	4.56	4.87	4.67
	UMI	3.92	3.10	4.57	4.79	5.22	4.95	4.93
	HI	4.05	4.66	4.48	4.55	4.75	4.87	4.11
	South Asia	2.15	2.88	3.41	3.68	3.18	3.86	4.43
	East Asia	3.15	2.59	3.69	2.99	3.53	3.87	3.83
	World	3.93	4.07	4.29	4.31	4.60	4.68	4.42
Inequality								
Gini coefficient	LI		44.60	48.50	42.78	45.46	42.78	
	LMI	38.65	38.90	41.77	41.93	34.95	38.40	33.80
	UMI	44.20	48.31	46.97	43.54	41.35	40.04	40.67
	HI	40.10	33.19	34.24	32.84	32.53	32.98	42.55
	South Asia	32.80	34.50	33.40	32.25	31.23	31.30	
	East Asia	36.23	40.85	39.70	36.95	36.57	39.68	36.00
	World	40.86	38.74	40.58	39.04	36.48	36.80	39.49

Source: World Bank (2022)

Note: LI is low-income countries; LMI is lower-middle-income countries; UMI is upper-middle-income countries; HI is high-income countries; Data on government spending on health are not available for 1990, 1995, and 2020.

TABLE A2: Country coverage (51 countries)

Asia (21 countries)	Latin America (9 countries)	Africa (21 countries)
Bangladesh	Argentina	Botswana
Cambodia	Bolivia	Burkina Faso
China	Brazil	Cameroon
Chinese Taipei	Chile	Egypt
Hong Kong	Colombia	Ethiopia
India	Costa Rica	Ghana
Indonesia	Ecuador	Kenya
Israel	Mexico	Lesotho
Japan	Peru	Malawi
Korea (Rep. of)		Mauritius
Laos		Morocco
Malaysia		Mozambique
Myanmar		Namibia
Nepal		Nigeria
Pakistan		Rwanda
The Philippines		Senegal
Singapore		South Africa
Sri Lanka		Tanzania
Thailand		Tunisia
Turkey		Uganda
Vietnam		Zambia

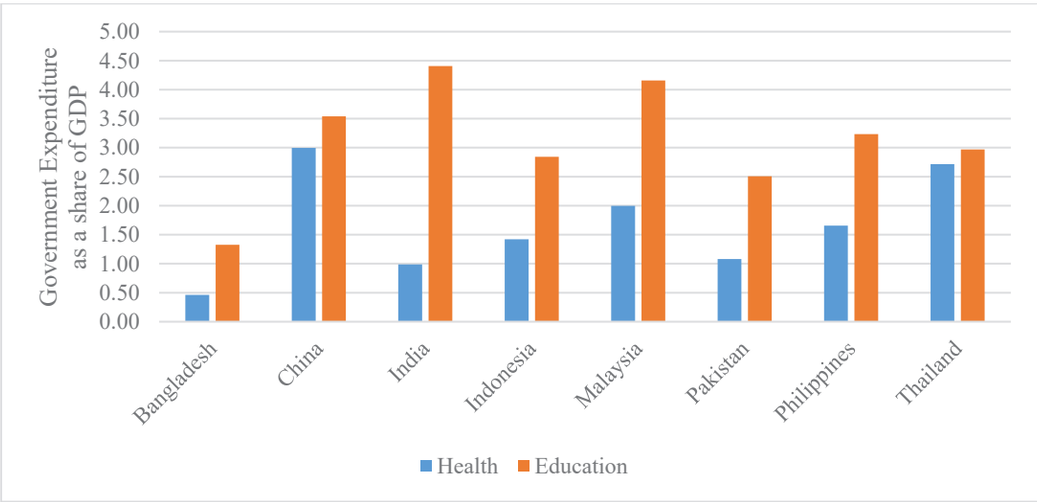

FIGURE A1. Health and education spending among selected developing Asian countries in 2019
Source: World Bank (2022)