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ECONOMIC GROWTH, FDI, TRADE OPENNESS, AND INEQUALITY: STANDING OF ASIAN ECONOMIES

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ABSTRACT

The main objective of this study is to identify the effect of foreign direct investment (FDI) and trade openness (TO) on income inequality in 25 Asian economies using panel data from 1991 to 2018. The effects of FDI and trade openness on income inequality in the Asian region has been examined by using the Kuznets curve hypothesis on the growth–inequality relationship and employing a random effects model, generalized least squares, and system GMM estimations. This study found that the effect of FDI and trade openness on inequality is positive as they enhance income inequality in the Asian region. It also found that the growth–inequality relationship is non-linear with an inverted U-shape, which indicates that growth increases inequality in Asian economies to a certain level; after that, an additional increase in per capita GDP decreases the income inequality. This study exposed that FDI and trade openness have increased inequalities in the Asian region, making it difficult to achieve the Sustainable Development Goal (SDG) 10 within the stipulated timeframe. Asian economies should therefore review investment- and trade-related policies to reap the benefits and to ensure equitable income distribution.

Contribution/Originality: This is the first study on the subject covering the Asian region using the Kuznets curve hypothesis to measure the income inequality from the perspectives of FDI, trade openness and economic growth by applying the random effects, generalized least squares and system GMM methods.

1. INTRODUCTION

The 2030 agenda for Sustainable Development is a mixture of the functionality of people, planet, and prosperity or, in other terms, a combination of economic, social, and environmental concerns. One of the most important agendas is ensuring equality, which reflects social and economic aspects through the equitable and proper distribution of resources. More specifically, Sustainable Development Goal (SDG) 10 is to reduce inequality to ensure an equal and just society. The world has observed a dramatic increase in social and economic inequalities after the third quarter of the twentieth century. The Asian economic upsurge in the last century was a prominent example for all other countries trying to control inequality while boosting economic growth. Japan, Korea, Taiwan, and other economies showed an ideal "growth with equity" pattern. This situation lasted for some days and "growth with inequality" soon appeared, and economists started looking into the inherent causes. Researchers identified technological development,

globalization, and market-oriented reforms as the drivers of growth in Asia. They showed that these drivers accelerate inequalities in countries by choosing skilled labor over unskilled labor, increasing the segment of capital over labor in the total growth, and spatial inequality due to the gap in facilities between rural and urban areas. Countries in the developing stage tend to have higher inequalities than developed countries. Soon after the establishment of the World Trade Organization (WTO), many countries became members and opened their economies to trade, showing mixed results. Accordingly, studies investigated the growth–inequality, trade openness–inequality, and foreign capital–inequality relationships to determine the highest interest, and those studies produced different results from different empirical aspects, theories, and models.

For the last two decades, Asia and the Pacific region has been the most prosperous economic constituency in the world, but this economic development is creating problems for this region at the same time. Though this region has the highest share of increased economic growth globally, it constantly faces challenges in ensuring equality in earnings in society. Previously, Asia was used as an ideal example of growth due to reduced inequalities, but now Asian growth drives increased inequalities. The increased inequalities lead to social unrest, and the benefits of economic progress go only to a specific portion of people in the country. In this circumstance, ensuring sustainable development is almost impossible. A substantial piece of work has been carried out on the effects of trade and FDI on economic growth and development, but the findings are inconclusive. As sustainable development comprises three main pillars, i.e., sustained economic growth, environmental quality and income equality, and the recent rise of inequality has gained the greatest attention among policymakers, out of these three pillars, this paper aims to assess the impact of FDI and trade openness on income inequality of the selected Asian economies.

Using panel data of 25 Asian economies, from 1991 to 2018, and employing the Kuznets curve hypothesis, we empirically found that economic growth significantly increases inequality but only up to a certain level. After that, the growth reduces inequality. We also found that the estimates of FDI and trade openness (TO) are positively and significantly correlated with inequality, which supports the findings that these two macro-economic factors have produced benefits for already developed and advanced nations because of the quality of different channels, infrastructure, and good governance. We did not find a significant impact of inflation, domestic investment, and government size on inequality. One of the interesting findings is that a controlled level of corruption helps to reduce inequalities in Asian countries. Except corruption, FDI and TO have increased inequalities in the Asian region, making it tough to achieve SDG 10 (reduced inequalities) within the stipulated time and ensure the foundation pillar of sustainable development.

Our study is different from the existing studies in several ways. First, researchers and policymakers have theoretically claimed that a higher growth pattern in the Asian region is not inequality-adjusted growth. We have proved this argument empirically by using the Kuznets curve hypothesis and a substantial number of important control variables. By employing the non-linear model, we consider both economic factors, such as FDI and trade openness, and social and political factors, such as government size and corruption, in our empirical investigation. We analyze the effect of each factor on inequality with the most up-to-date dataset and in a more comprehensive manner than any other recent study on Asian economies.

The remainder of this study is structured as follows: Section 2 reviews the basic stylized facts regarding the Asian economies; Section 3 provides existing FDI–inequality, trade–inequality, and growth–inequality empirical literature; Section 4 describes the data, its sources, and the methodology used in this study; Section 5 presents the empirical results and justification of findings as per theory and literature; and Section 6 concludes the article with policy recommendations, research limitations, and further possible studies.

2. BASIC STYLIZED FACTS REGARDING ASIAN ECONOMIES

Asia is currently the economic region of the world with the most growth, backed by increased opening up of trade policies and increased flow of FDI into the continent. Once, Asian economies were growing with equity, but

recent experience has blurred that scenario. Currently, most Asian economies are growing faster, which also leads to increased inequalities. Growth with inequality cannot benefit all of the people in any country, and it creates problems for Asian economies. So, to reap the benefits of economic growth and facilitate the advantages of growth for all people, countries must formulate and implement policies accordingly. Figure 1 shows the Gini coefficients for 1995, 2000, 2005, 2010, and 2015 for 25 Asian economies. The five-year average of Gini indices shows that most Asian economies experienced an increase in income inequality. In Figure 2, Hong Kong shows the highest level of income inequality in the Asian region. Malaysia stands at second in the graph, with constantly decreasing income inequality.

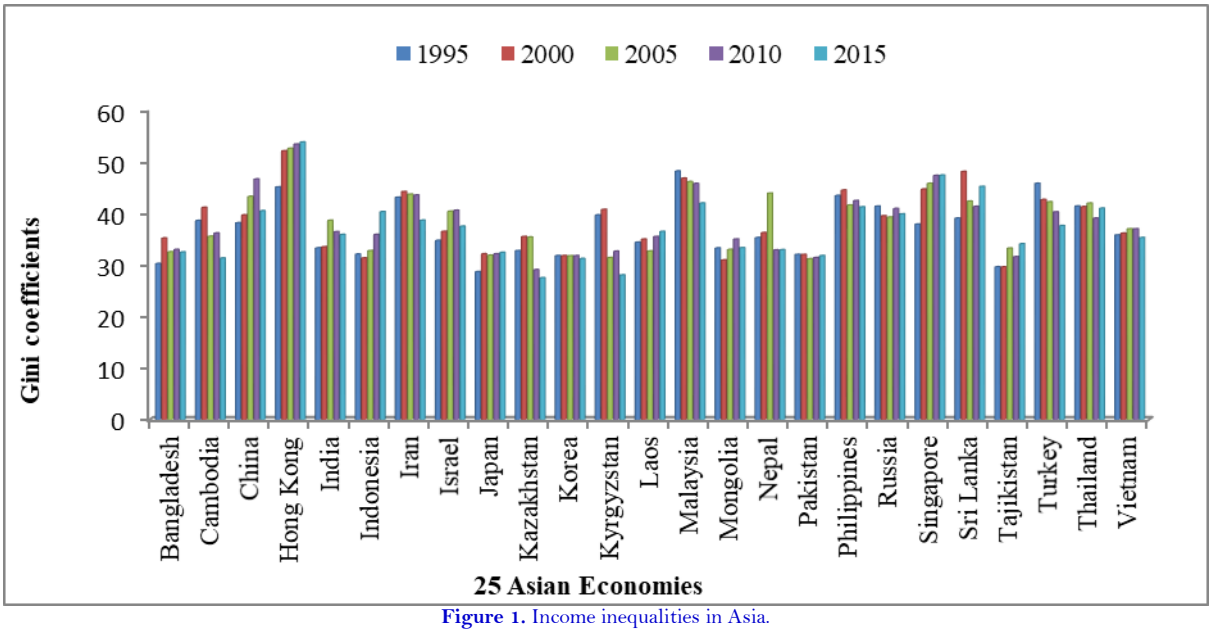

Figure 1. Income inequalities in Asia.

Figure 2 exhibits the Gini coefficients for 25 Asian economies for 1995 and 2015. Looking at the graph closely, we can see that among the 25 economies, 12 economies (Bangladesh, China, Hong Kong, India, Indonesia, Israel, Japan, Laos, Mongolia, Singapore, Sri Lanka, and Tajikistan) experienced a rise in income inequality. In contrast, the other 13 economies (Vietnam, Thailand, Turkey, Russia, Philippines, Pakistan, Nepal, Malaysia, Kyrgyzstan, Korea, Kazakhstan, Iran, and Cambodia) experienced a fall in income inequality.

In 1995, Malaysia reported the highest Gini coefficient among reporting economies, whereas Turkey, Hong Kong, Philippines, Iran, Thailand and Russia reported the subsequent values in that order. In 2015, Hong Kong reported the highest Gini coefficient among the 25 economies. After that Singapore, Sri Lanka, Malaysia, Philippines, Thailand, China and Indonesia occupied the subsequent positions in income inequality in 2015.

Asian economies are growing, but experts allege that the benefits of this growth are only received by a specific class of people. However, to ensure a sustainable and balanced economic growth throughout the world, economic planners have set a Gini coefficient target value of 29.5.

In the Figure 3, there are 19 Asian economies, including least developed, developing and developed countries. The Gini coefficients are shown for four consecutive years, from 2015 to 2018. Over this period, we can see that out of these 19 economies only seven have a Gini coefficient under 29.50 and the other 12 have a higher Gini coefficient, which refers to the higher disparity or inequality of income among these Asian economies. So, to adapt to the SDG 10 requirements regarding the reduction of income equality, the countries implementing sustainable development should focus on equal distribution of resources and income to ensure equity among people of all classes.

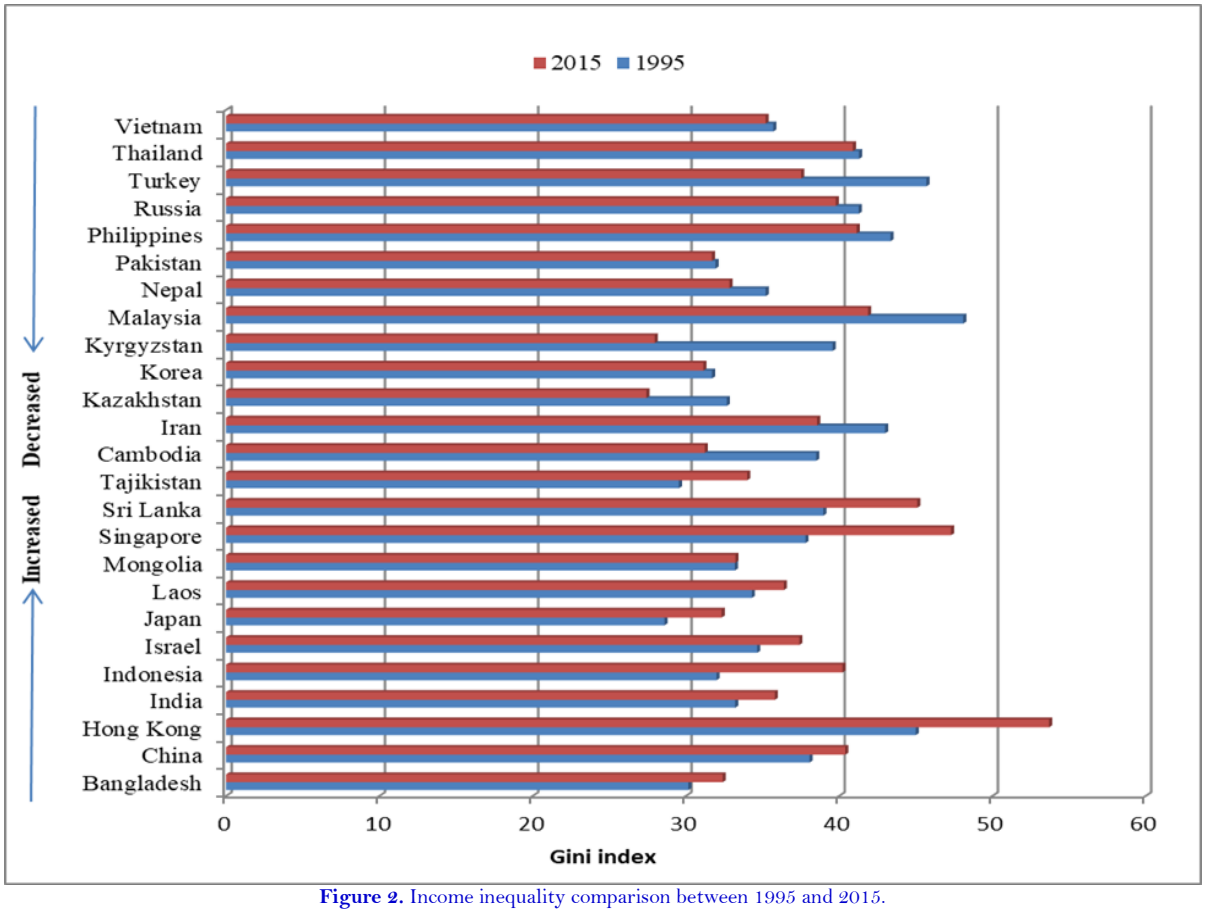

Figure 2. Income inequality comparison between 1995 and 2015.

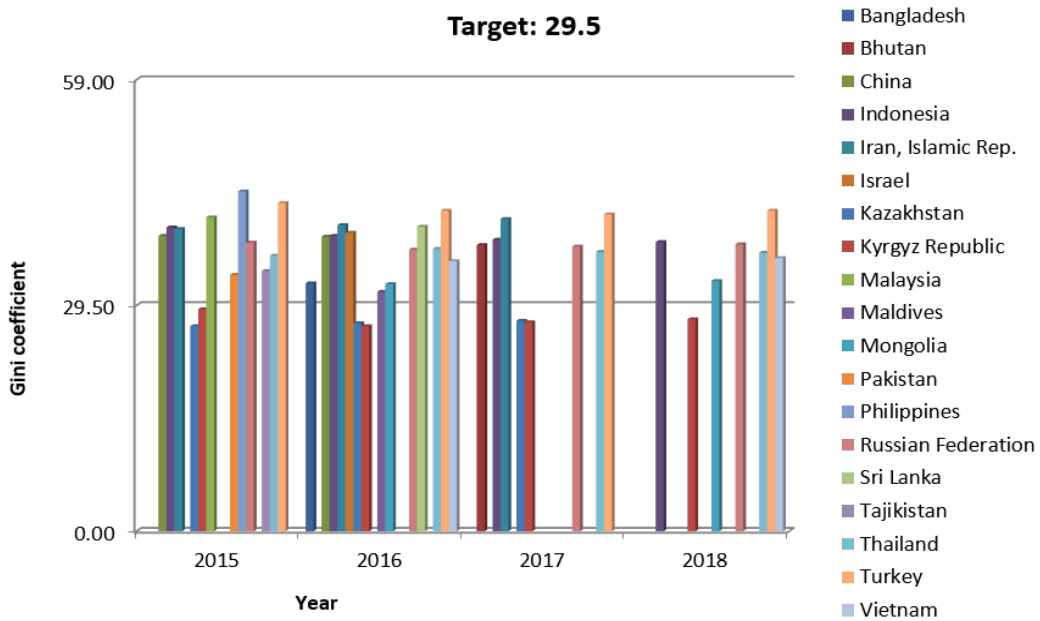

Figure 3. Gini coefficients of Asian economies.

3. LITERATURE REVIEW

Theoretical literature on the inequality of income and economic growth could be separated into the "classical theory" and "political economy" approaches. Classical theory states that the savings rate increases with wealth, and therefore there is a positive connection between economic growth and income inequality (Stiglitz, 1969). Accordingly, in a state of income inequality, the incomes of the richer population increase, which gives them higher saving rates and encourages the accumulation of capital and investment that consecutively produces higher economic growth. On

the other hand, the political economy ideology states the negative aspect of inequality and assumes that income inequality is detrimental to economic growth. It states that increasing inequality produces higher social pressure toward distribution policies that create rent-seeking activities and credit market imperfections. These policies bring about distortions in societies that affect the physical capital build-up, human capital accretion, and economic growth. As inequality creates social unrest, governments will try to minimize instability to strengthen its power and tenure. For this reason, the government will spend on short-term projects that give instant benefits to all classes, and long-term investment will be ignored, resulting in a lack of economic growth. When the rich see that the returns on private investments are not in their favor, they will not invest further, which may also hamper investment and economic growth. So, there are arguments for both sides of the relationship between economic growth and income inequality.

3.1. The Foreign Direct Investment and Income Inequality Nexus

Income inequality has been a growing concern in Asia in recent times. The benefit of growth and investment is not adequately distributed among all social groups. Many researchers have focused their recent studies on inequality to determine the inherent causes of inequality and offer policy suggestions to policymakers. With the wave of these studies, Alderson and Nielsen (1999) devoted their time to estimating the consequences of FDI on income inequality using unbalanced panel data for 88 countries, with 488 observations over a period of 28 years, from 1967 to 1994. For the data analysis, the authors used the random effects model (REM) and found that the stock of FDI affects inequality independently of the mechanisms identified by Firebaugh. The researchers concluded that the link between investment dependence and income inequality should be revisited in the presence of an investment–development path that relates the flows of foreign investment to economic development. With further investigation of income inequality by Reuveny and Li (2003), democracy and economic openness showed mixed results. Their study used panel data for 69 countries/states worldwide over 37 years, from 1960 to 1996, and economic openness was represented by trade flows, the inflow of FDI, and the inflow of financial capital. For income inequality, Gini coefficient datasets were utilized. It was concluded that income inequality is reduced by trade and democracy, whereas foreign direct investment contributed to increasing income inequality, but there was no impact of financial capital on income inequality. Mahutga and Bandelj (2008) explored the effect of FDI on income inequality in Central and Eastern European countries. For the data analysis, they used the fixed effects model and they found that foreign direct investment has a strong positive effect on income inequality, which means that FDI triggers inequality in European nations, showing that the influence is noticeable over the short term.

Kaulihowa and Adjasi (2018) conducted research on African countries to determine the scenario of income inequality after being instrumented by FDI. They utilized panel data for 16 nations and collected data over a 34-year period, from 1980 to 2013. Using the pooled mean group (PMG) estimator, the study concluded that the association between inequality and FDI is non-linear and stated that FDI followed U-shaped behavior with inequality. The results showed that FDI first decreases income inequality and later increases inequality with the further increases in FDI. They proposed that even though FDI might improve development, FDI-actuated development may not convert into a decrease in inequality. Therefore, FDI must be organized so that the subsequent benefits can be utilized effectively.

To identify specific consequences of FDI in a single country, Teixeira and Loureiro (2019) conducted a study on income inequality and poverty reduction in the case of Portugal. To achieve this, they used time-series data for Portugal over a 44-year period, from 1973 to 2016. They used Johansen cointegration and Granger non-causality tests to produce accurate estimations. The results showed that FDI inflow and poverty have a causal relationship in the long run. There is unidirectional causation from inequality to FDI but no causality from FDI to inequality. Moreover, they found that human capital played a key role in reducing income inequality and poverty, which indirectly contributed to additional FDI inflows.

3.2. Trade Openness and Income Inequality Nexus

Trade openness increases the volume of world trade and countries' participation, contributing to high growth rates for participant countries and the transfer of technical know-how, which aggregately contributes to reducing income inequality. The correlation between inequality and trade openness has also gained the attention of researchers. The link between inequality and trade openness has produced mixed outcomes for different countries, periods, and techniques. Several studies show an adverse affiliation between economic growth and inequality, few show a positive relationship, and some show no relationship at all. Barro (2000) tried to sum up the inequality and trade openness relationship theories and found mixed results from standard trade theory and the debate on globalization. Standard trade theory suggests that trade openness causes inequality to increase in rich countries and reduce in poor nations. This contrasts with the globalization debate, which states that more open trade will benefit the already well-off countries rather than poor countries. Zhu and Trefler (2005) examined the affiliation between trade and inequality in developing nations using the general equilibrium model. For the analysis, they used four-digit Schwarz information criterion (SIC) data for northern countries, organization for economic cooperation and development (OECD) countries, and southern countries. They found a positive relationship across southern countries between the growth in wage inequality and the shifting of export shares, which claims that trends in wage inequality across developing and industrialized countries are linked by the general equilibrium trade movements triggered by technological catch-up. Mahesh (2016) examined the effect of trade openness on income inequality in BRIC (Brazil, Russia, India, and China) nations. He found that trade openness has resulted in aggravating income distributions in the sample countries. Grossman and Helpman (2018) examined the triangular liaison among growth, trade, and inequality with the co-determination of a country's growth and income inequality in the case of both closed and open economies. They allowed international trade and knowledge spillovers to link with inequality measures and found that income inequality is exacerbated by knowledge sharing because it inspires innovation and productivity in the sample countries, thus creating demand for knowledge-intensive labor.

The negative effect of trade on inequality has been addressed by Kraay and Dollar (2004) and Van Marrewijk (2007). Kraay and Dollar (2004) examined globalization and its impact on inequality and found that globalization and openness to trade reduce inequality for emerging countries. Van Marrewijk (2007) tried to identify the link between inequality and trade openness. He found that openness and international trade lower inequality in developing countries with an abundance of labor and increases inequality in capital-abundant rich countries. However, Edwards (1997) used an assortment of countries for different years during the 1970s and 1980s to identify the relationship between trade openness and income distribution. He found that the effects of trade policy differ in less developed and advanced economies, and countries with high external sector distortion experience high inequality, other things remaining the same. He asserted that "there is no evidence of a link between trade openness and increasing levels of income inequality."

3.3. Economic Growth–Income Inequality Nexus

The inequality–growth nexus has shown mixed results in several studies, which have found a parabolic, positive, negative, non-linear, and no connection between inequality and economic growth. The earlier works of Kuznets (1955) stated a parabolic relationship between economic growth and inequality. He stated that increasing economic growth (income) contributes to raising inequality first and then reduces inequality after a certain point. This relationship is more likely to be an inverse U-shape association between inequality and growth.

3.4. Positive and Negative Liaisons Between the Inequality–Growth Nexus

Li and Zou (1998) used data from 1960 to 1990. They used static panel data techniques, namely the fixed effects and random effects methods. After the processing and analysis, they found an affirmative association between inequality (Gini coefficient) and economic growth. They showed that if inequality increases by one standard deviation,

then economic growth will increase at the rate of 0.45–0.48%. Theoretically, this positive relationship can be supported when increasing inequality increases savings among the rich people, who will give a higher return on investments and pave the way for higher economic growth. Forbes (2000) tried to elucidate the connection between inequality and economic growth using diverse panel data methods, i.e., random effects (RE) and fixed effects (FE) models, and the difference generalized method of moments (Diff. GMM). She took into account time dummies and country dummies for unobservable country effects and periods when global economic shocks happened and found confirmation of a bond between the Gini coefficient and economic growth in all estimation techniques. She asserted that "a ten-point increase in a country's Gini coefficient is correlated with a 1.3% increase in annual growth over the next five years". Persson and Tabellini (2012) in their notable paper "Is inequality harmful to growth?" that was published in the American Economic Review, found that in a society with high distributional conflict, economic policies are based on political decisions in order to redistribute income through tax collection and growth-promoting activities. This paper postulates a theoretical model that represents this idea supported by both past panel records and after-war cross-segments evidence indicating a large, adverse and noteworthy correlation between inequality and economic growth. Assa (2012) used 141 countries as samples between 1998 and 2008 to determine the connection between inequality and growth. He employed the ordinary least squares (OLS) and the two-stage least squares (2SLS) techniques. He also used the Gini coefficient as an indicator for income inequality and found proof regarding the estimated coefficient, which is undesirable and statistically momentous. If the Gini coefficient increases by one standard deviation on average, the subsequent economic growth will lower by 6%–7%. To ensure the robustness of the results, he used instrumental variables in the model, and to remove reverse causation, he also used previous years as a reference.

3.5. Non-Linear and No Relationship between Inequality–Growth Nexus

Barro (2000) aimed to determine the relationship between economic growth and inequality by using different econometric techniques and found results supporting a non-linear liaison between economic growth and inequality. He added that economic growth positively affects rich countries and negatively affects poor countries. Banerjee and Duflo (2003) attempted to clarify the affiliation between per capita income and inequality (Gini) and found a negative and statistically important correlation. They also found that the relationship is non-linear and quadratic, which means that it turns into an inverted U-shape, supporting the Kuznets curve hypothesis. Deyshappriya (2019) examined the impression of macroeconomic dynamics on inequality and distribution of income for 33 Asian economies over 24 years, from 1990 to 2013. He used dynamic panel data models and found a reversed-U shape (parabolic) association between gross domestic product (GDP) and inequality, supporting the Kuznets curve hypothesis. It states that income inequality in Asian countries increases with GDP and decreases after a further rise in GDP. Panizza (2002) used data for a single US state to identify the relationship between inequality (Gini coefficient and the third quintile income share) and economic growth. He did not find statistically significant estimates for the coefficient and concluded that "the cross-state relationship between inequality and growth is not robust to small changes in the data or econometric specification."

4. DATA AND METHODOLOGY

To assess the impact of economic growth, FDI and trade openness on inequality, we use annual panel data for 25 Asian economies from 1991 to 2018. The sample countries include Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Iran, Israel, Japan, Kazakhstan, Korea, Kyrgyzstan, Laos, Malaysia, Mongolia, Nepal, Pakistan, Philippines, Russia, Singapore, Sri Lanka, Tajikistan, Thailand, Turkey and Vietnam, which were selected based on the availability of data.

Following Barro (2008), our empirical model is based on the Kuznets curve hypothesis that inequalities are the product of growth and other controls.

$$Gini_{jt} = f(Y_{jt}, Y_{jt}^2, Control\ variables)$$

Our other main variables of interest are foreign direct investment (FDI) and trade openness (TO). Thus, following Barro (1999); Barro (2008); Forbes (2000); Deyshappriya (2019) and Naguib (2017), the main empirical model of the study is:

$$Gini_{jt} = \gamma_0 + \gamma_1 lnY_{jt} + \gamma_2 (lnY)_{jt}^2 + \gamma_1 lnFDI_{jt} + \gamma_1 lnTO_{jt} + \beta_1 Z'_{jt} + \varepsilon_{jt}$$

Where:

$Gini_{jt}$ refers to the Gini coefficient, the proxy of income inequality and the main dependent variable. The coefficient is an index ranging from 0 to 1, with 0 meaning no inequality and 1 meaning perfect inequality. The Gini data were collected from the World Banks' world development indicators (WDI) and the United Nations University world income inequality database for economic research (UNU-WIDER). lnY_{jt} denotes the natural log of per capita GDP, which is the proxy of economic growth. The squared term of lnY_{jt} is the indication of the existence of the Kuznets curve hypothesis. $lnFDI_{jt}$ and $lnTO_{jt}$ represent the inflow of FDI and trade as a proportion of GDP, respectively. Z'_{jt} is the vector of other control variables, such as domestic investment, corruption, government size, and inflation. Domestic investment (DI) is proxied by gross fixed capital formation as a percentage of GDP. Investment from any internal or external sources helps to set up new factories and generate employment opportunities, which can assist in reducing inequity. Similarly, the proxies of corruption and government size (Govtsize) are the corruption perception index (CPI) and government consumption as a percentage of GDP, respectively. CPI refers to the abuse of public power for personal benefit and is measured on a scale from 0 (highly corrupt) to 100 (very clean). Data on FDI, TO, DI, government size, and inflation was obtained from the WDI database, and the CPI data is available from the Transparency International database. Finally, ε_{jt} is the error of the model that contains both country and year effects. Due to the limited availability of data on the income inequality indicator (Gini index), we have transformed the data for all variables into five-year averages, i.e., 1991–1995, 1996–2000, 2001–2005, 2006–2010, and 2011–2015. To ensure consistent and robust results from the findings of the initial model, a two-step system generalized method of moments estimation strategy was used in this analysis.

5. RESULTS AND DISCUSSION

5.1. Summary Statistics and Correlation Matrix

Table 1 contains the data summary of each variable, and Table 2 shows the correlation matrix of the variables considered for this study. Income inequality (Gini) shows a mean of 37.50 with a total of 142 observations across the 25 Asian economies during each of the six five-year time periods.

From the correlation matrix (see column 1 in Table 2), all variables are positively correlated with the Gini index except for inflation and the size of the government. This positive relationship is statistically significant at a 5% level, except for DI. Our initial interpretation from the matrix is that economic growth, FDI, and trade openness enhance inequality in the Asian economies. The Kuznets curve hypothesis is primarily absent between inequality and the growth indicator in the correlation matrix.

Table 1. Descriptive Statistics.

Variable		Mean	Standard Deviation	Minimum	Maximum	Observations
Gini	Overall	37.499	5.945	24.900	53.900	N = 142
	Between		5.380	30.878	51.733	n = 25
	Within		2.645	30.766	46.191	T-bar = 5.68
lnGDP	Overall	7.801	1.578	5.134	10.933	N = 150
	Between		1.472	5.882	10.530	n = 25
	Within		0.630	6.199	9.267	T-bar = 6
$lnGDP^2$	Overall	63.330	25.531	26.356	119.520	N = 150
	Between		24.125	34.897	110.877	n = 25
	Within		9.452	40.439	86.432	T-bar = 6

Variable		Mean	Standard Deviation	Minimum	Maximum	Observations
FDI	Overall	4.097	6.576	-7.761	45.298	N = 143
	Between		6.005	0.191	27.219	n = 24
	Within		3.455	-11.338	22.607	T-bar = 5.958
Tradeopen	Overall	94.611	82.764	16.881	425.158	N = 150
	Between		80.763	25.345	353.565	n = 25
	Within		23.369	12.324	202.162	T-bar = 6
CPI	Overall	39.082	19.636	11.000	92.800	N = 111
	Between		18.892	20.863	89.815	n = 25
	Within		4.499	27.559	61.748	T-bar = 4.44
DI	Overall	25.306	6.385	8.223	45.142	N = 148
	Between		4.963	15.734	38.518	n = 25
	Within		4.098	14.293	36.967	T-bar = 5.92
Inflation	Overall	27.164	163.160	-2.255	1877.372	N = 145
	Between		66.921	0.406	326.955	n = 25
	Within		148.844	-293.023	1577.581	T-bar = 5.8
Govtsize	Overall	12.222	4.503	4.606	26.203	N = 148
	Between		4.279	5.111	24.278	n = 25
	Within		1.536	7.590	18.241	T-bar = 5.92

Table 2. Correlation matrix.

Variable	Gini	lnGDP	lnGDP²	FDI	Tradeopen	CPI	DI	Inflation	Govtsize
Gini	1								
lnGDP	0.2839*	1							
lnGDP²	0.2734*	0.9958*	1						
FDI	0.4678*	0.3449*	0.3668*	1					
Tradeopen	0.5263*	0.3934*	0.4133*	0.7979*	1				
CPI	0.4712*	0.8053*	0.8311*	0.5004*	0.6462*	1			
DI	0.1374	0.2751*	0.2436*	0.0625	0.0532	0.0677	1		
Inflation	-0.0605	-0.0519	-0.0605	-0.0441	-0.0134	-0.2824*	0.0036	1	
Govtsize	-0.0726	0.3702*	0.3683*	-0.1695*	-0.1680*	0.2452*	-0.0371	0.0827	1

Note: * represents a significance level of 5%.
Gini = Gini coefficient; lnGDP = log of gross domestic product; lnGDP² = squared term of logged gross domestic product; FDI = foreign direct investment; Tradeopen = trade openness; CPI- = corruption perception index; DI = domestic investment; Govtsize = government size.

Figure 4. Scatterplots of the Gini Index and Growth.

5.2. Checking the Existence of the Kuznets Curve

In this stage, we investigate the existence of the Kuznets curve in our model of income inequality and growth. As our dataset represents the panel data of 25 economies, we first decide whether to use the random effects (RE) or the fixed effects (FE) model through the Hausman specification test (Hausman, 1978). The test results indicate that the RE model is the most appropriate to use, followed by generalized least squares (GLS) regression as it produces a

more unbiased and consistent estimator. In Figure 4, the scatter plot diagrams of growth (lnGDP) and squared term of growth ($lnGDP^2$) represent patterns that initially support the existence of the Kuznets curve.

From the GLS estimation, the turning point of the Kuznets curve of inequality is 7.89 based on the following equation:

$$\tau = \frac{-\beta_1}{2\beta_2}$$

Where τ = the turning point, β_1 = the coefficient of income (lnGDP), and β_2 = the coefficient of the squared term of income ($lnGDP^2$).

Figure 5 below depicts the pattern of inequalities concerning growth. This turning point denotes that before 7.89, inequality rises with the increase in income or growth (lnGDP), but inequality tends to fall with a further increase in income (lnGDP). This finding justifies the use of the Kuznets curve hypothesis in our model to evaluate the impact of FDI and TO on inequality in Asian countries.

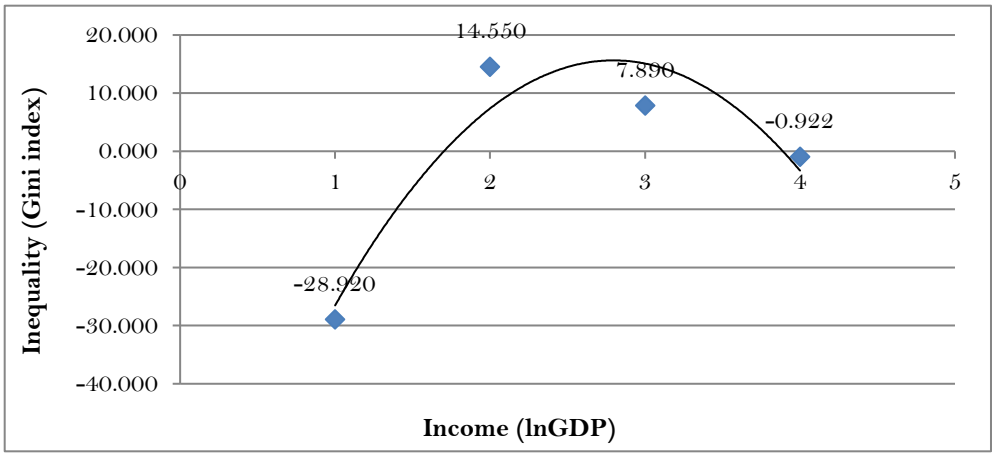

Figure 5. Kuznets curve of inequality.

5.3. Regression Results

First, the pooled OLS was applied to the regression model to evaluate the effect of economic growth, FDI and trade openness on income inequality. The results of shown in Column I of Table 3 indicate a positive relationship between growth and inequality and is significant at the 0.01 level, which states that a 1% increase in the economic growth of Asian economies, income inequality increases by 14.55%. The squared term of the growth is negative and highly significant, affirming that when Asian economies increase by a further 1%, income inequality tends to fall by 0.922%, which confirms that Asian economies follow the Kuznets curve hypothesis. FDI shows an insignificant but positive impact on inequality. Trade openness shows a positive and significant impact on inequality, inferring that when trade openness increases by 1%, inequality increases by 0.0338%. The positive and significant impact of CPI illustrates that corruption leads to more inequality. However, researchers have claimed that the pooled OLS might produce bias and inconstant estimators, particularly in panel data set; therefore, utilization of the fixed effects (FE) or random effects (RE) models are more appropriate to achieve more consistent and unbiased estimators.

Second, we employed the Hausman (1978) specification test to determine the use of the FE model over the RE model, or vice versa. The p-value of the test is 0.3187, which denotes that we should use the RE model over the FE model in the analysis. However, the results of both the FE and RE models are presented in Table 3 for comparison purposes. All other estimators symbolize a statistically insignificant relationship with inequality in the RE and FE models, except for TO and DI. However, the negative sign of squared economic growth in the RE model still indicates that the Kuznets curve exists. Studies further recommend employing the generalized least squares (GLS) method

over the RE model, as the GLS produces efficient, consistent, and unbiased results in the case of RE estimation. So, in the third stage, we use the GLS estimation, and the results are presented in Column IV of Table 3.

It was found that economic growth is positive and significant, which means that as the Asian economies grow, the inequality in Asia also rises. This is in accordance with Forbes (2000), who stated that growth leads to higher inequality. Then, when there is a further economic boost in Asia, inequality in Asian economies tends to fall. The squared term of economic growth supports this, and it assures the existence of the Kuznets curve of income inequality. This result is validated by Kuznets (1955), who first confirmed the parabolic liaison between inequality and economic growth. The inflow of FDI into Asia also contributes to its increased inequality, which Mahutga and Bandelj (2008) justified. The coefficient of trade openness shows that if Asian economies open up by 1%, income inequality increases by 0.0338%. The CPI shows a positive and significant sign that if corruption decreases in any Asian country, then inequality rises. The finding is somewhat contradictory as it goes beyond conventional thinking. Generally, if corruption increases, inequality also increases.

Table 3. Regression results.

Dependent variable: Income Inequality (Gini Index).					
Variable	**(I)**	**(II)**	**(III)**	**(IV)**	**(V)**
	Ordinary Least Squares (OLS)	**Fixed Effects (FE)**	**Random Effects (RE)**	**Generalized Least Squares (GLS)**	**Two-step System GMM**
lnGDP	14.55**	-2.875	-0.696	14.55***	14.83**
	(6.039)	(4.548)	(5.086)	(5.043)	(6.437)
lnGDP2	-0.922**	0.103	-0.0114	-0.922***	-0.973**
	(0.379)	(0.294)	(0.323)	(0.322)	(0.402)
FDI	0.0539	-0.00519	-0.00167	0.0539	0.191**
	(0.155)	(0.0893)	(0.0629)	(0.109)	(0.0796)
Tradeopen	0.0338***	0.0282*	0.0315***	0.0338***	0.000454
	(0.0120)	(0.0152)	(0.0111)	(0.0114)	(0.0123)
CPI	0.117*	0.0823	0.0823	0.117*	0.121*
	(0.0687)	(0.0639)	(0.0666)	(0.0620)	(0.0706)
DI	0.0901	0.226**	0.194***	0.0901	0.00510
	(0.0791)	(0.0933)	(0.0697)	(0.0809)	(0.0900)
Inflation	0.0235	0.0126	0.0229	0.0235	-0.0119
	(0.0379)	(0.0361)	(0.0223)	(0.0497)	(0.163)
Govtsize	0.0924	0.0213	0.0792	0.0924	0.280
	(0.135)	(0.213)	(0.167)	(0.142)	(0.192)
L.Gini					0.704***
					(0.196)
Constant	-28.92	42.54***	32.00	-28.92	-52.68**
	(24.55)	(15.97)	(22.17)	(19.60)	(25.27)
Robust SE	Yes	Yes	Yes	No	Yes
Observations	99	99	99	99	99
Number of countries	24	24	24	24	24
R-squared					
Within	-	0.1849	0.1705		
Between	-	0.3064	0.3843		
Overall	-	0.3204	0.3898		
F-statistic/Wald Chi^2	0.470			87.85	37.14
Groups/Instruments					23/20
AR(1) (p-value)					0.036
AR(2) (p-value)					0.660
Sargan Test (p-value)					0.734
Hansen J-statistics (p-value)					0.776

Note: ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively; standard errors are given in brackets; p-values are informed for AR(1), AR(2), the Sargan (1988) test, and the Hansen (1982) statistics. The GMM estimator uses the xtabond2 of STATA (Roodman, 2009).
Gini = Gini coefficient; lnGDP = log of gross domestic product; lnGDP^2 = squared term of logged gross domestic product; FDI = foreign direct investment; Tradeopen = trade openness; CPI = corruption perception index; DI = domestic investment; Govtsize = government size.

Nevertheless, in this paper, we see the opposite. It can be explained by the findings of Dobson and Ramlogan-Dobson (2010) and Andres and Ramlogan-Dobson (2011), who stated that the informal sector's existence in the economy decreased corruption and led to widening inequality in the Asian economy. The coefficient of CPI states that if corruption decreases in Asian economies by 1%, then inequality increases by 0.117%. Other control variables, i.e., domestic investment, inflation, and government size, are not significant under the GLS estimation, but they positively impact inequality.

Finally, to ensure the consistency of the findings, system GMM estimation technique is used to convert the main equation into the dynamic panel data model. Another rationale for using the dynamic model is that the income inequality of the previous year may affect the current year's inequality. Moreover, the system GMM estimation for the dynamic model reduces the problem that arises from the omitted variable biases. The results from the two-step system GMM estimation are presented in Column V below.

The estimator of economic growth was found to be positive and significant at the 5% level, *ceteris paribus*. An increase in economic growth provokes an increase in income inequality up to a certain point, and after that point, a further increase in growth leads to a reduction in inequality, which is shown by the parameter of the squared term of economic growth. This conclusion is supported by Banerjee and Duflo (2003) and Deyshappriya (2019). This inference is analogous to the finding of the GLS model (Table 3, column IV). The impacts of FDI and CPI in the GMM estimator are positive and significant, meaning that inequality increases with the increase in the flow of FDI, and corruption. Though the GMM estimator of TO is not significant, the positive impact persists so that openness promotes income inequality. The positive impact of trade openness on inequality is justified by the study of Mahesh (2016) on BRICS countries. The sign and level of significance of all the estimates of the remaining control variables are the same irrespective of the GLS model or the system GMM model, with the exception of the inflation variable. Lastly, the coefficient of the lagged dependent variable (L.Gini) is significant at the 1% level of significance and shows a positive sign. This means that a 1% increase in the lagged dependent variable (L.Gini) leads to a 0.704% increase in the dependent variable (Gini), other things remaining constant, indicating that the previous year's inequality brings about an escalation in the current year's inequality.

6. CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

This study analyzes how economic growth, foreign direct investment, and trade openness affect income inequality in Asian economies. Equality is one of the three pillars of sustainable development. We also examine the existence of the Kuznets curve and whether it hinders the achievement of SDG 10 (reduced inequality). Panel data for 25 Asian countries from 1991 to 2018 and a static and dynamic panel data estimation strategy were used in this analysis.

Our empirical investigation found that economic growth increases inequality in the economy to a certain level. After that level, growth in Asian economies helps to reduce inequality. We also found that the effects of FDI and TO on inequality are positive, which means that both FDI and TO contribute to the increase in income inequality in Asia. This happens when domestic firms can't compete with multinational enterprises with FDI. Many of these firms go out of businesses, which ultimately brings about inequality in income distribution. Governments and policymakers of Asian economies should implement strategies to support domestic firms in their efforts to stay competitive and secure benefits from multinational organizations.

We did not find a significant impact of inflation, domestic investment, and government size on inequality. One of the interesting findings is that a controlled level of corruption helps to reduce inequalities in the economy. Therefore, except corruption, FDI and TO have increased inequalities in the Asian region, making it tough to achieve SDG 10 within the stipulated time and ensure sustainable development. To ensure fair and equal distribution of income, the leaders of Asian countries should formulate and implement policies so that FDI and openness bring about reduced inequalities in Asian regions. The Kuznets curve in Asia also bolsters the effect of economic growth to reduce

inequalities after a certain time. So, governments in Asian economies should take steps to reimburse economic growth to people of all classes. Measures should be taken to curb corruption immediately to ensure proper distribution of resources and income and provide basic facilities for all people.

The main challenge of this study is the availability of data regarding income inequality. Data gaps for several years were found for different Asian economies. To overcome this, a five-year average of the available data was used to systematically conduct the research on 25 Asian economies.

Moreover, conducting research based on a few observations is always challenging and can be non-representative of a vast region. Our attempt to produce unbiased results could be improved by employing other sophisticated techniques. Interested researchers can use this study as a guideline to conduct further research in this field with new data, new areas, and new models.

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REFERENCES

Alderson, A. S., & Nielsen, F. (1999). Income inequality, development, and dependence: A reconsideration. *American Sociological Review*, *64*(4), 606-631.

Andres, A. R., & Ramlogan-Dobson, C. (2011). Is corruption really bad for inequality? Evidence from Latin America. *Journal of Development Studies*, *47*(7), 959-976.Available at: https://doi.org/10.1080/00220388.2010.509784.

Assa, J. (2012). Inequality and growth re-examined. *Technology and Investment*, *3*(1), 1-6.

Banerjee, A. V., & Duflo, E. (2003). Inequality and growth: What can the data say? *Journal of Economic Growth*, *8*(3), 267-299.

Barro, R. J. (1999). Inequality, growth, and investment (pp. 1-54). NBER Working Paper Series, No. 7038.

Barro, R. J. (2000). Inequality and growth in a panel of countries. *Journal of Economic Growth*, *5*(1), 5-32.

Barro, R. J. (2008). Inequality and growth revisited (pp. 1-24). ADB Working Paper Series on Regional Economic Integration, No. 11.

Deyshappriya, N. R. (2019). Impact of macroeconomic factors on income inequality in Asian countries. Demystifying Rising Inequality in Asia (Vol. 696, pp. 111-131). Manilla: Asian Development Bank Institute.

Dobson, S., & Ramlogan-Dobson, C. (2010). Is there a trade-off between income inequality and corruption? Evidence from Latin America. *Economics Letters*, *107*(2), 102-104.Available at: https://doi.org/10.1016/j.econlet.2009.12.038.

Edwards, S. (1997). Trade policy, growth, and income distribution. *The American Economic Review*, *87*(2), 205-210.

Forbes, K. J. (2000). A reassessment of the relationship between inequality and growth. *American Economic Review*, *90*(4), 869-887.Available at: https://doi.org/10.1257/aer.90.4.869.

Grossman, G. M., & Helpman, E. (2018). Growth, trade, and inequality. *Econometrica*, *86*(1), 37-83.

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica*, *50*(4), 1029–1054.Available at: https://doi.org/10.2307/1912775.

Hausman, J. (1978). Specification tests in econometrics. *Econometrica*, *46*(6), 1251-1271.Available at: https://doi.org/10.2307/1913827.

Kaulihowa, T., & Adjasi, C. (2018). FDI and income inequality in Africa. *Oxford Development Studies*, *46*(2), 250-265.Available at: https://doi.org/10.1080/13600818.2017.1381233.

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

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

Li, H., & Zou, H.-f. (1998). Income inequality is not harmful for growth: Theory and evidence. *Review of Development Economics*, *2*(3), 318-334.Available at: https://doi.org/10.1111/1467-9361.00045.

Mahesh, M. (2016). The effects of trade openness on income inequality-evidence from BRIC countries. *Economics Bulletin*, *36*(3), 1751-1761.

Mahutga, M. C., & Bandelj, N. (2008). Foreign investment and income inequality: The natural experiment of Central and Eastern Europe. *International Journal of Comparative Sociology*, *49*(6), 429-454.Available at: https://doi.org/10.1177/0020715208097788.

Naguib, C. (2017). The relationship between inequality and growth: Evidence from new data. *Swiss Journal of Economics and Statistics*, *153*(3), 183-225.Available at: https://doi.org/10.1007/bf03399507.

Panizza, U. (2002). Income inequality and economic growth: Evidence from American data. *Journal of Economic Growth*, *7*(1), 25-41.

Persson, T., & Tabellini, G. (2012). Is inequality harmful for growth?. Retrieved from: http://www.eco.uc3m.es/~mkredler/ReadGr/LoBelloOnPerssonTabellini94.

Reuveny, R., & Li, Q. (2003). Economic openness, democracy, and income inequality: An empirical analysis. *Comparative Political Studies*, *36*(5), 575-601.Available at: https://doi.org/10.1177/0010414003036005004.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, *9*(1), 86-136.

Sargan, J. D. (1988). *Testing for misspecification after estimating using instrumental variables. Contributions to econometrics*. New York: Cambridge University Press.

Stiglitz, J. E. (1969). Distribution of income and wealth among individuals. *Econometrica: Journal of the Econometric Society*, *37*(3), 382-397.Available at: https://doi.org/10.2307/1912788.

Teixeira, A. A., & Loureiro, A. S. (2019). FDI, income inequality and poverty: A time series analysis of Portugal, 1973–2016. *Portuguese Economic Journal*, *18*(3), 203-249.Available at: https://doi.org/10.1007/s10258-018-00152-x.

Van Marrewijk, A. (2007). Managing public–private megaprojects: Paradoxes, complexity, and project design. *International Journal of Project Management*, *26*(6), 591-600.

Zhu, S. C., & Trefler, D. (2005). Trade and inequality in developing countries: A general equilibrium analysis. *Journal of International Economics*, *65*(1), 21-48.Available at: https://doi.org/10.1016/j.jinteco.2003.11.005.