Wealth Inequality, Growth and Openness – A Dynamic Panel Analysis

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This study investigates how trade openness and financial openness influence wealth inequality by considering heterogeneity across transitional and developed countries in South and South-East Asia by employing dynamic panel data model with World Inequality Database (WID) and World Development Indicators of the World Bank over the period 1990 to 2000. We regress wealth inequality index on trade openness index, financial openness index, GDP, proportion of working age population and urbanisation in a dynamic panel setup. The study observes that trade openness reduces wealth inequality while financial openness increases it. Economic growth aggravates inequality, but urbanisation helps to reduce inequality for the full sample of countries. This empirical result can be explained by looking into the conditions in the labour markets by following the Stolper-Samuelson theorem.

Keywords: Trade openness, wealth inequality, GMM estimation, transition economies
JEL classification: C26, D31, D63, F02, F60, H11, H20

1. Introduction

The conventional wisdom of growth inequality relationship is related to Kuznets (1955) and Kaldor (1957). Kuznets (1955) formulated an inverted-U shaped relationship between economic growth and inequality to describe the transition of development. Inequality increases in the early phase of transition from informal to formal sector development. The inverted U hypothesis rests on the dynamics in a dual economy (Turnovsky 2013). While in Kaldor (1957) inequality is needed for growth. As the propensity to save is higher for the rich than the poor, the redistribution of income in favour of the rich would lead to greater savings and thus resources for investment and growth. Later on, Hirschman and Rothschild (1973) challenged this type of conventional growth inequality relationship. It is well documented that economic growth alleviates poverty (Dollar and Kray 2004), although inequality may persists in the growth process (Deaton 2013).

The experience of the past more than four decades of trade openness, financial liberalisation and spread of new technology across the globe reveals that economic growth peaked up and

absolute poverty declined everywhere, but their impact on income distribution is not clear in the literature. Jaumotte, et.al (2008) observed that skill biased technological change is one of the important driver of the rise in inequality in both the developed and developing countries. The study also observed that trade openness reduced income inequality while financial openness resulted in increase in inequality. As a result, globalisation has a little effect on inequality. This empirical finding has serious implications on growth and equality particularly in low income developing countries with rich natural resources and low skilled human resources.

This study investigates how trade openness and financial openness influence wealth inequality by considering heterogeneity across transitional and developed countries in South and South-East Asia by employing dynamic panel data model with World Inequality Database (WID) and World Development Indicators of the World Bank. In this study, the sample includes 19 countries from South and South-East Asia over the period 1995-2000. To find out the differential effects we form a panel of the sample countries by separating them into low income countries, middle income countries, and upper income countries by following World Bank's classification. The data set spans a range of economies with very different characteristics. The three groups of panel countries allow us to analyse the effect of trade openness, financial openness and growth on wealth inequality, conditioned on the stage of development. In our sample, 1 country is in the low-income group, 2 countries are classified as high income countries and the rest are lower-middle and upper-middle income countries.

We re-examine whether the effect of trade openness and financial openness on wealth inequality differs through the growth effect across these countries. The basic research question is whether trade openness or financial openness is likely to reduce wealth inequality. We have taken the ratio of sum of exports and imports to GDP as a measure of trade openness and the ratio of foreign direct investment (FDI) to GDP as a measure of financial openness. The ratio of 10^{th} to 90^{th} percentile of wealth as defined in WID is used as inequality index. The control variables used in this empirical exercise are government spending to GDP ratio, and relative per capita GDP calculated as country's per-capita GDP relative to the world per capita GDP.

We regress wealth inequality index on trade openness index, financial openness index, GDP, proportion of working age population and urbanisation in a dynamic panel setup by taking the full sample as well as separately for the countries classified as low income, middle income and upper income. We have estimated the model by taking country specific fixed effects by

applying bias-corrected robust two step Generalised Method of Moments (GMM) as developed in Windmeijer (2005). To examine this empirical result we develop a dynamic general equilibrium model in a small open economy framework for simulation. We simulate the model for shocks to the export sector (in the form of export demand and terms of trade changes), for varying degrees of openness. We also explore the importance of labour intensity in the production of traded and non-traded goods for understanding the mechanisms that affect income inequality.

The key empirical results from our dynamic panel estimation are the following. Trade openness reduces wealth inequality while financial openness increases it. Economic growth aggravates inequality, but urbanisation helps to reduce inequality for the full sample of countries. This empirical result can be explained by looking into the conditions in the labour markets by following the Stolper-Samuelson theorem. To some extent, our findings are in line with previous studies indicating that trade liberalisation reduces inequality and poverty in developing countries. By using changes in tariff revenue expressed as a percentage of total revenue as the measure of openness, Gourdon, Maystre, and de Melo (2008) found that trade openness has strong positive effects on inequality in countries where a high proportion of the labour force has little or no education.

The paper is organized as follows. Section 2 of the paper discusses some literature very closely related to this study. Section 3 provides the theoretical framework of this study. Section 4 is a short description of data used in empirical exercise. Section 5 sets out the econometric methodology. Section 6 analyses empirical findings. Concluding remarks are in section 7.

2. Literature

Relationship between trade openness and income inequality is examined in many empirical studies by using macroeconomic data (Wood 1995, Borjas et al. 1997, Meschi and Vivarelli 2009, Jaumotte et al. 2013, Bergh and Nilsson 2010, Roser and Cuaresma 2016). In many studies the prediction of the Stolper-Samuelson theorem that trade openness decreases inequality in developing countries and increases inequality in developed countries has been supported (Winters et al. 2004, Jaumotte et al. 2013, Bergh and Nilsson 2010, Roser and Cuaresma (2016)). While a large number of studies investigated how trade openness relates to income inequality, the empirical studies dealing with the relationship between trade openness and wealth inequality is absent in the literature. Even, to find out the effect of openness on income inequality, financial openness is considered by a few numbers of studies. A study by

Jaumotte et al. (2013) investigated the link between financial openness and inequality along with the link between trade openness and inequality and found that financial openness results in an increase in income inequality. Also, it is well documented that economic growth alleviates poverty (Dollar and Kray 2004), although inequality may persists in the growth process (Deaton 2013).

Although a number of country specific studies documented that most of the developing countries have experienced a rise in demand for skilled labour and so in inequality during the phase of trade liberalization, the empirical evidence from cross-country studies failed to reach a clear-cut conclusion about the direction of openness-inequality relationship (Edward 1997, Li, Squire and Zou 1998, Vivarelli 2004, Lee and Vivarelli, 2006). Some empirical studies contradict the distributive outcomes of traditional trade theory. For example, Barro (2000), Lundberg and Squire (2003) and Cornia and Kiiski (2001) have shown that trade liberalisation is associated with an increase in income inequality. Litwin 1998, Ravallion 2001, and Milanovic and Squire 2005 revealed that globalisation entails a greater increase in inequality in poorer countries. Majority of the studies on trade openness and inequality focused on between country inequality by using either cross section or short panel data and explaining between country inequality is rather a difficult task because of unknown country specific factors.

There is a scope of similar studies by taking wealth inequality as a response variable in transitional low, middle and high income countries as a sample in investigating relationship between openness and wealth inequality. Our study is an attempt in this direction by employing dynamic panel econometric model and contributes to the literature by estimating inequality-openness relationship by taking financial openness as another dimension of liberalisation based on a World Inequality Database (WID) from Asian countries over the period 1991-2020. This use of long panel enables to examine the dynamics behind the relationship as well as within-country inequality, which is even more important from a policy perspective.

3. Trade and inequality: theoretical framework

Inequality effect of trade openness may be looked into by considering differences in productivity, relative factor endowment, and relative shares of factor income across the trading

partners in the standard Heckscher-Ohlin (HO) framework (Ohlin, 1933). The doctrine of free trade states that countries have comparative advantage in production of commodities which are relatively abundant factor intensive and export them when they open up to trade[1]. The trade-induced relative changes in product prices increase the real return to the factors used intensively in the export sector and decrease the returns to the other factors (Stolper and Samuelson, 1941). Thus, the country's abundant factors gain from openness, while scarce factors lose. As capital and skilled labor are relatively abundant in advanced economies, income inequality and income concentration towards the top is expected to increase in those countries. In developing countries, on the other hand, unskilled labour, which is relatively abundant and used intensively in production, would benefit from trade openness by increasing wage income. Thus, according to Stolper-Samuelson (SS) theorem income inequality due to trade openness is expected to decrease in developing countries and increase in developed countries.

The distributive prediction of the SS theorem, however, is theoretically undetermined and depends on the relative weights and directions of trade flows (Wood 1997, Davis 1996, Feenstra and Hanson 1996), and the implications of the standard HO model are not sufficient to understand the pattern of inequality due to free trade by following the predictions of the SS theorem. If the assumption of homogeneous production functions is relaxed, the international market openness may facilitate skill intensive technology diffusion from high income countries to low- and middle-income countries. Thus, if we allow technology difference across countries, trade openness will facilitate skill biased technology diffusion from North to South and its impact on labour market will depend on the skill intensity of the transferred technology. Even if the technology transferred through trade is skill neutral, the transitional process of transferring and installing the new technologies may be skill biased (Pissarides 1997). If the transferred technology is skill neutral, the increase in demand for skilled labour will be temporary, but if it is skill biased, then this phenomenon will be permanent.

Trade openness induces technological upgradation in low- or middle-income developing countries through the rising inflows of capital goods from the high-income countries. A number of theoretical studies derived from HO and SS framework (Davis 1996, Feenstra and Hanson 1996, Xu 2003, Zhu and Trefler 2005) highlighted that the production of intermediate inputs shift form developed to developing countries through free trade and foreign direct investment.

[1] David Ricardo's *Principles of Political Economy and Taxation* demonstrated that it is beneficial for a nation to trade with another nation on the basis of the principle of comparative advantage.

While such products are unskilled-labour-intensive in developed countries, they appear to be skilled-labour-intensive in developing countries. In this way trade openness raises the demand for skilled labour both in the North and in the South, inducing a rise in the skill premium in both areas, reversing the prediction of the SS theorem.

Increase in international competition, import of capital goods to developing countries, and trade-induced technological transfers and catch-up processes induce the increase in skill intensity and relative demand for skilled labor in the developing world. Trade openness, in this case, may create a counter-effect to the prediction of SS theorem raising the skill premium of workers and wage dispersion not only in advanced countries but in developing countries as well (Lee and Vivarelli, 2006). Offshoring and outsourcing of production, an outcome of trade openness, might be relatively skill-intensive from the perspective of developing countries and less skilled intensive in developed countries. Thus, offshored and outsourced activities decrease the less-skilled wages so an increase in income inequality both in developed and developing countries (Feenstra and Hanson, 1996, 1999).

If factor abundance is defined in a local sense, the distributional consequences of trade may be the opposite of what we expect in the HO framework. While a developing country may be considered as unskilled labour abundant in global terms, this may not be true in relation to other developing countries. Middle-income developing countries, for example, are likely to be relatively unskilled-labour-abundant in comparison with high-income trading partners and relatively skilled-labour-abundant in comparison with low-income ones, and no longer have a comparative advantage in labour-intensive exports. Rather, trade openness in middle income countries may be beneficial by contracting both high skill intensive and low skill intensive domestic sectors and replacing by imports from high-income and low-income countries respectively. Trade openness, in this case, possibly results in a wider wage gap in middle income countries (Cornia 2003)[2].

4. Data

This study uses the World Inequality Database (WID) to analyse the macro perspectives of inequality between countries and over long time periods. It is well documented that the rising

[2] Cornia (2003) documented that middle-income countries have lost comparative advantage in labour intensive exports after the entry into the world market of low-skill manufactures from China and Indonesia. The formal sector in these countries informalises its production through a long chain of subcontracting agreements or shifts production towards skill-intensive exports. In both cases, wage inequality is likely to worsen.

trend in economic inequality over the past decades is largely driven by a rise in income and wealth at the top of the distribution at a higher proportional rate. While the household survey data provide useful information on income and wealth in many countries, surveys do not inform adequately on income and wealth levels of the richest individuals and the survey data alone are not sufficient to capture these sources of inequality dynamics. Although comparing income and wealth in different countries and over time is not straightforward because of differences in conceptual and methodological issues, some scholars have tried to trace income and wealth levels at different locations of the distribution by using WID. This database reconciles national income and wealth accounts, household income and wealth surveys, fiscal data coming from taxes on income, inheritance and wealth in a systematic manner. As of now, the database includes the Distributional National Accounts (DINA) series for the full distribution of income in more than 100 countries, including the USA, France, China, India, Russia, Brazil, the Middle-East, Africa and other Asian economies. Distributions of wealth are also available for the USA, France, China, Spain, the UK and Russia.

As gross domestic product (GDP) is not a satisfactory measure of economic welfare of a country, the WID uses the concept of national income instead of the commonly used concept of GDP. National income takes into account the depreciation of the capital stock, which is not an income to anyone, as well as the fraction of domestic output that is transferred to foreign capital owners. It is a better measure of wellbeing because a country, for example, with a large GDP but higher capital depreciation and foreign outflows does not have much income to distribute to its residents and citizens. To describe the evolution of the distribution of national income and wealth across countries, the WID uses concepts of income and wealth as used in DINA.

The sample countries include low income countries, lower-middle income countries, upper-middle income countries and high income countries from South and South-East Asia. The World Bank classifies different countries on the basis of per capita GNI every year by considering global inflation. The low-income countries are less developed, and the upper-middle- and lower-middle-income countries are classified collectively as developing countries. In 2022, upper middle-income countries are those with a per-capita GNI lying between $12,695 and $4,096, and countries having GNI per capita between $4,095 to $1,046 are lower-middle countries. Countries with GNI more than $12,695 belong to high income group, while those with GNI less than $1,046 are in low income group.

More than half of the world's countries (110 in 2021-22) are middle-income countries displaying diversification in geographical regions, sizes, populations, and cultures, but roughly similar in terms of population growth, physical infrastructure, capital and human resources. These countries together produce one-third of the global GDP with three fourth of the world's population and more than 60 per cent of world's poor. They are roughly homogeneous in terms of population growth, infrastructure development, capital and skilled worker.

5. Econometric framework

This study uses dynamic panel data model developed by Blundell and Bond (1998), an extension of the Arellano and Bond (1991), that accommodates large autoregressive parameters and a large ratio of the variance of the cross section specific effect to the variance of idiosyncratic error. Blundell and Bond (1998) advocated the use of extra moment conditions based on the stationarity restrictions of the time series properties of the data, as suggested by Arellano and Bover (1995). They propose a system GMM procedure that uses moment conditions based on the level equations together with the usual Arellano and Bond type orthogonality conditions. Their modification of the estimator includes lagged levels as well as lagged differences.

We consider the following model:

$$y_{it} = \phi_1 y_{i,t-1} + \beta x_{it} + \mu_i + \varepsilon_{it} \qquad (1)$$

Here, x_{it} is a vector containing both contemporaneous and lagged values of explanatory variables. The dynamic panel data model in (1) captures both the long run equilibrium and the short-run dynamics. The presence of lagged dependent variable as a regressor incorporates the entire history of it and any impact of x_{it} on y_{it} is conditioned on this history.

Estimation of such a model becomes complicated both in the fixed and random effects model because the lagged dependent variable, by construction, is correlated with the disturbance, even if the random disturbance itself is not autocorrelated. Furthermore, the cross section specific effect, μ_i, is thought to be correlated with x_{it}. The covariates may also exhibit a nonzero correlation with the contemporaneous or lagged idiosyncratic errors. All these endogeneity issues imply that least squares based estimators may be inconsistent.

The first difference instrumental variable (*IV*) estimation method leads to consistent but not necessarily efficient estimates of the parameters in the model because it does not make use of

all the available moment conditions, and it does not take into account the differenced structure on the residual disturbances.

Arellano and Bond (1991) used Generalised Method of Moments (GMM) by taking more instruments available. The GMM estimator used by them suffers from a weak instrument problem when the dynamic panel autoregressive coefficient approaches unity.

The idiosyncratic errors obey the following conditional moment restriction:

$E(\varepsilon_{it}|y_{i0}, \dots., y_{it-1}, x_{i0}, \dots, x_{it}, \mu_i) = 0,$ t=1,2,…T (2)

The first differenced form of (1) is

$\Delta y_{it} = \phi_1 \Delta y_{i,t-1} + \beta \Delta x_{it} + \Delta \varepsilon_{it}$ (3)

The unconditional moment conditions are:

$E((y_{i0}, \dots., y_{it-2})' \Delta \varepsilon_{it}) = 0$ (4)

$E((x_{i0}, \dots., x_{it-1})' \Delta \varepsilon_{it}) = 0$ (5)

Anderson and Hsiao (1981) used simple IV estimators of this type for AR(1) model in a multivariate framework, while Arellano and Bond (1991) used GMM estimators in this framework. Ahn and Schmidt (1995) suggested an additional set of T - 3 nonlinear moment conditions:

$E(\mu_i + \varepsilon_{it}) \Delta \varepsilon_{it} = 0$, t=3,……., T (6)

Blundell and Bond (1998) use lagged changes of the variables as instruments for current levels, and the additional moment conditions under the assumptions that

$E(\Delta y_{it}|\mu_i) = 0$ and $E(\Delta x_{it}|\mu_i) = 0$ are

$E\big((\Delta y_{i0}, \dots., \Delta y_{it-1})'(\mu_i + \varepsilon_{it})\big) = 0$

and

$E\big((\Delta x_{i0}, \dots., \Delta x_{it})'(\mu_i + \varepsilon_{it})\big) = 0$

(7)

However, the moment conditions shown in (7) is redundant because it can be expressed as a linear combination of the moments shown in (4) and (5).

Kiviet, Pleus and Poldermans (2013) suggested the following non-redundant moment conditions

$$E\left(\Delta y_{it-1}(\mu_i + \varepsilon_{it})\right) = 0 \quad , \text{t= 2, 3,……., T} \qquad (8)$$

Along with, for endogenous x_{it},

$$E\left(\Delta x_{it-1}(\mu_i + \varepsilon_{it})\right) = 0 \quad \text{t= 2, 3,……., T} \qquad (9)$$

If x_{it} is exogenous,

$$E\left(\Delta x_{it}(\mu_i + \varepsilon_{it})\right) = 0 \qquad \text{t= 1, 2, 3,……., T} \qquad (10)$$

Equations (4), (5), (8) and either (9) or (10) form what is known as the system GMM estimator.

The cost of the system GMM estimator involves a set of additional restrictions on the initial conditions of the process generating y. Hsiao, Pesaran, and Tahmiscioglu (2002), on the other hand, consider direct maximum likelihood estimation based on the differenced data under assumed normality for the idiosyncratic errors. Both approaches yield consistent estimators for all values of ϕ_1, but there are remaining issues that have yet to be determined in regard to the limit distribution when ϕ_1 is unity and T is large. Phillips and Han (2008) introduced a differencing-based estimator in an AR(1) model for which asymptotic Gaussian-based inference is valid for all values of $\phi_1 \in (-1, 1)$.

6. Empirical results

We have looked into wealth inequality in terms of proportion of bottom 50 per cent, top 10 per cent and top 1 per cent of people in wealth distribution. Table 1 provides the sample means of these indicators of wealth inequality for each of the 19 countries in South and South-East Asia during 1991 and 2020. In terms of bottom 50 per cent of the distribution Cambodia exhibits the highest share and Thailand shows the lowest. In Thailand, the share of top 10 percent as well as top 1 percent in the wealth distribution is the highest.

Table 1 Wealth inequality indicators: average estimates by country

	p0p50	p90p100	p99p100
Afghanistan	0.06	0.58	0.24
Bangladesh	0.06	0.58	0.24
Bhutan	0.06	0.57	0.24
Indonesia	0.06	0.58	0.25
India	0.05	0.60	0.29
Cambodia	0.07	0.62	0.30

Lao PDR	0.06	0.59	0.25
Sri Lanka	0.05	0.59	0.26
Myanmar	0.04	0.63	0.30
Malaysia	0.03	0.67	0.34
Nepal	0.04	0.63	0.30
Philippines	0.06	0.60	0.29
Pakistan	0.06	0.58	0.25
Timor-Leste	0.05	0.63	0.33
Viet Nam	0.06	0.59	0.26
Maldives	0.05	0.62	0.30
Thailand	0.02	0.74	0.44
Brunei Darussalam	0.06	0.57	0.24
Singapore	0.06	0.59	0.26
Full Sample	0.05	0.61	0.28

Source: Author's estimate with WID

This study estimates the relationship of the wealth inequality index in terms of top 10 per cent of the wealth distribution with the trade and financial openness after controlling the effects of urbanization, GDP and share of working age population by applying GMM in dynamic panel data model. We have estimated the model with both country-specific and time-specific fixed effects. Country specific fixed effects capture the unobserved heterogeneity across countries, while time-specific fixed effect is important is important to consider some important events during the sample period, 1991-2020.

The results of dynamic panel estimates appear in Table 2. A key empirical result from our dynamic panel estimation is that trade openness has significant negative effect on wealth inequality supports the Stolper–Samuelson theorem. As per Stolper–Samuelson theorem, trade openness enhance inequality in advanced region and reduce inequality in developing region in South and South-East Asia. The empirical results pertaining to inequality and trade openness is usually explained with reference to conditions in the labour markets. Initial endowments of skilled labour actually matters when assessing the effects of openness on inequality and poverty. Financial openness, on the other hand, has no significant effect on wealth inequality. Deaton (2013) pointed out why foreign aid can have negligible to perverse effects on both growth and income inequality. According to this study, as foreign aid takes place by government-to-government transactions and the governments in many developing countries are weak, having access to foreign aid flows makes them even less accountable to domestic constituents, since they no longer have to rely on these constituents for tax revenue. With the increased aid flows, they can pursue self-interested agenda with even less regard for the lower-

income segments of the population. The rise in GDP increases wealth inequality significantly implying that economic growth and relative income have significant effects on inequality

Table 2 GMM estimation

Variables	Coef.	Std.	z	P>z
$Ineq_{t-1}$	0.11	0.088	1.2	0.229
Urbanisation	-1.05	0.520	-2.02	0.043
Trade openness	-0.73	0.302	-2.42	0.016
Financial Openness	0.02	0.052	0.47	0.636
Working population	11.52	2.752	4.19	0.000
GDP	0.36	0.091	3.95	0.000
Intercept	-32.94	10.185	-3.23	0.001
Number of observations	113			
Number of groups	9			
Number of instruments	94			
Wald chi2(6)	66.73			
Prob > chi2	0			

Source: Author's estimate with WID

7. Conclusions

In this paper, we explore the impact of economic globalization (trade and financial openness) on income inequality for South Asian developing economies. We consider a panel sample of 19 South and South-East Asian developing countries. We have applied GMM estimation of the dynamic panel model. It is observed that trade openness reduced regional wealth inequality while financial openness has no significant effect. This result supports the Stolper–Samuelson theorem. Whereas GDP growth has raised wealth inequality, urbanization is helping to reduce the inequality in Asia.

The empirical analysis of this study suggests that the countries following structural adjustment programme in favour of capital intensive export sector promoted economic growth but not necessarily reduced wealth inequality. For countries where the export and domestic goods sectors both are labour-intensive, trade openness can promote growth without increasing inequality. The findings of this study have significant policy implications on market openness. The study raises the question whether financial openness is an effective avenue for a low income mineral rich country with low-skilled labour force to reduce inequality through growth

effect. The findings also have implications on the roles of education, skills and technological progress in promoting growth and reducing inequality in low income countries.

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