Kaldor and Kuznets Together in a Three-way Growth-Equity Nexus in Developed and Developing Countries : The Common Decoupling of Functional and Household Income Distribution but Different Details of the Nexus

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Abstract

This study analyzes the three-way relationship of economic growth and the two aspects of income distribution, namely, functional income distribution (labor income share) and household income distribution (Gini coefficient). It reveals the more serious nature of inequality in developing countries with a lower value of labor share but a higher Gini coefficient in comparison with developed countries, although both groups show a sharp decline of labor share but stable Gini coefficients over time. The study confirms the same three-way relationship in two groups of countries but with several different determinants and the different trends of the key variables. One contribution of such three-way analysis is to find the 'decoupling' pattern of the growth-equity nexus, namely decoupling between functional income distribution and household income distribution, as it finds that economic growth tends to increase labor income share but worsen household income inequality. Moreover, for both groups, higher labor income shares and household income inequality lead to a higher rate of economic growth. These findings are indicative of the common growth mechanism driven by skill-biased technical changes. The study also confirms the different determinants of equity. That is, declining labor share and stable Gini coefficients seem to be caused by the slow growth and increasing years of schooling in developed countries, whereas by sharp decreases in fertility rates and government expenditure in developing countries.

Keywords: Income distribution, economic growth, simultaneous equations system, Gini coefficient, labor income share, Kuznets.
JEL Codes: O11, O15, O47.

1. Introduction

Research on interface between economic growth and household income inequality has several strands. First, as Kuznets (1955) pioneered the inversed-U hypothesis, numerous researchers, including Deininger and Squire (1998) and Barro (2000), have studied the effect of economic growth on inequality. The second group touches upon the opposition direction of the causality from inequality to growth (e.g., Persson and Tabellini (1994), Alesina and Rodrik (1994), and Forbes (2000)), as well as more recent variations on top income shares (Herwartz and Walle 2020) and redistribution (El-Shagi and Shao 2019). The third group identifies determinants of economic growth or inequality (e.g., Barro (2000), Li et al. (1998), and Blau (2018)).

Empirical evidence on the two-way relationship between growth and equity is still mixed, reflecting multiple causal relationship running differently in different regimes (Molero-Simarro 2017). Many cross-sectional regressions (Alesina and Rodrik 1994; Deininger and Squire 1998; Perotti 1996; Sylwester 2000) have found a negative relationship across countries, whereas the contrary is found by using panel data models (Forbes 2000; Li and Zou 1998). One source of the mixed results concerns the possible different relationships at different stages of economic development or income levels. Barro (2000) indicated that evidence from a broad panel of countries shows little overall relationship between income inequality and economic growth rates when rich and poor countries are pooled together, which is consistent with the findings of Bagchi and Svejnar (2015) for politically unconnected wealth and income inequality. A related argument by Chambers and Krause (2010) is that the influence of inequality on growth changes along the stage of development, depending upon the degree of human and physical capital accumulation and their relative return. Castelló-Climent (2010) found that the effects of income and human capital inequality on growth differ by the countries' development level, with a negative result for low- and middle-income countries, and vice versa. Sukiassyan (2007) also found a negative relationship for transition economies in Eastern Europe. By contrast, Herzer and Vollmer (2012) found the same negative long-run effect of inequality on growth regardless of the development level.

The present study revisits this issue of growth–equity nexus at different income levels by estimating the simultaneous systems of not only the traditional two-way relationship but also a new three-way relationship among economic growth and two measures of equity, namely, Gini coefficient measuring household inequality and labor share of income measuring functional income distribution. Functional income distribution has a long history dating back to Lewis (1954) and Kaldor (1955). Reviving the interest in the area is a recent work by Piketty

(2014), who suggested that in a society where output per capita increases slowly, the relative importance of labor income to income from accumulated wealth decreases. In other words, the first and second laws of capitalism indicate that in the long run, the increase in growth rate of per capita income increases the share of labor income to total income, and vice versa.

Another strand related to functional income distribution is the so-called “wage-led growth” theory based on post-Keynesian perspectives, which dates back to Bhaduri and Marglin (1990), followed by Stockhammer et al. (2008), Stockhammer and Onaran (2013), and Lavoie and Stockhammer (2013). These studies have suggested that the increase in labor income share can accelerate economic growth through its boosting effect on aggregate demand.[1] Charpe (2011), Guerriero and Sen (2012), Young and Lawson (2014), and Dünhaupt (2016) analyzed the determinants of labor income share by using cross-country panel data. However, in comparison with the volume of empirical studies on the relationship between economic growth and household income inequality, fewer empirical studies have focused on the relationship between economic growth and labor income share, in particular in terms of its two or three-way relationship.

The importance of the interface between functional and household income distributions was recognized by Piketty and Saez (2003), who argued that “the working rich have replaced the rentiers at the top of the income distribution” in the US. This argument indicates that the increase in labor income share and in household income inequality can occur simultaneously. This observation is in sharp contrast with the traditional belief that higher labor income share correlates with a more equal distribution of household income, given that the share of labor income in total household income is higher in poor households with lower income. This possible controversy justifies the need to further analyze the three-way interaction among measures of income distribution and economic growth simultaneously.

One contribution of such three-way analysis is to find the ‘decoupling’ pattern of the growth-equity nexus, namely decoupling between functional income distribution and household income distribution, as it finds that economic growth tends to increase labor income share but worsen household income inequality in both developed and developing countries. Conversely, an increase in labor income share or Gini coefficient accelerates the per capita GDP growth rate in both samples. While these patterns are different from some of the existing

[1] Criticising wage-led growth theory, Palley (2014) and Skott (2017) point out the endogenous, rather than exogenous, nature of labor income share.

idea coupling more labor share with less personal inequality (Daudey and García-Peñalosa 2007; Molero-Simarro 2017), such pattern implies that global economic growth is driven by skilled labor paid with higher wage rates compared with unskilled labor. But, the difference between the developed and developing countries has to do with different determining variables of the nexus (e.g., variables of schooling years, fertility rates, and government expenditure). Therefore, while both groups share the common pattern of the decreasing share of labor in GDP, it is associated with different causes, such as the decreasing trend of economic growth rates in the developed countries, and the decrease of government expenditure and fertility rates in developing countries. These empirical findings will then be subject to some interpretation, such as financialization hypotheses (Pariboni and Tridico 2019; Tomaskovic-Devey, Lin, and Meyers 2015; Tridico 2018) in developed countries, and privatization and liberalization along the Washington Consensus in developing countries.

These findings are derived by a three-way equation system, which is one step forward from the two-way system of Lundberg and Squire (2003) and addresses the endogeniety issue better than single-direction estimations. In other words, in terms of empirical contributions, this study introduces several improvements over the existing literature. First, in comparison with Lundberg and Squire (2003) who used 119 observations of 38 countries, the empirical analysis of the present work includes more countries and observations, that is, 99 countries and more than 390 observations, such that separate regressions can be run for developed and developing countries. This separate regression is also a way to test Kuznets' hypothesis on the different effects of growth on inequality at countries with different income levels.

Second, this study makes an important improvement over Lundberg and Squire (2003) in the issue of omitted control variables and the associated overestimation of the effect of income distribution. In other words, the coefficient of the effects of labor share and Gini coefficient on growth equations tends to be greater in the separate two-way model than in the three-way model. This difference is indicative of the possibility of omitted variable bias. When the Gini coefficient (labor income share) variable is omitted in equity to growth equations, the effect of labor income share (Gini coefficient) on per capita GDP growth is overestimated. In other words, a certain portion of the effect of labor income share (Gini coefficient) is actually the effect of the Gini coefficient (labor income share).

The remainder of this paper is organized as follows. Section 2 provides a theoretical discussion on the relationship between economic growth and income distribution. Section 3 discusses the simultaneous equation model (SEM) method and the dataset used in this study.

Section 4 provides the results of the empirical analysis and discusses their interpretations. Finally, Section 5 concludes the study.

2. Empirical Literature and Theoretical Reasoning

2.1. Early Literature

Early literature on the relationship between economic growth and income inequality tends to investigate a one-way relationship, either from growth to inequality or from inequality to growth, with a few exceptions, such as that by Lundberg and Squire (2003) who considers a two-way relationship.

Literature that follows the work of Kuznets (1955) concentrates on the causal effect of economic growth on income distribution. In this line of study, the conventional wisdom (the so-called Kuznets curve) is that income inequality and per-capita GDP have a relationship in the form of an inverted-U, whereby income inequality increases over time while a country develops. Then, when a certain income level is attained, income inequality decreases. Following Kuznets' insight, a number of studies that use data from developed and developing countries find evidence in support of Kuznets' theory (Adelman and Morris 1973; Ahluwalia 1976a, 1976b; Chenery, Syrquin, and Elkington 1975; Lindert and Williamson 1985). However, this inverted-U hypothesis has become ambiguous in more recent literature, especially with regard to developing countries (Deininger and Squire 1998; Oshima 1992; Ravallion 1995; Riskin 2007).

The other framework for the relationship between economic growth and income inequality is derived from studies influenced by Kaldor (1955). These studies emphasize an opposite causal link from income distribution to economic growth. The conventional wisdom that income inequality is *necessarily* good for incentives and therefore good for economic growth is challenged by a number of theories that claim income inequality has negative effect on economic growth. Common arguments for negative causality from income inequality to economic growth are as follows. (1) Greater income inequality increases the demand for redistributive policies and hence, distorts incentives for working and investing (Alesina and Rodrik 1994; Persson and Tabellini 1994). (2) In imperfect capital markets, a more unequal income distribution reduces opportunities for accumulating human capital and physical assets because a greater number of people are credit constrained (Banerjee and Newman 1993; Fishman and Simhon 2002). (3) Worsening income inequality may lead to socio-political instability, thereby harming the investment environment (Alesina and Perotti 1996).

Given the mixed theories and empirical results on either direction of the one-way relationship between growth and equity, exploring two-way relationship is even more complicated. The complication emerges because the simultaneous relationship between economic growth and income inequality are affected by many factors, including various initial conditions and government policies (Lundberg and Squire 2003), as well as nature of human capital accumulation and technological change (García-Peñalosa 2010).

2.2. New Challenges

This research brings in an additional challenge in the literature by raising the need to consider two different measures of equity together, namely functional income distribution (labor income share) and household income distribution (Gini coefficient) in a single system. This idea is another important gap in the literature, which tends to focus on either household income distribution (Alesina and Rodrik 1994; Barro 2000; Deininger and Squire 1998; Forbes 2000) or functional income distribution (Durlauf 2009; Stockhammer et al. 2008), but not both together.

Considering not only Gini coefficient but also the labor share in GDP representing functional income distribution is important given the recent debate about the trend of declining of the labor income share not only in United States (Elsby, Hobijn, and Şahin 2013) but also in other countries (Karabarbounis and Neiman 2013). This is different from the early observation by Kaldor (1957) that the share of labor (capital) income to national income is stable over long-run. Regarding the source of such decline, Elsby et al. (2013) suggests that the increase in openness or trade is the primary reason, whereas Karabarbounis and Neiman (2013) consider the decrease in relative price of investment goods associated with progress with information technology as the main source, and Autor et al. (2017) point out the rise of superstar firms.

Another reason why considering together these two different aspects of distribution is important is that economic growth could have possibly opposite effects on them when growth is driven by skill-biased technical change. For instance, Piketty and Saez (2003) find that the working rich replaces the rentiers at the top of the income distribution in the US, which is consistent with the story of skill-biased technical changes but also implies the possibility of higher household inequality coupled with rising (or not necessarily decreasing) labor income share. Acemoglu (2002, 2003), Aghion (2002), Mendez (2002), and Moore and Ranjan (2005) also argue, with theoretical and empirical bases, that the skill-biased technological change aggravates wage inequality but its impacts of labor share might be an empirical issue. The empirical analysis in this paper will explore the possibility that growth could increase labor income share while aggravating household income equality.

In general, three possibilities can be discussed with regard to the effects of long-run economic growth rate on income distribution. First, in case the change provides relatively more opportunities to workers with lower wages, the accelerated economic growth may increase labor income share and mitigate household income inequality. Second, in case the change is most beneficial to the people living on capital income, labor income share will decrease, and household inequality will increase. Third, in case when change is most beneficial to the workers with higher wage, the result is an increase in labor income share as well as income inequality. Given the impossibility of ruling out theoretically any of these possibilities, empirical analysis must determine the more dominant aspect.

Now, let us discuss the linkage from the two aspects of distribution to growth. In the framework of endogenous growth theory focusing on the role of human capital, the growth rate is affected by the accumulation of physical and human capital (Lucas 1988; Rebelo 1991).[2] If one follows this theory, the effect of income distribution on economic growth depends on how and which aspects of income distribution promotes the investment on physical and human capital.

First, functional income distribution could affect economic growth in two opposite directions. Given level of income, when the share of labor income in total GDP increases because of certain exogenous reasons, such higher share of labor income leads workers to increase investment on human capital, it results in the acceleration of economic growth. However, given that higher share of labor income means less share of capital income, this effect may lead to less investments into physical capital investment, which subsequently might decrease growth rate. Therefore, we can say that the actual effect of the labor income share on economic growth is an empirical issue that requires analysis. Second, the effect of household income distribution on economic growth is also dubious. Given level of income, when household income inequality increases, the rich who become richer may increase their investments on physical or human capital. By contrast, the poor whose income decreases may not be able to invest on their capital as their income cannot pay the minimum cost of living.[3]

[2] The regression model based on neoclassical growth theory, such as Barro (1991), includes a control variable that represents human capital as a determinant of the steady state income level.

[3] Using US state-level data, Biswas et al. (2017) show that the redistribution between median- and

In sum, studying the relationship between economic growth and income distribution is ultimately an empirical question. Such theoretical ambiguity or multiplicity is also in line with the argument of García-Peñalosa (2010) and Molero-Simaro (2017) and thus the lack of theoretical consensus in the literature underscores the necessity of empirical analysis.

3. Model and Data

3.1 Three-way Simultaneous Equation Model (SEM) of Growth–Distribution Nexus

This study constructs and uses a SEM on the relationship between economic growth and income distribution. The SEM consists of a growth equation and two equity equations on functional income and household income distribution, respectively.

First, the growth equation comes from the growth regression model first suggested by Barro (1991), which is based on conditional convergence (Barro and Sala-i-Martin 1992). This model is based primarily on the neoclassical growth theory but includes the view of endogenous growth theory by including human capital factor as a control variable. The model is expressed as follows (Barro 1997):

$$Dy = f(y, y^*) \tag{1}$$

where Dy is the growth rate of per capita GDP, y is the initial level of per capita GDP and y^* is the steady-state level of per capita GDP. Barro and Sala-i-Martin (2004) include various macroeconomic institutional variables, such as level of education, fertility rate, government expenditure ratio and terms of trade change, as determinants of y^*. In Barro (1991), these variables are control variables to verify the conditional convergence and the effect of y on Dy. However, these variables also serve as determinants of stead-state or long-run growth rate of per capita GDP (Barro 1997; Barro and Sala-i-Martin 2004). In our growth–distribution nexus model, income distribution variables are included as determinants of stead-state growth rate.

Second, regarding income distribution equations, no single dominant model of income

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high-income households decelerates economic growth, whereas redistribution between low- and median-income households accelerates economic growth. Such empirical result supports the idea that high-income households have higher propensity to invest, whereas low-income households lack ability of capital accumulation.

distribution exists. Literature on cross-country (panel) regression models for Gini coefficient and labor income share utilizes the same regressors that are included in the growth regression models. Regarding the determinants of the Gini coefficient, Papanek and Kyn (1986), Deininger and Squire (1998), Barro (2000) and Forbes (2000) conduct cross-country regression analysis. Regarding labor income share, studies include Charpe (2011), Guerriero and Sen (2012), Young and Lawson (2014), and Dünhaupt (2016). These studies share common regressors, such the level of per capita GDP, level of education, size of government activity and trade openness. The similarity in the regressors in economic growth and income distribution models indicates that common macroeconomic factors affect economic growth and income distribution. Therefore, this study constructs an income distribution model with the same regressors as growth regression model but adds per capita GDP growth rate as a determinant of income distribution.

Thus, in this study, SEM on economic growth–income distribution nexus *integrates the following* key variables of per capita GDP growth, labor income share and Gini coefficient in a single system as follows:

$$gr_{it} = \alpha_1 + \beta_{12} ls_{it} + \beta_{13} gn_{it} + X_{1,it}\gamma_1 + u_{1,it} \quad (2a)$$

$$ls_{it} = \alpha_2 + \beta_{21} gr_{it} + X_{2,it}\gamma_2 + u_{2,it} \quad (2b)$$

$$gn_{it} = \alpha_3 + \beta_{31} gr_{it} + X_{3,it}\gamma_3 + u_{3,it} \quad (2c)$$

where gr_{it} is the per capita GDP growth rate, ls_{it} is the logged value of labour income share and gn_{it} is the logged value of Gini coefficient. In each equation j, $X_{j,it}$ is the macroeconomic control variable and $u_{j,it}$ is the statistical error term. In essence, this model extends the two-equation model of Lundberg and Squire (2003) to the three-equation model by adding the equation of labor income share.

The advantage and necessity of this three-equation model as compared to the two-equation model is that we can acquire a more nuanced and precise picture of growth–distribution nexus, for instance, that reflects the impact on growth from the two different aspect of inequality. If we use either of the two-equation model, then we are not free from the omitted variable bias. For instance, suppose that we use the two-equation model with the growth and labor equations only but without the Gini coefficient equation. In this case, the impact of labor share on growth, namely coefficient β_{12}, may be overestimated because the impact of household inequality on growth is not considered. However, in reality, the initial growth impact of labor share has the accompanying effect on household inequality, which in turn affects growth eventually. An example of this channel of reaction is the skill-biased technological change leading to higher labor shares and higher inequality in household income. Both factors affect growth through separate channels.

3.2 Estimation Method and Econometrical Issues

This study estimates the SEM with three-stage least squared (3SLS) estimator introduced by Zellner and Theil (1962). The 3SLS estimator is a combination of 2SLS estimator and a FGLS (feasible general least square) estimator, and it is a commonly used approach for multiple linear equations model. The 3SLS estimation is conducted in following procedures: First, as the first step of the 2SLS estimation, we regress endogenous variables on exogenous (instrument) variables and calculate the predicted value of endogenous variables. Second, using predicted value of endogenous variables, we conduct OLS estimation of each model in the simultaneous equation, which is equivalent to the second step of 2SLS estimation. Third, by calculating residuals from the second step, we conduct feasible GLS estimation assuming correlations among error terms of each equation. This way, the 3SLE estimators are considered not only consistent but also more efficient than the 2SLS estimator because it considers the correlation between error terms of each equation.

To explain further details of estimation, let us first consider a simple two-way SEM following Lundberg and Squire (2003):

$$y_{1,i} = \alpha_1 + \beta_1 y_{2,i} + X_{1,i}\gamma_1 + u_{1,i} \tag{3a}$$

$$y_{2,i} = \alpha_2 + \beta_2 y_{1,i} + X_{2,i}\gamma_2 + u_{2,i} \tag{3b}$$

The conventional simultaneous equations estimation follows the so-called "exclusion restriction," an idea that assuming X_1 and X_2 are exogenous, the variables included in X_1 but excluded from X_2 become the instrument variables to identify β_2 in the right-hand side of the second equation. However, in typical cross-country panel regressions, it is not easy to find and justify such exogenous control variables. Such endogeneity issue is a classical and most challenging concern of growth or equity regression (Durlauf 2009). To address this issue, this study follow several empirical research, including Lundberg and Squire (2003), Barro (2000), and Li et al (1998), which do not assumes the exogeneity of control variables, and instead introduces lagged control variables and other additional institutional variables as the common instruments and test their validity as instrument.[4] In other words, even though the traditional exclusion restriction is not considered as an identification strategy, the parameters of the equations are still identifiable once the number of instruments is equal to or larger than that of endogenous variables. Thus, our instrumental variables include lagged per capita GDP and other control variables, as well as additional institutional variables that are chosen based on the literature, such as female education, arable land share, life expectancy, and urban population ratio (Lundberg and Squire 2003) and terms of trade (Barro 2000).[5]

In order to check the validity of those instruments, this study conducts an overidentification test, as suggested by Sargan (1958), to verify whether the instrument variables are exogenous or uncorrelated with the error term. Also, this study conducts weak-IV test, as suggested by Angrist and Pischke (2008) and Sanderson and Windmeijer (2016) in order to check the correlation between instruments and endogenous variables. Compared to weak-IV test, overidentification test is more essential, because the exogeneity condition of instruments is the key to guarantee the consistency of estimator using instruments.

In addition, validity of these as instruments have been subject to test with a set of control variables which include those most commonly used in cross-country regressions, such as lagged per capita GDP, fertility rate, human capital variable (years of schooling), government expenditure to GDP ratio, trade openness and change in terms of trade, political institutions (political rights and civil liberty indices provided by Freedom House), as well as some variables typically included in equity equation, such as the size of population, and a possible factors affecting labor share, such as the share of manufacturing sector in GDP.

An additional issue to be considered is related to the use of panel data. When using cross-country panel-data, unobserved country- or time-specific characteristics can cause a bias. Therefore, this study includes country and time dummies to control unobserved country- and time-specific characteristics in growth and distribution. Such method of two-way fixed-effect estimator is important in this study because the model cannot include all control variables that may affect growth or equity. For instance, in the case of the control variables related to country-specific social environment, despite their possible effects on economic growth or income

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[4] This method is necessary because the exclusion restriction does not guarantee validity of instrument when the control variables are endogenous.

[5] These instrument variables are used in the first-stage regressions only and the results from that stage are not reported in tables

distribution, measuring them with sufficient quality or quantity is difficult. In such case, introducing panel dummies is an appropriate way to address the issue.

When considering the issues above, the model is modified as follows:

$$gr_{it} = \alpha_1 + \beta_{12} ls_{it} + \beta_{13} gn_{it} + X_{1,it}\gamma_1 + \nu_{1,i} + \tau_{1,t} + \varepsilon_{1,it} \tag{4a}$$

$$ls_{it} = \alpha_2 + \beta_{21} gr_{it} + X_{2,it}\gamma_2 + \nu_{2,i} + \tau_{2,t} + \varepsilon_{2,it} \tag{4b}$$

$$gn_{it} = \alpha_3 + \beta_{31} gr_{it} + X_{3,it}\gamma_3 + \nu_{3,i} + \tau_{3,t} + \varepsilon_{3,it} \tag{4c}$$

where $X_{j,it}$ is the control variables for growth or equity equations, $\nu_{j,i}$ is the country-specific fixed-effect dummy, $\tau_{j,t}$ is the time-specific dummy and $\varepsilon_{j,it}$ is the error term.

This study also tries some variations from the estimation model (4) to test robustness and also to derive additional implications.

First, we replicate the original Lundberg and Squire two-way equation model in two different ways, which are the simultaneous equation of per capita GDP growth and labor income, and that of the per capita GDP growth and Gini coefficient, respectively. The two sets of equations are Equations (5a) and (5b) and (6a) and (6b), respectively, and are as follows:

$$gr_{it} = \alpha_1 + \beta_{12} gn_{it} + X_{1,it}\gamma_1 + u_{1,it} \tag{5a}$$

$$gn_{it} = \alpha_2 + \beta_{21} gr_{it} + X_{2,it}\gamma_2 + u_{2,it} \tag{5b}$$

$$gr_{it} = \alpha_1 + \beta_{12} ls_{it} + X_{1,it}\gamma_1 + u_{1,it} \tag{6a}$$

$$ls_{it} = \alpha_2 + \beta_{21} gr_{it} + X_{2,it}\gamma_2 + u_{2,it} \tag{6b}$$

In particular, the first set of per capita GDP growth–Gini coefficient SEM is a replication of Lundberg and Squire (2003). By conducting the replication analysis, we examine whether the conclusion of Lundberg and Squire (2003) is still valid with extended time-series and expanded group of countries. By comparing the estimated coefficients of income distribution variables in the three-way or *integrated* growth–equity model to those in *separated* models, we can examine the integration of two economic growth–income distribution models in a single three-way system. This step is important in avoiding the possible overestimation of the impact of distribution on growth (such as β_{12} becoming bigger in two- than in three-way systems). Later, we show that a certain difference in estimated coefficients indicates the necessity of the SEM integrating the functional and household income distribution factors.

Second, this study estimates the SEM based on two different sub-sample groups, namely, high- and low- and middle-income countries. The criteria level of per capita GDP is 12,475 dollars in 2011 price, which is suggested by World Bank as the criterion of high-income country group. By estimating the model on two groups, this study discusses whether the estimation result on the entire group is similar or different between the subgroups.

3.3 Cross-country Panel Data and the Trend of Inequality

This study uses five-year averaged cross-country panel data. The dataset for primary estimation includes 396 observations from 99 countries with maximum nine sub-periods (from 1970 to 2014). Each country includes four periods (20 years) of data on average and 50 countries have four or more periods and 90 countries have at least 2 periods. This study includes about 3.3 times greater number of observations and about 2.6 times larger number of countries than the dataset of Lundberg and Squire (2003), which used only 119 observations from 38 countries. The extended dataset provides more reliable estimates on the relationship between growth and income distribution.

Using five-year averaged value cross-country panel data has several advantages. First the long-term tendency of growth–distribution nexus can be observed more clearly as short-term shocks on growth or distribution are averaged. Second, the balance of panel data can be increased by covering missing values by averaging. Third, the effect of serial correlation in dependent variables can be reduced.

For the inequality variable, this study tries three different set of data for robustness. Tt uses primarily “All the Ginis Dataset (ATG)” presented by Milanovic (2016), and then it uses also “Standardized World Income Inequality Database 8.0” (SWIID) provided by Solt (2019) for the robustness check.[6] It is important to use Gini index data which is based on *observed* household income, *comparable* across countries and time, available for *enough number of observation* for cross-country panel analysis. ATG provides the Gini index data based on actual household survey and uses the criteria suggested by Deininger and Squire (1996). However, the data values are not perfectly comparable since they are calculated by different methods depending on their original sources. On the other hand, SWIID provides the Gini index values which are adjusted to take account for different methods in calculating Gini index. However, SWIID utilized Monte Carlo simulation method (Solt 2009) for the adjustment and the

[6] This study used Gini coefficients of 0 to 1 scale, rather than the scale of 0 to 100.

interpolation of missing observations, and the data values are not directly calculated from household income data. Finally, in addition to Gini coefficient measuring household income inequality, this study also presents, for robustness, the results using the Theil index for industrial wage inequality provided by the University of Texas Inequality Project (UTIP) and compiled using the data of United Nations Industrial Development Organization (UNIDO).

For labor income share, this study uses "Penn World Table 9.0" (PWT), as provided by Feenstra et al. (2015).[7] PWT provides a large amount of labor income share based on the method proposed by Gollin (2002), who suggested a proper method for processing mixed income, such as the income of self-employed people. This labor income share is calculated by using market incomes, which are before redistributing taxation.

For the growth rate of per capita GDP, this study uses PWT. One unique advantage of PWT in measuring per capita GDP growth is that the dataset provides per capita GDP data adjusted by purchase power parity (PPP) and more comparable measurement on the changes in living standards of various countries.

For other control and instrument variables, this study uses the dataset of PWT, World Development Indicator (WDI) of World Bank and Barro-Lee Dataset (Barro and Lee 2013) (BL). These datasets are commonly used in cross-country empirical analysis because of their quality and comparability. The developing and developed countries included in the dataset are listed in Appendix 1, the details of the data sources and descriptive statistics are provided in Appendix 2, and the correlation table across the variables are presented in Appendix 3.

Figure 1 presents the trend of the two equity variables in developed and developing country samples. The problem of equity is more serious in developing countries with higher values of Gini coefficients and lower values of labor income share than in developed countries. Moreover, labor income shares have been clearly decreasing over time in both groups. By contrast, the longer trends of Gini coefficients are not showing such clear-cut pattern but seem to be more stable in both groups. Given that the recent trend of Gini coefficients is also decreasing in developing countries, more attention should be given to the decreasing share of labor in both groups, which will be discussed further in this study.

[Figure 1]

[7] As we do for Gini coefficients, this study records labour income shares in the 0 to 1 scale.

4. Results of Empirical Analysis

4.1 Validity of Model Specifications and Instruments

The results of estimating the three-way SEM of growth–distribution nexus are presented in Part A of Table 1, and the instrument variables in the models satisfy the validity conditions. First, Sargan's over identification test cannot reject the null hypothesis in which the instrument variables are uncorrelated with the error term. Second, the test based on either Angrist and Pischke (2008) or Sanderson and Windmeijer (2016) rejects the null hypothesis that the instrumented variables are "weakly identified," the results of which means that the instrument variables are rightly correlated with instrumented variables. Part B of Table 1 presents the F-statistics of AP (Angrist and Pischke 2008) and SW (Sanderson and Windmeijer 2016) test as well as that of joint significance (JS) test of the instrument variables used in the first-stage regression of control variables. Our instrument variables pass all the three tests, which underscores very strongly their validity.

[Table 1]

As mentioned in the preceding section, we have tried various set of control variables, such as institution, population sizes, and share of industry value added to GDP, for growth or equity equations. Among many trials, the one presented in Table 1 is the one that passes all the tests of weak-IV and overidentification. The specification in Table 1 includes the common control variables in all of the three equations. This might look odd but is the only one that passes the two tests of the above. Actually, Appendix 4 present the result with an alternative specification which includes at least one unique and different control variable in each of the three equations, such as the share of industry value added included only in the labor share equation, the size of economy measured by population only in Gini coefficient equation, and changes in terms of trade only in the growth equity equation. The estimation result yields the same results regarding the relationship between growth and two measures of equity as the one in Table 1. However, this specification does not pass the test of validity of instrument variables, failing the overidentification test at the level of 1 percent significance.[8]

Despite the above discussion, the possibility of omitted variable bias is always an issue. Thus, in our specification in Table 1, each equation includes the country and period dummies

[8] See Appendix 4 for more discussion of this result and the related issue.

to reflect unobserved country- or time-specific characteristics. The joint significance test on these dummy variables indicates that country and period dummies have significant effects on growth and distribution. This is one of the defenses for the possible existence of other omitted variables which might bring in results that pass the above tests.

In the meantime, the specification in Table 1 did not include the investment to GDP ratio as a control variable or regressor. This follows the idea of growth model of Barro (1997), which observes that the changes in included control (explanatory) variables affect per capita GDP growth rate by affecting the stead-state income level *via* investment; actually the model shown in Equation (1) is derived from using production function and law of motion in physical capital (Barro and Sala-i-Martin 2004). In contrast, Berg et al. (2018), based on the model of Mankiw et al. (1992), include the ratio of investment to GDP as a control variable in analyzing the effect of household income inequality on economic growth, and find that household income inequality decelerates economic growth.

Given this divide, it would be better to check the results with investment to GDP included in the regressions. Table 2 present such results, also using population growth instead of fertility rate. The estimated growth–equity relationship remains unchanged from the one in Table 1. In particular, the coefficients of the investment variable are not statistically significant in none of the three equations, which confirms the validity of insight of Barro (1997) that the effect of investment on economic growth or income distribution is already reflected in other variables which affect growth or equity via investment. Tables 1 and 2 produce the same results that the Gini coefficient is positively associated with economic growth. Overall, the results suggest that the channels of income distribution affecting economic growth is not limited to the channel through investment. While the results with Table 2 serves as one robustness test, one may think of other variables which are also omitted in the models. However, given that investment is a very big variable which are related to so many such variables, it can be argued that the results would stand fairly well for most of other possibly omitted variables.

[Table 2]

Finally, the estimation results in Table 1 can be considered satisfactory also in terms of the fact that the coefficients of control variables in the growth equation are consistent with stylized facts as studied in previous literature on growth regression, including Barro (1997). The effect of basic variables, such as initial level of income, fertility rate and government expenditure share to GDP, are negative, with those of openness and terms of trade as positive. Such results are indicative of the validity of the SEM of our study. In addition, we have done additional estimations using different Gini index, using the one provided by SWIID and Theil index of UTIP-UNIDO to yield the consistent results (see Appendix 5).

4.2 Similarity and Differences between Developed and Developing Countries

First, regarding the relationship between economic growth and functional income distribution, the results in Table 1 indicate the positive feedback relationship between the two factors, that is, the coefficients for the effect of labor income share on per capita GDP growth and the effect of vice versa are positive. The increase in 1% of labor income share increases per capita GDP growth by approximately 0.10%p with 1% significance level, and the increase in 1%p of per capita GDP growth increases labor income about 4.48% with 1% significance level. Considering the common notion that the increase in labor income share is considered to desirable, the sign of the coefficients can be interpreted as a beneficial relationship between economic growth and functional income distribution. Hence, the increase in growth rate improves functional income distribution, which in turn accelerates economic growth.

By contrast, the result indicates a negative feedback relationship between economic growth and household income distribution. According to the result, the coefficients for the effect of the Gini coefficient on per capita GDP growth and the effect of vice versa are positive. The increase in 1% of the Gini coefficient increases per capita GDP growth by approximately 0.14%p, and the increase in 1%p of per capita GDP growth increases the Gini coefficient by 3.91% at the 1% significance level. Given that the decrease in the Gini coefficient is considered desirable or equity-enhancing, the signs of these coefficients indicate an adverse relationship between economic growth and household income inequality. The increase in growth rate aggravates household income inequality, and a higher equitable household income distribution slows down economic growth, which is consistent with the results of Lundberg and Squire (2003).

The estimation results on different country subgroups, namely, high-income and developing countries, are presented in Table 3. In the subgroups of country samples with different income levels, the coefficients on reciprocal relationship between growth and distribution show identical signs and significance levels to the results using the entire sample of countries. The same results for developed and developing countries suggest that the type of economic growth occurring worldwide may be similar regardless of the income levels. The same results that a higher growth in per capita GDP lead to a higher labor income share and a higher Gini coefficient implies that economic growth worldwide seems to be driven by skill-biased technical changes, allowing skilled labor higher wage rates compared with unskilled labor, as argued by Acemoglu (2002, 2003), Aghion (2002), Mendez (2002), and Moore and Ranjan (2005).

Economic growth becoming more technology-intensive rather than labor- or capital-intensive can be explained as follows. Labor-intensive development in an open economy inevitably ends when the economy loses its relative advantage of low wages. As concluded by the neoclassical growth model, capital-intensive growth cannot perpetuate itself without technological advancement. Thus, the changes led by economic growth becomes more technology-intensive in the long run. Given that workers with skilled labor are key players in economic growth, the income distribution favorable to them is most beneficial to economic growth. Moreover, the change in income distribution induced by economic growth is beneficial to skilled labor, given that the nature of the change is technology-intensive. Skilled labor may have high marginal propensity to invest on human capital because they earn more labor income through skill premium. As a result, people with skilled labor can relatively contribute more to economic growth, and consequently, the status of income distribution becomes more favorable to them.

Then, what is the implications for the Kuznets' hypothesis of the results that developed and developing groups show that the increase in the level of per capita GDP (and its growth rates) aggravates household income inequality. Such result in the rich and poor country samples is contrary to the original insights of Kuznets that economic growth may improve income inequality if a country reaches higher income levels. However, one aspect of the results that is consistent with Kuznets' is that the size of the aggravating effects (shown by the estimated coefficient) of increases in either growth rate or the level of per capita income on household income inequality is smaller in high-income countries than in developing countries.

These results allow the further observation about the nature of equity problem, particularly the sources of the declining labor income share. Regarding this issue, descriptive data and some tests in Table 4 show that this trend of declining labor share is true for high-income and developing countries, dropping from 62% in the early 1970s to 52% in the 2010s for the whole group. The labor share has declined from 57% to 48% for the developing countries and from 69% to 54% for the developed countries. This negative trend of labor income share turns out be statically significant for both groups, whereas no evidence of increasing or decreasing trend is found for Gini coefficient (Table 4).

The regression results in Table 3 are indicative of different suspect variables for this declining labor share in developed and developing countries. Rather than the trade openness variable,[9] the key responsible variable for the developed countries are economic growth rates and the years of schools, which have similar effects on labor shares (-) and Gini coefficients (-). Table 4 is indicative of the declining of economic growth rates, as well as the increasing trend of average years of schooling in high-income groups, which implies an increasing supply of quality-adjusted and thus a downward pressure for wage rates. Such trend of these variables seems to have resulted in reducing the labor share. Increasing years of schooling is shown to have affected the reduction of Gini coefficient by decreasing the premium of skilled labor.

Then, one may wonder what caused the decline of growth rates in developed countries. One possible answer could be the trend of financialization that could results in decline of investment (Table 4) and thus economic growth. An increasing volume of literature has discussed the negative aspect of financialization coupled with shareholder capitalism that forces firms to pay high dividends to shareholders rather than use profits for reinvestments, which leads to slow growth (Dore, Lazonick, and O'Sullivan 1999; Lazonick 2010, 2014; Tomaskovic-Devey et al. 2015). More dividend income than labour income as well as the growing dominance of financial sectors and income of those working in such sectors is related to the rising income inequality in developed countries (Alvarez 2015; Kus 2012; Pariboni and Tridico 2019; Tridico 2018).

In the meantime, the declining labor income share in developing countries seems to be first caused by the shaper declining of fertility rates, as shown in Table 4, whereas it was partially offset by a faster economic growth over time and the associated pressure on wage rates. Thus, in developing countries, decelerating trend of labor forces increase has been dominant over any wage rate increase effects of faster economic growth in determining the labor share. Similar to the influence of the schooling year variable in developed country sample, the fertility variable has the same positive signs with labor share and Gini coefficient, which implies that the decreasing trend of fertility reduces the labor share and household income inequality.

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[9] Although the results in Table 1 seem to be consistent with argument of Elsby et al. (2013) about economic openness, which is shown to be negatively related to labour income share, the results in Table 3 find the same variable insignificant in the high-income country sample.

Another variable responsible for the declining labor share is shown to be the decreasing trend (Table 4) of the government expenditure to GDP ratio in developing countries, which is the opposite from the case of the developed countries. In other words, this variable has been declining over time (Table 4) but is shown to be positively related to labor income share and Gini coefficient in Table 3 (part B). These signs imply that government expenditure helps the overall share of labor but is still more favorable to the high-paid labor or elite class of the society in the global south. Gini coefficients are more or less stable, if not increasing, over a longer term in developing countries, and this pattern seems to be associated with the mutually offsetting effects of increasing growth rates (+) and Gini-reducing effects of decreasing fertility and government expenditure. One may wonder what caused the decline of the government expenditure in the global South. One possible conjecture might be the drives for smaller government associated with the liberalization and privatization since the 1980s as the core policies of the so-called Washington Consensus (Williamson 1990). The above results suggest that such policy program may have contributed to the gradual decrease of the labor income share but not necessarily to household income inequality.

[Table 3] and [Table 4]

4.3 Comparison with Two-way Growth–Equity Nexus

For comparison, the present study also estimates the growth–labor income share and growth–Gini coefficient models separately in conventional two-way relationships. This approach is a replication of the specification of Lundberg and Squire’s (2003). The estimation results of the *separated models* are presented at Table 5. In comparison with the results in Table 1, most of the estimates in the separated model are similar to that in the integrated model. Particularly, in the case of the per capita GDP growth–Gini coefficient model, the coefficients of per capita GDP growth and the Gini coefficient are positive, which reconfirms the conclusion of Lundberg and Squire (2003).

Specifically, the estimated coefficients of the income distribution variables on the growth equations in the separated model are greater than the results in the three-way model in Table 1. As mentioned previously, such difference indicates the existence of omitted variable bias because larger coefficients imply overstating the influence of distribution on growth. That is, when the Gini coefficient (labor income share) variable is omitted, the effect of labor income share (Gini coefficient) on per capita GDP growth is overestimated. Hence, a certain portion of the effect of labor income share (Gini coefficient) is actually the effect of the Gini coefficient (labor income share). Such overestimation indicates that labor income share is positively correlated with Gini coefficient. In other words, higher labor income share is related to higher wages of skilled labor rather than that of unskilled labor. An increase in income inequality thus indicates an increase in the labor income of skilled labor rather than in capital income.

In sum, the difference in estimation results between the three-way model and the separated two-way models of growth–distribution nexus implies the need to consider functional and household income distributions simultaneously. In particular, the three-way estimation verifies whether the two separate results from the two-way estimation can co-exist together; namely the idea of the decoupling of functional and household income distribution is properly verified only in the three-way estimations.

[Table 5]

5. Summary and Concluding Remarks

This study analyzes the three-way relationship of economic growth and the two aspects of income distribution, with functional income share measured by labor income share and household income distribution as measured by the Gini coefficient. The descriptive data indicate the more serious nature of inequality in developing countries, with a lower value of labor share but a higher Gini coefficient than in developed countries, although both groups show a sharp decline of labor share but somewhat stable Gini coefficients over time. Despite this difference, the study confirms the same fundamental three-way relationship in two groups of countries, which is the decoupling of functional and household income distribution, but with several different determinants of the nexus and the trend of the key variables.

Contrary to the idea that higher labor income share will correlate to a more equal distribution of household income, a higher growth rate of per capita GDP goes together with higher labor income share and higher household income inequality in developed and developing country groups. For both groups, higher labor income shares and household income inequality lead to a higher rate of economic growth, as measured by growth of per capita income. These findings are indicative of the possibility of the common nature of growth across the two groups, which is driven by skill-biased technical changes, thereby aggravating the inequality in household income. The skilled laborers are the ones who have higher marginal propensity to invest in human and physical capital given a higher rate of return to such investment. Such positive feedback mechanism underlies the worsening inequality around the world. The study further confirms the different determinants of equity across two groups. That is, declining labor share and stable Gini coefficients seem to be caused by the slow growth and increasing years of schooling in developed countries, whereas by sharp decreases in fertility rates and government expenditure in developing countries.

The results in the two different country samples are contrary to the original insights of Kuznets because this study finds that economic growth aggravates household income inequality in the both groups of countries. This finding appears to be due to the higher rates of skill-biased innovation in rich countries than in poor countries. In addition, the results provide mixed support for Kaldor's insight and the wage-led growth theory, because a higher labor income share has a positive effect on economic growth, whereas a higher household income inequality does not lead to less but more growth. However, the findings of this study should also be taken cautiously because the results are confined to the analysis Gini coefficient, not the top 10% income share, as a measure of income inequality. That can be a subject of future studies.

Such complicated three-way relationship between economic growth and the two aspects of income distribution is important for policy makers because this finding confirms a newly nuanced trade-off between economic growth and household income equality, coupled with the absence of such trade-off between growth and labor income share. A sensible policy prescription may be a combination of growth-enhancing taxation on capital income relative to labor income and separate redistribution policies to mitigate household income inequality, which is in line with Piketty (2014, 2020: 975–79) on introducing taxation on wealth. A redistribution policy that increases tax on capital income can alleviate household income inequality and increase labor income share. As a result, although decreased income inequality can decelerate economic growth, increased labor income share will stimulate economic growth. Restoring growth momentum by stimulating investment seems to be vital to reverse the trend of declining labor share in developed countries. However, further increasing government expenditure in more inclusive manner or being favorable to the poor than the rich seems to be one of the policy options for developing countries.

References

Acemoglu, Daron. 2002. "Technical Change, Inequality, and the Labor Market." *Journal of Economic Literature* 40(1):7–72.

Acemoglu, Daron. 2003. "Cross-Country Inequality Trends." *Economic Journal* 113(485):F121–49.

Adelman, Irma, and Cynthia Taft Morris. 1973. *Economic Growth and Social Equity in Developing Countries*. Stanford University Press.

Aghion, Philippe. 2002. "Schumpeterian Growth Theory and the Dynamics of Income Inequality." *Econometrica* 70(3):855–82.

Ahluwalia, Montek S. 1976a. "Income Distribution and Development: Some Stylized Facts." *American Economic Review* 66(2):128–35.

Ahluwalia, Montek S. 1976b. "Inequality, Poverty and Development." *Journal of Development Economics* 3(4):307–42.

Alesina, Alberto, and Roberto Perotti. 1996. "Income Distribution, Political Instability, and Investment." *European Economic Review* 40(6):1203–28.

Alesina, Alberto, and Dani Rodrik. 1994. "Distributive Politics and Economic Growth." *The Quarterly Journal of Economics* 109(2):465–90.

Alvarez, Ignacio. 2015. "Financialization, Non-Financial Corporations and Income Inequality: The Case of France." *Socio-Economic Review* 13(3):449–75.

Angrist, Joshua D., and Jörn-Steffen Pischke. 2008. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton university press.

Autor, David, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen. 2017. "Concentrating on the Fall of the Labor Share." *American Economic Review* 107(5):180–85.

Bagchi, Sutirtha, and Jan Svejnar. 2015. "Does Wealth Inequality Matter for Growth? The Effect of Billionaire Wealth, Income Distribution, and Poverty." *Journal of Comparative Economics* 43(3):505–30.

Banerjee, Abhijit V, and Andrew F. Newman. 1993. "Occupational Choice and the Process of Development." *Journal of Political Economy* 101(2):274–98.

Barro, Robert J. 1991. "Economic Growth in a Cross Section of Countries." *The Quarterly Journal of Economics* 106(2):407–43.

Barro, Robert J. 1997. *Determinants of Economic Growth : A Cross-Country Empirical Study*. Cambridge, Mass.: Cambridge, Mass. : The MIT Press.

Barro, Robert J. 2000. “Inequality and Growth in a Panel of Countries.” *Journal of Economic Growth* 5(1):5–32.

Barro, Robert J., and Jong Wha Lee. 2013. “A New Data Set of Educational Attainment in the World, 1950–2010.” *Journal of Development Economics* 104:184–98.

Barro, Robert J., and Xavier Sala-i-Martin. 1992. “Convergence.” *Journal of Political Economy* 100(2):223–51.

Barro, Robert J., and Xavier Sala-i-Martin. 2004. *Economic Growth*. 2nd ed.. C. edited by X. Sala-i-Martin. Cambridge, Mass.: Cambridge, Mass. : MIT Press.

Berg, Andrew, Jonathan D. Ostry, Charalambos G. Tsangarides, and Yorbol Yakhshilikov. 2018. “Redistribution, Inequality, and Growth: New Evidence.” *Journal of Economic Growth* 23(3):259–305.

Bhaduri, Amit, and Stephen Marglin. 1990. “Unemployment and the Real Wage: The Economic Basis for Contesting Political Ideologies.” *Cambridge Journal of Economics* 14(4):375–93.

Biswas, Siddhartha, Indraneel Chakraborty, and Rong Hai. 2017. “Income Inequality, Tax Policy, and Economic Growth.” *The Economic Journal* 127(601):688–727.

Blau, Benjamin M. 2018. “Income Inequality, Poverty, and the Liquidity of Stock Markets.” *Journal of Development Economics* 130:113–26.

Castelló-Climent, Amparo. 2010. “Inequality and Growth in Advanced Economies: An Empirical Investigation.” *The Journal of Economic Inequality* 8(3):293–321.

Chambers, Dustin, and Alan Krause. 2010. “Is the Relationship between Inequality and Growth Affected by Physical and Human Capital Accumulation?” *The Journal of Economic Inequality* 8(2):153–72.

Charpe, Matthieu. 2011. “The Labour Share of Income: Determinants and Potentialcontribution to Exiting the Financial Crisis.” *World of Work Report* 2011(1):55–74.

Chenery, Hollis Burnley, Moises Syrquin, and Hazel Elkington. 1975. *Patterns of Development, 1950-1970*. edited by M. Syrquin. Oxford]: [Oxford] : Oxford Univ. Press.

Daudey, Emilie, and Cecilia García-Peñalosa. 2007. “The Personal and the Factor Distributions of Income in a Cross-Section of Countries.” *The Journal of Development Studies* 43(5):812–29.

Deininger, Klaus, and Lyn Squire. 1996. “A New Data Set Measuring Income Inequality.”

The World Bank Economic Review 10(3):565–91.

Deininger, Klaus, and Lyn Squire. 1998. "New Ways of Looking at Old Issues: Inequality and Growth." *Journal of Development Economics* 57(2):259–87.

Dore, R., W. Lazonick, and M. O'Sullivan. 1999. "Varieties of Capitalism in the Twentieth Century." *Oxford Review of Economic Policy* 15(4):102–20.

Dünhaupt, Petra. 2016. "Determinants of Labour's Income Share in the Era of Financialisation." *Cambridge Journal of Economics* 41(1):283–306.

Durlauf, Steven N. 2009. "The Rise and Fall of Cross-Country Growth Regressions." *History of Political Economy* 41:315–33.

El-Shagi, Makram, and Liang Shao. 2019. "The Impact of Inequality and Redistribution on Growth." *Review of Income and Wealth* 65(2):239–63.

Elsby, Michael WL, Bart Hobijn, and Ayşegül Şahin. 2013. "The Decline of the U.S. Labor Share." *Brookings Papers on Economic Activity* 1–52.

Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer. 2015. "The Next Generation of the Penn World Table." *American Economic Review* 105(10):3150–82.

Fishman, Arthur, and Avi Simhon. 2002. "The Division of Labor, Inequality and Growth." *Journal of Economic Growth* 7(2):117–36.

Forbes, Kristin J. 2000. "A Reassessment of the Relationship between Inequality and Growth." *American Economic Review* 90(4):869–87.

García-Peñalosa, Cecilia. 2010. "Income Distribution, Economic Growth and European Integration." *The Journal of Economic Inequality* 8(3):277–92.

Gollin, Douglas. 2002. "Getting Income Shares Right." *Journal of Political Economy* 110(2):458–74.

Guerriero, Marta, and Kunal Sen. 2012. "What Determines the Share of Labour in National Income? A Cross-Country Analysis." *IZA Discussion Paper No.6643*.

Herwartz, Helmut, and Yabibal M. Walle. 2020. "Do Rising Top Incomes Spur Economic Growth? Evidence From OECD Countries Based on a Novel Identification Strategy." *Review of Income and Wealth* 66(1):126–60.

Herzer, Dierk, and Sebastian Vollmer. 2012. "Inequality and Growth: Evidence from Panel Cointegration." *The Journal of Economic Inequality* 10(4):489–503.

Kaldor, Nicholas. 1955. "Alternative Theories of Distribution." *The Review of Economic Studies* 23(2):83–100.

Kaldor, Nicholas. 1957. "A Model of Economic Growth." *The Economic Journal*

67(268):591–624.

Karabarbounis, Loukas, and Brent Neiman. 2013. “The Global Decline of the Labor Share.” *The Quarterly Journal of Economics* 129(1):61–103.

Kus, Basak. 2012. “Financialisation and Income Inequality in OECD Nations: 1995-2007.” *Economic and Social Review* 43(4):477–95.

Kuznets, Simon. 1955. “Economic Growth and Income Inequality.” *The American Economic Review* 45(1):1–28.

Lavoie, Marc, and Engelbert Stockhammer. 2013. *Wage-Led Growth : An Equitable Strategy for Economic Recovery*. Houndmills, Basingstoke, Hampshire: Houndmills, Basingstoke, Hampshire.

Lazonick, William. 2010. “Innovative Business Models and Varieties of Capitalism: Financialization of the U.S. Corporation.” *Business History Review* 84(4):675–702.

Lazonick, William. 2014. “Profits without Prosperity.” *Harvard Business Review* 92(9):46–55.

Lewis, W. Arthur. 1954. “Economic Development with Unlimited Supplies of Labour.” *The Manchester School* 22(2):139–91.

Li, Hongyi, Lyn Squire, and Heng-fu Zou. 1998. “Explaining International and Intertemporal Variations in Income Inequality.” *The Economic Journal* 108(446):26–43.

Li, Hongyi, and Heng-fu Zou. 1998. “Income Inequality Is Not Harmful for Growth: Theory and Evidence.” *Review of Development Economics* 2(3):318–34.

Lindert, Peter H., and Jeffrey G. Williamson. 1985. “Growth, Equality, and History.” *Explorations in Economic History* 22(4):341–77.

Lucas, Robert E. 1988. “On the Mechanics of Economic Development.” *Journal of Monetary Economics* 22(1):3–42.

Lundberg, Mattias, and Lyn Squire. 2003. “The Simultaneous Evolution of Growth and Inequality.” *The Economic Journal* 113(487):326–44.

Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. “A Contribution to the Empirics of Economic Growth.” *The Quarterly Journal of Economics* 107(2):407–37.

Mendez, Rodrigue. 2002. “Creative Destruction and the Rise of Inequality.” *Journal of Economic Growth* 7(3):259–81.

Milanovic, Branko. 2016. “Description of All the Ginis Dataset (Version October 2016).” *The Stone Center on Socio-Economic Inequality, CUNY.*

Molero-Simarro, Ricardo. 2017. “Growth and Inequality Revisited: The Role of Primary

Distribution of Income. A New Approach for Understanding Today's Economic and Social Crises." *Cambridge Journal of Economics* 41(2):367–90.

Moore, Mark P., and Priya Ranjan. 2005. "Globalisation vs Skill-Biased Technological Change: Implications for Unemployment and Wage Inequality." *The Economic Journal* 115(503):391–422.

Oshima, Harry T. 1992. "Kuznets' Curve and Asian Income Distribution Trends." *Hitotsubashi Journal of Economics* 33(1):95–111.

Palley, Thomas I. 2014. "Rethinking Wage vs. Profit-Led Growth Theory with Implications for Policy Analysis." *IMK Working Paper No. 141-2014*.

Papanek, Gustav F., and Oldrich Kyn. 1986. "The Effect on Income Distribution of Development, the Growth Rate and Economic Strategy." *Journal of Development Economics* 23(1):55–65.

Pariboni, Riccardo, and Pasquale Tridico. 2019. "Labour Share Decline, Financialisation and Structural Change." *Cambridge Journal of Economics* 43(4):1073–1102.

Perotti, Roberto. 1996. "Growth, Income Distribution, and Democracy: What the Data Say." *Journal of Economic Growth* 1(2):149–87.

Persson, Torsten, and Guido Tabellini. 1994. "Is Inequality Harmful for Growth?" *The American Economic Review* 84(3):600–621.

Piketty, Thomas. 2014. *Capital in the Twenty-First Century*. edited by A. Goldhammer. London: London : The Belknap Press of Harvard University Press.

Piketty, Thomas. 2020. *Capital and Ideology*. edited by A. Goldhammer. Cambridge, Massachusetts.

Piketty, Thomas, and Emmanuel Saez. 2003. "Income Inequality in the United States, 1913–1998." *The Quarterly Journal of Economics* 118(1):1–41.

Ravallion, Martin. 1995. "Growth and Poverty: Evidence for Developing Countries in the 1980s." *Economics Letters* 48(3):411–17.

Rebelo, Sergio. 1991. "Long-Run Policy Analysis and Long-Run Growth." *Journal of Political Economy* 99(3):500–521.

Riskin, Carl. 2007. "Has China Reached the Top of the Kuznets Curve?" Pp. 41–57 in *Paying for progress in China*, edited by V. Shue and C. Wong. Routledge.

Sanderson, Eleanor, and Frank Windmeijer. 2016. "A Weak Instrument F-Test in Linear IV Models with Multiple Endogenous Variables." *Journal of Econometrics* 190(2):212–21.

Sargan, J. D. 1958. "The Estimation of Economic Relationships Using Instrumental

Variables." *Econometrica* 26(3):393–415.
Skott, Peter. 2017. "Weaknesses of 'Wage-Led Growth.'" *Review of Keynesian Economics* 5(3):336–59.
Solt, Frederick. 2009. "Standardizing the World Income Inequality Database." *Social Science Quarterly* 90(2):231–42.
Solt, Frederick. 2019. "Measuring Income Inequality Across Countries and Over Time: The Standardized World Income Inequality Database." *SWIID Version 8.0*.
Stockhammer, Engelbert, and Ozlem Onaran. 2013. "Wage-Led Growth: Theory, Evidence, Policy." *Review of Keynesian Economics* 1(1):61–78.
Stockhammer, Engelbert, Özlem Onaran, and Stefan Ederer. 2008. "Functional Income Distribution and Aggregate Demand in the Euro Area." *Cambridge Journal of Economics* 33(1):139–59.
Sukiassyan, Grigor. 2007. "Inequality and Growth: What Does the Transition Economy Data Say?" *Journal of Comparative Economics* 35(1):35–56.
Sylwester, Kevin. 2000. "Income Inequality, Education Expenditures, and Growth." *Journal of Development Economics* 63(2):379–98.
Tomaskovic-Devey, Donald, Ken-Hou Lin, and Nathan Meyers. 2015. "Did Financialization Reduce Economic Growth?" *Socio-Economic Review* 13(3):525–48.
Tridico, Pasquale. 2018. "The Determinants of Income Inequality in OECD Countries." *Cambridge Journal of Economics* 42(4):1009–42.
Williamson, John. 1990. "What Washington Means by Policy Reform." Pp. 90–120 in *Latin American Adjustment: How Much Has Happened*. Institute for International Economics.
Young, Andrew T., and Robert A. Lawson. 2014. "Capitalism and Labor Shares: A Cross-Country Panel Study." *European Journal of Political Economy* 33:20–36.
Zellner, Arnold, and H. Theil. 1962. "Three-Stage Least Squares: Simultaneous Estimation of Simultaneous Equations." *Econometrica* 30(1):54–78.

[Table 1] Regression Results of the Three-way Growth–Distribution Relationship

Part A: Regression Result	**All Countries**					
Equation (Dept. Var.)	**Per capita GDP growth**		**Ln(labor income share)**		**Ln(Gini coefficient)**	
Ln(labor income share)	0.103	(0.005)***				
Ln(Gini coefficient)	0.138	(0.007)***				
Per capita GDP growth			4.480	(0.709)***	3.913	(0.548)***
Ln(fertility rate)	-0.047	(0.015)***	0.222	(0.075)***	0.174	(0.075)**
Ln(years of schooling)	0.013	(0.016)	-0.132	(0.073)*	0.003	(0.075)
Ln(gov't expend./GDP)	-0.072	(0.010)***	0.347	(0.061)***	0.265	(0.057)***
Ln(trade/GDP)	0.023	(0.012)*	-0.135	(0.058)**	-0.064	(0.058)
Terms of trade change	0.245	(0.289)	-0.252	(1.320)	-1.587	(1.356)
Ln(per capita GDP)$_{(t-1)}$	-0.069	(0.007)***	0.301	(0.058)***	0.279	(0.049)***
Constant	0.780	(0.085)***	-3.285	(0.601)***	-3.205	(0.534)***
Joint significance test						
Country dummies $\chi^2(98)$	(744.51)***		(1246.96)***		(1332.00)***	
Period dummies $\chi^2(8)$	(57.17)***		(26.82)***		(38.09)***	
R-Squared	0.551		0.769		0.806	
Overidentification test			$\chi^2(11) = 16.10$			
Observations			396			
Part B: Weak-IV test	**JS**		**AP**		**SW**	
Ln(labor income share)	(9.55)***		(8.57)***		(3.72)***	
Ln(Gini coefficient)	(1.84)*		(2.43)**		(2.20)*	
Per capita GDP growth	(7.25)***		(2.12)*		(2.23)*	
Ln(fertility rate)	(88.59)***		(127.55)***		(67.14)***	
Ln(years of schooling)	(89.46)***		(106.39)***		(9.26)***	
Ln(gov't expend./GDP)	(19.19)***		(34.28)***		(19.88)***	
Ln(trade/GDP)	(23.89)***		(43.93)***		(13.13)***	
Terms of trade change	(3.19)***		(5.81)***		(4.49)***	

Notes:

1) Standard errors in parentheses.

2) Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3) When control variables (except past value of per capita GDP) are assumed to be endogenous.

4) Weak-IV test description (F-statistics): JS: Joint significance test on excluded instrument variables in first-stage regression, AP: Weak-IV test of Angrist and Pischke (2009) and SW: Weak-IV test of Sanderson and Windmeijer (2016).

[Table 2] Regression Results including Investment to GDP Ratio

Model	**Including investment ration to GDP**					
Equation (Dept. Var.)	**Per capita GDP growth**		**Ln(labor income share)**		**Ln(Gini coefficient)**	
Ln(labor income share)	0.128	(0.017)***				
Ln(Gini coefficient)	0.214	(0.033)***				
Per capita GDP growth			3.289	(0.904)***	2.684	(0.597)***
Ln(investment/GDP	0.001	(0.025)	0.159	(0.098)	-0.100	(0.085)
Population growth	-2.589	(1.456)*	15.613	(6.209)**	2.708	(5.296)
Ln(years of schooling)	0.011	(0.020)	-0.079	(0.078)	-0.005	(0.070)
Ln(gov't expend./GDP)	-0.085	(0.014)***	0.360	(0.085)***	0.180	(0.065)***
Ln(trade/GDP)	0.013	(0.015)	-0.092	(0.064)	-0.007	(0.055)
Terms of trade change	0.210	(0.453)	1.957	(1.714)	-2.150	(1.530)
Ln(per capita GDP)$_{(t-1)}$	-0.059	(0.008)***	0.181	(0.063)***	0.168	(0.046)***
Constant	0.717	(0.087)***	-1.909	(0.558)***	-2.195	(0.417)***
Joint significance test						
Country dummies $\chi^2(98)$	(396.23)***		(1202.68)***		(1740.63)***	
Period dummies $\chi^2(8)$	(48.76)***		(14.20)*		(31.71)***	
R-Squared	0.321		0.747		0.850	
Overidentification test	$\chi^2(11) = 15.38$					
Observations	396					

Notes:

1) Standard errors in parentheses.

2) Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3) When control variables (except past value of per capita GDP) are assumed to be endogenous.

[Table 3] Regression Results by Different Country Groups

Model	(A) Developed countries					
Equation (Dept. Var.)	**Per capita GDP growth**		**Ln(labor income share)**		**Ln(Gini coefficient)**	
Ln(labor income share)	0.294	(0.018)***				
Ln(Gini coefficient)	0.040	(0.006)***				
Per capita GDP growth			2.801	(0.223)***	4.432	(1.164)***
Ln(fertility rate)	-0.018	(0.035)	0.068	(0.106)	-0.043	(0.164)
Ln(years of schooling)	0.066	(0.029)**	-0.187	(0.089)**	-0.281	(0.145)*
Ln(gov't expend./GDP)	-0.019	(0.030)	0.054	(0.091)	0.086	(0.139)
Ln(trade/GDP)	-0.031	(0.022)	0.084	(0.065)	0.149	(0.100)
Terms of trade change	-0.363	(0.386)	1.172	(1.158)	0.461	(1.754)
Ln(per capita GDP)$_{(t-1)}$	-0.107	(0.022)***	0.315	(0.067)***	0.370	(0.136)***
Constant	1.182	(0.186)***	-3.531	(0.572)***	-3.623	(1.137)***
Joint significance test						
Country dummies $\chi^2(98)$	(317.72)***		(784.96)***		(476.16)***	
Period dummies $\chi^2(8)$	(54.91)***		(49.22)***		(20.42)***	
R-Squared	0.480		0.877		0.808	
Overidentification test			$\chi^2(11)$=8.22			
Observations			174			
Model	**(B) Developing countries**					
Equation (Dept. Var.)	**Per capita GDP growth**		**Ln(labor income share)**		**Ln(Gini coefficient)**	
Ln(labor income share)	0.075	(0.002)***				
Ln(Gini coefficient)	0.107	(0.003)***				
Per capita GDP growth			5.210	(1.024)***	5.686	(0.730)***
Ln(fertility rate)	-0.092	(0.026)***	0.452	(0.160)***	0.546	(0.170)***
Ln(years of schooling)	-0.003	(0.022)	-0.094	(0.121)	0.091	(0.139)
Ln(gov't expend./GDP)	-0.056	(0.013)***	0.301	(0.084)***	0.308	(0.087)***
Ln(trade/GDP)	0.020	(0.016)	-0.104	(0.089)	-0.112	(0.101)
Terms of trade change	0.403	(0.236)*	-0.592	(1.342)	-3.347	(1.497)**
Ln(per capita GDP)$_{(t-1)}$	-0.075	(0.010)***	0.343	(0.088)***	0.457	(0.079)***
Constant	0.892	(0.115)***	-4.052	(0.974)***	-5.485	(0.892)***
JS test						
Country dummies $\chi^2(98)$	(682.86)***		(633.26)***		(387.95)***	
Period dummies $\chi^2(8)$	(75.02)***		(21.15)***		(47.98)***	
R-Squared	0.673		0.739		0.605	
Overidentification test			$\chi^2(11)$=12.60			
Observations			222			

Notes:

1) Standard errors in parentheses.

2) Significance level: $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

3) When control variables (except past value of per capita GDP) are assumed to be endogenous.

[Table 4] Period Average and Trend Regression for Several Variables

Country Group	Variable	Period Average										Trend Regression	
		Whole period	1970 ~1974	1975 ~1979	1980 ~1984	1985 ~1989	1990 ~1994	1995 ~1999	2000 ~2004	2005 ~2009	2010 ~2014	$\hat{\beta}$	se($\hat{\beta}$)
All Countries	Labor income share	54.7%	62.6%	62.0%	61.1%	59.3%	55.5%	54.5%	53.9%	51.9%	51.8%	-1.425	(0.093)***
	Gini coefficient	0.39	0.44	0.42	0.38	0.36	0.42	0.41	0.39	0.39	0.38	-0.001	(0.001)
	Per capita GDP growth	3.39%	6.28%	2.93%	1.29%	2.34%	2.77%	3.23%	3.17%	4.48%	3.66%	0.046	(0.087)
	Observations	396	9	16	22	26	43	59	76	82	63		
Developed Countries	Labor income share	58.4%	69.4%	68.5%	63.6%	60.6%	59.6%	58.3%	57.8%	57.4%	54.2%	-1.119	(0.096)***
	Gini coefficient	0.34	0.40	0.37	0.33	0.34	0.34	0.33	0.33	0.33	0.34	0.000	(0.001)
	Per capita GDP growth	2.6%	3.4%	1.8%	0.4%	2.6%	2.0%	4.3%	2.3%	2.5%	2.9%	-0.190	(0.084)**
	Fertility rate	1.72	2.16	1.89	1.88	1.78	1.75	1.66	1.60	1.66	1.73	-0.011	(0.609)*
	Years of schooling	10.09	8.08	8.28	8.83	8.76	9.27	9.66	10.39	10.88	11.13	0.494	(2.355)***
	Investment/GDP	26.5%	26.9%	28.7%	27.1%	28.0%	27.1%	28.7%	24.8%	27.4%	24.1%	-0.892	(0.158)***
	Gov't expend./GDP	17.2%	13.6%	14.6%	15.8%	15.8%	15.5%	14.7%	17.3%	18.1%	20.4%	0.298	(0.080)***
	Trade/GDP	88.9%	28.8%	53.4%	51.5%	77.5%	95.1%	94.7%	92.7%	101.0%	95.6%	5.218	(0.943)***
	Terms of trade change	0.2%	-1.0%	-1.0%	0.1%	0.3%	0.4%	-0.6%	0.2%	0.4%	0.6%	0.073	(0.044)*
	Observations	174	3	7	11	14	16	23	28	34	38		
Developing Countries	Labor income share	51.8%	59.2%	57.0%	58.5%	57.7%	53.1%	52.1%	51.6%	47.9%	48.2%	-1.748	(0.002)***
	Gini coefficient	0.44	0.46	0.46	0.42	0.39	0.46	0.45	0.43	0.43	0.42	-0.001	(0.002)
	Per capita GDP growth	4.0%	7.7%	3.8%	2.2%	2.0%	3.2%	2.6%	3.6%	5.9%	4.8%	0.575	(0.139)***
	Fertility rate	3.36	4.48	4.11	4.04	4.30	3.77	3.26	2.92	3.09	3.13	-0.321	(1.590)***
	Years of schooling	6.11	3.97	3.96	4.32	4.73	5.34	5.93	6.90	6.84	7.07	0.611	(2.163)***
	Investment/GDP	20.2%	20.1%	22.4%	25.0%	15.9%	19.1%	18.9%	18.4%	22.0%	22.2%	1.264	(0.190)***
	Gov't expend./GDP	18.4%	13.5%	15.7%	20.7%	24.5%	19.3%	18.4%	19.1%	17.1%	17.2%	-0.877	(0.218)***
	Trade/GDP	38.7%	37.0%	43.5%	69.9%	27.4%	29.3%	31.2%	39.4%	41.8%	43.1%	4.478	(0.359)***
	Terms of trade change	0.7%	1.3%	2.7%	1.9%	0.9%	0.4%	0.2%	1.0%	0.6%	0.0%	-0.040	(0.072)
	Observations	222	6	9	11	12	27	36	48	48	25		

Notes:

1) The model for the trend regression is as follows: $(variable) = \beta \cdot (period) + (country\ fixed\ effect) + (constant)$

2) Standard errors in parentheses.

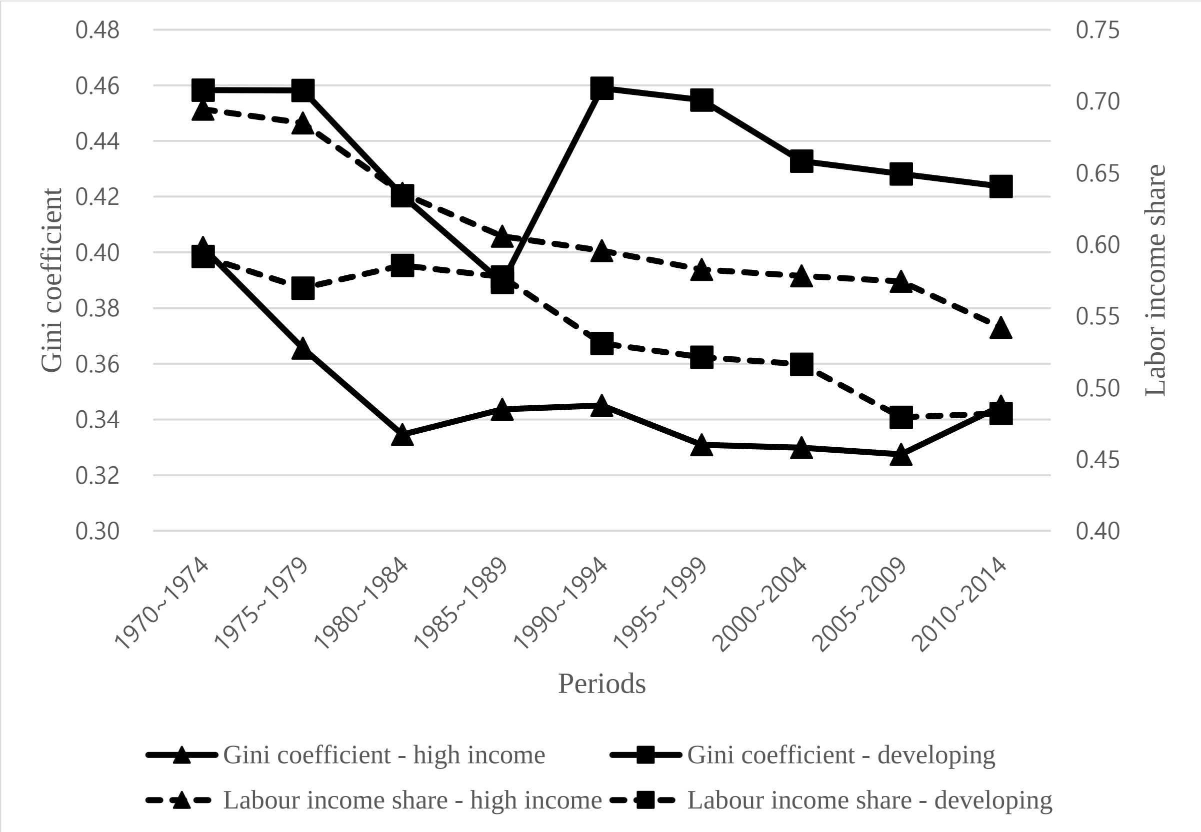
3) Significance level (sig.): * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

[Table 5] Regression Results from of the Two-way Growth–Distribution Nexus

Model	(1) Two-way model: economic growth–labor income share	
Equation (Dept. Var.)	**Per capita GDP growth**	**Ln(labor income share)**
Ln(labor income share)	0.206 (0.015)***	
Per capita GDP growth		4.844 (0.384)***
Ln(fertility rate)	-0.049 (0.014)***	0.237 (0.071)***
Ln(years of schooling)	0.028 (0.015)*	-0.134 (0.073)*
Ln(gov't expend./GDP)	-0.076 (0.010)***	0.367 (0.052)***
Ln(trade/GDP)	0.030 (0.011)***	-0.147 (0.055)***
Terms of trade change	0.075 (0.271)	-0.359 (1.309)
Ln(per capita GDP)$_{(t-1)}$	-0.067 (0.006)***	0.326 (0.041)***
Constant	0.727 (0.080)***	-3.523 (0.458)***
Joint significance test		
Country dummies $\chi^2(98)$	(566.34)***	(1430.70)***
Period dummies $\chi^2(8)$	(57.09)***	(45.77)***
R-Squared	0.566	0.742
Overidentification test	$\chi^2(8) = 5.71$	
Observations	396	
Model	**(2) Two-way model: economic growth - Gini coefficient**	
Equation (Dept. Var.)	**Per capita GDP growth**	**Ln(Gini coefficient)**
Ln(Gini coefficient)	0.230 (0.021)***	
Per capita GDP growth		4.346 (0.403)***
Ln(fertility rate)	-0.044 (0.017)***	0.191 (0.074)***
Ln(years of schooling)	-0.000 (0.017)	0.001 (0.075)
Ln(gov't expend./GDP)	-0.066 (0.011)***	0.289 (0.053)***
Ln(trade/GDP)	0.018 (0.013)	-0.077 (0.057)
Terms of trade change	0.394 (0.310)	-1.714 (1.352)
Ln(per capita GDP)$_{(t-1)}$	-0.071 (0.007)***	0.308 (0.042)***
Constant	0.802 (0.092)***	-3.488 (0.475)***
Joint significance test		
Country dummies $\chi^2(98)$	(403.14)***	(1395.54)***
Period dummies $\chi^2(8)$	(54.17)***	(47.84)***
R-Squared	0.428	0.784
Overidentification test	$\chi^2(8) = 2.92$	
Observations	396	

Notes:
1) Standard errors in parentheses.
2) Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
3) Control variables (except past value of per capita GDP) are assumed endogenous.

[Figure 1] Income Distribution Trends by Country Groups



[Appendix 1] List of Countries by Groups

Developing Countries

Argentina (~1999), Armenia, Bolivia, Botswana, Brazil, Bulgaria (~2009), Burundi, Cameroon, Central African Republic, Chile, China, Hong Kong SAR (China) (~1984), Colombia, Costa Rica, Croatia (~2004), Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, Estonia (~2004), Fiji, Gabon, Guatemala, Honduras, Hungary (~1999), India, Indonesia, Iran (~2009), Iraq, Jamaica, Jordan, Kazakhstan (~2009), Kyrgyzstan, Lao People's DR, Latvia (~2009), Lesotho, Lithuania (~2004), Malaysia, Mauritania, Mauritius (~1994), Mexico (~2009), Mongolia, Morocco, Mozambique, Namibia, Nicaragua, Niger, Panama, Paraguay, Peru, Philippines, Poland (~2004), Republic of Korea (~1994), Romania (~2009), Russian Federation (~2009), Rwanda, Senegal, Sierra Leone, Singapore (~1984), South Africa, Sri Lanka, Sudan (Former), Tajikistan, Thailand, Trinidad and Tobago (~1979), Tunisia, Turkey, Tanzania: Mainland, Uruguay, Venezuela (~2009), Zimbabwe.

Developed Countries

Argentina (2000~), Australia, Austria, Barbados, Bulgaria (2010~), Canada, Hong Kong SAR (China) (1985~), Croatia (2005~), Cyprus, Czech Republic, Denmark, Estonia (2005~), Finland, France, Germany, Greece, Hungary (2000~), Iceland, Iran (Islamic Republic of) (2010~), Ireland, Israel, Italy, Japan, Kazakhstan (2010~), Latvia (2010~), Lithuania (2005~), Luxembourg, Mauritius (2010~), Mexico (2010~), Netherlands, New Zealand, Norway, Portugal, Poland (2005~), Republic of Korea (1995~), Romania (2010~), Russian Federation (2010~), Singapore (1985~), Slovakia, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago (1980~), United Kingdom, United States, Venezuela (2010~).

Note:
1) The dividing level of per capita GDP between developed and developing country is 12,475 dollars in 2011 price.
2) Only the countries included in the Tables, 1~5, are listed.

[Appendix 2] Descriptive Statistics

Variable	Source	Mean	Std. Dev.	Min	Max
(1) Per capita GDP growth	PWT	0.0333	0.0342	-0.0826	0.2249
(2) Labor income share	PWT	0.5468	0.112	0.1734	0.852
(3) Gini coefficient	ATG	0.3932	0.0941	0.224	0.743
(4) Gini coefficient	SWIID	0.3752	0.0887	0.2062	0.6217
(5) Theil index	UTIP	0.0572	0.0796	0.0016	0.69
(6) Lagged per capita GDP	PWT	14,912.77	14,109.82	482.2832	115,933.94
(7) Fertility rate	WDI	2.8237	1.5931	0.9454	8.4226
(8) Investment share to GDP	PWT	0.2295	0.0773	0.0287	0.5595
(9) Population growth	PWT	0.0125	0.0106	-0.0167	0.053
(10) Years of schooling	BL	7.6116	3.0798	0.4843	13.4236
(11) Gov't expenditure to GDP	PWT	0.1808	0.069	0.0621	0.5443
(12) Trade share to GDP	PWT	0.6196	0.5854	0.0152	4.5882
(13) Terms of trade change	PWT	0.0055	0.0195	-0.0482	0.1842
(14) Industry VA share to GDP	WDI	0.2860	0.0776	0.0913	0.6050
(15) Population (million)	PWT	69.28	209.14	0.29	1,355.30
(16) Terms of trade	PWT	1.0028	0.107	0.4693	1.2961
(17) Female primary education ratio	BL	0.7341	0.2845	0.0198	1.0006
(18) Life expectation	WDI	67.8044	9.2631	36.3866	81.5694
(19) Arable land share	WDI	0.1512	0.1348	0.0034	0.6077
(20) Urban population share	WDI	0.594	0.2252	0.035	1

Note:

1) The sources of variables: PWT; Penn World Tables 9.0, ATG; All the Ginis 2016, SWIID; Standardized World Income Inequality 8.0, UTIP; the University of Texas Inequality Project, BL; Barro-Lee Education Dataset, and WDI; World Development Indicator (World Bank).

[Appendix 3] Correlation Table

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	1						
(2)	-0.2668***	1					
(3)	-0.0515	-0.2444***	1				
(4)	0.0052	-0.297***	0.8821***	1			
(5)	0.1296***	-0.4079***	0.197***	0.314***	1		
(6)	-0.1331***	0.0413	-0.4181***	-0.5156***	-0.0139	1	
(7)	-0.1132**	-0.024	0.3388***	0.4573***	0.1709***	-0.5571***	1
(8)	0.1925***	0.0727	-0.2105***	-0.3355***	-0.3184***	0.3769***	-0.4443***
(9)	-0.0934*	-0.2709***	0.3829***	0.4487***	0.2258***	-0.4002***	0.8073***
(10)	0.0361	0.1033**	-0.4093***	-0.506***	-0.1958***	0.6343***	-0.7718***
(11)	-0.0625	0.0684	-0.2286***	-0.0965**	-0.0404	-0.2026***	0.2018***
(12)	0.0724	-0.0851*	-0.176***	-0.2512***	-0.1296***	0.4654***	-0.3636***
(13)	0.0656	0.0093	0.0521	0.0501	0.0551	-0.0906**	0.179***
(14)	0.2769***	-0.3661***	0.1393***	0.1292**	0.0480	-0.2115***	-0.0894*
(15)	0.1163**	0.0877	0.0225	0.0938*	0.0298	-0.1372**	-0.0323
(16)	-0.1191***	0.0286	-0.0739	-0.0259	-0.0537	0.036	-0.191***
(17)	0.0092	0.2224***	-0.235***	-0.3874***	-0.2952***	0.5875***	-0.7552***
(18)	0.0821	0.0511	-0.4346***	-0.5793***	-0.2642***	0.7498***	-0.8256***
(19)	0.0181	0.1748***	-0.3436***	-0.2558***	-0.0814	0.0553	-0.2253***
(20)	0.0412	-0.1376***	-0.1725***	-0.3817***	-0.1332**	0.6871***	-0.6274***

	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(8)	1						
(9)	-0.1848***	1					
(10)	0.225***	-0.6513***	1				
(11)	-0.1279**	-0.0786	0.0017	1			
(12)	0.4861***	-0.1287**	0.3336***	-0.0575	1		
(13)	-0.1246**	0.0468	-0.1595***	0.0917**	-0.0303	1	
(14)	0.1005*	-0.0010	-0.0719	-0.0895*	-0.0279	0.1452***	1
(15)	0.1214**	-0.0103	-0.1549***	-0.0731	-0.2062***	-0.0087	0.2006***
(16)	0.0309	-0.1174**	0.2008***	0.0981**	0.1712***	-0.2021***	-0.4441***
(17)	0.2070***	-0.6622***	0.8164***	-0.1882***	0.1293**	-0.1393**	0.1267*
(18)	0.4502***	-0.5401***	0.7136***	-0.2513***	0.3510***	-0.2042***	-0.0012
(19)	-0.0256	-0.3243***	0.0165	-0.0154	-0.1493**	0.0076	-0.1630**
(20)	0.4254***	-0.3397***	0.6072***	-0.2206***	0.4500***	-0.1949***	-0.0012

	(15)	(16)	(17)	(18)	(19)	(20)
(15)	1					
(16)	-0.1812***	1				
(17)	-0.2831***	0.2519***	1			
(18)	-0.1731**	0.2319***	0.6867***	1		
(19)	0.3701***	0.1020	0.0046	0.0522	1	
(20)	-0.2649***	0.0820	0.4901***	0.7212***	-0.1828***	1

Notes:

1) Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

2) Variable numbers are matched with those in [Appendix 3].

[Appendix 4] Discussion on the Model Specification.

[Table A4] Regression Results of Alternative Specification

Model	**(1) Specification with at least one unique control variable for each equation**					
Equation (Dept. Var.)	**Per capita GDP growth**		**Ln(labor income share)**		**Ln(Gini coefficient)**	
Ln(labor income share)	0.072	(0.044)*				
Ln(Gini coefficient)	0.272	(0.040)***				
Per capita GDP growth			1.277	(0.513)**	3.093	(0.780)***
Ln(fertility rate)	-0.035	(0.018)*	-0.056	(0.049)	0.105	(0.085)
Ln(years of schooling)	0.009	(0.021)	-0.115	(0.042)***	0.020	(0.075)
Ln(gov't expend./GDP)	-0.068	(0.014)***	0.063	(0.043)	0.198	(0.070)***
Ln(trade/GDP)	0.023	(0.014)	-0.061	(0.034)*	-0.060	(0.051)
Terms of trade change	-0.067	(0.111)				
Ln(industry VA/GDP)			-0.300	(0.087)***		
Ln(population)					-0.031	(0.092)
Ln(per capita GDP)$_{(t-1)}$	-0.073	(0.008)***	0.073	(0.037)*	0.233	(0.069)***
Constant	0.877	(0.111)***	-1.459	(0.391)***	-2.714	(0.852)***
Joint significance test						
Country dummies $\chi^2(94)$	(228.91)***		(3115.14)***		(1751.11)***	
Period dummies $\chi^2(8)$	(35.69)***		(16.96)***		(28.16)***	
R-Squared	0.307		0.938		0.854	
Overidentification test			$\chi^2(17) = 41.23^{***}$			
Observations			347			

Notes:
1) Standard errors in parentheses.
2) Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The above estimation result yields same results regarding the relationship between growth and equity with those of Table 1, but the overidentification test rejects the null hypothesis that the instruments are not correlated with error-term. One plausible explanation for such results is as follows. Suppose that there exists one possible control variable (e.g., C) which affects equity but has no direct effect on the growth. Then, such variable C can be included in the equity equation only and serve as the instrument for the equity variable in the growth equation. However, in the long-run, this variable will affect ultimately not only equity but also growth via the assumed interaction between growth and equity that will go on for several periods. Therefore, in such system of a SEM applied for data of several periods like 20 or more years, it is almost impossible to find out any variables which is correlated with only one dependent variable, not the other, in the long run.

[Appendix 5] Results Using SWIID Gini Coefficient and UTIP-UNIDO Theil Index

Model	**(A5.1) Using SWIID Gini Coefficient**		
Equation (Dept. Var.)	**Per capita GDP growth**	**Ln(labor income share)**	**Ln(Gini coefficient)**
Ln(labor income share)	0.231 (0.016)***		
Ln(Gini coefficient)	0.084 (0.029)***		
Per capita GDP growth		4.049 (0.330)***	0.754 (0.441)*
Ln(fertility rate)	-0.074 (0.016)***	0.261 (0.064)***	0.165 (0.030)***
Ln(years of schooling)	0.042 (0.019)**	-0.172 (0.079)**	-0.028 (0.035)
Ln(gov't expend./GDP)	-0.072 (0.011)***	0.283 (0.047)***	0.081 (0.026)***
Ln(trade/GDP)	0.034 (0.013)***	-0.144 (0.053)***	-0.011 (0.028)
Terms of trade change	0.403 (0.258)	-1.352 (1.066)	-1.074 (0.479)**
Ln(per capita GDP)$_{(t-1)}$	-0.085 (0.007)***	0.335 (0.038)***	0.088 (0.037)**
Constant	0.894 (0.088)***	-3.381 (0.423)***	-1.330 (0.349)***
Joint significance test			
Country dummies $\chi^2(98)$	(638.14)***	(1970.89)***	(9191.99)***
Period dummies $\chi^2(8)$	(53.99)***	(46.37)***	(81.54)***
R-Squared	0.481	0.809	0.972
Overidentification test		$\chi^2(11) = 12.56$	
Observations		442	
Model	**(A5.2) Using UTIP-UNIDO Theil Index**		
Equation (Dept. Var.)	**Per capita GDP growth**	**Ln(labor income share)**	**Ln(Theil index)**
Ln(labor income share)	0.161 (0.005)***		
Ln(Theil index)	0.012 (0.000)***		
Per capita GDP growth		4.914 (0.423)***	16.929 (5.229)***
Ln(fertility rate)	-0.049 (0.016)***	0.289 (0.080)***	0.190 (0.360)
Ln(years of schooling)	0.046 (0.017)***	-0.181 (0.087)**	-1.371 (0.419)***
Ln(gov't expend./GDP)	-0.059 (0.009)***	0.298 (0.048)***	0.861 (0.297)***
Ln(trade/GDP)	0.048 (0.011)***	-0.208 (0.057)***	-1.159 (0.299)***
Terms of trade change	0.422 (0.208)**	-1.954 (1.074)*	-8.772 (5.048)*
Ln(per capita GDP)$_{(t-1)}$	-0.087 (0.006)***	0.446 (0.047)***	1.237 (0.467)***
Constant	0.955 (0.079)***	-4.888 (0.519)***	-13.613 (4.416)***
Joint significance test			
Country dummies $\chi^2(98)$	(1159.10)***	(1351.49)***	(830.96)***
Period dummies $\chi^2(8)$	(54.90)***	(51.62)***	(28.84)***
R-Squared	0.626	0.770	0.762
Overidentification test		$\chi^2(11) = 13.76$	
Observations		398	

Notes:

1) Standard errors in parentheses.

2) Significance level: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

3) Control variables (except past value of per capita GDP) are assumed endogenous; 1-period (5-year) lagged values of the variables are used as instrument variables.