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STRUCTURAL CHANGE, TRADE, AND INEQUALITY: SOME CROSS-COUNTRY EVIDENCE

Rudra Prosad Roy
and Saikat Sinha Roy

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Rudra Prosad Roy is research scholar and Saikat Sinha Roy (corresponding author) is professor, both at the Department of Economics, Jadavpur University, Kolkata, India.

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Please contact the authors for information about this paper.

Email: rudraprosadroy@gmail.com, saikat.sinharoy@gmail.com

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Asian Development Bank Institute
Kasumigaseki Building, 8th Floor
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

Abstract

The process of transition from a low-income to a high-income country involves a structural transformation of the economy along with a change in the distribution of income and wealth in the economy. This study examines how this process of structural change impacts on inequality for a sample of advanced, emerging, and transition economies. Trade liberalization, through a reduction in tariff and removal of nontariff barriers, aids the process of structural transformation and simultaneously changes the income distribution in an economy. This study investigates whether structural change impacts inequality. Using a panel of 217 countries during the period 1991–2014 and the System GMM method of dynamic panel data analysis, it is found that the process of structural change increases income inequality, while trade liberalization and FDI inflows help to reduce it. Income distribution is found to be more equal to infrastructure development. The econometric results are robust and have important policy implications.

Keywords: inequality, growth and structural change, trade, System GMM

JEL Classification: D63, F1, O18, O40, C23

Contents

1. INTRODUCTION

Reduction in inequality within and across countries is one of the main targets of the recent Sustainable Development Goals (SDGs). Even though global inequality is found to have remained stable or, at best, declined[1], there has been a rising incidence of income inequality in many countries since the 1980s. There is great heterogeneity in within-country inequality across countries and regions (Klasen et al. 2016). Inequality is seen to increase in developing countries, transition economies, and emerging market economies; these are the economies that have undergone structural transformation in the recent past. Within-country inequality is associated with different drivers, which vary across countries. Structural change is one such driver. This study aims to examine the causal relationship between income inequality and structural transformation while considering the role of international trade and foreign direct investment (FDI), as it is widely believed that globalization is one of the key drivers of increasing inequality both in advanced and developing countries.

Structural change at a narrow level refers to changes in the structure of the economy, while at a broader level, it refers to social, political, cultural, societal, and other changes (Aizenman, Lee and Park 2012). Although there are many definitions of structural change, the most common meaning refers to long-term and continual shifts in the sectoral composition of economic systems (Chenery, Robinson and Syrquin 1986; Syrquin 2007; UNIDO 2009). According to Machlup (1991), structural change is "the different arrangements of productive activity in the economy and different distributions of productive factors among various sectors of the economy, various occupations, geographic regions, types of product, etc….." Thus, in the process of structural change, a gradual shift of resources is observed from traditional to more sophisticated sectors. A rise in the relative share of the manufacturing sector is seen to occur, followed by a rise in the relative share of the service sector[2].

Before discussing the association between structural change and income inequality, it is important to study the pattern of both. Since the literature largely discusses the link between structural transformation and wage inequality, it is important to understand the change in wage gap between skilled and unskilled labor during the period1995–2009[3]. Figure 1 shows that in major advanced countries, such as the United States, Japan, Canada, Australia, Germany, and some emerging countries, such as the People's Republic of China (PRC), Brazil, Mexico, and Indonesia, the wage gap increased between 1995 and 2009. On the other hand, in other developing and emerging countries such as India; the Russian Federation; Taipei,China; and the Republic of Korea, the wage gap decreased between these two time periods. A discussion on the trend in inequality and the pattern of structural change across geographic regions can give some insights into the relationship between the two.

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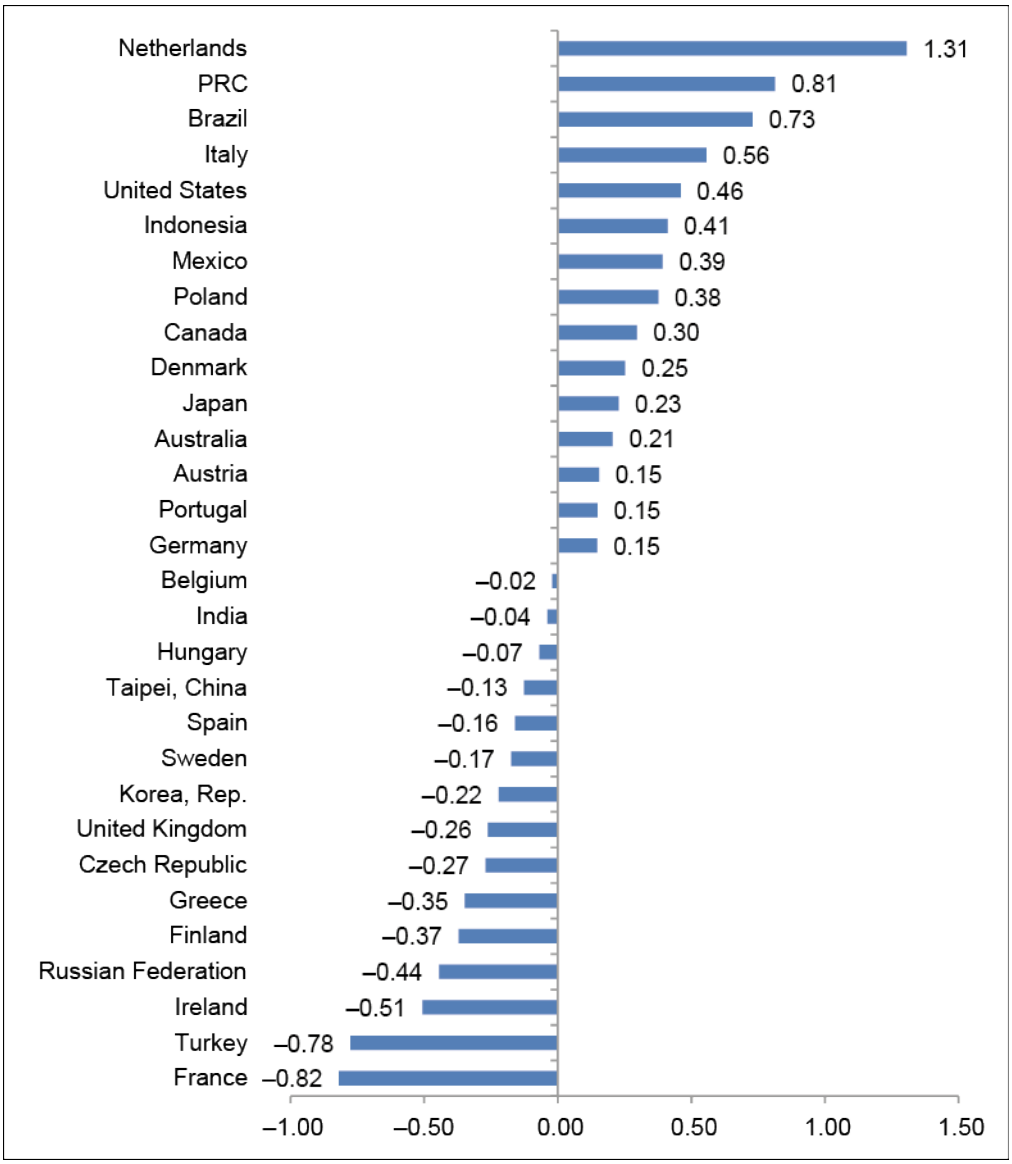
[1] Nino-Zarazua, Roope and Tarp (2016) show that while relative global inequality declined substantially during the period 1975–2010, global inequality measured using 'absolute' and 'centrist' measures registered a pronounced increase during this period of time.

[2] See Johnston (1970) for some other definitions of structural change.

[3] Wage gap is calculated using the Socio-Economic Accounts (SEA) database of the World Input Output Database (WIOD). First, for all industries, the total hours worked by high-skilled and low-skilled employees and the total compensation for high-skilled and low-skilled labor are calculated. Then hourly compensation for high-skilled and low-skilled labor and the gap between them have been estimated for 1995 and 2009. The wage gap is the ratio of hourly compensation for high-skilled labor to that for low-skilled labor.

Figure 1: Change in Wage Gap between High-skilled and Low-skilled Labor between 1995 and 2009



Source: Authors' calculation on the basis of Socio-Economic Accounts (SEA) of the World Input Output Database (WIOD).

Heterogeneity in income inequality, measured in terms of the Gini coefficient, can be found across countries in different geographical regions. Cross-country comparison of inequality is difficult on account of the lack of coverage and inconsistent data and methodology. In this exercise the World Bank database on inequality is used for purposes of comparison. Three indicators are considered, namely the difference between income shares of the top 20% and bottom 20% of the population, the difference between income shares of the top 10% and bottom 10% of the population, and the Gini index; these indicators can, however, be used interchangeably. From the yearly data on different indicators of inequality, the average indicators are calculated for the periods 1991–2000 and 2001–2010, as given in Table A2.The highest level of inequality is found in African countries, followed by South American and North American countries. Inequality is the lowest in European countries. In what follows, details can be found on each region.

In Africa, very high inequality is seen in countries like Botswana, the Central African Republic, Namibia, and South Africa. In Botswana, Kenya, Ethiopia, Nigeria, and Cameroon, all three indicators show a downward trend from the 1990s to the 2000s, whereas in countries like Egypt, Morocco, and South Africa they show an upsurge. As an emerging market economy, South Africa showed high economic growth in the 2000s, and also experienced an increase in inequality, as the Gini coefficient is found to increase from 57.96 to 63.33.

Inequality in Asian countries is not as severe as in African countries. From the 1990s to the 2000s, when the Chinese economy showed a huge increase in inequality, the Indian and Indonesian economies experienced a moderate increase. Small countries like Jordan, Kazakhstan, Malaysia, Pakistan, and the Philippines, and large countries like the Russian Federation and Thailand, showed a decline in inequality, whereas Bangladesh and Sri Lanka experienced an increase in inequality. The inequality measured in terms of the Gini coefficient for Bangladesh increased from 30.5 to 32.9. The Chinese economy showed almost a 15% increase in inequality in the last two decades. In the case of India, the Gini coefficient increased from 30.8 to 33.6. Among ASEAN countries, in Indonesia, Lao PDR, and Viet Nam, the Gini coefficient increased from 29.37 to 34.3, from 32.7 to 34.7, and from 35.6 to 36.8, respectively. Some other ASEAN countries like the Philippines and Thailand showed a downward trend in inequality. In Australia, inequality increased slightly[4]. In the 1990s, the average inequality measured in terms of the Gini coefficient was 33.7, and in the 2000s it increased to 34.1.

In general, inequalities across countries in Europe are lower than those among Asian and African countries. In the 21st century, European countries show a mixed trend in terms of decline in inequality. Inequality has declined in countries such as Austria, France, Greece, Ireland, Moldova, the Netherlands, Spain, and Ukraine and increased in all other countries. At the same time, Switzerland has successfully reduced its level of inequality from 37.10 to 32.70 (in terms of the Gini coefficient); and in counties like Belgium it has gone up from a level of 26.75 to 33.14 (in terms of the Gini coefficient).

Inequality in North American countries is higher than that in Asian and European countries but lower than in African countries. Inequality has increased in the 21st century in almost all major countries in this continent, though the magnitude varies across countries. In the United States, inequality measured in terms of all three indicators has increased marginally. Some countries, such as Guatemala, Mexico, Nicaragua, and Panama, however, have shown a marginal decline in inequality. In all South American countries, inequality is very severe. A high level of income and consumption inequality persists in countries like Bolivia, Brazil, Chile, Colombia, Paraguay etc. From the last decade of the 20th century to the beginning of the 21st century, inequality increased in all countries except Brazil, Chile, and Ecuador. In Paraguay and Peru it increased marginally.

On the whole, inequality is highest in the Latin American countries followed by the Caribbean and Sub-Saharan African countries, while it is lowest in countries in Europe, and Central and South Asia (see Table 1). On the other hand, inequality across countries in Europe and North America is lower than that in Asian and African countries, in general. Inequality in all countries across regions is seen to have increased in 2000 and to have decreased thereafter, with high inequality prevailing in some African countries. Since 2000, the largest decline in the level of inequality can be seen among countries in East Asia and the Pacific (25.51%) followed

[4] Data for New Zealand are not available.

by countries in Latin America and the Caribbean (8.61%), and the Middle East and North Africa (8.12%).

Table 1: Trend in Income Inequality across Regions

Region	Time Period				
	1990	1995	2000	2005	2010
East Asia and Pacific	35.63	38.48	50.06	40.86	37.29
Europe and Central Asia	NA	33.19	33.34	32.15	31.25
Latin America and Caribbean	49.20	51.38	53.42	51.61	48.82
Middle East and North Africa	41.01	38.50	40.73	37.71	37.42
North America	NA	NA	37.06	NA	37.07
Sub-Saharan Africa	NA	46.46	45.69	44.26	45.32
South Asia	32.85	34.52	33.06	32.71	31.44
World	42.67	43.25	43.57	38.40	36.41

Note: NA refers to nonavailability of data.

Source: Authors' own calculation on the basis of data obtained from WDI.

Although structural change can only be observed over the long term, countries across geographical regions are found to have undergone structural transformation over a period of 25 years (1990–2014). By the early 1990s, most countries had started moving away from the agricultural sector towards the manufacturing and services sectors. Table 2 provides a snapshot of structural change across regions. Across geographical regions, the shares of the agriculture and manufacturing sectors are found to have decreased over time and that of services has increased. For Latin American and Caribbean countries, where inequality is the greatest, the share of the agricultural sector fell from 8.77% to 5.50% and that of the service sector increased from 53.66% to 65.53% between 1990 and 2014. In Sub-Saharan Africa, where inequality is also very high, the share of the agricultural sector decreased from 23.62% to 17.09%, and that of the manufacturing sector also decreased from 13.62% to 10.61%. Interestingly, in South Asian countries the share of the manufacturing sector remained more or less unchanged over the period. A shift is found to occur from agriculture to the services sector. Another interesting fact that can be observed is that the share of agriculture in North American countries is increasing marginally along with a shift from manufacturing to the services sector. On the whole, it can be seen that structural change is widespread in regions where inequality is high. Thus a relationship between the two is expected to exist.

The paper thus investigates whether structural change determines inequality in countries across regions during globalization. The rest of the paper is structured as follows. This short introduction is followed by a review of existing literature in Section 2. In Section 3, data, the empirical model, and empirical methodological issues are discussed. Empirical results are discussed in Section 4, and in Section 5, a summary of the findings is presented.

Table 2: Sectoral Shares of GDP across Regions

Region	Time Period								
	1990			1995			2000		
	Sector								
	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services
East Asia and Pacific	13.69	27.36	47.90	10.46	26.33	51.00	8.05	25.52	54.82
Europe and Central Asia	NA	NA	NA	4.12	19.79	65.32	3.28	18.74	67.38
Latin America and Caribbean	8.77	NA	53.66	6.76	18.53	62.04	5.60	17.54	62.62
Middle East and North Africa	NA	NA	NA	NA	NA	NA	8.62	12.75	45.06
North America	NA	NA	NA	NA	NA	NA	1.19	15.51	75.66
South Asia	29.08	15.91	44.99	26.28	16.93	46.90	23.39	15.15	51.03
Sub-Saharan Africa	23.62	13.62	41.78	22.91	12.12	43.54	19.86	11.40	44.18
World	NA	NA	NA	8.12	21.39	58.30	5.23	19.20	64.27
	Time Period								
	1990			1995			2000		
	Sector								
Region	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services
East Asia and Pacific	6.37	25.16	56.91	5.59	24.40	58.27	5.34	NA	60.04
Europe and Central Asia	2.55	17.03	69.50	2.21	15.76	71.49	2.20	14.79	72.31
Latin America and Caribbean	5.67	17.61	60.23	5.35	15.85	61.36	5.50	13.69	65.53
Middle East and North Africa	6.69	NA	41.45	5.75	NA	45.42	6.09	NA	46.45
North America	1.18	13.33	76.89	1.20	12.32	77.68	1.33	12.33	77.98
South Asia	19.16	15.74	53.06	18.73	14.86	54.86	17.97	15.92	53.18
Sub-Saharan Africa	20.93	11.19	47.61	18.21	10.36	54.77	17.09	10.61	56.48
World	4.37	17.98	65.67	3.88	16.81	67.52	3.88	14.71	68.47

2. LITERATURE REVIEW

There is a large literature discussing the relationship between structural change and income inequality. One strand of these studies discusses the macroeconomic impact of inequality, while the other school of thought relates inequality to structural transformation and growth in the economy. While discussing the former, inequality of outcomes (as measured by income, wealth, or expenditure) and inequality of opportunities need to be distinguished. To understand the nature and extent of inequality, it is important to consider the distribution of opportunities and of outcomes (Rawls 1971). Some economists believe that a certain degree of inequality is good as it provides incentives for individuals to excel and compete. Lazear and Rosen (1981) argue that by providing incentives for innovation and entrepreneurship, inequality can influence growth positively. Inequality to a tolerable extent is necessary, especially in developing countries, as it allows at least a few individuals to accumulate startup capital (Barro 2000). However, inequality of outcomes does not generate the “right” incentives if it relies on rents (Stiglitz 2012). In that case it results in resource misallocation, corruption, nepotism, and hence adverse social and economic

consequences as individuals have an incentive to divert their efforts toward securing favored treatment and protection.

Several empirical studies have found that inequality negatively affects economic growth and its sustainability (see Berg and Ostry 2011; Ostry, Berg and Tsangarides 2014; and Roy and Sinha Roy 2017). Economic inequality may weaken the progress of health and education, lead to political and economic instability, and hence reduce investment, undermine the social consensus required to adjust in the face of major shocks, and thus reduce the pace and durability of economic growth (Persson and Tabellini 1994; Easterly 2007; Berg, Ostry and Zettelmeyer 2012). A more equitable distribution of income encourages investment in human capital and thus induces economic growth (Berg and Ostry 2011; Wilkinson and Pickett 2009); and inequality deprives the poor of the ability to stay healthy and accumulate human capital (Perotti 1996; Galor and Moav 2004; Aghion, Caroli and Garcia-Penalosa 1999). In the presence of economic inequality, if political power is found to be distributed in a more egalitarian manner, any effort to redistribute income or wealth may lead to lower economic growth by creating disincentives for investment (Rodrik 1999). On the other hand, if economic elites try to resist this process of redistribution, it may hamper economic growth (Barro 2000). Investment incentive also dwindles if the uncertainty and risk increase due to income inequality (Alesina and Perotti 1996). Inequality and political instability may hamper the effectiveness of economies in responding to external shocks (Rodrik 1999).

The idea behind the nexus between structural change and inequality follows from the seminal papers by Kuznets (1955, 1963). With globalization, structural change across developed and developing economies, along with rising productivity and growth, has increased the wage gap between skilled and unskilled labor (ILO 2014). More precisely, structural change in developing economies has increased productivity and helped them to catch up with advanced economies. This process of reducing the productivity gap has created a huge demand for skilled labor and thus resulted in higher inequality by intensifying the wage gap with unskilled labor (Zhu and Trefler 2005). Although in the long term structural change is expected to create job opportunities and as a result increase the income level of the population and lead to a more equal society, in the medium and short term it causes an increase in wage inequality and therefore income inequality, by increasing the demand for skilled workers in the expanding high-productivity sector (ECLAC 2012). With the contraction of traditional sectors such as agriculture and mining, and the expansion of modern sectors such as manufacturing and services with more sophisticated skill- and technology-intensive activities, a shift in labor demand is also observed. With the expansion of the skill- and technology-intensive sectors, the relative demand for high-skilled labor increases and at the same time low-skilled workers are seen to be replaced more and more by “automatization” (Henze 2014). During this transition, the wage gap is seen to increase between high-skilled and low-skilled workers (see Blum 2008; OECD 2008; OECD 2011, among others) and this wage gap is the key link between structural heterogeneity and income inequality (ECLAC 2012).

Some recent studies have considered the relationship between structural change and wage inequality. Aizenman, Lee and Park (2012) show that although structural change has widened the wage gap and hence increased the level of inequality, it has helped to reduce the level of poverty, especially in developing Asia. In relation to German microdata, Henze (2014) has studied the causal relationship between wage premium and structural change. Both Aizenman, Lee and Park (2012) and Henze (2014) have considered the role of international trade to be a major determinant of wage inequality. Lundberg and Squire (2003) argue that some determining factors simultaneously

determine both growth and inequality. One such structural factor is international trade (Aizenman, Lee and Park 2012). International trade, or more precisely trade liberalization, plays an important role in this process (Attanasio, Goldberg and Pavcnik 2004; Wood 1997). First, due to a rise in the relative price of goods produced in the sectors using relatively more high-skilled labor intensively, the relative demand for high-skilled workers and hence the wage gap increase as predicted by the Heckscher-Ohlin model. Second, with more integration with the world economy, the global value chain becomes more and more prominent and countries outsource parts of the production process that use low-skilled workers to low-wage countries (Freenstra and Hanson 2001). A number of theoretical studies have attempted to give possible explanations for the relationship between an increase in intra-country wage inequality and trade liberalization[5]. On the other hand, Attanasio, Goldberg and Pavcnik (2004) studied the impact of tariff reduction on the wage distribution in Columbia between the 1980s and 1990s. They show that the rise in skill premium was primarily driven by skill-biased technological progress, and sectors that underwent large tariff cuts experienced a greater decrease in wage premium as well. A recent strand of literature, extending the work of Melitz (2003), tries to explain the impact of trade on inequality in the presence of firm and workers' heterogeneity. The positive relationship between firm productivity and workers' skill can explain the employer size-wage premium and the exporter wage premium (Sampson 2014). On the other hand, with trade liberalization, an increase in imports may raise competition in the modern sector of the economy and thus compels firms to improve labor productivity. This may result in a shift of low-skilled workers to the informal sector and thus an increase in wage inequality. Similarly, the removal of restriction from imports of capital-intensive investment goods may reduce the demand for low-skilled workers and their wages relative to high-skilled workers. Thus, "skill-enhancing" trade ends up resulting in an increase in the wage gap and thus inequality (Cornia 2005; Zhu and Trefler 2005; Avalos and Savvides 2006; Chari, Henry and Sasson 2012). This relationship is not unique in the sense that some other studies show that trade openness significantly reduces income inequality (White and Anderson 2001; Dollar and Kraay 2002; Edwards 1997; Higgins and Williamson 1999).

FDI plays an important role in expanding the wage gap and hence augmenting income inequality. However, in the existing literature, the relationship between FDI and inequality is far from being conclusive. FDI may increase inequality in host countries by benefiting high-skilled workers more than low-skilled workers (see Aitken, Harrison and Lipsey 1996; Freenstra and Hansen 1997; Lipsey and Sjöholm 2004; Mah 2002; Hansen 2003). On the other hand, inward FDI worsens income distribution by raising wages in the corresponding sectors in comparison with traditional sectors (Girling 1973; Rubinson 1976; Bornschier and Chase-Dunn 1985; Tsai 1995).Some empirical studies support the proposition derived from endowment-driven North-South models of international trade that argues that FDI causes a higher level of inequality by raising the skill premium in poor host countries (see Aitken, Harrison and Lipsey 1996; Freenstra and Hansen 1997; Hansen 2003). Aitken, Harrison and Lipsey (1996), Freenstra and Hansen (1997), and Hansen (2003) have considered the relationship between inequality and FDI for Mexico. Lipsey and Sjöholm (2004) discuss the relationship by considering data from Indonesia. Mah (2002) shows the inequality-augmenting role of FDI for the Republic of Korea. Some cross-country studies have also shown similar results (see Tsai 1995; Slywester 2005; Choi 2006). The theoretical literature in this regard takes into account the role of multinational enterprises (MNEs) and argues that by increasing the demand for skilled labor they could lead to more inequality (Figini and Görg 1999; Taylor and Driffield 2005).

[5] See Acharyya (2010, 2016) for a detailed discussion on different theoretical studies.

However, some other studies show the inequality-dampening role of FDI (see Markusen and Venables 1997; Blonigen and Slaughter 2001; Aghion and Howitt 1998 etc.). Markusen and Venables (1997) argue that advanced countries are typically host countries and at the same time home countries for MNEs, and hence the establishment of foreign plant operations through FDI reduces the demand for skilled labor in the host country and thus reduces income inequality. Aghion and Howitt (1998), in a theoretical model, show that through FDI-induced technological spillover to domestic firms, inequality decreases in the long run. The inverted U-shaped relationship can also be found from the empirical study by Figini and Görg (1999).

In the modern era, when trade liberalization compels countries to face more global competition, infrastructure development helps them to become more competitive. At the same time, there is empirical evidence showing a negative impact of the quantity and quality of infrastructure on inequality (Sinha Roy and Roy 2016). Infrastructure development can have a positive impact on the income and welfare of the poor on account of its impact on average income[6] (López 2003). Infrastructure development allows the poor to access additional productive opportunities and thus helps poorer individuals and underdeveloped areas to get connected to core economic activities (Estache 2003). Reduction of production and transaction costs is possible if infrastructure development takes place in poorer regions (Gannon and Liu 1997). Thus development of infrastructure is necessary to reduce income inequality, when it results in improved access and/or enhanced quality, especially for low-income households (Estache, Foster and Wodon 2000). A number of studies show that improvement in income distribution is possible with the development of infrastructure (World Bank 1994; Schady and Paxson 2000; Chong and Calderon 2000; Sinha Roy and Roy 2016). Chong and Calderon (2000) show that both the quantity and quality of infrastructure are negatively linked with income inequality; and for the developing countries the quantitative link is much stronger than the qualitative link. Working on ASEAN countries, Seneviratne and Sun (2013) show that better infrastructure, both in terms of quantity and quality, improves income distribution. Some other studies show that some specific categories of public spending, such as public investments in infrastructure, health and education, and social insurance provision, may be pro-growth and pro-equality (see Benabou 2000, 2002; Bleaney, Gennell and Kneller 2001). Pi and Zhou (2012), using a static multi-sectoral model, show that public infrastructure development reduces the wage gap between skilled and unskilled labor. Some other empirical studies have checked the effect of infrastructure development on overall inequality by regressing the Gini coefficient on different indicators of infrastructure (see López 2003; Calderon and Chong 2004).

In the literature, studies examining the nexus between the wage gap and structural change can be found. However, there are hardly any studies examining the impact of structural change on income inequality as a whole. On the other hand, studies examining the relationship between wage inequality and structural change focus on countries of one particular region or any specific income group (see Dastidar 2004, 2012, for example). The study by Dastidar (2004) focuses on the Asian and Latin American developing countries and finds a weak relationship between structural change and income inequality. On the other hand, data show that there is an important difference in the pattern of structural transformation between developed and developing countries. While in developed countries service orientation is seen to follow the industrialization, the pattern is the opposite in developing countries (Dastidar 2012). Under these circumstances, it is important to understand the consequences of

[6] For a detailed survey of the infrastructure-distribution relationship, see Estache, Foster and Wodon (2002), Estache (2003), and Calderon and Serven (2004).

structural change and more precisely the service orientation on income inequality. This empirical study on the one hand considers a large group of countries from all geographical regions and income groups, and on the other seeks to examine the relationship between structural change and overall income inequality.

3. DATA, EMPIRICAL MODEL, AND ESTIMATION METHOD

Despite common perceptions, casual observation does not suggest an obvious association between changes in inequality and structural change. For a more profound understanding of the relationship between structural change and income inequality, an empirical analysis has been carried out with a panel of 217 countries. All data used in this analysis are collected from the database of World Development Indicators[7]. A panel[8] of all developing, emerging, and advanced countries for the period 1991–2014 has been considered. The selection of the time period is very important here. Since the early 1990s, the developing countries have become more integrated with the world economy. On the other hand, the growth of countries in Asia, Latin America, and Sub-Saharan Africa since the 1990s and especially after the 2000s can be explained by the variation in the contribution of structural change to labor productivity (McMillan and Rodrik 2011). At the same time, inequality has increased in most of the developed countries and has remained stable in emerging market economies (Dabla-Norris et al. 2015).

Apart from structural change, the estimated panel data model incorporates some other explanatory variables that directly or indirectly determine a country's level of income inequality. The inclusion of past levels of inequality or initial levels of inequality helps us to understand the nature of path dependence. To control for a country's economic size or level of development, per capita real income is also incorporated. A high degree of correlation is expected to be seen between per capita real income and other explanatory variables. On the other hand, inequality is also a determinant of GDP growth (Dabla-Norris et al. 2015). Thus a problem of endogeneity is very obvious. The relationship between trade liberalization or globalization and inequality is expected to operate through multiple channels. On the one hand, trade openness and the quantity and quality of infrastructure have been used as indicators of trade liberalization; on the other hand, FDI has been employed as an indicator of financial globalization or financial openness.

The estimated empirical model is as follows:

$$(\ln \mathrm{INQ})_{it} = \beta_0 + \beta_1(\ln \mathrm{INQ})_{it-j} + \beta_2(\ln \mathrm{PCGDP})_{it} + \beta_3(\ln \mathrm{TO})_{it} + \beta_4(\ln \mathrm{FDI})_{it} + \beta_5(\ln \mathrm{Infra})_{it} + \beta_6(\ln \mathrm{Manu\_Share})_{it} + \beta_7(\ln \mathrm{Serv\_Share})_{it} + \beta_8(\ln \mathrm{Infra\_Q})_{it} + \beta_9(\mathrm{Urban})_{it} + \varepsilon_{it} \quad (1)$$

[7] A detailed discussion of data sources is presented in Table A1 Appendix 1.

[8] Panels are unbalanced as the data are driven largely by the availability of information on the inequality variable.

Where lnINQ = log of inequality measure;

lnPCGDP = log of per capita GDP;

lnTO = log of trade openness;

lnFDI = log of FDI;

lnInfra = log of infrastructure stock index;

lnManu_share = log of GDP share of manufacturing sector;

lnServ_share = log of GDP share of service sector;

lnInfra_Q = log of infrastructure quality;

lnurban = log of urbanization.

In this empirical analysis, the selection of the dependent variable follows Deininger and Squire (1996) and Calderon and Chong (2004). As a measure of inequality the Gini index has been used for the analysis following several other former studies (see López 2003; Calderon and Chong 2004, etc.). The Gini index is considered to be the best known and most commonly used measure of inequality (Klasen et al. 2016). The index has many advantages over other measures of inequality[9]. The Gini index and some other indices such as the Theil Index and the Atkinson Index all give information about the overall income distribution of the population. However, to check the robustness of results three other models have been estimated considering three different measures of inequality. The income share of the top 20% of the population, the income share of the bottom 20% of the population, and the ratio of the two quintiles have been used as three indicators of income inequality. Some other studies have also used the income share of the top 20% of the population and the income share of the bottom 20% of the population as measures of inequality (see Calderon and Chong 2004).

While estimating equation (1), the possibility of endogeneity cannot be ruled out. The bidirectional relationship between growth and inequality is well documented in literature. On the other hand, trade openness, FDI, and infrastructure are determinants of both inequality and per capita GDP. Structural change also depends upon factors like trade openness, infrastructure, and FDI. Thus the empirical model described above cannot be interpreted as causal until the possibility of endogeneity has been ruled out. To address this problem, a dynamic GMM estimator (System GMM) – also known as Arellano-Bover/Blundell-Bond linear dynamic panel-data estimation – was used to analyze changes across countries and over time[10]. One of the main advantages of the System GMM estimator is that it does not require any external instruments other than the variables already included in the dataset. It uses lagged levels and differences between two periods as instruments for current values of the endogenous variable, together with external instruments. More importantly, the estimator does not use lagged levels or differences by themselves for the estimation, but instead employs them as instruments to explain variations in infrastructure development. This approach ensures that all information will be used efficiently, and that focus is placed on the impact of regressors (such as trade openness) on inequality, and not vice versa.

Dynamic relationships among economic variables are identified by the presence of a lagged dependent variable among regressors. In a panel data setup this can be discerned by the presence of autocorrelation and other individual effects account for heterogeneity among individuals:

[9] For a comparative analysis on different measures of inequality see Klasen et al. (2016).

[10] First introduced by Arellano and Bond (1991).

$$y_{it} = \delta y_{i,t-1} + x'_{it}\beta + u_{it} \quad i = 1, 2,\ldots\ldots, N;\ t = 1,2,\ldots\ldots, T \tag{2}$$

where δ is a scalar, x'_{it} is a 1 x K vector of strictly exogenous regressors, and β is a K x 1 vector of coefficients. The u_{it} is assumed to follow a one-way error component model

$$u_{it} = \mu_i + v_{it} \tag{3}$$

where μ_i and v_{it} are independent of each other and IID with a mean of 0 and variance of σ_μ^2 and $\sigma_{v,}^2$ respectively. The ineluctable correlation between $y_{i,t-j}$, i.e., the lagged dependent variables, and u_i, i.e., the unobserved panel level effects, makes the OLS estimator biased and inconsistent even though v_{it} is not serially correlated. Anderson and Hsiao (1981) show that first differencing of the model gives a consistent estimator. But this does not necessarily produce an efficient estimator. A generalized method of moments (GMM) procedure suggested by Arellano and Bond (1991) gives us a consistent estimator that is certainly more efficient than Anderson and Hsiao's (1981) estimator. Before using GMM, the Arellano-Bond (1991) technique transforms all regressors by taking the first difference, and hence the technique is popularly known as the "difference GMM" technique (Hansen 1982). However, in the presence of too large autoregressive parameters, or if the ratio of the panel-level effect to the variance of idiosyncratic error is too large, this estimator can perform poorly.

Based on the study of Arellano and Bover (1995), Blundell and Bond (1998) developed an estimator assuming the absence of autocorrelation in the idiosyncratic errors and no correlation between panel-level effects and the first difference of the dependent variable. The first difference GMM model is found to have very poor finite sample properties in terms of biasness and precision, especially when the series is persistent as the instruments are then weak predictors of endogenous changes. As a remedy, the level restrictions and the use of extra moment conditions that depend on certain stationarity conditions of the initial observation suggested by Arellano and Bover (1995) are factual and also augmented by Blundell and Bond (1998) by making an additional assumption of no correlation between the first difference of instrument variables and fixed effects. In doing so, one can increase efficiency by introducing more instruments. This method is called "System GMM" as it deals with a system of two equations – the original equation and the transformed equation. This System GMM estimator not only improvises precision but also reduces finite sample bias even when covariates are weakly exogenous. With a large sample of individuals or cross section of units observed for a small number of time periods, difference GMM estimators have been found to produce unsatisfactory results (Mairesse and Hall 1996). However, with large T first difference GMM estimator performs relatively well. Blundell and Bond (1998) suggest use of extra moment conditions with small T. In this study, since we have considered many panels with few time periods, we consider a system estimator as suggested by Blundell and Bond (1998).

4. EMPIRICAL RESULTS AND DISCUSSIONS

Table 3 shows summary statistics of the Gini index and some other important determinants of income inequality. It can be seen that the average level of inequality is highest in South American countries. Among African countries, the average level of income (measured by average per capita GDP) is the lowest and at the same time the average inequality is very high. Interestingly, among North American countries, both the average inequality and average income are very high in contrast to European countries, where the average income is very high and average inequality is the lowest.

Table 3: Summary Statistics

		Variable						
Continent	**Statistics**	**Gini**	**PCGDP**	**TO**	**FDI**	**Infrastructure**	**Manu**	**Serv**
Africa	Mean	44.89	3,545.89	0.76	7.04E+08	43,323.08	11.01	48.06
	S.D	8.46	10,936.72	0.46	2.01E+09	108,750.90	7.09	13.43
	Min	29.81	115.44	0.05	1.00E+02	1,682.33	0.24	12.87
	Max	65.76	94,903.20	3.38	2.37E+10	591,906.50	45.67	93.22
Asia	Mean	36.50	10,422.48	0.88	5.88E+09	89,230.85	15.55	51.64
	S.D	6.38	14,744.27	0.60	2.25E+10	175,048.70	7.56	13.56
	Min	19.49	314.88	0.09	1.00E+01	1,682.33	0.86	16.56
	Max	69.47	74,632.24	4.00	2.91E+11	1525,740.00	40.45	83.70
Europe	Mean	31.65	26,171.71	0.94	1.34E+10	49,724.03	16.95	62.82
	S.D	4.27	22,939.06	0.48	4.16E+10	78,080.52	7.95	15.08
	Min	16.23	690.92	0.17	1.00E+03	1,925.26	0.69	2.43
	Max	44.42	145,221.20	3.61	7.34E+11	591,906.50	47.34	93.76
North America	Mean	49.23	10,982.34	0.95	1.34E+10	34,612.17	12.52	65.57
	S.D	6.61	12,630.64	0.74	4.61E+10	40,693.69	6.91	11.00
	Min	31.15	662.28	0.16	3.00E+05	1,682.33	1.28	33.40
	Max	60.91	50,662.41	4.48	3.50E+11	220,406.50	29.01	92.98
Oceania	Mean	41.13	8,596.69	0.58	2.20E+09	33,510.30	7.29	63.56
	S.D	8.05	13,273.78	0.28	8.80E+09	38,402.92	5.19	12.44
	Min	33.72	1,047.45	0.24	1.00E+01	1,682.33	0.38	22.81
	Max	61.18	54,232.66	1.32	6.56E+10	200,919.90	19.93	88.02
South America	Mean	51.54	6,624.60	0.53	7.49E+09	104,135.30	15.84	55.13
	S.D	5.03	3,728.78	0.26	1.66E+10	171,701.40	4.11	8.69
	Min	40.20	1,397.18	0.10	7.30E+06	1,925.26	3.68	26.12
	Max	63.00	14,687.98	1.31	1.12E+11	591,906.50	28.31	72.85

Across countries, variation in inequality can also be understood from the standard deviation of the Gini index. The highest variability is observed among African countries and the least variability is found to exist among European countries. On the other hand, the size of the manufacturing sector and service sector (measured in terms of average GDP share of manufacturing and service sectors, respectively) is largest in European countries and smallest in African countries. Before the empirical estimation, it is important to check the possibility of the presence of multicollinearity. Table A3 (see Appendix 2) presents the correlation matrix of the explanatory variables. It can be seen that the GDP share of the service sector, FDI, and the quality of the infrastructure have high correlations with PCGDP. Thus, while estimating the empirical model, PCGDP has been considered an endogenous variable. The absence of a high correlation among any other pairs of explanatory variables is evidence in favor of the absence of a multicollinearity problem.

Table 4 presents the results of the first set of estimations. In each model, the Sargan test has been carried out to check the validity of the overidentifying restriction. The Sargan test [11] accepts the null hypothesis of valid overidentifying restrictions. Instrumental variables must be uncorrelated with the structural error term and correlated with the endogenous regressors. Here all models are overidentified or the number of additional instruments used in each model exceeds the number of

[11] See Sargan (1958).

endogenous regressors, and instruments are uncorrelated with the error term. In Table 4, four different specifications of equation (1), with changes only in the measure of inequality, have been shown. Regression equations using four different dependent variables, namely the Gini index, income share of the top quintile, income share of the bottom quintile and the ratio of the two quintiles, and controlling for a group of basic variables (PCGDP, TO, FDI, quantity and quality of infrastructure, urbanization), as well as the two variables of interest, share of manufacturing sector and share of service sector, are estimated.

Table 4: Estimation Result (Overall)

	Model 1		**Model 2**	
	Dependent Variable			
	lnGini		**ln Q1**	
	Coef.	**SE**	**Coef.**	**SE**
$lnInequality_{t-1}$	0.7663	(0.0321)***	0.8328	(0.0367)***
$lnInequality_{t-2}$	0.1795	(0.0326)***	0.0981	(0.0355)***
$lnPCGDP_t$	–0.0267	(0.0107)**	–0.0185	(0.0086)**
$lnManufacturing\_Share_t$	0.0366	(0.0156)**	0.0228	(0.0127)*
$lnServices\_Share_t$	0.1031	(0.0296)***	0.0540	(0.0214)**
$lnTO_t$	–0.0227	(0.0122)*	–0.0236	(0.0101)**
$lnFDI_t$	–0.0047	(0.0027)*	–0.0038	(0.0021)*
$lnInfrastructure\_Quantity_t$	–0.0135	(0.0053)**	–0.0013	(0.0037)
$lnInfrastructure\_Quality_t$	–0.0222	(0.0116)*	–0.0057	(0.0090)
$lnUrbanization_t$	0.0185	(0.0108)*	0.0008	(0.0080)
Constant	0.1785	(0.1757)	0.2367	(0.1475)
Sargan test p value	0.5654		0.9719	
	Model 3		**Model 4**	
	Dependent Variable			
	ln Q5		**ln (Q1/Q5)**	
	Coef.	**SE**	**Coef.**	**SE**
$lnInequality_{t-1}$	0.7029	(0.0361)***	0.7408	(0.0358)***
$lnInequality_{t-2}$	0.1837	(0.0338)***	0.1629	(0.0338)***
$lnPCGDP_t$	0.0179	(0.0265)	–0.0406	(0.0332)
$lnManufacturing\_Share_t$	–0.0667	(0.0388)*	0.0942	(0.0486)*
$lnServices\_Share_t$	–0.1192	(0.0682)*	0.1716	(0.0843)**
$lnTO_t$	0.0527	(0.0300)*	–0.0735	(0.0378)*
$lnFDI_t$	0.0100	(0.0068)	–0.0125	(0.0084)
$lnInfrastructure\_Quantity_t$	0.0083	(0.0117)	–0.0100	(0.0145)
$lnInfrastructure\_Quality_t$	–0.0250	(0.0270)	0.0142	(0.0341)
$lnUrbanization_t$	–0.0053	(0.0247)	0.0079	(0.0310)
Constant	0.5139	(0.3526)	–0.1259	(0.4522)
Sargan test p value	0.2332		0.4514	

Note:

(a) Standard errors are given in parentheses.

(b) An * implies significance at the 10% level; ** implies significance at the 5% level; and *** implies significance at the 1% level.

(c) PCGDP, Manufacturing Share and Services Share are considered to be endogenous.

In the first model, log of Gini index has been used as the dependent variable. Clear evidence of path dependence can be seen from the result as the lagged dependent variable is found to be positive and significant. So it is likely that if inequality exists in the present period, it will prevail in the future period as well, if not controlled. Per capita GDP is found to be negative and significant, and thus there is evidence of a trickledown effect. Trade openness – as measured by the ratio of exports and imports to GDP – tends to make income distribution more equal. This clearly confirms the findings of White and Anderson (2001), Dollar and Kraay (2002), Edwards (1997), and Higgins and Williamson (1999); however, it contradicts the finding of Barro (2000), Calderon and Serven (2004, 2008), and Wan, Lu and Chen (2006a). The coefficient of FDI is significant and negative, suggesting that FDI reduces income inequality. This is consistent with Markusen and Venables (1997), Blonigen and Slaughter (2001), and Aghion and Howitt (1998); however, it contradicts the finding of Wan et al. (2006b). A negative and significant relationship between infrastructure stock and income inequality is found. That is, the larger stock of infrastructure, the more equal the distribution of income. This result is consistent with the findings of Calderon and Chong (2004) and Seneviratne and Sun (2013). Similarly, there is a negative and significant relationship between the quality of infrastructure and income inequality. In short, the better the quality of infrastructure, the more equal the distribution of income. This confirms the findings of Seneviratne and Sun (2013); however, it contradicts the findings of Calderon and Chong (2004). Urbanization is found to have a positive significant relationship with income inequality. This is consistent with the finding of Wan et al. (2006b) but at the same time contradicts the result of Wan et al. (2006a).

The two variables of interest, namely the share of the manufacturing sector and that of the service sector, are found to be positive and significant. This implies that the process of structural transformation results in a more unequal distribution of income. A 1% increase in the share of the manufacturing sector in GDP results in a 3% increase in income inequality. On the other hand, a 1% increase in the GDP share of the service sector increases income inequality by 0.10%. To confirm this, three models have been estimated considering three other dependent variables. In the second model, where the income share of the top 20% of the population has been used as the dependent variable, GDP shares of the manufacturing and service sectors are found to be positive and significant. A 1% increase in the GDP share of the manufacturing and service sectors increases the income share of the top 20%of the population by 0.02% and 0.05%, respectively, and thus increases income inequality. On the other hand, when the income share of the bottom 20% of the population has been considered as the dependent variable, the two coefficients have been found to be negative and significant. It can be seen that a 1% increase in the GDP share of the manufacturing and service sectors decreases the income share of the bottom 20%of the population by 0.06% and 0.11%, respectively, and thus makes the income distribution more unequal. The result is the same even when the ratio of the income shares of the two groups or the difference between the income groups has been considered as the dependent variable. The gap in the income shares between the two income groups increases by 0.09% and 0.17% when the share of the manufacturing sector and that of the service sector, respectively, increase by 1%. This clearly proves the robustness of the results.

Now, to check the heterogeneity across regions, instead of GDP shares of the manufacturing and service sector as a whole, the interaction of sectoral shares with region dummies has been considered. For each region, a high correlation has been found between the share of the manufacturing sector and that of the service sector (see Table A4 in Appendix 2). Thus Model 5-8 in Table 5 considers interaction dummies only with the manufacturing share, and Model 9–12 in Table 6 considers interaction dummies only with the service share. Due to insufficient data on inequality

measures, estimation for two regions, namely Africa and Oceania, has not been done. It can be seen that the expansion of the manufacturing sector is significantly increasing inequality in two regions, namely North America and South America (see Model 5 in Table 5). On the other hand, in all four regions, income distribution is found to become more unequal due to the expansion of the service sector (see Model 9 in Table 6).

Table 5: Region-Specific Estimation Result (Manufacturing)

	Model 5		**Model 6**	
	Dependent Variable			
	lnGini		**ln Q1**	
	Coef.	**SE**	**Coef.**	**SE**
$lnInequality_{t-1}$	0.7432	(0.0327)***	0.7915	(0.0393)***
$lnInequality_{t-2}$	0.0984	(0.0354)***	0.0439	(0.0369)
$lnPCGDP_t$	0.0120	(0.0106)	0.0019	(0.0082)
$D\_Europe \times lnManufacturing\_Share_t$	0.0207	(0.0138)	0.0135	(0.0114)
$D\_NorthAmerica \times lnManufacturing\_Share_t$	0.0483	(0.0146)***	0.0305	(0.0117)***
$D\_SouthAmerica \times lnManufacturing\_Share_t$	0.0473	(0.0170)***	0.0319	(0.0131)**
$D\_Asia \times lnManufacturing\_Share_t$	0.0226	(0.0147)	0.0136	(0.0118)
$lnTO_t$	–0.0270	(0.0143)*	–0.0199	(0.0106)*
$lnFDI_t$	–0.0050	(0.0028)*	–0.0026	(0.0021)
$lnInfrastructure\_Quantity_t$	–0.0065	(0.0049)	–0.0016	(0.0034)
$lnInfrastructure\_Quality_t$	0.0077	(0.0121)	0.0096	(0.0091)
$lnUrbanization_t$	–0.0138	(0.0122)	–0.0156	(0.0092)*
Constant	0.5356	(0.1659)***	0.6018	(0.1604)***
Sargan test p value	0.8600		0.9198	
	Model 7		**Model 8**	
	Dependent Variable			
	ln Q5		**ln (Q1/Q5)**	
	Coef.	**SE**	**Coef.**	**SE**
$lnInequality_{t-1}$	0.6028	(0.0373)***	0.6498	(0.0375)***
$lnInequality_{t-2}$	0.1064	(0.0343)***	0.0883	(0.0345)**
$lnPCGDP_t$	–0.0419	(0.0243)*	0.0450	(0.0305)
$D\_Europe \times lnManufacturing\_Share_t$	–0.0460	(0.0341)	0.0642	(0.0432)
$D\_NorthAmerica \times lnManufacturing\_Share_t$	–0.1267	(0.0344)***	0.1658	(0.0438)***
$D\_SouthAmerica \times lnManufacturing\_Share_t$	–0.1525	(0.0402)***	0.1911	(0.0509)***
$D\_Asia \times lnManufacturing\_Share_t$	–0.0444	(0.0363)	0.0685	(0.0457)
$lnTO_t$	0.0269	(0.0322)	–0.0475	(0.0406)
$lnFDI_t$	0.0017	(0.0063)	–0.0042	(0.0081)
$lnInfrastructure\_Quantity_t$	0.0143	(0.0106)	–0.0153	(0.0131)
$lnInfrastructure\_Quality_t$	–0.0653	(0.0252)***	0.0752	(0.0323)**
$lnUrbanization_t$	0.0783	(0.0292)***	–0.0921	(0.0367)**
Constant	1.0554	(0.2976)***	–0.0714	(0.3711)
Sargan test p value	0.2989		0.5016	

Note:

(a) Standard errors are given in parentheses.

(b) An * implies significance at the 10% level; ** implies significance at the 5% level; and *** implies significance at the 1% level.

(c) PCGDP and Manufacturing Share are considered to be endogenous.

Table 6: Region-Specific Estimation Result (Service)

	Model 9		Model 10	
	Dependent Variable			
	lnGini		ln Q1	
	Coef.	SE	Coef.	SE
$lnInequality_{t-1}$	0.6909	(0.0327)***	0.7524	(0.0404)***
$lnInequality_{t-2}$	0.0801	(0.0332)**	0.0211	(0.0367)
$lnPCGDP_t$	–0.0111	(0.0100)	–0.0038	(0.0080)
$D\_Europe \times lnServices\_Share_t$	0.0813	(0.0288)***	0.0398	(0.0210)*
$D\_NorthAmerica \times lnServices\_Share_t$	0.1066	(0.0293)***	0.0567	(0.0212)***
$D\_SouthAmerica \times lnServices\_Share_t$	0.1087	(0.0300)***	0.0573	(0.0217)***
$D\_Asia \times lnServices\_Share_t$	0.0853	(0.0296)***	0.0438	(0.0216)**
$lnTO_t$	–0.0024	(0.0115)	–0.0165	(0.0099)*
$lnFDI_t$	–0.0042	(0.0027)	–0.0016	(0.0021)
$lnInfrastructure\_Quantity_t$	–0.0022	(0.0045)	0.0004	(0.0032)
$lnInfrastructure\_Quality_t$	0.0046	(0.0105)	0.0127	(0.0078)
$lnUrbanization_t$	–0.0006	(0.0120)	–0.0132	(0.0088)
Constant	0.6529	(0.1609)***	0.7033	(0.1611)***
Sargan test p value	0.4712		0.8877	
	Model 11		**Model 12**	
	Dependent Variable			
	ln Q5		ln (Q1/Q5)	
	Coef.	SE	Coef.	SE
$lnInequality_{t-1}$	0.6146	(0.0377)***	0.6501	(0.0382)***
$lnInequality_{t-2}$	0.1012	(0.0343)***	0.0810	(0.0345)**
$lnPCGDP_t$	–0.0048	(0.0238)	–0.0019	(0.0299)
$D\_Europe \times lnServices\_Share_t$	–0.0831	(0.0630)	0.1328	(0.0791)*
$D\_NorthAmerica \times lnServices\_Share_t$	–0.1419	(0.0629)**	0.2090	(0.0793)***
$D\_SouthAmerica \times lnServices\_Share_t$	–0.1438	(0.0645)**	0.2109	(0.0813)**
$D\_Asia \times lnServices\_Share_t$	–0.0924	(0.0645)	0.1473	(0.0810)*
$lnTO_t$	0.0233	(0.0293)	–0.0367	(0.0370)
$lnFDI_t$	0.0019	(0.0065)	–0.0035	(0.0082)
$lnInfrastructure\_Quantity_t$	0.0094	(0.0101)	–0.0110	(0.0126)
$lnInfrastructure\_Quality_t$	–0.0592	(0.0227)***	0.0694	(0.0287)**
$lnUrbanization_t$	0.0390	(0.0270)	–0.0470	(0.0338)
Constant	0.9834	(0.2882)***	–0.0818	(0.3489)
Sargan test p value	0.2217		0.3912	

Note:

(a) Standard errors are given in parentheses.

(b) An * implies significance at the 10% level; ** implies significance at the 5% level; and *** implies significance at the 1% level.

(c) PCGDP and Manufacturing Share are considered to be endogenous.

Furthermore, these interactive dummies are found to have a positive and statistically significant association with respect to the top 20% income share (see Model 6 in Table 5 and Model 10 in Table 6), and a negative and statistically significant relation with respect to the bottom 20% share of income (see Model 7 in Table 5 and Model 11 in Table 6). A positive relationship is found even when the ratio of the two income groups or the gap between the two income groups has been considered (see Model 8 in Table 5 and Model 12 in Table 6). All these econometric results with variants of

income inequality measure are therefore found to be robust, and thus structural change is found to be associated with an increase in income inequality.

5. CONCLUSIONS

In the literature on economic development, one of the earliest and most central themes is structural change. The countries that developed in the last few centuries are those that are able to diversify away from the production and consumption of traditional goods to modern sectors. Since the early 1990s, the developing countries have experienced rapid structural change and at the same time become more integrated with the world economy. The reduction of import tariffs and nontariff barriers (through infrastructure development), FDI flows, and thus globalization facilitated technology transfers to these countries. This reduction in trade barriers, FDI flows, and technology transfers not only promotes growth, but also leads to structural change. In the process, the demand for skilled labor increases, leading to a wage gap, and thus inequality increases.

This study empirically shows the positive impact of structural change on income inequality, that is, how structural change results in a more unequal distribution of income. While all previous studies have shown impacts of structural change on wage inequality, this study is the first to show the impact of structural transformation on overall income inequality. The data include a panel of a large number of countries from all income groups and all regions. To check the robustness of the results, different indicators of inequality have been considered. Analysis considering regional interactive dummies shows that among North and South American countries, both expansion of manufacturing and expansion of services are found to increase income inequality. On the other hand, in Asia and Europe, the problem of inequality has worsened with expansion of the service sector only. The study also shows the strong negative impact of trade liberalization on income inequality and weak negative impact of FDI inflow on the same in the long run. The study thus contributes to the literature by raising many important dimensions for policy analysis. The results are of particular importance with regard to Sustainable Development Goal 10 on Reduced Inequalities within and between countries. The widening disparity requires the adoption of sound policies to empower the bottom deciles of income earners through structural transformation, infrastructure development, and focusing on those groups of people where it is most required. Trade liberalization and FDI can be chosen as policy instruments to reduce inequality. This study, however, does not take into account the role of migration and development assistance in bridging the inequalities.

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APPENDIX

Table A1: Description and Sources of Data

Label	Content	Sources
Inequality (INQ)	Gini coefficient	World Development Indicators
Top Quintile (Q1)	Income Share of top or richest 20% of population	World Development Indicators
Bottom Quintile (Q5)	Income Share of bottom or poorest 20% of population	World Development Indicators
Quintile ratio (Q)	Ratio of Income Share of top or richest 20%of population and Income Share of bottom or poorest 20%of population	World Development Indicators
Per capita income (PCGDP)	GDP per capita (constant 2005 US$)	World Development Indicators
Share of Manufacturing Sector (Manu)	Value added of the manufacturing sector as a percentage of GDP	World Development Indicators
Share of Service Sector (Serv)	Value added of the service sector as a percentage of GDP	World Development Indicators
Trade openness (TO)	Trade (export and import) as percentage of GDP (%)	World Development Indicators
Foreign Direct Investment (FDI)	Foreign direct investment inflows (current US$)	UNCTAD
Infrastructure Stock Index (Infra)	Infrastructure quantity, which is estimated using the method of principal component analysis (PCA) on normalized indicators such as (a) total road network (km); (b) air transport, passengers carried (per 1000 population); (c) per capita energy consumption; (d) Internet users (per 1000 population); (e) fixed telephone subscribers (per 1000 population); (f) domestic credit provided by the public sector	World Development Indicators
Infrastructure Quality (Infra_Q)	Electric power transmission and distribution losses (percentage of output)	World Development Indicators
Urbanization (Urban)	Ratio of urban and rural population	World Development Indicators

Table A2: Average Inequality across Countries in 1990s and 2000s

		1990s						
		Income Share			Income Share			
Continent	Country	Highest 20 %	Lowest 20%	Difference between Quintiles	Highest 10p%	Lowest 10%	Difference between Deciles	Gini
Africa	Botswana	65	3.13	61.87	51.2	1.3	49.91	61
Africa	Burkina Faso	55.1	5.51	49.62	41	2.3	38.64	48.8
Africa	Burundi	44.8	6.54	38.27	29.7	2.6	27.11	37.9
Africa	Cameroon	51.6	6.2	45.36	36.5	2.8	33.78	44.6
Africa	Central African Republic	65	1.99	62.99	47.7	0.7	47.04	61.3
Africa	Egypt, Arab Rep.	40.5	9.11	31.39	26.4	4	22.37	31.1
Africa	Ethiopia	43.6	8.17	35.4	29.6	3.4	26.22	35
Africa	Gambia, The	55.3	4.02	51.23	38.2	1.6	36.56	50.2
Africa	Ghana	46	6.13	39.9	30	2.5	27.52	39.4
Africa	Guinea	50.5	4.15	46.33	33.3	1.6	31.68	45.9
Africa	Guinea-Bissau	53.5	5.15	48.35	39.2	2.1	37.13	47.8
Africa	Kenya	54.1	4.8	49.33	39.4	1.9	37.48	48.6
Africa	Lesotho	64.4	2.05	62.34	46.2	0.7	45.51	60.6
Africa	Madagascar	48.6	5.69	42.92	33.1	2.3	30.81	42.4
Africa	Malawi	56	4.84	51.12	42	1.9	40.08	50.3
Africa	Mali	56.1	4.64	51.46	40.6	2	38.58	50.5
Africa	Mauritania	50.1	5.78	44.29	35.4	2.3	33.15	43.7
Africa	Morocco	46.4	6.55	39.87	30.8	2.8	27.99	39.3
Africa	Mozambique	50.7	5.63	45.06	35.9	2.2	33.73	44.5
Africa	Namibia	78.3	1.48	76.77	65	0.6	64.39	74.3
Africa	Niger	46	6.74	39.28	31.1	2.8	28.34	38.8
Africa	Nigeria	50.7	4.5	46.24	34.3	1.7	32.66	45.7
Africa	Senegal	53.5	4.98	48.55	38.4	2	36.37	47.8
Africa	Seychelles	48.9	5.68	43.23	34	2.1	31.86	42.7
Africa	South Africa	63.1	3.26	59.82	45.9	1.4	44.49	58
Africa	Swaziland	64.3	2.74	61.59	49.9	1	48.81	60.7
Africa	Tanzania	41.6	7.43	34.18	26.6	3	23.57	33.8
Africa	Tunisia	47.1	5.76	41.34	31.2	2.3	28.93	41
Africa	Uganda	47.9	6.43	41.42	33.1	2.7	30.46	40.9
Africa	Zambia	56.3	3.54	52.77	40.2	1.3	38.88	52
Asia	Bangladesh	39.9	9.14	30.8	25.7	4	21.64	30.5
Asia	Cambodia	46.8	8.04	38.79	33	3.7	29.32	38.3
Asia	PRC	43.4	7.26	36.09	27.5	3.1	24.37	35.7
Asia	India	40.1	9.09	31.05	26	4	22.03	30.8
Asia	Indonesia	39.4	9.36	30.04	25.3	4.2	21.18	29.7
Asia	Iran, Islamic Rep.	49.5	5.29	44.18	33.5	2.1	31.41	43.6
Asia	Israel	43.4	6.53	36.86	27.6	2.6	24.95	36.8

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Table A2 *continued*

		1990s						
		Income Share			Income Share			
Continent	Country	Highest 20 %	Lowest 20%	Difference between Quintiles	Highest 10p%	Lowest 10%	Difference between Deciles	Gini
Asia	Jordan	47.2	6.78	40.42	32.4	2.9	29.51	39.9
Asia	Kazakhstan	41.4	7.17	34.24	25.7	2.9	22.73	34
Asia	Kyrgyz Republic	50.3	4.84	45.45	34.1	1.9	32.2	44.8
Asia	Lao PDR	41.7	8.65	33.03	27.4	3.8	23.61	32.7
Asia	Malaysia	53.8	4.51	49.25	37.8	1.8	35.96	48.4
Asia	Maldives	65.7	1.41	64.33	48.1	0.4	47.75	62.7
Asia	Mongolia	39.5	7.55	31.91	23.9	3.1	20.89	31.7
Asia	Nepal	43.5	7.87	35.65	29.1	3.4	25.69	35.2
Asia	Pakistan	40.9	8.93	31.99	26.9	3.9	22.95	31.6
Asia	Philippines	50.8	5.73	45.05	35	2.5	32.5	44.3
Asia	Russian Federation	49.4	5.01	44.39	33.8	1.8	32	44
Asia	Slovak Republic	33.1	10.3	22.81	19.5	4.1	15.41	22.7
Asia	Sri Lanka	42.7	8.37	34.34	28.3	3.7	24.62	34
Asia	Tajikistan	38.1	8.34	29.77	23.3	3.3	20.05	29.5
Asia	Thailand	50.9	6.01	44.91	35.1	2.5	32.59	44
Asia	Turkey	47.7	5.8	41.88	32.3	2.3	29.99	41.5
Asia	Uzbekistan	49.6	3.91	45.65	33.4	1.1	32.27	45.3
Asia	Viet Nam	44	7.92	36.08	29.2	3.5	25.64	35.6
Asia	Yemen, Rep.	41.2	7.41	33.75	25.9	3	22.88	33.4
Europe	Armenia	47.3	6.57	40.73	32.4	2.7	29.69	40.2
Europe	Austria	38.6	7.64	31	23.5	2.8	20.76	31
Europe	Azerbaijan	42.3	6.94	35.31	27	2.8	24.29	35
Europe	Belarus	36	9.4	26.62	21.7	3.9	17.79	26.5
Europe	Belgium	36	9.03	26.92	21.5	3.5	18.04	26.8
Europe	Bulgaria	37.9	9.09	28.81	23.6	3.8	19.85	28.5
Europe	Croatia	37.1	9	28.13	22.5	3.7	18.87	28.1
Europe	Czech Republic	36.7	10.3	26.41	23.2	4.5	18.68	26.2
Europe	Denmark	34.2	9.93	24.29	20.2	3.8	16.42	24.3
Europe	Estonia	43.2	7.16	36.05	27.9	3	24.99	35.7
Europe	Finland	34.1	10.7	23.32	20.1	4.6	15.54	23.2
Europe	France	40.5	7.92	32.62	25.7	3.2	22.47	32.4
Europe	Georgia	45.8	5.44	40.4	30.1	1.9	28.14	40.1
Europe	Germany	38.4	8.31	30.13	23.7	3.3	20.37	30
Europe	Greece	43.3	5.78	37.5	27.4	1.9	25.49	37.2
Europe	Hungary	37.1	9.58	27.55	23.2	4	19.13	27.4
Europe	Ireland	44.1	6.96	37.09	28.4	2.8	25.62	36.5
Europe	Italy	41.6	6.36	35.23	26.3	2.2	24.18	35.1

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Table A2 *continued*

		1990s						
		Income Share			Income Share			
Continent	Country	Highest 20 %	Lowest 20%	Difference between Quintiles	Highest 10p%	Lowest 10%	Difference between Deciles	Gini
Europe	Latvia	39.2	8.04	31.2	24.7	3	21.68	31
Europe	Lithuania	40.8	7.87	32.94	26.2	3.1	23.05	32.7
Europe	Macedonia, FYR	36.7	8.48	28.2	22.1	3.3	18.88	28.1
Europe	Moldova	45	6.38	38.61	29.4	2.5	26.93	38.1
Europe	Netherlands	38.8	7.8	30.96	23.2	2.5	20.68	30.7
Europe	Norway	35.8	9.44	26.32	21.4	3.8	17.63	26.4
Europe	Poland	39.6	8.4	31.22	24.8	3.5	21.26	31.1
Europe	Romania	37.1	8.82	28.24	22.5	3.6	18.86	28.1
Europe	Slovenia	38.2	9.19	28.99	23.8	4	19.81	28.8
Europe	Spain	41.8	6.78	35.05	26.4	2.4	24.02	34.7
Europe	Sweden	34.6	9.23	25.36	20.1	3.4	16.72	25.5
Europe	Switzerland	42.5	5.32	37.2	27.2	0.8	26.4	37.1
Europe	Ukraine	40.4	7.91	32.46	25.5	3.3	22.27	32.3
Europe	United Kingdom	43.5	6.32	37.17	27.9	2.2	25.66	36.9
North America	Canada	39.5	7.32	32.21	24.2	2.7	21.5	32
North America	Costa Rica	50.9	3.94	46.91	34.2	1.1	33.07	46.2
North America	Ivory Coast	45.3	6.51	38.81	29.6	2.7	26.92	38.4
North America	Dominican Republic	54.3	4.19	50.1	38.8	1.5	37.31	49.2
North America	El Salvador	56.2	2.84	53.39	39.8	0.7	39.11	52.4
North America	Guatemala	59.7	3.14	56.53	44.8	1	43.81	55.8
North America	Honduras	58.9	3.09	55.77	42.9	1	41.93	54.6
North America	Jamaica	47.3	6.16	41.14	32	2.5	29.48	40.6
North America	Mexico	55.1	4.19	50.93	39.4	1.7	37.72	50.1
North America	Nicaragua	55.9	3.74	52.12	40.1	1.3	38.81	51.3
North America	Panama	60.5	1.55	58.99	43.1	0.2	42.94	57.6
North America	United States	44.6	5.28	39.28	28.3	1.8	26.52	39.1
Oceania	Australia	40.8	6.8	33.98	24.9	2.1	22.78	33.7
South America	Argentina	52.8	4	48.76	36	1.3	34.68	47.9
South America	Bolivia	57.2	3.15	54.06	40.7	1.1	39.64	53
South America	Brazil	63.1	2.42	60.65	46.6	0.7	45.9	59
South America	Chile	61	3.56	57.4	45.5	1.3	44.2	55.8
South America	Colombia	58.9	2.94	55.97	43.1	0.8	42.32	54.6
South America	Ecuador	58	3.27	54.69	42.2	0.9	41.25	53.4
South America	Paraguay	56.5	3.38	53.09	40.1	1.1	38.98	52.1
South America	Peru	53.6	4.49	49.08	37.8	1.7	36.1	48.1
South America	Uruguay	47.9	5.1	42.84	31.6	1.8	29.75	42.3
South America	Venezuela, RB	51.1	4.14	47	34.7	1.3	33.48	46.3

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Table A2 *continued*

		2000s						
		Income Share			Income Share			
Continent	Country	Highest 20p%	Lowest 20%	Difference between Quintiles	Highest 10p%	Lowest 10%	Difference between Deciles	Gini
Africa	Botswana	67.3	2.56	64.7	51.4	0.9	50.41	62.6
Africa	Burkina Faso	48.4	6.27	42.1	33.1	2.7	30.4	41.5
Africa	Burundi	42.8	8.96	33.79	28	4.1	23.9	33.3
Africa	Cameroon	48.3	6.26	42.04	32.8	2.7	30.09	41.4
Africa	Central African Republic	55	4.29	50.71	39.6	1.7	37.92	49.9
Africa	Egypt, Arab Rep.	41.3	9.05	32.24	27.5	3.9	23.61	31.9
Africa	Ethiopia	40.6	8.61	32.02	26.6	3.6	22.95	31.7
Africa	Gambia, The	52.8	4.79	48.05	36.9	2	34.99	47.3
Africa	Ghana	48.6	5.24	43.31	32.8	2	30.72	42.8
Africa	Guinea	45	6.77	38.2	29.7	2.8	26.91	37.8
Africa	Guinea-Bissau	43.2	7.28	35.93	28.1	3.1	25.08	35.5
Africa	Kenya	53.2	4.84	48.36	38	2	36.03	47.7
Africa	Lesotho	56.7	2.94	53.78	39.7	1	38.66	52.9
Africa	Madagascar	49.3	6.14	43.18	33.9	2.5	31.45	42.3
Africa	Malawi	49.8	6.16	43.6	35.1	2.5	32.57	43.1
Africa	Mali	44.7	6.87	37.78	28.9	2.9	26	37.3
Africa	Mauritania	46.9	6.17	40.72	31.5	2.5	28.95	40.3
Africa	Morocco	47.8	6.5	41.3	32.8	2.7	30.04	40.8
Africa	Mozambique	52.4	5.33	47.05	38	2	35.94	46.4
Africa	Namibia	67.4	3.26	64.13	53.3	1.4	51.83	62.6
Africa	Niger	45.2	7.38	37.77	30.6	3.1	27.47	37.3
Africa	Nigeria	47.5	5.51	41.99	31.4	2.2	29.2	41.5
Africa	Senegal	47.1	6.28	40.77	31.6	2.6	28.97	40.3
Africa	Seychelles	69.6	3.71	65.92	60.2	1.6	58.52	65.8
Africa	South Africa	68.3	2.67	65.58	52	1.1	50.84	63.3
Africa	Swaziland	57.9	4.35	53.54	42.2	1.9	40.37	52.4
Africa	Tanzania	44.3	7.17	37.11	29.2	3	26.2	36.7
Africa	Tunisia	44.9	6.39	38.54	29.3	2.6	26.7	38.1
Africa	Uganda	50.8	5.85	44.96	35.9	2.4	33.44	44.3
Africa	Zambia	56.4	4.24	52.15	40.8	1.7	39.11	51.2
Asia	Bangladesh	42.2	8.78	33.37	27.8	4	23.79	32.9
Asia	Cambodia	43.9	8.05	35.81	29.1	3.6	25.54	35.3
Asia	PRC	47.9	4.98	42.91	31.2	1.9	29.29	41.4
Asia	India	42.6	8.59	34	28.5	3.7	24.81	33.6
Asia	Indonesia	42.2	8.4	33.77	27.5	3.7	23.81	34.3
Asia	Iran, Islamic Rep.	45.2	6.43	38.73	29.6	2.6	27.01	38.3
Asia	Israel	46.3	4.99	41.29	29.9	1.8	28.09	41.3

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Table A2 *continued*

		2000s						
		Income Share			Income Share			
Continent	Country	Highest 20p%	Lowest 20%	Difference between Quintiles	Highest 10p%	Lowest 10%	Difference between Deciles	Gini
Asia	Jordan	43.1	7.87	35.2	28.2	3.4	24.79	34.8
Asia	Kazakhstan	39.1	8.65	30.41	24.2	3.6	20.54	30.3
Asia	Kyrgyz Republic	41.9	7.75	34.14	26.4	3.2	23.22	33.8
Asia	Lao PDR	43.2	8.06	35.15	28.7	3.5	25.16	34.7
Asia	Malaysia	49.2	5.23	43.98	32.7	2.1	30.62	43.4
Asia	Maldives	44.2	6.51	37.73	28	2.7	25.32	37.4
Asia	Mongolia	42.3	7.28	34.99	26.6	3.1	23.53	34.7
Asia	Nepal	46.2	7.4	38.82	31.6	3.3	28.34	38.3
Asia	Pakistan	40.5	9.35	31.12	26.6	4.2	22.42	30.8
Asia	Philippines	50.6	5.66	44.89	34.3	2.4	31.91	44.1
Asia	Russian Federation	45.5	6.51	38.97	29.5	2.6	26.93	38.4
Asia	Slovak Republic	37.1	9.25	27.84	23	3.8	19.24	27.6
Asia	Sri Lanka	46.9	7.14	39.8	32.2	3.1	29.07	39.2
Asia	Tajikistan	40.4	7.87	32.57	25.4	3.1	22.25	32.3
Asia	Thailand	48.5	6.4	42.08	32.7	2.7	29.99	41.4
Asia	Turkey	46.3	5.66	40.59	30.2	2.1	28.09	40.1
Asia	Uzbekistan	42.7	7.79	34.86	27.8	3.1	24.74	34.2
Asia	Viet Nam	44.3	7.13	37.21	29	3	25.98	36.8
Asia	Yemen, Rep.	44.2	7.84	36.31	29.9	3.3	26.61	35.9
Europe	Armenia	41.6	8.49	33.07	27.3	3.6	23.69	32.7
Europe	Austria	38.1	8.51	29.61	23.4	3.3	20.03	29.5
Europe	Azerbaijan	34.5	11.2	23.29	21.1	5	16.08	23.1
Europe	Belarus	36.9	8.94	27.99	22.3	3.7	18.66	27.9
Europe	Belgium	41.7	8.35	33.34	28.3	3.3	25.03	33.1
Europe	Bulgaria	40	7.23	32.74	25	2.6	22.36	32.4
Europe	Croatia	39.9	8.36	31.54	25.1	3.5	21.59	31.2
Europe	Czech Republic	36.4	9.45	26.99	22.6	3.8	18.81	26.5
Europe	Denmark	35.1	9.68	25.45	21	3.7	17.3	25.4
Europe	Estonia	41.3	7.27	34.01	25.9	2.7	23.26	33.6
Europe	Finland	37.3	9.32	27.99	23	3.8	19.18	27.9
Europe	France	39.6	7.94	31.69	24.6	3.2	21.4	31.5
Europe	Georgia	46.5	5.46	41.02	30.5	1.9	28.51	40.6
Europe	Germany	39.4	8.38	31.05	24.7	3.4	21.34	30.9
Europe	Greece	41.1	6.7	34.38	25.8	2.3	23.51	34.2
Europe	Hungary	37.4	8.78	28.66	23	3.6	19.4	28.5
Europe	Ireland	40.7	7.76	32.93	25.7	3.1	22.65	32.7
Europe	Italy	42.4	6.2	36.2	27.2	2.1	25.03	36.1

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Table A2 *continued*

		2000s						
		Income Share			Income Share			
Continent	Country	Highest 20p%	Lowest 20%	Difference between Quintiles	Highest 10p%	Lowest 10%	Difference between Deciles	Gini
Europe	Latvia	42.5	6.66	35.85	27	2.4	24.61	35.5
Europe	Lithuania	41.5	7.14	34.32	26.2	2.7	23.5	34
Europe	Macedonia, FYR	45.9	5.88	40	30	2.3	27.7	39.6
Europe	Moldova	42.2	7.43	34.78	27	3	23.97	34.5
Europe	Netherlands	38.5	8.2	30.3	23.9	3	20.91	30.1
Europe	Norway	37.1	9.2	27.87	23.1	3.5	19.58	27.8
Europe	Poland	41.6	7.7	33.89	26.4	3.2	23.27	33.7
Europe	Romania	37.9	8.48	29.37	23	3.5	19.56	29.3
Europe	Slovenia	36.1	9.3	26.82	21.8	3.8	17.97	26.7
Europe	Spain	40.8	6.48	34.29	25.2	2.1	23.08	34.1
Europe	Sweden	36.2	9.32	26.84	21.8	3.7	18.07	26.8
Europe	Switzerland	40.3	7.67	32.65	24.8	2.9	21.89	32.7
Europe	Ukraine	37.4	9.16	28.27	22.8	3.9	18.97	28.1
Europe	United Kingdom	44.2	5.98	38.17	28.7	2	26.7	37.9
North America	Canada	41	7.02	33.99	25.8	2.6	23.17	33.8
North America	Costa Rica	54.3	3.92	50.35	37.7	1.3	36.44	49.3
North America	Ivory Coast	48.6	5.69	42.89	33	2.3	30.73	42.3
North America	Dominican Republic	54.9	4.24	50.68	39.1	1.6	37.54	49.6
North America	El Salvador	52.4	4.11	48.32	36.1	1.4	34.73	47.5
North America	Guatemala	58.3	3.13	55.17	42.3	1	41.25	54
North America	Honduras	60.1	2.52	57.61	43.7	0.8	42.94	56.5
North America	Jamaica	58.5	3.39	55.12	41.9	1.4	40.43	54.3
North America	Mexico	54.1	4.49	49.58	38.8	1.7	37.03	48.8
North America	Nicaragua	49.2	5.5	43.69	33.5	2.2	31.35	43.1
North America	Panama	58	2.83	55.22	41.3	0.9	40.44	54
North America	United States	46.2	4.95	41.2	30	1.5	28.53	40.9
Oceania	Australia	41.1	6.99	34.15	25.2	2.4	22.89	34.1
South America	Argentina	53.1	3.51	49.57	35.9	1.1	34.85	48.9
South America	Bolivia	58.3	2.41	55.87	41.9	0.6	41.29	54.7
South America	Brazil	60.3	2.93	57.32	44.3	0.9	43.4	55.9
South America	Chile	58.6	4.12	54.44	43.4	1.5	41.86	52.9
South America	Colombia	60.7	2.93	57.74	45.1	0.9	44.26	56.3
South America	Ecuador	56.4	3.61	52.83	40.6	1.1	39.49	51.7
South America	Paraguay	57	3.53	53.47	41.6	1.2	40.37	52.6
South America	Peru	53.6	3.93	49.68	37.5	1.4	36.12	49
South America	Uruguay	51	4.68	46.34	34.4	1.8	32.61	45.7
South America	Venezuela, RB	51.9	3.48	48.4	35.2	0.9	34.29	47.7

Table A3: Correlation Coefficients among Explanatory Variables

	ln PCGDP	lnManufacturing_Share	lnServices_Share	ln TO	ln FDI	lnInfrastructure_Quantity	lnInfrastructure_Quality	ln Urbanization
ln PCGDP	1							
lnManufacturing_Share	0.11	1						
lnServices_Share	0.52	0.27	1					
ln TO	0.19	0.01	0.06	1				
ln FDI	0.62	0.10	0.40	0.00	1			
lnInfrastructure_Quantity	–0.01	0.03	–0.06	–0.19	0.18	1		
lnInfrastructure_Quality	–0.55	–0.24	–0.35	–0.06	–0.36	0.06	1	
ln Urbanization	0.74	0.14	0.35	0.12	0.47	0.06	–0.32	1

Table A4: Correlation Coefficients among Interaction Dummies

	D_AfricaXlnManufacturing_Share	D_AsiaXlnManufacturing_Share	D_EuropeXlnManufacturing_Share	D_NorthAmericaXlnManufacturing_Share	D_SouthAmericaXlnManufacturing_Share	D_PacificXlnManufacturing_Share
D_AfricaXlnManufacturing_Share	1					
D_AsiaXlnManufacturing_Share	–0.32	1				
D_EuropeXlnManufacturing_Share	–0.32	–0.30	1			
D_NorthAmericaXlnManufacturing_Share	–0.20	–0.18	–0.19	1		
D_SouthAmericaXlnManufacturing_Share	–0.16	–0.15	–0.15	–0.09	1	
D_PacificXlnManufacturing_Share	–0.12	–0.11	–0.12	–0.07	–0.06	1
D_AfricaXlnServices_Share	0.95	–0.33	–0.34	–0.21	–0.17	–0.13
D_AsiaXlnServices_Share	–0.32	0.96	–0.31	–0.19	–0.15	–0.12
D_EuropeXlnServices_Share	–0.33	–0.31	0.96	–0.19	–0.15	–0.12
D_NorthAmericaXlnServices_Share	–0.21	–0.19	–0.20	0.94	–0.10	–0.07
D_SouthAmericaXlnServices_Share	–0.16	–0.15	–0.15	–0.09	0.99	–0.06
D_PacificXlnServices_Share	–0.15	–0.14	–0.14	–0.09	–0.07	0.82

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Table A4 *continued*

	D_AfricaXlnServices_Share	D_AsiaXlnServices_Share	D_EuropeXlnServices_Share	D_NorthAmericaXlnServices_Share	D_SouthAmericaXlnServices_Share	D_PacificXlnServices_Share
D_AfricaXlnManufacturing_Share						
D_AsiaXlnManufacturing_Share						
D_EuropeXlnManufacturing_Share						
D_NorthAmericaXlnManufacturing_Share						
D_SouthAmericaXlnManufacturing_Share						
D_PacificXlnManufacturing_Share						
D_AfricaXlnServices_Share	1					
D_AsiaXlnServices_Share	–0.34	1				
D_EuropeXlnServices_Share	–0.35	–0.32	1			
D_NorthAmericaXlnServices_Share	–0.22	–0.20	–0.20	1		
D_SouthAmericaXlnServices_Share	–0.17	–0.15	–0.16	–0.10	1	
D_PacificXlnServices_Share	–0.16	–0.14	–0.14	–0.09	–0.07	1