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The Relationship between Structural Change and Inequality: A Conceptual Overview with Special Reference to Developing Asia

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Abstract: Structural change has a far-reaching impact on inequality. It exposes the population to challenges and opportunities. Foreign trade and technological progress have been widely put forth as a structural driver of inequality. Broader structural change, such as demographic transition, can also impinge upon inequality. Structural change in developing Asia has been unprecedented in its scale and speed. The heterogeneity of the population implies that the adjustment capacity to these changes varies. The fundamental solution to mitigating the adjustment costs arising from structural change lies in empowering individuals to become more productive, adaptable, and versatile through access to education and employment. Structural change exerts a significant effect on inequality in both advanced and developing countries. The experiences of the advanced economies entail valuable lessons for developing Asia. Extensive structural change is both a cause and consequence of the exceptionally rapid economic growth, which enabled developing Asia to raise living standards and reduce poverty at a historically unprecedented rate. The region has already begun the difficult and complex task of addressing inequality arising from structural change. There is a growing recognition that more sustainable growth supported by broad-based political and social support requires a growth strategy, which provides equality of opportunity, especially in education and employment. The newly developing more inclusive growth philosophy envisions expanded social protection systems and social safety nets to protect the poor and the vulnerable.

***Keywords*:** Inequality; Structural change; Developing Asia

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1. Introduction

At a narrow level, structural change refers to changes in the structure of the economy. The rise in the relative share of manufacturing is typically followed by a rise in the relative share of services as the manufacturing sector matures and the economy moves into a post-industrial phase. Asia-wide structural change has been economic globalization, or growing integration into global trade and financial system. An indispensable core ingredient behind developing Asia's remarkable economic success has been the explosive growth of trade with the rest of the world and with other countries within the region. Equally important to the region's rapid growth has been the large inflows of FDI and other foreign capital into the region. The region has now become a globally significant exporter of capital and such capital outflows will benefit its growth. Another Asia-wide structural change is technological progress, which has steadily shifted the region's technological level toward the global technology frontier.

At a broader level, structural change encompasses social, political, cultural, societal, and other changes. Many countries in developing Asia, most notably China but also Mongolia, Indochinese countries and former Soviet republics in Central Asia, are in the midst of a transition from centrally planned economies to market-oriented economies. While this transition clearly has far-reaching economic implications, it is much more than a narrow economic shift since it entails a drastic change in the relationship between the state and the citizens and indeed in the mind set and world view of individuals. There has also been a gradual shift toward more open and pluralistic forms of government throughout the region. Family structure is also undergoing a major shift in the region. Developing Asia is currently experiencing a seismic demographic transition, which will result in substantially older population age structures in the future.

There is a great deal of interaction between different kinds of structural changes, both narrow and broad; therefore, it is unproductive to think of each structural change in isolation. It is instead conceptually more useful to think of structural change as a constellation of a wide range of economic, political, social, and other factors, which collectively alter the structure of the economy and the society at large. For example, large-scale migration of rural workers to urban areas contributes to the change in family

structure from extended families to nuclear families. At the same time, the same phenomenon accelerates the trend toward urbanization and the expansion of manufacturing and services sectors. What is unique about structural change in developing Asia is its sheer scale and speed due to the region's exceptionally rapid economic growth and development. In fact, far-reaching structural change has been both a cause and consequence of historically unprecedented growth rates. Structural change, which has occurred over centuries in the advanced economies, has been replicated within a few decades or even just a few years in developing Asia. One example of such a fast-forward structural change is the shift from agriculture to manufacturing to services. Another example is the demographic transition from youthful to older populations. Both the decline in fertility and increase in life expectancy have been notable in their speed. Yet another example is the quantum leap in the technological capacity of some countries in the region.

In general, structural change has a far-reaching impact on inequality. Foreign trade can exacerbate inequality by rewarding industries and firms which are able to compete in the global marketplace while punishing those which cannot. Furthermore, in the case of advanced economies, imports from low-wage developing countries compete with domestic production of labor-intensive products, thereby hurting unskilled workers who compete with low-wage workers in developing countries. This line of reasoning explains the widespread popular belief that globalization has been one of the key drivers of widening inequality in advanced economies and also helps to explain the often vehement protests against globalization in those economies. Technological progress has also been widely put forth as a structural driver of inequality. Skilled workers are better able to adopt and use new, improved technology than other unskilled workers, thereby increasing the skill premium and widening the wage gap between skilled and unskilled workers. Broader structural change, such as demographic transition, can also impinge upon inequality. In the absence of well-functioning pension systems, demographic change worsens inequality.

Because structural change in developing Asia has been unprecedented in its scale and speed, the impact of structural change on inequality in the region is potentially very large. We can expect the Schumpeterian, revolutionary technological shifts which are constantly rocking developing Asia's industrial landscape to even further increase the

skill premium and widen the wage gap between skilled and unskilled workers. Likewise, the region's high degree of openness and heavy dependence on trade exposes the region to extensive and frequent changes in its output mix. The constant change of firms and industries benefits the economy in the long run but entails serious adjustment costs in the short run. Providing adequate yet affordable and sustainable old age income support is challenging for the region's countries due to the lack of sound and efficient pension systems. In short, since developing Asia is a region in a flux, in the midst of a wide range of extensive and far-reaching structural changes, we can expect the impact of those changes on inequality to be potentially extensive and far-reaching as well.

The rest of this paper is organized as follows. Section II provides a conceptual/theoretical overview of the relationship between structural change and inequality. Section III takes a look at the nexus between structural change and inequality in the advanced economies. Section IV reviews and analyzes the nexus between structural change and inequality in developing Asia. Section V concludes the paper with some final observations and policy implications.

2. Conceptual/Theoretical Overview of the Relationship between Inequality and Structural Change

Structural changes in the economy expose the population to challenges and opportunities. The heterogeneity of the population implies that the adjustment capacity to these changes varies. At the broad level, the impact of structural changes on inequality is the outcome of the complex interaction between the initial conditions of a country and five broad time varying channels: incentives, technological changes, accumulation of physical and human capital, and access to capital markets and education, social changes and political changes. We elaborate first on these channels, and provide some examples of the complex interaction between these channels.

A. Economic Incentives

Reforms impact the private incentives. Starting from highly distorted equilibrium, where private incentives were not aligned with efficient allocation and use of resources, reforms may trigger a take-off, with large effects on poverty and inequality. The initial take-off may be associated less with accumulation of capital and the adaptation of new technologies, but with the more efficient use of existing resources and technologies. The performance of the PRC in the late 1970s and 1980s illustrates the gains of reforms at the level of the community, freeing entrepreneurship potential and allowing greater private ownership of the resultant surpluses.

Another class of incentives determines the exposure to competitive market forces stemming from international and interregional trade and the mobility of inputs, mainly capital and labor. Incumbents frequently engage in policies that may protect their quasi rents, stifling competition and future growth (Parente & Prescott, 2005). These policies include 'protection' against foreign competition by means of commercial policy, protection against the emergence of domestic competitors by means of red tapes, labor unions opposing immigration and controlling new hires, etc. Higher exposure to international and interregional trade, and greater input mobility curb these rent seeking activities, increasing thereby growth. Changing the exposure to competitive market forces would also impact inequality in numerous ways.

B. Technological Changes

Technological changes include the adaptation of better technologies, rising productivity via 'learning by doing', and efforts leading to technological innovations at the producer and plant levels (R&D, etc.).

C. Accumulation of Physical and Human Capital, and Access to Capital Market and Education

With the proper incentives, the accumulation of physical and human capital has large effect on future income. Unequal access to the capital market and to quality education has profound implications on income inequality.

D. Social Changes

The first three factors may impact the household and the community in profound ways. These are low frequency changes, yet over a span of a generation or two these changes have huge implications, like changing patterns of gender inequality, fertility, and inducing demographic transitions. A key development associated with take-offs is the rural-to-urban immigration, reducing overtime the employment share in rural areas, transforming agriculture from subsistence family farming into large and efficient corporate production. This transition may increase urban poverty, impacting income inequality.

E. Political Changes

Economic take-offs and the resultant changes in social organization and the distribution of income has been associated with political changes, where the under-represented groups (women, the poor, periphery, etc) may gain influence. Similarly, the developing new sectors may reduce the political clout of the declining sectors. These changes may lead to more equal access to education, health services, the formation of safety nets, etc.

The quest for stable association between inequality, growth, and these 5 factors is illusive, as in the long run there is no reason to expect the stability of the relevant feedbacks. Thus, technological changes may enhance equality if they increase the marginal product of labor, on the other hand, they may reduce equality if they hollow out the middle class as may be the case of some of the recent IT trends. Similarly, greater exposure to trade and FDI flows may impact the distribution of income in different directions, determined by the initial endowments of countries. The ability to adapt to the greater penetration of domestic markets by foreign competition and growing exposure to foreign technologies may determine the ultimate impact of globalization on income inequality.

To illustrate, in a country with comparative advantage in agriculture, opening the economy to free trade would increase the price of food, possibly increasing urban poverty and reducing urban areas real income, with opposite trends in villages producing food. The GDP would increase, but the ultimate impact of free trade on inequality would be ambiguous. Inequality would increase if most of the population is

in the non-farming sector, and the urban income is below that of the rural areas. The opposite would be the case if poverty is concentrated in the rural areas. Similarly, the adaption of better technology in agriculture in the open economy would gradually induce large immigration from the rural-to-urban areas. This in turn may increase poverty in the urban areas, and on balance would increase the income of land owners, who may replace rural workers with capital (tractors, trucks, etc.). While the GDP would increase, the net impact of these changes on inequality is ambiguous.

The association between inequality and the structural change encompassed in economic growth is summarized by the Kuznets curve (Kuznets, 1955). A decade later, Kuznets (1967) outlined the link between income distribution, fertility rates, and economic growth.

Dyson and Murphy (1985) documented that the rate of *fertility* rises before it declines during the development process. While fertility rates fluctuate, they tend to peak just before starting a prolonged decline, concluding that the first sign of an impending decline in fertility is a rise, which often starts many years before the pre-decline peak. These observations were interpreted by Dahan and Tsiddon (1998) in a growth model with endogenous fertility, deriving endogenously the demographic transition along with a Kuznets-type dynamics of income distribution, in a framework where economic growth is based on human capital accumulation. In line with the Kuznets hypothesis, in the first phase of development, the average rate of fertility increases and income becomes less equally distributed. In the second phase, fertility declines and income becomes more equally distributed. The economy also accumulates human capital more rapidly in this stage. The demographic transition and the *U-shaped* dynamics of equality are necessary for knowledge-based growth. A comprehensive analysis of this fertility-human capital-growth nexus was provided in several papers by Galor and co-authors, and is summarized in Galor (2005).

Another possible take on the Kuznets curve hypothesis may link it to Lewis (1954) characterization of economic development. A large share of workers in the poorest countries is in the rural sector, surviving in close to subsistence level of income earned in low efficiency framing. Frequently, the takeoff of growth is associated with growing importance of industry and services in urban areas, offering the prospect of higher income. Yet, the transition from rural areas to urban environments may come with

greater inequality associated with the growing importance of access to human and physical capitals, the accumulation of which is affected by differential access of the population to the credit market and to self-financing opportunities. This suggests that the first stage of growth may increase inequality, especially when it involves gradual migration from the rural areas to the vibrant urbanized sectors, where differential access to finance and education, differential abilities and luck is associated with greater inequality. After decades of growth, the low-income rural sector becomes a minority, and the greater scarcity of unskilled workers and possibly the adaption of better technologies in farming would increase their wage, leading to the convergence phase where growth is associated with lower inequality. This outcome may be hastened if the political process provides the poor with greater bargaining clout, inducing greater redistribution and seeding the emergences of a safety net. Brazil is one of the latest examples for this process.

The evidence on the Kuznets hypothesis is, at best, inconclusive. The cross-section analysis of countries taken in the 1970s suggests a parabolic relationship in line with Kuznets' hypothesis. Focusing on the low and low-middle income countries, Cornia, *et al.*(2004) find that, out of 34 developing countries between the 1950s and the mid-1990s, inequality is higher in the terminal period for 15 of them, equal for 14 and lower for 5. A U-shape is observed in a number of cases where inequality is found to be increasing when comparing the terminal and the initial years. Similarly to the Phillips curve, the scanty empirical evidence validating Kuznets hypothesis calls for a multi-factor analysis, recognizing that the contribution of the various factors explaining growth and inequality may change overtime.

Lundberg and Squire (2003) focus on whether growth and inequality are simultaneously determined and whether they are subject to the same set of determining factors. This research provides answers about the impact of policy innervations on the observed association between growth and inequality. They show that the determinants of growth and inequality are not mutually exclusive; however, they did not find variables that robustly uniquely identify the determinants of growth or of distribution. Consequently, analysis which examines each outcome independently ignores the evidence that policies designed to improve one outcome will probably also influence the other. Increasing the Sachs–Warner index to promote growth would lead to greater

inequity, trade-offs between growth and equality.[1] Improving income distribution through enhancing civil liberties may have harmful consequences for growth. Their results suggest that one can derive a set of policies that in combination, may achieve almost any desired outcome in the growth-distribution space: "Expanded education and more equitable land distribution will at least improve income distribution, and may also enhance growth. These policies could be used in combination with an increased value of the Sachs–Warner index to alleviate the distributional costs associated with 'openness'. Thus, growth could be improved without worsening income distribution by increasing the Sachs–Warner index (that is, increasing the proportion of time in a given period in which the country satisfies the Sachs–Warner criteria) by one standard deviation, and simultaneously improving the Gini index of land distribution by one standard deviation. This combination would nearly double the mean growth rate, and would also improve income distribution by 4%. These are of course very large policy shifts, but more modest policy changes could also yield improvements in both growth and distribution."

Among the structural factors possibly impacting both growth and inequality is international trade. Yet, the channels are complex, and the quest for clear cut results remains elusive. Attanasio, *et al.*(2004) studied the impact of the drastic tariff reductions of the 1980s and 1990s in Colombia on the wage distribution. They identified three channels through which the wage distribution was affected: increasing returns to college education, changes in industry wages that hurt sectors with initially lower wages and a higher fraction of unskilled workers, and shifts of the labor force towards the informal sector that typically pays lower wages and offers no benefits. The increase in the skill premium was primarily driven by skilled-biased technological changes, partially motivated by the tariff reductions and the increased foreign competition. Wage premiums decreased by more in sectors that experienced larger tariff cuts. Sectors with larger tariff cuts and more trade exposure experience a greater increase in informality. The overall effect of the trade reforms on the wage distribution may have been minimal.

[1] The Sachs and Warner index measures exchange rate and trade policies. It includes measures of exchange rate overvaluation, tariffs, and non-tariff restrictions on trade.

Recent contributions focus on the impact of trade in the presence of firms and workers heterogeneity, extending the insightful work of Melitz (2003). Sampson (2011) showed that the presence of positive matching between worker's skill and firm productivity explains the employer size-wage premium and the exporter wage premium. Trade has profound implications of trade on the resultant matching and income inequality. Under trade, the selection of high productivity firms into exporting raises the demand for skill and increases wage inequality in all countries, both on aggregate and within the export sector. This occurs when firm productivity is determined by a random draw, or when productivity is endogenous to firm level R&D. With endogenous productivity, the higher demand for skill caused by trade liberalization results from technology upgrading by new exporters.

The structural changes in Developing Asia have been driven by reforms inducing trade and the specialization of Eastern Asia in manufacturing (IT services in India). In these circumstances, the matching of firms and workers may provide the explanation for the growing skills premium, and the growing recognition about the importance of investment in human capital.

While estimating the impact of international trade on the rise of skill wage premium and inequality remains a work in progress, existing evidence is validating these forces. Castelló and Doménech (2002) computed the Gini coefficients and the distribution of education by quintiles for 108 countries over five-year intervals from 1960 to 2000. They found that human capital inequality negatively influences economic growth rates not only through the efficiency of resource allocation but also through a reduction in investment rates. Overall, education inequality is associated with lower investment rates and, consequently, lower income growth. Therefore, policies conducted to promote growth should not only take into account the level but also the distribution of education. Consequently, aiming at a universal access to quality education opt to reduce both inequality and increase economic growth.[2] This task is complicated by the public sector support required to move towards universal access to quality education, as

[2] The focus on quality of education follows the work of Hanushek and Woessmann (2010), finding that there is strong evidence that the cognitive skills of the population—rather than mere school attainment—are powerfully related to long-run economic growth. The relationship between skills and growth proves extremely robust in empirical applications. Growth simulations reveal that the long-run rewards to educational quality are large but also require patience.

the cost of such education is beyond the reach of a large fraction of the population. Furthermore, greater inequality implies that wider segment of the population is unable to fund quality education, requiring deeper commitment of the public sector. While the fiscal challenges associated with funding education are daunting, experience of countries reviewed in the next sections suggests that major strides in improving access to education have been accomplished within a generation or two in countries starting with low tax base.

While the link between higher inequality and lower growth may be tenuous in the short-run, the adverse effects of inequality on future growth may emerge. Growing income inequality seeds growing discontent, leading to future political and economic instability (Alesina & Perotti, 1996). Evidence shows the negative effect of economic volatility on private investment and economic growth (Aizenman and Marion, 1993 & 1999; Ramey & Ramey, 1995). Thereby, access to quality education would increase growth directly, working towards mitigating income inequality, and would reduce the downside risk of the future emergence of growth reduction economic instability.

3. Inequality-Structural Change Nexus in the Advanced Economies

Insight can be gained by tracing the inequality-structural changes in advanced countries during the last 200 years. As developing Asia is converging to the development level of the advanced countries, the experience of the OECD countries may provide insight on the inequality-structural change associations during varying stages of growth and convergence.[3]

The history of Europe, England being among the best documented examples, provides useful lessons. In the first phase of the Industrial Revolution, prior to the implementation of significant education reforms, physical capital accumulation propagated by technological improvements was the prime engine of economic growth. In the absence of significant human capital deepening, the concentration of capital among the capitalists widened wealth inequality. The industrialization set in motion a

[3] See Galor (2005), Parente & Prescott (2005) and Maddison (2008) for comprehensive overviews of long run growth patterns.

process whereby the increase in the return to labor relative to capital, and the higher demand for skills propagated education reforms. In the second phase of the Industrial Revolution, the pace of capital accumulation sharply decreased, whereas the education of the labor force increased, and skills became necessary for production. The investment ratio increased in England from 6% in 1760 to 11.7% in 1831, remained at around 11% on average in the years 1856–1913 (Crafts, 1985 and Matthews, *et al.*, 1982). In contrast, the average years of schooling of male in the labor force was overall stable until the 1830s, tripled by the beginning of the 20th century (Matthews, *et al.*,1982, p. 573).[4] All these changes, and the associated accumulation of assets by the workers, brought a gradual decline in inequality (Wiliamson, 1985; Clark, 2002 & 2003).

Education reforms in the second phase of the Industrial Revolution were associated with a sharp increase in real wages along with a sharp increase in the wage–rental ratio. Over 1823–1915, wealth inequality in the UK peaked around 1870 and declined thereafter, in close association with the sharp increase in the enrollment rates of children in public primary schools from about 20% in 1870 to about 80% in 1910 (Flora *et al.*, 1983). During that period, wages almost doubled, with mild changes in land and rental rates. The decline in inequality was associated with sizable changes that occurred around 1870 in the relative returns to the main factors of production possessed by capitalists and workers. The changes in factor prices reflect the capital accumulation triggered by technological innovations inducing higher demand for skilled workers, as well as the increase in enrollment rates and its delayed effect on the skill level per worker. Similar patterns were observed in France and Germany (Morrisson & Snyder, 2000). The decline in inequality in France appears to be associated with the significant changes in the relative returns to the main factors of production possessed by capitalists and workers in the second part of the 19th century. Levy-Leboyer and Bourguignon (1990) documented that real wages and the wage–rental ratio increased significantly as

[4] Education reforms in England followed the pressure by capitalists as well as labor unions, which recognized the importance of technical skills for maintaining competitiveness against other European countries. The 1889 Technical Instruction Act allowed the new local councils to set up technical instruction committees, and the 1890 Local Taxation Act provided public funds that could be spent on technical education (Green, 1990).

of 1860, reflecting the rise in the demand for skilled labor and the effect of the increase in enrollment rates on the skill level per worker.

The transformation of employment from agriculture to industry and services has been a key part of the growth process triggered by takeoffs, with massive rural to urban reallocation of population. In the UK, the employment share of agriculture dropped from about 35% in 1800, to 5% in 1950, reaching below 3% today. The results are more dramatic for the US, where the agriculture employment share at the beginning of 1800 was well above 70%, reaching about 2% today. For late comers to the industrialization, this process accelerated: the agriculture employment share dropped in Spain from about 67% in 1900, to well below 10% today. This process was driven by two factors: improvements in agricultural technology combined with Engel's law release resources from agriculture (*labor push from agriculture*), and improvements in industrial technology attracted labor out of agriculture (*labor pull*). Empirical analysis of 11 OECD countries, since 1800, suggests that the "pull" channel dominated until about World War II, with the "push" channel dominating afterwards. The "pull" channel seems to matter more in countries in early stages of the structural transformation (Gollin, *et al.*,2002; Alvarez-Cuadrado & Poschke, 2011).

Wealth inequality in the US, which increased gradually from colonial times until the second half of the 19th century, reversed its course at the turn of the century and maintained its declining pattern during the first half of the 20th century (Lindert &Willamson, 1976). The emergence of the "new economy" in the early 20th century increased the demand for educated workers. In tandem, the creation of publicly funded mass modern secondary schools from 1910 to 1940 provided general and practical education, contributed to workers' productivity, and broadened college education (Goldin, 2001), facilitating social and geographic mobility. It generated a large decrease in inequality in economic outcomes. This process was magnified by the onset of demographic transitions.

The industrial revolution in Western Europe set in motion a complex process of demographic transition. While the growth rate of output/capita increased in the first phase of the industrial revolution, the Malthusian effect of income per capita on population growth was maintained for a transitional period. During that period, the sizable increase in population growth mitigated some of the potential gains in income

per capita. In England, the acceleration in technological progress and the accumulation of physical capital, and to a lesser extent human capital, generated a gradual rise in real wages in the urban sector. Partly due to labor mobility and demand effects, it induced a gradual rise in real wages in the farming sector. The relaxation in the households' budget constraint following the takeoffs was associated with an increase in fertility rates along with an increase in literacy rates and years of schooling. Concurrently with the decline in mortality rates, fertility rates and population growth increased in most of Western Europe until the second half of the 19th century (Coale & Treadway, 1986). The take-off was associated with the acceleration in industrialization and rise in urbanization, and a persistent decline in the share of agriculture production in total GDP (Mitchell, 1981; Bairoch, 1988). The increasing skill requirements in the process of industrialization increased the demand for education, which was boosted also by the significant increase in life expectancy. Overtime, the contribution of human capital accumulation to the growth process increased (doubled in the US), whereas the contribution of physical capital declined significantly (Goldin & Katz, 2001).

Following the growth takeoff, population growth rate accelerated. However, with a significant lag (about a century in Western Europe, about 70 years in US, Canada and Australia), there was a dramatic drop of population growth rate (Maddison, 2001). The decline in population growth followed the dramatic decline in fertility rates, reaching in Europe levels well below the population replacement level. Importantly, the decline in fertility during the demographic transition outpaced the decline in mortality rates, and brought about a decline in the number of children who survived to their reproduction age. While this process fits well the secular increase in the demand for human capital, it may induce higher inequality if the demographic transition is distributed unevenly, tilted towards the higher end of the income distribution.

The process of industrialization in developed economies was magnified by the growth of international trade. The UK and Northwest Europe were net importers of primary products and net exporters of manufactured goods, whereas the exports of Asia, Oceania, Latin America, and Africa were overwhelmingly composed of primary products (Findlay & O'Rourke, 2003). O'Rourke and Williamson (2005) found that trade was a significant force behind the rise in productivity in the UK. Therefore, while technological advances could have triggered the Industrial Revolution without an

expansion of international trade, the growth in exports increased the pace of industrialization and the growth rate of output per capita of the UK and Western Europe.

Common threads of these experiences were that the accumulation of physical capital raised the role of human capital in the growth process, reflecting the complementarities between capital and skills. Investment in human capital, however, was sub-optimal due to credit market imperfections. Limited access to and affordability of quality education, where wealth, gender, race, and ethnicity affected schooling availability propagated unequal accumulation of human capital, inducing rising inequality at times of higher average real wages. Consequently, deeper public investment in education has been growth-enhancing, reducing income inequality. However, the low degree of complementarity between human capital and land during the industrial revolution implied that universal public education increased the cost of labor beyond the increase in average labor productivity in farming, probably reducing the return to land.[5]

International trade enhanced the specialization of industrial economies in the production of manufacturing and other skilled intensive goods during the second phase of the Industrial Revolution. The resultant rise in the demand for skilled labor induced a gradual investment in the quality of the population, expediting a demographic transition, probably stimulating follow up technological progress, and further enhancing the comparative advantage of Western Europe in the production of skilled intensive goods. In contrast, in non-industrial economies international trade has generated the opposite forces—greater specialization in non-industrial goods, produced by unskilled, low wage works. The resultant low demand for human capital has provided limited incentives to invest in the quality of the population. Therefore, the gains from trade in non-industrial economics probably delayed their demographic transition, increasing further their relative abundance of unskilled labor. Consequently, international trade affected in complex ways the distribution of population, skills, and technologies in the world economy.

[5] Therefore, landowners had limited economic incentives to support growth enhancing educational policies as their stake in the productivity of the industrial sector was insufficient. Thus, an unequal distribution of land ownership put a drag on the support and the accumulation of human capital (see Galor, *et al.*,2003).

The degree to which the education system and the social norms allow wide accessibility to human capital accumulation is a key factor accounting for the impact of structural changes on the distribution of income. Quality private education is frequently beyond the reach of the poorer segment of the population. Capital market imperfections associated with the inability to collateralize human capital implies that public funding and public education are critical for the wide accessibility to education. The history of Western Europe, Canada, and the US suggests that, in the second phase of the industrial revolution, the emergence of public education and greater labor mobility facilitated growth accompanied by lower inequality.

Nevertheless, the rosy outcome of growth with lower inequality in the second phase of the industrial revolution is not reassured. Widely available quality public education requires significant tax support, redistributing income towards the poorer segments of the population. Popular support for redistributive policies may decrease with inequality (Benabou, 2000). With imperfect credit and insurance markets some redistributive policies can improve ex ante welfare, and this implies that their political support tends to decrease with inequality. Conversely, with credit constraints, lower redistribution translates into more persistent inequality; hence the potential for multiple steady states, with mutually reinforcing high inequality and low redistribution, or vice versa. Benabou's framework also provides an interpretation for the documented negative relationship between initial disparities of income or wealth and subsequent aggregate growth (Alesina & Rodrik, 1994; Persson &Tabellini, 1994). Recognizing that pretax inequality has a significantly negative effect on social transfers (de Mello & Tiongson, 2006), it follows that greater inequality may hinder the support for quality public education and overall accumulation of human capital, reducing thereby growth.

The rise in inequality in the US from 1980 may represent a new development phase, associated with technological changes propagated by the ongoing IT innovation. Autor, *et al.* (2008) explain the rise in U.S. wage inequality since 1980 as the outcome of two trends. First, the rapid secular growth in the relative demand for skills, attributable to skill-biased technical change, and a sharp deceleration in the relative supply of college workers in the 1980s capture well the evolution of the college/high school wage premium over four decades. Second, the recent "polarization" of skill demands in which employment has expanded in high-wage and low-wage work at the expense of

middle-wage jobs may reflect the role of information technology in complementing abstract (high-education) tasks and substituting for routine (middle-education) tasks. The authors conclude that computerization and international outsourcing may have raised the demand for skill among higher-educated workers, depressed skill demands for "middle-educated" workers, while leaving the lower end of the wage distribution comparatively intact. This interpretation may account for the "*hollowing out*" of the wage distribution observed in OECD countries.

4. Analytical Review of the Inequality-Structural Change Nexus in Developing Asia

The global trend since the 1960s has been the 'catch-up' and convergence across countries (Maddison, 2008). Developing Asia has led this trend, with unprecedented growth of the GDP/capita from 1952 to 1978 in Japan, Taiwan, South Korea, Hong Kong, and Singapore, at annual rates ranging between 4.8% (Singapore) to 6.7% (Japan). The next step was the tectonic shift propagated by the takeoff of the PRC in the 1980s followed by India in the 1990s. A common feature of these takeoffs has been the high levels of investment in human and physical capital, rapid increases of international trade and inflows of FDI, and the transfer of technology. In most Asian takeoffs, the leading sectors were manufacturing (services in India). The rapid growth rates following these takeoffs were reinforced by large investment in physical and human capital, financed by very high investment and saving rates in developing Asia.

The experience of developing Asia differs from that of emerging Latin America, in the key role played by export led growth strategy, with heavy emphasis on industrialization. Frequently, this strategy was supported by direct allocation of available credit by state-owned banks, in ways linked to the realized growth and export performance. Japan (from the 1950s) and Korea (from the 1970s) are among the countries that used these credit policies for several decades, applying elaborate institutional mechanisms for selection and monitoring (World Bank, 1993). The growth was also propagated by trade liberalization efforts, increasing the Sachs-Warner index

of openness, resulting with a large increase in investment, growth, and exports (Wacziarg & Welch, 2008). Intriguingly, Japan and Korea were closed to inward FDI, and refrained from large hoarding of international reserves during the first decades of their economic takeoffs. The emergence of manufacturing as a leading sector provided the pull factor for the rural-to-urban migration. The agriculture sector in developing Asia managed to increase its productivity in tandem with the growth takeoff. This was the outcome of land reforms, notably in Korea and Taipei, China, improvement in agriculture extension services to speed the diffusion of Green Revolution technologies, and investment in infrastructure (World Bank, 1993). Thus, in the first stage of the takeoffs, growth benefits reduced poverty across the board. Yet, the preferential treatment of industrialization imposed an implicit tax on agriculture, resulting with lagged income growth in the rural relative to the more industrialized, mostly urban areas.

The experience of the last three decades in the PRC differ from that of Japan, Korea, and other developing Asian countries in the key role of inward FDI and joint ventures. These activities facilitated more rapid technological transformation. International trade remains a vital part of the PRC's growth strategy, with growing role for complex network-trade with Korea, Japan and other Asian countries. The strategy seems to work, allowing the PRC to climb rapidly on the ladder of product sophistication, at rates faster than the one observed earlier in Japan, Korea, and other developing Asian economies (Schott, 2008). FDI inflows to the PRC may contribute to greater inequality, as the geographical distribution of the inward FDI has been skewed towards the Eastern-Southern provinces. Fleisher, *et al.,* (2010) pointed out that FDI had a much larger effect on total factor productivity (TFP) before 1994 than after, attributing this finding to the increasing success of private and quasi-private enterprises. Regional differences in physical, human and infrastructure capital and regional differences in FDI flows account for the differential regional growth patterns. Human capital investment in less-developed areas is justified on efficiency grounds and because it contributes to a reduction in regional inequality.

While the export led growth strategy may fit small countries, short of the emergence of a "new demander of last resort," the Chinese growth path has been challenged by its own success (Aizenman & Sun, 2010). This is especially the case at times of

diminishing growth prospects of the US and the Euro block. Feenstra and Hong (2010) concluded that the growth in domestic demand led to *three-times* more employment gains than did exports over 2000–2005.Therefore, the PRC could turn towards domestic demand instead of export and consumer expenditures, in particular as an engine to stimulate employment. The policies associated with such a turn would reduce the inequality between the urban and the rural areas.

This intriguing observation is in line with the growth performance of India, which managed to grow fast in a more balanced way, without relying on external demand as the engine of growth. India's growth takeoff took place at the background of prior inequality in access to opportunities and income, which in turn put a drag on the speed of poverty reduction, and probably magnified the increase of inequality. The prior inequality in India, and the higher growth rate of the PRC, accounts for the faster poverty reduction accomplished by the PRC (Ravallion, 2011).

Inequality debate in India is generally discussed in relation to the major economic reforms in the 1990s.India underwent radical external sector liberalization—average manufacturing tariffs dropped from 117% in 1990–1991 to 39% in 1999–2000. Trade reforms, among other structural reforms economic growth has reduced poverty in India and important drivers were technological changes in the rural areas (Datt & Ravallion, 1998). Nevertheless, geographic and sector divergence in India's growth process, and heterogeneous access to opportunities dampened the poverty reduction effect of growth (Datt and Ravallion, 1992 & 2009). The remarkable increase in the growth rate triggered by takeoff was helped occasionally by the ability to 'leapfrog,' bringing advanced technologies to communities that were not exposed to the gains from older technologies. The fast adaptation of cell phones and IT networking in communities without access to reliable phone lines allowed India to become a key global provider of back office and software services, despite its infrastructure deficits.[6] As much of the service sector's growth comes from relatively skill-intensive subsectors such as IT, process outsourcing, and financial services, this growth contributed more to the well-educated and households with better access to schools and colleges. The relatively

[6] While leapfrogging may allow overcoming infrastructure deficiencies, the degree to which countries may leapfrog in a wide range of manufacturing remains debatable (see Hobday, 1994). Yet, the development patterns of China suggest that climbing very fast on the quality ladder is feasible.

small employment share of services and manufacturing in India accounts for the increased inequality in recent decades.

Kumar and Mishra (2008) provided evidence that trade liberalization in India led to decreased wage inequality between unskilled and skilled workers. Hasan and Mehta (2011) find that most of the shift in inequality cannot be attributed directly to liberalization. They find that 29%of the change in wage inequality from 1993 to 2004 can be attributed to liberalization, 25 percentage points of which is linked to services reforms and 4 percentage points is due to trade liberalization.

Burua and Chakraborty (2010), on the other hand, find positive relationship between trade openness and interregional inequality. India experienced a higher rate of increase in income inequality across the country during the post-reform period (1995–2000) as India's openness increased, interregional income inequality also elevated due to the concentration of manufacturing in the metropolis area.

In Malaysia, inequality, particularly between races, was given specific attention in policy making in the aftermath of the racial turbulence in the late 1960s.The government put emphasis on diversifying agriculture output and export-oriented manufacturing to facilitate growth and increase employment opportunities. The government also focused on education and human resource development.

Further liberalization and deregulation during the period 1991–1995 facilitated the decline in poverty incidence by 9.6%, helping more than 400,000 individuals out of poverty. Income inequality during this period, however, increased by 4.3%. Ragayah (2008) points to the government's liberalization and privatization policies after the mid-1980s as the reason for worsening inequality since 1990.Concerns that wage increases in the early 1990s would erode exports uncompetitive induced policy makers to open the economy to foreign workers who kept wages down. The resultant depressed wages deteriorated the income distribution.

The Asian financial crisis of 1997–1999 induced a decline in inequality, apparently because the crisis affected adversely more the top quintiles of the households. The impact on the bottom two quintiles was rather mild, as the crisis did not lead to massive unemployment for the locals while shortly after the crisis, inequality resumed the upward trend. Malaysia's preferential treatment of the *Bumiputra* (indigenous people of

Malay)seemed to reduce poverty and inter-ethnic income disparity, yet intra-ethnic income inequality has widened.

In post-crisis years, Malaysia has been experiencing growth of about 5–6% with no significant improvements in the unemployment rate. In order to maintain its competitiveness in the global market, it has been moving from labor-intensive towards capital- and technology-intensive production.

Consequently, the demand for skilled and highly educated workers increased, pushing up their wage relative to that of the unskilled workers, increasing inequality. This may reflect the maturing of the Malaysian economy, climbing up the value chain, substituting labor-intensive operations to skill/knowledge-intensive activities. Intriguingly, these interpretations are reminiscent of the development in the US discussed in the previous section.

Most Asian economies are characterized by their dual economic structure, where the agrarian sector engaged in subsistence farming. Thereby, the adaptation of better farming technologies has the byproduct of pushing the surplus labor to the urban areas. Transferring more than half of the population from rural to urban communities took about 100 years in Europe, yet the faster convergence of East Asia implies that this transformation may happen within less than 50 years. The challenges associated with this transformation are enormous, as it's not obvious that the push forces inducing rural labor to move to cities (better farming technologies) would match the pull forces (higher demand for labor in manufacturing and services, mostly concentrated in rapidly growing urban communities). As the pull factors may play a greater role at the first stage of economic development, the transition may impose key economic and social challenges. While restrictions on labor mobility may help in the first stages (see the PRC's experience), it may lead to segmented labor markets, with growing underclass of discontent workers. The fast industrialization experienced in developing Asia implies also a rapid increase in the demand for skilled workers, leading to bottlenecks, with widening wage gaps between skilled and unskilled workers. Distortions associated with uneven access to the capital market and education may expose Asian countries to faster increases in wealth and income inequalities, and may put a drag on the sustainability of fast growth.

The PRC's experience provides a key case study of the five forces shaping growth and inequality dynamics described in Section II. Changing economic incentives induced by reforms of the early 1980s induced rapid growth in the rural economy, and accounted for the majority of the PRC's success in poverty reduction since 1980 (Ravallion & Chen, 2007).The rapid industrialization of South-Eastern provinces facilitated by selective incentives, FDI inflows and the export led growth strategy induced rapid technological changes and accumulation of capital. The combination of these factors led to massive migration from rural towards the growing industrialized urban centers in South-Eastern China, and the growth of urban poverty (Li, 2006; Knigh, *et al.,* 2007). The process was shaped by the initial conditions of the PRC, including the *hukou*system.[7] Its power in controlling people's life has declined in the reform era in the wake of enormous social and economic changes and dramatic rise in rural-to-urban mobility. Despite all the reforms, the system still functions to constrain personal free migration and contribute to societal segregation. The gross inequality of the system has triggered a political and social process, putting in motion a slow trend toward further relaxation of the *nongzhuanfei* process (i.e., the process of converting the *hukou* status from agricultural to non-agricultural one). The growing demand for human capital, labor market pressures, and the social fragmentation may provide the impetus for further reforms.

The fast initial growth rates of developing Asia observed during the second half of the 20th century may also imply faster demographic transitions. This reflects several factors: modern technology allowing gender screening and selective abortions; the enforcement of the "one Child policy," in the PRC; and the rapid drop in infant mortality propagated by adopting modern medical standards. This is in contrast to the slower demographic transitions in Western Europe, where the control mechanism impacting the family size in the 19th was endogenous adjustment of female's age of marriage (Wrigley and Schofield, 1981). Consequently, developing Asia has been

[7] The Chinese household registration system (*hukou*) divides the population into "agricultural" and "nonagricultural" sectors.It may be the most important determinant of differential privileges in state socialist China, determining access to good jobs, education for one's children, housing, health care, and even the right to move to a city (Wu &Treiman, 2004). Transforming one's *hukou* status from rural to urban is a central aspect of upward social mobility. Education and membership in the Chinese Communist Party are the main determinants of upward social mobility.

moving faster than Western Europe throughout the paces of demographic transition. This may account for the increase of FDI outflows from Japan in recent decades, needed to compensate for its shirking and expensive labor force, possibly increasing the wage inequality between workers and owners of capital. Similar challenges would affect the PRC, Korea, and other countries projected to enter the stage of rapid increase in the old dependency ratio within less than a decade.[8]

The dilemma facing developing Asia is that "While the developed countries became rich before they became old, the developing countries will become old before they become rich" [Harlem Brundtland (former Director-General of the WHO)]. The growing inter-generational tension associated with rapidly aging societies would aggravate the drag on the growth rate of developing Asia. While there are no quick and easy fixes to demographic challenges, there exist possible policies that may mitigate the downside risks:

(i) Key importance for deepening equal access to quality publicly supported education. This would facilitate faster growth and act to mitigate the rising inequality.

(ii) Minimizing the debt overhang associated with unfunded liabilities, and improving the foreign asset position of developing Asia would help. Stockpiling foreign assets in the form of international reserves well above 15% of the GDP, a common practice in most developing Asia, may be sub-optimal. A better policy stance may involve diversifying reserves into well run Sovereign Wealth Fund, investing globally in equities.

(iii) Policies that would reduce the private cost of rearing kids would help. Access to quality public education is important, but one should go beyond this. Dealing with the root causes of the tendency to 'overeducate' kids due to a 'rate-race' to top universities would be useful.[9]Other steps reducing the burden

[8] Korea's speed of population ageing has been unprecedented. The average fertility rate (birth per woman) is by now about 1.3, among the lowest in the world. The By 2050, the median age of the population of Korea is projected to be 57 years, making it one of the most elderly nation in the world. In contrast, at present, Japan has the oldest median age at 43 years, while Korea's stands at 37 years (Klassen, 2010).

[9] South Korea is a sad example of this situation, though the 'rate race' distortion applies well beyond Korea. According to Chang (2008), "All told, astronomical amounts of educational resources are grossly misallocated because of the failure of public education. While these resources

of rearing kids, which is typically born by the mother, may help in mitigating the collapse of child bearing in developing Asia.

(iv) Adopting policies that are friendlier to immigrants would help. This would be especially helpful in smaller countries (for the experience of Singapore and Malaysia, see Ruppert, 1999), but it would alleviate bottlenecks even in large countries. Arguably, developing Asia can apply its monopsony power to encourage a human capital profile of its immigration and foreign labor that would fit its economic aspirations and challenges, as has been the practice of Canada and Australia.

5. Concluding Observations and Policy Implications

Structural change—or changes in the structure of the economy or broader changes in non-economic, political, social, cultural, or other spheres—has a major impact on inequality. Greater openness to foreign trade intensifies competition and thus accelerates changes in a country's industrial structure and output mix. In the short run, openness increases adjustment costs since some industries and firms will be unable to withstand foreign competition. Analogously, technological progress will benefit more skilled workers who are able to use the new and improved technology but disadvantage less skilled workers. In the process, the skills premium will increase, widening the wage gap between the two groups of workers. Structural change exerts a significant effect on inequality in both advanced and developing countries. What sets developing Asia apart from the rest of the world is not the close link between structural change and inequality but the sheer speed and scale of structural change. Extensive structural change is both a cause and consequence of the exceptionally rapid economic growth, which enabled the region to raise living standards and reduce poverty at a historically unprecedented rate.

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turn into a deadweight loss or social waste, much of the public education infrastructure remains substandard."This waste included running "education trade deficit" of 4.4 Billion US dollar in 2006, projected to increase at a rate of 30% annually.

Our review of developing Asia's experience confirms that the region has experienced seismic structural change during its growth and development process. Of course, each country faces different structural changes and the relative importance of a given structural change differs across countries. Furthermore, even for the same country, a given structural change can become more or less important over time. For example, the increase in inequality arising from the PRC's transition from a centrally planned economy to a market-oriented economy is becoming less important as it moves farther away from the market reforms of 1978.In the case of Malaysia, the economically disadvantaged position of the majority Malay population has traditionally been a main source of inequality. In response, the government has implemented discriminatory policies, which explicitly sought to help the majority Malays bridge the income gap with the other ethnic groups. A relative high level of illiteracy stands in the way of India's efforts to make growth more inclusive. India differs too from its poor infrastructure which impedes inter-regional connectivity and thus impedes inter-regional income convergence. In short, while many countries in developing Asia are buffeted by structural changes which impinge upon inequality, the relative importance of different structural changes differs across countries and, for a single country, over time.

Given the interconnectedness between different types of structural changes, what separates developing Asian countries matters less than what unites them, namely the collective scale of the structural change confronting them. At a broader level, structural change entails adjustment costs. Therefore, addressing the inequality resulting from structural change requires mitigating those adjustment costs.

Developing Asia has already begun the difficult and complex task of addressing inequality arising from structural change. In response to growing popular demand for more equity, governments across the region are seeking to include more of the population in the growth process and spread the fruits of growth to more of the population. While the dominant growth philosophy among the region's governments in the past was "grow first, redistribute later", there is now a growing recognition that more sustainable growth supported by broad-based political and social support requires a growth strategy, which provides equality of opportunity, especially in education and employment. The newly developing more inclusive growth philosophy also envisions expanded social protection systems and social safety nets to protect the poor and the

vulnerable. Although this new growth philosophy is geared toward reducing inequality and promoting equity in general, the fact that structural change is likely to be a major source of inequality in developing Asia re-confirms and validates the basic direction of the philosophy. The fundamental solution to mitigating the adjustment costs arising from structural change lies in empowering individuals to become more productive, adaptable, and versatile through access to education and employment.

Finally, the experiences of the advanced economies entail a number of valuable lessons for developing Asia. First, the impact of the adaptation of new technology on income inequality is frequently large, varying depending on initial conditions and the nature of the technology. While some technologies lead to widespread gains and higher equality, some may lead to greater inequality generating losers and gainers, with "hollowing out" effects. Second, international trade reinforces the take-off and growth in economies where manufacturing is the leading sector. Faster technological adaptation magnifies growth, and benefits from aggressive education drive. On the other hand, new technologies tend to generate winners and losers, and may increase inequality. Third, ensuring equal access to quality public education is extraordinarily important. This would facilitate faster growth and act to mitigate the rising inequality that characterizes the first phase of takeoffs. Fourth, the downside of growing Inequality is breeding socio-political instability and lower economic growth. Quality public education helps, but at the second stage of the growth takeoff, state-sponsored safety net would mitigate the downside risk of growing inequality. Safety net would also reduce the opposition to rapid changes and the adaptation of new technologies. Fifth, demographic transitions following a successful takeoff are unavoidable, imposing new challenges. While the drop in net fertility opts to increase the investment in human capital, the final phase of the demographic transition may impose acute fiscal challenges. Widening the tax base and curbing unfunded liabilities help in avoiding stagnation.

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