

## Chapter 4

# LEAP-FROGGING INDUSTRIALIZATION? MYTHS ON STRUCTURAL TRANSFORMATION AND ECONOMIC DEVELOPMENT

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### 1 Introduction

The modern economic growth (Kuznets, 1966) in the 19th century was driven by export industrialization, which is, if simply put, to realize and accelerate industrialization through exports. By contrast, industrialization toward not the foreign market, but only the domestic market is called as import substitution for domestic production. The majority of developing economies pursued economic growth through this import substitution until the 1970s. If we look back, early industrializers such as Germany and the US also adopted this import substitution strategy in the 19th century. They imposed high tariffs on competitive import products and maintained high exchange rates in order to lower the prices of imported intermediate and capital goods for domestic production. Nevertheless, these protectionistic measures turned out to be short-lived, the manufacturing sector equipped with competitiveness turned to foreign markets, graduating import substitution for export industrialization. Japan also took the similar steps toward the end of World War I.

Emerging market economies in East Asia such as Korea and Taiwan started export industrialization with labor intensive products since the 1960s. Increasing shares of these emerging market economies in world manufacturing exports threatened manufacturing sectors in advanced economies, part of which was reflected in the OECD report in 1977, titled, *The Challenges of Newly Industrializing Countries*.

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Nevertheless, to the majority of developing economies, the shift from import substitution to export industrialization strategies was not an easy policy decision. Some southeast Asian economies following Korea and Taiwan were spotlighted by World Bank (1993)'s East Asian Miracle, which stressed how they were exceptional among developing economies with respect to market-government cooperation. In fact, the majority maintained high (effective) tariff rates and exchange rates, while their heavily protected manufacturing sectors mostly failed to enhance their international competitiveness until the 1990s. Actually, these manufacturing sectors often became vested interests incentivised to continue being protected. One of the reasons why the Miracle could avoid this trap may come at least partly from the political situation where authoritarian regimes in East Asia must resort to economic policy changes to establish their political legitimacies.

As such, East Asia made exceptional success in export industrialization among developing economies. Industrialization itself, however, was an economic development strategy commonly shared among post WWII developing economies including those in South Asia, Latin America, Sub Sahara Africa, Middle East and Socialist countries. Almost all of them failed to industrialize, though, mainly because they stuck to import substitution in capital intensive heavy and chemical industries and did not adopt export industrialization in unskilled labor intensive light manufacturing industries, which better suits their factor endowments.

Since the Industrial Revolution (IR), economic development has been led by manufacturing. Industrialization jointly enhanced productivity and generated unskilled labor jobs. The success of labor intensive manufacturing comes from their tradability in the world market as well as from its higher income elasticity of demand. Agriculture also exports their products, but their income elasticity of demand is lower. Also, agricultural productivity growth tends to rely on labor saving technological innovation. As to the other sector, i.e. services, their tradability as well as their job creation was limited as compared to manufacturing sector until recently.

However, in the 21st century, we observe that the change in patterns of technological innovation and economic globalization seems to threaten the once effective development strategy of export industrialization. On one hand, the digital revolution is destroying comparative advantages of rich pool of unskilled labor and on the other, global value chains of industries is not dispersing across economies, but rather clustering into few economies. one may concern whether export industrialization will not be able to jointly realize productivity growth and job creation any more.

In this chapter, we re-examine the process of industrial structural transformation and productivity growth<sup>2</sup> across economies under these changing global economic environments, using the disseminating database developed by the Groningen Growth and Development Centre, draw some new insights on cross-economy labor share changes and sectoral productivity growth in 42 advanced and developing economies during the period of 1947-2013, particularly focusing on their dispersions and concentrations, and consider their implications for the future of de-industrialization and development strategies. It is well known that advanced economies graduated from industrialization by the 1970s and are in the process of de-industrialization and servicification. Furthermore, developing economies seem to have started de-industrialization since the 1990s, which raises worries about its possibly negative impact on their economic development (Rodrik, 2016, IMF, 2018). Can they bypass or leap-frog industrialization for development?

In the following, Section 1 showed some evidence that the well-known hump-shaped manufacturing share in labor and value added over time and across GDP per capita levels observed in advanced economies may not be a norm over the post WWII decades (1947-2013) across an extended coverage of economies. Next, looking into premature de-industrialization progressing since the 1990s, Section 2 showed that, while manufacturing productivity levels are generally higher than those of agriculture, they are mostly lower than those of (aggregate) services within each economy, but that, at the same time, some services subsectors' productivity levels are often lower than those of manufacturing again within each economy.

After summarizing the engines of economic growth and structural transformation (Section 3), we reviewed US agricultural development since 1880 as a de-agriculturalization process (Section 4) and recent global manufacturing development as a de-industrialization process, and found some common features in structural transformation with a loop interaction among income growth, technology innovation and market integration through trade and investment (Section 5).

On top of this, Section 6 decomposed aggregate labor productivity growth of the 42 economies, which gives us a comprehensive perspective over the process of structural transformation in terms of their sectoral labor shares and productivities over the post WWII period. The decomposition revealed that, throughout the period, (aggregate) services played a dominant

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<sup>2</sup> Throughout the chapter, “productivity” means not total factor productivity (TFP), but labor productivity defined as value added divided by labor employment (i.e. the number of workers).

role in aggregate labor productivity growth across both mature and premature de-industrializing economies due to its largest labor share and its higher productivity levels, despite its lower productivity growth rates, while manufacturing played a complementary role particularly in mature de-industrializing economies.

Nevertheless, we would not be able to say that some services subsectors could substitute for manufacturing and that they can help leap-frogging industrialization as a development strategy for most developing economies (Section 7). Why? Because there remains a huge gap between the global frontier and developing economies' productivity levels in all sectors and subsectors and we could not find any solid evidence of productivity growth convergence in all sectors and subsectors, yet.

## 2 Industrialization, Structural Transformation and Economic Growth

From the outset, modern economic growth was a process of industrialization, which accompanies a transformation in industrial structure from an agricultural society. The United States shows a typical case. A national industrial structure is often decomposed into three sectors, i.e. agriculture, manufacturing and services. Figure 1 shows changes in employment shares in these sectors over the past two centuries in the US.

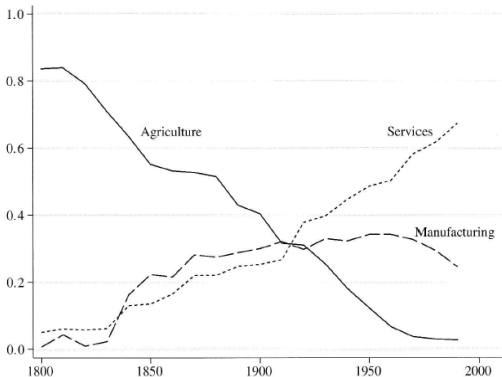


FIGURE 1: Sectoral labor shares, United States, 1800-2000

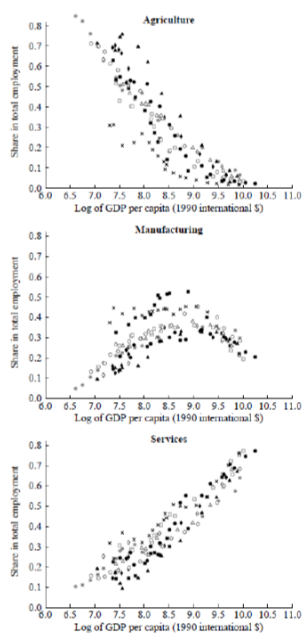
Source: Acemoglu, *Introduction to Modern Economic Growth*, Figure 20.1, 2009.

In the early 19th century, the United States was an agricultural society where agriculture occupied more than 80 % of the total employment, while

manufacturing and services did less than 10 % each. Since then on, the agriculture employment share trend-declined below 50 % around the Civil War era in the 1860s, and further below 10% by the 1970s. By contrast, the shares of employment in manufacturing and services rose parallelly to 30% until the early 20th century, and then the former peaked out at before 40% in the beginning of the 1950s and started to decline around the 1970s, while the latter rose at higher speed since then.

Similar trends are observed commonly in advanced economies. As one popular example, Herrendorf et al. (2013) show scatter maps of a combination of sectoral employment as well as value added shares and per capita income levels at constant international dollars in 1990 with a panel data across 10 advanced economies over the years of 1800-2000 (Figure 2, Panel a).

a. 10 advanced economies, 1880-2000



b. 42 economies, 1947-2013

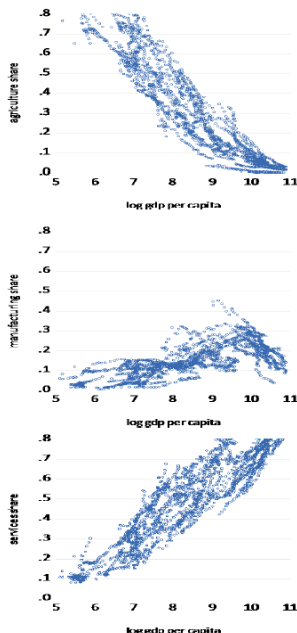


FIGURE 2: Sectoral labor shares

Source: Panel a: Herrendorf, Rogerson and Valentinyi (2013), Figure 1. Panel b. Author's construction based on GGDC 10 sector database and World Bank, *World Development Indicators*.

The Figure shows: the higher the income level, the lower the employment share of agriculture to less than 10% and the higher that of services to more than 70%, while the higher up to 30-50% but from there the lower to around 20% that of manufacturing, being named as “hump-shaped”. Also its original figure showed that, while these patterns of industrial transformation across sectors are similar between shares in employment and value added, the employment share in agriculture is higher than its value added share at the same income level and the other way around in manufacturing, which suggests that the labor productivity (= value added/employment) is generally lower in agriculture than in manufacturing.

This hump-shape pattern of changes in employment share of manufacturing is not necessarily shared in common,<sup>3</sup> but shifts across economies nor across periods, though. Figure 2, Panel b, shows a scatter plot across 42 economies over the period of 1947-2009 based on GGDC 10 sector database.<sup>4</sup> Apparently, we cannot detect one single hump for manufacturing anymore (looking like a horse?), while employment shares of agriculture and services show almost identical patterns to those of Panel a. It would not be surprising if we recognize not a single drivers of productivity growth and structural transformation which would work differentially across time and space as will be discussed below in Section 3.

When the productivity level of manufacturing is higher than that of agriculture, resource re-allocation or structural transformation from agriculture to manufacturing would, other things being equal, enhance a national average productivity level even without any productivity growth (reallocation effect on aggregate growth). In addition, when the productivity growth of manufacturing is higher than that of agriculture, the same re-allocation would also enhance the national productivity growth (sectoral growth effect on aggregate growth). In fact, both of these seem to have

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<sup>3</sup> Comin et al (2021) tried to recover the hump-shaped pattern by presuming some nonhomothetic preferences, and Sposi et al. (2021) did so by presuming nonhomothetic preferences, differential sectoral productivity growth and trade integration, both theoretically and empirically.

<sup>4</sup> <http://www.rug.nl/research/ggdc/data/ggdc-10-sector-databaseGGDC>, accessed on May 13, 2022. The data covers 10 sectors, i.e. 1. Agriculture (agriculture, mining, forestry and fishing), 2. Mining (mining and quarrying), 3. Manufacturing, 4. Utilities (electricity, gas and water supply), 5. Construction, 6. Trade (wholesale and retail trade, hotels and restaurants), 7. Transportation (transport, storage, and communication), 8. Finance (finance, insurance, real estates and business services), 9. Government (government services), and 10. Service (community, social and personal services).

really happened in modern economic growth. In this sense, industrialization has been the engine of sustained productivity growth or modern economic growth in advanced as well as some other economies.

In advanced economies, however, the manufacturing shares have kept declining, i.e. de-industrialization has prevailed since around the 1970s. If the share of manufacturing with higher productivity level and growth be replaced by that of services with lower productivity level and growth, it would lead to lower aggregate productivity level and growth.

In developing economies, because their agriculture shares remain large, the resource shift by industrialization has been expected to enhance their productivity level and growth, as experienced by advanced economies. In fact, however, the resource shift from agriculture to manufacturing was limited and/or skipped, and that from agriculture to services to be unexpectedly conspicuous in recent years. Figure 3 depicts a combination of peak manufacturing shares in employment and their income levels across the 42 economies. It demonstrates that, in most developing economies or late industrializers a la IMF (2018)<sup>5</sup>, their relatively small manufacturing shares (less than 20%) started to decline at lower income levels (less than 5,000 constant 2015 US\$) as compared to advanced economies or earlier industrializers. This fact is labeled as pre-mature de-industrialization by Rodrik (2016).

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<sup>5</sup> IMF (2018) states on page 6: “Moreover, many of the developing economies with declining manufacturing shares never experienced strong expansion of the shares to begin with, unlike most of the economies that developed earlier. As a result, compared with those of earlier developers, the manufacturing employment shares of many developing economies have typically peaked at lower shares and income levels.”

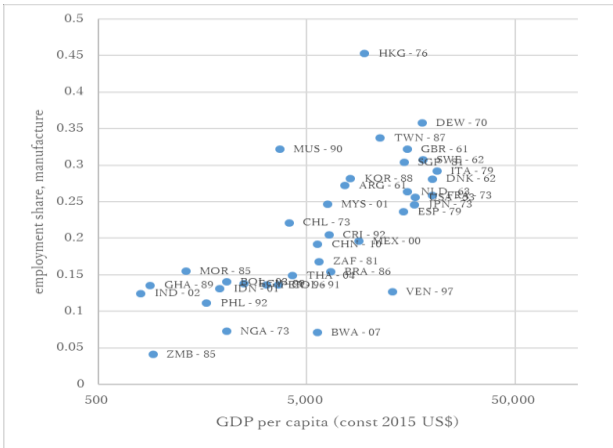


FIGURE 3: Peak Labor Shares of Manufacturing, 42 economies, 1947-2011

Note: Each plot stands for a pair of economy (ISO country codes, hereafter) - peak manufacturing share year.

Once, in advanced economies, it was worried that the reallocation of resources from manufacturing to services may slow down aggregate productivity growth (Baumol, 1976), because manufacturing, being technologically advanced sectors as compared to services, was regarded as a higher productivity growth sector. Among developing economies, it was only those in East Asia since the 1960s, who realized income convergence to advanced economies along with increasing employment and export shares of manufacturing. Particularly, Rodrik (2013) and McMillan and Rodrik (2011) argue that, because unconditional productivity convergence can be found not in aggregate economy but in manufacturing, the structural transformation of developing economies during 1990-2005, being without an increase in manufacturing employment, could lead to at most modest growth. Now, if the premature de-industrialization observed in many developing economies is the resource re-allocation from agriculture to services, bypassing manufacturing, can services substitute for manufacturing as an engine of sustained economic growth?

### 3 De-industrialization

We note here that the services sector consists of a variety of heterogeneous subsectors. Figure 4 shows the cross-country distribution of



sectoral employment shares of four largest services subsectors, i.e. construction, trade, transport & communication and finance & business as well as of manufacturing and services, for the 42 economies between 1985 and 2009. Each plot shows a combination of employment shares of the economy's subsector over the two years, so that its location beyond (below) the 45 degrees line (not drawn) implies its expansion (contraction) over the period.,



FIGURE 4: Labor Shares of Services Subsectors, 42 Economies, 1985 and 2009

Conspicuous is a contrast between two subsectors. The largest expansion from 1985 can be found in finance & business particularly in advanced economies, which resulted in wider cross-economy dispersion of its labor shares from relatively narrow one. The second largest expansion is

in trade mostly in developing economies, resulting in narrowing its wide dispersion in employment shares. Two other subsectors, i.e. construction and transport & communication showed modest expansion mostly around the 45 degree's line.

This contrast between two groups of economies matters significantly when we consider the growth implication of de-industrialization. Why? Because so far we observed that heterogeneous subsectors of the services sector have gone through heterogeneous degrees of resource reallocation or structural transformation not only between advanced and developing economies, but also across subsectors within the services sector. Likewise, we see heterogeneous levels and growth rates of labor productivities across services subsectors between advanced and developing economies. For example, Figure 5 shows the cross-country distribution of a combination of sectoral labor productivity relative to aggregate labor productivity in 2009 and changes in its labor share within the services sector between 1985 and 2009 for the 42 economies.

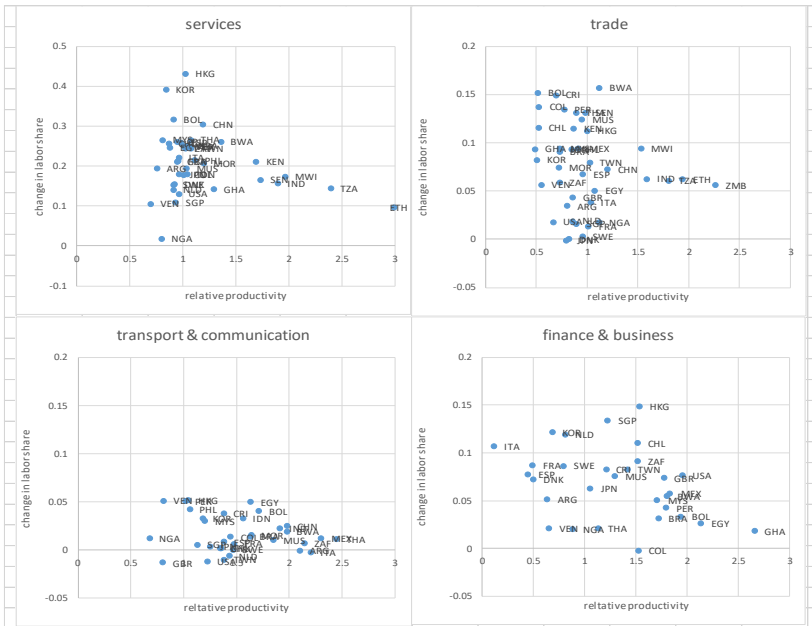


FIGURE 5: Sectoral labor share change and relative productivity to aggregate productivity, 42 economies, 1085-2009

Note: productivity: value added per worker in local currencies, and relative productivity: sectoral productivity divided by aggregate productivity.

The Figure shows: first, with its employment share increasing throughout economies, average labor productivity in services is almost equal to one, i.e. not much different from aggregate labor productivity except for some low-income developing economies in Africa, second, services subsectors, also with their employment shares increasing throughout economies, demonstrate very heterogeneous relative productivities one another, i.e. generally lower in trade, higher in transport & communication, and mixed in finance & business, and third, among services subsectors, their dispersions in relative productivity, in change in labor share and their combinations are distinct each other. Therefore, aggregating them into a services sector may crucially mask their implications for aggregate productivity growth in individual economies as will be discussed later in Section 6<sup>6</sup>.

This above may lead to a simplistic implication such as: first, resource reallocation to services subsectors with higher productivity could contribute to higher productivity growth and, second, if some services subsectors show faster productivity growth convergence to the global frontier, they could substitute for manufacturing, thereby bypassing industrialization.

Going back to the afore-mentioned pattern of structural transformation in terms of changes in employment shares in Figure 4, however, de-industrialization in developing economies strongly toward lower-productivity services subsectors may harm rather than enhance aggregate productivity growth. Also note that services subsectors with higher productivity tend to require higher skills, where developing economies may find less comparative advantage.

## 4 Engines of structural transformation

Previous studies suggest a few engines of structural transformation, one through the shift of demand across sectors via their different income elasticities along with income growth (e.g. Comin et al., 2021) and one through differential productivity growth based on technological advances across sectors, affecting and being affected by the demand shift (e.g. Sposi et al., 2021). We should also be reminded, however, that the transformation is rather a relatively recent phenomenon in economic history (Clark, 2007).

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<sup>6</sup> Duarte and Restuccia (2017) assert that services heterogeneity has a substantial impact on aggregate productivity as well as the input-output structure.

In agricultural societies before the Industrial Revolution (IR), aggregate demand was dominated by food demand, and agriculture was the dominant sector in both production and employment. During as long as about 10,000 years since the transition from hunting and gathering to agricultural societies, aggregate productivity growth is regarded almost zero so that there had been no room for structural transformation but for some modest population growth under some modest technological progress.

It is only after the IR that more and more people have become able to consume manufacturing products and enjoy leisure time in the process of industrialization and urbanization led by modern economic growth, where they have spent less on food and more on manufacturing products and services due to their high income elasticity<sup>7</sup>. Services are more demanded not only by themselves, but also by agriculture and manufacturing sectors to supplement them through communications, transport and storage, trade and commerce, and finance, insurance and real estates. These input-output linkages between services and other sectors could be regarded as an original form of value chains.

To capture these profit opportunities, manufacturing firms were mushrooming to compete one another to expand their market shares, promoting technological innovation, which constitutes the second engine of structural transformation. The innovation as well as capital accumulation have helped realizing higher productivity as well as economic growth, which generate the transformation of aggregate demand structures, depending on differential income elasticities.

On top of these two engines, IR-related technological progress also prompted global market integration through declining costs of transportation and telecommunication. The above discussions can explain well the major role played by export industrialization for modern economic growth. First of all, industrialization in labor intensive products would contribute to expanding domestic employment as well as per capita income levels significantly. Furthermore, manufacturing products are tradable, so that international trade enables them to make good use of economies of scale toward overseas markets and of technology spillovers through international transactions (Rodrik, 2013). These are the patterns found in modern economic growth in advanced economies in the 19th and early 20th centuries, and in East Asian Miracle in these emerging market economies in

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<sup>7</sup> It had been thought that per capita income growth had been almost zero until modern economic growth in the 19th century, but recent studies in economic history reveal that a sustained growth of around 1 % started in the 17th century after the Age of Discovery (Bouscasse et al. (2021)).

East Asia. Both employment expansion and productivity growth through international competition constitute a virtuous loop, while realizing rapid structural transformation through differential income elasticities across sectors.

As opposed to this, the present structural transformation, i.e. de-industrialization has brought about declining shares of manufacturing in both employment and value added in successfully industrialized economies, not only due to differential income elasticities, but also to deepening input-output linkages between manufacturing and services. More important is the direction of future technological progresses.

History has made several steps of technological innovation under global integration since the IR, such as mechanization and steam power in the late 18th century, mass production, assembly line and electrical energy in the late 19th century, information and telecommunication technologies in the late 20th century, and advanced robotics, internet of things and 3-D printing today. Particularly in the most recent, last step called the 4th industrial revolution, these digital technologies could turn over conventional comparative advantages, reducing sectoral trade costs and cross-sectional coordination costs and enhancing network efficiencies among production processes. Labor intensive processes would become less needed and/or re-shored from developing economies to advanced, technology-frontier economies, while skill- and knowledge-intensive processes would become clustered nearby the latter economies.

## **5 De-agriculturalization**

Thinking about the future of labor-saving industrialization, it would be instructive to examine the experience of agricultural development. Particularly interesting is the experience of rapid agricultural growth parallel with modern economic growth in the United States. Hereafter, drawing on Alston and Pardey (2020), we discuss the implication from the US agricultural development.

In the structural transformation of the US agriculture in the 20th century, technological innovations, which remarkably saved land and labor inputs, played a central role. Figure 6 (panel a) shows the number of agricultural farms and farm area since the mid-19th century. While they increased together until 1936, the former declined sharply and the latter kept expanding until 1954. Along with the resulting larger scale of production, proceeded were product specialization in output, and intensive use of capital and materials, substituting for land and labor, in input. The engine was without doubt industrialization, which was exogenous to agriculture. Labor

demand exploded outside agriculture and affected both farm wages directly and opportunity costs of farmers indirectly. To this, agricultural sector responded with land concentration, substitution for labor, and labor-saving technological innovation

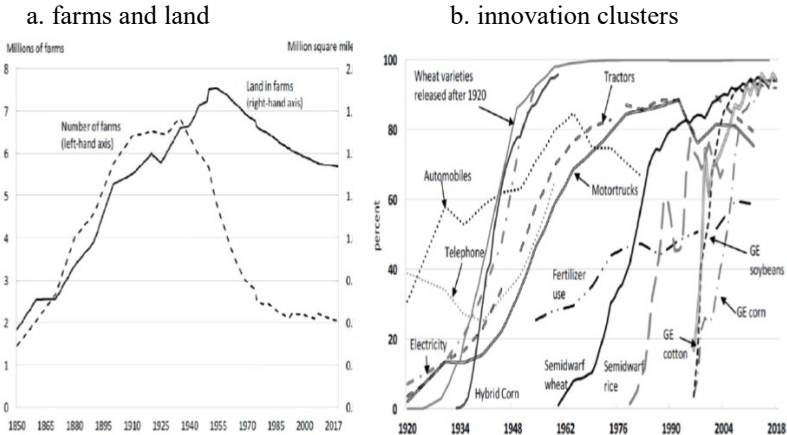


FIGURE 6: Agriculture development in the United States.

Source: Alston and Pardey (2020), Figure 1 (panel a) and Figure 8 (panel b).

Indeed, we observe waves of clustered inventions in US agricultural development in the 20th century. They include (1) “mechanical” (mostly labor-saving) technologies, (2) “biological” innovations such as improved animal breeds and crop varieties, (3) “chemical” technologies such as synthetic fertilizers, pesticides, and today’s (4) “information” and “digital” technologies. Figure 6 (panel b) shows these agricultural innovation waves by the time profiles of shares of farmlands which adopted each innovation. Their qualities and quantities as well as their paces and scopes of spread were overwhelming.

The resulting performance in agriculture production exhibited sheer expansion responding to both sustained increases in domestic as well as foreign demand and those in production possibility frontier as high as 1.58% annual average output growth and 2.90% labor productivity growth over the almost 100 years of 1910-2007. Particularly, the labor productivity grew at 4.07% a year during 1950-1990.

During the years, one more notable fact is the changes in input-output relationship with non-agricultural sectors. Specifically, a vertical integration by agri-business firms promoted Food Value Chains (FVC). Over time, farms specialized in a smaller number of products and externalized more

activities to outside farms. Once being inside farms, agricultural machines, seeds, chemical materials, energy, and other inputs including contract services are now provided by specialized agribusiness firms. This is very similar to what is happening in manufacturing sectors as servicification, where services sectors provide those inputs, intra-firm activities and other value added as once handled inside manufacturing sectors.

The upstream of agriculture includes generic engineering, chemical, machinery and digital technology sectors (forward linkages) and the downstream includes food processing, retail commerce as well as transport and distribution sectors connecting them (backward linkages). While income elasticities of agricultural products and food per se may be low, services accompanying them are far higher and the linkage with food processing and retail sectors is becoming stronger due to changes in consumers' lifestyles such as away-from-home food consumption as well as widespread choices for food types with increasingly diverse food preferences, which would in turn affect agricultural technology selections. In other words, agriculture (and its FVC) is just one of examples of Global Value Chains (GVC) where services widely constitute complementary input-output relations with goods production.

## **6 Whither de-industrialization?**

What happened in agriculture would happen in manufacturing or, actually, it is happening now as de-industrialization and growing GVCs. We should note, however, that the process is far from uniform across manufacturing subsectors, because they themselves are quite heterogeneous in terms of factor intensity and global market integration. In order to identify pro-development subsectors in terms of employment and tradability, Hallward-Dreimeier and Nayyar (2017) categorized 16 two-digit manufacturing subsectors into 5 groups with respect to the share of unskilled workers, export intensity, R&D intensity, and labor productivity (Figure 7).

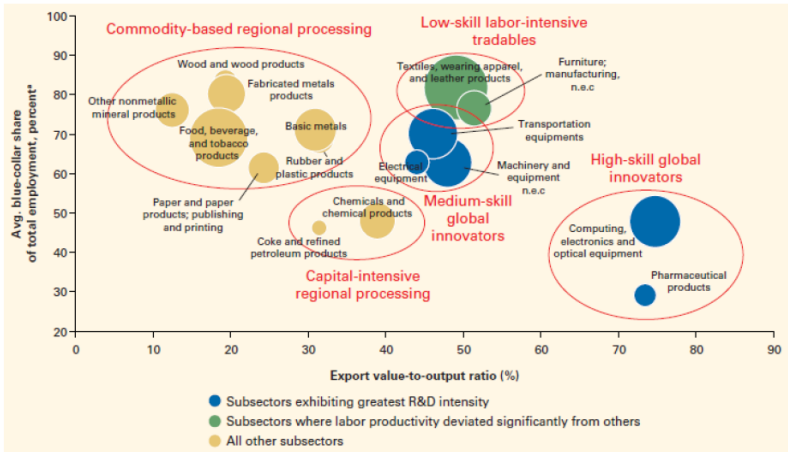


FIGURE 7: Manufacturing subsectors by unskilled labor intensity and trade openness

Source: Hallward-Dreimeier and Nayyar (2017), Figure 1.3.

Category 1 or High-skill global innovators (computing, electronics and optical equipment, and pharmaceutical products) is of the highest export intensity and R&D intensity, and then Category 2 or Medium-skill global innovators (electrical equipment, machinery and equipment, and transportation equipment) is of medium export as well as unskilled labor intensities and of the highest R&D intensity. Both Categories are of automated technological frontier subsectors. Category 3 or Capital-intensive regional processing (chemicals and chemical products, coke and refined petroleum products) is highly automated and of medium-low export as well as unskilled labor intensities. Category 4 or Commodity-based regional processing (basic metals, fabricated metal product, food, beverage, and tobacco products, paper and paper products; publishing and printing, rubber and plastic products, wood and wood products and other nonmetallic mineral products) is of medium to high unskilled labor intensity, but of limited export intensity. Finally, Category 5 or Low-skill labor-intensive tradables (furniture; manufacturing, and textile, wearing apparel and leather products) is of high export intensity and less automated.

In view of comparative advantage in developing economies, Category 5 and some part of Category 4 may appear to be generally pro-development among manufacturing subsectors. The other option could be a participation in GVCs even in Category 2, aiming at unskilled-labor intensive processes. Both options, however, would as always require enhanced basic



infrastructure and business environment. In addition, while GVC participation was increasing up until the 2000s with Category 3 as the top and Category 2 as the second, GVC production networks are rather tightly knitted around only three main regions, i.e. Europe, East Asia and North America (World Bank (2020), Figures 1.7 and 1.8), but not elsewhere.

We already observed that some services subsectors such as finance and business services show higher productivity levels (and growth rates) than those of manufacturing recently, particularly in advanced economies, but not generally in developing economies. Moreover, these subsectors have been regarded as relatively weak in absorbing employment, especially unskilled one, as compared to manufacturing and other services subsectors.

To sum up the above consideration on pre-mature de-industrialization overall, a feasibility of export industrialization as a development strategy cannot but become limited as compared to before the 1990s. Furthermore, bypassing or leap-frogging industrialization by resorting to pro-development services might not be very realistic to most of developing economies with limited skilled human resources. Just like US agriculture discussed above, frontier manufacturing is transforming itself through servicification, where both upstream preproduction and downstream postproduction processes increasingly generate value added in services subsectors such as design, marketing, delivery, after-service on one hand, and production processes become smart factories with fewer personnel on the other hand.

## 7 Decomposing aggregate productivity growth

We remember that aggregate productivity growth is simply a weighted average of sectoral productivity growth, which significantly differs from each other as well as over time along with their changing weights. Which sector contributes to aggregate productivity growth most and when? How resources are reallocated among sectors under structural transformation? These whole pictures end up with aggregate productivity growth after all.

Thus, in the wake of previous works such as Diao, McMillan and Rodrik (2017) and Kohsaka and Sinkai (2015, 2018), we decompose labor productivity growth into sectoral labor productivity growth and reallocation of labor between sectors, where an increase (decrease) in labor share in higher (lower) productivity sectors is expected to increase (decrease) the aggregate labor productivity of the economy as a whole. Sector  $i$ 's labor productivity in period  $t$ ,  $y_{i,t}$ , is defined as  $y_{i,t} = Y_{i,t}/L_{i,t}$  where  $Y$  and  $L$  are value added and employment of the sector, respectively. Sector  $i$ 's labor share at  $t$ ,  $\theta_{i,t}$ , is defined as  $\theta_{i,t} = L_{i,t}/L_t$ . Then, the aggregate labor productivity in

period  $t$ ,  $y_t$ , is expressed as a total sum of sectoral productivity multiplied by labor shares, i.e.  $y_t = \sum_i \theta_{i,t} y_{i,t}$ . Now, we can decompose the aggregate labor productivity change into a sectoral productivity growth and a reallocation of labor as:<sup>8</sup>

$$\Delta y_t = \sum_i (\theta_{i,t-k} \Delta y_{i,t} + \Delta \theta_{i,t} y_{i,t-k})$$

By dividing both sides by the labor productivity in period  $t-k$ , we obtain the following expression in growth terms:

$$\Delta y_t / y_{t-k} = \sum_i \theta_{i,t-k} (\Delta y_{i,t} / y_{i,t-k}) (y_{i,t-k} / y_{t-k}) + \sum_i \Delta \theta_{i,t} (y_{i,t-k} / y_{t-k}) \quad (1)$$

where the first term on the right-hand side represents the effect of sectoral productivity growth and the second term represents the effect of reallocation of labor on the aggregate productivity growth, between periods  $t-k$  and  $t$ .

The first term of the right hand side of Equation (1) implies that, the larger the sectoral labor share, and sectoral relative productivity level, the larger its sectoral productivity growth contributes to the aggregate productivity growth. This is the sectoral productivity growth effect on aggregate labor productivity growth. The second term implies that, the larger the sectoral relative productivity level, the larger its increase in labor share contributes to the aggregate labor productivity growth. This is the (labor) reallocation effect on aggregate labor productivity growth.

Our data consists of aggregate as well as sectoral real value added in local currencies and employment (persons employed) in 42 advanced and developing economies for the period of 1947-2011, obtained from Groningen Growth and Development Centre (GGDC) 10-Sector Database. We decompose aggregate and sectoral productivity growth for the periods of 1960-85, and 1985-2010.

Only part of the decomposition results is shown in Appendix Table, where, to save space, we select 16 relatively large economies out of 42 economies from four groups, i.e. advanced economies: US, UK, France, and Japan, developing economies: Asia: China, India, Korea, and Thailand, Latin America: Argentina, Brazil, Chile, and Mexico, Africa: Ghana, Nigeria, Tanzania, South Africa). Here a partial result for US and Korea is shown as an example (Table 1). From the Table, the anatomy of these accounting identities through decomposition gives us some insights on structural transformation.

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<sup>8</sup> Diao et al. (2017) define this by using  $y_{i,t}$  instead of  $y_{i,t-k}$  in the last term, which results in exaggerating the reallocation effect.

TABLE 1: Decomposition of aggregate productivity growth,  
US and Korea, 1960-1985 and 1985-2009.

		agriculture	mining	manufacturing	services	total	utilities	construction	trade	transport & communication	finance & business	government	other services
USA	1960-1985												
	labor share	5.70%	1.03%	23.57%	69.71%		0.73%	5.46%	20.70%	6.58%	8.28%	23.21%	4.75%
	productivity growth	3.74%	0.08%	2.76%	0.53%		1.88%	-1.72%	1.51%	2.96%	0.21%	0.00%	1.50%
	change in labor share	-3.40%	-0.18%	-6.50%	10.08%		-0.07%	0.19%	3.47%	-1.57%	5.51%	1.62%	0.93%
	relative productivity	0.22	4.22	0.48	1.19		2.29	2.52	0.44	0.53	2.61	1.31	0.66
	sectoral growth effect	0.05%	0.00%	0.31%	0.44%	0.49%	0.03%	-0.24%	0.14%	0.10%	0.04%	0.00%	0.05%
	reallocation effect	-0.03%	-0.03%	-0.12%	0.48%	0.54%	-0.01%	0.02%	0.06%	-0.03%	0.57%	0.08%	0.02%
	total	0.02%	-0.03%	0.19%	0.92%	1.05%	0.02%	-0.22%	0.20%	0.07%	0.62%	0.09%	0.07%
	1985-2010												
	labor share	2.30%	0.85%	17.07%	79.78%		0.65%	5.65%	24.17%	5.01%	13.79%	24.83%	5.68%
productivity growth	3.69%	2.27%	3.34%	0.83%		2.78%	-1.56%	2.22%	2.50%	0.85%	-0.35%	0.29%	
change in labor share	-0.84%	-0.35%	-8.40%	9.59%		-0.27%	-0.60%	-0.16%	-0.57%	4.25%	6.15%	0.79%	
relative productivity	0.43	3.32	0.74	1.05		2.82	1.26	0.50	0.86	2.11	1.01	0.74	
sectoral growth effect	0.04%	0.06%	0.42%	0.69%	1.01%	0.05%	-0.11%	0.27%	0.11%	0.25%	-0.09%	0.01%	
reallocation effect	-0.01%	-0.05%	-0.25%	0.40%	0.24%	-0.03%	-0.03%	0.00%	-0.02%	0.36%	0.25%	0.02%	
total	0.02%	0.02%	0.17%	1.10%	1.18%	0.02%	-0.14%	0.26%	0.09%	0.61%	0.16%	0.04%	
KOR	1963-1985												
	labor share	61.88%	0.71%	8.29%	29.11%		0.19%	2.61%	12.21%	2.86%	1.04%		10.20%
	productivity growth	4.60%	0.03%	6.36%	1.02%		12.93%	5.40%	2.74%	7.05%	-3.34%		0.63%
	change in labor share	-37.95%	0.26%	15.57%	22.12%		0.08%	3.56%	10.58%	1.87%	2.81%		3.21%
	relative productivity	0.34	2.23	0.48	2.53		0.60	1.21	0.70	0.50	11.72		4.73
	sectoral growth effect	0.95%	0.00%	0.25%	0.75%	1.63%	0.01%	0.17%	0.23%	0.10%	-0.41%		0.30%
	reallocation effect	-0.58%	0.03%	0.34%	2.54%	2.56%	0.00%	0.20%	0.34%	0.04%	1.50%		0.69%
	total	0.38%	0.03%	0.60%	3.29%	3.85%	0.02%	0.37%	0.57%	0.14%	1.09%		1.00%
	1985-2010												
	labor share	23.92%	0.97%	23.87%	51.24%		0.28%	6.17%	22.79%	4.74%	3.85%		13.41%
productivity growth	4.44%	8.12%	6.82%	1.43%		6.26%	1.09%	3.27%	4.07%	-1.94%		0.05%	
change in labor share	-17.02%	-0.90%	-5.67%	23.59%		0.03%	1.77%	1.02%	1.73%	10.22%		8.82%	
relative productivity	0.40	0.96	0.84	1.36		4.42	1.70	0.55	1.01	2.41		2.33	
sectoral growth effect	0.42%	0.08%	1.36%	1.00%	2.49%	0.08%	0.12%	0.41%	0.19%	-0.18%		0.01%	
reallocation effect	-0.27%	-0.03%	-0.19%	1.28%	1.53%	0.01%	0.12%	0.02%	0.07%	0.99%		0.82%	
total	0.15%	0.04%	1.17%	2.28%	3.47%	0.08%	0.24%	0.43%	0.26%	0.81%		0.84%	

Note: productivity: real value added per worker in local currencies. Relative productivity: sectoral productivity divided by aggregate productivity. Sectoral growth and reallocation effects: definitions are given in Section 6.

United States: The aggregate labor productivity growth of US was 1.05 % for the period of 1960-1985, to which services contributed by 0.92 % and manufacturing by 0.19 %. Among services, finance and business was the largest contributor (0.62 %) and trade the second (0.20 %), both of which were larger than that of manufacturing. One might wonder why the manufacturing contributed this little despite its relatively high productivity growth rate of 2.76% as opposed to services growth rate of 0.53%. We must be reminded that both manufacturing labor share (23.6%) and its relative

productivity level (0.48) are smaller than those of services (69.7% and 1.19, respectively). This is the reason why manufacturing's sectoral growth effect (0.31%) is a bit smaller than services' effect (0.44%). Furthermore, because the change in manufacturing labor share is negative and that of services is positive and larger, the reallocation effect offsets sectoral growth effect in manufacturing by -0.12%, but adds up in services by 0.48%.

This is almost similar to the result for 1985-2010, when services (finance and business, and trade) contributed the most by 1.10 % (0.61 % and 0.26 %, respectively) and manufacturing by 0.17 % for the aggregate productivity growth of 1.18%. Apparently, US had been de-industrialized with larger services labor share (79.8%) and its trend increase (9.6%) in this period. Turning to relative contributions between sectoral productivity growth and labor reallocation, the former became dominant from 0.49% to 1.01% compared to the latter from 0.54% to 0.24% in 1985-2010 mainly because of larger labor share and higher productivity level despite lower productivity growth in services (again, finance and business being typical).

Korea: Next, we move on to a successful industrialization case, i.e. Korea. Its average productivity growths were 3.85 and 3.47 % for 1963-1985 and 1985-2009, respectively, to which services contributes dominantly by 3.29 and 2.28 %, while manufacturing by 0.60 and 1.17 %, respectively. Again, main reasons are that services is dominant in labor share and its change and its productivity level is higher than that of manufacturing, even though manufacturing productivity growth is as high as 6.36% and 6.82% as opposed to services' 1.02% and 1.43% in both periods, respectively. In other words, even in Korea, being regarded as a flagship of export industrialization, its aggregate productivity growth has been dominantly supported by services rather than manufacturing according to the sectoral decomposition framework. It may seem a bit perplexing, but it is not.

To repeat the effect of the sectoral productivity growth in Equation (1), the larger the sectoral labor share and the higher the sectoral relative productivity level, the larger its sectoral productivity growth contributes to the aggregate productivity growth. Only one tradeoff comes from the fact that the manufacturing productivity growth is usually higher than that of services, but its effect is overwhelmed by larger labor share and higher relative productivity level of services with respect to contributions to aggregate productivity growth. Concerning the labor reallocation effect, the higher the sectoral relative productivity level, the larger its labor share increase contributes to the aggregate labor productivity growth. This fully applied to services, not manufacturing. Figure 8 illustrates these contributing factors resulting from the decomposition across selected economies over the two period of 1960-1985 and 1985-2009.

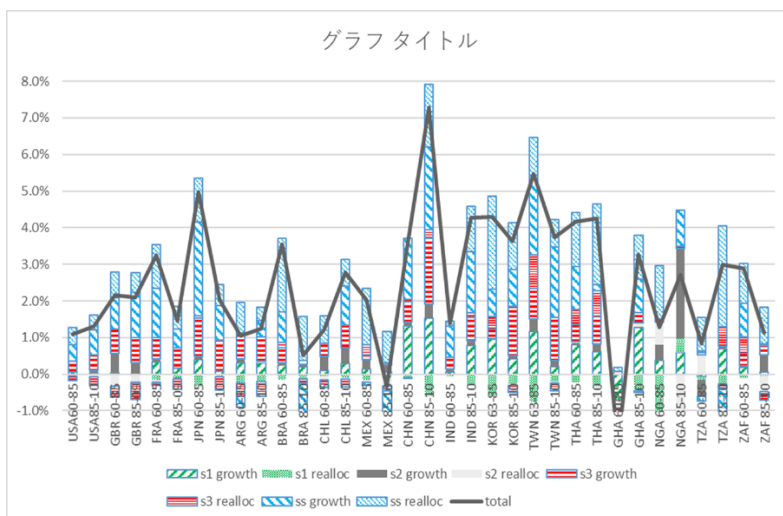


FIGURE 8: Decomposition of aggregate productivity growth, selected economies, 1960-1985 and 1985-2009

Note: For example: “s1 growth” stands for *sectoral growth effect* of agriculture (s1) and “s1 realloc” for labor *reallocation effect* of agriculture, etc., where s1: agriculture, s2: mining, s3: manufacturing, ss: services. Definitions of both effects are given in Section 6.

Summing up: Figure 8 demonstrates that the productivity-growth decomposition shows that aggregate productivity growth mainly consists of contribution of services rather than that of manufacturing both in mature industrialized economies and pre-mature ones.

From the Figure, we can also observe some regional characteristics among the four groups, i.e. advanced four, Latin American four, Asian five and African four, large economies in terms of sectoral growth contribution. The most successful performance in aggregate labor productivity growth in the two periods is found in Asia and the least in Latin America.

In Asia, their top contributor to aggregate productivity growth is not manufacturing, but services both in sectoral growth and reallocation effects, manufacturing also contributes particularly in sectoral growth more significantly than in the other economies and then, unforgettably, agriculture contributes to a non-negligible degree in sectoral growth. In advanced economies, as expected, services is the largest contributor in both sectoral growth and reallocation effects and manufacturing follows them to some degree.

In Africa, their productivity growth is not persistent across periods except for South Africa. The top growth contributor is services across economies, other sectors such as agriculture or mining support significantly, but manufacturing' role is minimal. In Latin America, services is the firstly important growth contributor, but mainly in reallocation effects. Manufacturing secondly contributes rather modestly, followed thirdly by agriculture to a lesser degree compared to Africa.

## **8 Leap-frogging industrialization?**

Now, what would be the implication of these results for development strategies in developing economies?

Remember the rationale for industrialization in Section 1: When the productivity level of manufacturing is higher than that of agriculture, resource re-allocation or structural transformation from agriculture to manufacturing would simply enhance an aggregate productivity level even without any productivity growth (reallocation effect on aggregate growth). In addition, when the productivity growth of manufacturing is higher than that of agriculture, the same re-allocation would simply enhance the aggregate productivity growth, too (sectoral growth effect on aggregate growth). We know now that we could rather substitute services for manufacturing in the above context.

In fact, remember the observation of services' performance in Section 2: First, along with its increasing labor share, labor productivity in services is mostly not much different from aggregate productivity, second, services subsectors, also with their labor shares increasing throughout economies, demonstrate very heterogeneous relative productivities one another, and third, among services subsectors, their dispersions in relative productivity, the change in labor shares and their combinations are distinct each other.

So that, this simply implies: first, resource reallocation to services subsectors with higher productivity could contribute to higher productivity growth and, second, if some services subsectors show faster productivity growth convergence to the global frontier, they could substitute for manufacturing, thereby enabling to bypass industrialization.

These observations in previous sections and the above decomposition results suggest that aggregate labor productivity growth is dominated mostly by services, instead of manufacturing not only in mature de-industrializing economies, but also in premature de-industrializing developing economies. One side evidence is Table 2, which shows correlations between sectoral and aggregate productivity growth across economies for the period of 1985-2009. Manufacturing shows far stronger

correlation than agriculture, but it is slightly weaker than services<sup>9</sup>, which is not very hard to guess if we admit the dominant role of services in productivity growth decomposition.

TABLE 2: Correlation between sectoral and aggregate productivity growth across the 42 economies, 1950-2009

	agriculture	mining	manufacturing	services	utilities	construction	trade	transport & communication	finance & business
1950-2009	0.390	0.514	0.757	0.784	0.353	0.589	0.771	0.686	0.374
1950-1975	0.350	0.575	0.837	0.906	0.302	0.732	0.743	0.770	0.292
1960-1985	0.553	0.558	0.784	0.822	0.436	0.672	0.825	0.634	0.259
1985-2009	0.106	0.393	0.713	0.754	0.209	0.451	0.687	0.710	0.474

Note: productivity: real value added per worker in local currencies.

Nevertheless, if we get into services subsectors, we will realize that the services sector masks important heterogeneities across subsectors. They are discrepancies in productivity levels across economies and their convergence across periods. Look at Figure 9, which shows scatter plots of labor productivities in constant 2005 international \$ relative to that of US in agriculture, manufacturing, services and services subsectors across economies in 1990 and 2009<sup>10</sup>. United States locate at (1, 1) by definition. In agriculture, productivity levels are very unevenly dispersed as well as clustering at less than 20% of US productivity, and they show less convergence and more divergence particularly with low productivity economies in Latin America and Africa. Productivity levels are less clustering in manufacturing and services than in agriculture, but less so in manufacturing in comparison. In manufacturing, most plots locate below the 45 degrees line (not drawn) connecting the origin and the US plot, suggesting divergence from the frontier (US), while services plots appear to locate mostly along the 45 degrees line, suggesting both convergence and divergence.

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<sup>9</sup> Herrendorf et al. (2022) also pointed out a strong correlation between manufacturing and aggregate productivity growths with 64 mostly poor countries during 1990-2018. They did not mention a correlation between services and aggregate productivity growths, though.

<sup>10</sup> Since aggregate and sectoral real value added in GGDC 10 sector database is in local currencies, we simply use the PPP conversion rate in 2005 from World Development Indicators to obtain real value added in international \$.



FIGURE 9: Sectoral productivity convergence:  
productivity relative to US, 1990-2009

Note: productivity: real value added per worker in constant 2005 international \$.

But, again, this services characteristics does not necessarily hold for its subsectors. Looking into three large services subsectors (trade, transport & communication, finance & business), all show that diverging productivities cluster in developing economies. one may wonder if leapfrogging or substituting services for manufacturing generally is a very good idea or not. Apparently it depends on where each economy locates, in that sense, conditional eventually.

## 9 Concluding remarks: Structural transformation

We showed some evidence that the well-known hump-shaped manufacturing share in labor and value added over time and across GDP per capita levels observed in advanced economies may not be a norm over the post WWII decades (1947-2013) across an extended coverage of 42 advanced and developing economies. Next, looking into premature de-



industrialization progressing since the 1990s, we showed that, while manufacturing productivity levels are generally higher than those of agriculture, they are mostly lower than those of (aggregate) services within each economy, but that, at the same time, some services subsectors' productivity levels are often lower than those of manufacturing within each economy.

After summarizing the engines of economic growth and structural transformation, we reviewed US agricultural development since 1880 as a de-agriculturalization process and recent global manufacturing development as a de-industrialization process, and found some common features in structural transformation with a loop interaction among income growth, technology innovation and market integration through trade and investment.

On top of this, we decomposed aggregate labor productivity growth of the 42 economies, which gives us a comprehensive perspective over the process of structural transformation in terms of their sectoral labor shares and productivities over the post WWII period. The decomposition revealed that, throughout the period, not manufacturing but services played a dominant role in aggregate labor productivity growth across both mature and premature de-industrializing economies due to its largest labor share and its higher productivity levels, despite its lower productivity growth rates, while manufacturing played a complementary role particularly in mature de-industrializing economies.

Nevertheless, it would be too early to say that we could substitute some services subsectors for manufacturing and de-industrialization would not be premature in terms of development strategy for most developing economies. Why? Because there remains a huge gap between the global frontier and developing economies' productivity levels in all sectors and subsectors and we could not find any solid evidences of productivity growth convergence in all sectors and subsectors, yet.

Probably, this is because of the limit of the decomposition method, which looks like a post mortem anatomy without considering dynamic loop interaction among sectors. Maybe manufacturing has more significant spillover effects to the others than the other sectors through input-output linkages. Or structural transformation is not simply an altercation of leading sectors, but substantial changes within sectors themselves, both the speed and pace of which must be very different among economies.

Reconsidering the meaning of industrial structural transformation, structural transformation driven by modern economic growth in the 19th century started by chain reactions among differential sectoral productivity growth, sectoral employment shifts and creation, aggregate income growth,

sectoral demand shifts and expansion, physical and human capital formation, and technological innovation. On top of this, global market integration added growth impetus through economies of scale and technological spillovers via international competition.

Along with these changes in industrial structure with modern economic growth, the presence of agriculture in employment and value added production became smaller and smaller. This is simply because demand for agriculture is less income elastic than those for manufacturing and services. Consequently, for example, the agricultural employment share shrank to less than 1.5% in the US by 2010.

If one regards this as a fall of agriculture, however, it is very wrong. Rather, the US agriculture with only less than 1.5% share of total employment sustains agricultural demand not only of the US, one of the highest income economies, but also those of foreign countries through exports. It could be said that the US case is an ultimate outcome of enhanced labor productivity in agriculture, where it became almost comparable to that in non-agriculture, suggesting eventual (national) market integration in output as well as input factors.

In other words, modern economic growth can be regarded not only as industrialization, but as de-agriculturalization. Note that de-agriculturalization does not necessarily mean the demise of agriculture, but rather a transformation of agriculture and its input-output linkage with other sectors. Likewise, it would not be wrong if we presume similar process of structural transformation in the case of de-industrialization. Manufacturing would not cease, but seriously transform itself, being disbanded and externalized into services with its production processes being majorly automatized<sup>11</sup>. Manufacturing in the 4th IR drawn in Industry 4.0 shows almost no resemblance to the one in the early 20th century. On top of this, de-industrialization is transforming sectoral input-output linkages in a global scale through GVCs toward global market integration, which could be an analogy of national market integration under de-agriculturalization and industrialization via modern economic growth.

If we think twice, transformation is not limited to industrial structure. Industries themselves transform, just like manufacture in an agricultural society progressed into manufacturing in an industrial society. Talking about structural transformation over 100 years, or even just 50 years, we pretend that exiting sectors have existed as they are throughout these years, but it is

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<sup>11</sup> Ding et al. (2022) showed that US manufacturing firms have significantly increased in-house service-related activities including R&D significantly through expanding nonmanufacturing employment from 1977-2019.

not true. Two hundred years ago, we had no automobiles nor electricity, while we had bars, carpenters and doctors.

Lastly, and more importantly as usual, we should be reminded that the pace of these transformations would be very different across economies, because technology transfer is generally far from automatic nor smooth, requiring a long list of preconditions as suggested by economic development literature. It is known that, in agriculture, a wide range of production technologies coexist on the globe, from those of slash and burn before the 19th century to the frontier ones in the US of the 21st century.

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**Appendix Table. Decomposition of aggregate productivity growth, 1960-1985 and 1985-2009.**

		agriculture, hunting, forestry and fishing	mining and quarrying	manufacture	services	total	electricity, gas, and water supply	construction	wholesale/ retail trade, hotels & restaurants	transport, storage & communication	finance, insurance, real estate & business services	government services	community, social & personal services
USA	1960-1985												
	labor share	0.0570	0.0103	0.2357	0.6971		0.0073	0.0546	0.2070	0.0658	0.0828	0.2321	0.0475
	productivity growth rate	0.0374	0.0008	0.0276	0.0053		0.0188	-0.0172	0.0151	0.0296	0.0021	0.0000	0.0150
	change of labor share	-0.0340	-0.0018	-0.0650	0.1008		-0.0007	0.0019	0.0347	-0.0157	0.0551	0.0162	0.0093
	relative productivity	0.2177	4.2220	0.4807	1.1922		2.2891	2.5164	0.4420	0.5332	2.6067	1.3069	0.6575
	sectoral growth effect	0.0005	0.0000	0.0031	0.0044	0.0049	0.0003	-0.0024	0.0014	0.0010	0.0004	0.0000	0.0005
	reallocation effect	-0.0003	-0.0003	-0.0012	0.0048	0.0054	-0.0001	0.0002	0.0006	-0.0003	0.0057	0.0008	0.0002
	total effect	0.0002	-0.0003	0.0019	0.0092	0.0105	0.0002	-0.0022	0.0020	0.0007	0.0062	0.0009	0.0007
	1985-2010												
	labor share	0.0230	0.0085	0.1707	0.7978		0.0065	0.0565	0.2417	0.0501	0.1379	0.2483	0.0568
	productivity growth rate	0.0369	0.0227	0.0334	0.0083		0.0278	-0.0156	0.0222	0.0250	0.0085	-0.0035	0.0029
	change of labor share	-0.0084	-0.0035	-0.0840	0.0959		-0.0027	-0.0060	-0.0016	-0.0057	0.0425	0.0615	0.0079
	relative productivity	0.4272	3.3195	0.7387	1.0478		2.8232	1.2604	0.4961	0.8606	2.1129	1.0072	0.7359
	sectoral growth effect	0.0004	0.0006	0.0042	0.0069	0.0101	0.0005	-0.0011	0.0027	0.0011	0.0025	-0.0009	0.0001
reallocation effect	-0.0001	-0.0005	-0.0025	0.0040	0.0024	-0.0003	-0.0003	0.0000	-0.0002	0.0036	0.0025	0.0002	
total effect	0.0002	0.0002	0.0017	0.0116	0.0118	0.0002	-0.0014	0.0026	0.0009	0.0061	0.0016	0.0004	
GBR	1960-1985												
	labor share	0.0442	0.0552	0.3205	0.5800		0.0120	0.0701	0.1574	0.1315	0.0266	0.1594	0.0230
	productivity growth rate	0.0491	0.0491	0.0278	0.0131		0.0483	0.0088	0.0080	0.0309	0.0046	0.0064	0.0138
	change of labor share	-0.0177	-0.0404	-0.1025	0.1605		-0.0027	0.0069	0.0266	-0.0115	0.0313	0.0975	0.0124
	relative productivity	0.2076	1.9179	0.7565	1.1076		0.9341	1.3371	1.0848	0.3169	1.9652	1.4653	1.7058
	sectoral growth effect	0.0005	0.0052	0.0068	0.0084	0.0187	0.0005	0.0008	0.0014	0.0013	0.0002	0.0015	0.0005
	reallocation effect	-0.0001	-0.0031	-0.0031	0.0071	0.0040	-0.0001	0.0004	0.0012	-0.0001	0.0025	0.0057	0.0008
	total effect	0.0003	0.0021	0.0037	0.0155	0.0184	0.0004	0.0012	0.0025	0.0011	0.0027	0.0072	0.0014
	1985-2009												
	labor share	0.0266	0.0149	0.2181	0.7405		0.0092	0.0770	0.1840	0.1200	0.0580	0.2568	0.0355
	productivity growth rate	0.0206	0.0481	0.0327	0.0171		0.0568	0.0094	0.0192	0.0438	0.0282	-0.0002	0.0003
	change of labor share	-0.0075	-0.0123	-0.1154	0.1353		-0.0049	-0.0021	0.0195	-0.0123	0.0575	0.0498	0.0278
	relative productivity	0.4469	4.1292	0.9570	0.9697		1.9727	1.0498	0.8364	0.4332	1.3905	1.0850	1.5203
	sectoral growth effect	0.0002	0.0029	0.0068	0.0123	0.0193	0.0010	0.0008	0.0030	0.0023	0.0023	-0.0001	0.0000
reallocation effect	-0.0001	-0.0021	-0.0046	0.0055	0.0004	-0.0004	-0.0001	0.0007	-0.0002	0.0033	0.0023	0.0018	
total effect	0.0001	0.0008	0.0022	0.0177	0.0180	0.0006	0.0007	0.0036	0.0021	0.0056	0.0022	0.0018	
FRA	1960-1985												
	labor share	0.2238	0.0104	0.2462	0.5196		0.0065	0.0813	0.1383	0.0515	0.0514	0.1674	0.0234
	productivity growth rate	0.0574	0.0368	0.0445	0.0171		0.0487	0.0196	0.0277	0.0399	0.0183	0.0075	0.0081
	change of labor share	-0.1500	-0.0066	-0.0391	0.1957		0.0020	-0.0052	0.0283	0.0113	0.0519	0.0928	0.0147
	relative productivity	0.2675	2.0069	0.5238	1.5210		2.9739	1.6735	1.0275	0.7546	0.7388	2.1850	2.1581
	sectoral growth effect	0.0034	0.0008	0.0057	0.0136	0.0229	0.0009	0.0027	0.0039	0.0015	0.0007	0.0028	0.0004
	reallocation effect	-0.0016	-0.0005	-0.0008	0.0119	0.0093	0.0002	-0.0003	0.0012	0.0003	0.0015	0.0081	0.0013
	total effect	0.0018	0.0002	0.0049	0.0255	0.0297	0.0012	0.0023	0.0051	0.0019	0.0022	0.0109	0.0017
	1985-2009												
	labor share	0.0739	0.0038	0.2071	0.7153		0.0084	0.0761	0.1666	0.0627	0.1033	0.2602	0.0381
	productivity growth rate	0.0392	-0.0103	0.0363	0.0065		-0.0065	0.0043	0.0144	0.0303	0.0081	0.0038	-0.0027
	change of labor share	-0.0422	-0.0026	-0.0884	0.1331		-0.0013	-0.0035	0.0056	0.0015	0.0656	0.0372	0.0280
	relative productivity	0.5346	2.3946	0.7586	1.1106		4.7802	1.3005	0.9757	0.9722	0.5549	1.2550	1.2564
	sectoral growth effect	0.0015	-0.0001	0.0057	0.0051	0.0131	-0.0003	0.0004	0.0023	0.0018	0.0005	0.0012	-0.0001
reallocation effect	-0.0009	-0.0003	-0.0028	0.0062	0.0008	-0.0003	-0.0002	0.0002	0.0001	0.0015	0.0019	0.0015	
total effect	0.0006	-0.0003	0.0029	0.0113	0.0129	-0.0005	0.0002	0.0026	0.0019	0.0020	0.0032	0.0013	
JPN	1960-1985												
	labor share	0.3145	0.0119	0.2040	0.4697		0.0049	0.0658	0.1787	0.0472	0.0445	0.1066	0.0220
	productivity growth rate	0.0320	0.0765	0.0662	0.0363		0.0590	0.0281	0.0769	0.0446	0.0312	0.0247	0.0170
	change of labor share	-0.2095	-0.0096	0.0207	0.1984		0.0007	0.0208	0.0589	0.0085	0.0567	0.0287	0.0242
	relative productivity	0.3950	1.0359	0.7735	1.5026		3.4055	2.0974	0.3564	1.3506	1.5272	2.7276	2.9520
	sectoral growth effect	0.0040	0.0009	0.0105	0.0256	0.0384	0.0010	0.0039	0.0045	0.0028	0.0021	0.0072	0.0011
	reallocation effect	-0.0033	-0.0004	0.0006	0.0119	0.0095	0.0001	0.0017	0.0008	0.0005	0.0035	0.0031	0.0029
	total effect	0.0007	0.0005	0.0111	0.0376	0.0502	0.0011	0.0056	0.0057	0.0033	0.0056	0.0103	0.0040
	1985-2010												
	labor share	0.1050	0.0022	0.2247	0.6681		0.0056	0.0866	0.2376	0.0557	0.1012	0.1353	0.0462
	productivity growth rate	0.0279	0.0062	0.0330	0.0133		0.0131	0.0009	0.0232	0.0198	0.0211	0.0031	-0.0030
	change of labor share	-0.0559	-0.0015	-0.0792	0.1365		0.0020	-0.0024	-0.0146	0.0052	0.0435	0.0747	0.0280
	relative productivity	0.2508	1.9488	1.1554	1.0623		4.2476	1.2078	0.6944	1.1751	0.9506	1.4439	1.2872
	sectoral growth effect	0.0007	0.0000	0.0086	0.0094	0.0173	0.0003	0.0001	0.0038	0.0013	0.0020	0.0006	-0.0002
reallocation effect	-0.0006	-0.0001	-0.0037	0.0058	0.0031	0.0003	-0.0001	-0.0004	0.0002	0.0017	0.0043	0.0014	
total effect	0.0002	-0.0001	0.0049	0.0152	0.0188	0.0006	0.0000	0.0034	0.0015	0.0037	0.0049	0.0013	

(continued)

		agriculture, hunting, forestry and fishing	mining and quarrying	manufacture	services	total	electricity, gas, and water supply	construction	wholesale/ retail trade, hotels & restaurants	transport, storage & communication	finance, insurance, real estate & business services	government services	community, social & personal services
ARG	1960-1985												
	labor share	0.2180	0.0060	0.2710	0.5050		0.0120	0.0620	0.1320	0.0760	0.0316	0.1278	0.0636
	productivity growth rate	0.0258	0.0427	0.0246	-0.0055		0.0560	-0.0050	-0.0109	0.0213	-0.0127	-0.0103	-0.0121
	change of labor share	-0.0969	-0.0008	-0.0868	0.1845		0.0004	0.0169	0.0615	-0.0154	0.0272	0.0627	0.0312
	relative productivity	0.5661	4.3419	1.0442	1.1239		0.3151	0.8675	1.4424	0.7830	1.4232	1.2908	0.7890
	sectoral growth effect	0.0032	0.0011	0.0070	-0.0031	0.0075	0.0002	-0.0003	-0.0021	0.0013	-0.0006	-0.0017	-0.0006
	reallocation effect	-0.0022	-0.0001	-0.0036	0.0083	0.0035	0.0000	0.0006	0.0035	-0.0005	0.0015	0.0033	0.0010
	total effect	0.0010	0.0010	0.0033	0.0052	0.0082	0.0002	0.0003	0.0015	0.0008	0.0010	0.0015	0.0004
	1985-2010												
	labor share	0.1211	0.0052	0.1842	0.6895		0.0124	0.0789	0.1935	0.0606	0.0588	0.1905	0.0949
productivity growth rate	0.0289	-0.0007	0.0231	0.0080		0.0448	0.0167	0.0068	0.0375	-0.0012	-0.0068	0.0026	
change of labor share	-0.0545	0.0011	-0.0646	0.1181		-0.0052	-0.0030	0.0171	-0.0008	0.0401	0.0521	0.0178	
relative productivity	0.8777	10.2781	1.5722	0.7980		1.0391	0.6228	0.8943	1.0859	0.8426	0.8131	0.4744	
sectoral growth effect	0.0031	0.0000	0.0067	0.0044	0.0138	0.0006	0.0008	0.0012	0.0025	-0.0001	-0.0011	0.0001	
reallocation effect	-0.0019	0.0004	-0.0041	0.0038	-0.0019	-0.0002	-0.0001	0.0006	0.0000	0.0014	0.0017	0.0003	
total effect	0.0012	0.0004	0.0026	0.0082	0.0107	0.0004	0.0007	0.0018	0.0024	0.0013	0.0006	0.0005	
BRA	1960-1985												
	labor share	0.5893	0.0043	0.1181	0.2883		0.0083	0.0369	0.0803	0.0348	0.0317	0.0480	0.0483
	productivity growth rate	0.0242	0.0542	0.0186	0.0124		0.0359	0.0081	-0.0005	0.0514	0.0128	0.0009	0.0009
	change of labor share	-0.2390	0.0007	0.0212	0.2171		-0.0014	0.0342	0.0545	-0.0075	0.0656	0.0357	0.0359
	relative productivity	0.1733	2.4050	1.8649	2.3146		3.9413	1.5875	2.3295	1.3881	4.3362	3.5095	0.7148
	sectoral growth effect	0.0025	0.0006	0.0041	0.0083	0.0131	0.0012	0.0005	-0.0001	0.0025	0.0018	0.0002	0.0000
	reallocation effect	-0.0017	0.0001	0.0016	0.0201	0.0240	-0.0002	0.0022	0.0051	-0.0004	0.0114	0.0050	0.0010
	total effect	0.0008	0.0006	0.0057	0.0284	0.0309	0.0010	0.0026	0.0050	0.0021	0.0131	0.0052	0.0011
	1985-2010												
	labor share	0.3503	0.0050	0.1393	0.5054		0.0069	0.0711	0.1348	0.0272	0.0974	0.0837	0.0842
productivity growth rate	0.0398	0.0320	0.0060	-0.0110		0.0376	-0.0035	-0.0115	-0.0140	-0.0195	-0.0005	-0.0001	
change of labor share	-0.1833	-0.0019	-0.0182	0.2035		-0.0029	0.0042	0.0741	0.0200	0.0132	0.0374	0.0576	
relative productivity	0.1467	4.3021	1.3693	1.4573		4.4601	0.8985	1.0167	2.3143	2.7545	1.6588	0.3379	
sectoral growth effect	0.0020	0.0007	0.0011	-0.0081	-0.0030	0.0012	-0.0002	-0.0017	-0.0009	-0.0052	-0.0001	0.0000	
reallocation effect	-0.0011	-0.0003	-0.0010	0.0119	0.0069	-0.0005	0.0002	0.0031	0.0018	0.0014	0.0025	0.0008	
total effect	0.0010	0.0004	0.0001	0.0037	0.0028	0.0006	-0.0001	0.0015	0.0010	-0.0038	0.0024	0.0008	
CHL	1960-1985												
	labor share	0.3022	0.0390	0.1833	0.4755		0.0078	0.0575	0.1024	0.0507	0.0250	0.0480	0.2320
	productivity growth rate	0.0226	0.0352	0.0185	-0.0003		0.0409	-0.0003	-0.0085	0.0283	0.0033		-0.0075
	change of labor share	-0.0798	-0.0088	-0.0457	0.1344		-0.0009	0.0029	0.0384	0.0040	0.0117		0.0784
	relative productivity	0.1422	2.8694	1.0720	1.3642		2.0203	1.3131	1.0144	0.6403	4.5240		1.3267
	sectoral growth effect	0.0010	0.0039	0.0036	-0.0002	0.0073	0.0006	0.0000	-0.0009	0.0009	0.0004		-0.0023
	reallocation effect	-0.0005	-0.0010	-0.0020	0.0073	0.0046	-0.0001	0.0002	0.0016	0.0001	0.0021		0.0042
	total effect	0.0005	0.0029	0.0017	0.0071	0.0112	0.0006	0.0001	0.0007	0.0010	0.0025		0.0019
	1985-2010												
	labor share	0.2224	0.0301	0.1376	0.6099		0.0069	0.0604	0.1407	0.0547	0.0367		0.3104
productivity growth rate	0.0695	0.0272	0.0349	0.0173		-0.0183	0.0207	0.0084	0.0419	-0.0044		0.0176	
change of labor share	-0.1346	-0.0017	-0.0419	0.1781		0.0021	0.0248	0.1353	0.0092	0.0761		-0.0693	
relative productivity	0.1887	5.2250	1.2845	1.0228		4.2435	0.9839	0.6192	0.9814	3.7123		0.8309	
sectoral growth effect	0.0029	0.0043	0.0062	0.0108	0.0210	-0.0005	0.0012	0.0007	0.0023	-0.0006		0.0045	
reallocation effect	-0.0010	-0.0004	-0.0022	0.0073	0.0105	0.0004	0.0010	0.0034	0.0004	0.0113		-0.0023	
total effect	0.0019	0.0039	0.0040	0.0181	0.0261	-0.0002	0.0022	0.0041	0.0026	0.0107		0.0022	
MEX	1960-1985												
	labor share	0.5203	0.0120	0.1318	0.3359		0.0035	0.0346	0.0911	0.0302	0.0129	0.0621	
	productivity growth rate	0.0179	0.0297	0.0075	-0.0013		0.0316	-0.0040	-0.0079	0.0083	-0.0012		-0.0007
	change of labor share	-0.2499	-0.0021	0.0601	0.1919		0.0025	0.0257	0.0576	0.0158	0.0084		0.0311
	relative productivity	0.1625	6.9562	1.2000	2.0065		1.3723	2.3044	2.4208	1.9167	8.6197		0.4286
	sectoral growth effect	0.0015	0.0023	0.0012	-0.0009	0.0036	0.0002	-0.0003	-0.0017	0.0005	-0.0001		0.0000
	reallocation effect	-0.0016	-0.0006	0.0029	0.0154	0.0134	0.0001	0.0024	0.0056	0.0012	0.0029		0.0005
	total effect	-0.0001	0.0019	0.0041	0.0145	0.0166	0.0003	0.0020	0.0038	0.0017	0.0028		0.0005
	1985-2010												
	labor share	0.2704	0.0099	0.1919	0.5278		0.0061	0.0603	0.1486	0.0460	0.0214	0.1523	0.0932
productivity growth rate	0.0119	0.0202	0.0032	-0.0156		0.0352	-0.0306	-0.0186	0.0110	-0.0509	-0.0181	-0.0114	
change of labor share	-0.1269	-0.0060	-0.0354	0.1683		-0.0029	0.0379	0.0729	0.0010	0.0543	0.0011	0.0040	
relative productivity	0.1675	9.6470	0.9544	1.2808		1.9951	1.3759	1.3116	1.5555	5.5232	1.1205	0.2781	
sectoral growth effect	0.0005	0.0019	0.0006	-0.0105	-0.0113	0.0004	-0.0025	-0.0036	0.0008	-0.0060	-0.0031	-0.0003	
reallocation effect	-0.0009	-0.0023	-0.0014	0.0086	0.0133	-0.0002	0.0021	0.0038	0.0001	0.0120	0.0000	0.0000	
total effect	-0.0003	-0.0004	-0.0008	-0.0019	-0.0061	-0.0002	-0.0005	0.0002	0.0009	0.0060	-0.0030	-0.0003	

(continued)

		agriculture, hunting, forestry, and fishing	mining and quarrying	manufacture	services	total	electricity, gas, and water supply	construction	wholesale/ retail trade, hotels, restaurants	transport and communications	finance, insurance, real estate & business services	government services	community, social & personal services	
CHN	1960-1985													
	labor share	0.6513	0.0164	0.1190	0.2133		0.0022	0.0187	0.0499	0.0528	0.0138		0.0256	
	productivity growth rate	0.0240	0.0736	0.0683	0.0480		0.0702	0.0374	0.0448	0.0351	0.0042		0.0285	
	change of labor share	-0.0271	0.0015	0.0289	-0.0032		0.0004	0.0212	0.0011	-0.0045	-0.0043		0.0062	
	relative productivity	0.8376	0.9807	0.6673	1.6828		4.3058	1.5793	2.4122	1.9161	3.0527		0.8142	
	sectoral growth effect	0.0131	0.0012	0.0054	0.0165	0.0323	0.0007	0.0011	0.0054	0.0022	0.0027		0.0006	
	reallocation effect	-0.0009	0.0001	0.0008	-0.0002	0.0008	0.0001	0.0013	0.0001	-0.0003	-0.0005		0.0002	
	total effect	0.0122	0.0012	0.0062	0.0163	0.0401	0.0007	0.0024	0.0055	0.0019	0.0022		0.0008	
	1985-2010													
	labor share	0.6242	0.0179	0.1478	0.2101		0.0026	0.0399	0.0511	0.0283	0.0095	0.0469	0.0318	
productivity growth rate	0.0437	0.0967	0.0898	0.0550		0.0606	0.0551	0.0446	0.0825	0.0773	0.0787	0.0279		
change of labor share	-0.2572	-0.0051	0.0439	0.2184		0.0024	0.0376	0.0457	0.0117	0.0047	0.0106	0.1056		
relative productivity	0.5597	2.2654	1.3522	1.9524		9.1391	1.4777	2.7146	1.6929	5.5819	1.4628	0.6095		
sectoral growth effect	0.0153	0.0030	0.0179	0.0226	0.0620	0.0014	0.0032	0.0055	0.0040	0.0041	0.0054	0.0005		
reallocation effect	-0.0058	-0.0005	0.0024	0.0171	0.0093	-0.0009	0.0022	0.0050	0.0008	0.0011	0.0006	0.0026		
total effect	0.0095	0.0035	0.0203	0.0396	0.0761	0.0023	0.0055	0.0111	0.0047	0.0052	0.0060	0.0031		
IND	1960-1985													
	labor share	0.7188	0.0051	0.0959	0.1802		0.0015	0.0149	0.0469	0.0174	0.0023		0.0195	
	productivity growth rate	0.0012	0.0319	0.0286	0.0252		0.0359	0.0224	0.0150	0.0213	-0.0036		-0.0012	
	change of labor share	-0.0190	-0.0007	0.0003	0.0194		0.0014	-0.0012	0.0147	0.0088	0.0016		0.0099	
	relative productivity	0.7329	4.7473	1.2062	1.8487		3.6996	4.5838	2.2062	1.9433	17.2976		1.3023	
	sectoral growth effect	0.0005	0.0008	0.0033	0.0084	0.0087	0.0002	0.0015	0.0016	0.0007	0.0000		0.0000	
	reallocation effect	-0.0005	-0.0001	0.0000	0.0014	0.0029	0.0002	-0.0002	0.0013	0.0007	0.0011		0.0005	
	total effect	0.0001	0.0007	0.0033	0.0098	0.0163	0.0004	0.0013	0.0028	0.0014	0.0011		0.0005	
	1985-2010													
	labor share	0.6997	0.0045	0.0962	0.1995		0.0029	0.0137	0.0616	0.0262	0.0039	0.0618	0.0294	
productivity growth rate	0.0225	0.0321	0.0410	0.0364		0.0541	-0.0152	0.0323	0.0393	0.0111	0.0617	0.0391		
change of labor share	-0.1532	0.0004	0.0197	0.1331		-0.0004	0.0579	0.0540	0.0218	0.0183	-0.0205	0.0018		
relative productivity	0.5017	7.0068	1.6394	2.3044		6.0368	5.3303	2.1345	2.1992	11.3286	1.7945	0.8397		
sectoral growth effect	0.0079	0.0010	0.0065	0.0167	0.0300	0.0009	-0.0011	0.0042	0.0023	0.0005	0.0068	0.0010		
reallocation effect	-0.0031	0.0001	0.0013	0.0123	0.0240	-0.0001	0.0124	0.0046	0.0019	0.0083	-0.0015	0.0001		
total effect	0.0048	0.0011	0.0078	0.0290	0.0438	0.0009	0.0112	0.0089	0.0042	0.0088	0.0054	0.0011		
KOR	1960-1985													
	labor share	0.6188	0.0071	0.0829	0.2911		0.0019	0.0261	0.1221	0.0286	0.0104		0.1020	
	productivity growth rate	0.0460	0.0003	0.0636	0.0102		0.1293	0.0540	0.0274	0.0705	-0.0334		0.0063	
	change of labor share	-0.3795	0.0026	0.1557	0.2212		0.0008	0.0356	0.1058	0.0187	0.0281	0.0000	0.0321	
	relative productivity	0.3352	2.2340	0.4825	2.5302		0.5986	1.2112	0.6991	0.4991	11.7155		4.7330	
	sectoral growth effect	0.0095	0.0000	0.0025	0.0075	0.0163	0.0001	0.0017	0.0023	0.0010	-0.0041	0.0000	0.0030	
	reallocation effect	-0.0058	0.0003	0.0034	0.0254	0.0256	0.0000	0.0020	0.0034	0.0004	0.0150	0.0000	0.0069	
	total effect	0.0038	0.0003	0.0060	0.0329	0.0385	0.0002	0.0037	0.0057	0.0014	0.0109		0.0100	
	1985-2010													
	labor share	0.2392	0.0097	0.2387	0.5124		0.0028	0.0617	0.2279	0.0474	0.0385		0.1341	
productivity growth rate	0.0444	0.0812	0.0682	0.0143		0.0626	0.0109	0.0327	0.0407	-0.0194		0.0005		
change of labor share	-0.1702	-0.0090	-0.0567	0.2359		0.0003	0.0177	0.1012	0.0173	0.0122		0.0882		
relative productivity	0.3955	0.9642	0.8386	1.3581		4.4168	1.7040	0.5485	1.0102	2.4107		2.3329		
sectoral growth effect	0.0042	0.0008	0.0136	0.0100	0.0249	0.0008	0.0012	0.0041	0.0019	-0.0018		0.0001		
reallocation effect	-0.0027	-0.0003	-0.0019	0.0128	0.0153	0.0001	0.0012	0.0002	0.0007	0.0099		0.0082		
total effect	0.0015	0.0004	0.0117	0.0228	0.0347	0.0008	0.0024	0.0043	0.0026	0.0081		0.0084		
TWN	1963-1985													
	labor share	0.4886	0.0203	0.1353	0.3558		0.0054	0.0263	0.1102	0.0468	0.0113	0.1034	0.0523	
	productivity growth rate	0.0458	0.0518	0.0565	0.0411		0.0994	0.0285	0.0724	0.0527	0.0312	0.0301	0.0589	
	change of labor share	-0.3223	-0.0158	0.1870	0.1512		-0.0011	0.0400	0.0876	0.0052	0.0176	0.0007	0.0011	
	relative productivity	0.5167	3.3933	1.0784	1.4971		2.2197	1.4463	0.5191	1.766	3.7370	2.7930	0.7534	
	sectoral growth effect	0.0116	0.0036	0.0082	0.0219	0.0449	0.0012	0.0009	0.0041	0.0029	0.0013	0.0087	0.0023	
	reallocation effect	-0.0076	-0.0024	0.0092	0.0103	0.0071	-0.0001	0.0026	0.0021	0.0003	0.0030	0.0001	0.0000	
	total effect	0.0040	0.0011	0.0174	0.0322	0.0551	0.0011	0.0036	0.0062	0.0032	0.0043	0.0088	0.0024	
	1985-2010													
	labor share	0.1662	0.0045	0.3223	0.5070		0.0044	0.0663	0.1979	0.0521	0.0288	0.1041	0.0534	
productivity growth rate	0.0285	0.1230	0.0331	0.0344		-0.0060	-0.0005	0.0470	0.0458	0.0174	0.0262	0.0403		
change of labor share	-0.1138	-0.0041	-0.0496	0.1675		-0.0001	0.0096	0.0379	-0.0056	0.0726	0.0288	0.0242		
relative productivity	0.4212	3.1543	1.1109	1.1002		5.8802	0.7979	0.7589	1.1152	2.2094	1.6098	0.8187		
sectoral growth effect	0.0020	0.0017	0.0118	0.0197	0.0324	-0.0002	0.0000	0.0071	0.0027	0.0011	0.0044	0.0015		
reallocation effect	-0.0019	-0.0005	-0.0022	0.0074	0.0056	0.0000	0.0003	0.0012	-0.0003	0.0064	0.0019	0.0008		
total effect	0.0001	0.0012	0.0096	0.0265	0.0369	-0.0002	0.0003	0.0082	0.0024	0.0075	0.0062	0.0025		
THA	1960-1985													
	labor share	0.8131	0.0014	0.0433	0.1422		0.0010	0.0053	0.0842	0.0124	0.0056		0.0088	
	productivity growth rate	0.0237	0.0526	0.0367	0.0224		0.0743	-0.0101	0.0272	0.0138	0.0973		0.0144	
	change of labor share	-0.1362	0.0016	0.0342	0.1004		0.0028	0.0148	0.0334	0.0088	0.0040		0.0096	
	relative productivity	0.4206	6.1885	2.9550	3.6799		2.3544	10.7138	2.9972	4.8003	0.4421		15.3571	
	sectoral growth effect	0.0081	0.0004	0.0047	0.0117	0.0227	0.0002	-0.0005	0.0069	0.0008	0.0002		0.0019	
	reallocation effect	-0.0023	0.0004	0.0040	0.0148	0.0204	0.0003	0.0063	0.0040	0.0017	0.0001		0.0059	
	total effect	0.0058	0.0008	0.0087	0.0265	0.0399	0.0004	0.0058	0.0109	0.0025	0.0003		0.0078	
	1985-2010													
	labor share	0.6769	0.0029	0.0775	0.2426		0.0038	0.0201	0.1176	0.0212	0.0097	0.0518	0.0184	
productivity growth rate	0.0328	0.0858	0.0360	0.0030		0.0683	-0.0395	-0.0016	0.0356	0.0165	0.0197	0.0063		
change of labor share	-0.2942	-0.0019	0.0632	0.2329		-0.0010	0.0419	0.1163	0.0079	0.0201	0.0386	0.0092		
relative productivity	0.2801	8.5005	2.7091	2.3719		5.5079	3.0714	2.1810	2.5009	1.8555	0.3086	8.1237		
sectoral growth effect	0.0062	0.0021	0.0076	0.0017	0.0179	0.0014	-0.0024	-0.0004	0.0019	0.0003	0.0003	0.0000		
reallocation effect	-0.0033	-0.0006	0.0068	0.0221	0.0237	-0.0002	0.0051	0.0101	0.0008	0.0015	0.0005	0.0030		
total effect	0.0029	0.0015	0.0144	0.0238	0.0362	0.0012	0.0027	0.0097	0.0027	0.0018	0.0008	0.0039		



(concluded)

		agriculture, hunting, forestry and fishing	mining and quarrying	manufacture	services	total	electricity, gas, and water supply	construction	wholesale/ retail trade, hotels, & restaurants	transport, storage & communications	finance, insurance, real estate & business services	government services	community, social & personal services	
GHA	1960-1985													
	labor share	0.6067	0.0185	0.1092	0.2656		0.0054	0.0340	0.1424	0.0260	0.0027		0.0173	
	productivity growth rate	-0.0174	-0.0081	-0.0303	-0.0198		0.0660	-0.0105	-0.0343	-0.0008	-0.0290		0.0101	
	change of labor share	-0.0200	-0.0133	0.0142	0.0191		-0.0023	-0.0220	0.0095	-0.0033	0.0024		0.0134	
	relative productivity	0.6055	3.4545	1.2513	1.6268		0.5680	3.8888	0.8696	3.5918	6.0473		0.4797	
	sectoral growth effect	-0.0064	-0.0005	-0.0041	-0.0086	-0.0170	0.0002	-0.0014	-0.0042	-0.0001	-0.0005		0.0001	
	reallocation effect	-0.0005	-0.0018	0.0007	0.0012	-0.0044	-0.0001	-0.0034	0.0003	-0.0005	0.0006		0.0003	
	total effect	-0.0069	-0.0024	-0.0034	-0.0073	-0.0205	0.0002	-0.0048	-0.0039	-0.0005	0.0001		0.0003	
	1985-2010													
	labor share	0.5867	0.0052	0.1233	0.2847		0.0031	0.0120	0.1519	0.0227	0.0051	0.0592	0.0307	
productivity growth rate	0.0333	0.0073	0.0227	0.0193		0.0302	0.0073	0.0197	0.0210	0.0040	0.0213	0.0127		
change of labor share	-0.1711	0.0058	-0.0154	0.1806		0.0008	0.0186	0.0915	0.0127	0.0180	0.0067	0.0324		
relative productivity	0.6542	4.7101	0.9788	1.6537		4.9369	4.9863	0.6161	5.8828	4.8882	1.8858	1.3038		
sectoral growth effect	0.0128	0.0002	0.0027	0.0091	0.0241	0.0005	0.0004	0.0018	0.0028	0.0001	0.0024	0.0004		
reallocation effect	-0.0045	0.0011	-0.0006	0.0119	0.0105	0.0002	0.0037	0.0023	0.0030	0.0035	0.0005	0.0013		
total effect	0.0083	0.0013	0.0021	0.0211	0.0301	0.0006	0.0041	0.0041	0.0058	0.0036	0.0029	0.0017		
NGA	1960-1985													
	labor share	0.7818	0.0025	0.0341	0.1816		0.0013	0.0152	0.1295	0.0177	0.0025		0.0098	
	productivity growth rate	0.0053	0.0613	0.0593	-0.0205		0.0138	0.0162	-0.0123	-0.0214	0.0501		-0.0689	
	change of labor share	-0.3490	0.0054	0.0076	0.3360		0.0061	-0.0022	0.1338	0.0285	0.0029		0.0973	
	relative productivity	0.9201	27.7855	4.2448	1.0790		0.3635	1.4047	1.1755	0.5913	1.2071		0.4776	
	sectoral growth effect	0.0038	0.0043	0.0009	-0.0040	0.0071	0.0000	0.0003	-0.0019	-0.0002	0.0002		-0.0003	
	reallocation effect	-0.0128	0.0060	0.0001	0.0145	0.0023	0.0001	-0.0001	0.0063	0.0007	0.0001		0.0019	
	total effect	-0.0090	0.0103	0.0010	0.0105	0.0255	0.0001	0.0002	0.0044	0.0004	0.0003		0.0015	
	1985-2010													
	labor share	0.4328	0.0080	0.0417	0.5176		0.0074	0.0130	0.2633	0.0462	0.0055	0.0752	0.1071	
productivity growth rate	0.0245	0.0454	0.0139	0.0556		0.0542	0.0275	0.0584	0.0715	-0.0205	0.0321	0.0789		
change of labor share	0.1738	-0.0056	0.0001	-0.1683		-0.0052	0.0031	-0.0941	-0.0157	0.0221	-0.0321	-0.0465		
relative productivity	0.5560	67.9781	0.9897	0.3416		0.2714	1.1139	0.4571	0.1832	2.2333	0.1931	0.0451		
sectoral growth effect	0.0059	0.0246	0.0006	0.0058	0.0398	0.0001	0.0004	0.0070	0.0006	-0.0002	0.0005	0.0004		
reallocation effect	0.0039	-0.0153	0.0000	-0.0023	-0.0116	-0.0001	0.0001	-0.0017	-0.0001	0.0020	-0.0002	-0.0001		
total effect	0.0098	0.0092	0.0006	0.0075	0.0200	0.0001	0.0005	0.0053	0.0005	0.0017	0.0002	0.0003		
TZA	1960-1985													
	labor share	0.9174	0.0014	0.0107	0.0705		0.0003	0.0017	0.0097	0.0023	0.0009		0.0208	
	productivity growth rate	-0.0016	-0.1159	0.0087	-0.0030		0.0059	-0.0338	-0.0620	-0.0325	-0.0023		0.0447	
	change of labor share	-0.0435	0.0047	0.0020	0.0369		0.0006	0.0016	0.0321	0.0048	0.0016		-0.0034	
	relative productivity	0.4908	27.9072	6.4433	6.2757		29.8600	42.1581	18.2852	26.8621	27.8502		0.2528	
	sectoral growth effect	-0.0007	-0.0044	0.0006	-0.0013	-0.0197	0.0000	-0.0024	-0.0110	-0.0020	-0.0001		0.0002	
	reallocation effect	-0.0009	0.0052	0.0005	0.0093	0.0387	0.0007	0.0027	0.0235	0.0052	0.0017		0.0000	
	total effect	-0.0016	0.0008	0.0011	0.0079	0.0055	0.0007	0.0003	0.0125	0.0032	0.0017		0.0002	
	1985-2010													
	labor share	0.8738	0.0061	0.0127	0.1074		0.0009	0.0033	0.0418	0.0072	0.0025	0.0344	0.0175	
productivity growth rate	0.0192	0.0645	-0.0132	-0.0125		-0.0492	-0.0109	-0.0079	-0.0154	-0.0282	-0.0304	-0.0069		
change of labor share	-0.1572	0.0018	0.0197	0.1357		0.0037	0.0105	0.0560	0.0119	0.0041	0.0480	0.0015		
relative productivity	0.4108	1.3415	6.9704	5.0688		30.1369	15.7843	3.3831	10.3774	22.8859	5.3034	0.6739		
sectoral growth effect	0.0069	0.0005	-0.0012	-0.0068	-0.0051	-0.0013	-0.0006	-0.0011	-0.0011	-0.0016	-0.0055	-0.0001		
reallocation effect	-0.0026	0.0001	0.0055	0.0275	0.0406	0.0044	0.0066	0.0076	0.0050	0.0038	0.0102	0.0000		
total effect	0.0043	0.0006	0.0043	0.0207	0.0186	0.0032	0.0061	0.0065	0.0038	0.0022	0.0046	0.0000		
ZAF	1960-1985													
	labor share	0.4876	0.0888	0.0930	0.3307		0.0041	0.0399	0.1085	0.0296	0.0172		0.0847	
	productivity growth rate	0.0379	0.0014	0.0218	0.0178		0.0142	0.0141	0.0236	0.0165	0.0261		0.0142	
	change of labor share	-0.2370	-0.0023	0.0677	0.1716		0.0067	0.0249	0.0446	0.0191	0.0223		0.0096	
	relative productivity	0.1057	3.1129	1.6453	1.5697		3.1106	0.8107	1.9692	2.0081	2.1415		0.7553	
	sectoral growth effect	0.0020	0.0004	0.0033	0.0092	0.0120	0.0002	0.0005	0.0028	0.0010	0.0010		0.0009	
	reallocation effect	-0.0010	-0.0003	0.0045	0.0108	0.0105	0.0008	0.0008	0.0020	0.0015	0.0019		0.0003	
	total effect	0.0010	0.0001	0.0078	0.0200	0.0284	0.0010	0.0013	0.0048	0.0025	0.0029		0.0012	
	1985-2010													
	labor share	0.2505	0.0865	0.1606	0.5023		0.0108	0.0648	0.1532	0.0487	0.0395	0.0911	0.0942	
productivity growth rate	0.0193	0.0341	0.0115	0.0006		0.0277	0.0038	-0.0041	0.0202	-0.0022	-0.0209	0.0158		
change of labor share	-0.1003	-0.0657	-0.0417	0.2076		-0.0046	0.0077	0.0470	0.0043	0.0738	0.0637	0.0189		
relative productivity	0.1340	1.5864	1.3947	1.2047		2.1815	0.5670	0.9733	1.4923	2.0238	2.1217	0.5293		
sectoral growth effect	0.0006	0.0007	0.0026	0.0004	0.0059	0.0007	0.0001	-0.0006	0.0015	-0.0002	-0.0040	0.0006		
reallocation effect	-0.0005	-0.0042	-0.0023	0.0100	0.0065	-0.0004	0.0002	0.0018	0.0003	0.0060	0.0054	0.0003		
total effect	0.0001	0.0005	0.0002	0.0104	0.0073	0.0002	0.0003	0.0012	0.0017	0.0058	0.0014	0.0009		