



THE LEAST DEVELOPED COUNTRIES REPORT 2014

Growth with structural transformation: A post-2015 development agenda

CHAPTER 4

STRUCTURAL TRANSFORMATION AND LABOUR PRODUCTIVITY IN LDCs



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A. Introduction

Human development is inextricably linked to economic development, as argued in chapter 3 of this Report. Key elements of human development, such as poverty, nutrition, health and education, are thus important indicators of the impact of economic development. As also highlighted in that chapter, structural transformation, labour productivity growth and employment creation are essential to the development process. The present chapter applies these concepts to the least developed countries (LDCs) and analyses the progress made by these countries in these vital areas since the 1990s. The results of this analysis offer insights into the “LDC paradox” of slow progress in human development despite accelerated economic growth since 2000.

The economic performance of developing countries is based on two separate but interrelated processes: increasing labour productivity and productive structural transformation.

The chapter is organized as follows. Section B presents a conceptual framework of the relationship between structural transformation, labour productivity and employment. Section C analyses the patterns of economic growth and structural transformation in the LDCs since the 1990s. Based on these trends, Section D assesses developments in labour productivity over the same period. Section E deepens that analysis by decomposing the growth of labour productivity by sector, and the growth of the employment-to-population ratio into its demographic and labour market components. Section F analyses the relationship between LDCs’ progress in structural transformation and their performance in economic and social development. The final section summarizes and concludes.

B. The interaction between structural change, labour productivity and employment

A rise in labour productivity can increase output and incomes ...

The economic performance of developing countries is based on two separate but interrelated processes: increasing labour productivity and productive structural transformation. Structural transformation has different dimensions, especially changes in the composition of output, employment, exports and aggregate demand. This chapter focuses on the first two of these dimensions, since it is their interaction that determines labour productivity. There are important feedbacks between efficiency gains and changes in the structure of the economy, so that they need to occur together if economic progress is to be sustainable.

... but without strong demand growth, a rise in labour productivity could even reduce employment.

Under favourable economic and institutional conditions, a rise in labour productivity leads to a rise in output, and thus to higher incomes. The extent to which the rise in incomes is distributed more widely depends on implicit and explicit contractual arrangements between firms and workers, and on labour market conditions. Higher labour productivity can also lower unit labour costs, which is especially important in the agricultural sector in LDCs for keeping prices of food and food-related items in check, as these constitute the major components of the average consumption basket. If those prices were to rise, economy-wide inflationary pressures could mount and strangle growth. Increasing labour productivity also increases competitiveness, helping to stimulate exports.

However, higher labour productivity also gives rise to trade-offs. For LDCs, the crucial trade-off relates to aggregate employment. Employment growth is limited if faster productivity growth is not accompanied by faster expansion of aggregate demand (Ocampo et al., 2009). Indeed, without strong demand for output, a rise in labour productivity could even reduce employment. This would

further accentuate the already stark differences in labour productivity between sectors (structural heterogeneity), typical of developing countries. Thus, economic policy must seek to ensure that demand growth does not lag behind gains in labour productivity.

There are two main sources of *aggregate* labour productivity growth. First, it can result from innovations *within* each sector or activity, as capital is increased, new technologies are adopted and the knowledge to use them is acquired. Second, overall productivity can increase as a result of the movement of workers *across* sectors — from lower- to higher-productivity sectors or activities (chart 23). The transfer of workers from one sector to another sector with higher labour productivity will benefit both economic performance and the workers themselves, as they will become more productive and therefore will be likely to earn a higher wage. This intersectoral transfer is an essential part of the process of structural transformation discussed in this chapter.

Structural transformation of production is a necessary condition for long-term growth of per capita income (Ocampo et al., 2009; Herrendorf et al., 2014). It is associated with two types of dynamic efficiency, accelerating the growth of productivity, output and employment over time. The first is a Schumpeterian efficiency effect, whereby those sectors with the highest rates of productivity growth and capacity expansion lead the innovation process and drive productivity gains. The second is a Keynesian efficiency effect, whereby the pattern of specialization shifts towards sectors that benefit from faster growth of domestic and external demand, generating positive impacts on output and employment. These two types of efficiency generally go hand in hand, as the more knowledge-intensive sectors also tend to face stronger domestic demand growth in the long run, and tend to be more competitive in international markets (ECLAC, 2012).

Historically, the countries that have succeeded in achieving sustained economic growth and development are those that have been able to transform their production activities effectively from low to high productivity, and to diversify from the production and export of a single or a few primary products to the manufacture and export of finished products. Research on the process of development has shown that the large divergences in living standards across countries can be attributed to two simple facts: (i) developing countries are much less productive than developed countries, especially in agriculture; and (ii) developing countries devote much more of their labour than developed countries to agriculture (Caselli, 2005; Restuccia et al., 2008; Gollin et al., 2002 and 2007). Thus, understanding why developing countries — and especially LDCs — are so poor requires an understanding of the forces that shape their allocation of resources between economic sectors.

The benefits of structural transformation are not limited to a rise in overall labour productivity; there are also spillovers through demand, intersectoral linkages, learning and induced innovations. As workers transfer to more productive activities and better paid jobs, their demand increases, which stimulates overall output, and, in turn, increases the demand for labour.

Structural transformation also reduces structural heterogeneity, since it helps to narrow productivity differences between sectors by channelling more resources towards better performing sectors and activities. Higher-productivity sectors are more dynamic and better positioned to accumulate further knowledge and innovations by virtue of their greater stocks of human and physical capital. In other words, the ideal form of structural transformation is one that creates the conditions for further economic growth and development, and thus for further changes in the structure of the economy. For LDCs, greater progress in economic development will require not only economic growth as traditionally defined, but also a dynamic transformation of their economies.

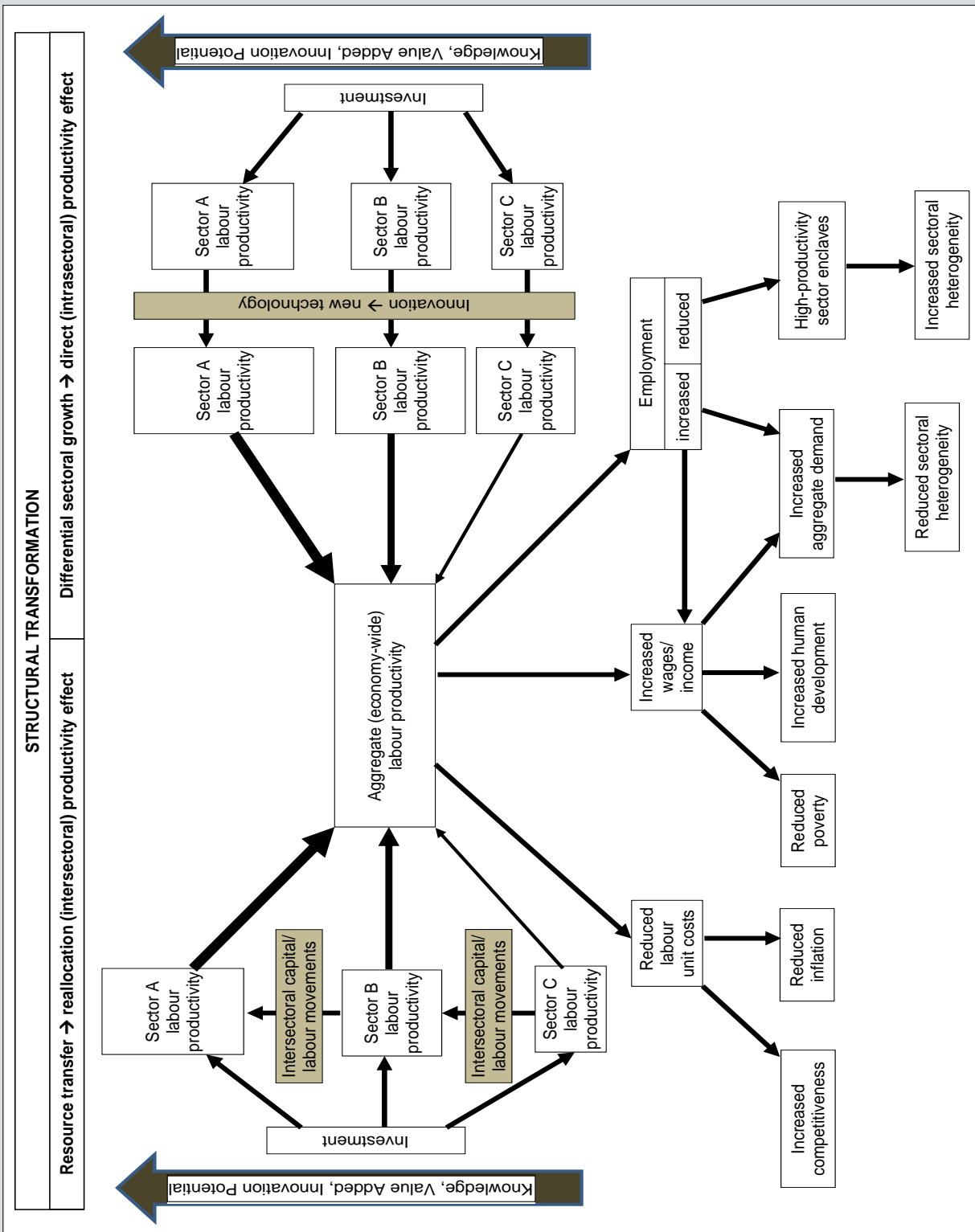
There are two main sources of aggregate labour productivity growth: (i) innovations within sectors; and (ii) movement of workers across sectors.

The wide income gap between developed and developing countries can be explained by developing countries' lower productivity, especially in agriculture, and their greater share of agriculture in employment.

Structural transformation helps to narrow productivity differences between sectors.

For LDCs, greater progress in economic development will require not only economic growth, but also a dynamic transformation of their economies.

Chart 23. Structural transformation and labour productivity



Source: UNCTAD secretariat.

C. Economic performance and structural transformation

This section examines the economic performance of the LDC economies since the 1990s, focusing on their structural transformation, output and employment growth. Data are presented by country group based on the following classifications:

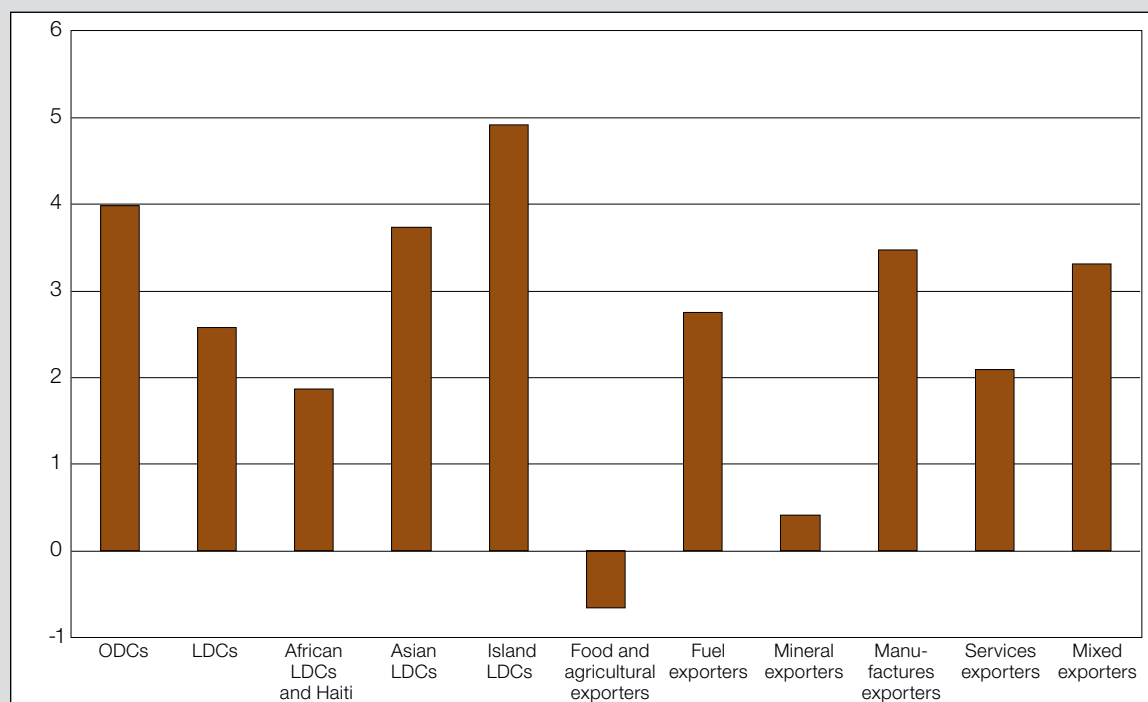
- Economies classified according to development level: LDCs, other developing countries (ODCs) and developed countries;
- LDCs classified according to geographical/structural criteria: African LDCs and Haiti, Asian LDCs and island LDCs;
- LDCs classified according to their export specialization: exporters of food and agricultural goods, fuel exporters, exporters of manufactures, mineral exporters and mixed exporters.

The criteria for these classifications are explained in the note on page xiii of this Report, which also contains the list of the countries composing each group.

Chart 24 shows annual growth rates of per capita output (as measured by value added) for LDCs and ODCs in the 1991–2012 period. Average annual output per capita has been growing steadily at 4 per cent or more in two groups of countries — ODCs and island LDCs,¹ compared with 2.6 per cent for the LDCs as a whole. Among the LDCs, Asian economies, mixed exporters and exporters of manufactures performed better than the LDC average, with per capita growth at or above 3.3 per cent per year.² In a second group of LDCs,

Among the LDCs, Asian economies, mixed exporters and exporters of manufactures achieved faster per capita growth than average in 1991–2012, their per capita output growing at or above 3.3 per cent per year.

Chart 24. Annual growth rate of output per capita in LDCs and ODCs, 1991–2012
(Per cent)



Source: UNCTAD secretariat calculations, based on data from UN/DESA, Statistics Division, *National Accounts Main Aggregates Database* for national accounts data (accessed June 2014); UN/DESA, Statistics Division, *Demographic Yearbook Database* for population data (accessed June 2014).

Note: Output is measured by gross value added at constant 2005 dollars.

Sustaining strong economic performance and generating sufficient productive employment are critical challenges for all the LDCs.

comprising fuel exporters, services exporters, and African LDCs and Haiti, output per capita grew more slowly, at average annual rates of between 1.9 per cent and 2.7 per cent.³ Finally, in mineral exporters and food and agricultural exporters, output per capita stagnated or declined. All economies in these two categories of exporters are African, except for the Solomon Islands.

At first glance, the growth performance of LDCs thus appears to vary widely, with considerable disparities between the various groups. On closer examination, however, these disparities appear to be largely associated with geographical location, the economic performance of the African LDCs and Haiti lagging behind that of other LDC groups. Nonetheless, sustaining strong economic performance and generating sufficient productive employment are critical challenges for all the LDCs.

Variations in economic growth across country groups are closely associated with changes in the basic structures of their economies.

A closer examination of economic growth performance shows that variations across country groups are closely associated with changes in the basic structures of their economies. Thus, the structures of LDC economies are analysed in terms of the distribution of employment and output between three broadly defined sectors: agriculture, industry and services.⁴

1. STRUCTURAL CHANGE IN EMPLOYMENT

Structural transformation has been taking place in LDCs in terms of both employment and output composition.

A major challenge confronting the LDCs is the scale of employment generation required to make significant progress towards achieving the Millennium Development Goals (MDGs) and their successors, the planned Sustainable Development Goals (SDGs). As discussed at length in *The Least Developed Countries Report 2013*, this is exacerbated by rapid growth in the working age population in LDCs (UNCTAD, 2013).

The sectoral composition of employment and output is a major determinant of overall labour productivity, which is one of the basic measures of economic performance. Tables 11 and 12 show sectoral shares of employment and output in selected years, and changes in those shares between 1991 and 2012. Structural transformation has been taking place in LDCs as a whole, as well as in LDC country groups, in terms of both employment and output composition.

Table 11. Sectoral composition of employment, 1991–2012
(Per cent and percentage points)

| | Agriculture | | | | Industry | | | | Services | | | |
|---------------------------------|-------------|------|------|------------------|----------|------|------|------------------|----------|------|------|------------------|
| | 1991 | 2000 | 2012 | Change 1991–2012 | 1991 | 2000 | 2012 | Change 1991–2012 | 1991 | 2000 | 2012 | Change 1991–2012 |
| Developed economies | 7 | 5 | 4 | -3 | 31 | 27 | 23 | -9 | 62 | 67 | 74 | 12 |
| ODCs | 53 | 46 | 34 | -19 | 20 | 20 | 25 | 5 | 27 | 33 | 41 | 14 |
| LDCs | 74 | 71 | 65 | -9 | 8 | 8 | 10 | 1 | 18 | 21 | 26 | 8 |
| African LDCs and Haiti | 76 | 75 | 70 | -7 | 6 | 5 | 7 | 1 | 18 | 20 | 24 | 6 |
| Asian LDCs | 70 | 65 | 57 | -14 | 11 | 11 | 14 | 2 | 18 | 24 | 30 | 11 |
| Island LDCs | 66 | 57 | 55 | -12 | 8 | 10 | 11 | 3 | 25 | 33 | 34 | 9 |
| Food and agricultural exporters | 75 | 73 | 71 | -3 | 8 | 8 | 8 | 0 | 17 | 19 | 20 | 3 |
| Fuel exporters | 57 | 57 | 50 | -7 | 9 | 8 | 10 | 0 | 34 | 35 | 40 | 6 |
| Mineral exporters | 76 | 80 | 76 | 0 | 6 | 4 | 4 | -1 | 19 | 17 | 19 | 1 |
| Manufactures exporters | 70 | 65 | 54 | -16 | 13 | 11 | 14 | 1 | 17 | 25 | 32 | 15 |
| Services exporters | 82 | 78 | 72 | -10 | 5 | 6 | 8 | 3 | 13 | 15 | 19 | 7 |
| Mixed exporters | 72 | 68 | 63 | -9 | 7 | 8 | 10 | 2 | 20 | 24 | 27 | 7 |

Source: UNCTAD secretariat calculations, based on data from ILO, *Global Employment Trends 2014* database (accessed June 2014).

Note: Differences between the figures shown and the “change 1991–2012” column are due to rounding.

Table 12. Sectoral composition of output, 1991–2012
(Per cent and percentage points)

| | Agriculture | | | | Industry | | | | Services | | | |
|---------------------------------|-------------|------|------|------------------|----------|------|------|------------------|----------|------|------|------------------|
| | 1991 | 2000 | 2012 | Change 1991–2012 | 1991 | 2000 | 2012 | Change 1991–2012 | 1991 | 2000 | 2012 | Change 1991–2012 |
| Developed economies | 1 | 1 | 2 | 0 | 28 | 26 | 24 | -4 | 71 | 72 | 75 | 4 |
| ODCs | 11 | 10 | 8 | -4 | 38 | 40 | 40 | 2 | 51 | 51 | 52 | 2 |
| LDCs | 33 | 30 | 25 | -8 | 23 | 27 | 31 | 9 | 45 | 43 | 44 | -1 |
| African LDCs and Haiti | 34 | 32 | 26 | -8 | 23 | 28 | 34 | 10 | 43 | 40 | 40 | -3 |
| Asian LDCs | 30 | 26 | 22 | -8 | 21 | 27 | 27 | 6 | 48 | 47 | 51 | 2 |
| Island LDCs | 31 | 30 | 13 | -18 | 22 | 25 | 64 | 42 | 47 | 44 | 23 | -24 |
| Food and agricultural exporters | 48 | 45 | 37 | -10 | 12 | 12 | 20 | 8 | 40 | 43 | 43 | 3 |
| Fuel exporters | 21 | 22 | 19 | -2 | 36 | 45 | 48 | 11 | 43 | 33 | 34 | -9 |
| Mineral exporters | 39 | 36 | 31 | -8 | 20 | 22 | 25 | 5 | 41 | 42 | 44 | 3 |
| Manufactures exporters | 28 | 23 | 18 | -10 | 20 | 24 | 29 | 9 | 53 | 53 | 53 | 0 |
| Services exporters | 44 | 40 | 30 | -14 | 16 | 18 | 22 | 5 | 40 | 43 | 48 | 9 |
| Mixed exporters | 38 | 38 | 33 | -5 | 17 | 17 | 22 | 5 | 45 | 44 | 45 | 0 |

Source: UNCTAD secretariat calculations based on data from UN/DESA, Statistics Division, *National Accounts Main Aggregates Database* (accessed June 2014).

Note: Differences between the figures shown and the “change 1991–2012” column are due to rounding.

The overall pattern of change in employment shares is towards the services sector, and to a lesser extent towards industry. However, despite relatively rapid growth of employment in the industrial and services sectors (table 13), agriculture continues to account for the largest share of the labour force in LDCs, although it declined from 74 percent in 1991 to 65 per cent in 2012. However, this is almost double the average level in ODCs (table 11).

By definition, a smaller share of employment in agriculture implies a larger combined share for the other two sectors. In LDCs, this increase has been occurring overwhelmingly in the services sector, which gained 8 percentage points between 1991 and 2012, compared with just 1 percentage point in the industrial sector. This is markedly different from the classical pattern of structural transformation that took place in countries that are now at higher income levels. There, the employment share of industry rose significantly in the early stages of development, particularly in labour-intensive manufacturing. The economic rationale for a shift towards manufacturing activities is that they have higher average productivity and are characterized by increasing returns to scale, so that they offer greater potential for more rapid productivity growth.

The overall pattern of change in employment shares is towards the services sector, and to a lesser extent towards industry.

Table 13. Average annual growth rates of employment, 1991–2012
(Per cent)

| Annual growth rates | Agriculture | Industry | Services |
|---------------------------------|-------------|----------|----------|
| Developed economies | -2.5 | -0.9 | 1.4 |
| ODCs | -0.5 | 2.8 | 3.7 |
| LDCs | 2.2 | 3.6 | 4.6 |
| African LDCs and Haiti | 2.7 | 4.0 | 4.4 |
| Asian LDCs | 1.3 | 3.3 | 4.8 |
| Island LDCs | 0.4 | 2.6 | 2.9 |
| Food and agricultural exporters | 2.3 | 2.7 | 3.4 |
| Fuel exporters | 2.9 | 3.7 | 4.3 |
| Mineral exporters | 3.1 | 2.1 | 3.3 |
| Manufactures exporters | 1.0 | 2.7 | 5.3 |
| Services exporters | 2.5 | 5.6 | 5.2 |
| Mixed exporters | 2.0 | 3.9 | 4.2 |

Source: UNCTAD secretariat calculations, based on data from ILO, *Global Employment Trends 2014* database (accessed June 2014).

Agriculture continues to account for the largest share of the labour force in LDCs at 65 per cent in 2012, double the level in ODCs.

Structural transformation in African LDCs and Haiti has occurred at half the rate of Asian LDCs.

Agricultural employment in the African LDCs and Haiti grew by 2.7 per cent per year, compared with 1.3 per cent per year in the Asian LDCs.

Although the number of jobs in industry and services grew faster in the LDCs, the composition of employment changed more dramatically in the ODCs.

Exporters of manufactured goods recorded the fastest rate of transformation.

Food and agricultural goods exporters and mineral exporters experienced little or no contraction in agriculture's share of employment.

The patterns of structural change in LDC employment outlined above also hold for all the geographical/structural groups, although with varying intensities. These changes are the most pronounced in the Asian LDCs, where services and industries added 11 percentage points and 2 percentage points respectively, compared with 6 and 1 percentage points, respectively, in the African LDCs and Haiti. This comparison, suggesting that structural transformation in African LDCs and Haiti has occurred at half the rate of Asian LDCs, warrants further attention. Data on employment growth, presented in table 13, indicate that industrial jobs in African LDCs and Haiti grew by 4 per cent per year, which was faster than the 3.3 per cent growth recorded in the Asian LDCs. However, because of the lower starting point (6 per cent in the African LDCs and Haiti, compared with 11 per cent in the Asian LDCs), this faster growth rate translated into a smaller absolute increase in the industrial share of employment. Employment in the services sector expanded at about the same rate in both regions.

The crucial difference between the two groups of LDCs lies in the much faster growth of labour in agriculture in the African LDCs and Haiti: 2.7 per cent per year, compared with 1.3 per cent per year in the Asian LDCs. This can be explained partly by differences in the demographic dynamics of the two groups. Annual population growth has been one percentage point higher in the African LDCs and Haiti, leading to a more rapid expansion of the overall labour supply. The resulting labour surplus has accumulated in subsistence agriculture, which acts as an "employer of last resort". This process slows down changes in the sectoral composition of employment in countries experiencing more rapid population growth.

Demographic differences also partly explain the differences in structural transformation between the LDCs and the ODCs. Although the number of jobs in industry and services grew faster in the LDCs, the composition of employment changed more dramatically in the ODCs. The share of the agricultural sector's employment in the ODCs fell by 19 percentage points, on average, between 1991 and 2012, of which 5 percentage points were gained by the industrial sector. Besides the effect of population growth on labour supply, differences in economic performance also contributed to these differential outcomes. The decline in the agricultural sector's share in employment in ODCs, at an average rate of 0.5 per cent per year, is indicative of greater structural transformation (table 13).

Patterns of structural change in employment since the 1990s show a marked contrast between LDCs grouped by export specialization, reflecting the close relationship between export composition and productive structure. Exporters of manufactured goods recorded the fastest rate of transformation, with a 16-percentage-point decline in the agricultural sector's share of employment, followed by services exporters and mixed exporters, with 10 percentage points and 9 percentage points respectively. At the other end of the scale, food and agricultural goods exporters and mineral exporters experienced little or no contraction in agriculture's share of employment.

The fastest employment growth in all groups of LDCs occurred in the services sector, where it exceeded 3 per cent per year in all export categories. This was followed by employment in industries, with growth rates ranging from 2.1 per cent per year in mineral exporters to 5.6 per cent in services exporters.

2. STRUCTURAL CHANGE IN OUTPUT

Changes in the sectoral composition of output in LDCs have been very different from those in employment (table 12). The largest relative output expansion in all LDC groups has been in the industrial sector, mostly at the

expense of the agricultural sector. Between 1991 and 2012, the share of industry in overall output increased by 5 percentage points or more in all regions. African LDCs and Haiti and island LDCs recorded double-digit changes towards industry, as did exporters of fuel and of manufactured goods. By contrast, the economic structure in ODCs changed relatively little during this period, shares of the industrial and services sectors growing by just 2 percentage points.

The growth of industry at the expense of agriculture in LDCs reflects the transfer of resources from agriculture to industry. This pattern is typical of the development paths of countries now at higher income levels. There, the manufacturing sector played a key role. Manufacturing leads in technological change and learning and, under the right circumstances, can be a major source of technological spillovers, while generating strong backward and forward linkages across sectors within the economy (Astorga et al., 2014).

In this respect, however, further disaggregation of the data in table 12 paints a more sober picture of structural transformation in the LDCs. For the LDCs as a group, the sector's share of output increased by only 1 percentage point between 1991 and 2012, compared with 9 percentage points in ODCs (table 14). The best performing LDC groups in this respect were the Asian LDCs and manufactured goods exporters, with Bangladesh as the main driver. In both cases, the share of manufacturing in output rose by 5 percentage points. For the other LDC groups, in contrast, the increase in the share of industrial output (table 12) was the result of booming extractive industries. Fuel exporters experienced the greatest increase in the industrial share, reflecting the relative expansion of their extractive industries since the 1990s. An extreme example is the island LDCs, where the 42 percentage point increase in the industrial sector's share of output was due entirely to increasing oil and gas production in Timor-Leste.

While the services sector led the transformation of sectoral shares of employment in the group of LDCs, its share of output remained virtually unchanged throughout the 1991–2012 period.⁵ This combination of a rapidly increasing share of employment and a stable share of output suggests that labour productivity expansion in the services sector has been very modest or even regressed. The next section presents an analysis of aggregate and sectoral labour productivity.

The largest relative output expansion in LDCs has been in the industrial sector, mostly at the expense of agriculture.

The growth of industry at the expense of agriculture in LDCs reflects the transfer of resources from agriculture to industry.

The strongest relative increase in manufacturing output took place in the Asian LDCs and manufactured goods exporters ...

... while for the other LDC groups, the increase in the share of industrial output was the result of booming extractive industries.

Table 14. Manufacturing sector share of total output, 1991–2012
(Per cent and percentage points)

| Output shares | Manufacturing | | | Change 1991–2012 |
|---------------------------------|---------------|------|------|------------------|
| | 1991 | 2000 | 2012 | |
| Developed economies | 16 | 16 | 15 | -1 |
| ODCs | 14 | 14 | 23 | 9 |
| LDCs | 9 | 10 | 11 | 1 |
| African LDCs and Haiti | 8 | 8 | 8 | -1 |
| Asian LDCs | 11 | 12 | 16 | 5 |
| Island LDCs | 4 | 4 | 2 | -2 |
| Food and agricultural exporters | 8 | 7 | 12 | 4 |
| Fuel exporters | 6 | 6 | 6 | 1 |
| Mineral exporters | 9 | 9 | 8 | -1 |
| Manufactures exporters | 13 | 15 | 18 | 5 |
| Services exporters | 10 | 9 | 7 | -2 |
| Mixed exporters | 9 | 9 | 12 | 2 |

Source: UNCTAD secretariat calculations, based on data from UN/DESA, Statistics Division, *National Accounts Main Aggregates Database* (accessed June 2014).

Note: Differences between the figures shown and the last column are due to rounding.

D. Trends in labour productivity

Increases in labour productivity are the major source of growth in GDP per capita.

A widely accepted stylized fact in economic development is that increases in labour productivity are the major source of growth in real gross domestic product (GDP) per capita. This section focuses on trends in labour productivity in the LDCs, and how they compare with observed trends in ODCs. This allows an assessment of whether the level of labour productivity in LDCs is converging towards, or diverging from, that of ODCs.

1. TRENDS IN ECONOMY-WIDE LABOUR PRODUCTIVITY

Average output per worker in LDCs fell from almost 25 per cent of that in ODCs in 1991 to about 19 per cent in 2012.

Charts 25 and 26 provide an overview of aggregate and sectoral labour productivity performance in the LDCs. Chart 25 shows trends in ratios of labour productivity between the LDCs and the ODCs, overall and by sector. In the 1991–2012 period, labour productivity in the LDCs increased more slowly than in the ODCs, the gap widening in both relative and absolute terms for the LDCs as a group, for African LDCs and Haiti, and for Asian LDCs. This is shown in the charts by the decline in the ratio of LDCs' labour productivity to ODCs' labour productivity. Thus, most LDC groups have diverged from ODCs in terms of labour productivity, rather than converging towards them. Average output per worker in LDCs fell from almost 25 per cent of that in ODCs in 1991 to about 19 per cent in 2012.

Except for fuel exporters, the average worker in other LDCs produced less than 2 per cent of the output produced by the average worker in developed countries in 2012.

The average annual growth rate of labour productivity in LDCs between 1991 and 2012 was 1.4 percentage points below that of the ODCs (chart 26). While it was above that of the developed countries, the extent of catching up was minimal. With the exception of fuel exporters and island LDCs, the average worker in other LDCs produced less than 2 per cent of the output produced by the average worker in developed countries in 2012. These numbers emphasize the enormity of the task facing LDCs. If they are to catch up with today's developed economies, LDCs must grow much faster than in the post-2000 period, and for considerably longer. The relative labour productivity of the island LDCs rose from 4 per cent of the level in developed countries to 9 per cent between 1991 and 2012, while that of fuel-exporting LDCs increased from 5.4 per cent to 6.6 per cent over the same period.

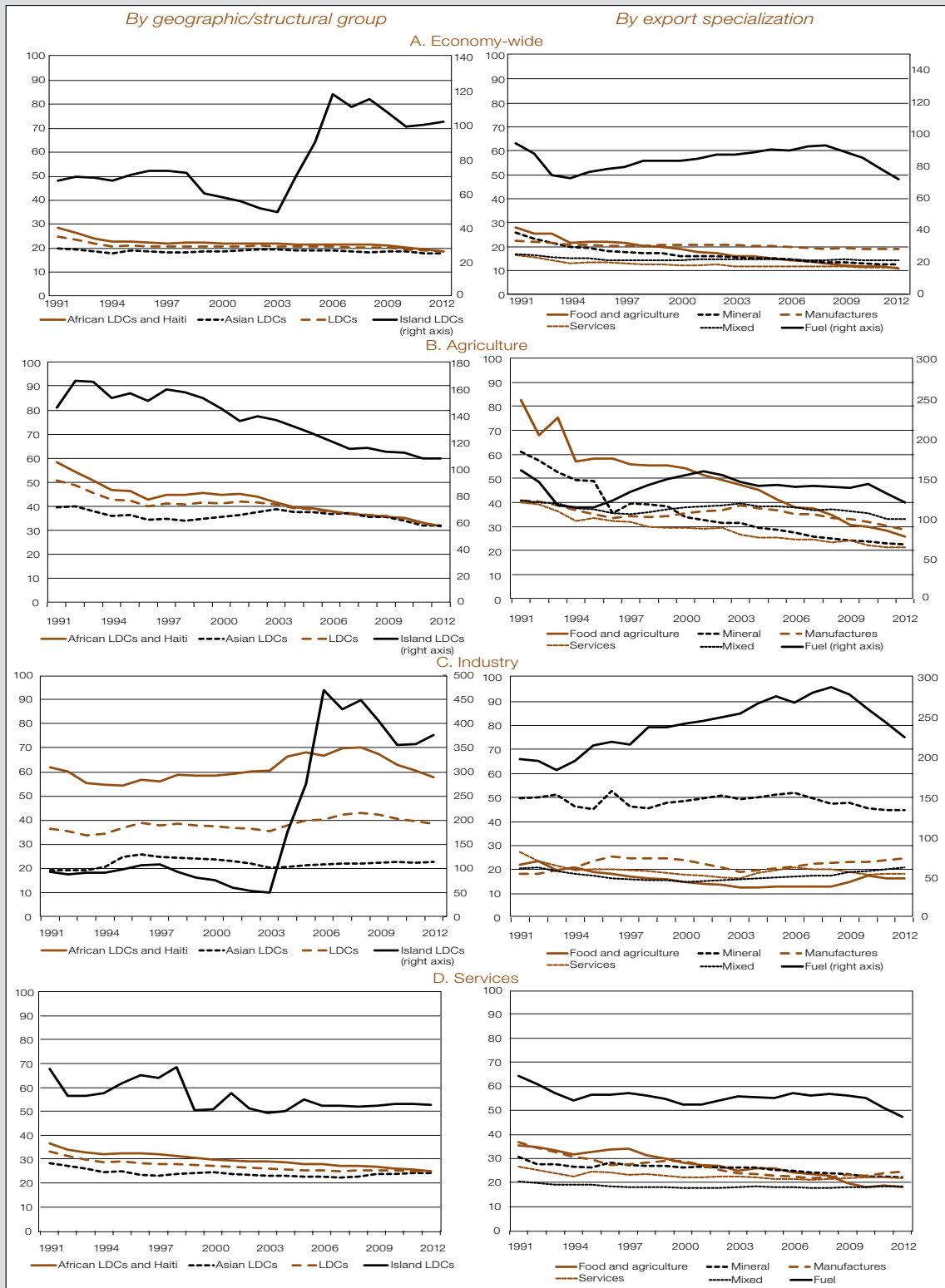
Productivity in African LDCs and Haiti expanded at 1.6 per cent annually, half the rate of the Asian LDCs.

The aggregate statistics for the LDCs hide considerable differences in the economic performances of the different categories. African LDCs and Haiti trailed the other two groups, their productivity expanding at 1.6 per cent annually, which was half the rate of growth recorded by Asian LDCs. Island LDCs' labour productivity declined in relative terms until the early 2000s. After 2003, however, their annual labour productivity growth increased to 5.8 per cent, driven by the inclusion in the group of Timor-Leste, where exploitation of oil and gas increased.

Fuel-exporting LDCs have the highest labour productivity, but this reflects a very high level of capital intensity, and their performance is the most volatile among the LDC groups.

Grouping LDCs by export specialization further highlights the challenges they face. While fuel-exporting LDCs have the highest labour productivity, this must be considered in the light of two countervailing factors. First, as can be observed in panel A of chart 25, their heavy dependence on fuel prices makes their performance the most volatile among the LDC groups. At its peak in 1991, labour productivity in fuel-exporting LDCs reached 95 per cent of the average output per worker in the ODCs, falling to 72 per cent in 2012. Second, the high labour productivity of the fuel sector reflects a very high level of capital-intensity. Since the fuel sector also typically has few backward and forward linkages with the rest of the economy, in some cases developing as an enclave, the benefits of rising labour productivity tend to spill over to the wider population only to a limited extent.

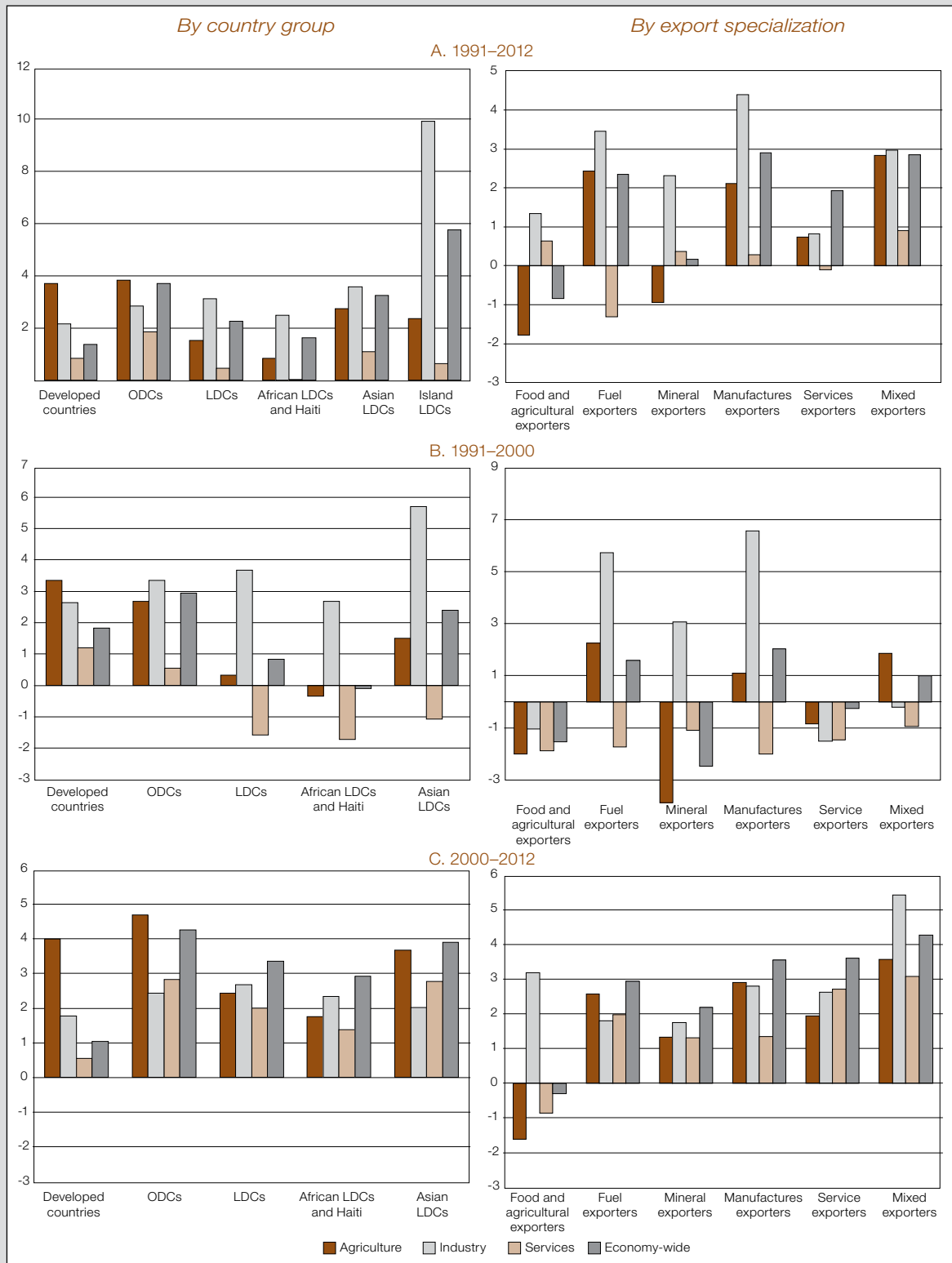
Chart 25. Economy-wide and sectoral labour productivity ratios between LDCs and ODCs, 1991–2012 (Per cent)



Source: UNCTAD secretariat calculations, based on data from UN/DESA, Statistics Division, *National Accounts Main Aggregates Database* for national accounts data (accessed June 2014); and ILO, *Global Employment Trends 2014* database for employment data (accessed June 2014).

Note: Food and agriculture: Food and agricultural exporters; Fuel: Fuel exporters; Mineral: Mineral exporters; Manufactures: Manufactures exporters; Services: Services exporters; Mixed: Mixed exporters.

Chart 26. Average annual growth rates of total and sectoral labour productivity in LDCs and ODCs, 1991–2012 (Per cent)



Source: As for chart 25.

Labour productivity grew relatively slowly in the exporters of manufactures and in mixed exporters in the 1990s, but this trend was reversed subsequently, attaining an average annual rate of increase of 2.9 per cent. Average annual output per worker in services exporters expanded by only 1.9 per cent, resulting in a fall of more than 5 percentage points relative to ODCs. The worst performers were exporters of food and agricultural products, and of minerals. The gap in their aggregate labour productivity relative to the ODCs widened substantially throughout the 1991–2012 period (panel A of chart 25). In food and agricultural

exporting LDCs, labour productivity declined in absolute terms, at an annual rate of about 0.8 per cent, while it stagnated in mineral exporters.

The performance of the LDCs over the 1991–2012 period has varied considerably, reflecting the wider tendency towards highly volatile economic growth in the poorest countries, with growth spurts followed by growth collapses (Hausmann et al., 2005; Ocampo and Parra, 2006). Growth rates of labour productivity differed markedly between the 1990s and the 2000s (chart 26). Most of the decline in LDCs' labour productivity relative to that of ODCs over the period as a whole was due to their poor economic performance during the 1990s, when aggregate output per worker expanded at the rate of only 0.8 per cent per year, compared with almost 3 per cent in ODCs, and 1.8 per cent in developed countries. Labour productivity growth in the 1990s was particularly slow in the African LDCs and Haiti, where it declined at an annual rate of 0.1 per cent.

As noted in chapter 1 of this Report, more favourable global economic conditions and a rise in commodity prices at the turn of the century allowed accelerated economic growth in many LDCs. As a result, the average annual growth rate of output per worker in these countries accelerated to 4.2 per cent between 2000 and 2008. However, this growth spurt was brought to an end by the financial crisis that hit developed economies in 2008. Since then, labour productivity in the LDCs has expanded at 1.6 per cent — less than half the rate of previous years. Nonetheless, since 2000, in the LDCs as a group, labour productivity has grown by 3.4 per cent per year, and it has grown in all country groups, at varying rates, except in exporters of agricultural products. It has exceeded 4 per cent per year in the ODCs and the mixed exporters group of LDCs, and risen by 3.4 per cent or more in exporters of manufactured goods, services exporters and the Asian LDCs (chart 26).

2. TRENDS IN SECTORAL LABOUR PRODUCTIVITY

Aggregate labour productivity is the outcome of economic performance at the sectoral level and of transfers of labour between sectors, as discussed in section E of this chapter. Labour productivity in agriculture is particularly important for the LDCs, owing to its large share of output and employment. In this respect, the picture that emerges from charts 25 and 26 is not encouraging. Overall, agricultural output per worker in the LDCs increased at an average rate of 1.5 per cent per year in 1991–2012, much slower than in the ODCs, where it grew at 3.8 per cent per year. This represents a considerable divergence between LDCs and ODCs in agricultural labour productivity (panel B of chart 25).

There have been significant differences in the rate of growth of agricultural labour productivity among LDC groups. Asian and island LDCs, exporters of manufactures and fuels, and LDCs with a mixed export base recorded faster-than-average rates of increase in 1991–2012, at 2 per cent or more per year. However, agricultural labour productivity was largely stagnant in the African LDCs and Haiti, and in services exporters, and declined in food and agricultural goods exporters (by 1.8 per cent per year) and in mineral exporters (by 0.8 per cent per year).

Surprisingly, at first sight, the LDCs as a group appear to have outperformed both the ODCs and the developed countries in growth of labour productivity in the industrial sector: output per worker increased at an annual rate of 3.1 per cent in the LDCs, compared with 2.8 per cent in the ODCs and 2.2 per cent in developed countries (chart 26). The Asian and island LDCs, exporters of manufactures, fuel exporters and mixed exporters performed best by this measure, recording impressive rates of increase in industrial labour productivity:

Most of the decline in LDCs' relative labour productivity since 1990 has been due to their poor economic performance during the 1990s.

Since 2000, the labour productivity of the LDCs as a group has grown by 3.4 per cent per year.

Agricultural output per worker in the LDCs increased at an average rate of 1.5 per cent per year in 1991–2012, much slower than in the ODCs, where it grew at 3.8 per cent per year.

Asian and island LDCs, exporters of manufactures and fuels, and LDCs with a mixed export base recorded faster-than-average increases in agricultural labour productivity in 1991–2012.

almost 10 per cent per year in the island LDCs, 4.4 per cent in exporters of manufactures and 3.5 per cent in fuel exporters.

Exporters of manufactures proved to be resilient to the negative external shocks wrought by the 2008–2009 crisis ...

However, panel A of chart 25 suggests a more nuanced story, highlighting the contrast between those LDCs where the industrial sector is dominated by manufacturing and those where it is dominated by extractive industries. Exporters of manufactures (primarily Asian LDCs) proved to be resilient to the negative external shocks wrought by the 2008–2009 crisis, increasing their industrial labour productivity ratio by almost 6 percentage points between 2003 and 2012. In those LDCs where the industrial sector is dominated by extractive industries, by contrast, the 2008 global economic crisis pushed labour productivity into a steep decline. This substantiates the findings of the previous section regarding patterns of structural change in the industrial sector in LDCs. It also underlines the vulnerability of economies that are dependent on natural resources, and the importance of diversifying their production structures. Indeed, in LDCs with a diversified export based (the mixed exporters), industrial labour productivity increased by 5 percentage points between 2003 and 2012 and they proved to be resilient in face of the negative external shocks brought about by the crisis, similarly to the exporters of manufactures.

... but it pushed labour productivity into a steep decline in those LDCs where the industrial sector is dominated by extractive industries.

Labour productivity in services has varied much less among LDC groups (panel D of chart 25). It did not show strong growth in any of those groups between 1991 and 2012, with an average annual rate of increase of only 0.4 per cent. Output per worker in services grew faster than 1 per cent per year only in the Asian LDCs and the mixed exporters, compared with an average of 1.8 per cent per year for ODCs. As noted above, employment in services grew rapidly in all the LDCs between 1991 and 2012, partly as a result of rural-urban migration. Since urban industry (and especially manufacturing) is not able to absorb most rural migrants, they are obliged to resort to service activities where most of the jobs created have been low-productivity, informal jobs. Rising informality is a serious impediment to development efforts in the LDCs. Moreover, since low productivity is associated with low incomes, low-productivity jobs not only restrain dynamic structural transformation, but also keep workers in poverty.

Labour productivity in services did not show strong growth in LDCs between 1991 and 2012 ...

... as rural-urban migrants unable to secure industrial employment resorted to employment in low-productivity informal sector services.

E. Decomposition of labour productivity growth

Aggregate economic indicators can often be decomposed to capture contributions by individual sectors. This section discusses sectoral contributions to aggregate labour productivity and to the employment-to-population ratio in the various country groups. The Divisia index growth decomposition is used, and is expressed in multiplicative form.⁶

1. MAIN SOURCES OF AGGREGATE LABOUR PRODUCTIVITY GROWTH

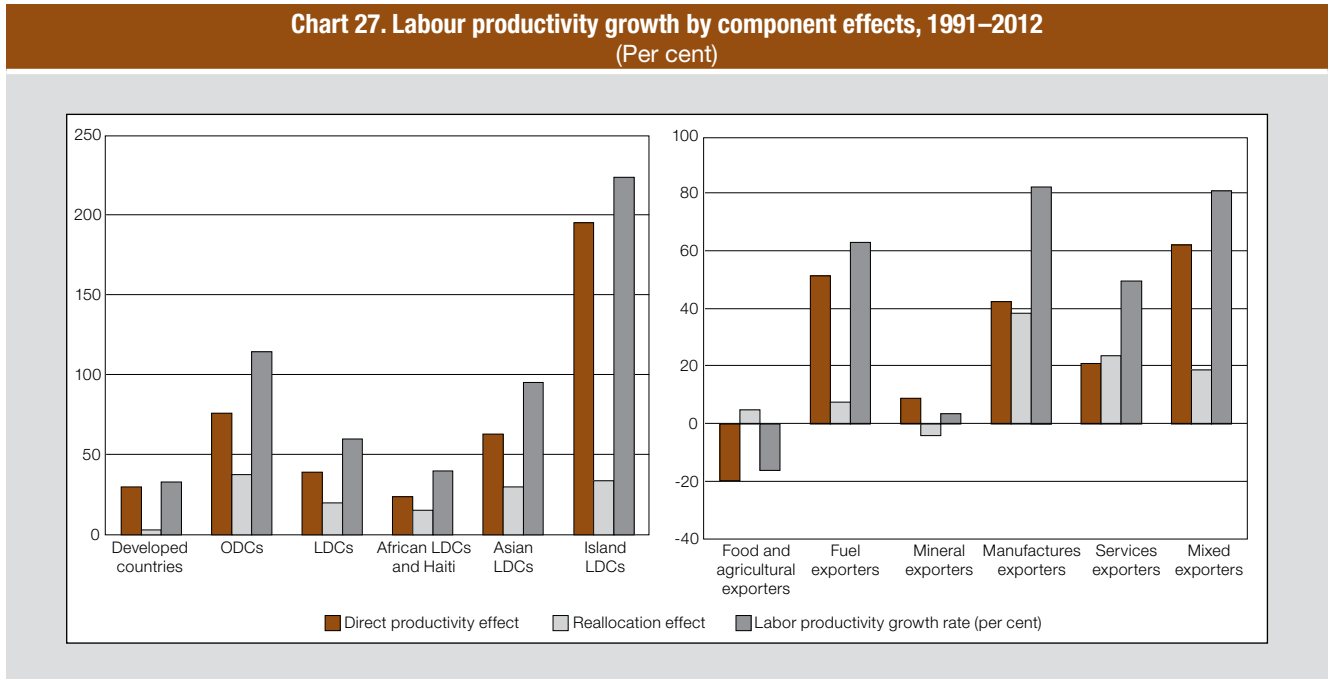
Aggregate labour productivity growth can be decomposed into three main components that capture contributions from changes within and between sectors:

Low-productivity jobs not only restrain dynamic structural transformation, but also keep workers in poverty.

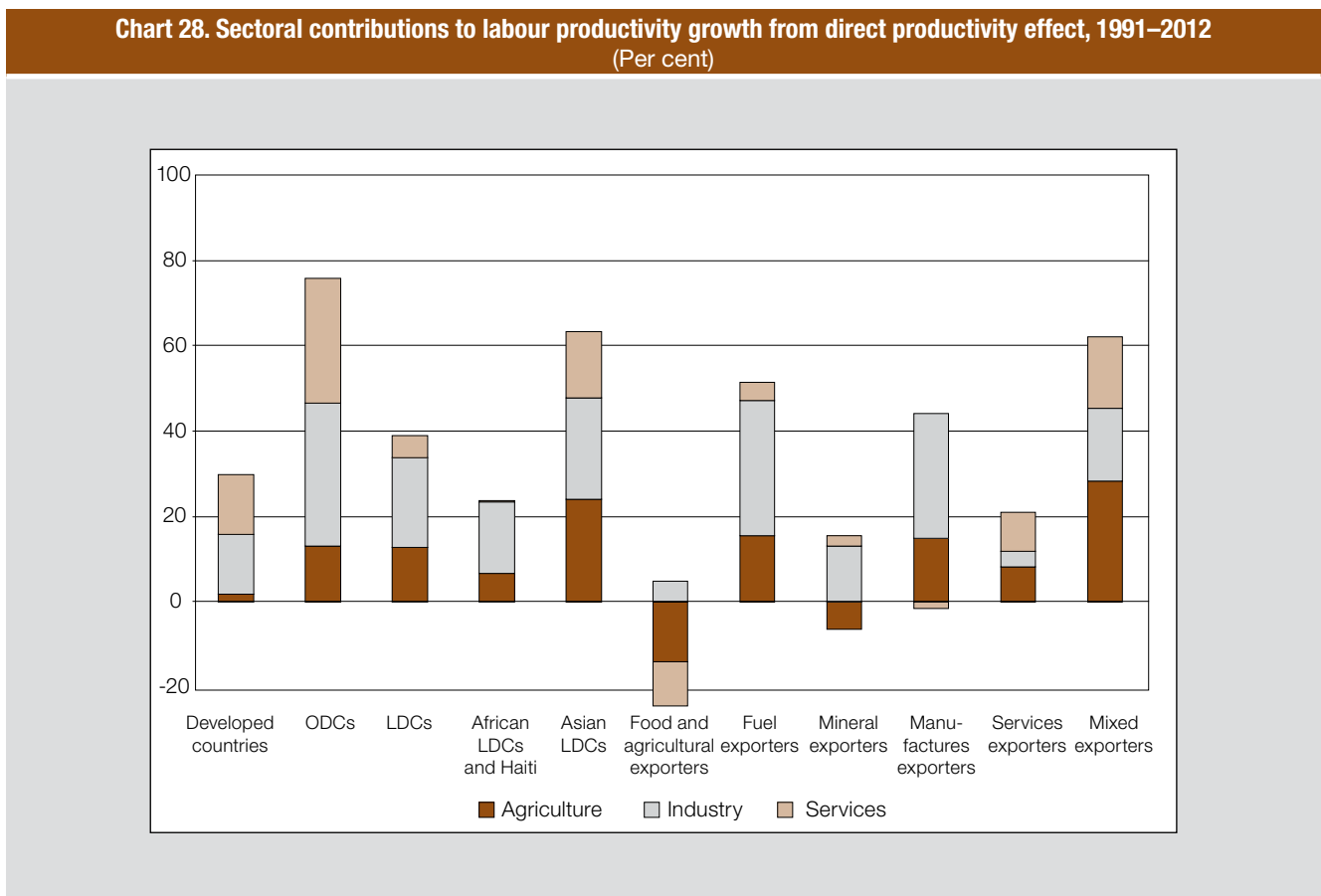
- A direct productivity growth effect D_{prod} measuring changes in aggregate output per worker due to increases in productivity within each sector;
- A structural or reallocation effect D_{str} reflecting the impact on aggregate labour productivity of movements of labour between sectors with different levels of output per capita; and
- A terms-of-trade effect D_{price} reflecting changes in relative output prices between sectors.⁷

All the decomposition terms are weighted by each sector's share in nominal value added. In other words, the Divisia index is the sum of the logarithmic growth rates of these components, weighted by each sector's share in total value added (Ang, 2004).

The results of this decomposition, focusing on direct productivity growth and reallocation effects, are presented in table 15 and charts 27 and 28. Three major features emerge from this analysis.



Source: As for chart 25.



Source: As for chart 25.

Table 15. Sectoral contribution to labour productivity growth, 1991–2012
(Divisia index decomposition)

| | | Direct productivity effect | Reallocation effect | Terms-of-trade effect | Labour productivity growth rate (Per cent) | Contribution to employment |
|---------------------------------|-------------|----------------------------|---------------------|-----------------------|--|----------------------------|
| Developed countries | Agriculture | 1.7 | -1.4 | -0.8 | | |
| | Industry | 14.0 | -10.1 | -3.0 | | |
| | Services | 14.3 | 14.4 | 4.2 | | |
| | Total | 29.9 | 2.9 | 0.4 | 33.3 | |
| ODCs | Agriculture | 13.1 | -7.4 | 0.4 | | -17.2 |
| | Industry | 33.4 | 13.5 | 2.7 | | 7.0 |
| | Services | 29.2 | 31.2 | -1.8 | | 16.4 |
| | Total | 75.7 | 37.3 | 1.2 | 114.2 | 6.1 |
| LDCs | Agriculture | 12.6 | -5.3 | -3.4 | | -5.0 |
| | Industry | 21.0 | 5.2 | 6.2 | | 2.0 |
| | Services | 5.2 | 19.9 | -1.3 | | 9.6 |
| | Total | 38.9 | 19.8 | 1.4 | 60.0 | 6.6 |
| African LDCs and Haiti | Agriculture | 6.7 | -3.5 | -4.2 | | -3.0 |
| | Industry | 16.7 | 5.9 | 7.2 | | 1.5 |
| | Services | 0.3 | 13.0 | -2.0 | | 6.8 |
| | Total | 23.6 | 15.5 | 1.0 | 40.1 | 5.3 |
| Asian LDCs | Agriculture | 23.9 | -9.1 | -1.9 | | -7.9 |
| | Industry | 23.7 | 6.0 | 4.0 | | 3.8 |
| | Services | 15.6 | 33.1 | 0.2 | | 14.5 |
| | Total | 63.3 | 29.9 | 2.3 | 95.5 | 10.4 |
| Island LDCs | Agriculture | 21.0 | -8.5 | -6.1 | | -20.4 |
| | Industry | 165.9 | 21.9 | -3.9 | | 0.8 |
| | Services | 8.5 | 20.3 | 4.7 | | 4.1 |
| | Total | 195.4 | 33.7 | -5.4 | 223.8 | -15.4 |
| Food and agricultural exporters | Agriculture | -14.3 | -1.7 | 2.1 | | -0.6 |
| | Industry | 4.7 | 0.4 | -15.9 | | 0.5 |
| | Services | -10.2 | 6.2 | 12.5 | | 3.9 |
| | Total | -19.7 | 4.9 | -1.3 | -16.1 | 3.8 |
| Fuel exporters | Agriculture | 15.3 | -3.8 | -13.4 | | -2.4 |
| | Industry | 32.0 | 2.1 | 23.4 | | 1.3 |
| | Services | 4.1 | 9.1 | -5.9 | | 9.7 |
| | Total | 51.4 | 7.4 | 4.1 | 62.9 | 8.5 |
| Mineral exporters | Agriculture | -6.6 | 0.2 | 2.3 | | 4.4 |
| | Industry | 12.9 | -5.6 | -0.9 | | -0.8 |
| | Services | 2.4 | 1.5 | -2.7 | | 1.7 |
| | Total | 8.8 | -3.9 | -1.3 | 3.5 | 5.3 |
| Manufactures exporters | Agriculture | 14.7 | -8.8 | -1.9 | | -9.7 |
| | Industry | 29.4 | 3.0 | -2.7 | | 3.0 |
| | Services | -1.6 | 44.3 | 5.9 | | 19.1 |
| | Total | 42.5 | 38.4 | 1.3 | 82.2 | 12.4 |
| Services exporters | Agriculture | 8.2 | -6.8 | 0.1 | | -7.4 |
| | Industry | 3.6 | 10.3 | 2.1 | | 3.6 |
| | Services | 9.3 | 20.2 | 2.5 | | 7.2 |
| | Total | 21.0 | 23.6 | 4.7 | 49.3 | 3.4 |
| Mixed exporters | Agriculture | 28.2 | -6.6 | 2.0 | | -3.2 |
| | Industry | 17.3 | 7.1 | 2.6 | | 3.1 |
| | Services | 16.7 | 18.4 | -5.0 | | 9.9 |
| | Total | 62.1 | 18.8 | -0.4 | 80.5 | 9.8 |

Source: As for chart 25.

First, better economic performance is associated with a combination of significant contributions from changes within and between sectors. From an analytical perspective, rapid expansion of output per worker at the aggregate level can result from large productivity gains within sectors alone. However, both theoretical arguments and empirical evidence suggest that, at the LDCs' stage of development, sustained economic growth also requires structural change. Country groups with an annual rate of growth of 3 per cent or more have experienced both faster rates of growth of productivity within sectors and more profound changes in sectoral shares of employment. Sectoral reallocation of labour has contributed 30 or more percentage points to the expansion of aggregate productivity in the ODCs, Asian and island LDCs and exporters of manufactured goods. However, the nature and direction of structural change is also important.

Better economic performance is associated with a combination of significant contributions to higher aggregate productivity from changes within and between sectors.

Second, among all LDC groups, only exporters of manufactures surpassed ODCs' record on productivity gains caused by intersectoral reallocation of labour. Notwithstanding the high level of aggregation, these numbers reflect important differences in the pace and nature of structural transformation between LDCs and ODCs. Among the geographical/structural LDC groups, direct productivity and reallocation effects have been greatest in island LDCs, once again due to Timor-Leste. Asian LDCs are second, with a 63.3 percentage point contribution from sectoral productivity growth and 30 percentage points from faster employment growth in higher productivity sectors. Economic performance in the African LDCs and Haiti has been much more modest: neither improvements in sectoral output per capita nor changes in the composition of employment have been strong enough to expand aggregate labour productivity as much as in other LDC regions. The weight of African LDCs and Haiti in total LDC population and output means that the decomposition results for LDCs as a whole primarily reflect the performance of this group.

Among all LDC groups, only exporters of manufactures surpassed ODCs' record on productivity gains caused by intersectoral reallocation of labour.

Third, there is a greater imbalance between the contributions of productivity increases within sectors and of reallocation between sectors in LDCs that are dependent on extractive industries than in other LDC groups. In the island LDCs and fuel and mineral exporters, increases in productivity within sectors are responsible for more than 80 per cent of the overall rise in productivity. The proportions are, in fact, very similar to those for developed countries, the important difference in this comparison being that the economic structure of developed countries has reached maturity, while in LDCs it is an ongoing process. In developed countries, the great majority of workers are employed in productive activities, whereas most workers in LDCs remain in activities characterized by very low levels of productivity.

There is a greater imbalance between the contributions of productivity increases within sectors and of reallocation between sectors in LDCs that are dependent on extractive industries than in other LDC groups.

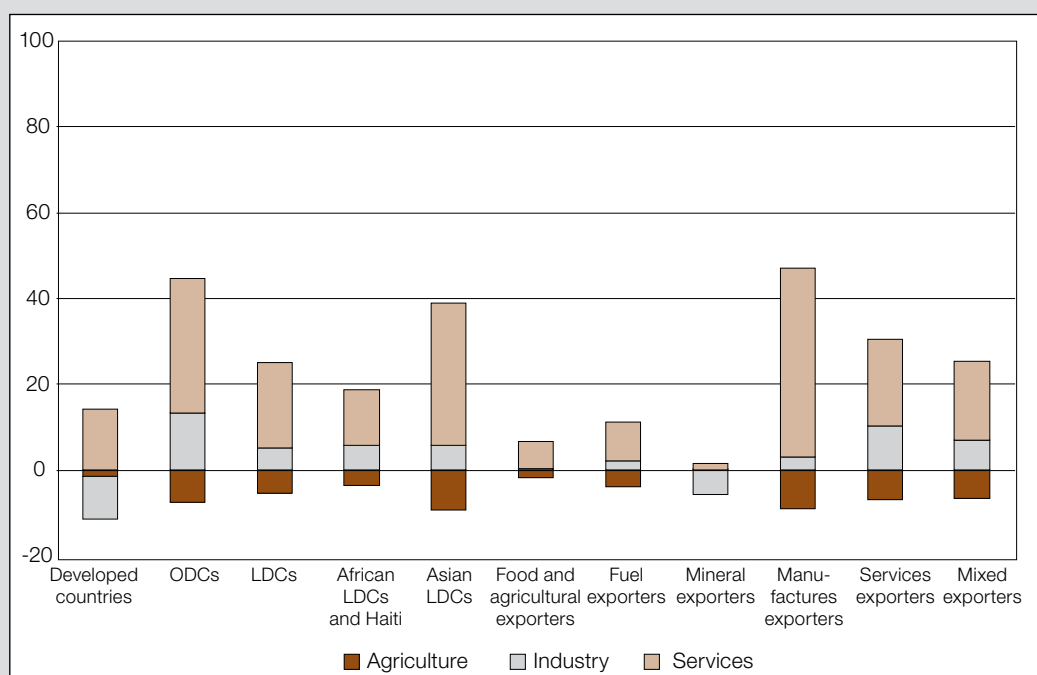
These results thus reflect a lack of structural transformation in many LDCs, particularly the fuel and mineral exporters. Between 1991 and 2012, reallocation of labour between sectors contributed only 4.9 percentage points to labour productivity expansion in fuel exporters, and led to a decline of 3.9 percentage points in mineral exporters. In island LDCs, while the rise in aggregate labour productivity is accounted for mostly by direct productivity effects, reallocation effects give rise to a 34-percentage-point increase in output per worker, comparable to other, more dynamic, developing economies. Once again, however, most of the dynamic structural change occurred in Timor-Leste.

Structural transformation has been slow in many LDCs, particularly the fuel and mineral exporters.

2. SECTORAL CONTRIBUTIONS TO LABOUR PRODUCTIVITY GROWTH

Charts 29 and 30 show direct productivity and reallocation effects by sector, thus providing further insights into the sources of overall economic performance and the nature of structural transformation in the LDCs. The main conclusions are summarized by the correlation coefficients in table 16.

Chart 29. Sectoral contributions to labor productivity growth from reallocation effects, 1991–2012
(Per cent)



Source: As for chart 25.

Higher aggregate output per worker is most strongly associated with higher productivity in the industrial sector, and with the transfer of workers to this sector.

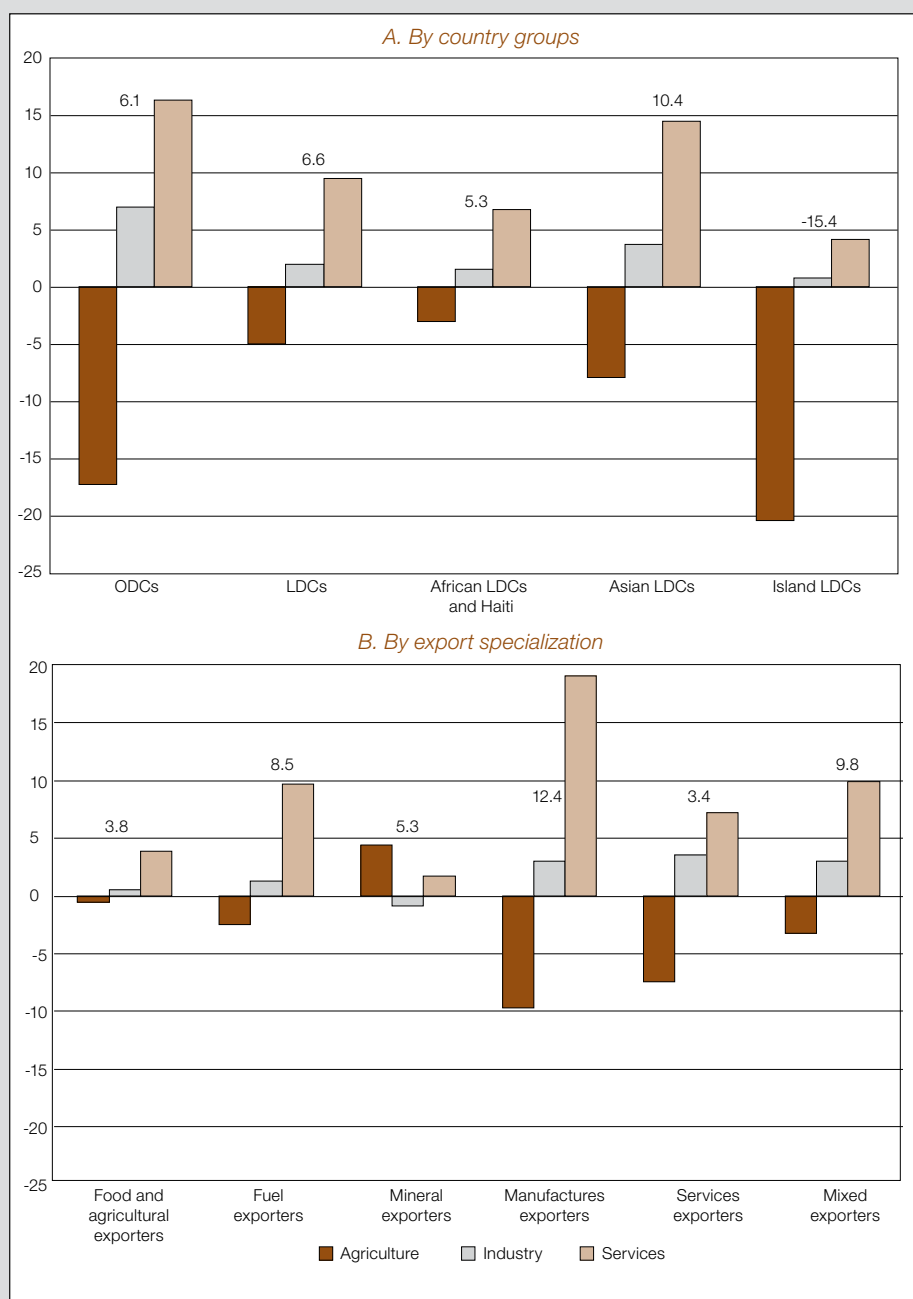
First, higher aggregate output per worker is most strongly associated with higher productivity in the industrial sector, and with the transfer of workers to this sector. This observation is in line with the traditional structuralist view of the industrial sector as the main driver of productivity gains and productive structural transformation in developing countries (Ocampo et al., 2009; Ocampo, 2005). However, not all industries are the same. The manufacturing sector, in particular, is considered the “leading sector” due to its greater economies of scale, fast learning and potential for the adoption of new and better technologies, as well as its deep linkages with the rest of the economy (Ocampo, 2005).

The second most important contributor to aggregate productivity growth is agriculture, given its share in output and employment.

The industrial sector has been the most dynamic in the ODCs, contributing 33.4 percentage points in direct productivity gains and 13.5 percentage points as a result of its absorption of labour (table 15, and charts 28 and 29). It is this pattern, combining large gains in productivity and in employment in high productivity activities, which is needed for successful transformation and sustained economic growth. While industrial productivity and the shifting of labour to industry has been significant in island LDCs as well, the pattern for other LDC groups has been mixed. Some LDC groups experienced large contributions from productivity growth within the industrial sector, notably Asian LDCs (23.7 percentage points), fuel exporters (32 percentage points) and exporters of manufactures (29.4 percentage points). However, their gains from reallocation of labour to industry have been more modest: 6 percentage points for the Asian LDCs, and less for the others.

The second most important contributor to aggregate productivity is agriculture, given its share in output and employment. More than half the LDC groups had positive contributions — in double digits — from direct productivity gains in agriculture between 1991 and 2012. In mixed exporters, for example, agricultural output per worker increased by 2.8 per cent per year, adding 28.2 percentage points to economy-wide labour productivity over the period as a whole. Contributions from productivity within the agricultural sector were also

Chart 30. Sectoral contributions to growth in employment-to-population ratio, 1991–2012
(Per cent)



Source: UNCTAD secretariat calculations, based on data from ILO, *Global Employment Trends 2014* database for employment data (accessed June 2014); UN/DESA, *Demographic Yearbook Database* for population data (accessed June 2014).

Note: The figures above the bars indicate the rate of change of the aggregate employment-to-population ratio growth.

Table 16. Correlation of aggregate labour productivity growth and its decomposition terms
(Correlation coefficients)

| | Between direct and aggregate productivity | Between reallocation and aggregate productivity | Between reallocation and direct productivity |
|-------------|---|---|--|
| Agriculture | 0.73 | -0.75 | -0.80 |
| Industry | 0.88 | 0.81 | 0.67 |
| Services | 0.46 | 0.50 | 0.37 |

Source: As for chart 25.

positive, though less impressive, in the African LDCs and exporters of services, but negative in exporters of minerals, and in exporters of food and agricultural products.

Reallocation effects in agriculture were negative for all groups, reflecting a reduction in its share in employment as a result of a reallocation of labour to other, higher productivity sectors. This is a positive sign. Indeed, the correlation coefficient between agricultural reallocation terms and aggregate productivity in table 16 is -0.75, confirming that a negative reallocation term for the agricultural sector is associated with higher productivity growth.

While most of the labour force in LDCs is employed in agriculture, the highest rates of employment growth have been registered in the services sector. This presents policymakers with potential opportunities as well as challenges. The conceivable opportunities can be found in potential linkages between the services sector and high productivity industrial activities. Integration of activities across sectors could foster technological and human capital spillovers, and therefore faster growth in labour-intensive activities such as services. However, this is not the situation prevailing in LDCs, where policy efforts aimed at the structural transformation of the services sector face the challenges of the informal nature of many service activities, a lack of productive capabilities — especially at the firm level — and a generally low level of capital and information technology (Salazar-Xirinachs et al., 2014). Coupled with a weak development policy framework, these constraints have been responsible for the lack of dynamism in the services sector in many LDCs (as well as ODCs), as employment growth in this sector has often been at the expense of gains in labour productivity.

However, the decomposition analysis reveals a diverse picture concerning the performance of the services sector across country groups. The sector added double-digit gains in direct productivity only in developed countries, ODCs, Asian LDCs and the mixed exporters group of LDCs. Even among these groups, there were significant differences: services contributed 29.2 percentage points in direct gains to overall labour productivity in the ODCs, followed, at a distance, by mixed exporter LDCs, with 16.7 percentage points. In none of the other groups did the services sector show significant increases in aggregate labour productivity; indeed it actually declined in the LDC exporters of food and agricultural products, and in the exporters of manufactures. This shows that the performance of the services sector had an adverse impact on overall economic performance of the latter LDC groups.

The figures for the LDCs confirm that most of the jobs created in services are characterized not only by low productivity, but also by strongly decreasing marginal productivity. In the exporters of manufactures, for example, growth of employment in services moved inversely with labour productivity. Between 1991 and 2005, employment in services expanded at an average annual rate of more than 7 per cent, while output per worker declined by 2.3 per cent. By contrast, the slowdown in employment growth to 1.7 per cent per year after 2005 was accompanied by an increase in productivity, at an average annual rate of 4.5 per cent.

While direct productivity gains within services have been modest, reallocation of employment to this sector has been the largest source of expansion in aggregate labour productivity in all LDC groups. Among LDC exporters of manufactures, for example, the reallocation term for the services sector explains more than half of the overall increase in labour productivity since 1991 (44.3 percentage points). However, the rise in the proportion of employment in sectors with above-average labour productivity must be accompanied by an increase in output per worker. This will not only ensure continuity of growth, but will also improve the prospects for achieving development goals.

Challenges to the structural transformation of the services sector in many LDCs include its largely informal nature, limited productive capabilities and a generally low level of capital and information technology.

In many LDCs, employment growth in the services sector has been at the expense of gains in labour productivity.

While direct productivity gains within services have been modest, reallocation of employment to this sector has been the largest source of expansion in aggregate labour productivity in the LDCs.

3. DIVISIA INDEX DECOMPOSITION OF THE EMPLOYMENT-TO-POPULATION RATIO

The first challenge for the LDCs is to generate more jobs for their increasing labour force. However, merely creating more jobs is not sufficient; the jobs must also be more productive and better paid. Although an in-depth analysis of the types of jobs created in the LDCs is not possible based on the available data, it is possible to identify which sectors have been the main drivers of employment generation. The discussion in this section adds to the previous analysis on employment trends and the composition of employment in LDCs.

Using the Divisia decomposition method, the economy-wide growth rate of the employment-to-population ratio is given by the average of the sectoral rates of increase, weighted by their labour shares. A sector creates jobs in excess of population growth if its output per capita grows faster than its labour productivity. This condition can be expressed as the ratio of the income per capita index, (D_{inc}), to the productivity index, (D_{prod}), that is $D_{empl} = D_{inc}/D_{prod}$.

This subsection seeks to combine this decomposition with the analysis of sectoral contributions to aggregate labour productivity, in order to identify the most dynamic sectors in the LDCs, defined as sectors which create jobs, and where both output per capita and labour productivity grow rapidly (that is, where both D_{inc} and D_{prod} are positive and large). The results are presented numerically in the last column of table 15, and visually in chart 30. The aggregate employment-to-population ratio was higher in 2012 than in 1991 for all country groups except for the island LDCs, where sectoral employment, especially in services, grew considerably more slowly than in the other LDC groups.

The first conclusion from chart 30 is that the agricultural sector appears to be characterized by a trade-off between employment generation and labour productivity similar to that noted above in the services sector. The employment-to-population ratio in the services sector increased in all the country groups, but in the agricultural sector it declined in all the groups except exporters of minerals. Relative to population growth, employment in services grew most strongly in the ODCs, the Asian LDCs and the LDC exporters of manufactures, where it added double-digit percentage points to the aggregate employment-to-population ratio. The smallest contribution by the services sector was recorded in the LDC exporters of agricultural products and minerals, and to a lesser extent, in the island LDCs, where the overall employment-to-population ratio declined. In the LDCs as a group, the services sector added 9.6 percentage points to the aggregate employment-to-population ratio, but with marked differences between fast- and slow-growing country groups.

Among the more rapidly growing countries, the positive contribution of services to employment growth in the ODCs, the Asian LDCs and the mixed LDC exporters was the result of output per capita growth in services outpacing the productivity increases that underlie its overall positive contribution to growth (chart 27). Exporters of manufactures appear to have the least dynamic services sector among the faster growing groups. Employment generation in this group was accompanied by stagnating labour productivity, indicating that most of the jobs created were in low-productivity (generally informal) activities. The same pattern applies to most of the slower growing groups, where, although employment in services increased significantly, the sector's direct contribution to economy-wide productivity growth was generally insignificant or negative. Underemployment in services thus appears to have been the major mechanism to absorb the excess supply of labour in these economies. Nonetheless, since average productivity in services is higher than in agriculture, which is the main source of labour supply, the reallocation effects (reflected in chart 29) added to overall productivity growth.

Merely creating more jobs in LDCs is not sufficient; the jobs must also be more productive and better paid.

The aggregate employment-to-population ratio was higher in 2012 than in 1991 for all country groups except for the island LDCs.

The agricultural sector appears to be characterized by a trade-off between employment generation and labour productivity similar to that in the services sector.

Underemployment in services appears to have been the major mechanism to absorb the excess supply of labour in slower growing LDC groups.

The rate of productivity growth in the industrial sector tended to exceed the sector's growth in output per capita.

The industrial sector in ODCs added 7 percentage points to the employment-to-population ratio. The next best performers in industrial employment, with contributions ranging between 3 and 3.8 percentage points, were the Asian LDCs, and the manufactures, services and mixed exporters. Consistently with charts 29 and 30, the rate of productivity growth in the industrial sector tended to exceed that sector's growth in output per capita. This conforms to a structuralist observation in development economics, that the industrial sector is the main motor of productivity increases but not necessarily of job creation (Ocampo et al., 2009).

F. Structural transformation, economic growth and the MDGs

This section builds on the preceding analysis to examine the links between structural transformation, economic growth and progress towards the MDGs in the LDCs. In particular, it examines how changes in the structure of the LDCs' economies since the early 1990s relate to their observed progress in economic and human development in a number of areas. It also studies how differing degrees of structural transformation affect the growth-MDGs nexus, and to what extent divergences in performance relative to the MDGs between LDCs with comparable economic growth rates can be explained by differences in processes of structural and productive transformation.

There is a positive relationship between the overall growth rate and changes in employment shares in services and industry in LDCs.

1. STRUCTURAL TRANSFORMATION AND ECONOMIC GROWTH

Chart 31 presents scatter plots of annual growth rates in value added per capita against percentage point changes in the employment shares of the three broad sectors. Rapidly growing country groups show significant structural changes in employment shares across all sectors, but particularly for agriculture and services. The observed changes are in the classical direction: from agriculture to industry and, mostly, to services, similar to the process of structural transformation undergone by countries now at higher levels of income. The negative correlation for agriculture, shown in panel A of chart 31, contrasts with the positive correlations in the other panels, showing the positive relationship between the overall growth rate and changes in employment shares in services and industry. In line with insights from traditional structuralist economics, more dramatic structural shifts in employment away from agriculture are associated with higher rates of economic growth.

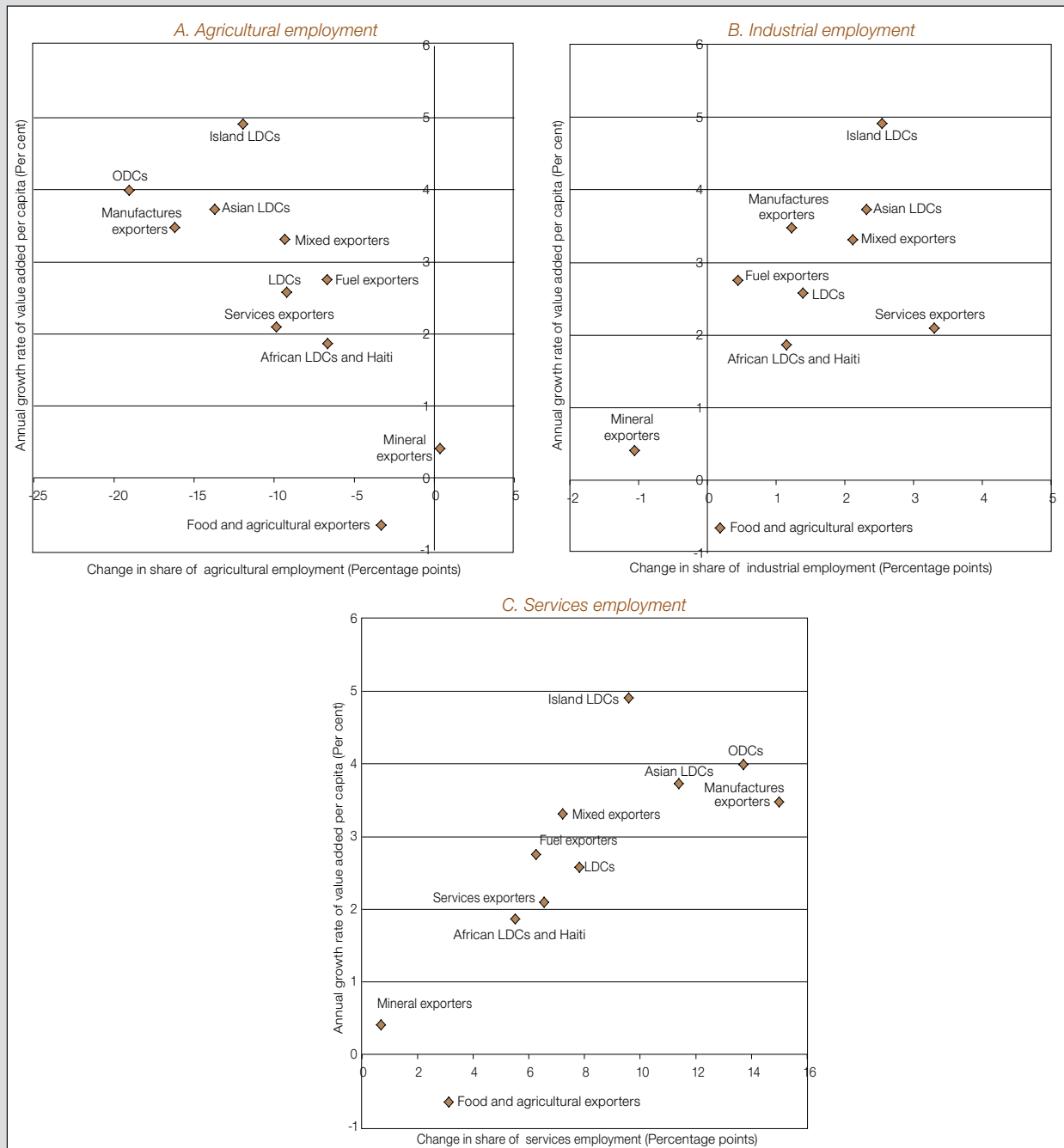
Stronger structural shifts in employment away from agriculture are associated with higher rates of economic growth.

Chart 26 underlines the importance of productive structural transformation for overall economic performance in the LDCs. Their economic growth appears to have resulted from two separate processes. First, there has been a shift of employment from low-productivity agricultural activities to service activities with higher productivity. However, this shift has not been accompanied by an equivalent increase in output growth in the services sector. As a result, as is evident in chart 26, labour productivity in services expanded only modestly over the period. The second source of growth is labour productivity in industry, which was faster than in agriculture or services in 1991–2012 in all LDC groups. The challenge in industry has been the creation of enough jobs to increase the sector's share in total employment.

2. STRUCTURAL TRANSFORMATION AND HUMAN DEVELOPMENT

This subsection presents a Structural Transformation Index based on the first Divisia index results analysed in section E above. This excludes the component

Chart 31. Structural changes in the composition of employment and annual growth rates of output per capita, 1991–2012



Source: As for chart 25.

reflecting variations in relative prices (i.e. the terms-of-trade effect) so as to focus on changes in aggregate productivity arising from productivity changes within sectors and reallocation between sectors. The Index is thus calculated as the simple arithmetic sum of the direct productivity term measuring gains in aggregate output per worker due to increases in productivity within each sector, and the reallocation term capturing the effects of changes in employment shares between sectors.

The following analysis considers two critical aspects of human development: poverty (MDG 1) and enrolment in primary education (MDG 2). It considers whether LDCs' progress in these areas since 1991 is related to their structural and productive transformation during this period. Panel A of chart 32 presents the performance of all LDCs relative to target 1A of MDG 1 (halving the

Countries where transformation was faster performed better in terms of poverty reduction than those where transformation was slower.

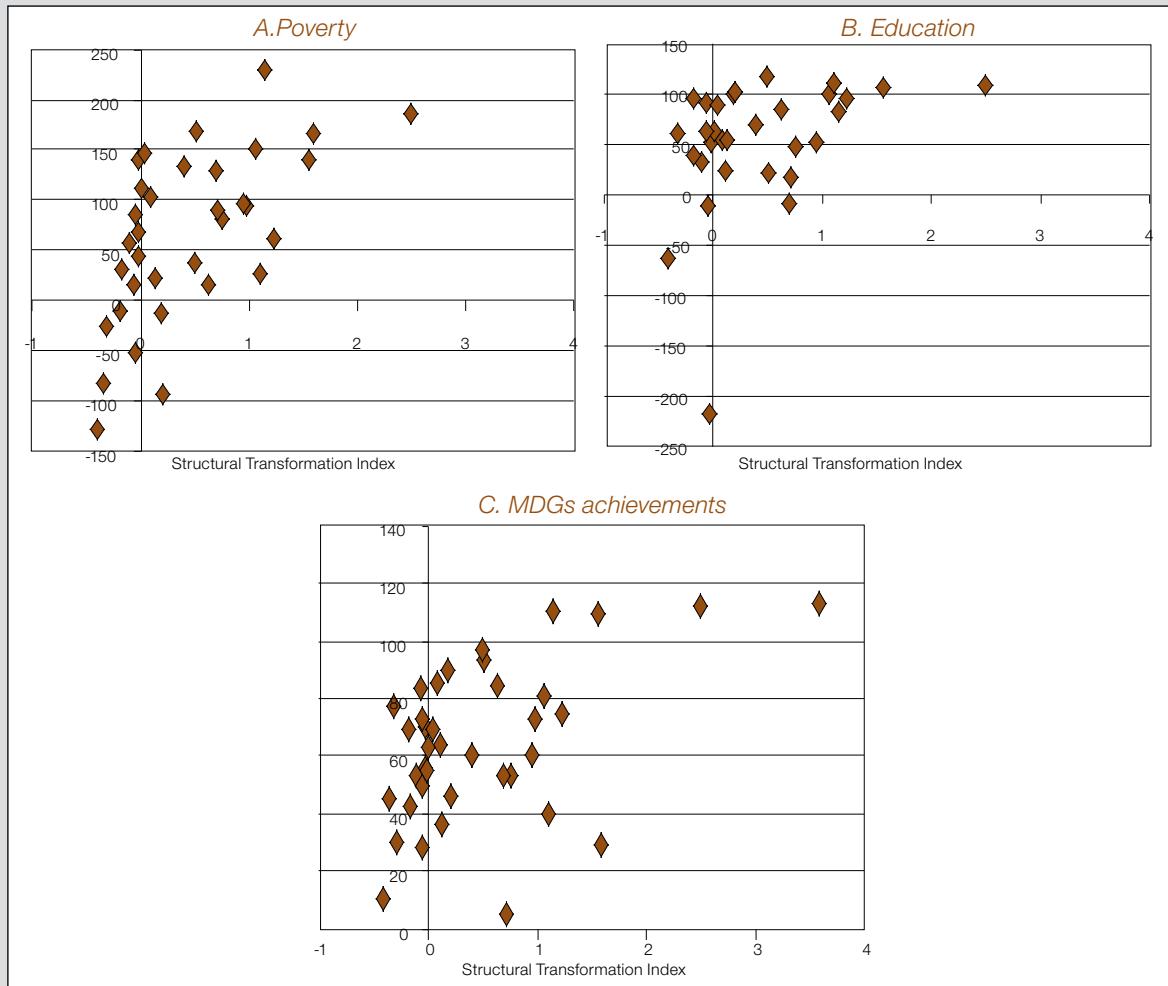
poverty headcount ratio at the \$1.25-a-day poverty line) against the Structural Transformation Index. It suggests a strong and positive association between structural change and progress in halving poverty: countries that achieved faster transformation performed better in terms of poverty reduction than those where transformation was slower. Asian LDCs such as Bhutan, Cambodia and Nepal, which have experienced rapid transformation of their economic structures over the past two decades, have also been among the highest achievers in reducing poverty.

There is a significant positive correlation between structural change and average progress across MDG targets.

A similar result holds for educational attainment: as depicted in panel B of chart 32, progress in primary school enrolment appears to be strongly related to structural transformation, economies performing satisfactorily on MDG 2 also displaying, on average, higher rates of transformation.

This pattern is generally replicated across other MDG targets, suggesting a significant positive correlation between structural change and the average progress across all the MDG targets analysed in chapter 2 of this Report, as shown in panel C of chart 32.

Chart 32. Progress towards MDG and Structural Transformation Index in LDCs (Per cent)



Source: As for chart 25; and World Bank, *World Development Indicators* database and *PovCalNet* (accessed August 2014).

Notes: The Structural Transformation Index is the arithmetic sum of the first two components of the first Divisia index (i.e. the direct productivity term which measures gains in aggregate output per worker due to increases in productivity within sectors, and the reallocation term capturing changes in employment shares across sectors with different levels of output per capita). MDGs achievement is the average of the degree of achievement of the seven MDG targets analysed in chapter 2 of this Report.

Structural change and sustained increases in labour productivity are necessary for the income growth needed to achieve development goals, as discussed in chapter 2 of this Report. This double nexus partly explains why there is such a strong correlation between progress towards the MDGs and the Structural Transformation Index.⁸

3. THE INTERACTION BETWEEN STRUCTURAL TRANSFORMATION, ECONOMIC GROWTH AND HUMAN DEVELOPMENT

The rise and decline of economic sectors leads to constant changes in the opportunities available to people and the capabilities required of them. This can either favour social mobility and innovation, or, conversely, create unsustainable levels of inequality in income and knowledge, hampering dynamic economic development. By simultaneously increasing productivity within sectors and shifting labour from lower- to higher-productivity sectors, the type of productive structural transformation discussed in this Report would increase the number and quality of jobs, and thus facilitate the achievement of human development objectives for a given rate of income growth.

The impact of structural transformation on the relationship between growth and human development can be investigated by comparing dynamic and lagging LDC economies — those with a value of the Structural Transformation Index respectively above and below the LDC average — in terms of the relationship between their economic growth and MDG performance. With the exception of MDG 4 (reducing the under-five mortality rate), the correlation between average annual per capita income growth over the period 1991–2012 and performance relative to the MDG targets is consistently stronger in the dynamic economies than in the lagging economies.

Panel A of Chart 33 presents data on primary education enrolment as an illustration. It shows that those countries experiencing a faster-than-average structural transformation display a much stronger correlation between growth and net primary enrolment ratios than those where transformation has been slower, the impact of income growth in the latter case being close to zero. Panel B of chart 33 shows the varying impact of growth on the completion rate of target 1C of MDG 1 (undernourishment). Again, the association with growth is strongly positive for dynamic economies, but negligible in the lagging economies. Panel C repeats the exercise for target 7C of MDG 7 (halving the number of people without access to sanitation). While the impact of income growth here is significantly different from zero even in lagging LDCs, the correlation coefficient is much higher for the dynamic economies.

These results strongly support the finding that economic growth is much more effective in improving the living conditions of the most vulnerable people where it is accompanied by structural transformation.

G. Summary and conclusions

The failure of most LDCs to achieve the majority of MDG targets mainly reflects their limited success in creating decent, productive and adequately paid jobs. This, in turn, is due to the failure of most LDCs to achieve significant structural transformation; that is, to reallocate labour towards higher-productivity sectors and sustain strong labour productivity growth within sectors.

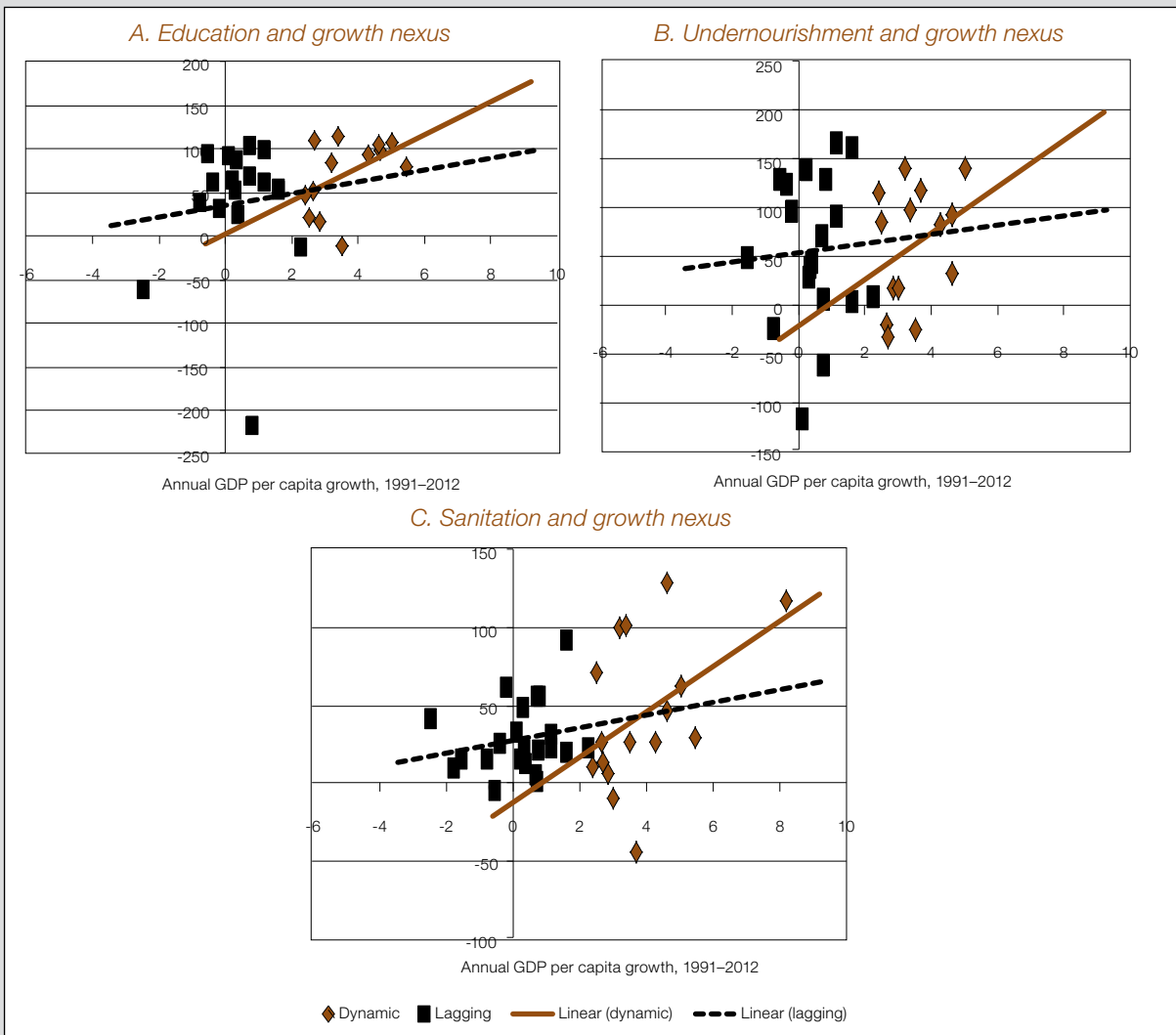
Structural change and sustained increases in labour productivity are necessary for the income growth needed to achieve development goals.

The correlation between average annual per capita income growth and performance relative to the MDG targets is consistently stronger in the dynamically transforming LDCs than in the lagging economies.

Economic growth is much more effective in improving the living conditions of the most vulnerable people where it is accompanied by structural transformation.

The failure of most LDCs to achieve the majority of MDG targets mainly reflects their limited success in creating productive and adequately paid jobs and in achieving significant structural transformation.

Chart 33. Impact of structural transformation on the nexus between growth and selected MDGs in LDCs (Per cent)



Source: As for chart 32.

Notes: LDC economies are divided in two groups around the sample average of the Structural Transformation Index (0.48). Dynamic economies are those countries with above average index value and lagging economies are the remaining ones.

Growth of overall productivity has been strongest in exporters of manufactures and mixed exporters, but it has stagnated in mineral exporters, and declined in food and agricultural goods exporters.

Growth of overall productivity has varied considerably among LDC groups since the 1990s. It has increased the most in exporters of manufactures and mixed exporters, but stagnated in mineral exporters, and declined in food and agricultural goods exporters. Labour productivity growth in the Asian LDCs has been double that in the African LDCs and Haiti.

The largest single source of expansion in aggregate labour productivity in all LDC groups has been the shift of labour from agriculture to services.

The largest single source of expansion in aggregate labour productivity in all LDC groups has been the shift of labour from agriculture to services. This has also been the largest intersectoral movement of labour, greater than the movement from agriculture to industry. The greatest decline in the agricultural sector's share of employment has occurred in exporters of manufactures (mainly Asian LDCs), but it has stagnated in fuel exporters and fallen only marginally in food and agricultural goods exporters (mainly among the African LDCs and Haiti). As a result, the movement away from agriculture has been much stronger in the Asian LDCs than in the African LDCs and Haiti.

Output per worker is higher in services than in agriculture, which explains why this intersectoral shift has increased overall productivity. However, labour productivity within the services sector has been virtually stagnant in LDCs

since the early 1990s. This is because most of the additional employment in services has been in low-productivity informal jobs taken by rural migrants to urban areas, who, failing to find jobs in industry, have been forced to resort to low-productivity informal jobs as a “refuge” activity. This makes a negligible contribution to structural transformation, as it represents the movement of labour into activities with low productivity (though somewhat higher than agriculture) and few prospects for future productivity growth.

Higher productivity within the agricultural sector has also contributed to the overall rise in productivity in LDCs as a whole, but it has grown at less than half the rate in the ODCs. It has also varied very widely among the different LDC groups, remaining largely stagnant in the African LDCs and Haiti overall, and declining in exporters of both food and agricultural goods and minerals.

Productivity in industry has also improved, largely because that sector’s share of output has grown at the expense of agriculture and, to a lesser extent, services, while its share in employment has increased relatively little. This output growth has been driven mainly by the growth of extractive industries in fuel and mineral exporters, and of manufacturing output in exporters of manufactures. However, the extractive industries generally generate little employment and have limited linkages with the rest of the economy, therefore providing little, if any, benefit to most of the population. There was a steep decline in industrial labour productivity in fuel-exporting LDCs following the 2008–2009 global financial and economic crisis, though it continued to rise in exporters of manufactures. This demonstrates the vulnerability of countries dependent on extractive industries to international commodity cycles. These economies have also relied so heavily on increases in productivity within their extractive industries sectors, that they have experienced little economic transformation resulting from intersectoral shifts in labour.

The fastest-growing LDCs are those that have experienced both forms of productivity growth; that is, significant structural changes in employment shares between sectors as well as productivity growth within sectors. Labour movements between sectors have had the greatest impact on aggregate labour productivity growth in exporters of manufactures.

Overall growth rates closely reflect sectoral changes in employment: economic growth is negatively correlated with the share of agriculture in employment, but positively correlated with the shares of industry and services. The LDCs which have experienced the greatest structural transformation are also those that have made the greatest progress towards attaining the MDGs. Moreover, economic growth has been much more strongly correlated with MDG performance in countries with above-average structural transformation than those which have experienced less structural transformation. This is indicative of the importance of structural change in achieving human development goals.

Labour productivity within the services sector has been virtually stagnant in LDCs since the early 1990s.

Low-productivity informal jobs in the services sector make a negligible contribution to structural transformation.

Higher productivity within the agricultural sector has contributed to the overall rise in productivity in LDCs as a whole, although it has grown at less than half the rate in the ODCs.

Productivity in industry has also improved, driven mainly by the growth of extractive industries in fuel and mineral exporters, and of manufacturing output in exporters of manufactures.

Countries dependent on extractive industries have experienced little economic transformation resulting from intersectoral shifts in labour.

The LDCs which have experienced the greatest structural transformation are also those that have made the greatest progress towards attaining the MDGs.

Notes

- 1 In the present analysis, the group of island LDCs consists only of Comoros, Solomon Islands and Timor-Leste, due to the lack of data for the other island LDCs. In this reduced grouping, the economic performance of island LDCs has been driven almost exclusively by the extractive industries in Timor-Leste.
- 2 Exporters of manufactures are dominated by Asian LDCs, of which Bangladesh is the largest and most important economy.
- 3 The fuel exporters group in this analysis includes five LDCs, all of them African. Services exporters are a more diverse group, but most of them are African LDCs.
- 4 The definition of these broad sectors is based on ISIC Rev.3 (International Standard Industrial Classification of All Economic Activities, Revision 3) sections as follows: agriculture: A–B, industry: C–F, services: G–Q. These three broad sectors of economic activity are also often referred to as primary, secondary and tertiary, respectively, but this Report uses the terms “agriculture”, “industry” and “services” for ease of reference.
- 5 Examining LDC groups by export specialization, the major change in the importance of the services sector during the period took place in services exporters, where the sector expanded by 9 percentage points, and in fuel exporters, where it shrank by the same proportion.
- 6 For a detailed discussion of the Divisia decomposition method, see Ang (2004) and Diewert (2010).
- 7 The terms-of-trade effect for the macro economy is relatively minor, since, by definition, changes in terms of trade across all sectors should be close to zero (Diewert, 2010).
- 8 This conclusion is consistent with findings in the economic development literature that highlight the linkages between per capita income growth and human development (e.g. Dollar and Kraay, 2002; Ravallion, 2001). Besley and Burgess (2003), for example, estimate an elasticity of poverty with respect to income per capita of around -0.73, with a (robust) standard error of 0.25. This confirms that increases in per capita income are associated with reductions in poverty, and implies that an annual growth rate of around 3.8 per cent, sustained for 25 years, would cut the poverty rate by half. More recent studies also document the effect of per capita income on other dimensions of human development (Sánchez and Vos, 2009).

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