3

Sub-Regional Perspectives on Structural Change

Pedro M. G. Martins

Introduction

There is a renewed interest in the role that structural change can play in stimulating economic growth (McMillan and Heady 2014). Developing countries have significantly improved their economic performance since the early 2000s, but there are mounting concerns about the inclusiveness and sustainability of current growth patterns. In particular, the recent growth accelerations have not always been translated into concomitant improvements in socio-economic indicators—such as the poverty headcount—and broad-based economic development. This chapter investigates the pace and pattern of structural change in developing regions with a view to better understand the key drivers of economic growth and provide insights on how to enhance it.[1]

[1]This chapter is based on the gross domestic product (GDP) production approach, rather than the (perhaps more common) expenditure approach. Therefore, instead of assessing whether it is

P. M. G. Martins (✉)
World Bank, Washington, DC, USA
e-mail: pmartins@worldbank.org

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The early literature on structural change dates back to the 1950s and 1960s. For instance, Kuznets (1957), Chenery (1960) and Chenery and Taylor (1968) uncover important stylised facts on the relationship between a country's economic structure and its income level. This literature posits that structural change is a key characteristic and driver of economic and social development. Structural change can be narrowly defined as a process whereby labour moves from low-productivity to higher-productivity sectors. This relocation of labour raises workers' productivity, which contributes to accelerating economic growth. In developing countries, labour productivity in agriculture is considerably lower than in the non-agricultural sector (Gollin et al. 2014). This suggests that a reallocation of labour from agriculture to industry and services would considerably boost aggregate productivity and economic growth. Broader definitions of structural change go beyond changes in economic structure—such as production and employment—as they also encompass changes in other aspects of society (Kuznets 1966). For instance, structural change may entail a spatial reorganisation of the population, through rural-urban migration, and demographic change, arising from lower fertility rates. This chapter adopts a broader view of structural change.

The recent emphasis on structural change has led to a rapidly expanding body of theoretical and empirical work. Herrendorf et al. (2014) review recent advances in the literature. Datasets have been compiled to document regional patterns—with varying degrees of sectoral disaggregation and country coverage. This chapter, however, uses a much more comprehensive dataset and focuses on the sub-regional level in order to offer deeper and richer insights into the recent dynamics of structural change. Moreover, the empirical literature decomposes aggregate labour productivity growth into within-sector and between-sector (structural) effects. In this chapter, we adopt an empirical methodology based on the decomposition of output per capita—rather than output per worker. This strategy enables an empirical assessment that is compatible with a broader concept of structural change. In addition to evaluating within-sector and between-sector productivity effects, we estimate the

consumption, investment or exports that is stimulating economic growth, we investigate which economic sectors are driving economic performance.

contribution of demographic and employment changes to economic growth. Lower dependency ratios can generate a sizeable demographic dividend, while social preferences can impact on employment rates—through economic inactivity—which in turn affect economic growth.

This chapter is structured as follows. "Methodology and Data" presents the empirical methodology and the data used in this study. "Trends in Economic Structure" discusses trends in output, employment and labour productivity by economic sector—for regions and sub-regions. "Empirical Results" provides estimates on the relative contribution of within-sector and between-sector productivity improvements to output per capita growth, as well as the contribution of demographic change and employment rates. "Other Empirical Studies" compares these results with the evidence emerging from the existing literature. "Conclusion" concludes by summarising the main findings.

Methodology and Data

Shapley Decompositions

Most empirical studies on structural change focus on the decomposition of labour productivity growth. In this chapter, we adopt a broader framework that provides additional insights, namely, on the contribution of the employment rate and demographic change to output growth. Hence, our starting point is output per capita, which can be expressed as:

$$\frac{Y}{N} = \frac{Y}{E} \cdot \frac{E}{A} \cdot \frac{A}{N}$$

where Y is total output (value added), N is total population, E is total employment and A is the working-age population. Output per capita is represented by y, while the remaining components consist of output per worker (w), the employment rate (e) and the relative size of the working-age population (a).

$$y = w \cdot e \cdot a$$

To calculate the contribution of each of these components to changes in output per capita, we employ Shapley decompositions—see below.[2] This decomposition has the advantage of being additive and that each component has the interpretation of a counterfactual scenario.

$$\begin{aligned}\Delta y =&\Delta w\left[\frac{1}{3}(e_{t=1}a_{t=1}+e_{t=0}a_{t=0})+\frac{1}{6}(e_{t=1}a_{t=0}+e_{t=0}a_{t=1})\right]\\&+\Delta e\left[\frac{1}{3}(w_{t=1}a_{t=1}+w_{t=0}a_{t=0})+\frac{1}{6}(w_{t=1}a_{t=0}+w_{t=0}a_{t=1})\right]\\&+\Delta a\left[\frac{1}{3}(w_{t=1}e_{t=1}+w_{t=0}e_{t=0})+\frac{1}{6}(w_{t=1}e_{t=0}+w_{t=0}e_{t=1})\right]\end{aligned}$$

We can express these contributions as a share of output per capita growth by dividing each of the three terms above by Δy. Denoting $\bar{w}$, $\bar{e}$ and $\bar{a}$ as the share of growth that can be attributed to each component, output per capita growth can then be expressed as:

$$\frac{\Delta y}{y}=\bar{w}\frac{\Delta y}{y}+\bar{e}\frac{\Delta y}{y}+\bar{a}\frac{\Delta y}{y}$$

At this point, we can decompose output per worker—a measure of labour productivity. We start with the following equation:

$$w=\sum_{i=1}^{n}w_i s_i$$

where w_i represents output per worker in sector i (Y_i/E_i), s_i is the sectoral employment share (E_i/E) and n is the total number of economic sectors. This can then be decomposed into within-sector and between-sector effects, respectively:

[2]The Shapley decomposition considers the marginal effect on a variable (in our case, output per capita growth) of sequentially eliminating each of the contributory factors, and then assigns to each factor the average of its marginal contributions in all possible elimination sequences (Sorrocks 2013). See also World Bank (2015).

$$\Delta w = \sum_{i=1}^{n} \Delta w_i \left(\frac{s_{i,t=0} + s_{i,t=1}}{2} \right) + \sum_{i=1}^{n} \Delta s_i \left(\frac{w_{i,t=0} + w_{i,t=1}}{2} \right)$$

It is important to note that this decomposition differs from other studies in the literature, which will be taken into consideration when comparing results.[3] Finally, the sectoral pattern of employment rate changes can be calculated as:

$$\Delta e = \sum_{i=1}^{n} \Delta e_i$$

Figure 3.1 provides a schematic representation of the stepwise decomposition strategy used in this chapter.

Data Sources and Aggregation

This chapter uses three main sources of data. Data on sectoral employment comes from the World Employment and Social Outlook (WESO) database of the International Labour Organization (ILO). The latest release constitutes the most comprehensive source of sectoral employment data in existence. It includes annual employment data for 174 countries, which is disaggregated by 14 economic sectors and covers the period from 1991 to 2013. It should be noted that the dataset relies on modelled estimates for years and countries for which country-reported data is unavailable.

Data on sectoral output comes from the National Accounts Main Aggregates database of the United Nations Statistics Division (UNSD)—which serves under the United Nations Department of Economic and Social Affairs (UNDESA). The database provides a consistent annual dataset of national accounts aggregates for 212 countries and territories. It is based on official data reported to UNSD—through an annual questionnaire—and supplemented with data estimates for

[3] For instance, McMillan et al. (2014) use $\Delta w = \sum_{i=1}^{n} \Delta w_i (s_{i,t=0}) + \sum_{i=1}^{n} \Delta s_i (w_{i,t=1})$, while Timmer et al. (2015) use an empirically equivalent decomposition that further disaggregates the between-sector component into static and dynamic reallocation effects.

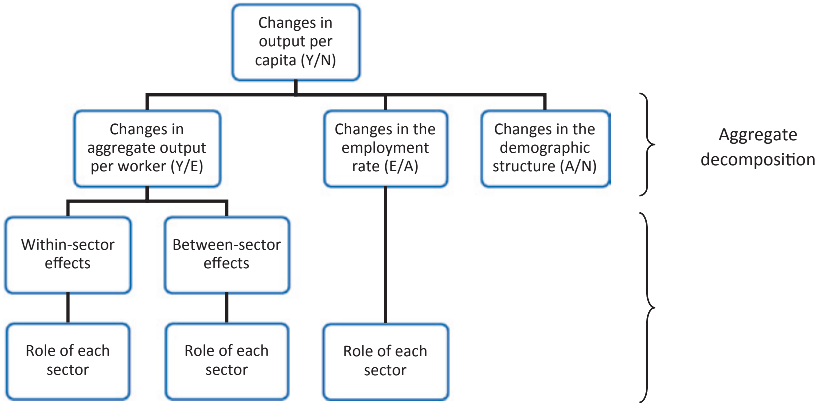

Fig. 3.1 Stepwise decomposition approach

years and countries with incomplete or inconsistent information. For the purpose of this chapter, we use gross value added (GVA) by kind of economic activity in US dollars at constant market prices.

Finally, data on total population and working-age population (i.e. 15–64 years old) comes from the World Population Prospects (2012 Revision) database of the United Nations Population Division (UNPD)—which is also under UNDESA. The database provides demographic estimates and projections for 233 countries and territories.

The consolidation of these three data sources led to a large annual dataset comprised of 169 countries. The employment data was the key binding constraint for the country sample, although Guadeloupe, Macau (China), Martinique, Réunion and Taiwan (China) had to be excluded due to the lack of (or incomplete) data on sectoral output. In 2013, these 169 countries had a combined total population of 7072 million inhabitants (compared to 7162 million for the whole world) and a total GVA of $53,139 billion (compared to $53,191 billion for the whole world). This suggests that this sample represents 98.7% of the world's population and 99.9% of global GVA.

The countries were then grouped into four main world regions—Africa, Asia, Latin America and Other (Developed). Since the aim of this chapter is to investigate patterns of structural change at the sub-regional level—with a special focus on developing countries—these countries were also classified according to 13 sub-regions in Africa, Asia and Latin America (Table 3.1). See Table 3.A1 in the Appendix for the countries included these regions and sub-regions.

Table 3.1 Sample

UN classification		Structure of study sample	
Geographical (continental) regions and sub-regions	UN member countries	Regions and sub-regions[a]	Countries
Africa	**54**	**Africa**	**49**
Eastern Africa	18	Eastern Africa	14
Middle Africa	9	Middle Africa	8
Northern Africa	6	Northern Africa	6
Southern Africa	5	Southern Africa	5
Western Africa	16	Western Africa	16
Americas	**35**	**Asia**	**48**
Caribbean	13	Central Asia	5
Central America	8	Eastern Asia	4
Northern America	2	South-Eastern Asia	14
South America	12	Southern Asia	9
		Western Asia	16
Asia	**47**		
Central Asia	5	**Latin America**	**28**
Eastern Asia	5	Caribbean	8
South-Eastern Asia	11	Central America	8
Southern Asia	9	South America	12
Western Asia	17		
		Other (Developed)	**44**
Europe	**43**		
Eastern Europe	10		
Northern Europe	10		
Southern Europe	14		
Western Europe	9		
Oceania	**14**		
Australia and New Zealand	2		
Melanesia	4		
Micronesia	5		
Polynesia	3		
Total	**193**	**Total**	**169**

[a]Due to the lack of disaggregated data, Sudan refers to 'former Sudan' and is included in Northern Africa. Eastern Asia includes Hong Kong, China (not a UN member country); South-Eastern Asia includes Fiji, Papua New Guinea and Solomon Islands (all from Melanesia); Western Asia includes West Bank & Gaza Strip (not a UN member country). The Caribbean includes Puerto Rico (not a UN member country). Following common practice, 'developed' includes Europe, as well as Canada and United States (both from Northern America), Australia and New Zealand (both from Oceania) and Japan (from Eastern Asia)—see http://unstats.un.org/unsd/methods/m49/m49regin.htm

The output data determined the level of sectoral disaggregation. The UNSD data is disaggregated into seven sectors of economic activity, which meant that the ILO 14-sector data had to be aggregated in order to ensure data consistency (Table 3.2). Both sources report data according to the third revision of the International Standard Industrial Classification of All Economic Activities (ISIC Rev.3.1). In our dataset, agriculture includes fishing (section B), while mining & quarrying (section C) and electricity, gas & water supply (section E) are lumped together. Commerce includes wholesale & retail trade (section G) and hotels & restaurants (section H). Finally, other services includes a wide range of service activities: financial intermediation (section J), real estate & business activities (section K), public administration & defence (section L), education (section M) and health & social work (section N), other service activities (section P) and activities of private households

Table 3.2 Data aggregation by ISIC section

ISIC Rev.3.1		Aggregation for this chapter	
Sector	Section	Short name	Section(s)
Agriculture, hunting & forestry	A	Agriculture	A, B
Fishing	B	Mining & utilities	C, E
Mining and quarrying	C	Manufacturing	D
Manufacturing	D	Construction	F
Electricity, gas and water supply	E	Commerce	G, H
Construction	F	Transport	I
Wholesale and retail trade; repair of motor vehicles (…)	G	Other services	J–P
Hotels and restaurants	H		
Transport, storage and communications	I		
Financial intermediation	J		
Real estate, renting and business activities	K		
Public administration and defence; compulsory social security	L		
Education	M		
Health and social work	N		
Other community, social and personal service activities	O		
Activities of private households as employers (…)	P		
Extraterritorial organizations and bodies	Q		

Note See http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17&Lg=1&Top=1

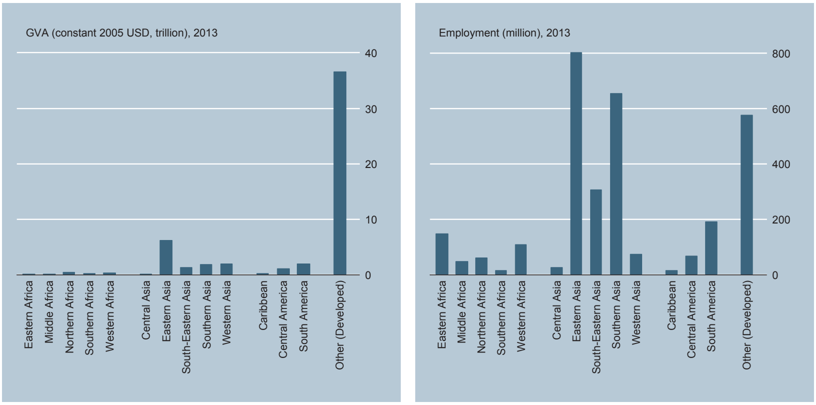

Fig. 3.2 Output and employment by sub-region

(section P). Section Q is not quantified in national accounts (output) data and is usually negligible in terms of employment.

Figure 3.2 shows aggregate output and employment levels for the 13 sub-regions.

Trends in Economic Structure

Regions

The structure of output and employment varies considerably across regions (Fig. 3.3). In 2013, the share of agriculture in total GVA ranged from 15% in Africa to under 2% in developed countries. Other services accounted for 52% of total GVA in developed countries, but represented less than 30% in Africa and Asia. Finally, manufacturing contributed to 26% of GVA in Asia, but only 11% in Africa. In terms of employment, the differences are even starker. Agriculture employed over 55% of Africa's workers while accounting for less than 5% of total employment in developed countries. Other services represented 44% of total employment in developed countries, but only 15% in Asia.

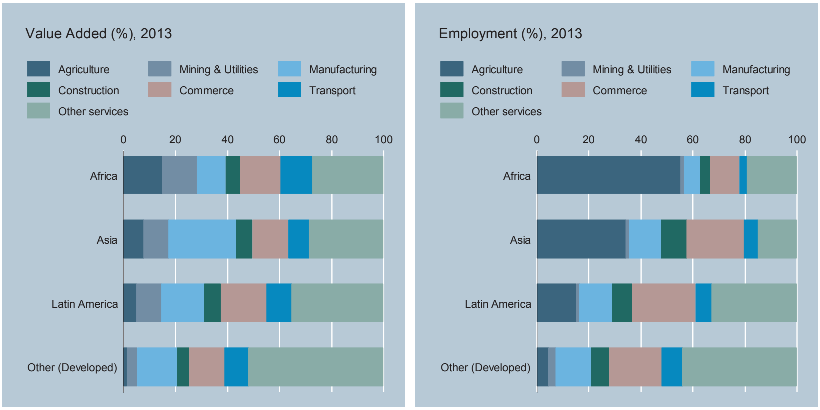

Fig. 3.3 Structure of output and employment—regions

As noted in the early literature on structural change, these differences in economic structure are partly responsible for the large income gaps observed across regions.

Africa's real GVA more than doubled between 1991 and 2013, mainly due to the strong economic performance registered since the early 2000s—see Table 3.A2 in the Appendix. The structure of production remains relatively diversified, with other services accounting for 27% of total GVA in 2013 and most other sectors also in the double-digits—construction is the only exception. Mining & utilities has seen its GVA share decline from 22% in 1991 to 13% in 2013, suggesting that the economic acceleration was not predominantly driven by natural resources, as it is often portrayed. On the other hand, transport has substantially increased its share in total GVA—from 7% in 1991 to 12% in 2013—while the share of agriculture stagnated at about 15%. Asia nearly quadrupled its real GVA in these 22 years, which led to a remarkable increase in its share of global GVA—from 10% in 1991 to 22% in 2013. The share of manufacturing in total GVA rose from 17% in 1991 to 26% in 2013, while the share of agriculture nearly halved—to 8%. Latin America achieved lower GVA growth rates than Africa and Asia, but also experienced a stronger performance during 2002–2013. Other services represented about 35% of total GVA throughout the period, while commerce and manufacturing were also important sectors. Developed countries have lagged significantly behind in terms of economic performance. In fact, aggregate GVA growth decelerated in 2002–2013—from 2.2 to 1.4%—and the construction sector even contracted. This slower growth was partly due to the global financial crisis of the late 2000s, and contributed to a declining weight in global GVA—from 82% in 1991 to 69% in 2013. Other services accounted for the majority of GVA in 2013—52%—while manufacturing and commerce accounted for a combined 29%.

The structure of employment has not changed significantly in Africa over the past 22 years, although there are encouraging signs since 2002. Employment in agriculture fell from 60% of total employment in 2002 to 55% in 2013, while other services absorbed most of this change. In Asia, the share of employment in agriculture dropped from 56% in 1991 to 34% in 2013. In fact, the absolute number of workers in agriculture fell between 2002 and 2013. Commerce, construction and other services observed large relative gains—more than 6 percentage points since 1991—while the share of manufacturing remained around 12%. There was a similar shift away from agriculture in Latin America—albeit less pronounced. The share of employment in agriculture fell from 25% in 1991 to 15% in 2013, while manufacturing also recorded a decline. Other services accrued the largest relative gains—6 percentage points. In developed countries, the share of manufacturing dropped from 22% in 1991 to 14% in 2013, while other services made important gains over this period—9 percentage points.

Sectoral output and employment data provide valuable insights on economic structure—see Fig. 3.A1 in the Appendix for annual trends. However, the concept of structural change is intrinsically linked to labour productivity. In this chapter, we use GVA per worker as a measure of labour productivity. At the global level, we note that agriculture has the lowest labour productivity by a wide margin. On average, each agricultural worker produced 2019 of output in 2013, while mining & utilities workers produced 30 times more. Exploiting these large productivity gaps can significantly boost incomes and accelerate economic development. However, the employment-generation potential of some high-productivity sectors is rather limited—such as mining & utilities—owing to their high capital intensity.

In Africa, aggregate labour productivity stagnated in the 1990s. Stronger output growth since 2002 was crucial to achieve a 2% average annual growth in productivity. Mining & utilities had the highest labour productivity in 2013—37 times higher than agriculture—despite declining since 1991.[4] The transport sector has consistently experienced strong labour productivity growth—2.5% per year since 1991. Asia has experienced very strong productivity growth over the past two decades. Despite having a lower starting point than Africa in 1991, aggregate labour productivity nearly tripled by 2013. Productivity growth in manufacturing was particularly high—7% per year—as well as in agriculture since 2002—6% per year. In Latin America, aggregate productivity growth was negligible in the 1990s. Since 2002, agriculture became an important source of aggregate productivity growth, with some support from commerce, transport and even manufacturing. However, labour productivity in mining & utilities declined significantly. Productivity growth in developed countries decelerated considerably in 2002–2013, with only agriculture and manufacturing showing positive signs.

Countries can considerably enhance their economic performance by taking advantage of existing labour productivity gaps, especially in Africa and Asia—see Fig. 3.A2 in the Appendix. As noted earlier, the employment share of agriculture—the least productive sector—declined in all regions. The key question, however, is whether agricultural labour is moving to dynamic sectors that have above-average (and growing) levels of labour productivity (Fig. 3.4). Africa observed an employment shift towards other services, a sector that lags behind mining & utilities, transport and manufacturing in terms of labour productivity. In Asia, employment shifted towards construction, commerce and other services. However, both construction and commerce had labour productivity levels below the economy-wide average, which has somewhat limited the impact of labour relocation. In Latin America, labour mainly relocated to other services, but the labour productivity of the sector is only

[4]The observed decline in labour productivity is partly due to stronger employment growth in public utilities (section E)—which is observed across all regions.

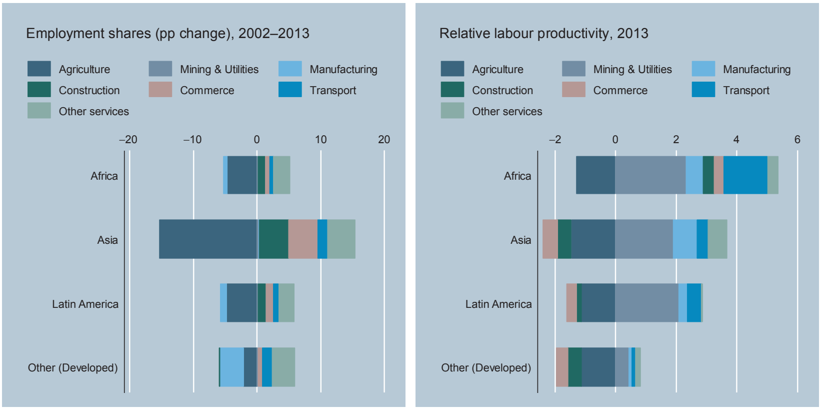

Fig. 3.4 Changes in employment and labour productivity gaps—regions (*Note* Relative labour productivity is calculated as the natural logarithm of the ratio of sectoral productivity to aggregate productivity. If a sector has the same productivity level as the whole economy, then it will not be shown in the graph—since log(1) equals zero. Large productivity gaps are represented by wider bar areas—positive or negative. If the width of a bar measures 1 unit, then the sector's productivity is 10 times higher than the average—or a tenth of the average if negative)

marginally above that of the aggregate level. Developed countries shed a considerable amount of manufacturing jobs, but since productivity gaps are small, the potential impact of structural change is more limited than in developing countries.

Africa

In this chapter, we are especially interested in sub-regional dynamics. The African region comprises five sub-regions: Eastern, Middle, Northern, Southern and Western Africa.[5] The structure of output varies

[5]It should be noted that South Africa accounted for 91% of Southern Africa's GVA in 2013 and 85% of employment, while Nigeria represented 76% of Western Africa's GVA in 2013 and 45% of employment.

Fig. 3.5 Structure of output and employment—Africa

significantly across these sub-regions (Fig. 3.5). In 2013, mining & utilities accounted for more than 43% of total GVA in Middle Africa, but less than 7% in Eastern, Southern and Western Africa. The agriculture share of GVA was about 23% in Eastern and Western Africa, but less than 3% in Southern Africa. Finally, other service s accounted for 45% of GVA in Southern Africa, but only 12% in Middle Africa. The structure of employment is even more diverse across the region. Employment in agriculture ranged from 72% of total employment in Eastern Africa to 9% in Southern Africa, while employment in other services ranged from 48% in Southern Africa to 13% in Eastern Africa. In addition, commerce accounted for 19% of employment in Southern and Western Africa, but less than 3% in Middle Africa.

All African sub-regions improved their economic record in 2002–2013. GVA growth was particularly strong in Western Africa (7.1%), Middle Africa (6.3%) and Eastern Africa (6.2%)—see Table 3.A3 in the Appendix. In Eastern Africa, the share of agriculture in GVA remained constant in 1991–2002, but then declined from 29% in 2002 to 23% in 2013. This was compensated by relative increases in construction and transport. In Middle Africa, the weight of mining & utilities in total GVA increased from 34% in 1991 to 43% in 2002, though it has flattened since then. Manufacturing, on the other hand, saw its share decline from 14% in 1991 to 8% in 2013. Northern Africa has gradually reduced its reliance on mining & utilities—from 33% of total GVA in 1991 to 19% in 2013—with concomitant increases in the remaining sectors. Southern Africa also registered a decline in the share of mining & utilities—from 14% in 1991 to 7% in 2013—while agriculture and manufacturing also had relative declines. Transport and other services increased their weight in total GVA. Finally, the relative importance of mining & utilities in Western Africa dropped from 15% of total GVA in 1991 to less than 6% in 2013, while transport increase by almost 10 percentage points—to 17% in 2013.

Employment growth rates were relatively stable in Eastern, Middle and Western Africa—around 3% per year—while Southern Africa registered a sharp fall—from 2.9 to 1.3%. In Southern Africa, the share of employment in agriculture halved—from 18% in 1991 to 9% in 2013—while other services recorded an increase of nearly 10 percentage points. Changes in the structure of employment were less pronounced in Eastern Africa. The share of agriculture declined by nearly 5 percentage points since 2002—to 72% in 2013—most of which was absorbed by other services. In Middle Africa, agricultural employment fell from 72 to 65% between 1991 and 2013, which was met by relative increases in all remaining sectors. Northern Africa saw its share of employment in agriculture decline by more than 6 percentage points—to 29% in 2013—while manufacturing fell to a lesser extent. The relative weight of the remaining sectors increased, especially the construction sector. Agriculture and manufacturing declined in Western Africa to a similar extent, while other services significantly increased their weight in total employment.

Eastern Africa had the lowest aggregate labour productivity—just above $1000 per worker in 2013—while Southern Africa's was 17 times larger. Nonetheless, all sub-regions registered an acceleration in labour productivity growth. In Eastern Africa, labour productivity was stagnant in 1991–2002, but grew by an average of about 3% per year in the subsequent period. Construction, commerce and transport were the best-performing sectors since 2002. Labour productivity declined in Middle Africa between 1991 and 2002—by 1.5% a year—although it bounced back strongly since then. Construction recorded a strong growth in productivity in 2002–2013, while the increase in

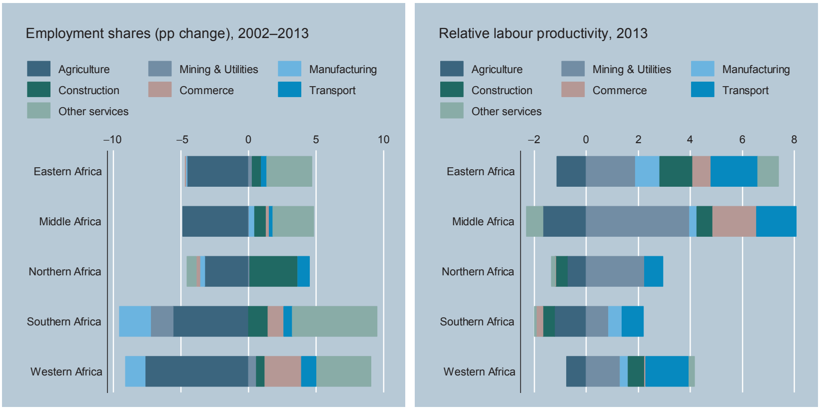

Fig. 3.6 Changes in employment and labour productivity gaps—Africa

manufacturing and other services was almost negligible. The mining & utilities sector is associated with very high productivity levels—nearly \$144,000 per worker in 2013—leaving commerce (the second highest) at a considerable distance—about \$15,000. Northern Africa only had a small improvement in productivity growth. Mining & utilities registered strong declines in both periods, thus dampening the improvements of the remaining sectors. Manufacturing and construction also had disappointing performances in 2002–2013. In Southern Africa, transport was the only sector that had a positive performance in 1991–2002, while construction suffered the largest relative decline in productivity—2.4% a year. Since 2002, transport broadly maintained its pace of improvement, while the remaining sectors improved considerably—especially agriculture. Western Africa had the strongest rate of productivity growth in 2002–2013—4% per year—despite a strong decline in mining & utilities. Manufacturing, commerce and transport all posted productivity growth rates above 6% in the 2002–2013 period.

Between 2002 and 2013, the share of employment in agriculture declined by about 5 percentage points in three African sub-regions—the reduction was smaller in Northern Africa and larger in Western Africa (Fig. 3.6). With the exception of Northern Africa, other services gained the most ground in terms of employment shares. However, we note

Fig. 3.7 Structure of output and employment—Asia

that the productivity of the sector is not often higher than the aggregate level. This may suggest that the benefits of structural change could have been significantly higher, had labour relocated to other sectors—such as manufacturing.

Asia

The Asian region comprises five sub-regions: Eastern, Central, South-Eastern, Southern and Western Asia.[6] The economic structure is less heterogeneous across Asian sub-regions than in Africa, although there are still significant variations (Fig. 3.7). For instance, mining & utilities accounted for about 24% of Western Asia's GVA in 2013, but less than 6% in Eastern Asia. Conversely, manufacturing comprised 34% of total GVA in Eastern Asia, but only 13% in Western Asia. In terms of employment, the share of agriculture ranged from 47% in Southern Asia to 17% in Western Asia, while commerce and other services also varied considerably across sub-regions.

[6]In 2013, China accounted for 78% of Eastern Asia's GVA and 96% of employment; while India was responsible for 70% of Southern Asia's GVA and 71% of employment.

Central Asia presents a fairly diversified economic structure—see Table 3.A4 in the Appendix. While there have not been major changes in the structure of output since 1991, real GVA growth rates do capture the economic decline experienced by many ex-USSR countries in the early 1990s. Manufacturing was the fastest growing sector in Eastern Asia, which led to a considerable increase in its share of GVA—rising from 22% in 1991 to 34% in 2013. Agriculture, on the other hand, saw its relative importance fall by nearly 10 percentage points. Southern Asia also observed a relative decline in agriculture—11 percentage points—which was mainly captured by transport and other services. In South-Eastern Asia, agriculture experienced a relative decline of about 5 percentage points between 1991 and 2013, while transport recorded the largest relative increase—probably supported by India's information technology (IT) sector. In Western Asia, the weight of mining & utilities and agriculture in total GVA declined, while transport increased by nearly 4 percentage points. It is worth noting that the share of manufacturing in total GVA increased in all Asian sub-regions between 1991 and 2013, while it declined in most of Africa.

Central Asia observed a considerable decline in the share of workers employed in agriculture—from 37% in 1991 to 27% in 2013—while other services recorded the largest relative increase in that period (4 percentage points). Eastern Asia is the sub-region with the largest number of workers—more than 800 million—but employment growth has been weak. Agriculture shed a substantial number of workers—about 150 million between 1991 and 2013—which has played a critical role in the overall trends. The share of employment in agriculture shrunk by 29 percentage points, which was met by increases in commerce (13 percentage points), construction (8 percentage points) and other services (nearly 8 percentage points). This points to a dramatic change in the structure of employment in a fairly short period of time, even though agriculture remains the second largest employer in the sub-region. In South-Eastern Asia, the share of workers in agriculture dropped by almost 20 percentage points. Commerce and other services made significant gains—about 5 and 7 percentage points, respectively.

Southern Asia and Western Asia also registered a sizeable reduction in the share of agricultural employment—about 15 percentage points. These shares were mainly captured by construction in Southern Asia (6 percentage points) and other services in Western Asia (8 percentage points).

Aggregate labour productivity fell sharply in Central Asia during 1991–2002, mainly due to the economic decline mentioned earlier. Nonetheless, most sectors bounced back strongly. Perhaps surprisingly, transport is the sector with the highest productivity level—rather than mining & utilities. Eastern Asia achieved the highest aggregate labour productivity growth rate in the region—above 7 percentage points—by a considerable margin. Manufacturing had a very strong performance in both periods, while productivity growth in agriculture accelerated remarkably in the second period. Southern-Eastern Asia improved its productivity growth rate by 1.1 percentage points per year, despite the decline in mining & utilities. The transport sector, in particular, registered a strong performance since 2002. Southern Asia had a stronger acceleration in aggregate productivity growth—to nearly 5% a year in 2002–2013—but the construction sector was subdued in both periods. Productivity in transport, commerce and manufacturing grew by about 5% since 2002. In Western Asia, aggregate productivity growth remained at a low 1.7% a year. Productivity in mining & utilities is extremely high—more than $320,000 per worker in 2013—despite a recent decline. However, this large productivity gap is difficult to seize upon, since the employment-generation potential of the sector is quite limited.

In sum, Eastern Asia dramatically reduced its employment share in agriculture, while the remaining sub-regions also achieved considerable reductions (Fig. 3.8). Labour relocated mainly to construction, commerce and other services. Nonetheless, labour productivity in both construction and commerce were below the aggregate level in most regions. Once again, the impact of structural change could have been larger if a greater proportion of labour had relocated to higher-productivity sectors—such as manufacturing, transport or other services.

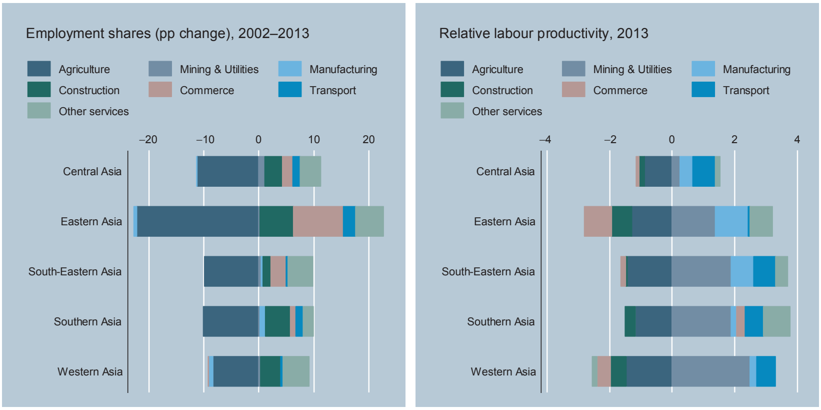

Fig. 3.8 Changes in employment and labour productivity gaps—Asia

Latin America

The Latin America region comprises three sub-regions: the Caribbean, Central America and South America.[7] In our sample, the Caribbean sub-region encompasses eight small island developing states (SIDS), which nonetheless have a combined GVA larger than Central Asia, Eastern Africa and Middle Africa—$219 billion in 2013. Latin America seems considerably less heterogeneous than Africa and Asia in terms of the structure of output and employment (Fig. 3.9).

In the Caribbean, the share of manufacturing and agriculture in total GVA declined, while the weight of transport and other services increased by almost 3 percentage points each—see Table 3.A5 in the Appendix. However, it should be noted that the Caribbean was the only sub-region—out of the 13 sub-regions under analysis—that suffered a deceleration in its real GVA growth rate between the two periods. In Central America, the transport sector made significant relative gains—more than 4 percentage points—while mining & utilities declined from

[7]In 2013, Mexico accounted for 88% of Central America's GVA and 74% of employment; while Brazil represented 49% of South America's GVA and 52% of employment.

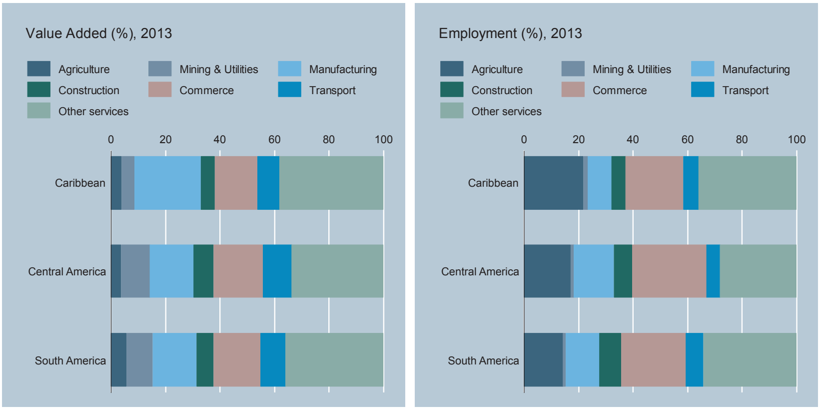

Fig. 3.9 Structure of output and employment—Latin America

13% in 1991 to 10% in 2013. South America accounted for 60% of the region's GVA in 2013. The share of manufacturing decline from 19% in 1991 to 16% in 2013, while transport increased by 2 percentage points. Overall, the structure of output in Latin America has not shifted significantly over time, at least when compared to Asia or even Africa.

In the Caribbean, employment in agriculture declined from about 26% of total employment in 1991 to under 22% in 2013. Manufacturing also lost some ground—more than 3 percentage points. Commerce and other services, on the other hand, registered the largest improvements. Central America experienced a large relative decline in agricultural employment—from 28% in 1991 to 17% in 2013—which was mostly compensated by other services (nearly 8 percentage points). South America also had a considerable fall in the share of agricultural employment—10 percentage points—which was partly offset by a rise in other services (6 percentage points). Latin America's employment structure has changed to a lesser extent than in Asia.

Compared to other regions, aggregate labour productivity levels are relatively homogeneous across Latin America. Nonetheless, the performance has varied within the region. The Caribbean experienced a significant deceleration in aggregate labour productivity growth,

Fig. 3.10 Changes in employment and labour productivity gaps—Latin America

notwithstanding an improvement in agriculture. Labour productivity in manufacturing is relatively high—at par with mining & utilities—and the highest in the region. Labour productivity growth in Central America has been disappointing. The strong decline in mining & utilities—almost 3% a year since 1991—has certainly contributed to this performance, although productivity growth in construction and other services has also been negative since 1991. South America has the lowest level of productivity in the region. Although aggregate productivity declined by 0.2% a year in 1991–2002, it has shown many positive signs since 2002. Agriculture was the best performing sector over the entire period, while productivity in mining & utilities fell considerably—the only sector to register a productivity decline in 2002–2013.

Overall, both agriculture and manufacturing registered significant reductions in the employment share—much of which was absorbed by other services (Fig. 3.10). Apart from mining & utilities, the sectors with the highest labour productivity levels were manufacturing and transport—which either saw their employment share decline or increase by a small amount. This is likely to have hampered the potential of structural change in the region, and thus economic growth.

Fig. 3.11 Decomposition of GVA per capita growth—regions

Empirical Results

Regions

Africa's economic performance has improved remarkably since 2002 (Fig. 3.11)—see also Table 3.A7 in the Appendix. Annual GVA per capita growth accelerated from 0.3% in 1991–2002 to 2.4% in 2002–2013—which mainly reflected improvements in labour productivity. In fact, both within-sector and between-sector components provided strong contributions since 2002. Employment also emerged as a positive influence in the latter period, mainly due to an increase in the employment rate—see Table 3.A6 in the Appendix. The contribution of the demographic structure declined, owing to a slower increase in the share of the working-age population. GVA per capita growth was outstandingly high in Asia—accelerating from 4.3% in 1991–2002 to 5.9% in 2002–2013. Within-sector productivity improvements have been the main driver of this strong performance, but the contribution of structural change has also been substantial and growing. Employment has dampened growth—as the employment rate declined in both periods—but demographic changes supplemented output per capita growth with over 0.5 percentage points. In Latin America, GVA per capita growth also accelerated in the latter period, with labour productivity accounting for most of this improvement. The contribution of the employment component also increased—due to a stronger increase in the employment rate—while the demographic structure continued to provide a sizeable (though declining) contribution. In developed countries, however, GVA per capita growth decelerated considerably in 2002–2013. A declining contribution from within-sector productivity accounted for most of this disappointing performance, although the negative impact of the demographic structure component was also noticeable—partly due to population ageing and the relative shrinking of the working-age population. The only positive sign came from the employment component. Overall, within-sector and between-sector productivity trends seem promising in developing countries, while employment and demography played a relatively minor role in boosting output per capita growth—with the exception of Latin America.

The aggregate results provide a useful overview of the key contributors to output per capita growth. Nevertheless, we are also interested in identifying the economic sectors that have been driving these trends. Table 3.3 decomposes the results discussed above by sector for the period 2002–2013 and reports them as percentages of GVA per capita growth.

In Africa, within-sector productivity improvements accounted for 46% of output per capita growth, especially due to commerce, agriculture and transport. Mining & utilities had a negative impact, partly a consequence of the labour productivity declines experienced by Northern Africa and Western Africa. Agriculture provided the largest contribution to the structural change component, while manufacturing had a negative impact.[8] If labour had not reallocated between economic sectors—predominantly from agriculture to other services—output per capita growth would have been over one-third lower (35%). Finally, changes in the agricultural employment rate dampened growth, but were more than compensated by the services sectors.[9] Overall, the three service sectors—commerce, transport and other services—contributed

[8]A sector provides a positive contribution to the between-sector component if: (i) its labour productivity is above the aggregate average and its employment share increases or (ii) its labour productivity is below the aggregate average and its employment share declines (this is often the case of agriculture).

[9]The structural change component is intrinsically linked to the employment share (Ei/E), while the employment component relates to the (sectoral) employment rate (Ei/A).

to most of the output growth in 2002–2013. Contrary to common perception, mining & utilities did not drive economic performance in Africa—rather, it seems that the sector has undermined it.

Within-sector productivity was the key driver of Asia's economic performance—accounting for 70% of output per capita growth. Manufacturing was the most important sector within this component, representing 29% of total output per capita growth. Structural change—which itself contributed with 27%—was mainly driven by agriculture and other services. Changes in the employment rate had a negative impact, mainly due to agriculture. Overall, manufacturing and other services were the sectors that provided the strongest contributions to output per capita growth in Asia.

The results for Latin America point to a fairly even contribution across the four key components. On the whole, other services was the key driver of economic performance, followed by commerce. Manufacturing had a negative impact on both the structural change and employment components. Mining & utilities undermined the contribution of within-sector productivity, but provided a significant contribution to between-sector effects—the sector marginally increased its share in total employment.

In developed countries, manufacturing provided a strong boost to within-sector productivity, but had a large negative impact on the employment component—the sector recorded a strong increase in productivity levels coupled with a relative decline in employment shares. As a result, its overall contribution to output per capita growth was significantly reduced. Other services provided very strong contributions throughout and were by far the largest contributors to overall economic performance.

Agriculture was the largest contributor to the structural change component across all regions. However, this is because the sector—which has below-average productivity levels—experienced considerable declines in employment shares.[10] In practice, it is the reallocation of labour from agriculture to higher-productivity sectors that is driving structural change. In fact, there is a clear negative relationship between agricultural employment and average incomes—both within and across regions (Fig. 3.12). It also seems that the faster labour moves out of agriculture,

[10]In fact, agriculture is the least productive sector in all regions (and sub-regions).

Table 3.3 Decomposition of GVA per capita growth, 2002–2013—regions

Region/sector	Contribution from (%)				Total contribution (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Africa	**45.9**	**34.9**	**11.4**	**7.8**	**100.0**
Agriculture	15.5	13.0	−11.1		17.3
Mining & utilities	−17.1	8.2	0.8		−8.1
Manufacturing	8.8	−1.9	−1.7		5.1
Construction	3.6	1.9	4.7		10.2
Commerce	18.2	0.8	3.8		22.7
Transport	12.5	7.5	2.7		22.7
Other services	4.5	5.6	12.2		22.3
Asia	**69.6**	**27.4**	**−6.1**	**9.1**	**100.0**
Agriculture	9.6	19.3	−27.6		1.3
Mining & utilities	4.3	2.5	0.3		7.0
Manufacturing	28.7	0.2	−0.6		28.3
Construction	1.3	−1.8	7.1		6.7
Commerce	9.5	−2.5	6.3		13.3
Transport	4.1	1.5	2.2		7.9
Other services	12.1	8.3	6.1		26.5
Latin America	**32.1**	**20.6**	**28.4**	**18.9**	**100.0**
Agriculture	6.5	13.4	−14.1		5.8
Mining & utilities	−9.2	7.5	1.2		−0.5
Manufacturing	7.6	−1.4	−0.5		5.7
Construction	0.0	−0.4	6.9		6.5
Commerce	11.4	−1.3	11.3		21.4
Transport	5.5	1.9	4.9		12.2

(continued)

Table 3.3 (contiuned)

Region/sector	Contribution from (%)				Total contribution (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Other services	10.2	1.1	18.7		30.0
Other (Developed)	**67.6**	**23.3**	**20.4**	**−11.3**	**100.0**
Agriculture	6.2	14.2	−18.5		2.0
Mining & utilities	−1.2	0.9	2.0		1.7
Manufacturing	47.7	−0.1	−30.2		17.4
Construction	−6.1	0.3	0.3		−5.5
Commerce	6.0	−1.9	10.3		14.4
Transport	−0.9	2.7	15.6		17.5
Other services	15.8	7.1	40.9		63.8

Note Changes in employment refer to changes in the ratio of sectoral employment to the working-age population (Ei/A). It is not possible to disaggregate the working-age population by sector. Moreover, changes in the demographic structure cannot be related to sectors the larger is the increase in output per capita. Moreover, the contribution of manufacturing has been partly hampered by negative impacts on the between-sector and employment components—its share in total employment declined in all regions, except Asia (where it stagnated). Other services has been a consistently strong sector across regions.

Africa

GVA per capita growth accelerated in all African sub-regions after 2002 (Fig. 3.13)—see also Table 3.A8 in the Appendix. In Eastern Africa, growth registered in 2002–2013 was mostly due to improvements in labour productivity—both within and between sectors. Changes in the demographic structure are also playing an increasing (albeit much smaller) role. Middle Africa experienced a significant decline in output per capita in 1991–2002, mainly due to a broad-based fall in sectoral labour productivity. The recent performance is mainly explained by a sharp reversal of these sectoral productivity trends. Like in Eastern Africa, changes in the demographic structure have also provided a small

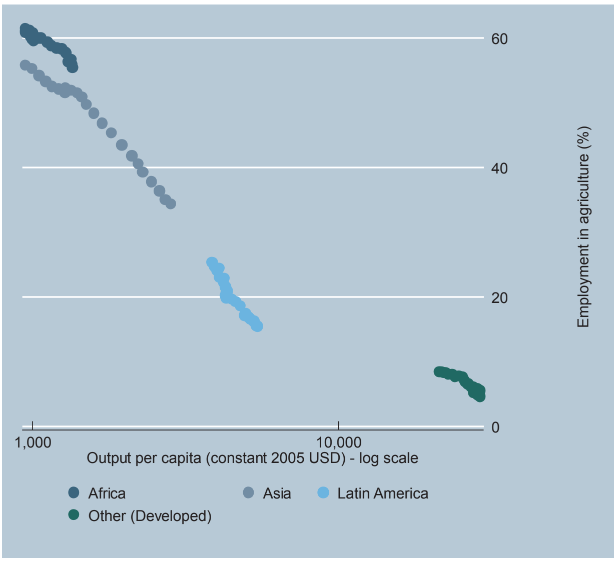

Fig. 3.12 Trends in agricultural employment and output per capita, 1991–2013

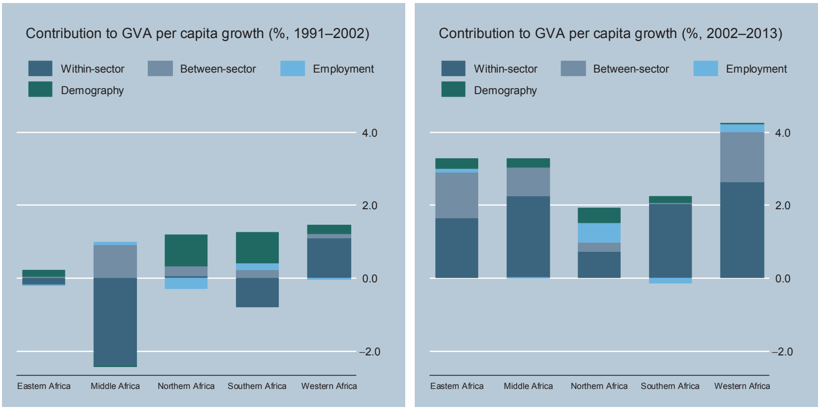

Fig. 3.13 Decomposition of GVA per capita growth—Africa

contribution to economic growth. In Northern Africa, the improved economic performance was due to both within-sector productivity and employment improvements. Nevertheless, a lower increase in the working-age population share drove down the contribution of demography. Structural change has played a limited role in Southern Africa, especially in recent years. Employment undermined output growth in 2002–2013, while the contribution of demography shrunk significantly. Hence, the positive economic performance was mainly due to within-sector productivity growth. Western Africa accelerated output per capita growth from 1.4% in 1991–2002 to 4.2% in 2002–2013—owing to both within-sector and between-sector productivity. Overall, the improved economic performance of African sub-regions was mainly due to enhanced labour productivity. Within-sector productivity played a major role in accelerating output per capita growth, while the contribution of structural change rose significantly in Eastern Africa and Western Africa. The contribution of the employment component grew in Eastern, Northern and Western Africa, and that of the demographic structure in Eastern and Middle Africa. Nonetheless, the relative importance of these two components was rather limited—with the exception of Northern Africa.

In Eastern Africa, other services provided the largest sectoral contribution to output per capita growth, mostly through structural change (15%) but also due to changes in employment (10%) (Table 3.4). Transport, construction and commerce also provided sizeable contributions. In Middle Africa,

Table 3.4 Decomposition of GVA per capita growth, 2002–2013—Africa

Region/sector	Contribution from (%)				Total contribution (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Eastern Africa	**50.1**	**38.0**	**3.0**	**8.9**	**100.0**
Agriculture	11.0	8.4	−10.7		8.7
Mining & utilities	0.3	4.7	0.7		5.7
Manufacturing	6.3	−0.3	−0.1		5.9
Construction	5.8	5.1	2.1		12.9
Commerce	14.6	−0.2	0.0		14.4
Transport	8.3	5.4	1.2		14.8
Other services	3.9	15.1	9.8		28.8
Middle Africa	**68.7**	**23.9**	**−0.1**	**7.4**	**100.0**
Agriculture	9.5	11.2	−13.9		6.8
Mining & utilities	31.7	8.5	0.2		40.4
Manufacturing	1.4	0.6	1.2		3.1
Construction	6.4	1.6	2.4		10.4
Commerce	13.1	3.1	0.7		16.9
Transport	5.3	2.5	0.7		8.5
Other services	1.3	−3.5	8.8		6.6
Northern Africa	**37.3**	**13.0**	**27.8**	**21.9**	**100.0**
Agriculture	18.8	8.6	−6.9		20.5
Mining & utilities	−34.8	5.7	1.1		−28.0
Manufacturing	3.5	0.0	1.4		4.9
Construction	0.8	−5.7	19.5		14.5
Commerce	13.3	0.1	2.8		16.2

(continued)

Table 3.4 (continued)

Region/sector	Contribution from (%)				Total contribution (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Transport	12.0	3.8	5.8		21.6
Other services	23.5	0.6	4.2		28.3
Southern Africa	**96.6**	**0.7**	**−6.1**	**8.8**	**100.0**
Agriculture	7.0	18.0	−25.2		−0.1
Mining & utilities	8.6	−9.7	−7.3		−8.4
Manufacturing	23.9	−6.3	−10.9		6.7
Construction	5.1	−2.6	6.0		8.6
Commerce	14.3	−1.1	3.9		17.1
Transport	6.7	3.7	2.5		12.9
Other services	31.0	−1.3	24.8		54.4
Western Africa	**62.2**	**32.5**	**5.1**	**0.2**	**100.0**
Agriculture	22.1	8.9	−14.1		16.9
Mining & utilities	−16.4	8.6	1.4		−6.4
Manufacturing	13.3	−0.7	−2.9		9.7
Construction	3.0	1.3	1.5		5.9
Commerce	23.6	−0.2	6.9		30.3
Transport	17.8	9.7	2.6		30.1
Other services	−1.1	4.9	9.7		13.5

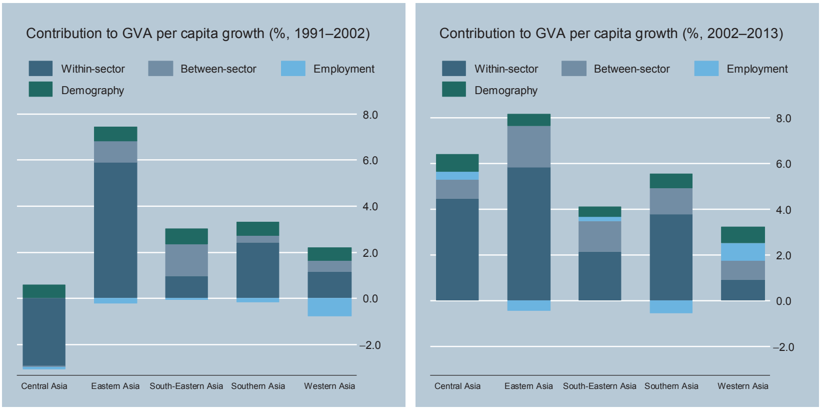

Fig. 3.14 Decomposition of GVA per capita growth—Asia

mining & utilities played the vital role in boosting output per capita—especially through enhanced sectoral productivity (32%). In Northern Africa, however, the performance of the mining & utilities sector severely undermined aggregate output growth. Other services and transport were the most dynamic sectors. In Southern Africa, other services accounted for most of the positive economic performance. Mining & utilities and agriculture had a net negative impact. In West Africa, commerce and transport were the most important sectors. In sum, the three service sectors accounted for most of the stronger economic record since 2002—except in Middle Africa—while manufacturing has provided a limited boost to output growth.

Asia

GVA per capita growth accelerated in all Asian sub-regions in 2002–2013 (Fig. 3.14)—see also Table 3.A9 in the Appendix. Central Asia, in particular, underwent notable changes. Growth improved considerably in 2002–2013—following a negative performance in the previous period—mainly owing to sectoral productivity growth. The remaining components also boosted economic growth, although to a much lesser extent. Eastern Asia experienced remarkably strong and consistent growth. Although the contribution of structural change nearly doubled in percentage points, within-sector productivity remained the key driver of economic performance. The negative impact of employment was more than compensated by demographic changes. In South-Eastern Asia, structural change provided the largest contribution to output growth in 1991–2002, which remained strong in the subsequent period. However, the improved economic record was mainly due to within-sector productivity changes. Southern Asia registered substantial increases in both components of aggregate labour productivity, which accounted for much of the overall progress—despite a negative effect from employment. The employment component seems to have played a key role in Western Asia—rising from 0.76 percentage points in the earlier period to 0.74 percentage points in the later period. The contribution of within-sector productivity declined in 2002–2013, while the weight of the between-sector component increased. Overall, these decompositions suggest that Asia's story is also predominantly one of enhanced labour productivity—especially within sectors, but also structural change. There is some variation within the region, but with the exception of Western Asia, changes in employment and demographic structure have been relatively less important.

Other services were the leading contributor to GVA per capita growth, except for Eastern Asia. Manufacturing, commerce and transport also provided strong contributions, often in the double-digits (Table 3.5). In Eastern Asia, manufacturing provided the largest sectoral contribution, although exclusively through increases in within-sector productivity. Manufacturing also played an important role in South-Eastern Asia, but other services provided even higher net contributions to output per capita growth. Overall, most of the between-sector improvements were attributable to agriculture, which is not surprising—since declining employment shares in the least-productive sector (i.e. agriculture) implicitly boost aggregate productivity levels. With the exception of Eastern Asia, other services was the main contributor to output per capita growth in Asian sub-regions. However, the three service sectors were often (meaningfully) supported by the manufacturing and construction sectors.

Latin America

GVA per capita growth declined in the Caribbean during 2002–2013, mainly owing to a much lower contribution from within-sector productivity (Fig. 3.15)—see also Table 3.A10 in the Appendix. The between-sector

Table 3.5 Decomposition of GVA per capita growth, 2002–2013—Asia

Region/sector	Contribution from (%)				Total contribution (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Central Asia	**69.5**	**13.2**	**5.2**	**12.2**	**100.0**
Agriculture	12.1	10.0	−15.2		6.9
Mining & utilities	3.2	0.8	1.9		5.9
Manufacturing	14.4	−0.1	0.3		14.6
Construction	4.0	−0.5	5.3		8.8
Commerce	10.0	−0.3	3.6		13.3
Transport	9.1	2.1	2.2		13.4
Other services	16.7	1.3	7.0		25.0
Eastern Asia	**75.5**	**23.0**	**−5.4**	**7.0**	**100.0**
Agriculture	11.1	21.2	−30.6		1.7
Mining & utilities	5.0	0.6	0.1		5.8
Manufacturing	39.2	−1.2	−1.4		36.6
Construction	1.6	−2.7	7.4		6.3
Commerce	8.3	−6.4	10.4		12.3
Transport	1.2	1.1	2.6		4.9
Other services	9.1	10.3	6.1		25.5
South-Eastern Asia	**51.7**	**32.5**	**5.8**	**10.1**	**100.0**
Agriculture	9.3	17.0	−20.1		6.3
Mining & utilities	−7.5	7.6	1.0		1.1
Manufacturing	18.3	0.9	1.5		20.7
Construction	2.5	0.0	3.6		6.1
Commerce	12.5	−0.9	7.3		18.9
Transport	10.7	0.7	1.0		12.4
Other services	5.8	7.2	11.5		24.5

(continued)

Table 3.5 (continued)

Region/sector	Contribution from (%)				Total contribution (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Southern Asia	**75.3**	**23.0**	**−10.5**	**12.2**	**100.0**
Agriculture	13.8	13.0	−24.6		2.1
Mining & utilities	1.9	2.2	0.2		4.3
Manufacturing	13.4	0.4	0.6		14.4
Construction	−0.2	−1.0	8.0		6.9
Commerce	14.4	0.6	0.7		15.7
Transport	9.2	2.0	2.0		13.2
Other services	22.9	5.8	2.6		31.3
Western Asia	**28.6**	**25.8**	**23.1**	**22.5**	**100.0**
Agriculture	2.8	18.1	−18.8		2.2
Mining & utilities	−7.1	12.2	1.4		6.5
Manufacturing	11.3	−0.4	0.0		10.8
Construction	0.5	−3.6	12.4		9.3
Commerce	8.1	0.1	3.9		12.1
Transport	7.8	0.9	2.5		11.2
Other services	5.1	−1.5	21.8		25.4

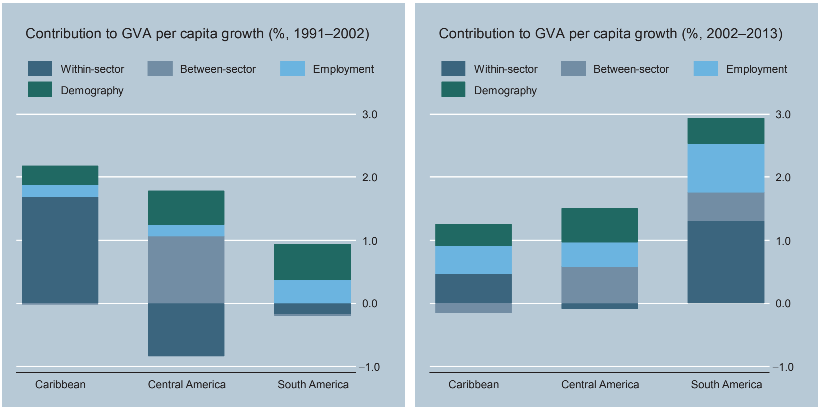

Fig. 3.15 Decomposition of GVA per capita growth—Latin America

component was negative—the only occurrence in all 13 sub-regions—which suggests that, on average, workers moved towards lower-productivity sectors. The positive impact of employment and demography were not sufficient to counter these productivity trends. In Central America, output per capita growth accelerated in 2002–2013. Nonetheless, the contribution of within-sector productivity growth remained negative, while the positive impact of structural change weakened. The employment component improved somewhat. South America enjoyed considerably faster output growth in 2002–2013, predominately due to stronger within-sector productivity. However, structural change and employment also played an important role. Overall, changes in employment and demographic structure were relatively important in the Caribbean and Central America, but mostly because the productivity performance was very disappointing. This is likely to explain much of the performance differential between Latin America and the other two regions.

As indicated above, the Caribbean was the only sub-region (out of 13) that showed a pattern of growth-reducing structural change in 2002–2013. This was largely due to the manufacturing sector, which experienced a significant relative decline in sectoral employment (Table 3.6). Its negative impact on overall economic performance was offset by other services, but also by commerce and transport. In Central America, other services were also the most dynamic sector, while mining

Table 3.6 Decomposition of GVA per capita growth, 2002–2013—Latin America

Region/sector	Contribution from (%)				Total contribution (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Caribbean	**42.0**	**−14.1**	**40.2**	**31.8**	**100.0**
Agriculture	4.5	13.6	−7.2		10.8
Mining & utilities	−10.0	5.6	3.0		−1.5
Manufacturing	29.0	−32.3	−15.3		−18.6
Construction	3.3	0.1	1.0		4.3
Commerce	−0.1	−3.5	22.1		18.5
Transport	11.0	1.4	6.0		18.4
Other services	4.4	1.2	30.6		36.2
Central America	**−5.9**	**40.8**	**26.7**	**38.4**	**100.0**
Agriculture	3.9	17.7	−17.4		4.1
Mining & utilities	−24.9	13.0	1.4		−10.5
Manufacturing	9.8	−1.1	−10.2		−1.5
Construction	−6.1	0.9	7.1		2.0
Commerce	11.9	0.1	7.0		18.9
Transport	13.1	2.8	4.1		20.1
Other services	−13.6	7.4	34.6		28.5
South America	**44.3**	**15.7**	**26.3**	**13.7**	**100.0**
Agriculture	7.6	10.7	−12.7		5.7
Mining & utilities	−4.7	6.0	1.0		2.2
Manufacturing	8.0	−0.6	1.5		9.0
Construction	2.2	−0.9	6.6		7.9
Commerce	12.5	−1.3	10.7		21.8
Transport	3.6	1.4	4.7		9.7
Other services	15.1	0.5	14.4		30.0

& utilities and manufacturing undermined output per capita growth. In South America, the key sectors were other services and commerce, while transport and manufacturing also had sizeable positive impacts. Overall, mining & utilities had a consistently negative impact on Latin America's within-sector productivity, while agriculture was the key contributor to the structural change component. Other services was the strongest economic sector by a considerable margin.

Other Empirical Studies

This section compares our results with those of the recent literature. In particular, we focus our attention on five key empirical studies: McMillan et al. (2014), McMillan and Harttgen (2015), Timmer et al. (2015), UNCTAD (2014) and Kucera and Roncolato (2012). It is worth noting that our country sample is significantly larger than that of previous studies, which enhances the representativeness of the findings (Table 3.7). Our dataset includes 169 countries, compared to the 81 of Kucera and Roncolato (2012) and the 38 of McMillan et al. (2014). We have data since the early 1990s, which we decide to split in half in order to look at two subperiods—knowing that economic growth accelerated in most developing countries since the early 2000s. Our sector coverage is determined by the national accounts data and thus restricted to seven sectors. It would have been useful to separate the mining and utilities sectors, as well as further disaggregate other services.

Since most studies decompose output per worker growth—rather than output per capita growth—we adjust our results as necessary to facilitate comparisons. In addition, we report within-sector and between-sector effects both as compound annual growth rates and shares. In the first case, the contributions add up to the annual compound growth rate of output per worker, while in the second they add up to 100%. Finally, we are only able to compare results for the 'macro' regions.

There are significant discrepancies in terms of the contribution of structural change to output per worker growth (Table 3.8). For instance, our results point to positive within-sector and between-sector productivity changes for all regions, which is not always the case in the literature.

Table 3.7 Coverage, sector aggregation and data sources of selected studies

	This study	Kucera and Roncolato (2012)	UNCTAD (2014)	McMillan et al. (2014)	McMillan and Harttgen (2015)	Timmer et al. (2015)
Countries	**169**	**81**	..	**38**	**37**	**31**
Aggregation	Africa (49) Asia (48) Developed (44) LAC (28)	Developed (25) Europe & CIS (18) LAC (19) Asia (14) MENA (3) SSA (2)	Developed (..) ODC (..) LDC (38)	Asia (10) Africa (9) LAC (9) Developed (9) Turkey	Asia (10) Africa (9) LAC (9) Developed (9)	Africa (11) Asia (11) LAC (9)
Years	**22**	**24**	**21**	**15**	**5**	**20**
Period(s)	1991–2002 2002–2013	1984–1998 1999–2008	1991–2012	1990–2005	2000–2005	1960–1975 1975–1990 1990–2010
Sectors	**7**	**7**	**3**	**9**	**9**	**8**
ISIC Rev. 3.1 (sections)	(1) A, B (2) C, E (3) D (4) F (5) G, H (6) I (7) J–P	(1) A, B (2) C, E (3) D (4) F (5) G, H (6) I (7) J–P	(1) A, B (2) C–F (3) G–Q	(1) A, B (2) C (3) D (4) E (5) F (6) G, H (7) I (8) J, K (9) L–P	(1) A, B (2) C (3) D (4) E (5) F (6) G, H (7) I (8) J, K (9) L–P	(1) A, B (2) C (3) D (4) E, F (5) G–I (6) J (7) L–N (8) O–P K excluded
Data sources						
Population	UNDESA	n/a	UNDESA	n/a	n/a	n/a
Employment	ILO	ILO, GGDC	ILO	GGDC, national	GGDC, national	GGDC
Value added	UNDESA	UNDESA, GGDC	UNDESA	GGDC, national	GGDC, national	GGDC

Note It is unlikely that studies include section Q (extraterritorial organizations and bodies), since this section is not usually reported in national accounts data. Latin America & the Caribbean (LAC), Least Developed Countries (LDC), Middle East and North Africa (MENA), Other Developing Countries (ODC), Sub-Saharan Africa (SSA)

Table 3.8 Comparison with other empirical studies

Study	Period	Region	Compound annual growth rate (%)			Share of contribution from (%)[a]	
			Output per worker growth	Contribution from			
				Within sectors	Between sectors	Within sectors	Between sectors
This study	1991–2013	Africa	1.0	0.5	0.4	54	46
		Asia	4.8	3.7	1.1	77	23
		Latin America	0.7	0.3	0.4	46	54
		Other (Developed)	1.3	1.1	0.3	80	20
This study	2002–2013	Africa	1.9	1.1	0.8	57	43
		Asia	5.8	4.1	1.6	72	28
		Latin America	1.2	0.7	0.5	61	39
		Other (Developed)	0.9	0.7	0.2	75	25
McMillan et al. (2014)	1990–2005	Africa	0.9	2.1	−1.3	248	−148
		Asia	3.9	3.3	0.6	86	15
		Latin America	1.4	2.2	−0.9	166	−65
		High income	1.5	1.5	−0.1	105	−6
McMillan and Harttgen (2015)	2000–2005	Africa	2.1	1.2	0.9	57	43
		Asia	3.9	3.5	0.4	89	11
		Latin America	1.0	1.9	−0.9	186	−86
		High Income	1.2	1.4	−0.2	116	−16
Timmer et al. (2015)[b]	1990–2010	Africa	1.9	1.7	0.1	94	6
		Asia	3.6	3.1	0.6	85	15

(continued)

Table 3.8 (continued)

Study	Period	Region	Compound annual growth rate (%)			Share of contribution from (%)[a]	
			Output per worker growth	Contribution from			
				Within sectors	Between sectors	Within sectors	Between sectors
		Latin America	0.9	1.1	−0.1	113	−13
UNCTAD (2014)[c]	1991–2012	LDCs	2.3	1.5	0.7	65	33
		ODCs	3.7	2.4	1.2	66	33
		Developed	1.4	1.2	0.1	90	9
Kucera and Roncolato (2012)	1999–2008	Sub-Saharan Africa	3.0	2.4	0.5	*80*	*17*
		Asia	3.8	2.9	1.0	*76*	*26*
		Middle East & North Africa	2.2	2.5	−0.2	*114*	*−9*
		Latin America	1.2	1.1	0.0	*92*	*0*
		Developed	1.1	1.2	0.0	*109*	*0*

[a]These shares do not always add up to 100—especially for Kucera and Roncolato (2012)—due to rounding of reported results

[b]Between-sector effects are further disaggregated into static and dynamic reallocation effects. This table reports the combined effect

[c]UNCTAD also estimates the contribution of changes in relative prices across sectors—though these are small

McMillan et al. (2014) point to a considerable growth-reducing structural change in Africa and Latin America during the 1990–2005 period, McMillan and Harttgen (2015) suggest the same for Latin America in 2000–2005 and ditto for Timmer et al. (2015) regarding Latin America in 1990–2010. Not even our results for 1991–2002 (not shown here) corroborate these finding. Despite this, our results for Africa are very similar to those reported by McMillan and Harttgen (2015).[11] Our results for Asia suggest a stronger contribution from structural change than that reported in other studies. The findings from UNCTAD (2014) and Kucera and Roncolato (2012) are not directly comparable to ours, due to different regional aggregates. Nevertheless, UNCTAD (2014) suggest that structural change accounted for about 33% of GVA per worker growth in developing countries, which is similar to what we obtain when aggregating Africa, Asia and Latin America into a single region.[12] Kucera and Roncolato (2012), however, suggest a negligible role of structural change in Latin America and the Middle East & North Africa (MENA), and a relatively small role in sub-Saharan Africa (SSA).

A range of factors might explain these discrepancies, including different country samples, time frames, level of sectoral aggregation, data sources and empirical methodologies. Therefore, we undertake additional calculations and checks to ensure that our results are robust to different choices, namely, the method of aggregation and the decomposition methodology.

Most studies compute results at the country level and then report unweighted regional averages. This strategy can be misleading, since it treats all countries equally—regardless of their relative importance in terms of output and employment.[13] In practice, the prospects of a worker in a larger country are deemed less important than those of workers in

[11] McMillan and Harttgen (2015) also report results for an expanded African sample (19 countries), but disaggregated into four sectors only. The findings are broadly similar to the main results.

[12] Such a decomposition yields an output per worker growth rate of 3.4% per year for 1991–2013, of which 72% is due to within-sector improvements and the remaining 28% is due to structural change.

[13] For instance, China accounts for most of GVA and employment in Eastern Asia. As a comparison, GVA per worker growth declines from 7.6% (our result) to 5.3% (when unweighted) in 2002–2013, while the between-sector effect drops from 1.8 percentage points to 0.9 percentage points. Similar discrepancies emerge when McMillan and Harttgen (2015) apply employment weights and Kucera and Roncolato (2012) apply GDP weights to their respective results.

smaller countries. Moreover, weighing countries ex-post entails several arbitrary decisions, such as choosing the weighting variable and the type of weight.[14] In this chapter, we consider each region (and sub-region) as a unit of analysis. This means that output, employment and population data is aggregated in absolute terms before the analysis is carried out. As a robustness check, we also calculate unweighted, employment-weighted and GDP-weighted averages from individual country results. Interestingly, the unweighted averages significantly underestimate output per worker growth in Asia and Africa, probably because some large economies are performing better than the average—such as China, India, Ethiopia and Nigeria. See Table 3.A11 in the Appendix. Nonetheless, the weighted results are broadly in line with our findings on the pattern and pace of structural change. In addition, we apply the decomposition method used by McMillan et al. (2014) and Timmer et al. (2015) to our data. In 2002–2013, the contribution of between-sector effects increases from 43% to 44% for Africa and from 28 to 31% in Asia. On the other hand, this share declines from 39 to 37% in Latin America and from 25 to 19% in developed countries. Overall, it seems that different empirical methodologies and strategies to estimate regional trends do not account for the different results across studies. Hence, it might be that a more representative country sample and the availability of recent data explain some of these discrepancies.

Conclusion

This chapter uncovered evidence of growth-enhancing structural change in 12 out of the 13 sub-regions analysed—the exception being the Caribbean. All sub-regions recorded a reduction in the share of employment in agriculture between 2002 and 2013, often by a large amount. Moreover, the manufacturing's employment share also declined in all

[14]A single weight needs to be used across all components to ensure consistency, but while output would probably be more suitable for weighing within-sector effects, employment is likely to be more appropriate for between-sector effects. This can be problematic, since a country's weight may vary considerably according to which variable is chosen. For example, D.R. Congo accounts for 50% of Middle Africa's employment, but only 14% of GVA.

but four sub-regions: South-Eastern Asia, Southern Asia, Middle Africa and Eastern Africa—it actually remained constant in the latter. On average, other services achieved the largest relative increases in employment, although construction and commerce also made important gains in some sub-regions. Since agriculture has the lowest level of labour productivity across all sub-regions, the relocation of workers from agriculture to other sectors led to positive structural change, which helped boost aggregate productivity and thus economic growth. Improvements in within-sector productivity were the key driver of economic performance in 2002–2013—as noted in earlier studies—but the contribution of structural change has also been considerable and often growing in importance. Changes in the demographic structure had a positive impact on output per capita growth in developing regions, while the impact of changes in the employment rate has varied considerably across sub-regions. In sum, labour productivity growth—especially within sectors—has been the main force behind the recent acceleration of output per capita growth in developing countries, although a demographic dividend and rising employment rates have also added to this performance (Fig. 3.16).

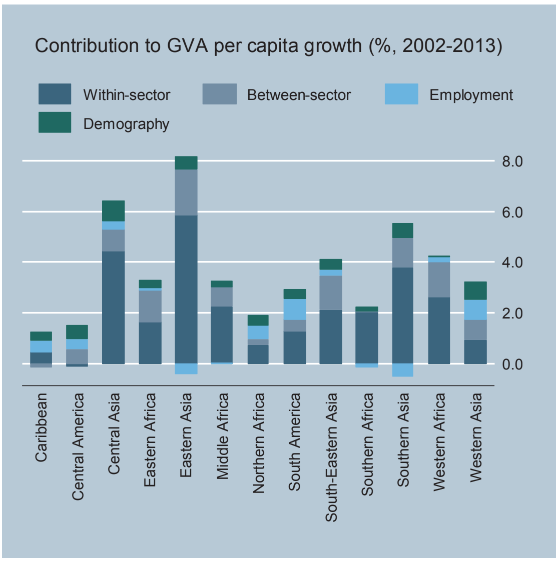

Fig. 3.16 Decomposition of GVA per capita growth—sub-regions

Despite these positive findings, there is still much scope for accelerating structural change. For instance, the (relative) reductions in agricultural employment are not uniform across regions—for instance, they have happened much faster in Asia than in Africa. Moreover, the sectors with the largest increases in the labour share do not always have above-average productivity. Large labour productivity gaps remain in many developing regions, which suggests that there remains significant scope to improve the current growth performance. The period since 2002 has been unquestionably positive for developing regions, but it is important to accelerate the pace of structural change in order to fully seize its benefits—especially for the poorest countries. Even if the structure of employment does not change considerably in a short period of time, economic gains can still be substantial due to very large productivity gaps—especially between agriculture and non-agricultural sectors.

Appendix

Table 3.A1 Country composition of regions and sub-regions

Sub-region	Country	Code	Sub-region	Country	Code	Sub-region	Country	Code	Sub-region	Country	Code
AFRICA			Western Africa	Mauritania	MRT	Western Asia	Israel	ISR	Other (Developed)	Belarus	BLR
Eastern Africa	Burundi	BDI	Western Africa	Niger	NER	Western Asia	Jordan	JOR	Other (Developed)	Belgium	BEL
Eastern Africa	Comoros	COM	Western Africa	Nigeria	NGA	Western Asia	Kuwait	KWT	Other (Developed)	Bosnia and Herzegovina	BIH
Eastern Africa	Eritrea	ERI	Western Africa	Senegal	SEN	Western Asia	Lebanon	LBN	Other (Developed)	Bulgaria	BGR
Eastern Africa	Ethiopia	ETH	Western Africa	Sierra Leone	SLE	Western Asia	Oman	OMN	Other (Developed)	Canada	CAN
Eastern Africa	Kenya	KEN	Western Africa	Togo	TGO	Western Asia	Qatar	QAT	Other (Developed)	Croatia	HRV
Eastern Africa	Madagascar	MDG	**ASIA**			Western Asia	Saudi Arabia	SAU	Other (Developed)	Czech Republic	CZE
Eastern Africa	Malawi	MWI	Central Asia	Kazakhstan	KAZ	Western Asia	Turkey	TUR	Other (Developed)	Denmark	DNK
Eastern Africa	Mauritius	MUS	Central Asia	Kyrgyzstan	KGZ	Western Asia	United Arab Emirates	ARE	Other (Developed)	Estonia	EST
Eastern Africa	Mozambique	MOZ	Central Asia	Tajikistan	TJK	Western Asia	West Bank and Gaza Strip	PSE	Other (Developed)	Finland	FIN
Eastern Africa	Rwanda	RWA	Central Asia	Turkmenistan	TKM	Western Asia	Yemen	YEM	Other (Developed)	France	FRA
Eastern Africa	Tanzania, United Rep.	TZA	Central Asia	Uzbekistan	UZB	**LATIN AMERICA & THE CARIBBEAN**			Other (Developed)	Germany	DEU
Eastern Africa	Uganda	UGA	Eastern Asia	China	CHN	Caribbean	Bahamas	BHS	Other (Developed)	Greece	GRC

(continued)

Table 3.A1 (continued)

Sub-region	Country	Code	Sub-region	Country	Code	Sub-region	Country	Code	Sub-region	Country	Code
Eastern Africa	Zambia	ZMB	Eastern Asia	Hong Kong, China	HKG	Caribbean	Barbados	BRB	Other (Developed)	Hungary	HUN
Eastern Africa	Zimbabwe	ZWE	Eastern Asia	Korea, Republic of	KOR	Caribbean	Cuba	CUB	Other (Developed)	Iceland	ISL
Middle Africa	Angola	AGO	Eastern Asia	Mongolia	MNG	Caribbean	Dominican Republic	DOM	Other (Developed)	Ireland	IRL
Middle Africa	Cameroon	CMR	South-Eastern Asia	Brunei Darussalam	BRN	Caribbean	Haiti	HTI	Other (Developed)	Italy	ITA
Middle Africa	Central African Republic	CAF	South-Eastern Asia	Cambodia	KHM	Caribbean	Jamaica	JAM	Other (Developed)	Japan	JPN
Middle Africa	Chad	TCD	South-Eastern Asia	East Timor	TLS	Caribbean	Puerto Rico	PRI	Other (Developed)	Latvia	LVA
Middle Africa	Congo	COG	South-Eastern Asia	Indonesia	IDN	Caribbean	Trinidad and Tobago	TTO	Other (Developed)	Lithuania	LTU
Middle Africa	Congo, D. R.	COD	South-Eastern Asia	Lao P.D.R.	LAO	Central America	Belize	BLZ	Other (Developed)	Luxembourg	LUX
Middle Africa	Equatorial Guinea	GNQ	South-Eastern Asia	Malaysia	MYS	Central America	Costa Rica	CRI	Other (Developed)	Malta	MLT
Middle Africa	Gabon	GAB	South-Eastern Asia	Myanmar	MMR	Central America	El Salvador	SLV	Other (Developed)	Montenegro	MNE
Northern Africa	Algeria	DZA	South-Eastern Asia	Philippines	PHL	Central America	Guatemala	GTM	Other (Developed)	Netherlands	NLD
Northern Africa	Egypt	EGY	South-Eastern Asia	Singapore	SGP	Central America	Honduras	HND	Other (Developed)	New Zealand	NZL
Northern Africa	Libya	LBY	South-Eastern Asia	Thailand	THA	Central America	Mexico	MEX	Other (Developed)	Norway	NOR
Northern Africa	Morocco	MAR	South-Eastern Asia	Viet Nam	VNM	Central America	Nicaragua	NIC	Other (Developed)	Poland	POL
Northern Africa	Sudan (former)	SDN	South-Eastern Asia	Fiji	FJI	Central America	Panama	PAN	Other (Developed)	Portugal	PRT
Northern Africa	Tunisia	TUN	South-Eastern Asia	Papua New Guinea	PNG	South America	Argentina	ARG	Other (Developed)	Republic of Moldova	MDA

(continued)

Table 3.A1 (continued)

Sub-region	Country	Code	Sub-region	Country	Code	Sub-region	Country	Code	Sub-region	Country	Code
Southern Africa	Botswana	BWA	South-Eastern Asia	Solomon Islands	SLB	South America	Bolivia	BOL	Other (Developed)	Romania	ROU
Southern Africa	Lesotho	LSO	Southern Asia	Afghanistan	AFG	South America	Brazil	BRA	Other (Developed)	Russian Federation	RUS
Southern Africa	Namibia	NAM	Southern Asia	Bangladesh	BGD	South America	Chile	CHL	Other (Developed)	Serbia	SRB
Southern Africa	South Africa	ZAF	Southern Asia	Bhutan	BTN	South America	Colombia	COL	Other (Developed)	Slovakia	SVK
Southern Africa	Swaziland	SWZ	Southern Asia	India	IND	South America	Ecuador	ECU	Other (Developed)	Slovenia	SVN
Western Africa	Benin	BEN	Southern Asia	Iran, Islamic Rep.	IRN	South America	Guyana	GUY	Other (Developed)	Spain	ESP
Western Africa	Burkina Faso	BFA	Southern Asia	Maldives	MDV	South America	Paraguay	PRY	Other (Developed)	Sweden	SWE
Western Africa	Cape Verde	CPV	Southern Asia	Nepal	NPL	South America	Peru	PER	Other (Developed)	Switzerland	CHE
Western Africa	Côte d'Ivoire	CIV	Southern Asia	Pakistan	PAK	South America	Suriname	SUR	Other (Developed)	FYR of Macedonia	MKD
Western Africa	Gambia	GMB	Southern Asia	Sri Lanka	LKA	South America	Uruguay	URY	Other (Developed)	Ukraine	UKR
Western Africa	Ghana	GHA	Western Asia	Armenia	ARM	South America	Venezuela	VEN	Other (Developed)	United Kingdom	GBR
Western Africa	Guinea	GIN	Western Asia	Azerbaijan	AZE	**OTHER (DEVELOPED)**			Other (Developed)	United States	USA
Western Africa	Guinea-Bissau	GNB	Western Asia	Cyprus	CYP	Other (Developed)	Albania	ALB			
Western Africa	Liberia	LBR	Western Asia	Georgia	GEO	Other (Developed)	Australia	AUS			
Western Africa	Mali	MLI	Western Asia	Iraq	IRQ	Other (Developed)	Austria	AUT			

Table 3.A2 Output, employment and labour productivity by sector—regions

Region/sector	GVA (constant 2005 USD, billion)			GVA (% total GVA)			GVA (annual growth, %)			Employment (million)			Employment (% total employment)			Employment (annual growth, %)			GVA per worker (constant 2005 USD)			GVA per worker (annual growth, %)		
	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991–2002	2002–2013	1991–2013
World	**30,160**	**40,091**	**53,151**	**100.0**	**100.0**	**100.0**	**2.6**	**2.6**	**2.6**	**2232**	**2664**	**3111**	**100.0**	**100.0**	**100.0**	**1.6**	**1.4**	**1.5**	**13,515**	**15,047**	**17,086**	**1.0**	**1.2**	**1.1**
Agriculture	1091	1367	1865	3.6	3.4	3.5	2.1	2.9	2.5	958	1052	924	42.9	39.5	29.7	0.9	−1.2	−0.2	1140	1299	2018	1.2	4.1	2.6
Mining & utilities	1957	2418	3124	6.5	6.0	5.9	1.9	2.4	2.1	40	38	50	1.8	1.4	1.6	−0.4	2.5	1.0	49,174	63,527	62,590	2.4	−0.1	1.1
Manufacturing	4810	6526	9318	15.9	16.3	17.5	2.8	3.3	3.1	320	338	364	14.3	12.7	11.7	0.5	0.7	0.6	15,038	19,321	25,627	2.3	2.6	2.5
Construction	2090	2307	2701	6.9	5.8	5.1	0.9	1.4	1.2	103	147	263	4.6	5.5	8.5	3.3	5.4	4.4	20,345	15,718	10,266	−2.3	−3.8	−3.1
Commerce	3827	5558	7435	12.7	13.9	14.0	3.4	2.7	3.1	350	466	636	15.7	17.5	20.5	2.6	2.9	2.7	10,922	11,914	11,685	0.8	−0.2	0.3
Transport	2137	3236	4747	7.1	8.1	8.9	3.8	3.5	3.7	85	116	176	3.8	4.4	5.7	2.9	3.8	3.4	25,077	27,846	26,967	1.0	−0.3	0.3
Other services	14,246	18,679	23,962	47.2	46.6	45.1	2.5	2.3	2.4	376	507	698	16.9	19.0	22.4	2.7	3.0	2.9	37,885	36,872	34,336	−0.2	−0.6	−0.4
Africa	**644**	**876**	**1490**	**100.0**	**100.0**	**100.0**	**2.8**	**5.0**	**3.9**	**207**	**282**	**389**	**100.0**	**100.0**	**100.0**	**2.8**	**3.0**	**2.9**	**3108**	**3103**	**3834**	**0.0**	**1.9**	**1.0**
Agriculture	93	137	226	14.4	15.6	15.2	3.6	4.7	4.1	126	169	215	60.7	60.0	55.4	2.7	2.2	2.5	739	809	1,052	0.8	2.4	1.6
Mining & utilities	141	165	198	21.9	18.8	13.3	1.4	1.7	1.6	2	3	5	1.2	1.1	1.3	2.6	4.3	3.5	58,687	51,510	38,832	−1.2	−2.5	−1.9
Manufacturing	84	107	163	13.1	12.2	10.9	2.2	3.9	3.0	15	19	24	7.4	6.8	6.2	2.1	2.0	2.1	5530	5573	6796	0.1	1.8	0.9
Construction	23	34	82	3.6	3.9	5.5	3.5	8.2	5.9	5	8	15	2.5	2.7	3.9	3.8	6.3	5.0	4581	4473	5463	−0.2	1.8	0.8
Commerce	85	114	233	13.2	13.0	15.6	2.7	6.7	4.7	21	30	44	10.3	10.7	11.4	3.2	3.5	3.3	3959	3780	5273	−0.4	3.1	1.3
Transport	44	75	182	6.8	8.5	12.2	4.9	8.4	6.7	5	6	11	2.2	2.2	2.9	2.9	5.3	4.1	9625	11,921	16,399	2.0	2.9	2.5
Other services	173	243	406	26.9	27.8	27.3	3.1	4.8	4.0	33	46	74	15.7	16.4	19.1	3.2	4.4	3.8	5309	5247	5474	−0.1	0.4	0.1
Asia	**2956**	**5475**	**11,687**	**100.0**	**100.0**	**100.0**	**5.8**	**7.1**	**6.4**	**1339**	**1617**	**1867**	**100.0**	**100.0**	**100.0**	**1.7**	**1.3**	**1.5**	**2208**	**3385**	**6259**	**4.0**	**5.7**	**4.9**
Agriculture	451	616	926	15.2	11.2	7.9	2.9	3.8	3.3	746	802	639	55.7	49.6	34.2	0.7	−2.0	−0.7	604	768	1448	2.2	5.9	4.1
Mining & utilities	388	619	1107	13.1	11.3	9.5	4.3	5.4	4.9	20	19	26	1.5	1.2	1.4	−0.3	2.9	1.3	19,670	32,496	42,285	4.7	2.4	3.5
Manufacturing	515	1241	3039	17.4	22.7	26.0	8.3	8.5	8.4	168	194	226	12.5	12.0	12.1	1.3	1.4	1.4	3071	6390	13,449	6.9	7.0	6.9
Construction	190	297	736	6.4	5.4	6.3	4.2	8.6	6.4	51	86	187	3.8	5.3	10.0	4.9	7.2	6.1	3721	3440	3941	−0.7	1.2	0.3
Commerce	378	698	1606	12.8	12.7	13.7	5.7	7.9	6.8	195	279	408	14.6	17.3	21.9	3.3	3.5	3.4	1937	2498	3936	2.3	4.2	3.3
Transport	189	409	925	6.4	7.5	7.9	7.3	7.7	7.5	41	63	102	3.0	3.9	5.5	4.1	4.4	4.3	4634	6458	9073	3.1	3.1	3.1
Other services	846	1595	3347	28.6	29.1	28.6	5.9	7.0	6.5	118	173	279	8.8	10.7	14.9	3.5	4.4	4.0	7150	9224	12,010	2.3	2.4	2.4
Latin America	**1745**	**2309**	**3375**	**100.0**	**100.0**	**100.0**	**2.6**	**3.5**	**3.0**	**166**	**217**	**279**	**100.0**	**100.0**	**100.0**	**2.5**	**2.3**	**2.4**	**10,518**	**10,626**	**12,116**	**0.1**	**1.2**	**0.6**
Agriculture	95	127	169	5.4	5.5	5.0	2.7	2.6	2.7	42	44	43	25.2	20.1	15.4	0.4	−0.2	0.1	2264	2895	3933	2.3	2.8	2.5
Mining & utilities	188	258	324	10.8	11.2	9.6	2.9	2.1	2.5	2	2	3	1.2	1.0	1.2	0.3	4.1	2.2	91,902	121,970	97,981	2.6	−2.0	0.3
Manufacturing	325	424	559	18.6	18.4	16.6	2.5	2.5	2.5	24	30	35	14.6	13.7	12.6	1.9	1.5	1.7	13,375	14,248	15,884	0.6	1.0	0.8
Construction	120	143	219	6.9	6.2	6.5	1.6	4.0	2.8	9	14	21	5.6	6.3	7.5	3.6	4.0	3.8	12,966	10,440	10,433	−2.0	0.0	−1.0
Commerce	294	372	591	16.8	16.1	17.5	2.2	4.3	3.2	37	51	68	22.0	23.4	24.5	3.0	2.7	2.9	8032	7324	8669	−0.8	1.5	0.3

(continued)

Table 3.A2 (continued)

Region/sector	GVA (constant 2005 USD, billion)			GVA (% total GVA)			GVA (annual growth, %)			Employment (million)			Employment (% total employment)			Employment (annual growth, %)			GVA per worker (constant 2005 USD)			GVA per worker (annual growth, %)		
	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991–2002	2002–2013	1991–2013
Transport	116	185	320	6.6	8.0	9.5	4.3	5.1	4.7	7	11	17	4.3	5.2	6.0	4.2	3.7	3.9	16,089	16,372	19,164	0.2	1.4	0.8
Other services	608	802	1193	34.8	34.7	35.4	2.6	3.7	3.1	45	66	91	27.0	30.4	32.8	3.6	3.0	3.3	13,592	12,149	13,063	−1.0	0.7	−0.2
Other (Developed)	**24,815**	**31,431**	**36,599**	**100.0**	**100.0**	**100.0**	**2.2**	**1.4**	**1.8**	**520**	**547**	**576**	**100.0**	**100.0**	**100.0**	**0.5**	**0.5**	**0.5**	**47,749**	**57,431**	**63,495**	**1.7**	**0.9**	**1.3**
Agriculture	453	488	544	1.8	1.6	1.5	0.7	1.0	0.8	44	37	27	8.4	6.8	4.6	−1.4	−3.0	−2.2	10,392	13,115	20,392	2.1	4.1	3.1
Mining & utilities	1240	1376	1495	5.0	4.4	4.1	0.9	0.8	0.9	16	14	15	3.0	2.5	2.7	−1.2	1.0	−0.1	79,329	100,536	97,528	2.2	−0.3	0.9
Manufacturing	3886	4754	5556	15.7	15.1	15.2	1.9	1.4	1.6	113	95	78	21.7	17.3	13.6	−1.6	−1.7	−1.6	34,530	50,251	70,872	3.5	3.2	3.3
Construction	1756	1833	1664	7.1	5.8	4.5	0.4	−0.9	−0.2	37	39	40	7.2	7.1	7.0	0.4	0.3	0.3	47,006	47,038	41,251	0.0	−1.2	−0.6
Commerce	3071	4374	5005	12.4	13.9	13.7	3.3	1.2	2.2	97	106	116	18.7	19.4	20.1	0.8	0.8	0.8	31,523	41,199	43,214	2.5	0.4	1.4
Transport	1789	2568	3320	7.2	8.2	9.1	3.3	2.4	2.8	33	35	46	6.3	6.5	8.0	0.7	2.5	1.6	54,648	72,565	71,761	2.6	−0.1	1.2
Other services	12,619	16,038	19,015	50.9	51.0	52.0	2.2	1.6	1.9	180	221	254	34.7	40.4	44.0	1.9	1.2	1.6	69,952	72,483	74,985	0.3	0.3	0.3

Source Calculated from UNSD and ILO

Table 3.A3 Output, employment and labour productivity by sector—Africa

Region/sector	GVA (constant 2005 USD, billion)			GVA (% total GVA)			GVA (annual growth, %)			Employment (million)			Employment (% total employment)			Employment (annual growth, %)			GVA per worker (constant 2005 USD)			GVA per worker (annual growth, %)		
	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991–2002	2002–2013	1991–2013
Eastern Africa	**62.2**	**84.7**	**163.6**	**100.0**	**100.0**	**100.0**	**2.8**	**6.2**	**4.5**	**76.8**	**106.2**	**149.9**	**100.0**	**100.0**	**100.0**	**3.0**	**3.2**	**3.1**	**810**	**797**	**1091**	**−0.1**	**2.9**	**1.4**
Agriculture	18.0	24.6	37.9	29.0	29.0	23.2	2.8	4.0	3.4	58.8	80.9	107.4	76.6	76.2	71.6	2.9	2.6	2.8	307	304	353	−0.1	1.4	0.6
Mining & utilities	4.8	4.7	9.5	7.7	5.6	5.8	−0.1	6.6	3.2	0.6	0.7	1.3	0.7	0.6	0.9	1.6	6.4	3.9	8372	6988	7123	−1.6	0.2	−0.7
Manufacturing	6.7	9.0	15.6	10.7	10.7	9.6	2.8	5.1	3.9	3.3	4.1	5.6	4.3	3.8	3.8	1.9	3.0	2.5	2028	2226	2781	0.8	2.0	1.4
Construction	2.3	3.8	11.8	3.7	4.5	7.2	4.8	10.8	7.7	0.8	1.4	3.0	1.1	1.3	2.0	4.7	7.3	6.0	2745	2752	3903	0.0	3.2	1.6
Commerce	8.0	11.6	23.4	12.9	13.7	14.3	3.4	6.6	5.0	5.1	7.5	10.5	6.6	7.1	7.0	3.7	3.1	3.4	1583	1534	2223	−0.3	3.4	1.6
Transport	3.8	6.4	16.3	6.0	7.5	10.0	4.9	9.0	6.9	0.9	1.4	2.5	1.2	1.3	1.7	3.7	5.7	4.7	4084	4620	6470	1.1	3.1	2.1
Other services	18.6	24.6	48.9	29.9	29.0	29.9	2.6	6.5	4.5	7.3	10.3	19.5	9.5	9.7	13.0	3.2	6.0	4.6	2559	2394	2509	−0.6	0.4	−0.1
Middle Africa	**58.5**	**68.4**	**133.4**	**100.0**	**100.0**	**100.0**	**1.4**	**6.3**	**3.8**	**25.5**	**35.2**	**49.5**	**100.0**	**100.0**	**100.0**	**3.0**	**3.1**	**3.1**	**2292**	**1943**	**2698**	**−1.5**	**3.0**	**0.7**
Agriculture	8.4	9.7	16.4	14.4	14.2	12.3	1.3	4.9	3.1	18.3	24.6	32.1	71.7	69.8	64.9	2.7	2.5	2.6	461	395	510	−1.4	2.4	0.5
Mining & utilities	20.1	29.5	57.6	34.3	43.1	43.2	3.5	6.3	4.9	0.2	0.3	0.4	0.7	0.8	0.8	4.0	3.8	3.9	116,833	110,784	143,764	−0.5	2.4	0.9
Manufacturing	8.4	6.5	10.4	14.3	9.5	7.8	−2.3	4.3	1.0	0.9	1.9	2.9	3.6	5.5	5.9	7.1	3.8	5.4	9197	3367	3564	−8.7	0.5	−4.2
Construction	1.3	1.9	6.9	2.3	2.8	5.2	3.4	12.2	7.7	0.5	0.7	1.4	2.0	2.0	2.9	3.0	6.5	4.7	2626	2741	4900	0.4	5.4	2.9
Commerce	8.3	8.3	18.5	14.2	12.2	13.9	0.0	7.5	3.7	0.6	0.8	1.3	2.3	2.3	2.6	3.1	4.1	3.6	14,383	10,295	14,691	−3.0	3.3	0.1
Transport	3.5	3.4	8.2	6.0	5.0	6.2	−0.3	8.3	3.9	0.3	0.4	0.7	1.1	1.1	1.3	3.2	5.0	4.1	13,112	8,967	12,557	−3.4	3.1	−0.2
Other services	8.4	9.0	15.3	14.4	13.2	11.5	0.6	4.9	2.8	4.8	6.5	10.7	18.7	18.6	21.7	2.9	4.6	3.7	1762	1375	1427	−2.2	0.3	−1.0
Northern Africa	**224.9**	**303.3**	**454.7**	**100.0**	**100.0**	**100.0**	**2.8**	**3.7**	**3.3**	**35.3**	**45.8**	**61.8**	**100.0**	**100.0**	**100.0**	**2.4**	**2.8**	**2.6**	**6379**	**6617**	**7353**	**0.3**	**1.0**	**0.6**
Agriculture	28.8	39.1	63.6	12.8	12.9	14.0	2.8	4.5	3.7	12.6	14.9	18.0	35.7	32.4	29.2	1.5	1.8	1.7	2291	2633	3527	1.3	2.7	2.0
Mining & utilities	74.0	83.1	86.2	32.9	27.4	19.0	1.1	0.3	0.7	0.6	0.9	1.2	1.8	1.9	2.0	3.1	3.3	3.2	118,630	95,281	69,236	−2.0	−2.9	−2.4
Manufacturing	23.4	35.7	49.7	10.4	11.8	10.9	3.9	3.1	3.5	4.7	5.2	6.8	13.2	11.3	10.9	1.0	2.5	1.7	5038	6894	7360	2.9	0.6	1.7
Construction	10.7	16.1	32.5	4.8	5.3	7.1	3.8	6.6	5.2	2.4	3.5	6.9	6.8	7.7	11.2	3.6	6.3	4.9	4447	4546	4671	0.2	0.2	0.2
Commerce	25.9	37.2	61.3	11.5	12.2	13.5	3.3	4.7	4.0	4.4	6.4	8.5	12.5	14.0	13.7	3.5	2.6	3.0	5893	5808	7220	−0.1	2.0	0.9
Transport	16.3	25.6	52.7	7.2	8.4	11.6	4.2	6.8	5.5	1.9	2.2	3.6	5.3	4.9	5.8	1.8	4.4	3.1	8786	11,378	14,674	2.4	2.3	2.4
Other services	45.8	66.7	108.7	20.3	22.0	23.9	3.5	4.5	4.0	8.7	12.8	16.8	24.8	27.8	27.1	3.5	2.5	3.0	5232	5228	6484	0.0	2.0	1.0
Southern Africa	**171.1**	**221.0**	**317.5**	**100.0**	**100.0**	**100.0**	**2.4**	**3.3**	**2.8**	**10.9**	**15.0**	**17.2**	**100.0**	**100.0**	**100.0**	**2.9**	**1.3**	**2.1**	**15,684**	**14,736**	**18,424**	**−0.6**	**2.1**	**0.7**
Agriculture	6.5	7.0	8.5	3.8	3.2	2.7	0.7	1.7	1.2	2.0	2.2	1.5	18.2	14.5	9.0	0.9	−3.1	−1.1	3296	3215	5473	−0.2	5.0	2.3
Mining & utilities	23.2	23.6	21.8	13.6	10.7	6.9	0.1	−0.7	−0.3	0.6	0.7	0.5	5.1	4.5	2.9	1.8	−2.7	−0.5	41,950	34,997	43,853	−1.6	2.1	0.2

(continued)

Table 3.A3 (continued)

Region/sector	GVA (constant 2005 USD, billion)			GVA (% total GVA)			GVA (annual growth, %)			Employment (million)			Employment (% total employment)			Employment (annual growth, %)			GVA per worker (constant 2005 USD)			GVA per worker (annual growth, %)		
	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991–2002	2002–2013	1991–2013
Manufacturing	31.7	40.5	51.3	18.5	18.3	16.1	2.3	2.2	2.2	1.3	1.8	1.7	12.0	12.0	9.6	2.9	−0.7	1.1	24,205	22,503	30,869	−0.7	2.9	1.1
Construction	5.4	5.9	12.7	3.1	2.7	4.0	0.9	7.1	4.0	0.5	0.7	1.1	4.6	4.9	6.3	3.4	3.7	3.6	10,671	8146	11,624	−2.4	3.3	0.4
Commerce	21.6	30.3	46.8	12.6	13.7	14.7	3.1	4.0	3.6	1.9	2.7	3.3	17.5	17.8	19.0	3.1	1.9	2.5	11,343	11,355	14,307	0.0	2.1	1.1
Transport	11.6	22.1	34.0	6.8	10.0	10.7	6.1	4.0	5.0	0.4	0.6	0.8	3.7	4.2	4.8	4.1	2.6	3.4	28,794	35,320	41,010	1.9	1.4	1.6
Other services	71.1	91.6	142.5	41.6	41.4	44.9	2.3	4.1	3.2	4.3	6.3	8.3	39.0	42.1	48.4	3.7	2.6	3.1	16,709	14,491	17,084	−1.3	1.5	0.1
Western Africa	**127.3**	**198.3**	**421.2**	**100.0**	**100.0**	**100.0**	**4.1**	**7.1**	**5.6**	**58.7**	**80.0**	**110.3**	**100.0**	**100.0**	**100.0**	**2.9**	**3.0**	**2.9**	**2167**	**2478**	**3819**	**1.2**	**4.0**	**2.6**
Agriculture	31.1	56.5	99.9	24.4	28.5	23.7	5.6	5.3	5.4	34.1	46.8	56.1	58.1	58.5	50.9	2.9	1.7	2.3	912	1208	1780	2.6	3.6	3.1
Mining & utilities	19.1	24.1	23.1	15.0	12.2	5.5	2.1	−0.4	0.9	0.5	0.7	1.6	0.8	0.9	1.5	3.6	7.8	5.7	39,396	33,832	14,203	−1.4	−7.6	−4.5
Manufacturing	14.2	15.6	36.0	11.2	7.9	8.5	0.9	7.9	4.3	5.1	6.3	7.0	8.7	7.8	6.4	1.9	1.0	1.5	2791	2482	5121	−1.1	6.8	2.8
Construction	3.8	6.6	18.1	2.9	3.3	4.3	5.3	9.6	7.4	0.9	1.3	2.5	1.5	1.7	2.3	4.0	6.0	5.0	4345	4991	7176	1.3	3.4	2.3
Commerce	21.0	26.7	82.8	16.5	13.5	19.6	2.2	10.8	6.4	9.5	12.8	20.6	16.1	16.0	18.7	2.7	4.4	3.6	2213	2093	4020	−0.5	6.1	2.7
Transport	8.9	17.2	70.4	7.0	8.7	16.7	6.2	13.7	9.9	1.1	1.6	3.5	1.9	2.0	3.2	3.4	7.1	5.2	7863	10,536	20,231	2.7	6.1	4.4
Other services	29.3	51.6	90.9	23.0	26.0	21.6	5.3	5.3	5.3	7.6	10.5	18.9	12.9	13.1	17.2	3.0	5.5	4.2	3866	4911	4806	2.2	−0.2	1.0

Source Calculated from UNSD and ILO

Table 3.A4 Output, employment and labour productivity by sector—Asia

Region/sector	GVA (constant 2005 USD, billion)			GVA (% total GVA)			GVA (annual growth, %)			Employment (million)			Employment (% total employment)			Employment (annual growth, %)			GVA per worker (constant 2005 USD)			GVA per worker (annual growth, %)		
	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991–2002	2002–2013	1991–2013
Central Asia	**79.8**	**66.6**	**151.6**	**100.0**	**100.0**	**100.0**	**–1.6**	**7.8**	**3.0**	**18.2**	**21.2**	**27.4**	**100.0**	**100.0**	**100.0**	**1.4**	**2.3**	**1.9**	**4374**	**3140**	**5535**	**–3.0**	**5.3**	**1.1**
Agriculture	12.3	9.8	16.9	15.4	14.8	11.1	–2.0	5.0	1.5	6.7	8.1	7.3	37.0	38.0	26.8	1.6	–0.9	0.4	1822	1221	2303	–3.6	5.9	1.1
Mining & utilities	8.0	8.9	15.9	10.0	13.4	10.5	1.0	5.4	3.2	1.2	1.5	2.2	6.4	7.1	8.2	2.3	3.6	3.0	6792	5905	7124	–1.3	1.7	0.2
Manufacturing	13.2	11.8	26.4	16.5	17.8	17.4	–1.0	7.6	3.2	2.3	2.5	3.2	12.5	11.9	11.7	0.9	2.2	1.5	5768	4703	8255	–1.8	5.2	1.6
Construction	7.4	4.2	12.0	9.2	6.3	7.9	–5.0	10.1	2.3	1.4	1.3	2.6	7.6	6.2	9.5	–0.4	6.3	2.9	5319	3152	4624	–4.6	3.5	–0.6
Commerce	8.5	7.4	19.6	10.6	11.2	12.9	–1.2	9.2	3.9	2.3	2.6	3.9	12.3	12.3	14.2	1.3	3.7	2.5	3761	2859	5039	–2.5	5.3	1.3
Transport	11.4	7.1	19.6	14.3	10.7	12.9	–4.2	9.6	2.5	0.9	1.1	1.7	4.9	5.0	6.2	1.5	4.5	3.0	12,663	6753	11,449	–5.6	4.9	–0.5
Other services	19.2	17.2	41.2	24.0	25.9	27.2	–1.0	8.2	3.5	3.5	4.1	6.4	19.2	19.5	23.5	1.5	4.1	2.8	5462	4167	6412	–2.4	4.0	0.7
Eastern Asia	**1083.4**	**2549.6**	**6190.9**	**100.0**	**100.0**	**100.0**	**8.1**	**8.4**	**8.2**	**651.2**	**741.0**	**802.3**	**100.0**	**100.0**	**100.0**	**1.2**	**0.7**	**1.0**	**1664**	**3441**	**7717**	**6.8**	**7.6**	**7.2**
Agriculture	175.7	264.1	416.5	16.2	10.4	6.7	3.8	4.2	4.0	348.9	347.6	197.9	53.6	46.9	24.7	0.0	–5.0	–2.5	504	760	2105	3.8	9.7	6.7
Mining & utilities	47.0	136.7	351.0	4.3	5.4	5.7	10.2	8.9	9.6	11.1	9.6	11.6	1.7	1.3	1.4	–1.4	1.8	0.2	4223	14,313	30,335	11.7	7.1	9.4
Manufacturing	235.3	753.7	2115.4	21.7	29.6	34.2	11.2	9.8	10.5	93.0	93.0	96.3	14.3	12.5	12.0	0.0	0.3	0.2	2529	8106	21,974	11.2	9.5	10.3
Construction	79.8	143.9	390.4	7.4	5.6	6.3	5.5	9.5	7.5	26.2	43.5	96.1	4.0	5.9	12.0	4.7	7.5	6.1	3049	3306	4061	0.7	1.9	1.3
Commerce	140.8	300.2	802.2	13.0	11.8	13.0	7.1	9.3	8.2	115.6	160.7	247.3	17.8	21.7	30.8	3.0	4.0	3.5	1218	1869	3244	4.0	5.1	4.6
Transport	62.4	168.3	359.4	5.8	6.6	5.8	9.4	7.1	8.3	17.3	23.7	43.4	2.7	3.2	5.4	2.9	5.7	4.3	3598	7103	8272	6.4	1.4	3.9
Other services	342.6	782.7	1756.1	31.6	30.7	28.4	7.8	7.6	7.7	39.1	63.0	109.8	6.0	8.5	13.7	4.4	5.2	4.8	8770	12,423	16,000	3.2	2.3	2.8
South-Eastern Asia	**477.2**	**783.8**	**1400.6**	**100.0**	**100.0**	**100.0**	**4.6**	**5.4**	**5.0**	**195.9**	**249.7**	**307.3**	**100.0**	**100.0**	**100.0**	**2.2**	**1.9**	**2.1**	**2436**	**3139**	**4558**	**2.3**	**3.4**	**2.9**
Agriculture	67.4	90.5	131.3	14.1	11.5	9.4	2.7	3.4	3.1	112.6	119.7	117.0	57.5	48.0	38.1	0.6	–0.2	0.2	599	756	1122	2.1	3.7	2.9
Mining & utilities	51.7	83.7	108.5	10.8	10.7	7.7	4.5	2.4	3.4	1.4	1.9	3.6	0.7	0.8	1.2	2.9	5.8	4.3	36,279	43,031	30,110	1.6	–3.2	–0.8
Manufacturing	108.4	202.1	352.3	22.7	25.8	25.2	5.8	5.2	5.5	19.2	30.0	38.0	9.8	12.0	12.4	4.1	2.2	3.2	5647	6737	9273	1.6	2.9	2.3
Construction	28.3	38.1	76.7	5.9	4.9	5.5	2.7	6.6	4.6	5.8	11.2	18.2	2.9	4.5	5.9	6.2	4.5	5.4	4914	3407	4215	–3.3	2.0	–0.7
Commerce	78.1	124.3	245.0	16.4	15.9	17.5	4.3	6.4	5.3	31.1	45.1	63.9	15.9	18.1	20.8	3.4	3.2	3.3	2509	2754	3838	0.9	3.1	2.0
Transport	28.1	57.3	133.3	5.9	7.3	9.5	6.7	8.0	7.3	6.0	11.0	14.6	3.1	4.4	4.7	5.7	2.6	4.1	4692	5196	9133	0.9	5.3	3.1
Other services	115.3	187.8	353.5	24.2	24.0	25.2	4.5	5.9	5.2	19.8	30.6	52.0	10.1	12.3	16.9	4.0	4.9	4.5	5819	6126	6797	0.5	0.9	0.7
Southern Asia	**556.4**	**959.8**	**1919.9**	**100.0**	**100.0**	**100.0**	**5.1**	**6.5**	**5.8**	**432.3**	**555.0**	**654.3**	**100.0**	**100.0**	**100.0**	**2.3**	**1.5**	**1.9**	**1287**	**1729**	**2934**	**2.7**	**4.9**	**3.8**
Agriculture	141.2	185.1	278.9	25.4	19.3	14.5	2.5	3.8	3.1	264.5	313.9	304.0	61.2	56.6	46.5	1.6	–0.3	0.6	534	590	918	0.9	4.1	2.5
Mining & utilities	60.6	87.4	138.3	10.9	9.1	7.2	3.4	4.3	3.8	5.3	5.2	7.2	1.2	0.9	1.1	–0.2	3.1	1.4	11,432	16,833	19,129	3.6	1.2	2.4

(continued)

Table 3.A4 (continued)

Region/sector	GVA (constant 2005 USD, billion)			GVA (% total GVA)			GVA (annual growth, %)			Employment (million)			Employment (% total employment)			Employment (annual growth, %)			GVA per worker (constant 2005 USD)			GVA per worker (annual growth, %)		
	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991–2002	2002–2013	1991–2013
Manufacturing	69.3	134.4	283.9	12.5	14.0	14.8	6.2	7.0	6.6	48.9	62.9	80.6	11.3	11.3	12.3	2.3	2.3	2.3	1418	2136	3522	3.8	4.7	4.2
Construction	32.6	56.5	127.6	5.9	5.9	6.6	5.1	7.7	6.4	15.2	27.0	61.9	3.5	4.9	9.5	5.4	7.8	6.6	2146	2094	2063	−0.2	−0.1	−0.2
Commerce	72.6	145.6	307.5	13.1	15.2	16.0	6.5	7.0	6.8	39.4	61.9	79.6	9.1	11.1	12.2	4.2	2.3	3.2	1844	2353	3864	2.2	4.6	3.4
Transport	33.6	75.7	199.0	6.0	7.9	10.4	7.7	9.2	8.4	14.5	24.8	37.8	3.4	4.5	5.8	5.0	3.9	4.5	2317	3055	5263	2.5	5.1	3.8
Other services	146.5	275.0	584.7	26.3	28.7	30.5	5.9	7.1	6.5	44.5	59.4	83.2	10.3	10.7	12.7	2.7	3.1	2.9	3289	4631	7027	3.2	3.9	3.5
Western Asia	**759.0**	**1115.5**	**2023.6**	**100.0**	**100.0**	**100.0**	**3.6**	**5.6**	**4.6**	**41.2**	**50.6**	**75.9**	**100.0**	**100.0**	**100.0**	**1.9**	**3.8**	**2.8**	**18,419**	**22,061**	**26,673**	**1.7**	**1.7**	**1.7**
Agriculture	54.0	66.4	82.2	7.1	6.0	4.1	1.9	2.0	1.9	13.5	12.9	13.1	32.9	25.5	17.3	−0.4	0.1	−0.1	3989	5142	6267	2.3	1.8	2.1
Mining & utilities	220.6	302.6	492.9	29.1	27.1	24.4	2.9	4.5	3.7	0.7	0.9	1.5	1.7	1.7	2.0	2.1	5.5	3.8	323,396	353,884	321,499	0.8	−0.9	0.0
Manufacturing	89.3	138.6	261.5	11.8	12.4	12.9	4.1	5.9	5.0	4.4	5.7	7.9	10.7	11.4	10.5	2.4	3.0	2.7	20,234	24,135	32,930	1.6	2.9	2.2
Construction	41.6	54.9	129.2	5.5	4.9	6.4	2.6	8.1	5.3	2.5	3.5	8.0	6.0	6.9	10.5	3.2	7.8	5.5	16,822	15,730	16,230	−0.6	0.3	−0.2
Commerce	77.7	120.4	232.0	10.2	10.8	11.5	4.1	6.1	5.1	6.7	9.1	13.6	16.2	18.0	17.9	2.8	3.7	3.3	11,648	13,252	17,100	1.2	2.3	1.8
Transport	53.4	100.2	213.8	7.0	9.0	10.6	5.9	7.1	6.5	2.0	2.7	4.4	4.9	5.4	5.8	2.7	4.5	3.6	26,208	36,811	48,572	3.1	2.6	2.8
Other services	222.3	332.4	612.0	29.3	29.8	30.2	3.7	5.7	4.7	11.4	15.8	27.3	27.6	31.2	36.0	3.0	5.1	4.1	19,536	21,094	22,381	0.7	0.5	0.6

Source Calculated from UNSD and ILO

Table 3.A5 Output, employment and labour productivity by sector—Latin America

Region/sector	GVA (constant 2005 USD, billion)			GVA (% total GVA)			GVA (annual growth, %)			Employment (million)			Employment (% total employment)			Employment (annual growth, %)			GVA per worker (constant 2005 USD)			GVA per worker (annual growth, %)		
	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991	2002	2013	1991–2002	2002–2013	1991–2013	1991	2002	2013	1991–2002	2002–2013	1991–2013
Caribbean	**125.3**	**179.1**	**219.2**	**100.0**	**100.0**	**100.0**	**3.3**	**1.9**	**2.6**	**11.7**	**13.9**	**16.5**	**100.0**	**100.0**	**100.0**	**1.6**	**1.5**	**1.6**	**10,736**	**12,876**	**13,315**	**1.7**	**0.3**	**1.0**
Agriculture	7.1	6.9	8.6	5.7	3.8	3.9	–0.3	2.0	0.9	3.0	3.3	3.6	26.1	23.7	21.8	0.7	0.7	0.7	2328	2078	2387	–1.0	1.3	0.1
Mining & utilities	6.9	9.4	10.5	5.5	5.2	4.8	2.9	1.1	2.0	0.2	0.2	0.3	1.6	1.4	1.6	0.1	3.3	1.7	36,902	49,568	39,059	2.7	–2.1	0.3
Manufacturing	33.8	49.8	53.1	27.0	27.8	24.2	3.6	0.6	2.1	1.4	1.5	1.4	11.9	10.9	8.6	0.8	–0.6	0.1	24,396	32,844	37,511	2.7	1.2	2.0
Construction	7.5	9.1	11.4	6.0	5.1	5.2	1.8	2.0	1.9	0.7	0.8	0.9	5.7	5.4	5.3	1.2	1.3	1.2	11,270	12,045	13,020	0.6	0.7	0.7
Commerce	19.3	26.7	34.2	15.4	14.9	15.6	3.0	2.3	2.6	2.1	2.7	3.5	17.8	19.4	21.1	2.4	2.3	2.4	9337	9863	9852	0.5	0.0	0.2
Transport	6.5	11.5	17.9	5.2	6.4	8.1	5.4	4.0	4.7	0.5	0.7	0.9	4.6	5.1	5.6	2.7	2.3	2.5	12,157	16,150	19,363	2.6	1.7	2.1
Other services	44.2	65.8	83.5	35.2	36.7	38.1	3.7	2.2	2.9	3.8	4.7	5.9	32.4	34.0	36.0	2.1	2.1	2.1	11,693	13,909	14,108	1.6	0.1	0.9
Central America	**616.5**	**836.2**	**1137.0**	**100.0**	**100.0**	**100.0**	**2.8**	**2.8**	**2.8**	**40.8**	**54.0**	**69.5**	**100.0**	**100.0**	**100.0**	**2.6**	**2.3**	**2.5**	**15,114**	**15,497**	**16,361**	**0.2**	**0.5**	**0.4**
Agriculture	28.3	34.8	43.3	4.6	4.2	3.8	1.9	2.0	1.9	11.4	11.1	11.9	27.9	20.6	17.1	–0.2	0.6	0.2	2488	3132	3637	2.1	1.4	1.7
Mining & utilities	79.7	106.1	118.3	12.9	12.7	10.4	2.6	1.0	1.8	0.3	0.5	0.7	0.6	0.9	1.0	5.4	4.1	4.7	306,586	229,175	164,293	–2.6	–3.0	–2.8
Manufacturing	105.2	150.5	184.1	17.1	18.0	16.2	3.3	1.8	2.6	6.5	9.2	10.3	15.9	17.0	14.8	3.2	1.0	2.1	16,220	16,401	17,930	0.1	0.8	0.5
Construction	51.9	63.6	82.3	8.4	7.6	7.2	1.9	2.4	2.1	2.0	3.2	4.7	5.0	6.0	6.8	4.3	3.6	3.9	25,594	19,709	17,372	–2.3	–1.1	–1.7
Commerce	106.1	144.8	206.5	17.2	17.3	18.2	2.9	3.3	3.1	10.6	14.7	18.9	26.0	27.2	27.2	3.0	2.3	2.7	10,013	9866	10,944	–0.1	0.9	0.4
Transport	37.2	66.8	118.3	6.0	8.0	10.4	5.5	5.3	5.4	1.6	2.4	3.4	4.0	4.4	4.9	3.5	3.2	3.3	22,707	28,059	35,039	1.9	2.0	2.0
Other services	208.0	269.7	384.3	33.7	32.2	33.8	2.4	3.3	2.8	8.4	12.9	19.6	20.6	24.0	28.3	4.0	3.9	3.9	24,779	20,857	19,572	–1.6	–0.6	–1.1
South America	**1003.2**	**1294.2**	**2018.8**	**100.0**	**100.0**	**100.0**	**2.3**	**4.1**	**3.2**	**113.4**	**149.5**	**192.6**	**100.0**	**100.0**	**100.0**	**2.5**	**2.3**	**2.4**	**8843**	**8659**	**10,481**	**–0.2**	**1.8**	**0.8**
Agriculture	59.3	85.0	116.7	5.9	6.6	5.8	3.3	2.9	3.1	27.4	29.4	27.4	24.2	19.6	14.2	0.6	–0.6	0.0	2164	2896	4264	2.7	3.6	3.1
Mining & utilities	101.6	142.5	195.1	10.1	11.0	9.7	3.1	2.9	3.0	1.6	1.5	2.3	1.4	1.0	1.2	–0.8	4.3	1.7	63,445	97,397	84,234	4.0	–1.3	1.3
Manufacturing	185.8	223.8	321.9	18.5	17.3	15.9	1.7	3.4	2.5	16.4	19.1	23.5	14.5	12.8	12.2	1.4	1.9	1.6	11,320	11,733	13,689	0.3	1.4	0.9
Construction	60.8	69.9	125.1	6.1	5.4	6.2	1.3	5.4	3.3	6.6	9.7	15.4	5.8	6.5	8.0	3.6	4.3	3.9	9241	7226	8145	–2.2	1.1	–0.6
Commerce	168.2	200.3	350.4	16.8	15.5	17.4	1.6	5.2	3.4	23.9	33.4	45.8	21.1	22.3	23.8	3.1	2.9	3.0	7040	6000	7643	–1.4	2.2	0.4
Transport	71.9	106.3	184.3	7.2	8.2	9.1	3.6	5.1	4.4	5.0	8.2	12.4	4.4	5.5	6.5	4.6	3.9	4.2	14,345	12,992	14,836	–0.9	1.2	0.2
Other services	355.5	466.4	725.3	35.4	36.0	35.9	2.5	4.1	3.3	32.5	48.3	65.8	28.7	32.3	34.2	3.7	2.8	3.3	10,926	9649	11,026	–1.1	1.2	0.0

Source Calculated from UNSD and ILO

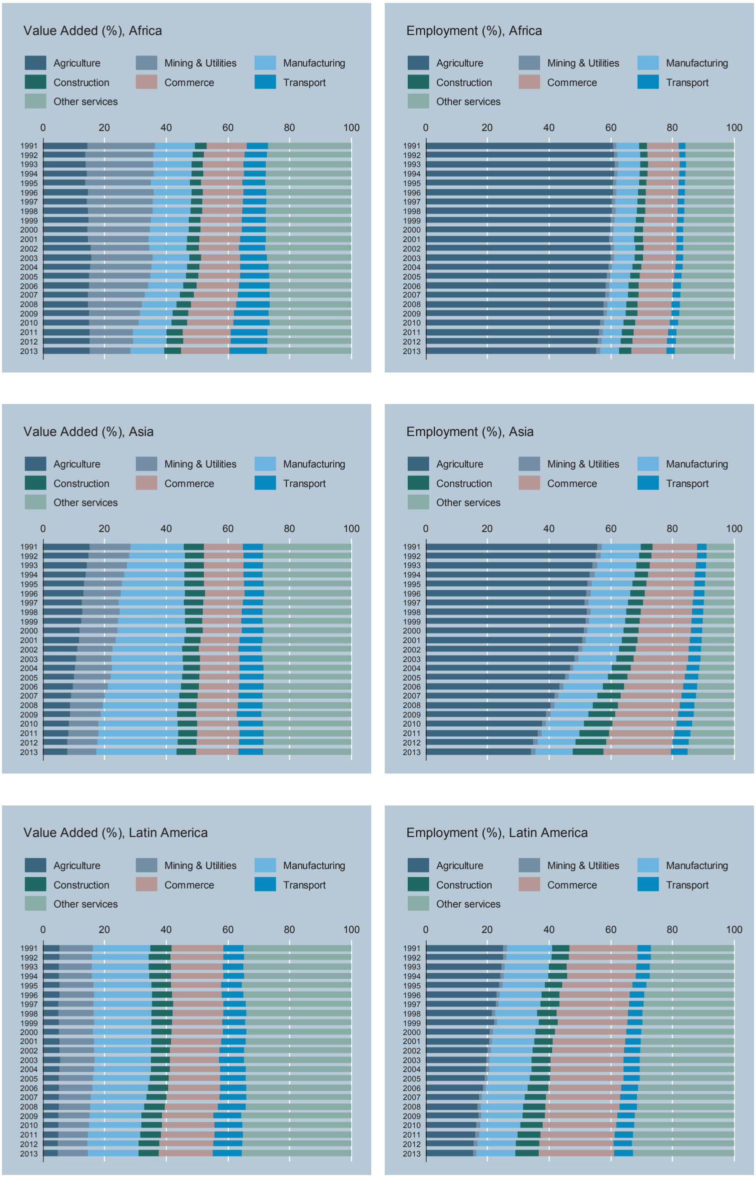

Fig. 3.A1 Structure of output and employment by region

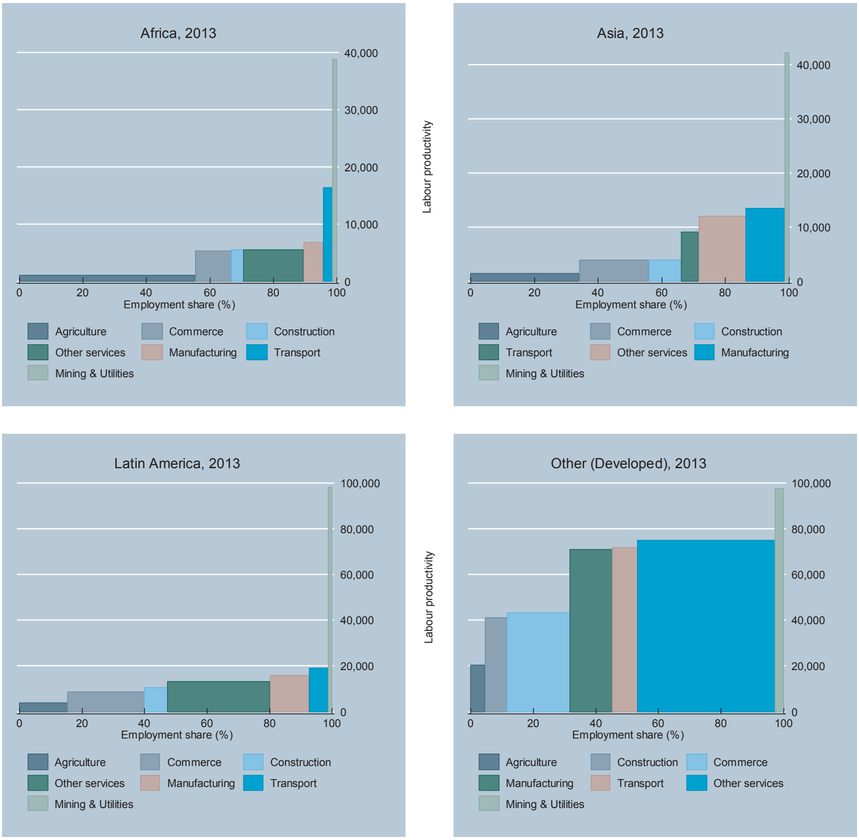

Fig. 3.A2 Labour productivity gaps, 2013

Table 3.A6 Demographics and employment rate

Region	Total population (millions)			Working-age population (15–64, millions)			Working-age population (% total population)			Employment rate (%)		
	1991	2002	2013	1991	2002	2013	1991	2002	2013	1991	2002	2013
World	**5343**	**6203**	**7072**	**3254**	**3946**	**4654**	**60.9**	**63.6**	**65.8**	**68.6**	**67.5**	**66.8**
Africa	**639**	**838**	**1097**	**335**	**457**	**611**	**52.4**	**54.6**	**55.7**	**61.9**	**61.8**	**63.6**
Eastern Africa	190	258	349	96	133	185	50.4	51.5	53.1	80.1	80.0	80.8
Middle Africa	72	99	136	37	50	71	50.8	50.7	52.1	69.5	70.1	70.0
Northern Africa	149	182	221	82	110	139	54.9	60.3	63.2	43.2	41.8	44.3
Southern Africa	43	53	60	25	33	39	57.6	63.1	64.4	44.0	44.9	44.3
Western Africa	185	246	331	96	131	177	51.9	53.2	53.3	61.3	61.1	62.5
Asia	**3099**	**3625**	**4108**	**1881**	**2339**	**2803**	**60.7**	**64.5**	**68.2**	**71.2**	**69.2**	**66.6**
Central Asia	51	56	64	29	34	43	57.3	61.2	66.3	62.7	62.0	64.1
Eastern Asia	1234	1351	1445	803	935	1056	65.0	69.2	73.1	81.1	79.2	76.0
South-Eastern Asia	458	547	628	272	350	420	59.5	64.1	67.0	72.0	71.3	73.1
Southern Asia	1217	1498	1749	698	914	1139	57.3	61.1	65.1	61.9	60.7	57.5
Western Asia	138	174	222	79	105	145	56.9	60.5	65.4	52.3	48.1	52.1
Latin America	**452**	**539**	**614**	**267**	**339**	**405**	**59.2**	**62.8**	**65.9**	**62.0**	**64.2**	**68.8**
Caribbean	33	37	40	20	23	26	60.9	63.0	65.4	58.0	59.3	62.2
Central America	118	144	167	67	87	107	56.7	60.2	63.9	61.2	62.4	65.0
South America	301	358	406	181	229	271	60.0	63.9	66.7	62.8	65.3	71.0
Other (Developed)	**1153**	**1201**	**1252**	**771**	**811**	**835**	**66.8**	**67.5**	**66.7**	**67.4**	**67.5**	**69.0**

Source Calculated from UNPD

Table 3.A7 Decomposition of GVA per capita growth—regions

Region/ period	Contribution from (percentage points)				GVA per capita growth (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Africa (1991–2013)	**0.52**	**0.44**	**0.13**	**0.28**	**1.36**
1991–2002	−0.05	0.04	−0.02	0.36	0.33
2002–2013	1.10	0.84	0.28	0.19	2.41
Asia (1991–2013)	**3.74**	**1.10**	**−0.34**	**0.59**	**5.09**
1991–2002	3.39	0.58	−0.27	0.57	4.27
2002–2013	4.12	1.63	−0.36	0.54	5.92
Latin America (1991–2013)	**0.30**	**0.35**	**0.48**	**0.49**	**1.61**
1991–2002	−0.10	0.19	0.30	0.54	0.94
2002–2013	0.73	0.47	0.65	0.43	2.29
Other (1991–2013)	**1.05**	**0.26**	**0.11**	**−0.01**	**1.40**
1991–2002	1.36	0.33	0.00	0.10	1.80
2002–2013	0.68	0.23	0.21	−0.11	1.01

Table 3.A8 Decomposition of GVA per capita growth—Africa

Region/ period	Contribution from (percentage points)				GVA per capita growth (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Eastern Africa (1991–2013)	**0.70**	**0.66**	**0.04**	**0.24**	**1.64**
1991–2002	−0.19	0.04	−0.01	0.19	0.03
2002–2013	1.65	1.25	0.10	0.29	3.28
Middle Africa (1991–2013)	**−0.08**	**0.83**	**0.04**	**0.11**	**0.89**
1991–2002	−2.40	0.91	0.08	−0.02	−1.44
2002–2013	2.25	0.78	0.00	0.24	3.27
Northern Africa (1991–2013)	**0.39**	**0.26**	**0.12**	**0.64**	**1.41**

(continued)

Table 3.A8 (contiuned)

Region/ period	Contribution from (percentage points)				GVA per capita growth (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
1991–2002	0.06	0.28	−0.29	0.85	0.90
2002–2013	0.72	0.25	0.54	0.42	1.93
Southern Africa (1991–2013)	**0.64**	**0.10**	**0.03**	**0.51**	**1.28**
1991–2002	−0.79	0.22	0.19	0.84	0.46
2002–2013	2.04	0.01	−0.13	0.19	2.11
Western Africa (1991–2013)	**1.86**	**0.74**	**0.09**	**0.13**	**2.82**
1991–2002	1.10	0.12	−0.04	0.24	1.42
2002–2013	2.64	1.38	0.22	0.01	4.24

Table 3.A9 Decomposition of GVA per capita growth—Asia

Region/ period	Contribution from (percentage points)				GVA per capita growth (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Central Asia (1991–2013)	**0.67**	**0.41**	**0.11**	**0.67**	**1.86**
1991–2002	−2.95	−0.03	−0.10	0.59	−2.49
2002–2013	4.45	0.85	0.33	0.78	6.40
Eastern Asia (1991–2013)	**6.02**	**1.17**	**−0.37**	**0.65**	**7.47**
1991–2002	5.90	0.92	−0.23	0.61	7.21
2002–2013	5.84	1.78	−0.42	0.54	7.74
South-Eastern Asia (1991–2013)	**1.51**	**1.37**	**0.08**	**0.56**	**3.52**
1991–2002	0.97	1.37	−0.08	0.68	2.94
2002–2013	2.12	1.33	0.24	0.41	4.10
Southern Asia (1991–2013)	**3.05**	**0.76**	**−0.37**	**0.62**	**4.06**
1991–2002	2.41	0.31	−0.19	0.58	3.12
2002–2013	3.78	1.15	−0.52	0.61	5.01
Western Asia (1991–2013)	**1.00**	**0.70**	**−0.01**	**0.64**	**2.33**
1991–2002	1.13	0.52	−0.76	0.55	1.45
2002–2013	0.92	0.83	0.74	0.73	3.22

Table 3.A10 Decomposition of GVA per capita growth—Latin America

Region/ period	Contribution from (percentage points)				GVA per capita growth (%)
	Within-sector productivity	Between-sector productivity	Changes in employment	Changes in demography	
Caribbean (1991–2013)	**1.06**	**−0.08**	**0.32**	**0.33**	**1.63**
1991–2002	1.68	−0.01	0.20	0.30	2.17
2002–2013	0.46	−0.15	0.44	0.35	1.10
Central America (1991–2013)	**−0.47**	**0.84**	**0.28**	**0.55**	**1.18**
1991–2002	−0.84	1.07	0.17	0.55	0.95
2002–2013	−0.08	0.58	0.38	0.54	1.42
South America (1991–2013)	**0.53**	**0.25**	**0.56**	**0.49**	**1.83**
1991–2002	−0.19	0.00	0.36	0.57	0.74
2002–2013	1.30	0.46	0.77	0.40	2.93

Table 3.A11 Top-10 performers by (developing) region, 2002–2013

Region	Country	GVA per capita growth (%)	Contribution from (%)			
			GVA per worker		Employment rate	Demographic structure
			Within-sector	Between-sector		
Africa	NGA	5.1	2.5	**2.6**	0.1	−0.1
	ETH	6.9	3.5	**2.5**	0.3	0.7
	TZA	3.6	1.2	**2.4**	0.1	−0.1
	ZMB	3.2	1.5	**1.7**	0.1	−0.1
	UGA	2.4	1.4	**1.4**	−0.6	0.2
	GHA	4.7	2.7	**1.3**	0.4	0.4
	MRT	2.5	0.2	**1.3**	0.6	0.4
	TCD	4.3	3.3	**0.9**	−0.1	0.2
	CPV	3.2	0.4	**0.9**	0.3	1.7
	COD	3.3	2.3	**0.8**	−0.1	0.3
Asia	KHM	6.0	2.5	**1.8**	0.7	0.9
	VNM	5.4	2.8	**1.7**	−0.1	1.0
	LAO	5.9	3.2	**1.7**	−0.2	1.2
	AFG	5.3	3.3	**1.6**	0.0	0.5
	CHN	9.5	7.9	**1.5**	−0.5	0.6
	MDV	4.4	0.0	**1.5**	1.5	1.4
	IND	6.0	4.9	**1.4**	−0.8	0.6
	MNG	7.0	4.5	**1.3**	0.4	0.7
	IDN	4.3	2.6	**1.2**	0.4	0.1
	PNG	2.9	1.4	**1.2**	0.0	0.3

(continued)

Table 3.A11 (contiuned)

Region	Country	GVA per capita growth (%)	Contribution from (%)			
			GVA per worker		Employment rate	Demographic structure
			Within-sector	Between-sector		
Latin America & the Caribbean	CHL	3.4	−0.3	**1.4**	1.9	0.4
	VEN	2.4	0.2	**1.4**	0.5	0.4
	PER	5.0	2.2	**1.3**	1.0	0.5
	ECU	3.0	1.3	**0.9**	0.4	0.4
	HTI	0.6	−1.4	**0.9**	0.5	0.6
	BOL	2.7	0.7	**0.9**	0.6	0.6
	GTM	1.2	−0.7	**0.7**	0.7	0.5
	MEX	1.4	−0.1	**0.7**	0.3	0.5
	NIC	2.2	0.2	**0.6**	0.5	0.9
	BRB	1.0	−0.1	**0.6**	0.1	0.4

Note The table excludes countries with a negative GVA per capita growth rate. These are: Gabon (−1.0%), Guinea (−0.1%) and Yemen (−0.5%)

References

Chenery, H. (1960). Patterns of Industrial Growth. *American Economic Review, 50,* 624–653.

Chenery, H., & Taylor, L. (1968). Development Patterns: Among Countries and Over Time. *The Review of Economics and Statistics, 50*(4), 391–416.

Gollin, D., Lagakos, D., & Waugh, M. (2014). The Agricultural Productivity Gap. *The Quarterly Journal of Economics, 129*(2), 939–993.

Herrendorf, B., Rogerson, R., & Valentinyiet, A. (2014). Growth and Structural Transformation. In P. Aghion & S. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 2, pp. 855–941). Amsterdam, North Holland: Elsevier.

Kucera, D., & Roncolato, L. (2012). *Structure Matters: Sectoral Drivers of Growth and the Labour Productivity Employment Relationship* (ILO Research Paper 3). Geneva: ILO.

Kuznets, S. (1957). Quantitative Aspects of the Economic Growth of Nations: II. Industrial Distribution of National Product and Labor Force. *Economic Development and Cultural Change, 5*(Suppl. 4), 1–111.

Kuznets, S. (1966). *Modern Economic Growth*. New Haven: Yale University Press.

McMillan, M., & Harttgen, K. (2015). *What Is Driving the African Growth Miracle* (NBER Working Paper No. 20077).

McMillan, M., & Headey, D. (2014). Introduction—Understanding Structural Transformation in Africa. *World Development, 63,* 1–10.

McMillan, M., Rodrik, D., & Verduzco-Gallo, I. (2014). Globalization, Structural Change, and Productivity Growth, with an Update on Africa. *World Development, 63,* 11–32.

Shorrocks, A. (2013). Decomposition Procedures for Distributional Analysis: A Unified Framework Based on the Shapley Value. *The Journal of Economic Inequality, 11*(1), 99–126.

Timmer, M., de Vries, G., & de Vries, K. (2015). *Patterns of Structural Change in Developing Countries*. Groningen Growth and Development Centre, Research Memorandum 149.

UNCTAD. (2014). The Least Developed Countries Report 2014—Growth with Structural Transformation: A Post-2015 Development Agenda. New York and Geneva: United Nations.

World Bank. (2015). *Job Generation and Growth Decomposition Tool: Understanding the Sectoral Pattern of Growth and Its Employment and Productivity Intensity Reference Manual and User's Guide Version 1.0*. World Bank Group. Available via http://siteresources.worldbank.org/INTEMPSHAGRO/Resources/JoGGs_Decomposition_Tool_UsersGuide.pdf. Accessed mid-April 205.