7. Labour productivity and unit labour costs indicator (KILM 18)

KILM 18. Labour productivity and unit labour cost

Introduction

This chapter presents information on labour productivity for the aggregate economy (table 18a), manufacturing (table 18b), transport and communication (table 18c), trade – including sales and repairs of motor vehicles, wholesale, retail, hotels and restaurants – (table 18d) and agriculture, forestry and fisheries (table 18e). Labour productivity is defined as output per unit of labour input (persons employed or hours worked). For a substantial number of economies, the productivity measures for the total economy and manufacturing are complemented with measures of unit labour cost, which stands for labour cost per unit of output.

This chapter provides estimates of growth rates of labour productivity and unit labour cost, as well as levels expressed in US dollars. All estimates are made according to the national accounts conventions to ensure that labour productivity for individual sectors can be compared. Hence, the selection of economies is based on the availability of consistent series of output in both national currencies and PPP (purchasing power parity)-converted US dollars and labour input. There are significant limitations in the availability of reliable data for these indicators, particularly when international comparability is the main criterion on the basis of which the estimates are constructed. In particular the estimates for the two service industries and the agricultural, forestry and fisheries sector are of an experimental nature largely because of the difficulty in obtaining adequate PPP measures for each country to convert services GDP to US dollars.

The productivity indicator for the aggregate economy covers 125 economies with coverage extending to all KILM regional groups (table 18a). Together, these economies represent more than 96 per cent of the world population and more than 99 per cent of world GDP. For a subset of economies (mostly in Europe and North America, with some in Asia and South America), separate measures are provided for manufacturing (31 economies), transport and communication (18 economies) and trade (15 economies). For agriculture, forestry and fisheries, estimates include as many as 113 economies. Unit labour cost estimates for manufacturing are provided for a somewhat smaller group of economies.

Use of the indicator

Economic growth in a country or a sector can be ascribed either to increased employment or to more effective work by those who are employed. The latter effect can be described through statistics on labour productivity. Labour productivity therefore is a key measure of economic performance. The understanding of the driving forces behind it, in particular the accumulation of machinery and equipment, improvements in organization as well as physical and institutional infrastructures, improved health and skills of workers ("human capital") and the generation of new technology, is important for formulating policies to support economic growth. Such policies may focus on regulations on industries and trade, institutional innovations, government investment programmes in infrastructures as well as human capital, technology or any combination of these.

Labour productivity estimates can serve to develop and monitor the effects of labour market policies. For example, high labour productivity is often associated with high

levels or particular types of human capital, indicating priorities for specific education and training policies. Likewise, trends in productivity estimates can be used to understand the effects of wage settlements on rates of inflation or to ensure that such settlements will compensate workers for (part of) realized productivity improvements.

Finally, productivity measures can contribute to the understanding of how labour market performance affects living standards. When the intensity of labour utilization – the average number of annual working hours per head of the population – is low, the creation of employment opportunities is an important means of raising *per capita* income in addition to productivity growth.[1] In Europe, for example, where, given lower *per capita* income levels, productivity levels are relatively close to the United States, labour utilization may be increased by encouraging a higher labour force participation rate or by encouraging everyone to work more hours, e.g. by creating more decent and productive employment opportunities for economic activity. In contrast, when labour intensity is already high, for example in East Asia, productivity will be the sole key to improving living standards. In any case, increasing labour force participation is at best a transitional source of growth depending on the rate of population growth and the age structure. In the long run only the productivity of labour determines the rise in per capita income.

The second measure presented in this chapter, unit labour cost, represents a direct link between productivity and the cost of labour used in generating output. On the one hand, a rise in an economy's unit labour cost represents an increased reward for labour's contribution to output. On the other hand, however, a rise in labour cost higher than the rise in labour productivity may be a threat to a country's competitiveness, if other costs are not adjusted in compensation. As a competitiveness indicator, unit labour cost is particularly relevant for the manufacturing industry where many internationally tradable products are produced.

Clearly, unit labour cost should not be interpreted as a comprehensive measure of competitiveness, but as a reflection of cost competitiveness. For example, in the case of durable consumer and investment goods, competitiveness between advanced economies is also determined by other factors, such as improvement of product quality, customization or improved after-sales service. Furthermore, unit labour cost measures deal exclusively with the cost of labour. Even though labour costs are an important determinant of competitiveness between advanced and developing economies, the cost of capital can also be a crucial factor in comparisons of cost competitiveness between economies.

In this chapter we provide unit labour cost measures for the manufacturing sector, but not for the agricultural sector and services sectors. In agriculture, labour cost is largely made up of the income of the farmers, and is best treated as the bottom line revenue on each year's farm operation which in turn is dependent on the quantity and price of farm output in each single year. For non-tradable industries in, for example, the services sector the usefulness of the measure derives from identifying the source from which a rise in unit labour cost originates. For example, an increase can result from upward wage pressure. Alternatively, the increase in unit cost may be due to a slowdown in productivity growth. At the aggregate level a rise in unit labour cost may be due to the rise in the sectoral share of the services sector, as seen in many developed (industrialized) economies. In many services sectors, productivity grows more slowly than in manufacturing, whereas the development of labour costs is often less

1. It is clear that living standards do not equal *per capita* income, but the latter can still be viewed as a reasonably good proxy of the former, even though the link is not automatic. For example, the United Nations Development Programme (UNDP) *Human Development Report 2006* (website: http://hdr.undp.org/) reveals that, out of 177 economies with information on both the human development index (HDI) and GDP per capita (at PPP) in 2004, 102 rank higher in HDI than in GDP, one ranks the same and 74 rank higher in GDP than in HDI.

diverse across sectors. The causes of changes in unit labour cost outside the tradable sector, therefore, have important policy implications for labour market and trade policies.

Definitions and sources

Output and labour productivity

Productivity represents the amount of output per unit of input. In this chapter, output is measured as "value added", which is the total production value minus the value of intermediate inputs, such as raw materials, semi-finished products, services purchased and energy inputs. Value added, called "gross domestic product" (GDP) in the national accounts, represents the compensation for input of services from capital (including depreciation) and labour directly engaged in the production. The GDP concepts for the aggregate economy were expressed at market prices, which reflects the market value of the output produced. For the individual sectors, GDP at market prices was adjusted to basic price level, i.e. indirect taxes on products were subtracted and subsidies on products were added. The adjusted GDP, therefore, represents the amount receivable by the producer for a unit of good or service produced.

For developing countries, value added in basic prices, which is a relatively new concept introduced in the latest revision of the System of National Accounts (1993), is generally not available and therefore these figures are mostly expressed at factor costs. The factor cost concept represents the overall gross income from operating activities.[2] These differences in valuation concepts do affect the consistency of the levels of output by sector in national currency or US dollars, which therefore cannot be added up without further adjustments. But the valuation concept has little impact on comparisons of growth rates of output and productivity as the percentage differences between output at various valuation concepts do not change much over time.

Labour productivity growth may be due to either increased efficiency in the use of labour, without more of other inputs, or because each worker works with more of the other inputs, such as physical capital, human capital or intermediate inputs. More sophisticated measures, such as "total factor productivity", which is the output per combined unit of all inputs, are not included in KILM 18.[3] Estimated labour productivity may also show an increase if the mix of activities in the economy or in an industry has shifted from activities with low levels of productivity to activities with higher levels, even if none of the activities have become more productive.

For a constant "mix" of activities the best measure of labour input to be used in the productivity equation would be "total number of annual hours actually worked by all persons employed". In many cases, however, this labour input measure is difficult to obtain or estimate reliably. For this reason, the labour productivity measures presented here show both gross value added per person employed and gross value added per hour worked.

To compare labour productivity levels across economies, it is necessary to convert

2. The United Nations System of National Accounts, 1993 (see website: http://unstats.un.org/unsd/nationalaccount/default.htm) recommends the use of the basic price concept, but for manufacturing a distinction between net indirect taxes on products and production can not always be made. For the United States, the value-added concepts for agriculture and services are also at factor cost.

3. For recent OECD-wide estimates of total factor productivity growth, see: OECD: *The Sources of Economic Growth* (Paris, 2003). For the EU-15 countries, see M.P. Timmer and B. van Ark: "Does information and communication technology drive productivity growth differentials? A comparison of the European Union countries and the United States", Oxford Economic Papers (2005). Estimates at the industry level can be obtained from the *EU KLEMS Growth and Productivity Accounts* (http://www.euklems.net). For estimates including developing countries, B. Bosworth and S. Collins: "The empirics of growth: An update," Brookings Papers on Economic Activities (Washington, DC, Brookings Institution, 2003).

gross value added to US dollars on the basis of adjusted purchasing power parity (PPP). A PPP represents the amount of a country's currency that is required to purchase a standard set of goods and services worth one US dollar. Through the use of PPPs one takes account of differences in relative prices between countries. Had official currency exchange rates been used instead, the implicit assumption would be that there are no differences in relative prices across countries. The total economy estimates of gross value added used for KILM 18 are expressed in terms of 1990 US dollars, as the 1990 PPP made it possible to compare the largest set of countries. For the individual sectors the base year is 1997. This year was chosen due to the availability of a new set of multilateral PPPs by industry for this benchmark year. The agricultural sector PPPs were originally for 1995, but have been extrapolated to 1997 to enhance the comparability between sectors.

Unit labour cost

Unit labour cost is defined as labour compensation per unit of gross value added produced. Total labour compensation is measured to include not only gross wages and salaries of employees, but also other costs of labour that are paid by employers, including employers' contributions to social security and pension schemes. In addition to employees' compensation, estimated labour costs of the self-employed are included where possible, mostly imputed on the assumption that the labour compensation per self-employed person equals that of an employee. Therefore, this adjustment can only be made when the number of self-employed persons is known separately.[4]

For comparisons of unit labour cost levels between countries, labour compensation is converted to US dollars on the basis of the nominal exchange rate. Labour compensation estimates are obtained from the national accounts estimates so that value added (GDP) and labour costs are compatible. However, the national accounts of developing economies often do not provide estimates of labour compensation which explains the limited number of developing countries for which unit labour cost estimates in this dataset are available.

Sources for the aggregate economy estimates (KILM 18a)

The estimates for the aggregate economy (KILM 18a) presented here are derived from the Total Economy Database of The Conference Board (TCB) and the Groningen Growth and Development Centre (GGDC) (University of Groningen, the Netherlands). TCB and GGDC have long-standing expertise in developing and analysing data on productivity performance, focusing in particular on comparisons of levels of productivity by sector and industry. This database also includes measures of labour compensation to obtain unit labour cost. A full documentation of sources and methods by country and underlying documentation on the use of PPPs, etc. can be downloaded from the website of the Groningen Growth and Development Centre.[5]

The aggregate economy estimates for OECD countries, most of which are included in the KILM tables under the headings of "Developed Economies & European Union", GDP (after 1990) and labour compensation for the aggregate economy are mostly obtained from OECD: *National Accounts*, Volumes I and II (annual issues) and the Eurostat New Chronos database. Maddison (2003) has been extensively used to cover the period 1980-1990.[6] Employment estimates for the

4. For the Latin American countries (except for Brazil and Mexico), we provide comparisons of unit labour cost exclusively for employee compensation.

5. Website: http://www.ggdc.net/. See also M.P. Timmer, G. Ypma and B. van Ark: *PPPs for industry output: A new dataset for international comparisons*, GGDC Research Memorandum GD-82 (2007), website: http://www.ggdc.net/pub/online/gd82(online).pdf.

6. A. Maddison: *The World Economy: Historical Statistics* (Paris, OECD Development Centre, 2001). See also Maddison's homepage: http://www.ggdc.net/maddison/. Some OECD countries, for example, the Czech Republic and Hungary, fall in the "transition economies" group.

aggregate economy are mostly taken from OECD: *Labour Force Statistics* (annual issues), Eurostat and the Bureau of Labor Statistics (BLS): *Comparative Civilian Labour Force Statistics*. The estimates of annual hours worked for total economy and manufacturing were obtained from various sources for OECD countries, in particular Scarpetta et al. (2000)[7] and the *OECD Employment Outlook*. These were extrapolated on the basis of trends on hours derived from the OECD and BLS databases.[8]

For other countries outside of the OECD, the national accounts and labour statistics which were assembled from national sources by international organizations such as the World Bank, the Asian Development Bank, the Food and Agriculture Organization (FAO), the ILO and the United Nations Statistical Office were mostly taken as the point of departure.[9] These series were complemented by the series from Maddison (2003) in particular to cover the period 1980-90. Maddison (1995) also provides benchmark estimates of annual hours worked for a significant number of non-OECD economies.[10] In individual cases use has also been made of national accounts statistics for the individual countries.

The total economy series (KILM 18a) are linked to a benchmark estimate of GDP at market prices in US dollars for 1990 from Maddison (2003).[11] Maddison's dollar estimates are based on purchasing power parities for GDP. The original PPPs were obtained from the International Comparisons Program (ICP) which uses specific expenditure price surveys that were coordinated across economies by international agencies, such as Eurostat, the OECD, the United Nations and the World Bank.[12]

The PPPs for the total economy used by Maddison represent multilaterally weighted PPPs. Multilateralization implies that the weights of all economies are used to obtain the aggregate PPPs, which makes comparisons between economies fully transitive, i.e. comparisons between economies A and B and economies B and C equal a comparison between economies A and C. The year 1990 was chosen because it is still the latest for which a reasonably comprehensive and reliable set of PPPs can be obtained for a largest possible range of economies in the world economy.[13] The multilateral weighting system for the aggregate economy was the Geary-Khamis system, which essentially weighs PPPs for each country on the basis of its relative size in terms of GDP.[14]

The Republic of Korea (Eastern Asia) and Mexico (Central America) are OECD countries as well.

7. See S. Scarpetta, A. Bassanini, D. Pilat and P. Schreyer: "Economic growth in the OECD area: Recent trends at the aggregate and sectoral level", Economics Department Working Papers, No. 248, OECD, Paris (2003).

8. OECD: *Employment Outlook* (various issues); BLS databases on foreign labour statistics and manufacturing unit labour costs (available on website: http://www.bls.gov/fls/).

9. World Bank: *World Development Indicators* (various issues); Asian Development Bank: *Key Indicators of Developing Asian and Pacific Countries* (annual issues); ILO: *Yearbook of Labour Statistics* (annual issues); United Nations: *National Account Statistics: Main Aggregates and Detailed Tables* (annual issues).

10. A. Maddison: *Monitoring the World Economy 1820-1992* (Paris, OECD Development Centre, 1995).

11. Maddison (2003), op. cit.

12. For a comprehensive account of the PPP methodology, see I.B. Kravis, A. Heston and R. Summers: *World Product and Income* (Baltimore: John Hopkins, 1982). More recent developments in the programme on purchasing power parities can be obtained from the websites of the OECD (http://www.oecd.org/topicstatsportal/0,2647,en_2825_495691_1_1_1_1_1,00.html#500300) and the United Nations (http://unstats.un.org/unsd/methods/icp/). See also the website of the Center for International Comparisons at the University of Pennsylvania (CICUP) (http://pwt.econ.upenn.edu/cic_intro.html).

13. A new set of worldwide PPPs from the International Comparisons Program is expected to be published by the World Bank by the end of 2007 (www.worldbank.org/data/icp/).

14. Except for the EU-15 countries which are internally weighted at EKS PPPs, which does not apply GDP weights for individual member States.

Sources for the sectoral estimates (KILM 18b to 18e)

For the individual sectors (KILM 18b to 18e) figures for European Union countries, the United States and Japan come from the EU KLEMS Growth and Productivity Accounts, which is a recently launched database constructed from a consortium of research institutes across Europe.[15] The EU KLEMS data are to a large extent based on the National Accounts of the individual countries. Canada and Australia are based on the GGDC 60-industry database, while the GGDC 10-sector database provided information about the Asian and Latin American countries. The estimates were originally obtained from national statistical offices and, where possible, were harmonized for differences in concepts and industry classifications, and have been supplemented, where necessary, with national accounts statistics obtained directly from the individual economies.

For sectors – agriculture, manufacturing, transport and communication and trade – appropriate currency conversion factors at output price level are not readily available, as there are no specific international surveys to construct output PPPs by industry of origin. However, over the past two decades sectoral PPPs have been constructed as part of an academic research programme, named the International Comparisons of Output and Productivity (ICOP) programme at the Groningen Growth and Development Centre.[16] The PPP measures for manufacturing, wholesale and retail trade, and transport and communication used here are derived from a new dataset of multilateral PPPs for 26 mostly OECD countries for 1997.[17] The industry-of-origin PPPs are mostly based on unit value ratios (UVRs). The unit values represent sales values divided by quantities for similar products or product groups, derived from national production censuses or industry surveys, which are matched between economies. In practice, unit value ratios have been complemented with selected expenditure PPPs for individual expenditure categories from the ICP programme, in particular for industries and products for which no reliable UVRs were available. These expenditure PPPs have been adjusted from market prices to basic prices using the margins for transport and distribution and sales and value added taxes.[18]

For the manufacturing sector (KILM 18b) in European countries unit values have been largely derived from Eurostat's Prodcom database which contains detailed information on quantities and sales values of individual products. The unit value ratios for European countries were benchmarked on Germany, which in turn was matched with unit values from the US 1997 *Census of Manufactures*. UVRs for other OECD countries were also obtained by direct comparisons with the United States. For several manufacturing

15. EU KLEMS database. Downloadable from: http://www.euklems.net. See also M.P. Timmer, M. O'Mahony and B. van Ark: *The EU KLEMS growth and productivity accounts: An overview* (University of Groningen and University of Birmingham, March 2007); see website: http://www.euklems.net/data/eu_klems_productivity_report_overview.pdf.

16. The industry-level comparisons are brought together under the International Comparisons of Output and Productivity (ICOP) project at the University of Groningen. See: http://www.ggdc.net/dseries/icop.html for an overview, as well as A. Maddison and B. van Ark: "The international comparison of real product and productivity", in A. Maddison, D.S. Prasada Rao and W.F. Shepherd (eds.): *The Asian Economies in the Twentieth Century* (Cheltenham, Edwar Elgar, 2002, pp. 5-26); B. van Ark and M.P. Timmer: "Purchasing Power Parity adjustments for productivity-level comparisons", in D.S. Prasada Rao (ed.): *Purchasing Power Parities of Currencies, Recent Advances in Methods and Applications* (Cheltenham, Edwar Elgar, 2005) and van Ark and Monnikhof, op. cit.

17. This dataset includes the former EU-15, as well as Australia, Canada, the Czech Republic, Hungary, Japan, the Republic of Korea, Norway, Poland, Slovakia, Taiwan (China) and the United States. For a more detailed description of these data, see: M.P. Timmer, G. Ypma and B. van Ark (2007): "The 1997 ICOP industry-of-origin PPP dataset", Research Memorandum GD-82 (Groningen Growth and Development Centre, 2005); website: http://www.ggdc.net/pub/online/gd82(online).pdf.

18. See Timmer, Ypma and van Ark (2007), op. cit.

industries, expenditure PPPs (adjusted for trade and transportation margins and taxes) were used to fill gaps. At the industry level, the manufacturing PPPs were made transitive using the Elteto-Koves-Szulc (EKS) weighting system, which differs from the Geary-Khamis (GK) system in the sense that countries are not weighted according to their relative size in industry output. The unit value ratios by industry are then aggregated to the level of total manufacturing by using gross output weights.

The benchmark year estimates for transport and communication (KILM 18c) and wholesale and retail trade (KILM 18d) are also obtained from the new 1997 ICOP industry-of-origin PPP dataset. Limitations in the available national accounts statistics that are internationally comparable and the complexity of the procedures to obtain PPPs limit the number of economies that can be compared. Essentially, the measures are based on the same methodology as for manufacturing, making use of industry-specific unit value ratios.[19] At the lowest level of aggregation the estimates for transport and communication (KILM 18c) are based on quantity measures such as rail and air freight (usually measured in ton-kilometres) and rail or air passenger transport (mostly measured in passenger kilometres), pieces of mail delivered or local, cellular and international telephone calls. The unit value ratios for transport and communication are aggregated to national accounts level in 1997.

For the distribution sector (KILM 18d), which includes wholesale and retail trade, separate PPPs for the sales and purchases of the goods are required, because the purchase value makes up most of the total sales value in the trade sector. Ignoring the differences in purchase and sales PPP in this sector might therefore significantly distort the PPP for value added in the distribution sector. The approach used derives retail input PPPs (for purchases) from retail sales PPPs (obtained from ICP expenditure PPPs) using the trade and transportation margins for the sector. Similarly, wholesale output PPPs (for sales) are obtained from PPPs for wholesale input, again adjusted for margins, which are based on UVRs for manufacturing products. The currency conversion estimates that result from this procedure are aggregated to national accounts level following the same procedures as for manufacturing.

The estimates for agriculture, forestry and fisheries (AFF) are based on measures of PPPs which are from a database of the Food and Agriculture Organization (FAO). These PPPs reflect genuine producer prices, as they are based on prices received by farmers for about 180 products in 1995. The prices refer to farm-gate prices or the first-point-of-sale prices and in principle do not include any transport costs or the profit margins that generally accrue to middle men. The PPPs for the farm sector are assumed to be representative for the fisheries and forestry industries. As for the aggregate economy, the PPPs for this sector are also of a multilateral nature, using a Geary-Khamis weighting system. To make the series comparable with the other sectors the benchmark estimates for AFF are updated to 1997.

Limitations to comparability

The limitations to the international and historical comparability of the estimates are summarized under the following four headings.

Output measures in national currencies

Output measures are obtained from national accounts and represent, as much as possible, GDP at market prices for the aggregate economy and value added at basic prices for the individual sectors. However, despite common principles that are mostly based on the United Nations System of National Accounts, there are still significant

19. See, for example, B. van Ark, E. Monnikhof and N. Mulder: "Productivity in services: An international comparative perspective", *Canadian Journal of Economics* (Montreal, University of Montreal), April 1999, Vol. 32, No. 2, pp. 471-499.

problems in international consistency of national accounts estimates, in particular for economies outside the OECD. Such factors include:

(a) *different treatment of output in services sectors*. In a considerable number of economies, especially for non-market services, output is often estimated on the basis of inputs, such as total labour compensation, or on an implicit assumption concerning productivity growth; in other cases – where output measures were available – quality changes are often insufficiently reflected in the measures of output volume.

(b) *different procedures in correcting output measures for price changes, in particular the use of different weighting systems in obtaining deflators*. Traditionally output trends in constant prices have been weighted at values that are kept fixed for several years. Fixed weights usually imply an overestimation of volume growth rates, creating a bias that increases the further one moves away from the base year. Most economies therefore change weights every five or ten years. Over the past year an increasing number of OECD countries are shifting to using annual chain weights. Another important source of methodological difference between countries is the use of deflators for ICT products. Price declines of these goods are often insufficiently chosen with traditional price measurement methods. The United States has introduced a range of hedonic price deflators for ICT goods, which measure the price change of a commodity on the basis of changes in the major characteristics that impact the price. Many other countries are introducing this type of price measures in their national accounts, but at a much slower pace than the United States. In the estimates for the manufacturing sector the latter problem has been tackled by using harmonized deflators for ICT industries, based on hedonic deflators for the United States, for those countries that have no adequate ICT deflator themselves.

(c) *different degree of coverage of informal economic activities in developing economies and of the underground economy in developed (industrialized) economies in national accounts*. Some economies use data from special surveys for "unregistered activities", or indirect estimates from population censuses or other sources to estimate these activities, and large differences in coverage between economies remain.[20]

In addition to such inconsistencies there are significant differences in scope and quality of the primary national statistics and the staff resources available for the preparation of the relevant national estimates.

Purchasing power parities

The International Comparison Program (ICP) price surveys to obtain PPPs are carried out for selected benchmark years only. Not all estimates are for the same year, so that it was necessary in Maddison (1995) to carry some data forward to 1990 with the use of national price indices. The precise nature of the ICP price surveys can differ across economies, principally for non-OECD countries. The ICP pricing procedures have been criticized for lack of comparability and reflection of the specified items between economies. Furthermore, the multilateral character of the estimates is affected by the fact that the PPPs were, in fact, estimated for six different regions, and "globalized" with particular interregional (binary) links. Finally, within each of the regions, the aggregation procedures of the PPPs differ. For example, for 1990 the country PPPs within the European Union are unweighted for size of GDP (using the so-called EKS procedure), whereas the PPPs for non-European OECD countries are combined with those for the European Union and weighted for size of GDP.[21]

20. For an overview of methods, see, for example, OECD: *Measuring the Non-Observed Economy. A Handbook* (Paris, 2002).

21. For more information about the latest developments in the ICP programme; website: http://worldbank.org/data/icp/.

Box 18a. World and regional estimates of labour productivity

Productivity levels (value added per person employed, constant 2000 US$ at PPP)	1996	2002	2003	2004	2005	2006*
WORLD	15,824	17,626	18,019	18,613	19,150	19,834
Developed Economies & European Union	52,876	58,642	59,588	60,749	61,759	62,952
Central & South-Eastern Europe (non-EU) & CIS	11,787	14,215	15,281	16,148	17,088	18,121
East Asia	6,347	9,345	9,965	10,745	11,552	12,591
South-East Asia & the Pacific	8,068	8,202	8,520	8,860	9,067	9,419
South Asia	5,418	6,353	6,662	7,111	7,531	7,998
Latin America & the Caribbean	17,652	17,337	17,228	17,758	18,250	18,908
North Africa	12,967	13,962	14,174	14,159	14,292	14,751
Sub-Saharan Africa	4,490	4,618	4,677	4,806	4,935	5,062
Middle East	22,130	20,990	21,273	21,119	21,630	21,910
Annual change in productivity (%)	**1996**	**2002**	**2003**	**2004**	**2005**	**2006***
WORLD	2.5	2.2	3.3	2.9	3.6	3.3
Developed Economies & European Union	2.2	1.6	1.9	1.7	1.9	2.1
Central & South-eastern Europe (non-EU) & CIS	4.0	7.5	5.7	5.8	6.0	5.8
East Asia	7.1	6.6	7.8	7.5	9.0	8.5
South-East Asia & the Pacific	2.3	3.9	4.0	2.3	3.9	3.5
South Asia	2.3	4.9	6.7	5.9	6.2	5.8
Latin America & the Caribbean	1.4	-0.6	3.1	2.8	3.6	2.9
North Africa	-0.6	1.5	-0.1	0.9	3.2	3.2
Sub-Saharan Africa	0.4	1.3	2.8	2.7	2.6	3.2
Middle East	-0.5	1.3	-0.7	2.4	1.3	1.2

* 2006 preliminary estimates.
Source: ILO Global Employment Trends Model (see box 3 in "Guide to understanding the KILM" for more information on estimation methodology).

Productivity levels increased between 1996 and 2006 for almost all KILM regions although growth rates varied widely amongst regions. The fastest increase was observed in East Asia where the output per worker almost doubled. Considerable increases over this period were also seen in Central & South-Eastern Europe (non-EU) & CIS and South Asia where productivity levels increased by around 50 per cent. The slowest increase was observed in Latin America & the Caribbean with around 7 per cent while productivity remained rather unchanged in the Middle East.

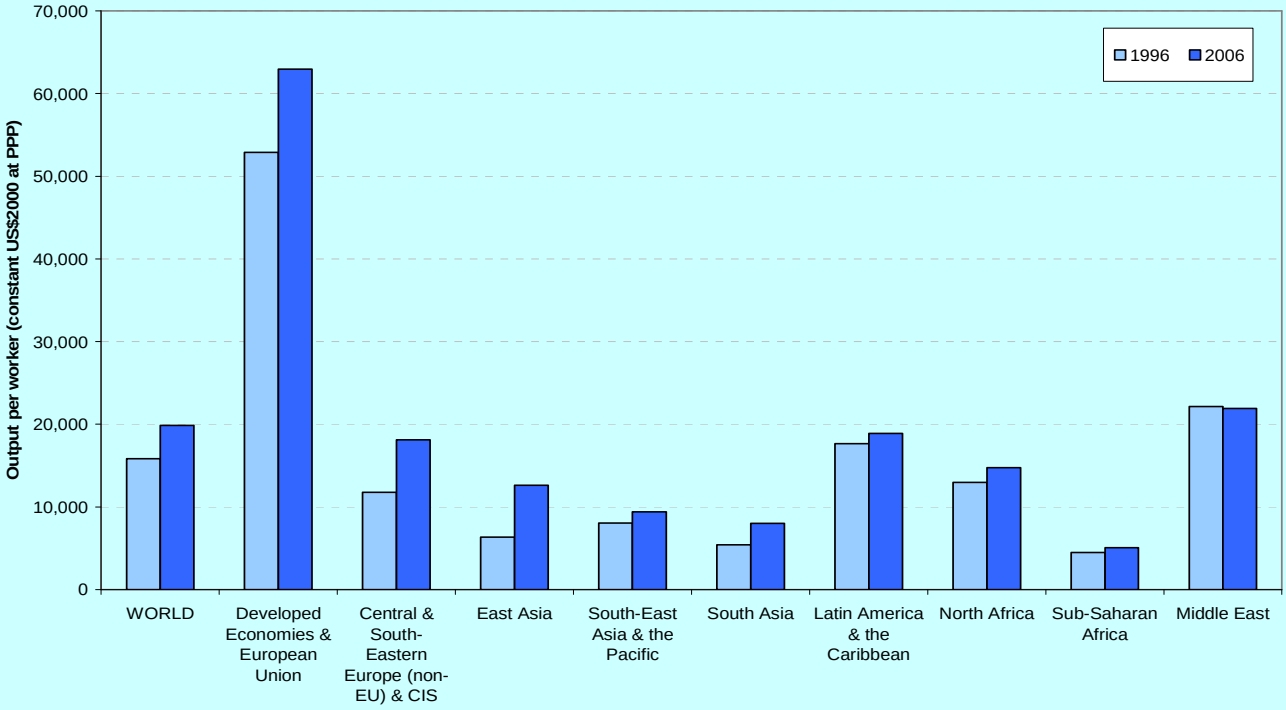
Differences in productivity levels between regions remained considerable. For example, a worker in the Developed Economies & European Union produced over ten times more than a worker in sub-Saharan Africa; and despite the big increases in productivity in East Asia, a worker in the Developed Economies & European Union still produced five times more than a worker in East Asia. The productivity gap with levels in the Developed Economies & European Union widened between 1996 and 2006, with the exceptions being East Asia, South Asia and Central & South-Eastern Europe (non-EU) & CIS.

(continued)

Box 18a continued

There are only two regions where productivity levels are above the world average: most obviously the Developed Economies & European Union but also the Middle East, although the level for this region is much lower than the former. The lowest levels of productivity can be found in the two poorest regions of the world: sub-Saharan Africa and South Asia. Over the last five years, productivity in South Asia has increased at higher rates than in earlier years and to a lesser degree this has also been the case in sub-Saharan Africa over the last four years. These are encouraging trends given the high linkage between productivity increases and poverty reduction.[1]

Productivity measured as value added per person employed (constant 2000 US$ at PPP) by region, 1996 and 2006



[1] The linkage between productivity and poverty reduction is explained in ILO: *World Employment Report 2004-05 – Employment, productivity and poverty reduction* (Geneva 2005); website: http://www.ilo.org/trends.

Even though the industry by origin PPPs for manufacturing, transport and communication and wholesale and retail trade are assumed to be a proxy of relative producer prices, the comparability of these measures suffers from biased sample coverage. Moreover, due to the "unit value" characteristics of part of the information, the method takes, in many cases, insufficient account of quality differences across economies.

Employment

Estimates of employment are, as much as possible, for the average number of persons with one or more paid jobs during the year. Particularly for low- and middle-income economies in Asia and Latin America, statistics on the number of self-employed and family workers in agricultural and informal manufacturing activities are probably less reliable than those for paid employees. As in the case of output estimates, the employment estimates are sensitive to under-coverage of informal or underground activities, which harbour a substantial part of labour input. In some cases, informal activities are not included in the production and employment statistics at all. In agriculture the labour force estimates include a substantial part of (part-time and seasonal) family workers. However, the estimates presented for the economies in this data set are meant to cover all economic activity.

Working hours[22]

Estimates of annual working hours are often unavailable or are relatively unreliable. Even for developed (industrialized) economies, annual working hours are not consistently defined across economies. For example, statistics on working hours often refer to paid hours rather than to hours actually worked, implying that no adjustments are made for paid hours that are not worked, such as hours for paid vacation or sickness, or for hours worked that are not paid for. Moreover, statistics on working hours often are only available for a single category of the workforce (in many cases, only employees), or only for a particular industry (such as manufacturing), or for particular types of establishments (for example, those above a certain size or in the formal sector). As always, these problems are particularly serious for a substantial number of low-income economies. Whether and how the estimates of annual hours worked have been adjusted for such weaknesses in the primary statistics is often undocumented.

22. Readers may wish to review the corresponding section relating to the comparability issue for working hours in the KILM 6 manuscript.

Trends

The United States continues to show the highest labour productivity levels in 2006 measured as value added per person employed per year, at US$63,885, followed by Ireland (US$55,986) and Luxembourg (US$55,641) at a considerable distance. However, Norway showed the highest labour productivity level measured as value added per hour worked (US$37.99), followed by the United States (US$35.63) and France (US$35.08). The difference in rankings can be explained by the fact that annual working hours per person employed are considerably higher in the United States than in the majority of European economies; therefore, each US worker is able to produce more, leading to higher labour productivity when measured based on per person employed.

Consequently, the productivity gap (measured as value added per person employed) between the United States and most developed economies continued to widen, especially in more recent years. Exceptions were Ireland, which saw its gap decline steadily over time from almost 40 percentage points in 1980 to less than 13 points in 2006. Since 2000, Finland, Sweden and the United Kingdom were also able to continue reducing their productivity gaps as well as several new members of the European Union – Estonia, Latvia and Lithuania – although productivity gaps in the latter group remain considerable.

Labour productivity declined from 1980 to 2005 in half of the countries in Latin America & the Pacific and increased only slightly in the remaining countries. With very little to no improvement over the past two decades, labour productivity levels for countries in this region have diverged from those of the developed economies. (See figure 18a, which displays economies with significant changes – 10 percentage points or more.) For example, in 2005, the comparative level of output per person employed in Venezuela was 42 per cent of the United States level, compared to 77 per cent in 1980. In contrast, economies in Asia & the Pacific, although generally having lower labour productivity levels than Latin American countries, showed significantly better catch-up performance relative to the developed economies. For instance, the overall productivity growth rate in China increased at 5.7 per cent per year on average since 1980 while it increased at 4.8 per cent per year in the Republic of Korea. This placed the Republic of Korea at 58 per cent of the US productivity level in 2005 compared to 28 per cent in 1980.

Figure 18b shows that, for almost all countries in the data set, manufacturing productivity growth between 1980 and 2005 has been faster than that for the total economy. However, the growth differential between manufacturing and the total economy was larger for the United States than for most other economies and was to a large extent driven by the relatively large size of the information and communication technologies producing industry in the United States. In most cases, therefore, the manufacturing productivity gap, measured against the United States, has widened over this period, in particular since the mid 1990s, and is bigger than for the aggregate economy. For example, the gap in manufacturing GDP per person employed relative to the United States increased from 1995 to 2005 by over 25 percentage points in Canada, Italy and Spain.

Manufacturing productivity growth in most Asian countries has been quite rapid, in particular in China and the Republic of Korea. In contrast, manufacturing productivity gaps between Brazil and Mexico on the one hand and the United States on the other widened substantially. While the manufacturing productivity gap between China and the United States narrowed from 5 per cent of the US level in 1980 to 12 per cent in 2005, the productivity level in Brazilian manufacturing dropped from 19 per cent of the US level in 1980 to only 5 per cent in 2005.

It has often been suggested that the potential for productivity growth in the services sector is quite limited, but this is not confirmed by the estimates for transport and communication and wholesale and retail trade (including hotels and restaurants). In many instances, productivity growth in transport and communication was even faster than in manufacturing. Much of that improvement stems from the acceleration in productivity growth in telecommunications. In trade, productivity growth is even higher, in particular in the developed economies, where the use of information and communication technology and the introduction of new business models, for example in the retail sector, have significantly accelerated productivity growth. Figure 18c shows that comparative levels of productivity in transport and communications and in the wholesale and retail trade differed at least as much between countries as for manufacturing. It should be emphasized, however, that the estimates for services are of an experimental nature and may, amongst other things, not be sufficiently adjusted for differences in the quality of the services provided in each of the countries.

Figure 18a. Labour productivity (value added per person employed) as a percentage of the US level, total economy, 1980 and 2005

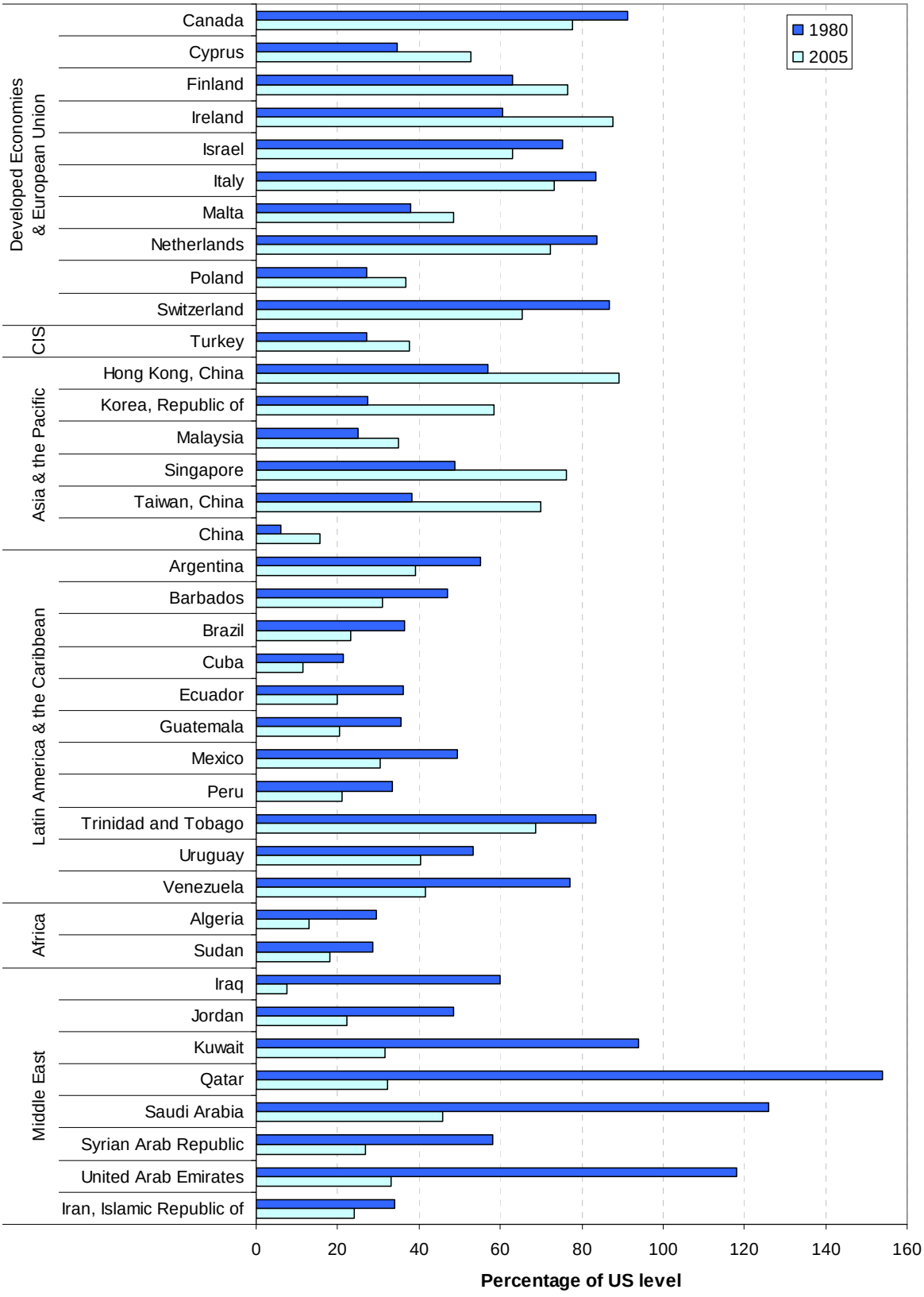


Figure 18b. Labour productivity annual average growth rates, 1980-2005

	Total economy		Manufacturing		Agriculture, forestry and fisheries	Transport and communi-cations	Wholesale and retail trade, including hotels and restaurants
	Value added per person employed 1980-2005	Value added per hour worked 1980-2005	Value added per person employed 1980-2005	Value added per hour worked 1980-2005	Value added per person employed 1980-2005	Value added per person employed 1980-2004	
Developed Economies & European Union							
European Union							
Austria	1.8 a	2.4 a	3.7	4.2	2.3		
Belgium	1.5 a	1.8 a	3.7	3.9	-4.8	3.1	
Bulgaria	1.4 c				2.2		
Cyprus	2.3 c	2.0 c			2.7		
Czech Republic	1.9 c	2.1 c	6.1 e	6.3 e	2.6	0.8 f	
Denmark	1.7 a	1.9 a	2.7	2.6			
Estonia	3.6 c	3.4 c					
Finland	2.5 a	2.8 a	5.4	5.7	-4.0	4.0	6.4
France	1.5 a	2.2 a	3.5	4.0	4.2	3.1	5.0
Germany	1.4 c	1.8 c	2.8 h	2.9 h	5.0 h	4.7 t	2.1 t
Germany, Federal Republic of (Western)	1.8 g	2.8 g	1.7 s	2.8 s	3.6 s	1.9 s	3.5 s
Greece	1.4 a	1.5 a	1.5	1.5	2.5		
Hungary	2.9 c	2.9 c	6.7 e	6.4 e	5.6		
Ireland	3.1 a	3.8 a	8.1	8.5	2.5		
Italy	1.1 a	1.4 a	2.0	2.0	6.0		
Latvia	2.8 c	2.9			4.3		
Lithuania	1.4 c	1.0			3.5		
Luxembourg	1.7 a	2.2 a	3.8	3.8	2.0		
Malta	2.1 c	2.2 c					
Netherlands	1.1 a	1.8 a	2.8	3.2	3.0	2.9	3.7
Poland	4.0 c	3.8 c	7.6 e	7.0 e	2.5		
Portugal	1.4 a	1.9 a	2.6	3.0	2.9		
Romania	2.6 c				-1.6		
Slovakia	3.5 c	3.8 c	10.2 e	10.0 e	5.4 d		
Slovenia	2.7 c	3.1 j			5.1 d		
Spain	1.2 a	1.7 a	2.0	2.4	5.0		
Sweden	2.0 a	1.8 a	4.7	4.3	3.3	2.9	5.9
United Kingdom	2.1 a	2.4 a	3.8	3.8	2.8	4.1	7.0
North America							
Canada	1.0 a	1.1 a	0.8	0.7	2.6	2.6	1.9
United States	1.7 a	1.7 a	4.1	4.0	4.1	2.6	4.2
Other Developed Economies							
Australia	1.5 a	1.6 a	2.3	2.2	3.4	2.0	1.7
Israel	0.9				1.2		
Japan	1.8 a	2.5 a	3.8	4.1	2.2	2.2	2.4
New Zealand	1.3 a	1.5 a			3.2		

Figure 18b continued

	Total economy				Manufacturing				Agriculture, forestry and fisheries		Transport and communi-cations		Wholesale and retail trade, including hotels and restaurants	
	Value added per person employed 1980-2005		Value added per hour worked 1980-2005		Value added per person employed 1980-2005		Value added per hour worked 1980-2005		Value added per person employed 1980-2005		Value added per person employed 1980-2004			
Western Europe (non-EU)														
Iceland	1.4	a	1.5	a										
Norway	2.0	a	2.5	a	2.1		2.3		4.5					
Switzerland	0.5	a	0.9	a					0.9					
Central & South-Eastern Europe (non-EU) & CIS														
Central & South-Eastern Europe														
Albania	4.5	k							2.9					
Bosnia and Herzegovina	7.8	k												
Croatia	0.1	c												
Serbia and Montenegro	-1.6	k												
The former Yugoslav Republic of Macedonia	-0.7	k												
Turkey	3.1	a	3.2	a					1.4					
Commonwealth of Independent States (CIS)														
Armenia	4.0	k												
Azerbaijan	1.5	k												
Belarus	2.6	k							4.7	d				
Georgia	-2.3	k							3.1	i				
Kazakhstan	-0.1	k							-2.8	l				
Kyrgyzstan	-2.1	k							-0.8	m				
Republic of Moldova	-3.5	k												
Russian Federation	-0.1	k							0.7	d				
Tajikistan	-4.1	k							-6.7	l				
Turkmenistan	-2.4	k							3.6	l				
Ukraine	-1.8	k							0.5	d				
Uzbekistan	-0.3	k							7.1	l				
Asia & the Pacific														
East Asia														
China	5.7				7.9				4.0					
Hong Kong, China	3.5		3.6											
Korea, Republic of	4.7	a	5.4	a	7.4		8.0		6.3		5.4		3.4	
Taiwan, China	4.1		4.8		4.7		5.4				5.9		4.3	
Pacific Islands														
Papua New Guinea									1.1					
South Asia														
Bangladesh	2.2								-0.1					
India	3.7				3.4				1.5		4.6			

Figure 18b continued

	Total economy				Manufacturing				Agriculture, forestry and fisheries	Transport and communi-cations	Wholesale and retail trade, including hotels and restaurants
	Value added per person employed 1980-2005		Value added per hour worked 1980-2005		Value added per person employed 1980-2005		Value added per hour worked 1980-2005		Value added per person employed 1980-2005	Value added per person employed 1980-2004	
Nepal									1.5		
Pakistan	2.9								2.0		
Sri Lanka	2.3								1.1		
South-East Asia											
Cambodia	1.3								1.5		
Indonesia	2.1				3.6				2.3	0.3	1.3
Malaysia	3.1								3.4		
Myanmar	-0.1								3.0		
Philippines	-0.1								0.3		
Singapore	3.5		3.6						1.5		
Thailand	3.9								2.7		
Viet Nam	4.1								2.9		
Latin America & the Caribbean											
Caribbean											
Barbados			-0.7	h							
Cuba	-0.8								-0.1		
Dominican Republic	1.4								2.4		
Haiti									-1.9		
Jamaica	-0.2		0.2	n							
Puerto Rico	1.2										
Saint Lucia	2.8		2.5	l							
Trinidad and Tobago	0.9		2.8	h							
Central America											
Costa Rica	0.6								2.2		
El Salvador									-0.2		
Guatemala	-0.6								0.1		
Honduras									0.7		
Mexico	-0.1	a	-0.3	a	0.7		0.5		1.5	0.5	-2.6
Nicaragua									-1.1		
Panama									2.4		
South America											
Argentina	0.3		0.4						2.9		
Bolivia	-0.7								1.9		
Brazil	-0.1		0.2		-0.9				3.6	-1.1	-3.4
Chile	1.6		1.5						5.3		
Colombia	0.7		1.0						1.2		
Ecuador	-0.7								3.2		
Paraguay									1.4		
Peru	-0.2								2.0		
Uruguay	0.5								3.1		
Venezuela	-0.8		-0.7						0.1		

Figure 18b continued

	Total economy		Manufacturing		Agriculture, forestry and fisheries	Transport and communi-cations	Wholesale and retail trade, including hotels and restaurants
	Value added per person employed 1980-2005	Value added per hour worked 1980-2005	Value added per person employed 1980-2005	Value added per hour worked 1980-2005	Value added per person employed 1980-2005	Value added per person employed 1980-2004	
Africa							
North Africa							
Algeria	-1.6				1.6		
Egypt	-2.2				2.6		
Morocco	1.0				1.8		
Sudan	-0.2				4.2		
Tunisia	0.3				2.2		
Sub-Saharan Africa							
Eastern Africa							
Burundi					-0.6		
Ethiopia	1.7						
Kenya	0.9				-0.3		
Madagascar	-0.2				-1.5		
Malawi	-1.9				0.9		
Mozambique	0.4				1.3		
Rwanda					-0.3		
Tanzania, United Republic of	1.0				1.7		
Uganda	1.3				1.1		
Zambia	1.9				0.4		
Zimbabwe	-1.1				-0.9		
Middle Africa							
Angola							
Cameroon					2.3		
Chad					1.4		
Congo, Democratic Republic of					-1.3		
Southern Africa							
South Africa	0.7				2.0		
Western Africa							
Benin					3.3		
Burkina Faso	2.1						
Côte d'Ivoire	-3.7				-1.5		
Ghana	0.2				0.8		
Guinea					1.6		
Mali	-0.2				1.8		
Niger	1.8				0.0		
Nigeria	-2.4				6.3		
Senegal	-0.4				-0.4		
Middle East							
Bahrain	0.5						

Figure 18b continued

	Total economy		Manufacturing		Agriculture, forestry and fisheries	Transport and communi-cations	Wholesale and retail trade, including hotels and restaurants
	Value added per person employed 1980-2005	Value added per hour worked 1980-2005	Value added per person employed 1980-2005	Value added per hour worked 1980-2005	Value added per person employed 1980-2005	Value added per person employed 1980-2004	
Iran, Islamic Republic of	0.3				3.0		
Iraq	-6.5				4.3		
Jordan	-1.5				-0.9		
Kuwait	-2.7						
Oman	1.9						
Qatar	-4.5						
Saudi Arabia	-2.4				8.6		
Syrian Arab Republic	-1.4				0.8		
United Arab Emirates	-3.4						
Yemen	-0.1				1.0 k		

Notes: The growth rates are average annual compounded rates. The figures for total economy have a 1990 US$ base year, while those for the sectors have a 1997 US$ base year. Therefore, the total economy figures are not strictly comparable with those of the sectors.

a. 1980-2006; b. 1987-2006; c. 1989-2006; d. 1990-2005; e. 1993-2005; f. 1993-2004; g. 1980-1997; h. 1991-2005; i. 1992-2005; j. 1990-2006; k. 1989-2005; l. 1985- 2005; m. 1987-2005; n. 1986-2005; o. 1990-1998; p. 1980-2003; q. 1980-2004; r. 1987-2003; s. 1980-1991; t. 1991-2004.

Figure 18c. Labour productivity (value added per person employed) as a percentage of the US level, manufacturing, transport and communication and trade, latest year