A. Trends in the employment intensity of economic growth[1]

1. Introduction

Employment elasticities, which measure the "employment intensity" of economic growth, can provide important information about labour markets and countries' overall macroeconomic performance. In their most basic use, employment elasticities serve as a useful way to examine how growth in economic output and growth in employment evolve together over time. They can also provide insights into how employment generation varies for different population subsets in a country (male/female or specific sector), and assist in detecting and analysing structural economic changes over time. Taken together with other indicators such as economic growth rates, labour force growth, poverty rates, hours of work and wages, employment elasticities can provide important insights into labour market performance.

The basic definition of employment elasticity utilized in the KILM (indicator 19) is the percentage-point change in the number of employed persons in a country or region associated with a 1 percentage point change in economic output, measured by gross domestic product (GDP).[2] In order to capture differences in the employment-output relationship among different subsets of the population, six separate elasticities were calculated for each country. The first three correspond to different sex components – both sexes, females and males.[3]

Employment elasticities by economic sector (agriculture, industry and services) make up the remaining three elasticities. For the sector employment elasticities, value added in the respective economic sector is used in place of GDP. Thus, we examine two types of elasticities: the elasticity of employment with respect to total output, and, secondly, with respect to value added in the given economic sector.

Examining changes in output together with employment elasticity gives an idea as to whether growth in a country is occurring hand in hand with gains in employment and labour productivity, or whether it is balanced between the two. If, for instance, moderate economic growth is accompanied by rising unemployment, falling employment-to-population ratios or falling labour force participation, this is likely to be indicated by a low or declining employment elasticity. Conversely, high employment elasticity (i.e. in the case of positive economic growth accompanied by an elasticity greater than one) is typically indicative of stagnant or falling labour productivity, and an expansion of relatively lower-productivity jobs, as is the case in many developing economies that specialize in cheap, labour-intensive agriculture or manufacturing.

With regard to the sector employment elasticities, a country or region with positive value added growth in a given sector and a very low sector employment elasticity may be experiencing productivity growth that enhances the efficiency of labour (for example, due to the technological innovations or organizational improvements). If this coincides with a sustained reduction in employment in the sector

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2. Annex 1 to this section provides methodological information as to how the employment elasticities presented here were calculated.

3. Total GDP is used in the calculation of elasticities disaggregated by sex. As a result, the elasticities of males

and females do not provide an indication of how employment for a given group varies with the group's respective output. Ideally, sex-specific output would also be calculated, but data limitations (the absence of GDP broken down by age and sex) prohibit such a calculation.

Box A1. Why do employment elasticities vary across countries and over time?

The employment elasticity data included in KILM 19 show a substantial degree of variation within countries over time and from country to country. Variation over time in national estimates of elasticities often reflects real and important changes in the underlying relationship between employment and output; however, countries with GDP growth close to zero may exhibit large swings in employment elasticities arising from relatively small changes in employment. It is, therefore, necessary to keep the country- or regional-specific GDP performance in mind when interpreting elasticities within countries over time. That is, because an elasticity is essentially a ratio, meaning that year-to-year variations could reflect both changes in the numerator (employment growth) or the denominator (GDP growth) or a combination of the two, it is important to pay attention to the underlying data. For instance, between 1991 and 1995 both China and Sri Lanka registered an employment elasticity of 0.14. However, China's average annual GDP growth rate of 12.7 per cent was more than double that of Sri Lanka's, which grew at 5.6 per cent. Therefore, while both countries' economic growth was robust, China's was accompanied by more employment growth and more productivity growth than Sri Lanka's.

In terms of explaining differences in employment elasticities, recent ILO research found that macroeconomic variables such as growth in labour supply, the relative size of a country's service sector, instability, uncertainty and taxes on labour earnings were particularly relevant for determining a country's employment intensity of growth.[1] Throughout each regression, labour supply was strongly and positively associated with employment intensity – a finding that is supported by the literature – and one that reflects both the relative abundance of low-wage labour in tandem with greater wage flexibility in labour surplus countries. Uncertainty in the form of hyperinflation was negatively associated with employment intensity, as was armed conflict. This supports the hypothesis that uncertainty may have a greater relative impact on employment generation than on overall economic growth. Globalization does not appear to have a systematic direct link vis-à-vis determining employment intensity levels. The notable exception to this was for female employment elasticities, which appeared to be positively associated with export orientation. Taxes on labour were negatively associated with employment intensity – more so for women than for men.

The relationship between employment elasticities and the variables mentioned above were to be expected. There was, however, one noteworthy surprise in the study: stricter employment protection was not found to be significantly related to the employment intensity of growth. This finding appears to contradict the relatively widespread notion that employment protection legislation hinders employment performance, particularly for women and youth.

[1] S. Kapsos: "The employment intensity of growth…", op. cit.

(as capital replaces labour), it is likely to indicate ongoing structural economic change. This type of situation can occur in countries at early stages of economic development: as the country grows, employment may shift away from agrarian activities into manufacturing and services. It can also arise in more developed economies, where employment tends to shift away from manufacturing and into services.

It is important to stress that the trends in employment intensity presented in this section are indicative of the response of employment in terms of the *quantity* of employed persons in

relation to GDP growth. It says nothing about overall changes in the *quality* of jobs or about growth in the number of "decent" jobs. This underscores the importance of examining elasticities in conjunction with other labour market indicators, particularly those more reflective of conditions of work (hours, status, compensation, etc.). Another caveat that should be raised relates to making value judgements on employment elasticity levels. While differences in opinion clearly exist in terms of whether employment-intensive or productivity-intensive growth is more desirable from an economic development perspective, a central

assumption in this section is that employment growth and productivity growth *must be jointly pursued* in order to maximize the potential for realizing economic development objectives such as poverty reduction. Finally, it is important to note that the employment elasticities in KILM table 19 are based on the aggregate number of jobs in a country, including both the formal and informal economies.

In this section, we examine how the employment intensity of economic growth has evolved around the world between 1991 and 2003. We focus on both global and regional trends, which are highlighted by individual country experiences. The section examines the employment intensity of growth for the total employed population, by sex and within the three economic sectors. The elasticity estimates are derived from KILM table 19 and are presented in conjunction with additional KILM indicators as well as with economic growth rates from the World Bank's *World Development Indicators 2005* database.

2. Global trends in employment intensity

Table A1 provides broad global trends in employment elasticities by sex as well as total GDP growth between 1991 and 2003. The figures reveal that for every 1 percentage point of additional GDP growth, total global employment grew between 0.30 and 0.38 percentage points during the three periods between 1991 and 2003. This implies that around two-thirds of the economic growth realized between 1991 and 2003 can be attributed to gains in productivity, while one-third resulted from employment growth.[4] Of the

three periods, employment growth was strongest from 1995 to 1999, which was also the period with the strongest global economic growth. Significantly, during the most recent period there was a slight decline in the rate of GDP growth coupled with a marked reduction in the employment intensity of growth.

Female employment elasticities exceeded male elasticities in each of the three periods. In other words, for a given rate of economic growth, female employment grew more on average than male employment. This was most likely due in part to a convergence, or "catching up", in terms of women's labour force participation relative to men's. Yet, higher female elasticities could also be indicative of greater relative responsiveness of female employment to both economic growth and economic contraction, whereby women suffer more than men in terms of employment loss during economic downturns. Another possible explanation is that women may tend to be engaged in lower-wage and lower-productivity (i.e. lower-quality) jobs.[5]

Table A2 provides a picture of historical global employment elasticities and value added growth by economic sector over the period 1991 to 2003.[6] This indicator provides a picture of the extent to which growth in a given sector is being driven by labour productivity or employment growth. The services sector was both the world's fastest-growing sector and the sector with the most job-intensive growth. Indeed, for every 1 percentage point of growth in services sector value added, employment increased by 0.57 percentage points (while the corresponding growth in productivity was 0.43

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4. There is a fundamental linkage between employment elasticities and labour productivity: mathematically, given small changes in output, total GDP growth is equal to labour productivity growth plus employment growth. This relationship implies that the employment elasticity is equal to 1 minus the elasticity of labour productivity to output. However, it is important to note that this relationship need not hold in cases in which employment corresponds to a population subgroup (such as women or men) while total output is used instead of

output for the population subgroup. See annex 2, for more details.

5. See S. Elder and D. Schmidt: "Global employment trends for women, 2004", Employment Strategy Paper, No. 8 (Geneva, ILO, 2004).

6. The global sector employment elasticities and corresponding value added growth rates were calculated based on data from 139 countries, whereas the employment elasticities by sex and GDP growth rates were calculated based on data from 160 countries. As a result, the sector value added growth rates in table A2 are not directly comparable with the total GDP growth rates in table A1.

Table A1. Global employment elasticities by sex, 1991-2003

	1991-1995	1995-1999	1999-2003
Total	0.34	0.38	0.30
Female	0.40	0.44	0.33
Male	0.30	0.34	0.29
GDP growth (%)	2.9	3.6	3.5

**Table A2. Global employment elasticities and value added growth rates by economic sector, 1991-2003**

	Agriculture	Industry	Services
Sector value added elasticity	0.41	0.28	0.57
Average annual value added growth rate (%)	2.0	2.1	3.0

percentage points). On the other hand, in the agriculture sector, and especially in the industrial sector, value added growth was driven more by gains in productivity than by gains in employment. On average over the 13-year period, around 40 per cent of growth in agricultural output was driven by employment growth (with around 60 per cent driven by productivity growth), while around 30 per cent of output in industry was due to employment growth (with around 70 per cent due to productivity growth).

The dynamism of the world's services sector can be seen in figure A1. The sector added some 282 million jobs between 1991 and 2003, representing growth of over 28 per cent. However, at the global level, employment grew as well in agriculture and industry, implying that there was no clear-cut structural change away from agriculture and into services and industry. The global industrial sector added 71 million jobs between 1991 and 2003, representing growth of 15 per cent. However the agriculture sector grew by 110 million jobs, or 10 per cent, between 1991 and 2003 and, with nearly 1.2 billion workers, it was still the world's largest source of employment in 2003, reflecting its continued importance in many developing economies with an abundance of labour (see the manuscript for KILM 4 for more information).

Figure A1. Employment by sector in the world (billions of workers), 1991-2003
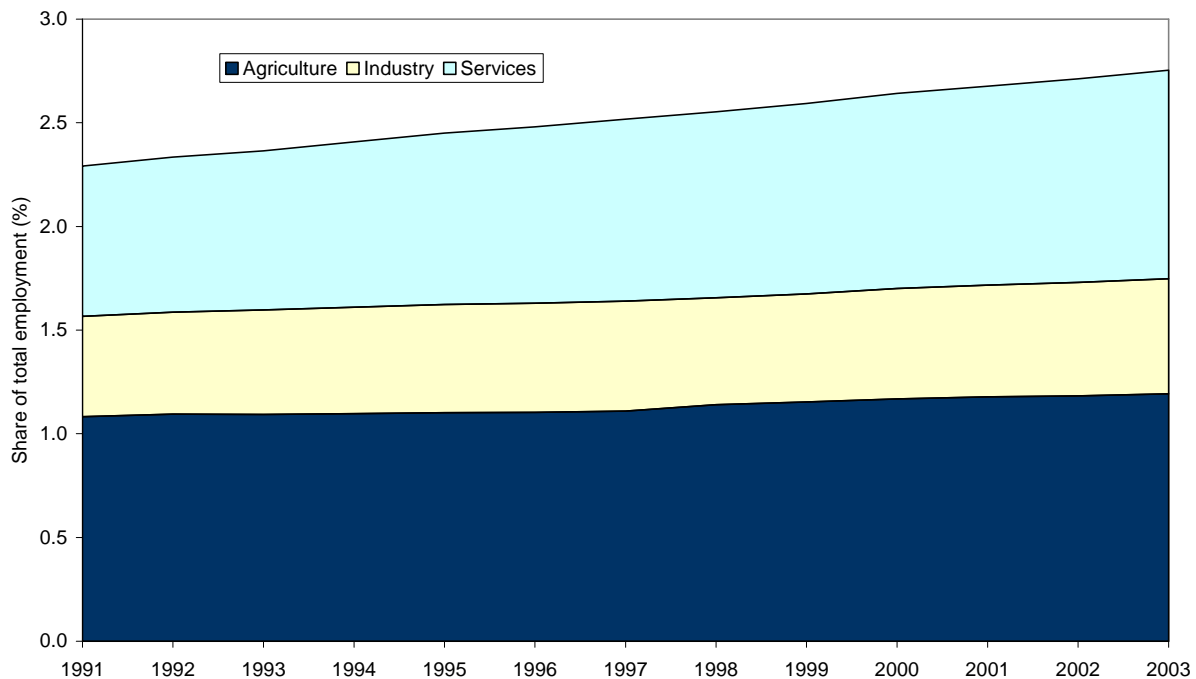
Source: Global Employment Trends Model 2005 (Geneva, ILO).

3. Regional and country trends in employment intensity

Western Europe and North America

Turning to the results in table A3, it is clear that Western Europe and North America witnessed very diverse employment outcomes.[7] The employment elasticity from 1991 to 1995 in Western Europe reflects the region's poor overall employment generation in the period. Over the four years, unemployment rates rose 2.1 percentage points in Western Europe, while the number of unemployed increased by over 25 per cent (see the manuscript for KILM 8).[8] Between 1995

and 1999, Western Europe witnessed faster overall economic growth together with an increase in the employment intensity of growth. The employment picture thus improved, which was evidenced by a drop of nearly 1 million in the total number of unemployed. Employment intensity in the final period increased further, with the region's unemployment rate declining by another 1 percentage point. However, the very low economic growth rate in the region between 1999 and 2003 began to impact unfavourably both on employment and productivity growth in the latter half of the period.

Interesting patterns emerge when examining elasticities in Western Europe by sex. Most prominently, female employment elasticities exceeded male elasticities in each time period. The underlying causes appear to relate to differences between women and men in the region with regard to historical labour

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7. The Western Europe region includes Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. North America includes Canada and the United States.

8. Global Employment Trends Model 2005 (Geneva, ILO). For more details on the Model, see box 3 in "A Guide to Understanding the KILM". See, also, G. Crespi Tarantino: "Imputation, estimation and prediction using the Key Indicators of the Labour Market (KILM)

dataset", Employment Strategy Paper, No. 16 (Geneva, ILO, 2004); website: http://www.ilo.org/public/english/employment/strat/download/esp16.pdf.

Table A3. Employment elasticities by sex and average annual GDP growth in Western Europe and North America, 1991-2003

	Total			Female			Male			GDP growth		
	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003
Western Europe	-0.09	0.36	0.42	0.32	0.56	0.77	-0.38	0.22	0.16	1.5	2.5	1.7
North America	0.67	0.44	0.23	0.66	0.49	0.32	0.68	0.39	0.15	3.1	4.1	2.4

force participation and unemployment rates. While male labour force participation rates fell over each of the periods, female participation rose considerably over the full 13-year period (see the manuscript for KILM 1). In addition, the female unemployment rate was lower in 2003 than in 1991, whereas the male unemployment rate was slightly higher at the end of the period. These figures indicate that, in terms of aggregate employment, the situation in Western Europe has improved for women seeking work.

The employment elasticity and economic growth figures in North America showed a near opposite pattern to those in Western Europe. Economic growth rates in North America exceeded those in Western Europe in each of the three periods and the region experienced relatively more employment-intensive growth during the first two periods, resulting in a decline of nearly 2.5 million unemployed between 1991 and 1999. However, the bursting of the global equities market bubble, the terrorist attacks of 11 September 2001, and the ensuing recession in the United States resulted in a reversal of these positive labour market trends. From 1999 to 2003 economic growth in North America was less than one-third as employment intensive as during the 1991 to 1995 period, while the rate of economic growth declined sharply. Not surprisingly, unemployment grew by over 3 million between 1999 and 2003.

Female employment elasticities indicate that gender-related differences clearly exist when comparing North American and Western European labour markets. This is most visibly indicated by the smaller gap between male and female employment elasticities in North America than in Western Europe. The main

reasons for this appear to be the smaller gender gap in labour force participation and unemployment rates in North America.

Figure A2 provides a picture of country-specific employment elasticities versus average annual GDP growth rates between 1999 and 2003 in the developed economies. The figure reveals substantial variation among the countries in the region. Ireland led the pack with an average growth of over 6 per cent and an employment elasticity of 0.40, indicating that robust output growth was balanced between employment growth and gains in labour productivity. Greece followed Ireland with over 4 per cent average annual growth and an employment elasticity of around 0.30. Luxembourg and Cyprus both experienced employment elasticities greater than 1, which, taken together with their positive GDP growth rates, implies that employment grew by more than total output in these countries, while labour productivity declined.

Despite slight increases in the working-age populations (the available labour pool), Japan and Denmark witnessed falling employment together with low GDP growth rates of less than 2 per cent. (For the present analysis, GDP growth below 2 per cent is considered low while GDP growth between 2 per cent and 3.5 per cent is considered moderate. Employment elasticities below 0.25 are considered low while elasticities between 0.26 and 0.75 are considered moderate.) In terms of growth and employment intensity between 1999 to 2003, the remaining countries can be placed into four broad groups: 1) low economic growth and low employment intensity (Austria, Germany and Switzerland); 2) low economic growth and moderate employment intensity (Belgium, France, Italy,

the Netherlands, Norway and Portugal); 3) moderate output growth and low employment intensity (the United States); and 4) moderate output growth and moderate employment intensity (Australia, Canada, Finland, Iceland, New Zealand, Spain, Sweden and the United Kingdom).

Figure A2. Employment elasticities versus average annual GDP growth in selected developed economies, 1999-2003
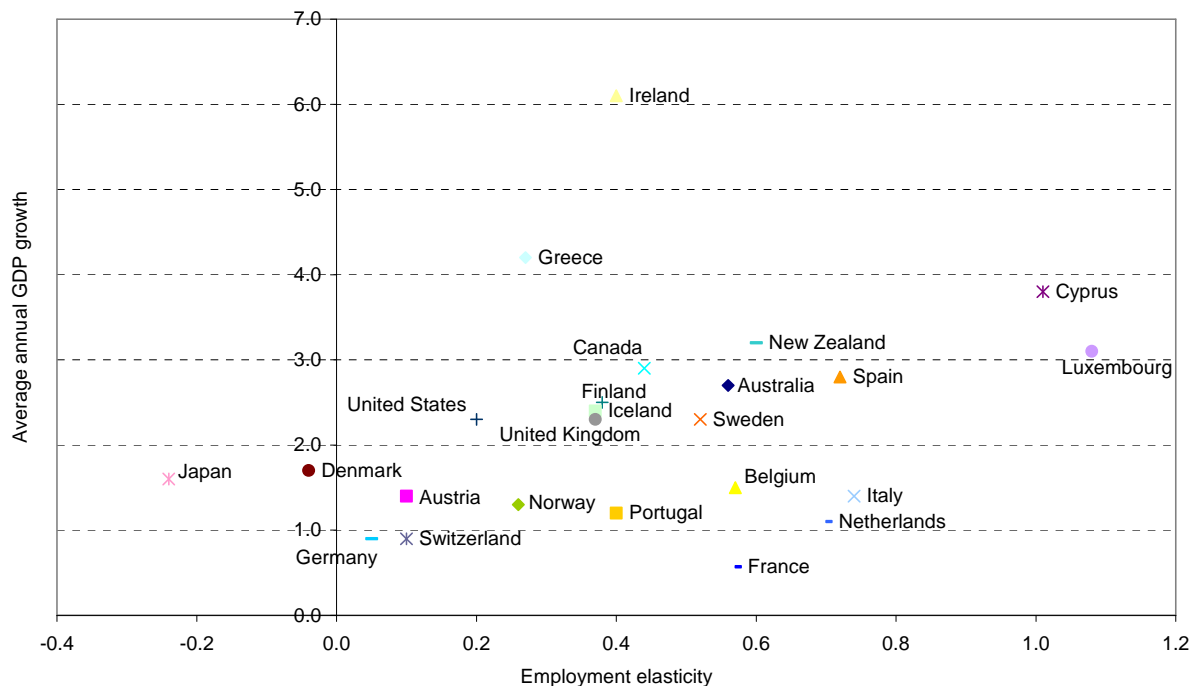
Source: KILM table 19 and World Bank, World Development Indicators, 2005.

Table A4. Employment elasticities and growth in value added by economic sector, Western Europe and North America, 1991-2003

	Employment elasticity			Average annual value added growth rate (%)		
	Agriculture	Industry	Services	Agriculture	Industry	Services
Western Europe	-1.39	0.49	0.62	1.0	1.1	2.5
North America	-0.09	0.27	0.53	3.5	3.0	3.7

In contrast with the global trends in sector employment elasticities, in Western Europe and North America (table A3) the sector-specific data provide a clear picture of ongoing structural change accompanied by net employment losses in agriculture and industry. The sector employment elasticities in the region point to labour-substituting productivity growth in agriculture, growth in industrial value added that was shared roughly equally between employment and productivity growth, and growth in the dynamic services sector biased more towards employment growth than productivity growth. Accordingly, during this period Western Europe witnessed a pronounced reduction in employment in both agriculture and industry, in parallel with rapid employment growth in the services sector.

The structural trends in North America were similar, albeit less pronounced, to those in Western Europe. North America witnessed a marginal decline in employment in agriculture, and there is evidence that the sector experienced labour-substituting productivity growth, though at a more moderate pace than that of Western Europe. Despite widespread reports of jobless growth and the decline of manufacturing in North America, for the full 1991 to 2003 period, employment in industry did grow modestly, and productivity gains in the sector were not associated with job destruction. Finally, as in Western Europe, the services sector in North America experienced the most robust growth – both in terms of value added growth and employment growth.

Transition economies

The transition economies[9] underwent substantial labour market and overall macroeconomic adjustments during the 1991 to 2003 period. Yet, despite experiencing severe macroeconomic shocks during the transformation towards more market-based economic institutions, Central and Eastern Europe (CEE) was able to achieve positive average rates of economic growth in each of the three periods. The Commonwealth of Independent States (CIS) stood in stark contrast, with average annual economic growth rates of negative 10.9 per cent in the first period and continued negative growth in the second period. However, the CIS region has begun to recover, with considerably faster economic growth between 1999 and 2003.[10]

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9. Although "transition economies" is no longer used as a regional grouping in this edition of the KILM, as a result of the need to distinguish between the "transition economies" that are now members of the European Union and those that are not, it remains a useful phrase to identify the former control countries in Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS) that were once part of the Soviet Union and thus share a common heritage and common development challenges.

10. For useful background information on these regions, see ILO: *Global Employment Trends Supplement for Europe and Central Asia, February 2005* (Geneva, 2005); website: http://www.ilo.org/public/english/employment/strat/download/get05sen.pdf.

A look at the trends in employment elasticities in the two regions reveals further divergence. In CEE, there was a steady deterioration in the employment intensity of growth and the last period's positive annual GDP growth rate of 3.5 per cent went hand in hand with job losses. In contrast with the total figures, women in the CEE region fared worse than men with respect to employment trends. In CEE, it is clear that productivity growth came at the expense of employment growth throughout much of the period following the transition to a market-based economy. Figure A3 provides evidence of this: labour productivity in Albania and Bosnia and Herzegovina grew by well over 100 per cent between 1991 and 2003. Not surprisingly, Albania's unemployment rate rose from 9.1 per cent to 15.2 per cent over the same period, while labour force participation in Bosnia and Herzegovina fell from 65.7 per cent to 62.1 per cent. Labour productivity increased as well in Romania, Croatia and Bulgaria although to a lesser extent. During this time Croatia experienced a rising unemployment rate, while unemployment rates in Romania and Bulgaria did rise for a period, but have since fallen and have remained relatively stable in recent years.

In the CIS, following two periods of very adverse employment outcomes, the most recent period witnessed substantial improvements in employment generation. The overall comparative trends between female and male employment elasticities in the CIS were not markedly different. Women fared somewhat worse initially in terms of job destruction, but employment among women rose faster in the last period than among men. In terms of labour productivity trends, the results in the CIS were practically opposite to those in CEE, as labour productivity fell in every CIS country except Armenia, Belarus and Kazakhstan. Meanwhile in Georgia, the Republic of Moldova and Tajikistan output per worker in 2003 stood at less than 60 per cent of the respective levels in 1991 (figure A4).

Table A5. Employment elasticities by sex and average annual GDP growth in the transition economies, 1991-2003

|	Total			Female			Male			GDP growth		
	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003
Central and Eastern Europe	0.24	0.01	-0.19	0.09	-0.11	-0.31	0.35	0.10	-0.11	2.0	3.0	3.5
CIS	0.19	0.28	0.18	0.23	0.26	0.22	0.15	0.31	0.14	-10.9	-0.1	7.2

Figure A3. GDP per person employed (1990 US$), selected CEE countries (1991=100)
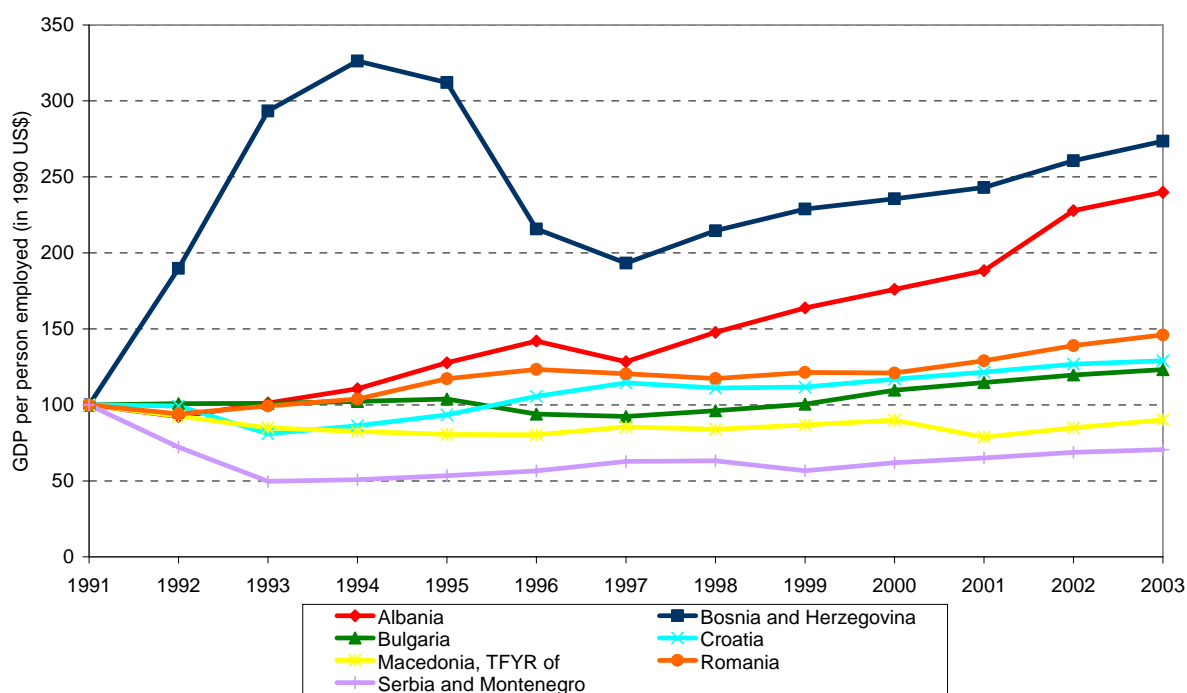
Source: KILM table 18a.

The sector-specific elasticity trends in CEE reveal ongoing structural change. As GDP grew in the region, jobs were shed in both agriculture and industry, while employment in the services sector expanded. Value added growth in agriculture and industry were fully driven by productivity growth – an increase in agriculture value added was actually associated with a *decline* in employment in agriculture. Employment and productivity contributed roughly equally to growth in services sector value added, as evidenced by the sector's value added elasticity of 0.47.

In the CIS, the value added elasticities indicate that both employment and productivity declined in the agriculture and industry sectors. In both sectors, every 1 percentage point reduction in value added output was associated with a reduction of around 0.4 percentage points in employment (and hence a reduction of 0.6 percentage points in labour productivity). In services, the decline in value added was met by an even greater relative fall in productivity than employment. Nonetheless, this sector also experienced the highest growth rate.

Figure A4. GDP per person employed (1990 US$), selected CIS countries (1991=100)

Source: KILM table 18a.
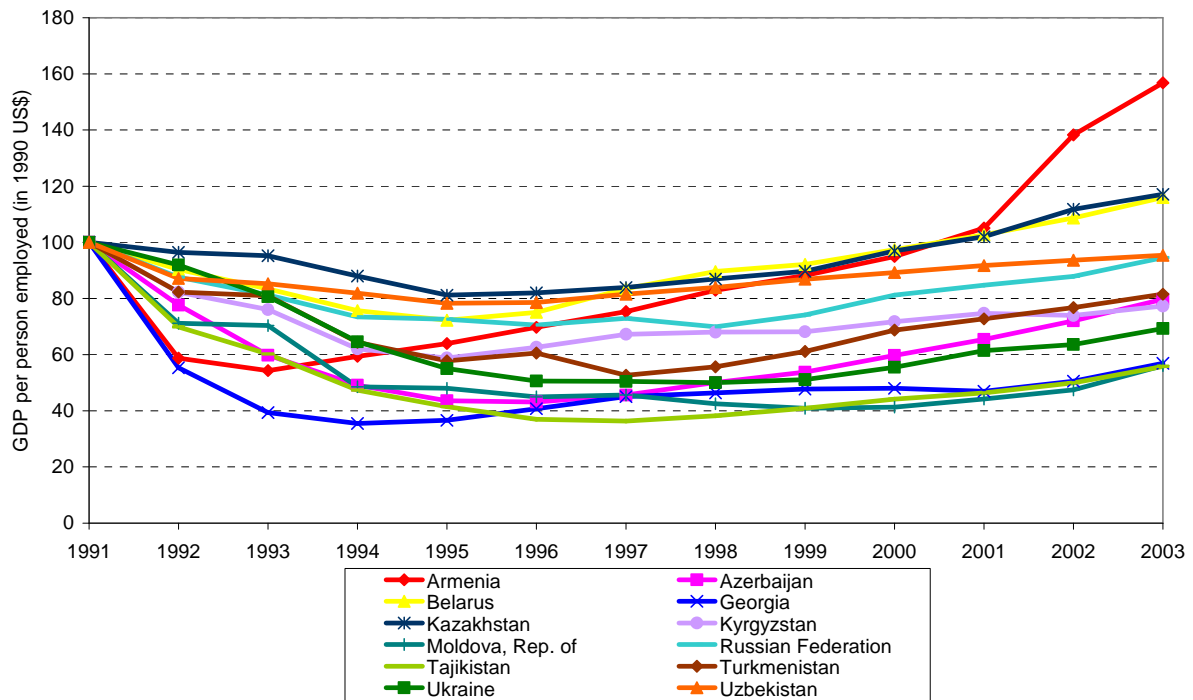
Table A6. Employment elasticities and growth in value added by economic sector, transition economies, 1991-2003

|	Employment elasticity			Average annual value added growth rate (%)		
	Agriculture	Industry	Services	Agriculture	Industry	Services
Central and Eastern Europe	-1.06	0.09	0.47	0.7	2.9	3.4
Commonwealth of Independent States	0.41	0.42	0.15	-1.2	-4.1	-0.5

Asia and the Pacific

The Asia and Pacific region unquestionably witnessed the most dynamic growth and development of all of the regions of the world between 1991 and 2003, with average annual GDP growth over the three periods ranging between 7.4 per cent and 11.5 per cent in East Asia, and between 5.1 and 6.0 per cent in South Asia. Yet, the region also struggled through the Asian financial crisis during the second period, which had adverse effects on many countries in South-East Asia. This is evidenced by South-East Asia's sharp drop in output growth in the 1995 to 1999 period.

Trends in employment elasticities provide further detail on both the region's successes as well as its struggles with the Asian crisis. In East Asia, total employment elasticities remained quite low in comparison with global figures. Combined with high GDP growth rates, this implies that the region experienced robust productivity growth. However, unemployment rates remained fairly low and steady. Consequently, the region's growth was sufficiently employment-intensive, while allowing for rapid increases in living standards through productivity growth. This is reflected in figure A5, which shows China's rapid rise in labour productivity between 1991 and 2003.

Figure A5. Labour productivity (1990 US$), 1991-2003, selected Asian economies
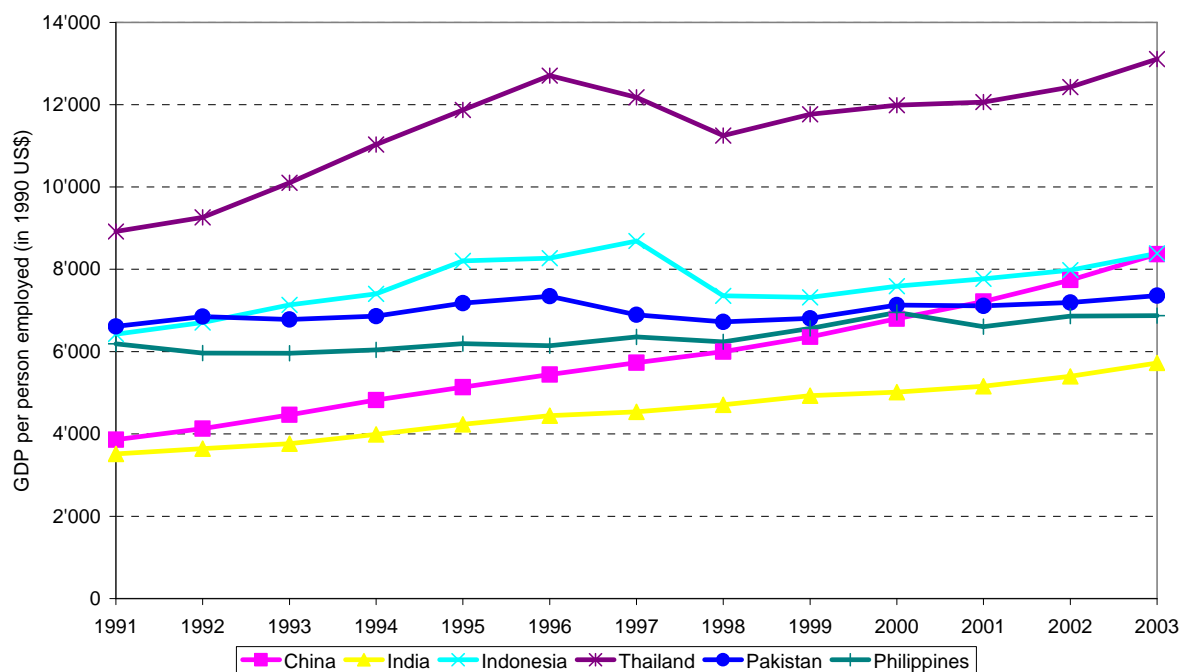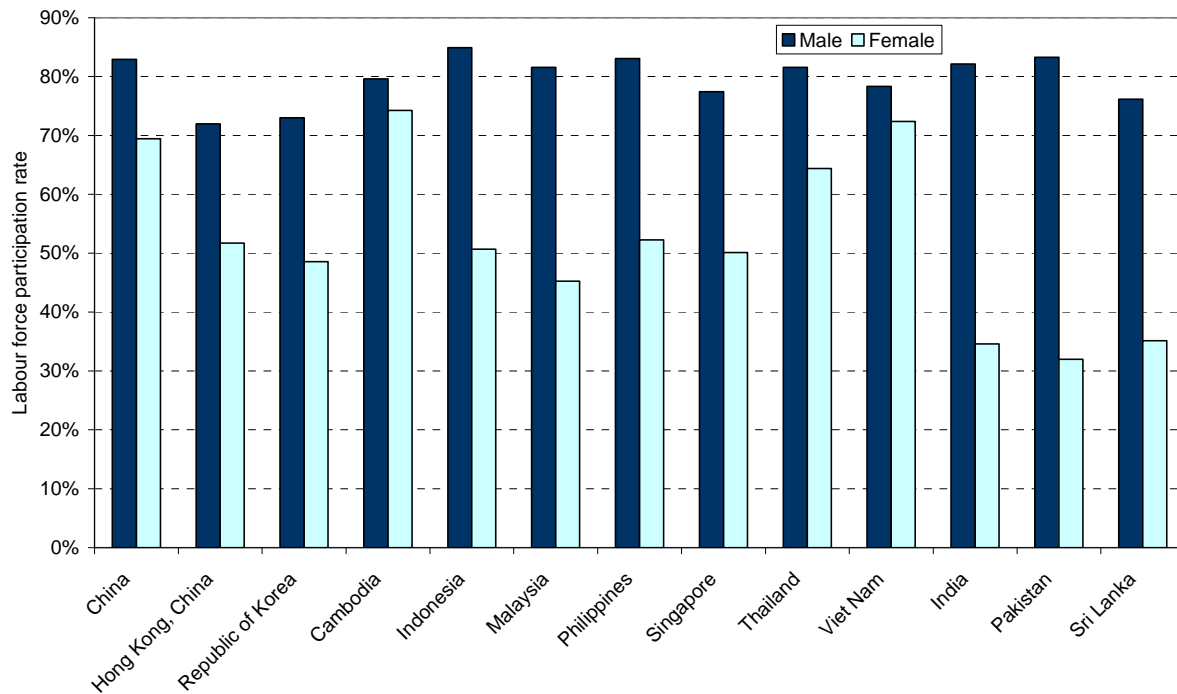

Source: KILM table 18a.

There was very little difference in employment intensity between women and men, which is not particularly surprising given the relative gender equality in terms of labour force participation in China, as shown in figure A6, and also given the relatively lower female unemployment rates in the region (3 per cent in 2003, compared to 4.2 per cent for men).

Figure A6. Labour force participation rates (aged 15 years and over), by sex, 2003, selected Asian economies[11]

Source: KILM table 1a.

Owing to the Asian financial crisis, South-East Asia experienced a large degree of volatility in overall economic and employment performance in the three periods. From 1991 to 1995, the region's output grew by over 7.4 per cent and the overall employment elasticity of 0.39 was high enough to translate into a reduction in total unemployment. In the period corresponding with the financial crisis, the region's overall employment elasticity fell, indicating that the reduction in output was met with a greater decline in employment growth than in productivity growth. The most recent period witnessed a substantial increase in employment intensity in the region, coupled with a more moderate rise in output. In each of the periods, there was little difference between the sexes with regard to employment intensity.

South Asia's strong growth between 1991 and 2003 gave rise to higher living standards, declining poverty rates and faster overall development in the region. Yet, the region remains one of the poorest in the world.

Employment intensity trends in South Asia were more similar to South-East Asia than East Asia. One likely explanation for this is that, while East Asia's working-age population expanded by around 18 per cent between 1991 and 2003, the working-age population in both South-East Asia and South Asia grew by about 32 per cent, reflecting different fertility patterns in the regions. Thus, for a given rate of GDP growth, South-East Asia and South Asia required higher relative employment elasticities in order to maintain stable unemployment. The differences in elasticities by sex were more pronounced in South Asia than in the other Asian regions. One potential reason behind this, shown in figure A6, is the substantially larger gender gap in labour force participation in many countries in the region. The tendency is for the gap in elasticities by sex to narrow over time as countries further develop, as was seen here. Overall, the employment intensity of growth in South Asia allowed for relatively solid employment growth, while also allowing for rapid increases

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11. Figure A6 is grouped by KILM sub-region. Looking at the figure from left to right, China through the Republic of Korea are in East Asia, Cambodia through Viet Nam are in South-East Asia and India through Sri Lanka are in South Asia.

in labour productivity in many of the region's countries. As will be shown below, however, a slightly different picture emerges when examining the sector elasticities.

Table A7. Employment elasticities by age group and sex and average annual GDP growth in Asia and the Pacific, 1991-2003

	Total			Female			Male			GDP growth		
	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003
East Asia	0.14	0.14	0.18	0.16	0.17	0.18	0.13	0.12	0.18	11.6	7.4	7.7
South-East Asia and the Pacific	0.39	0.20	0.42	0.38	0.20	0.49	0.39	0.20	0.37	7.4	1.6	4.8
South Asia	0.40	0.49	0.36	0.49	0.61	0.30	0.37	0.44	0.38	6.0	5.8	5.1

Table A8. Employment elasticities and growth in value added by economic sector, Asia and the Pacific, 1991-2003

	Employment elasticity			Average annual value added growth rate (%)		
	Agriculture	Industry	Services	Agriculture	Industry	Services
East Asia	0.23	0.06	0.50	3.7	12.5	8.8
South-East Asia	0.20	0.68	0.99	2.1	5.4	4.6
South Asia	0.71	0.37	0.36	2.9	5.9	6.9

Breaking down these regional results by economic sector provides some additional information on overall trends. The value added growth rates reveal that East Asia and South-East Asia's growth was led by growth in industry – 12.8 per cent average annual rate in East Asia and 5.4 per cent in South-East Asia – followed by growth in services – 8.8 per cent in East Asia and 4.6 per cent in South-East Asia. Services-sector growth in South Asia, at 6.9 per cent, slightly outpaced the 5.9 per cent average annual growth rate in the region's industrial sector.

The sector elasticities indicate that East Asia's industrial output growth was led by robust productivity gains. The same was true to a lesser extent for the region's agriculture sector, while growth in services corresponded with roughly equal gains in employment and productivity. It is important to note, however,

that the very rapid growth that took place in all three sectors in East Asia facilitated both robust employment generation as well as rapid productivity gains. This trend has resulted in a "virtuous cycle" of employment growth, productivity growth and poverty reduction in the region. In South-East Asia, agriculture growth was driven more by productivity growth, while growth in industry, and particularly services, was led by employment growth. South Asia provides a contrast, as growth in agriculture was driven mainly by employment growth, while around two-thirds of industrial and services output growth was due to growth in labour productivity. Not surprisingly, of these three regions, South Asia exhibited the least degree of structural economic change away from agriculture and into industry and services.

Latin America and the Caribbean

The Latin America and Caribbean regions achieved modest to moderate rates of economic growth from 1991 to 2003. In Latin America**,** the period of fastest GDP growth was from 1991 to 1995 and subsequently decelerated in each of the following periods. The region weathered two major financial crises – one occurring in Mexico primarily during the second period and the other in Argentina during the final period. Growth rates in the Caribbean also showed volatility, with the best growth performance registered between 1995 and 1999.

Overall, economic growth in Latin America was more employment-intensive than growth in the Caribbean. One potential reason for this is that the Latin America region has faster overall population and labour force growth than the Caribbean. To this end, in order to maintain stable unemployment, Latin America requires greater employment

intensity for a given level of growth. Economic growth was more employment intensive for females than for males throughout each of the periods, though this difference narrowed over time. This trend reflects a substantial narrowing of the labour force participation gap between men and women over the course of the 13 years.

Employment elasticities in the Caribbean also showed a trend decline. Following declining unemployment rates in each of the first two periods, the region's overall unemployment rate began to level off between 1999 and 2003. Female unemployment rates in the Caribbean were considerably higher than the corresponding rates for men. The higher relative female employment elasticities during the first two periods translated into fairly large reductions in these rates, but the employment picture for women also deteriorated during the 1999 to 2003 period.

Figure A7. Employment elasticities and average annual GDP growth in selected Latin American and Caribbean countries, 1999-2003
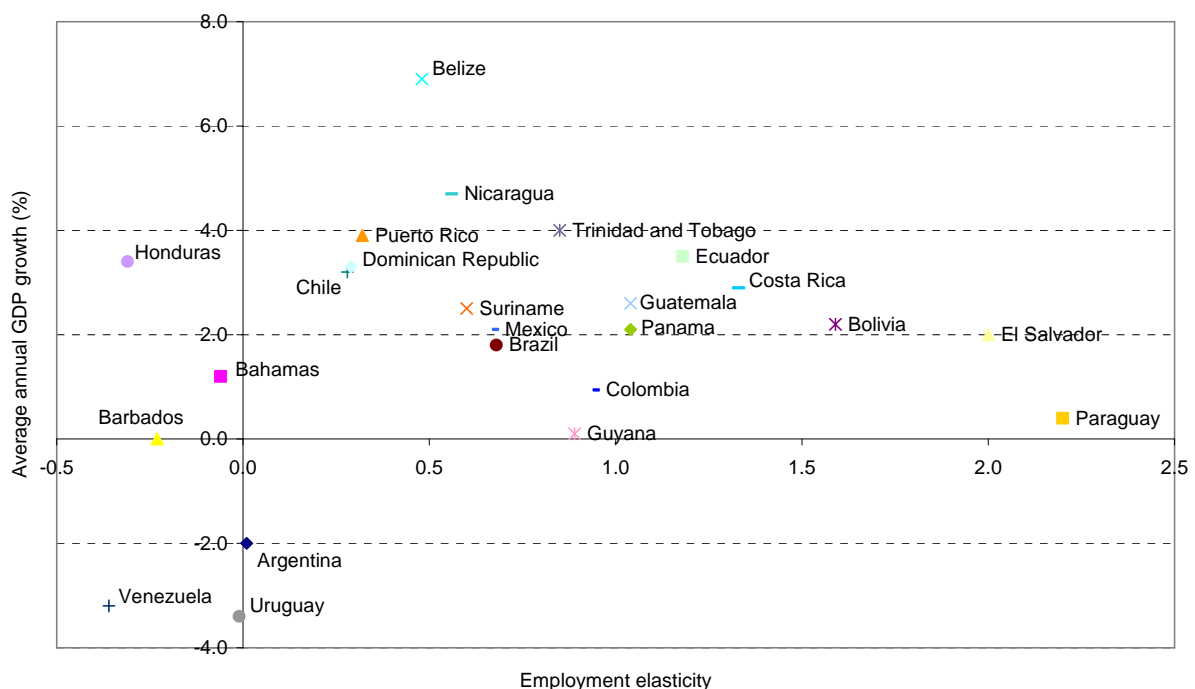
Source: KILM table 19 and World Bank, World Development Indicators, 2005.

At the country level, there were large variations in both GDP growth and the employment intensity of growth between 1999 and 2003. With average output growth of nearly 7 per cent and an employment intensity of just under 0.5, Belize registered a solid economic performance, with gains shared between employment and productivity growth. Chile, the Dominican Republic, Nicaragua, Puerto Rico and Trinidad and Tobago also experienced economic growth of over 3 per cent, with employment elasticities ranging

from 0.28 to 0.85, providing evidence of relatively strong, balanced economic growth. Several countries in Latin America and the Caribbean, including Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Jamaica, Panama and Paraguay, had employment elasticities greater than 1. Therefore, in these countries labour productivity fell over the period, signalling a potential reduction in worker welfare.

Table A9. Employment elasticities by age group and sex and average annual GDP growth in Latin America and the Caribbean, 1991-2003

	Total			Female			Male			GDP growth		
	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003
Latin America	0.65	0.70	0.45	0.96	1.01	0.49	0.49	0.52	0.43	3.5	2.7	1.4
Caribbean	0.43	0.37	-0.42	0.53	0.59	-0.51	0.40	0.23	-0.35	1.9	5.2	2.5

Table A10. Employment elasticities and growth in value added by economic sector, Latin America and the Caribbean, 1991-2003

	Employment elasticity			Average annual value added growth rate (%)		
	Agriculture	Industry	Services	Agriculture	Industry	Services
Latin America	-0.33	0.54	1.04	2.5	2.2	2.6
Caribbean	-0.11	0.05	0.99	2.5	3.7	3.8

There is evidence of ongoing structural change in both Latin America and the Caribbean, particularly in terms of movement away from employment in agriculture and into the services sector, the latter having grown the fastest in both regions. It is important to note that the services sector growth that occurred over the period was led fully by employment growth rather than by productivity growth – a different pattern as compared with other

regions of the world. Industry continued to contribute to job growth in Latin America, and the growth in industry value added was shared almost equally between productivity and employment gains. In terms of elasticity trends in the Caribbean, the industrial sector was in moderate decline vis-à-vis employment, with the majority of value added growth in the sector due to growth in productivity.

The Middle East, North Africa and sub-Saharan Africa

The sub-regions of the Middle East, North Africa and sub-Saharan Africa have some of the highest employment elasticities of any of the areas under examination, reflecting the regions' unique growth, employment and poverty-related characteristics. In the Middle East, overall elasticities were greater than 1 in each of the first two periods, which means that labour productivity actually declined. Between 1999 and 2003, the region did manage to generate some labour productivity growth (coupled with robust GDP growth of 4.1 per cent per annum), but overall gains in output were still skewed heavily towards employment growth rather than labour productivity growth. There is a large difference in employment elasticities by sex in both the Middle East and North Africa, with female elasticities considerably higher than those for males in each of the periods. These two regions have the highest gender gap in labour force participation, implying that the higher elasticities likely reflect a "catching-up" in terms of participation among women.

In sub-Saharan Africa, relative stability in employment elasticities and the relative homogeneity in elasticity levels across demographic groups highlight the shared struggles among the vast majority of workers in the region with regard to poverty and low productivity employment. While low labour productivity growth has hampered development in the region, the elasticity figures in table A11 do point to some improvement in the share of output growth accounted for by growth in productivity. Nevertheless, the region's very high population growth rate will likely continue to necessitate high employment intensity of growth for the foreseeable future. In terms of overall economic performance, the higher economic growth rates of the latter two periods under examination represent a positive trend. Continued growth in output, with gains shared between productivity and employment are required for long-term, sustainable development in the region.

Figure A8. Employment elasticities and percentage point change in US$1 working poor share in total employment in selected Middle Eastern and sub-Saharan African countries, 1991-2003
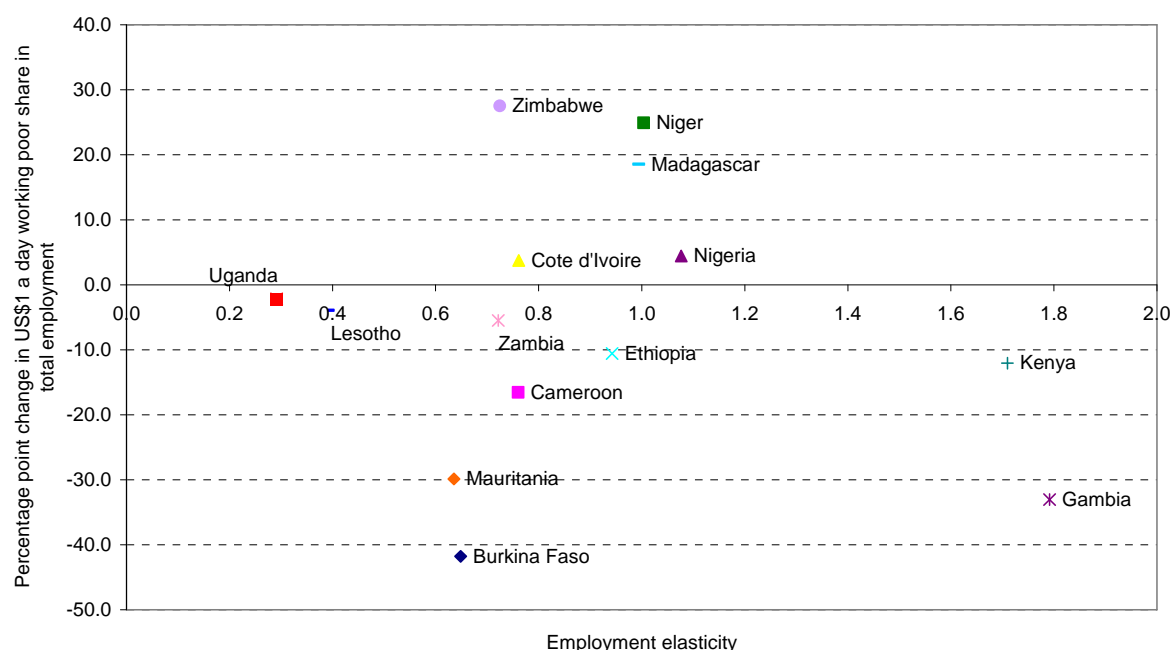
Source: KILM tables 19 and 20, and S. Kapsos: "Estimating growth requirements for reducing working poverty: Can the world halve working poverty by 2015?", Employment Strategy Paper, No. 14 (Geneva, ILO, 2004).

The country-level data presented in figure A8, which shows employment elasticities over the 1991-2003 period versus the change in the share of US$1 working poor in total employment, provide further evidence of the need for both productivity growth and employment growth.[12] The most successful country in terms of reducing working poverty was Burkina Faso, where the share of working poor fell by over 40 percentage points. Between 1991 and 2003, the country experienced rapid annual economic growth of 4.1 per cent and an employment elasticity of 0.65. This rapid, balanced growth is likely to have played a large role in the country's favourable outcome vis-à-vis poverty reduction. Other countries exhibiting balanced growth and significant poverty reduction include Lesotho, with average annual GDP growth of 3.4 per cent and an employment elasticity of 0.39; Mauritania, which had average annual growth of 4.4 per cent and an employment elasticity of 0.64; and Cameroon, with average annual growth of 2.6 per cent and an employment elasticity of 0.76. The two countries with the largest increase in working poverty were Niger and Zimbabwe. The former experienced negative economic growth over the period, together with declining employment and falling labour productivity, while the latter did manage to grow at 2.4 per cent per year, but its high employment elasticity of 1 reflects the country's negligible labour productivity growth. Madagascar and Nigeria also suffered from low or falling labour productivity together with rising poverty.

Three countries in figure A8 – Côte d'Ivoire, Gambia and Kenya – appear at first glance to have somewhat counterintuitive results; however, a closer look provides

reasonable explanations. In the case of Kenya, the country's very high employment elasticity together with a low GDP growth rate of 1.6 per cent implies that the country generated many low-productivity jobs over the period. It appears that in this case, one key to poverty reduction was employment creation. Yet, more research is clearly needed to better understand the specifics of the country's experience. Gambia also registered a very high employment elasticity and thus falling labour productivity. In this case, the country's average annual GDP growth rate of 3.6 per cent and its rapid employment creation are plausible explanations for the country's success vis-à-vis poverty reduction. Finally, Côte d'Ivoire's elasticity of 0.76 reveals that the country experienced balanced economic growth, however, its average growth rate of just 1.6 per cent was not sufficient to reduce poverty among workers. Taken together, these countries' experiences seem to indicate that while the rate of economic growth plays a key role in determining outcomes in terms of poverty reduction, the extent to which growth is balanced between employment and labour productivity growth can also play an important role.

There is no evidence of systematic structural economic change taking place in these three regions. Indeed, in the Middle East and in North Africa, the agriculture sector saw the most job growth of the three sectors. In sub-Saharan Africa, job growth was greatest in the services and industry sectors.

Growth in agriculture value added in the Middle East coincided with rapid employment growth and declining productivity in the sector. In sub-Saharan Africa, agriculture growth was driven mainly through employment growth, but the sector also experienced some productivity gains – though not enough to have a positive impact vis-à-vis poverty reduction. Industry value added growth was led by productivity growth in both the Middle East and North Africa, whereas in sub-Saharan Africa it was driven to a greater extent by employment growth. Notwithstanding the lack of structural change, the services sector still provided the fastest

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12**.** Changes in working poor shares were calculated for those countries for which two or more working poverty data points were available between 1991 and 2003. The figures are expressed as the total percentage point change in the share of US$1 working poor in total employment from 1991 to 2003. For more information on the working poor, see the manuscript of KILM 20 as well as S. Kapsos: "Estimating growth requirements for reducing working poverty: Can the world halve working poverty by 2015?", Employment Strategy Paper, No. 14 (Geneva, ILO, 2004).

overall value added growth rates in each of the regions. However, as with overall economic growth, growth in services throughout Africa and the Middle East continues to lag far behind other regions.

Table A11. Employment elasticities by age group and sex and average annual GDP growth in the Middle East, North Africa and sub-Saharan Africa, 1991-2003

	Total			Female			Male			GDP growth		
	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003	1991 - 1995	1995 - 1999	1999 - 2003
Middle East	1.10	1.29	0.91	2.11	2.12	1.09	0.83	1.03	0.85	3.9	3.0	4.1
North Africa	0.30	0.74	0.51	0.41	1.04	0.59	0.26	0.65	0.50	2.2	4.8	4.1
Sub-Saharan Africa	0.73	0.82	0.53	0.79	0.89	0.57	0.69	0.76	0.50	1.1	3.2	3.2

Table A12. Employment elasticities and growth in value added by economic sector, the Middle East, North Africa and sub-Saharan Africa, 1991-2003

	Employment elasticity			Average annual value added growth rate (%)		
	Agriculture	Industry	Services	Agriculture	Industry	Services
Middle East	1.94	0.26	0.70	3.9	1.3	4.6
North Africa	0.55	0.43	0.76	2.4	3.2	4.0
Sub-Saharan Africa	0.82	0.90	0.79	2.3	2.0	2.8

4. Conclusions

This section utilized the employment elasticity together with other relevant labour market indicators to identify broad trends in employment generation, productivity growth and structural economic change. By examining historical trends in the employment intensity of growth among subsets of the population, it also sought to provide a clearer picture of the diversity in employment outcomes among these different groups.

The global employment elasticity trends showed that while the share of employment growth in total output growth has been about one-third over the 13-year period (1991 to 2003), there was a decline in the employment intensity of growth in the most recent period from 1999 to 2003. This is most likely a reflection of poor employment performance following the global economic slowdown that began in 2001. Another significant trend in the global labour market is evidenced by higher female employment elasticities in each of the three time periods than the corresponding elasticities for men. This result appears to indicate a "catching up" in terms of women's labour force participation relative to men's, however, this result may also be indicative of women's continued disproportionate representation in low-wage and low-productivity jobs.

It is clear from the regional trends presented in the section that there is a wide variation in the employment intensity of growth in regions throughout the world. Between 1991 and 2003, the most employment-intensive growth was registered in sub-Saharan Africa and the Middle East, reflecting these regions' large surplus of labour. However, the relatively low output and productivity growth in many countries in the region continued to inhibit poverty reduction. Meanwhile in Asia and the Pacific, and particularly in East Asia, rapid economic growth has allowed the region to realize large gains in productivity, contributing to rising

living standards while also maintaining robust employment growth. There appears to be evidence of a structural divide in employment intensity between North America and Western Europe between 1991 and 2003, with the employment intensity of growth decreasing in the former and increasing in the latter over the course of the three periods under examination. The regional results also provided indications of ongoing structural economic change, particularly in the developed world, but also in the transition economies, Latin America and the Caribbean and throughout parts of Asia and the Pacific.

While the results presented here offer an empirical overview of the relationship between output growth, productivity and employment, and while they highlight some of the factors that appear to drive this relationship, policy conclusions based on these results have not been provided. This analysis may indeed help to inform future policy discussions, yet much additional work is needed to identify macroeconomic "best practices" for encouraging economic growth and development while striking an optimal balance between employment promotion and productivity growth.

Annex 1. Calculating employment elasticities

The most basic definition of employment elasticity is the percentage change in the number of employed persons in a country or region associated with a percentage change in economic output, measured by the gross domestic product. Within this broad definition, two methodologies are frequently utilized for calculating elasticities. The first technique, shown in equation 1, gives the *arc* elasticity of employment, ε_i:

$$\varepsilon_i = \left(\frac{(E_{i1} - E_{i0}) / E_{i0}}{(Y_{i1} - Y_{i0}) / Y_{i0}} \right) \tag{1}$$

The numerator gives the percentage change in employment in country i, E_i, between periods 0 and 1, while the denominator gives the corresponding percentage change in output, Y_i. While this methodology is computationally very simple, year-over-year employment elasticities calculated using this method tend to exhibit a great deal of instability and may, therefore, be inappropriate for comparative purposes.

Consequently, the employment elasticities presented in the KILM are based on a second method, which gives the *point* elasticity and is shown in equation 2. This method uses a multivariate log-linear regression model with country dummy variables, D_i, interacted with log GDP.

$$\ln E_i = \alpha + \beta_1 \ln Y_i + \beta_2 (\ln Y_i \times D_i) + \beta_3 D_i + u_i \tag{2}$$

In equation 2, the elasticity of employment with respect to GDP in country $_i$ is given as $\beta_1 + \beta_2$. This is calculated by differentiating both sides of equation 2 and solving for $\partial E / \partial Y$:

$$\left(\frac{\partial E}{E} \right) = (\beta_1 + \beta_2)\left(\frac{\partial Y}{Y} \right) \rightarrow \frac{\partial E}{\partial Y}\left(\frac{Y}{E} \right) = \beta_1 + \beta_2 \tag{3}$$

Using this econometric method, $\varepsilon_1 + \varepsilon_0$ represents the change in employment associated with a differential change in output. Thus, an elasticity of 1 implies that every 1-percentage point of GDP growth is associated with a 1-percentage point increase in employment. An elasticity of 0.4 implies

that every 1-percentage point of GDP growth is associated with employment growth of 0.4 percentage points, and so forth.

In order to capture differences in the employment-output relationship among different subsets of the population, sex-disaggregated elasticities were also calculated for each country. Equation 2 was used to generate the elasticities by sex, in which E_i represents total employment for the respective sex while Y_i represents total GDP.[13]

Employment elasticities by economic sector (agriculture, industry and services) were generated using equation 4 below:

$$\ln E_i = \alpha + \beta_1 \ln V_i + \beta_2 (\ln V_i \times D_i) + \beta_3 D_i + u_i \qquad (4)$$

Where E_i again represents total employment in the sector and V_i represents value added by economic sector. Therefore, equation 4 gives the elasticity of employment with respect to value added in the given economic sector.

Annex 2. The relationship between employment elasticities and labour productivity

There is a fundamental arithmetic identity that links employment elasticities and labour productivity, which is given by:

$$Y_i = E_i * P_i \qquad (1)$$

where Y_i and E_i are output and employment, respectively, while P_i is equal to labour productivity (output per worker).[14] Equation 1 implies that for small changes in output, the following holds:

$$\Delta Y_i = \Delta E_i + \Delta P_i \qquad (2)$$

That is, for a given amount of output growth, ΔY, any increase in the rate of employment growth must be met by an equal and opposite decrease in labour productivity growth. The significance of this employment elasticity-productivity relationship is critical: in formulating conclusions about elasticities, one must also consider the productivity side of the relationship. If we divide equation 2 by output growth, ΔY, we derive the following:

$$\varepsilon = 1 - p, \text{ where } \varepsilon = \frac{\Delta E}{\Delta Y} \text{ and } p = \frac{\Delta P}{\Delta Y} \qquad (3)$$

Equation 3 shows that the elasticity of employment with respect to GDP is equal to 1 minus the elasticity of labour productivity with respect to GDP.

13. Total GDP is also used in the calculation of female and male elasticities. As a result, the elasticities by sex do not provide a proper indication of how male or female employment varies with the respective output of males or females. Ideally, this would also be calculated, but data limitations (the absence of GDP broken down by age and sex) prohibit such a calculation.

14. This equation holds only when output corresponds exactly with employment (e.g. total output and total employment, or agriculture value added and employment in agriculture). The relationships between productivity, employment and output do not hold in cases where employment corresponds to a population subgroup (such as women) while total output is used instead of output for the population subgroup.