

# B

## Labour market outcomes: trends and analytical framework

This section aims to put the discussion of the labour market effects of trade and technology into perspective. A narrow focus on these effects may give the misleading impression that trade and/or technology are the main determinants of employment or wages. As explained in this section, however, levels of employment or unemployment and of wages are largely determined by how the labour market works. In other words, the effects of technology or trade on labour market outcomes depend, to a large extent, on institutional conditions in the labour market, concomitant economic changes and the diversification of employment opportunities when shocks occur.



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### Some key facts and findings

- Labour markets have evolved in many different ways across countries, suggesting that a pivotal role is played by country-specific factors.
- The labour force participation rate and the ratio of the population in employment have remained relatively stable across most high- and low-income countries but have decreased in middle-income countries. Unemployment rates tend to be lower in developing countries, but the share of the population in informal employment tends to be high.
- Average real wages have continued to rise, albeit more slowly since the post-2007 Great Recession, in most countries over the last 10 years.
- The evolution of labour markets has been marked by the expanding proportion of workers with secondary or tertiary education, increasing participation of women in the job market, declining participation of men in employment, and the increasing number of non-standard jobs, such as work based on temporary contracts, part-time work and self-employment.
- The proportion of employees in the services sector continues to increase in both developed and developing economies. At the same time, the proportion of workers in agriculture and manufacturing sectors is declining or stagnating. In developed economies and some developing economies, there has been a relative increase in the share of high- and low-skilled occupations and a relative decline in the share of middle-skill occupations.
- Smooth adjustments in the labour market can be hampered by the potential mismatch between those searching for jobs and the types of workers needed by employers. Adjustment can also be hampered by the obstacles faced by employees in moving to where new jobs are located, therefore limiting the gains from technological change or trade.



The section opens with a brief presentation of major labour market trends at the aggregate level. Section B.2 documents two important structural changes occurring in the labour market of a large number of countries, namely the increasing share of services employment in total employment and the relative decline in the share of middle-skill occupations in total employment. Finally, Section B.3 reviews a number of important theoretical insights on the functioning of the labour market.

## 1. Major trends in employment and wages

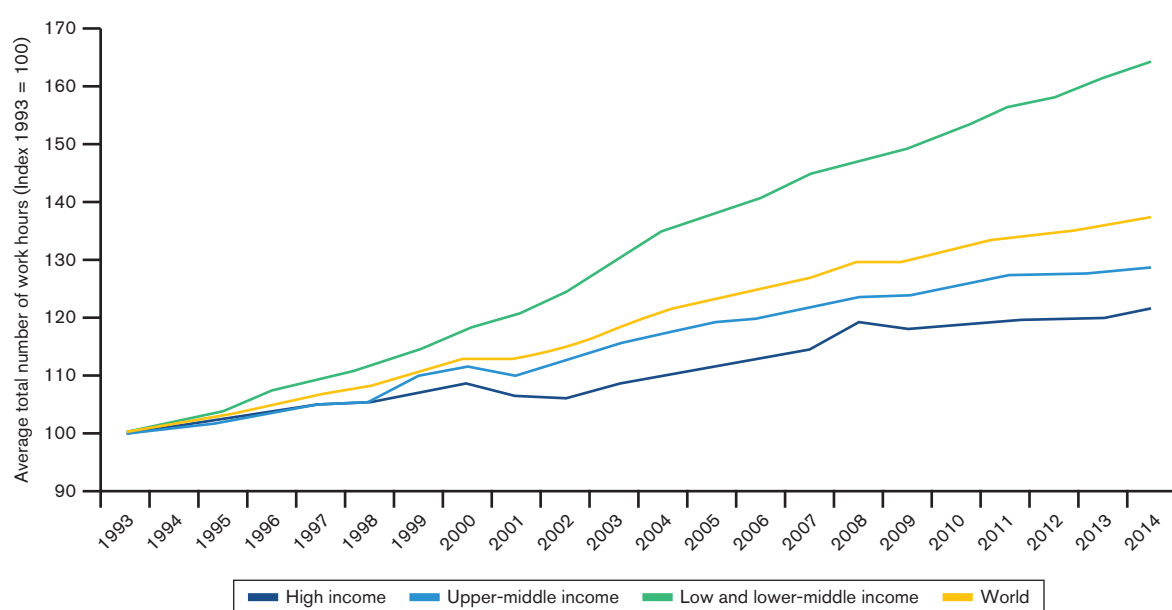
This subsection presents some general labour market trends in order to provide a general overview of the labour market. Some of these trends are longer-term, while others refer to more recent developments, in particular developments observed since the global financial crisis of 2007/08. Overall, although a number of general labour market trends can be observed, the evolution of labour markets remains highly diverse across countries, suggesting that country-specific factors play a pivotal role in the functioning of the labour market. As discussed in greater detail in the next subsections, labour markets are indeed affected by a broad range of demographic, social, economic and institutional changes.

Employment and labour issues continue to be high on the agenda of policymakers across countries, although

reasons for concern might differ. A broad range of indicators have been developed in the literature to measure the multi-faceted nature of labour markets. Important dimensions of the labour market include unemployment, wage inequality, the quality of jobs, the informal sector, gender inequality and labour unions. Given that most of the literature discussing the impact of technology or trade on labour markets focuses mainly on employment level and wages, much of this report also focuses on those two important dimensions. It is important to bear in mind, however, that more labour market data tend to be available for developed countries than for developing economies, and that where data are available for developing countries, the time-periods covered may be shorter and detailed breakdowns by age, gender and economic sector may not be available.<sup>1</sup>

One common measure developed to track the evolution of the total amount of labour employed across the economy is the total number of hours worked. As highlighted in Figure B.1, over the past 20 years the overall number of hours worked has, on average, increased in both developed and developing countries. The growth rate of total hours worked has been, however, much higher in low-income and lower-middle-income countries, such as Bangladesh, Cambodia, Costa Rica and Malaysia. Conversely, since the trough of the Great Recession, which was triggered by the 2007/08 financial crisis, total hours worked seem to have grown at a slower pace in high-income countries.

**Figure B.1: Evolution of the total number of work hours (1993 to 2014)**



Source: Penn World Table 9.0., Feenstra et al. (2015).

From a pure accounting perspective, the total number of hours in a given country is determined by four main factors besides the size and growth rate of the population:

- (1) the proportion of the working-age population willing to work, defined as the labour force market participation;
- (2) the share of the working-age population actually employed, defined as the employment-to-population ratio;

(3) the share of the working-age population willing and able to work but unemployed, defined as the unemployment rate; and

(4) the average number of hours worked.

These four indicators, as well as real wages are discussed in greater detail below. See Box B.1 for a list of definitions of terms related to labour market.

### Box B.1: Labour market definitions

A **job** or **occupation** is a group of specific **tasks** to be undertaken by an individual on a paid basis.

Different typologies of tasks have been developed in the literature. Based on their performance goals, tasks can be grouped in four main categories: generating, choosing, negotiating and executing (McGrath, 1984).

In establishing such bundles of tasks, the employer also generally specifies the **skills, qualifications and expertise** an individual is required to possess in order to perform the tasks satisfactorily and do the job. In practice, different types of occupations are often technically interdependent. Some tasks generate tangible or intangible outputs that are inputs for other tasks. As a result, the relationship between occupations and tasks can evolve over time. While an occupation can disappear in a given organization, the tasks of this former occupation can still be performed by the incumbent of another occupation.

The **labour force** consists of all the persons in a country who are in work or are unemployed seeking work. People who are not employed and who are not looking for work are not counted in the labour force, often referred to as working age population.

The **labour force participation rate** is the percentage of the labour force that is either employed or unemployed but is actively seeking work.

The **employment-to-population ratio** is the percentage of the working-age population with work (as dependent, self-employed or entrepreneurs).

The **unemployment rate** is the percentage of workers in the labour force that are unemployed. A worker is considered to be **unemployed** when she/he is not employed but would be willing and able to work at jobs she/he believes to be currently attainable (Jacobsen and Skillman, 2004). A worker is considered to be **involuntarily unemployed** if she/he is looking for work but does not find any.

A worker's **reservation wage** is the wage below which she/he will not work.

The **full employment** (or natural) rate of unemployment can be and has been defined in different ways (see Ehrenberg and Smith, 2012). It can be defined as the rate at which:

- job vacancies equal the number of unemployed workers;
- any increases in overall demand will cause no further reductions in unemployment;
- all unemployment is voluntary (frictional and perhaps seasonal, as explained in Section B.3); or
- the level of unemployment is unchanging and both the flows into unemployment and the duration of unemployment are normal.

**Informal employment** encompasses all remunerative work – both self-employment and wage employment – that is not recognized, regulated or protected by existing legal or regulatory frameworks and non-remunerative work undertaken in an income-producing enterprise (ILO, 2002).

(a) The labour force participation rate has remained constant in many high- and low-income countries in recent years

As explained above, only a part of the population, which is typically defined as the proportion of individuals aged 15 and older that is economically active, is willing and able to work.<sup>2</sup> Out of the working-age population, the labour force encompasses individuals who work, as well as those who are unemployed but seeking work, and first-time job-seekers. According to estimates by the International Labour Organization (ILO), the overall labour force participation rate has, on average, decreased in middle-income economies but has remained relatively constant in high- and low-income economies over the past two decades, as highlighted in the upper panel of Figure B.2.

These broad trends mask, however, large differences across economies, including between economies in the same region or with a similar level of economic development. As shown in the lower panel of Figure B.2, countries in South Asia, East Asia and the Pacific experienced the largest reduction in the labour force participation rate between 1990 and 2016. For instance, China's participation fell from 77 per cent to 71 per cent while India's rate dropped from 59 per cent to 53 per cent. Conversely, the labour force participation rate has, on average, remained relatively constant or increased slightly in many countries in the Middle East, North Africa, and Sub-Saharan Africa. Countries in Latin America, such as Colombia and Peru, have experienced, on average, the highest relative increase in the labour force participation rate.

The labour force participation rate has also evolved differently across developed countries. While labour force participation has generally remained stable or has slightly increased in many European countries, such as France, Italy and the United Kingdom, other major developed economies saw their participation rates decline even before the Great Recession. Both Japan and the United States have recorded falling participation and employment rates, since 1997 in the case of Japan and since 2000 in the case of the United States, with the pace of decline accelerating after the global financial crisis.

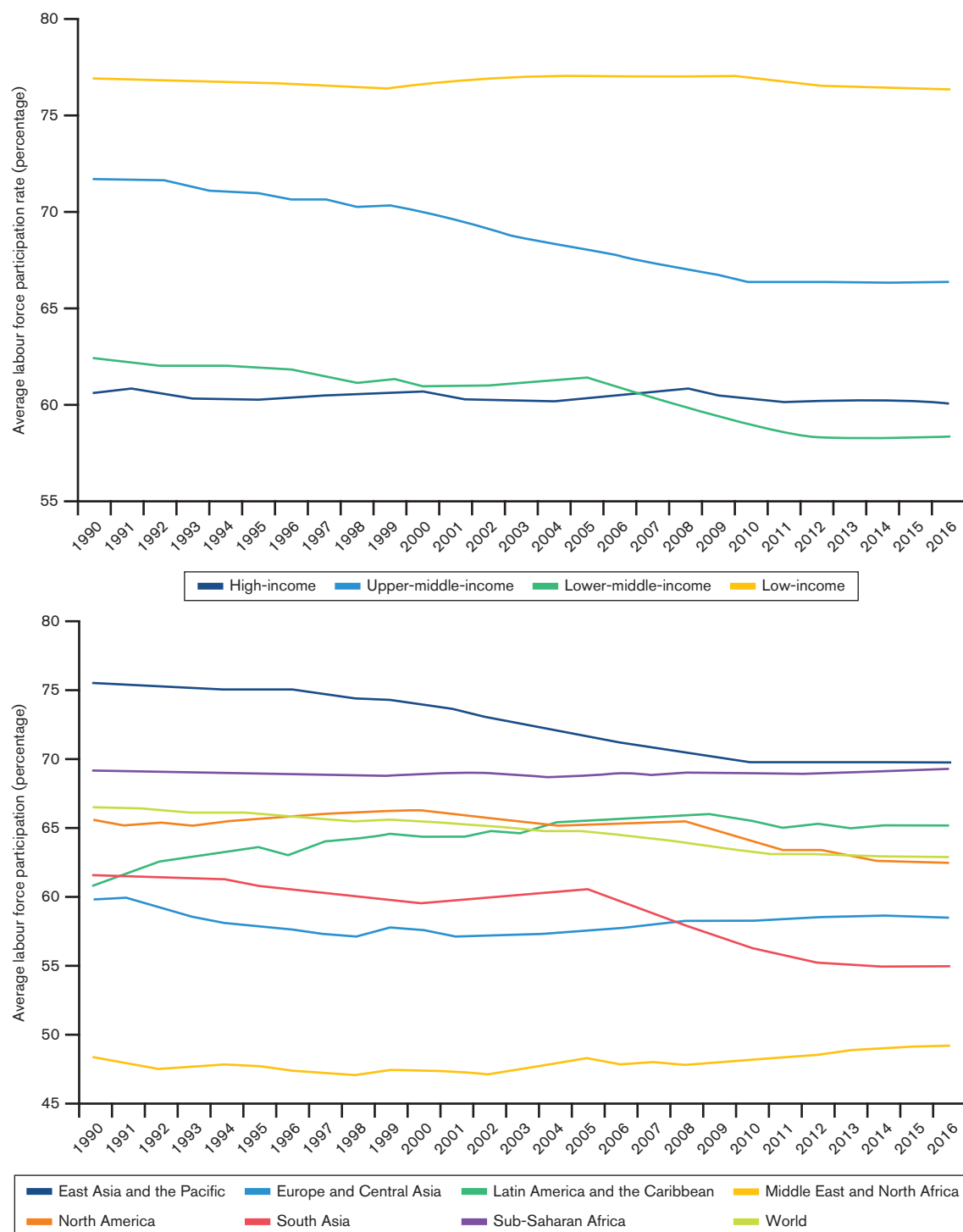
Part of these different trends in labour force participation is associated with changes in the output growth in response to business cycle fluctuations. While prior to the Great Recession of 2009 the correlation between gross domestic product (GDP) growth and the labour force participation rate was weak, that relationship has strengthened significantly ever since (see Appendix Figure B.1). In particular, GDP growth has tended to be associated with an

increase in the labour force participation rate since the end of the financial crisis in 2010.

Besides business-cycle fluctuations, changes in population growth can also explain part of the different evolution of the labour force participation rate in and across countries. Population growth, in particular of people aged 15 and over, represents an important component of the evolution of the workforce, defined in economics as the labour supply. Economies are facing important changes in the size and composition of their populations as a result of the so-called "demographic transition" – a process characterized by a reduction in mortality rates, followed by a decline in fertility rates. Among the four stages of the demographic transition, the second stage, characterized by a reduction in fertility and an increase in the working-age population, as younger people reach adulthood, can, through a growing labour force and increased savings, potentially boost economic growth and expand labour markets, generating a so-called "demographic dividend".<sup>3</sup> Many developing and least-developed economies are still in the early stages of their demographic transition with an increasing younger population, while other developing economies and most developed economies have already reached more advanced demographic stages (WTO, 2013).<sup>4</sup> One of the most important consequences of the demographic transition is the shift in the age distribution of the population at the later stages of the transition, which can ultimately lead to a reduction in the labour force as a share of the population.

An increase in the prime working-age population, typically defined as the population aged 25–54, tends to be positively associated with an increase in the labour market participation rate for countries experiencing early and late demographic dividends, such as Argentina, El Salvador, Ghana, Malaysia and Pakistan (see Appendix Figure B.2).<sup>5</sup> Conversely, the relationship between population growth and labour market participation tends to be much weaker for countries with a low population growth rate, such as Angola, Belarus, Canada, Cuba, France, Japan, Senegal and the United States. There are, however, noticeable differences among economies, highlighting the different demographic dynamics each country is experiencing.

Labour force participation rates are also driven by two opposite trends: the relative decline in the labour force participation among the young (most often defined as 15–24 years old) and the relative increase in the labour force participation among older individuals (54–64 years old) (see Appendix Figure B.3). Labour force participation among the young has

**Figure B.2: Evolution of labour force participation rate by income group and region (1990 to 2016)**

Source: ILO, ILOSTAT database (July 2017).

fallen significantly in both developed and developing economies, such as China, Ecuador, Germany, Jamaica, Rwanda, Tanzania and Thailand. In fact, the share of young people in the total working-age population reached its peak between the 1970s and 1980s in most regions, with the exception of

many Sub-Saharan countries, which peaked in the early 2000s. In comparison with countries for which the labour force participation among the young has decreased, the rise in the participation among the young in a limited number of countries, such as Mali, the Netherlands, Nigeria, Oman, Uganda and



Uzbekistan, is relatively more limited. The rise in labour force participation among older individuals is also much more modest in low- and middle-income economies than in developed economies.

The uneven evolution of the labour force participation rate across regions and countries also reflects the expansion of secondary and tertiary education, which tends to delay the entry into the job market of younger individuals and keep part of the adult individuals pursuing higher education out of the labour market for a longer period.<sup>6</sup> The relationship varies, however, even among countries within the same level of economic development (see Appendix Figure B.4). While most high-income economies, such as Canada, the Republic of Korea and the United States, tend to have relatively high tertiary school enrolment rates and a low labour force participation rate, several developing countries, such as Belarus, Cuba, Kazakhstan, the Russian Federation, Ukraine and the Bolivarian Republic of Venezuela, are in relatively similar positions. Although access to secondary and tertiary education levels has also improved in a number of developing and least-developed countries, the tertiary enrolment rate remains relatively low compared to high-income countries. Access barriers to higher education due to income and location often persist in many countries. Individuals with limited financial means must often work in parallel, which can hinder their participation, retention and academic success in secondary and tertiary education (UNESCO, 2015).

Part of the uneven evolution of the labour force participation rate across regions and countries can also be explained by two other opposite labour market trends, namely the relative increase in female participation in the labour force and the relative decrease in male participation in the labour force. Overall, the ratio of female to male labour force participation has slightly decreased in middle-income economies, but has increased in high- and low-income economies in the past two decades (see Appendix Figure B.5).

Female participation rates have risen across many economies, but more so in some than in others. Economies such as Chile, Colombia, Peru and Spain have experienced some of the sharpest increases in women's participation rates. Many other economies, such as Canada, France, Indonesia and the Republic of Korea, have registered a more modest rise in the female participation in the labour force. Several other economies, such as China, India, Japan and Poland, have experienced a relative decline in the labour force participation of women.<sup>7</sup> Despite the fact that female labour force participation has increased in a number of countries, the global labour force participation rate

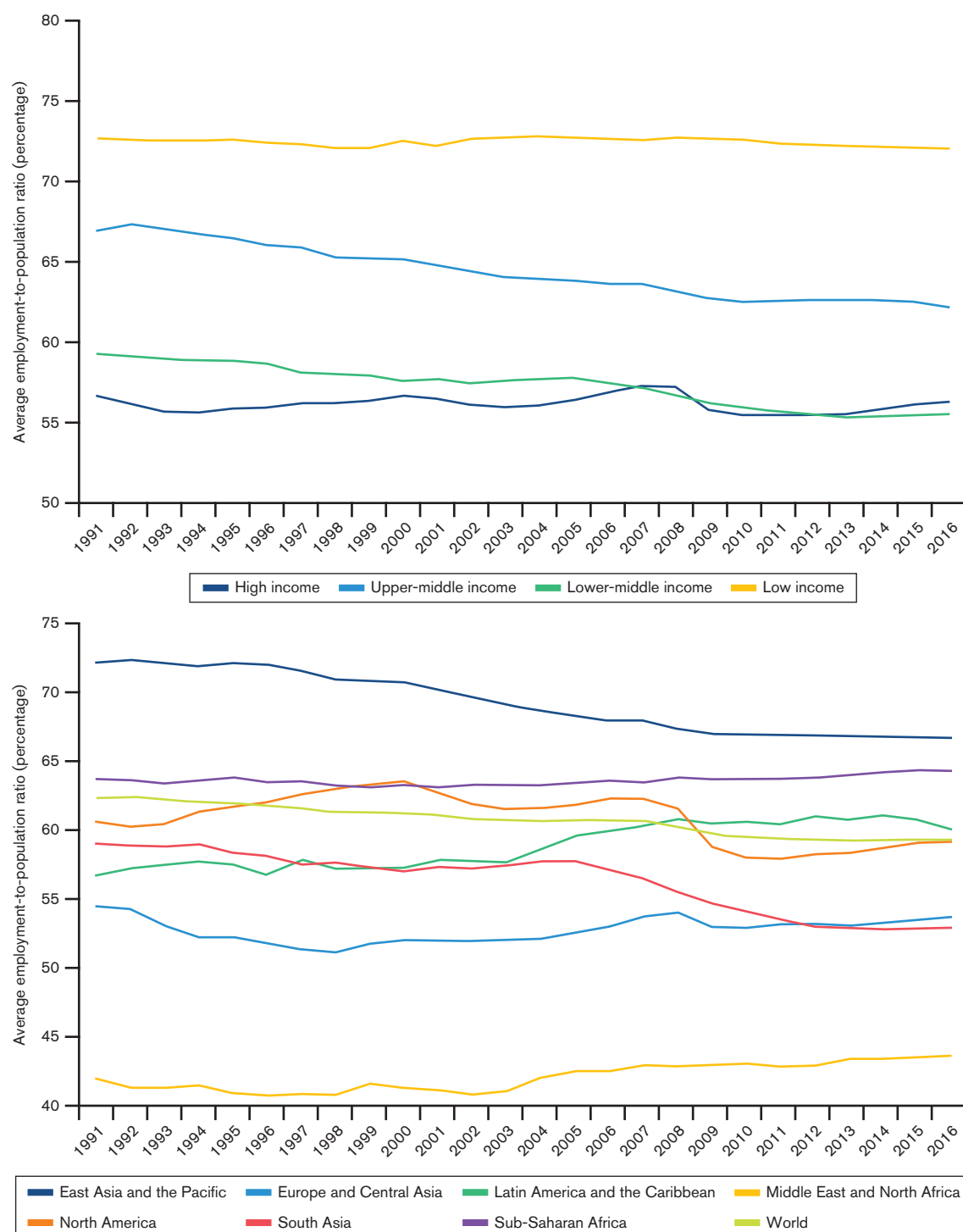
for women (46 per cent) remains lower than the rate for men (72 per cent).

The participation rate for men has decreased across a large number of countries, although the level of decline differs significantly across countries. Most high-income economies, such as Australia, Japan and the United States, have experienced a significant decrease in male labour force participation, and many developing and emerging economies, such as Argentina, Bangladesh, China and India, have also faced a decrease in the male participation rate. However, male participation rates have increased in several other economies, such as Cambodia, Colombia, Ghana, Myanmar and Peru. In a few economies, such as Angola, Qatar and Sweden, the male participation rate has remained relatively constant.

- (b) The employment-to-population ratio has remained constant in many low- and middle-income economies but has increased in high-income economies in recent years

The employment-to-population ratio, defined as the share of a country's working-age population that is actually employed, measures the ability of an economy to provide jobs for individuals who want to work. According to ILO estimates, the overall employment-to-population ratio exhibited a downward trend in middle-income countries up until the Great Recession, after which it became relatively constant (62 per cent and 55 per cent in upper- and lower-middle-income countries, respectively, in 2016). Low-income countries experienced a relatively constant employment-to-population ratio for a longer period time (72 per cent in 2016). Conversely, high-income countries have faced a much more volatile employment-to-population ratio. It dropped sharply during the Great Recession and remained stable for a few years, but has increased in the last three years (56 per cent in 2016). Like the labour force participation rate, the levelling and decline in the employment-to-population ratio tends to be more marked in middle-income economies than in developed economies, as shown in the lower panel of Figure B.3.

There are, however, sizeable disparities among developing and least-developed countries, as documented in the lower panel of Figure B.3. Economies in Asia and the Pacific have experienced the largest reduction in the employment-to-population ratio, from 72 per cent in South Asia and 59 per cent in East Asia and the Pacific in 1991 to 66 per cent and 52 per cent in 2016, respectively. Conversely,

**Figure B.3: Evolution of employment-to-population ratio by income group and region (1991 to 2016)**

Source: ILO, ILOSTAT database (July 2017).

most countries in the Middle East, North Africa, Sub-Saharan Africa, and Latin America and the Caribbean went through a relatively small increase in the ratio. Similarly, many developed countries, such as Canada, Germany and the United Kingdom, have registered a relative increase in the ratio. Other high-income countries, such as Japan and the United States, have

faced a declining employment-to-population ratio for more than 15 years, which tended to accelerate after the Great Recession.

Besides cyclical economic fluctuations, part of these different trends in the employment-population ratio reflects labour market differences between age groups



and gender. In particular, the youth employment-to-population ratio has exhibited a downward trend across many countries over the last two decades (ILO, 2015a). The level of the youth employment-to-population ratio is lower in North Africa and the Middle East (20 per cent in 2016) in particular, as well as in Southern Asia (33 per cent) and in Central and Southeastern Europe (34 per cent). As discussed in Section B.2, the declining trend of youth employment-to-population is closely associated with increasing trends in educational enrolment. The employment-to-population ratio also remains significantly lower for women (47 per cent in 2016) than for men (72 per cent). The gender employment gap is more marked in North Africa and the Middle East, in particular, as well as in Southern Asia, where the female employment-to-population ratio is more than three times lower than that for men (ILO, 2016d).

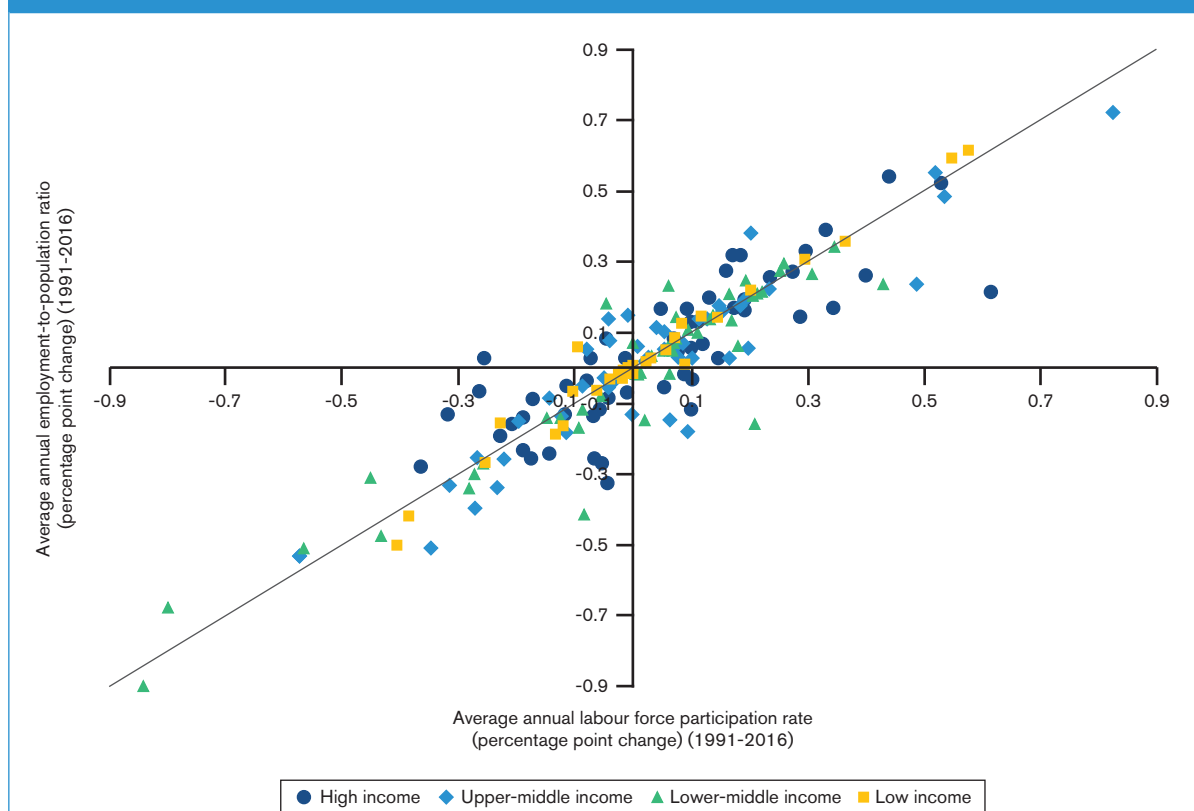
Overall, and as highlighted in Figure B.4, the employment-to-population ratio tends to be, on average, closely correlated with the labour force participation rate. This strong positive relationship between the labour force participation rate and the employment-to-population ratio is to be expected

and reflects, at least partially, the negative impact job losses and unemployment may have on labour force participation rate.

(c) The unemployment rate does not exhibit any long-term trends

The unemployment rate, defined as the fraction of the labour force that is unemployed, is the most widely used measure of labour market slack, i.e. unused labour resources.<sup>8</sup> According to ILO estimates, there were 38.6 and 159.1 million unemployed workers in developed and developing countries, respectively, in 2016. The geographical distribution of the number of unemployed workers differs significantly across regions. East Asia accounts for the largest number of unemployed workers, with 41.6 million jobless individuals, followed by Southern Asia (29.5 million), Sub-Saharan Africa (28 million), Latin America and the Caribbean (25.1 million) and Western Europe (20.2 million). The number of unemployed workers is significantly lower in other regions, such as North Africa and the Middle East (11.8 million), North America (9.4 million) and Central and Western Asia (6.6 million).

**Figure B.4: Changes in labour force participation and employment-to-population ratio (1991 to 2016)**

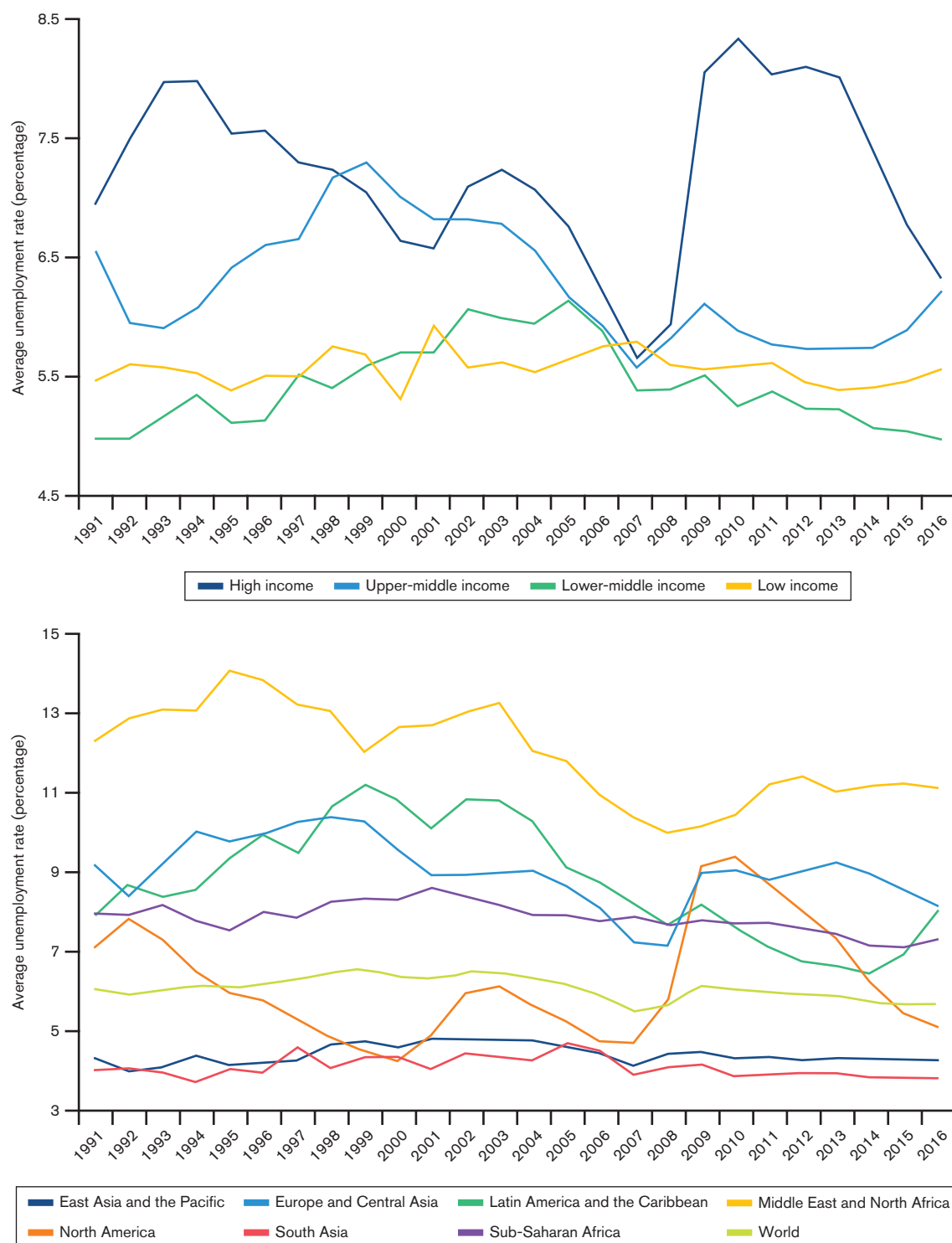


Source: ILO, ILOSTAT database (July 2017).

As highlighted in the upper panel of Figure B.5, the overall unemployment rate does not seem to present any specific long-term trends. It often tends to follow a cyclical pattern characterized by alternating periods of low and high unemployment. Part of this pattern reflects business cycle fluctuations. Periods

of unusually high unemployment rates are often associated with severe economic slowdown and recession. Although there are some similar trends (co-movements) in unemployment rates between certain countries, typically in the same region and with a similar level of economic development,

**Figure B.5: Evolution of unemployment rates by income group and region (1991 to 2016)**



Source: ILO, ILOSTAT database (July 2017).

unemployment rate patterns remain highly country-specific, underscoring the diverse and idiosyncratic conditions prevailing in different countries.

Unemployment rose sharply in most developed countries during the Great Recession and declined only gradually thereafter.<sup>9</sup> By 2015, unemployment rates in some developed countries had returned to their pre-crisis levels, such as in Germany (4.6 per cent in 2016), Japan (3.4 per cent) and the United States (4.8 per cent). Conversely, countries of the European Union hit hardest by the Euro-zone crisis continue to experience extremely high jobless rates, including Greece (23 per cent in 2016) and Spain (19.6 per cent), highlighting the persistent nature of unemployment in certain economies. Overall, the global unemployment rate, which currently stands at 5.7 per cent in 2016, has not yet returned to its pre-crisis level of 5.5 per cent in 2007.

While the unemployment rate tends to be lower in developing countries, the relative incidence of joblessness varies greatly across and within regions, as highlighted in the lower panel of Figure B.5. North Africa and the Middle East have consistently had the highest regional unemployment rates. There are however important contrasts between these economies, as some have relatively low unemployment rates, such as the Kingdom of Saudi Arabia (5.5 per cent), and others have much higher rates, such as Egypt (12 per cent in 2016) and Tunisia (14.8 per cent). Other developing countries with a relatively high unemployment rate include Armenia (16.7 per cent), Brazil (11.4 per cent), Saint Lucia (24 per cent), South Africa (25.9 per cent) and the former Yugoslav Republic of Macedonia (26.7 per cent). While, as explained above, countries in Eastern and Southern Asia account for the largest number of unemployed workers, their ranking in terms of the unemployment rate is reversed, and they have some of the lowest unemployment rates in the world, e.g. 3.3 per cent in Malaysia, 3.6 per cent in the Republic of Korea, and 2.2 per cent in Viet Nam.

Even though the Great Recession hit high-income economies harder, it also had an impact on a large number of developing countries, in particular through an increase in their large informal economy, where employment relationship is, in law or in practice, not subject to labour legislation, income taxation, social protection or certain employment benefits (IMF and ILO, 2010). While measuring the size of the informal sector and tracking the trends in informal employment are particularly challenging, available data suggest that informal employment rates tend to decline with economic development but remain highly persistent in most developing countries (Bacchetta et al., 2009). According to ILO estimates, informal employment

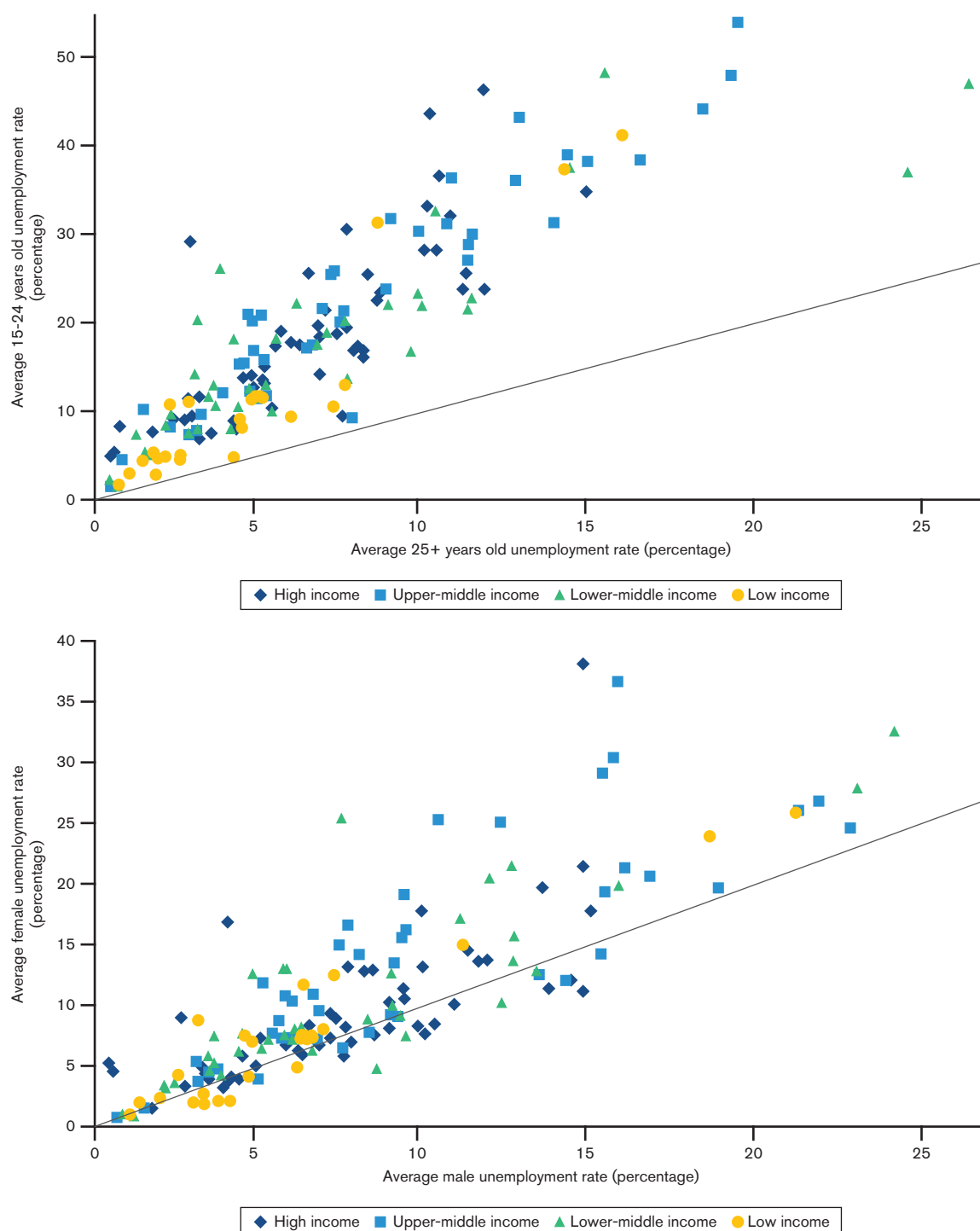
rates differ substantially between and within regions (ILO, 2014a).<sup>10</sup> In Eastern Europe and Central Asia, the informal employment rate ranges from 8 per cent in Serbia and 19 per cent in the Russian Federation to 39 per cent in Armenia and 63 per cent in Albania. Similarly, the informal employment rate varies across Latin American economies, from 25 per cent in Uruguay and 27 per cent in Mexico to 64 per cent in Guatemala and 74 per cent in Peru. Economies in Sub-Saharan Africa and South and Southeast Asia experience particularly high informal employment, such as Cambodia (77 per cent), India (80 per cent), Madagascar (97 per cent), Mali (76 per cent), Nepal (91 per cent) and Zimbabwe (94 per cent).

Like labour force participation rates, unemployment rates tend to differ across population groups, as illustrated in Figure B.6.<sup>11</sup> Historically, young people aged 15 to 24 years old have always been disproportionately more affected by unemployment than their adult counterparts. Unemployment among young people has exhibited an upward trend over the last 25 years; it declined in many countries in the early 2000s but then proceeded to rise again during the Great Recession (ILO, 2016g). According to ILO estimates, unemployment among young people is on average two to three times higher than that of adults, and is up to four or more times higher in some countries in Southeast Asia, Southern Asia and the Middle East. The youth jobs crisis is particularly acute in countries in North Africa and the Middle East (29.7 per cent in 2016), Pacific island small states (26.3 per cent), Caribbean small states (25.7 per cent) and Europe (20.9 per cent).

Traditionally, women's unemployment rates have also been higher than those of men in most countries. Although the unemployment rate gender gap decreased in many countries in the early 2000s, it has remained relatively constant since then. Women's unemployment rates tend to be larger in North Africa and the Middle East (on average 19.6 per cent in 2016) as well as in the Pacific island small states (17.6 per cent) and Caribbean small states (16.3 per cent). They are also relatively high in a number of Sub-Saharan African economies, such as the Gambia, Lesotho, Namibia and Swaziland. During the Great Recession, however, the sharp increase in the men's unemployment rate was such that it became larger than that for women in many economies (ILO, 2016d).

As mentioned above, many countries face persistent unemployment, which is characterized by a growing share of individuals with continuous periods of unemployment lasting a year or more. The situation worsened for many high-income countries during the Great Recession. In cases where the share of long-

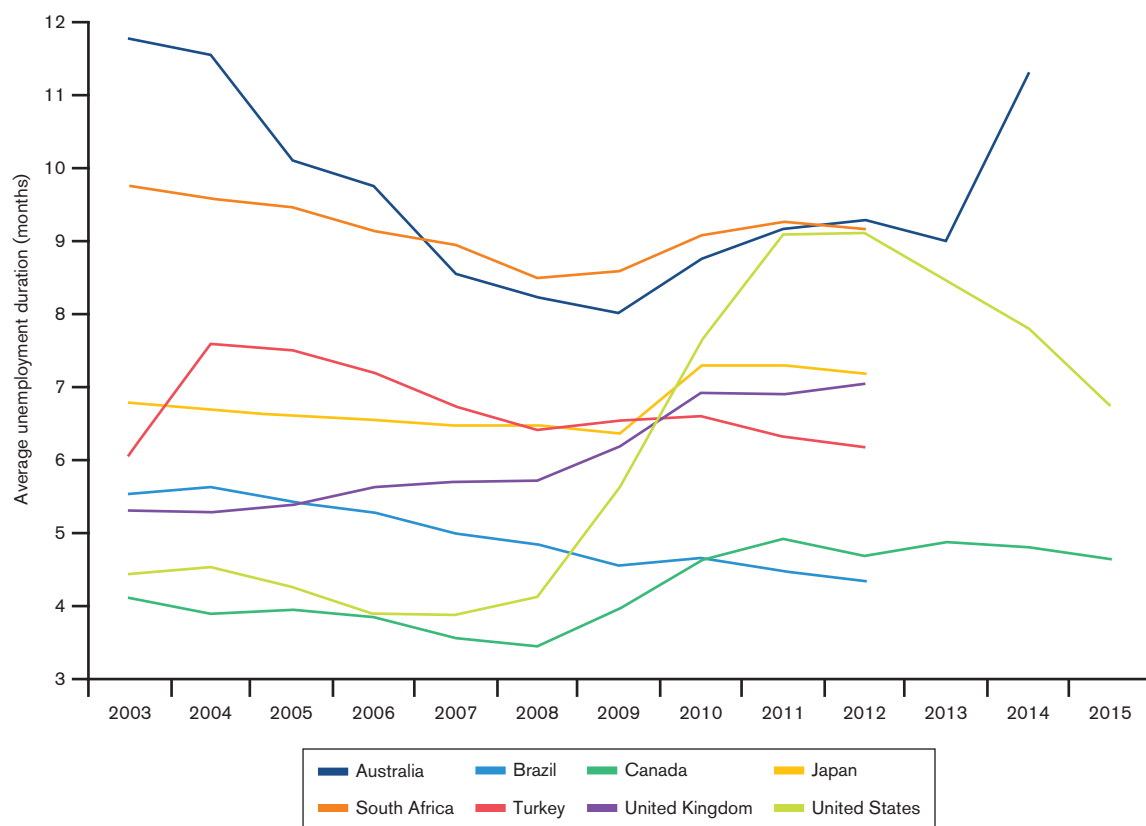
Figure B.6: Unemployment rate by age group and gender (1991 to 2016)



Source: ILO, ILOSTAT database (July 2017).

term unemployed did not increase, such as Germany, France, Italy and Japan, the share had persistently been very high even before the global economic recession (OECD, 2017). This increasing share of long-term unemployment is also associated with an increase in the average unemployment duration

and a reduction in the average probability of being rehired. As highlighted in Figure B.7, the evolution of the unemployment duration among the employed differs greatly from one country to another. In many developed countries, the average unemployment duration increased significantly during the Great

**Figure B.7: Average unemployment duration in selected countries (2003 to 2015)**

Source: ILO (2014a), OECD database (July 2017).

Recession but has not reverted to its pre-crisis level since then. This could increase the potential risk of hysteresis in unemployment, where unemployment remains high even after the causes that lead to its increase have disappeared (IMF and ILO, 2010). Conversely, the unemployment duration tends to be shorter in developing countries given the absence or limited access of unemployment compensation and benefits. Most developing countries have further experienced a steady decline in the average unemployment rate, which was not particularly affected by the Great Recession (ILO, 2014a).

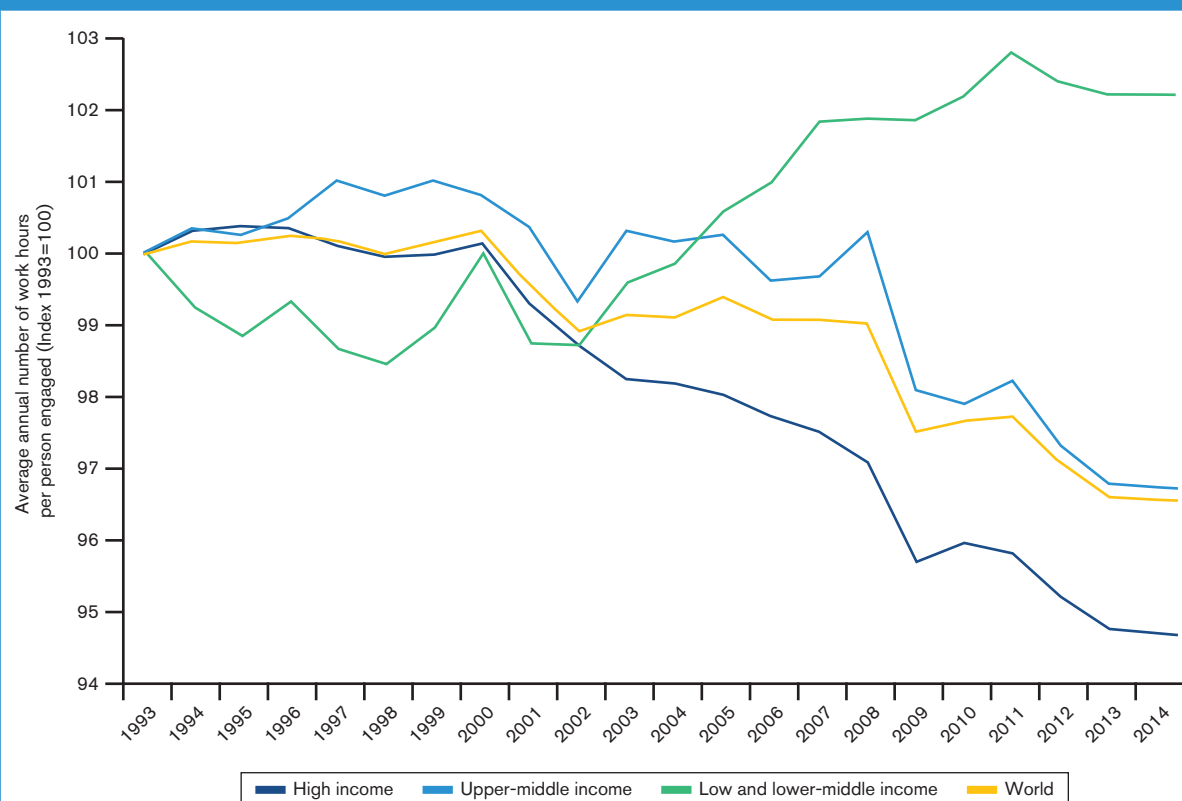
**(d) Average hours worked decreased in higher-income countries but increased in lower-income countries**

The average number of hours worked varies significantly over time and across economies.<sup>12</sup> According to ILO estimates, the average weekly hours actually worked per employed person ranges from less than 35 hours in Australia, Ethiopia, the Netherlands and Uganda to more than 50 hours

in Egypt, Myanmar, Qatar and Nepal. As shown in Figure B.8, the average annual number of hours worked per person engaged has, on average, decreased in high- and upper-middle-income countries but has increased in low- and lower-middle-income countries in the past two decades.

However, these broad trends mask important regional differences and country-specific evolution. In some countries, such as Colombia, Japan and the Republic of Korea, the decline in the average annual worked hours per person employed is relatively steady, while in other countries, such as Pakistan and Peru, the downward trend fluctuates more. Similarly, the upward trend is much more volatile in some countries, such as Sri Lanka and Viet Nam, than in others, such as the Russian Federation. Some other countries, such as Barbados, Malaysia and Singapore, have followed an inverted “U”-shaped pattern, where the average annual worked hours per person employed increased during the 1990s and decreased during the 2000s. The observed large volatility in hours of work reflects in part business cycle fluctuations (Ohanian and Raffo, 2012).

Figure B.8: Evolution of average hours worked (1993 to 2014)



Source: Penn World Table 9.0., Feenstra et al. (2015).

The average annual number of hours worked per person employed dropped significantly during the Great Recession in many economies. In some of these countries, such as Malaysia and Turkey, it has continued to decrease, while it has increased in several other countries, such as Argentina, the Philippines, the United Kingdom and the United States.

Part of the downward trend in average hours worked can be accounted for by changes in employment arrangements, in particular the increased incidence of non-standard jobs, namely temporary contracts, part-time hours and self-employment, in both developed and developing countries (ILO, 2015d). More than half of the jobs created in high-income countries between 1995 and 2013 have been non-standard jobs (OECD, 2015c). Non-standard work represented around one-third of total employment in high-income countries in 2013, shared almost equally between permanent part-time jobs, temporary jobs and self-employment. The use of temporary employment differs, however, greatly across economies, oscillating between less than 5 per cent in Jordan, Norway and Sierra Leone to more than 25 per cent in Mongolia, Peru and Poland in 2010. Casual work, for which there are no guaranteed work hours, is one form of temporary employment that

has gained in importance in developing and emerging countries. For instance, casual employment accounts for almost 33 per cent of all wage employment in Mali and Zimbabwe and 66 per cent in Bangladesh and India (ILO, 2016c).<sup>13</sup> Casual and “on call” work arrangements, such as “zero-hours” contracts with no guaranteed minimum hours, are also increasingly being used in many high-income countries, such as the United Kingdom and the United States.

While part-time employment has been rising across many countries over the past two decades, it is important to distinguish between voluntary and involuntary part-time employment. Voluntary part-time employment refers to individuals who have deliberately decided not to work full-time or who have accepted a part-time job in the absence of full-time job opportunities. Conversely, involuntary part-time work concerns individuals who would rather be working full-time. From a macroeconomic perspective, involuntary part-time employment represents underemployment, which can, beyond a certain level, reduce demand and ultimately impact economic growth and employment negatively.<sup>14</sup> According to ILO estimates, the time-related underemployment rate, defined as the share of employed persons willing and available to increase their



working time but having worked fewer hours than a specified threshold, tends to be higher in low- and middle-income countries, such as Benin (37 per cent in 2010), El Salvador (21 per cent in 2013), Ethiopia (42 per cent in 2012) and Madagascar (49 per cent in 2010), than in high-income countries. There are, however, important variations across countries within the same region and income group.

Like the other labour market outcome variables discussed above, the distribution of hours worked is highly diverse across demographic groups (ILO, 2016c). In particular, the probability of being in temporary or part-time employment is higher for young and/or female workers. While in many economies part-time and temporary employment can serve as a foothold into more stable and better-paid jobs, this seems to be less the case for many high-income countries, where young individuals mainly participate in temporary and part-time job arrangements because of the lack of permanent or full-time job opportunities (OECD, 2015c). Women are also more likely to be underemployed (ILO, 2016d). A substantial part of temporary employment also tends to be informal in many developing countries, although informal employment is often also characterized by longer work shifts (ILO, 2015d). There are also important differences in working hours between sectors and between firms. In many countries, the range of working hours tends to be relatively higher in the services sector compared to manufacturing. Working hours tend to be very high in certain services activities, such as transport, catering and retailing (Lee et al., 2007). According to ILO estimates, 60 per cent of firms in developing and emerging countries did not rely on temporary labour in 2010, while more than 7 per cent used it intensively, with more than half of their workforce on temporary contracts (ILO, 2016c).

#### (e) Real wages have been growing in recent years but at a slower pace

Wages play an important role in determining living standards and the development of individuals. In some situations, wages may be part of the decision to choose a job. In others, jobs may not necessarily be remunerated. Work arrangements can be broadly grouped into (1) wage employment and (2) self-employment and unpaid family work.<sup>15</sup>

Data availability on wages, in particular for low-income economies, is limited. Available empirical evidence suggests that labour earnings, which encompass the wages and earnings of self-employed and other types of non-wage workers, tend to increase with economic development. Similarly, job benefits, such as holiday leave, sick leave, health insurance and

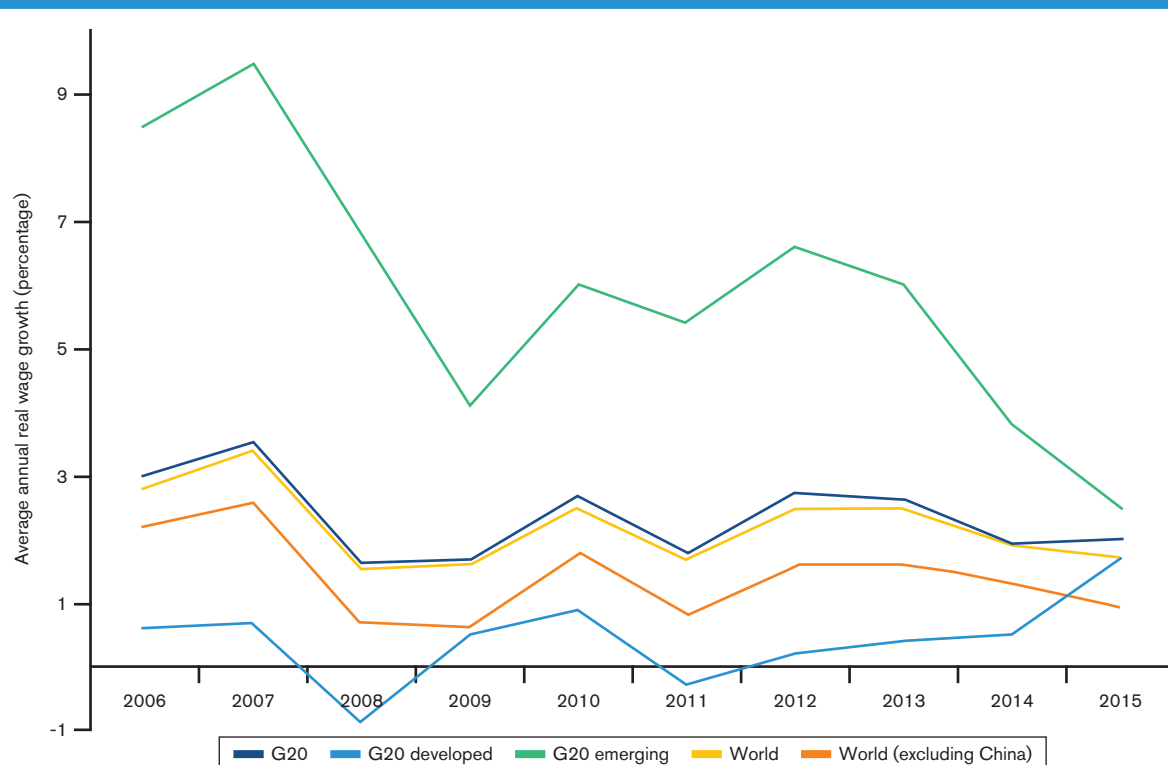
retirement plans, tend to be offered and developed as an economy's economic development increases and reaches a high level. Wages for the same occupation also tend to converge across countries (World Bank, 2013). As highlighted in Figure B.9, once inflation is taken into account, average annual real wage growth has been relatively stagnant in high-income countries, and has been higher but declining in emerging countries during the years from 2006 to 2015 (ILO, 2016b). As with the labour outcome variables discussed above, these general trends hide differences across regions and countries.

While real wage growth has been restrained in some high-income countries, it turned negative in many countries on several occasions during the Great Recession. Indeed, wage growth tends to be weak whenever unemployment is high, which is typically the case during recessions, as discussed above. Since the end of the Great Recession, the average real wage growth has exhibited an upward trend, reaching the highest rate of the past 10 years in 2015 with 1.7 per cent. Faster real wage growth in Australia, France, Germany and the United States accounts for a large part of the upward trend given the decline in real wages experienced by other high-income countries, such as Italy, Japan and the United Kingdom (ILO, 2014b; 2016b).

Similarly, the evolution of average real wage growth in emerging countries, and more generally in the world, has been driven to a large extent by emerging economies in Asia and the Pacific, in particular China and the Republic of Korea. The average real wage growth in emerging economies initially bounced back following its steep decline during the Great Recession but eventually reverted to a downward trend. However, it tends to grow faster in emerging and developing countries in Asia and the Pacific (4 per cent in 2015) and in Central and Western Asia (3.4 per cent) than in most high-income countries in North America (2 per cent) and Northern, Southern and Western Europe (1.5 per cent). Tentative estimates suggest a similar situation in Africa and the Middle East. The annual average real wage growth tends to be more volatile in Eastern Europe and in Latin America and the Caribbean, where it turned negative in 2015 mainly because of decreasing wages in Brazil, the Russian Federation and Ukraine (ILO, 2016b).<sup>16</sup>

In a broader context, real wages are associated with the evolution of the labour-income share, defined as the share of national income paid in wages, including benefits to workers. For a long time the labour-income share was considered stable over time. However, recent empirical evidence pointed to a long-term

Figure B.9: Annual average real wage growth (2006 to 2015)



Source: ILO (2016b).

Note: The G20 developed group includes Australia, Canada, the European Union, France, Germany, Italy, Japan, United Kingdom and the United States. The G20 emerging group includes Argentina, Brazil, China, India, Indonesia, the Republic of Korea, Mexico, the Russian Federation, the Kingdom of Saudi Arabia, South Africa and Turkey. The second global estimate, "World (excluding China)", omits China because its large population of wage employees weighs significantly on the global estimates ("World").

downward trend in the labour-income share (with the consequent increase in the capital income share) in a large number of developed, but also developing, countries, such as Argentina, Canada, China, Indonesia, South Africa, Turkey and the United States (ILO, 2011b; ILO-OECD, 2015; World Bank, 2016; IMF, 2017).<sup>17</sup>

The evolution of the labour-income share remains highly country-specific, even among countries with a declining labour-income share. Several developed and developing countries, such as Brazil, Malaysia, New Zealand, the Philippines and the United Kingdom have experienced an increase in the labour-income share in the last 25 years, while it has remained relatively constant in a few other countries, such as Hungary, Mexico and Morocco (IMF, 2017).

Besides business fluctuations and price inflation, part of the evolution of real wages is linked to the growing share of non-standard employment, such as part-time and temporary employment, which is often associated with lower wages (ILO, 2016c). Real wages tend also to differ across different population groups. Women

tend to earn less than men even after controlling for differences in individual and job characteristics (ILO, 2017; Verick, 2014). Empirical evidence from a large number of different countries suggests that this gender wage gap between men and women with similar characteristics ranges from 4 per cent in Tunisia and 6 per cent in Bosnia and Herzegovina to 38 per cent in United Kingdom and 52 per cent in Congo (Nopo et al., 2011).

Informal employment tends also to be less remunerative than formal employment (Normand et al., 2016; Dasgupta et al., 2015). The level of wages depends also on the type of firms active in the country with larger firms tending to pay higher wages (WTO, 2016; World Bank, 2013). As discussed in detail in the next subsection, part of the evolution of wages also reflects changes in the skill composition within employment, with a higher premium generally paid for more skilled occupations.

As explained above, besides wage employment, individuals can be engaged in self-employment and unpaid family work. Yet, these workers are more

likely than wage earners not to have formal work arrangements, not to be covered by social protection, to receive lower earnings and to face less predictable income streams (ILO, 2015d; Bianco, 2017). In many developing and least-developed countries, self-employment and unpaid family work continue to be important forms of employment.<sup>18</sup> According to ILO estimates, wage and salaried employment accounted for 57 per cent of global employment in 2016, while self-employed and contributing unpaid family workers represented almost 47 per cent and 79 per cent of total employment in emerging and developing countries, respectively (ILO, 2016f).

Although the share of self-employment and unpaid contributing family employment has declined in many countries over the years, its downward trend seems to have slowed down in several regions since the late 2000s.<sup>19</sup> The share remains particularly high in Southern Asia (75 per cent in 2016) and Sub-Saharan Africa (68 per cent). The incidence of self-employment and unpaid family work tends also to be higher among women and young people (ILO, 2016g; 2017).

## 2. Structural changes in the labour market

As documented above, labour markets are complex and multifaceted systems shaped by demographic, economic, social and institutional factors. Two important transformations in the sectoral and occupational structure of employment have occurred in a large number of economies over the past two decades.

First, developed countries and an increasing number of developing countries have experienced a sustained shift of employment from agriculture and manufacturing toward services.

Second, the labour markets of many developed countries and several developing countries have been polarized with the relative decline in the number of middle-skill/middle-pay jobs compared to the relative increase in the number of low-skill/low-pay and high-skill/high-pay jobs.

These important structural changes, which have changed and continue to change the labour market, may be relatively disruptive for workers, who face a higher risk of job loss and of having to switch to a job in a different type of occupation or sector (see Box B.2). This subsection discusses both phenomena, which have received increasing attention in the literature and in the political arena.

### (a) Employment has shifted from agriculture and industry toward services in many countries

The role of the agricultural, industry and services sectors in terms of job number has changed significantly in most countries over the past few decades. While the employment shares of agriculture and manufacturing in total employment have declined or stagnated in an increasing number of developed and developing countries, the services employment share has steadily increased in most countries.

#### (i) *Agricultural employment growth and share have declined and slowed down in many countries*

The agricultural sector, which encompasses activities in agriculture, hunting, forestry and fishing, was the world's largest provider of jobs up until the early 2000s (FAO, 2015). Since then, the number of jobs in agriculture has been decreasing in most countries. In parallel, the share of agricultural employment in total employment has fallen steadily in both developed and developing countries over the last 50 years, as highlighted in Figure B.10. According to ILO estimates, the world share of agricultural employment in total employment decreased from 39.6 per cent in 2000 to 29.1 per cent in 2016.

While the share of agricultural employment in total employment is very low in developed countries (on average 3.1 per cent in 2016) and relatively low in an increasing number of developing countries in Latin America and the Caribbean (15.6 per cent) and Pacific island small states (16.2 per cent), it remains relatively high in many economies in Africa, in particular Sub-Saharan Africa (55.7 per cent), and in Southern Asia (44.2 per cent). The employment share is particularly high in certain low-income economies, such as Burkina Faso (80.1 per cent in 2016), Burundi (91.3 per cent), Lao People's Democratic Republic (79 per cent) and Papua New Guinea (68.4 per cent). The agricultural sector often represents an important source of informal employment in many developing countries (Walther, 2011).<sup>20</sup> In addition, as explained in the previous subsection, self-employment and unpaid family work are the most important forms of employment in many developing and least developed countries, where many agricultural workers are engaged in small subsistence farming. Women tend also to be over-represented in the agricultural sector in many economies in Southern Asia, and to a lesser extent in North Africa and the Middle East, Sub-Saharan Africa, and Central, Western and Eastern Asia (ILO, 2017).

**Box B.2: Workers transition between economic activities**

In the presence of important structural changes in the labour market, along with technological change and globalization progress, a common perception is that workers may have to transition between economic activities more frequently. However, recent empirical research based on longitudinal household data, tracking individuals over a long period of time, suggests that this does not seem to have been the case for several high- and middle-income countries for at least the past decade (Muendler, 2017).

In fact, the share of cross-sector transitions has gradually declined in economies that offer historic longitudinal household data, as shown in Table B.1. In particular, the frequency of cross-sector moves has gradually declined, from 15 per cent to 9 per cent in the United States between 1977 and 2013, from 12 per cent to 5 per cent in the United Kingdom between 1995 and 2013, and from 8 per cent to 6 per cent in the Republic of Korea between 2007 and 2013. The analysis of cross-industry transitions reaches the same conclusion. The Russian Federation is the only economy for which data are available that has faced a different experience, both in terms of the level of transition frequency and of changes over time, with an increase in the frequency of cross-sector moves from 64 per cent to 75 per cent between 2008 and 2013 (not reported in Table B.1).

**Table B.1: Shares of four-year transitions of workers across sectors (1977 to 2013)**

	Australia	Germany	Republic of Korea	Russian Federation	Switzerland	United Kingdom	United States
1977	-	-	-	-	-	-	15.3%
1983	-	-	-	-	-	-	11.7%
1989	-	13.4%	-	-	-	-	11.6%
1995	-	14.5%	-	-	-	11.8%	11.5%
2001	-	10.8%	-	-	-	10.7%	12.1%
2007	11.6%	10.1%	7.6%	-	9.1%	8.9%	10.1%
2013	8.8%	10.2%	6.4%	74.6%	6.8%	4.5%	9.3%

Source: Muendler (2017)

Note: Share of four-year transitions of workers among three consistently defined sectors: (1) agriculture, energy and mining, (2) manufacturing and (3) services. Entries show the share of household members, with wage employment in the reported year and the four years prior, who are currently employed in one sector but were employed in another sector four years prior.

The recent decline in the frequency of workers' cross-industry and cross-sector moves could raise concerns that, in the wake of the Great Recession, workers may have transitioned into unemployment or out of the labour force altogether, rather than transitioning between economic activities. Yet the broad-based decline in transition frequencies occurs both in economies that were less affected by the Great Recession, such as Germany and Switzerland, and those that were strongly affected, such as the United Kingdom and the United States. One potential explanation for the common perception that workers transition between economic activities more frequently today than in the past may have to do with the specific transition experiences of the manufacturing sector, where technical change can be disruptive and globalization can occur quickly. The speed of gross worker outflows from manufacturing, among workers who continue in the workforce, seems to be steady in most economies, as shown in Table B.2. Some economies, such as Australia or the Russian Federation, have experienced fast gross worker moves out of manufacturing, while others, such as Germany or Switzerland, have undergone more gradual transitions out of manufacturing. Yet other economies, such as the United Kingdom and the United States, saw a slowdown in gross worker moves out of manufacturing. However, given the decline of manufacturing employment in total employment across these economies, net worker flows must be directed away from the manufacturing sector.

As workers continue in or move between sectors, their earnings change. If transitions out of a sector are driven by a pull from stronger labour demand in other sectors, moves are likely to be associated with wage gains. In contrast, if workers move out of a sector because of a push from weakening labour demand in their initial employment sector, the sector changes are expected to be accompanied by wage losses. Workers who stay in the manufacturing sector over a four-year period, either retaining their jobs or moving to different manufacturing jobs, command real wage increases in all reported periods, except for continuous manufacturing workers in the United Kingdom in 2013, as reported in Table B.3. Conversely, experiences with real wage changes for workers who moved to the primary or services sectors are much more diverse over time and across countries. Workers who transitioned to non-manufacturing sectors in the United States

suffered slower real-wage changes or outright real wage declines, while workers who switched out of manufacturing employment in Australia or, more recently, in the Republic of Korea, Switzerland and the United Kingdom experienced faster real wage gains than those who remained in the manufacturing sector.

**Table B.2: Shares of four-year continuations and transitions of workers across sectors from manufacturing (1989 to 2013)**

		Australia	Germany	Republic of Korea	Russian Federation	Switzerland	United Kingdom	United States
1989	Primary	-	0.6%	-	-	-	-	1.7%
	Manufacturing	-	78.7%	-	-	-	-	77.5%
	Services	-	20.7%	-	-	-	-	20.8%
1995	Primary	-	1.3%	-	-	-	1.2%	1.7%
	Manufacturing	-	72.1%	-	-	-	69.3%	72.5%
	Services	-	26.6%	-	-	-	29.6%	25.7%
2001	Primary	-	1.0%	-	-	-	0.7%	1.1%
	Manufacturing	-	77.4%	-	-	-	67.9%	69.4%
	Services	-	21.7%	-	-	-	31.4%	29.5%
2007	Primary	5.2%	0.6%	1.0%	-	0.6%	2.4%	1.2%
	Manufacturing	61.2%	78.2%	81.7%	-	76.5%	70.5%	68.8%
	Services	33.6%	21.1%	17.3%	-	22.9%	27.1%	30.1%
2013	Primary	4.0%	2.6%	0.7%	3.3%	1.1%	0.9%	1.8%
	Manufacturing	63.0%	75.7%	86.2%	55.0%	80.1%	81.8%	75.7%
	Services	33.1%	21.7%	13.0%	41.7%	18.8%	17.3%	22.5%

Source: Muendler (2017)

Note: Share of continuations or transitions to the primary, manufacturing or services sectors for workers who were in manufacturing employment four years prior. Entries show the share of household members, with wage employment in the reported year and four years prior, who were employed in the manufacturing sector four years prior.

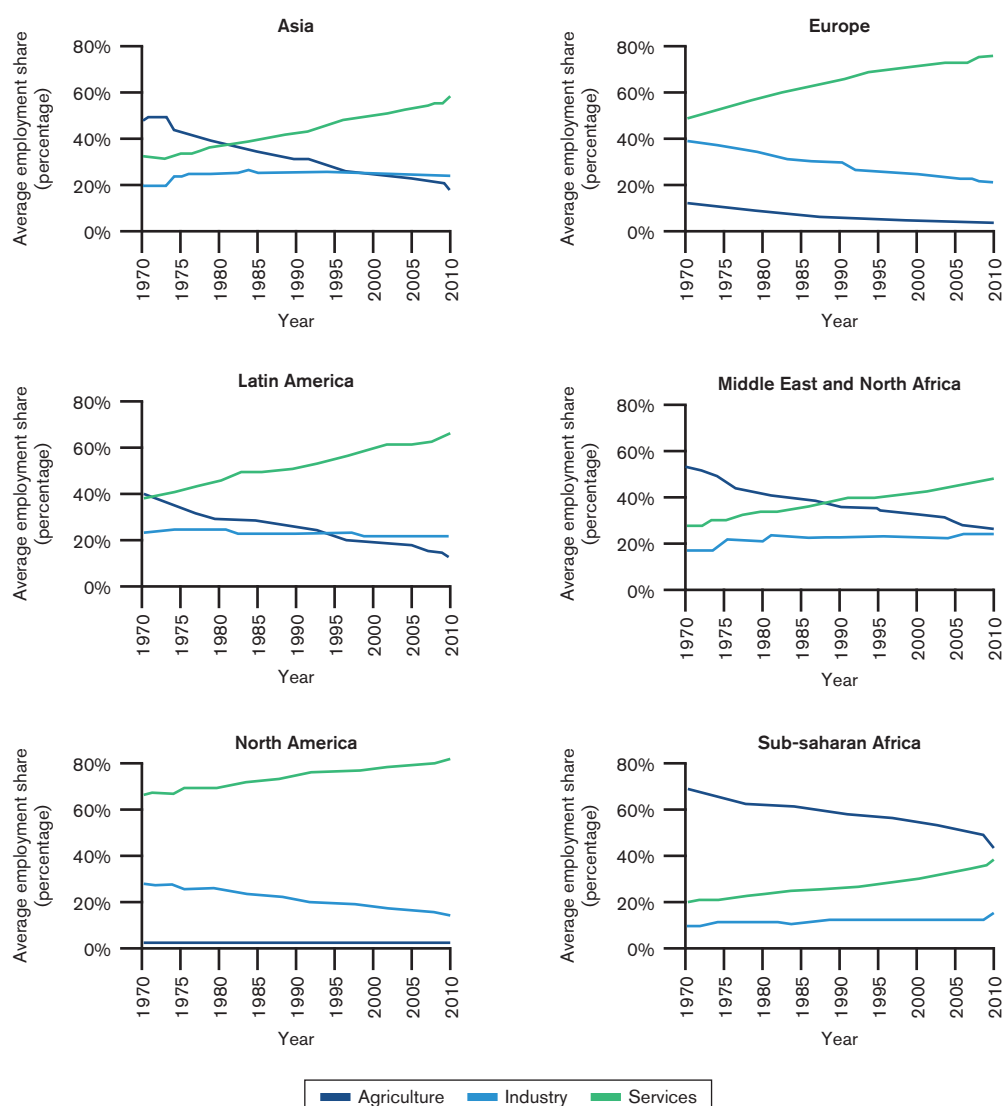
**Table B.3: Annual real wage differences of four-year continuations and transitions of workers across sectors from manufacturing (1989 to 2013)**

		Australia	Germany	Republic of Korea	Switzerland	United Kingdom	United States
1989	Primary	-	0.31	-	-	-	0.47
	Manufacturing	-	0.20	-	-	-	0.11
	Services	-	0.18	-	-	-	-0.04
1995	Primary	-	0.38	-	-	-0.59	-0.03
	Manufacturing	-	0.10	-	-	0.16	0.07
	Services	-	0.09	-	-	0.07	-0.09
2001	Primary	-	0.15	-	-	0.35	0.10
	Manufacturing	-	0.15	-	-	0.18	0.19
	Services	-	0.21	-	-	0.07	0.08
2007	Primary	0.41	0.20	-1.11	-0.29	-0.11	0.36
	Manufacturing	0.16	0.03	0.17	0.06	0.07	0.07
	Services	0.25	-0.03	0.15	-0.18	-0.13	-0.10
2013	Primary	0.25	0.06	0.14	0.62	0.02	-0.37
	Manufacturing	0.13	0.11	0.10	0.10	-0.01	0.00
	Services	0.16	0.00	0.15	0.15	0.01	-0.14

Source: Muendler (2017).

Note: Four-year difference of annual gross wages, expressed in local currency real terms, with continuations or transitions to the primary, manufacturing or services sectors conditional on their manufacturing employment four years prior. Entries show the mean differences of the logarithm of gross annual wages, after deflating wages with the country-specific consumer price index (base year 2014) for longitudinally trackable household members, with wage employment in the reported year and four years prior, who were employed in the manufacturing sector four years prior.

Figure B.10: Employment share by sector (1970 to 2011)



Source: Timmer, de Vries and de Vries (2015).

Note: This figure covers 40 economies: 10 developed and 30 developing. The agriculture sector consists of activities in agriculture, hunting, forestry and fishing. The industry sector consists of mining and quarrying, manufacturing, construction and public utilities (electricity, gas, and water). The data range from 1970 to 2011, except for North America (1970 to 2010) because of data availability.

(ii) *The manufacturing employment share has declined or stagnated in many economies*

The industrial sector, which encompasses mining and quarrying, manufacturing, construction, and public utilities, has played an important role in the economic development of many developed and developing countries by attracting agricultural workers towards industrial activities with higher wages. In particular, the emergence and development of the manufacturing sector has enabled many low-income countries to develop and become middle- and high-income countries. Even though the global number of

manufacturing jobs has increased relatively steadily in the past 25 years, manufacturing employment growth has been slowing down since the end of the Great Recession.

While manufacturing remains an important sector in many countries in terms of output and innovation, the world share of manufacturing employment in total employment decreased from 14.4 per cent in 1991 to 11.5 per cent in 2014.<sup>21</sup> The decline in the manufacturing employment share has been occurring in high-income countries for several decades but accelerated in the past two decades. For instance, the manufacturing employment share



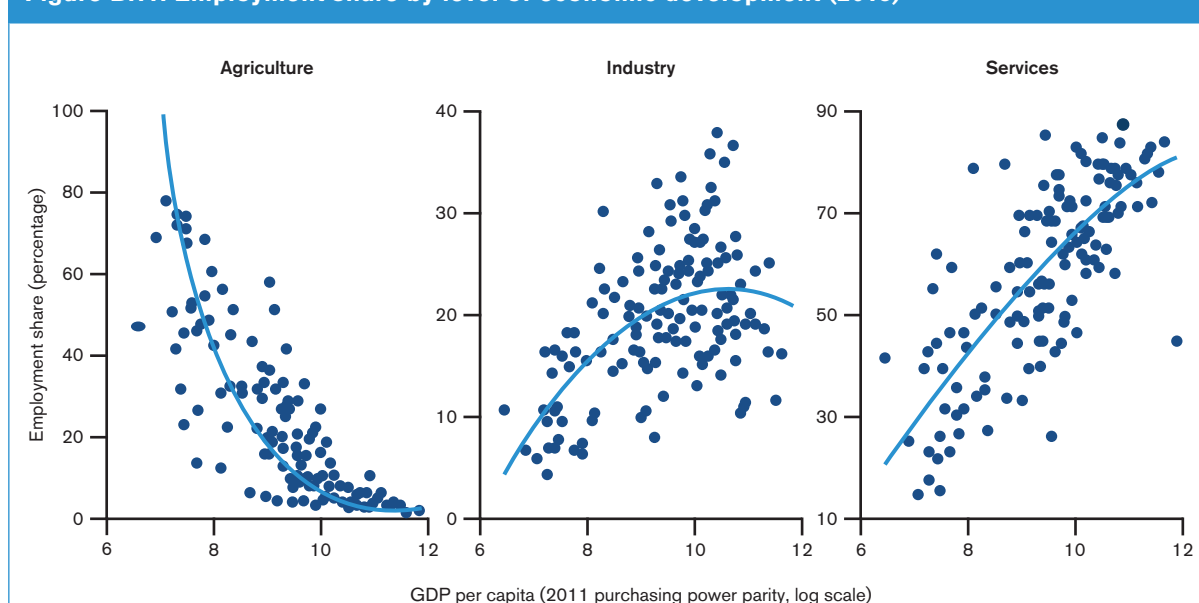
fell from 30.6 per cent and 17.7 per cent in Germany and the United States in 1991 to 19.4 per cent and 9.8 per cent in 2014, respectively. In some countries, such as the United Kingdom and the United States, the manufacturing employment share actually slowed down significantly after the Great Recession. The downward trend of the manufacturing employment share has been less pronounced in other high-income countries, such as Japan (from 24.3 per cent in 1991 to 17 per cent in 2014) and Switzerland (from 17.1 per cent to 13.5 per cent) (UNIDO, 2015). However, the decline in employment differs significantly within the manufacturing sector. Some industries have experienced a larger decline in the employment share, such as textiles and footwear, wood, pulp and paper, while the employment share has increased in a couple of other industries, such as transport equipment and food products (OECD, 2017). While these structural changes may be relatively disruptive for workers, who face the risk of job losses and having to switch jobs, the decline in manufacturing employment has generally not translated into a falling manufacturing output (see Box B.2). It has, for instance, remained stable in Japan and increased in Germany and the United States.

The decline in the manufacturing employment share in total employment is not limited to high-income countries. Several emerging economies have also

experienced a decrease in manufacturing jobs. For instance, the manufacturing employment share fell from 26.7 per cent in 1991 to 16.4 per cent in 2014 in the Republic of Korea. Other emerging economies exhibit a more stable trend, such as Brazil (12.9 per cent in 1991 and 2014) and Mexico (16.1 per cent in 1991 and 15.7 per cent in 2014). Conversely, a few emerging economies, such as China and India, have experienced a relative increase in the manufacturing employment share (Lardy, 2015; UNIDO, 2015). Similarly, the manufacturing employment share has expanded in several low-income economies, such as Botswana and South Africa.

As illustrated in Figure B.11, the share of industry employment in total employment tends to increase with economic development but ultimately decreases beyond a certain intermediate *per capita* income. A similar pattern applies to the manufacturing sector. Several recent studies have documented that late-industrializing developing countries tend to experience a decline in the manufacturing employment share at lower levels of economic development than early-industrializing countries (Rodrik, 2016; ILO, 2015c). In addition, the peaks in manufacturing employment share in late-industrializing countries tend to be lower than those in early-industrializing countries (with a 30 per cent manufacturing employment share on average).

**Figure B.11: Employment share by level of economic development (2015)**



Source: World Development Indicators (July 2017).

Note: The agriculture sector consists of activities in agriculture, hunting, forestry and fishing. The industry sector consists of mining and quarrying, manufacturing, construction and public utilities (electricity, gas, and water). Data on employment shares cover 2015 or the latest available year.

Another phenomenon that has received increasing attention in the literature is the decline in the share of female employment in the manufacturing sector as industrial production upgrades and becomes more capital-intensive from 50 per cent in 1991 to 38 per cent in 2014 (Greenstein and Anderson, 2017; UNIDO, 2015).

### (iii) *Services employment growth and share have increased in many countries*

The deindustrialization process highlighted above is associated in many countries with the growing share of services employment in total employment. The services sector encompasses a broad range of activities ranging from professional services, healthcare and banking to retail and wholesale trade, tourism and transport. According to ILO estimates, the services sector has been the world's largest provider of jobs since the early 2000s. The global number of services jobs increased steadily by an average of 3 per cent annually between 2000 and 2016. Services accounted for more than half of total global employment growth in 2016. In parallel, the world share of services employment in total employment increased from 40.9 per cent in 2000 to 49.4 per cent in 2016.<sup>22</sup>

Although the share of services in total employment has increased in all regions of the world, this broad upward trend masks important differences between income groups and regions. As shown in Figure B.11, the services employment share tends to be significantly larger in high-income and upper-middle-income economies, ranging respectively from 42.4 per cent and 43.9 per cent in China and Thailand to 78.5 per cent and 82.7 per cent in the United States and Macao, China in 2015. The employment share of services tends also to be relatively larger in economies in Latin America and the Caribbean and relatively smaller in North Africa and the Middle East. Conversely, the services employment share remains particularly low in several low-income economies, in particular in Sub-Saharan Africa and Southern Asia, such as Burkina Faso and Nepal, with a 14.9 per cent and 16.2 per cent share, respectively.

As discussed in Section D, part of the growth in the number of services jobs, in particular in business and transport services, is related to the emergence and development of global value chains (ILO, 2015d; Kizu et al., 2016). An increasing number of services jobs is also created to support manufacturing production or sales, a phenomenon referred to as the “servicification of manufacturing”. The incidence of temporary employment tends to be higher in services than in manufacturing in most developing regions,

except North Africa, the Middle East and Southern Asia (ILO, 2015b).

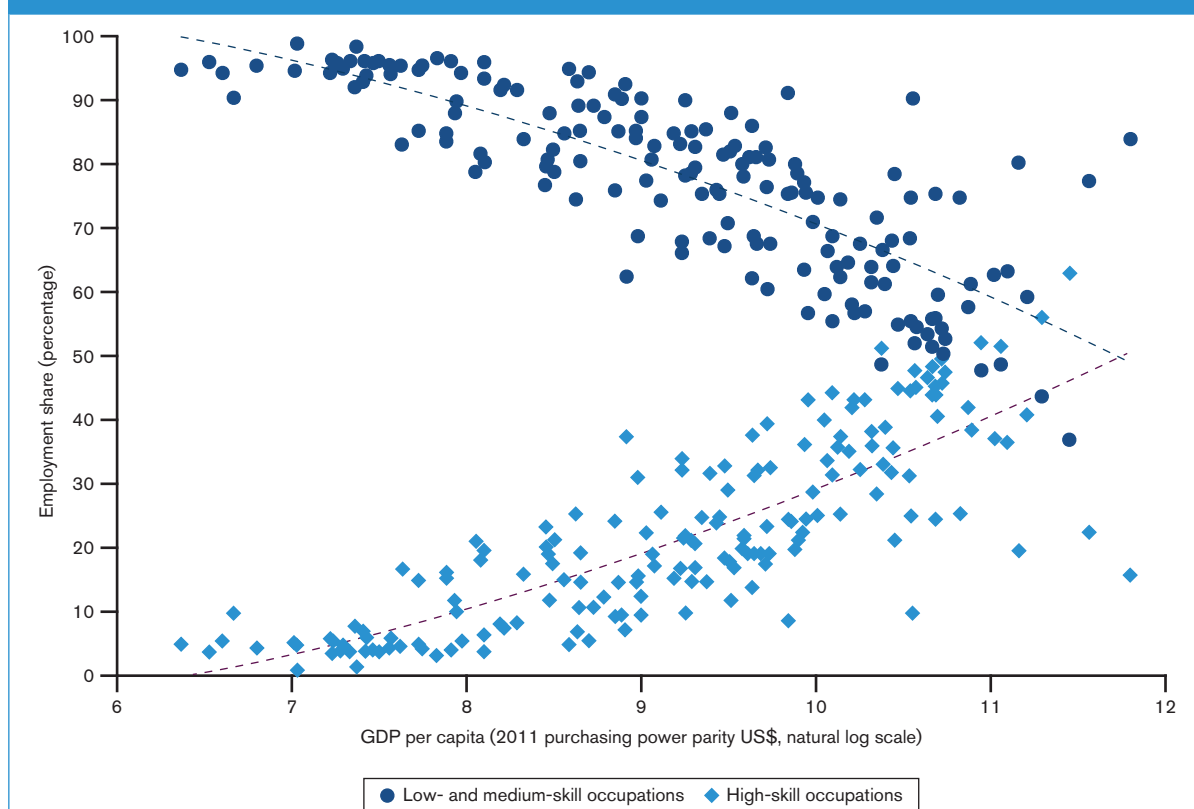
Unlike the manufacturing sector, where women tend to be underrepresented in some countries, the share of women in services tends to be higher, and in many cases is growing faster, than that of men in both developed and emerging economies (ILO, 2017). The services sector is the largest provider of jobs for women in many regions, including, in 2016, in North America (92 per cent), Europe (85 per cent), Southern Africa (81 per cent) and Latin America and the Caribbean (79 per cent). Similarly, unlike the agricultural sector, in which most of the working poor in developing countries are employed, 7 per cent of the individuals employed in services were in extreme poverty in developing countries in 2012 (ILO, 2016e).

### (b) *The demand for high skills has increased in many countries*

While most countries have been experiencing substantial changes in their sectoral structure of employment, important changes in terms of skill requirements at the occupation level have also been occurring in many countries. Skills refer to job-relevant knowledge, expertise and personal attributes, as well as specific competencies required to perform a job's specific tasks. Each job and related tasks require a specific combination of skills. A distinction is often made between manual, cognitive and social skills to perform, respectively, physical, mental and personal interactive tasks (World Bank, 2013).<sup>23</sup> These skills requirements differ across occupations, sectors and geographical locations, as well as between and within firms (ILO-WTO, 2017).

Different approaches are used in the literature to measure skills. A large strand of the economic literature generally classifies skills into two (or three) categories based on occupation or level of qualification: low-, (middle-) and high-skilled workers.<sup>24</sup> A related classification is often made between production, or “blue-collar”, workers and non-production, or “white-collar”, workers. As highlighted in Figure B.12, the share of low- and high-skilled workers in employment evolves with economic development. A high level of economic development tends to be associated with a higher share of high-skilled workers in total employment. Conversely, the share of low- and medium-skilled workers is relatively larger in low- and middle-income countries. However, even for a given level of economic development, the skill structure of employment can vary significantly between countries, highlighting the important role of country-specific factors.

Figure B.12: Employment share by skill levels (2015)



Source: ILO, ILOSTAT database (July 2017), World Development Indicators (July 2017).

Note: Employment share across skill levels based on aggregating categories from the International Standard Classification of Occupation (ISCO): low- and medium-skill levels include elementary occupations (e.g. cleaners and helpers, agricultural labourers, food preparation assistants and street sales workers), clerical, services and sales workers, skilled agricultural and trade workers, plant and machine operators and assemblers. The high-skill level includes managers, professionals and technicians. Data cover 2015 or latest available year.

The share of workers in high-skill occupations in total employment is particularly large in high-income countries, such as Israel (52 per cent in 2016), Luxembourg (63 per cent), Singapore (56 per cent) and Switzerland (52 per cent). It is also relatively large in several upper-middle-income countries, such as Cuba (43 per cent in 2016) and the Russian Federation (44 per cent). In contrast, the share of high-skill occupations is significantly lower in low- and lower-middle-income countries, ranging from 1 per cent and 4 per cent in Guinea and Papua New Guinea to 22 per cent and 34 per cent in Bangladesh and Egypt in 2016.

As discussed in the previous section, the changes in the labour market over the past two decades partly reflect the expansion of secondary and tertiary education. While there are different ways to acquire and develop skills, including through vocational training and on-the-job learning, primary and secondary education are often the foundations necessary to further skills development throughout life (ILO-WTO, 2017).<sup>25</sup> Higher levels of educational attainment can

therefore ultimately lead to a more skilled workforce. Education coverage, measured by the literacy rate, varies widely across countries. Developed countries tend to have much better educated workforces than developing countries. Although education coverage has improved significantly over the last two decades, it remains relatively low in many developing and least-developed countries (UNESCO, 2015). Overall, the increasing education coverage, albeit uneven, points towards a relative increase in the demand for skilled labour over time.

The relatively low education coverage in developing economies, in particular in low-income countries, is often associated with important skills mismatches, defined as imbalances between skills offered and skills needed in the world of work (ILO-WTO, 2017). As discussed hereafter in Section C.3(b), there are different types of mismatches. An increasing number of countries experience underskill mismatches, in which workers fill positions for which they do not have the required education and training (Hays, 2016; Sakamoto, 2017). According to ILO estimates,

the share of underskilled workers in total employment in the Southeast Asian region ranges from 22 per cent in Viet Nam in 2015 and 24 per cent in the Philippines in 2013 to 51 per cent in India in 2012 and 67 per cent in Timor-Leste in 2015. Although much lower, the incidence of overskill mismatches, in which workers are overqualified for the jobs they undertake, has been increasing in recent years in many developing economies. The share of overskilled workers in Southeast Asia ranges from 3 per cent in Timor-Leste in 2015 and 8 per cent in Cambodia in 2013 to 21 per cent in Viet Nam in 2015 and 32 per cent in the Philippines in 2013 (Sakamoto, 2017).

Part of the diverse skill structures across economies also reflects differences between sectors and demographic groups. The share of low-skill workers tends to be larger in agriculture, fisheries, mining, construction and transportation, as well as in food services and preparation, retail sales and customer services, and personal and home care helpers (OECD, 2008).<sup>26</sup> Similarly, women tend to be highly represented in certain low- and medium-skill occupations, such as certain elementary occupations (in restaurants, hotels, agriculture and fisheries) and as clerical supports.<sup>27</sup> However, women in high-income countries are also represented in certain highly paid managerial, professional and technical positions. High-skill occupations have also grown faster for women than for men in emerging economies in recent years (ILO, 2016d).

*(i) Middle-skill and paid jobs have declined in many countries*

According to ILO estimates, the share of middle-skill (routine) jobs in total employment of the global economy has remained relatively stable since at least the 2000s (37 per cent in 2013), while the share of high-skill (non-routine cognitive) jobs has increased, from 15 per cent in 2000 to 18 per cent in 2013, and the share of low-skill (non-routine manual) jobs has decreased from 50 per cent in 2000 to 45 per cent in 2013 (ILO, 2015c). These broad trends mask, however, stark differences between countries.

One phenomenon that has received increasing attention in the literature and political arena is so-called “job polarization”, by which the number of high- and low-skill and paid jobs increases, while the number of middle-skill and paid jobs decreases. As discussed in Sections C and D, the literature has identified a number of factors that could explain the hollowing out of the middle-skilled occupations, including technological progress and international trade and, more generally, globalization.

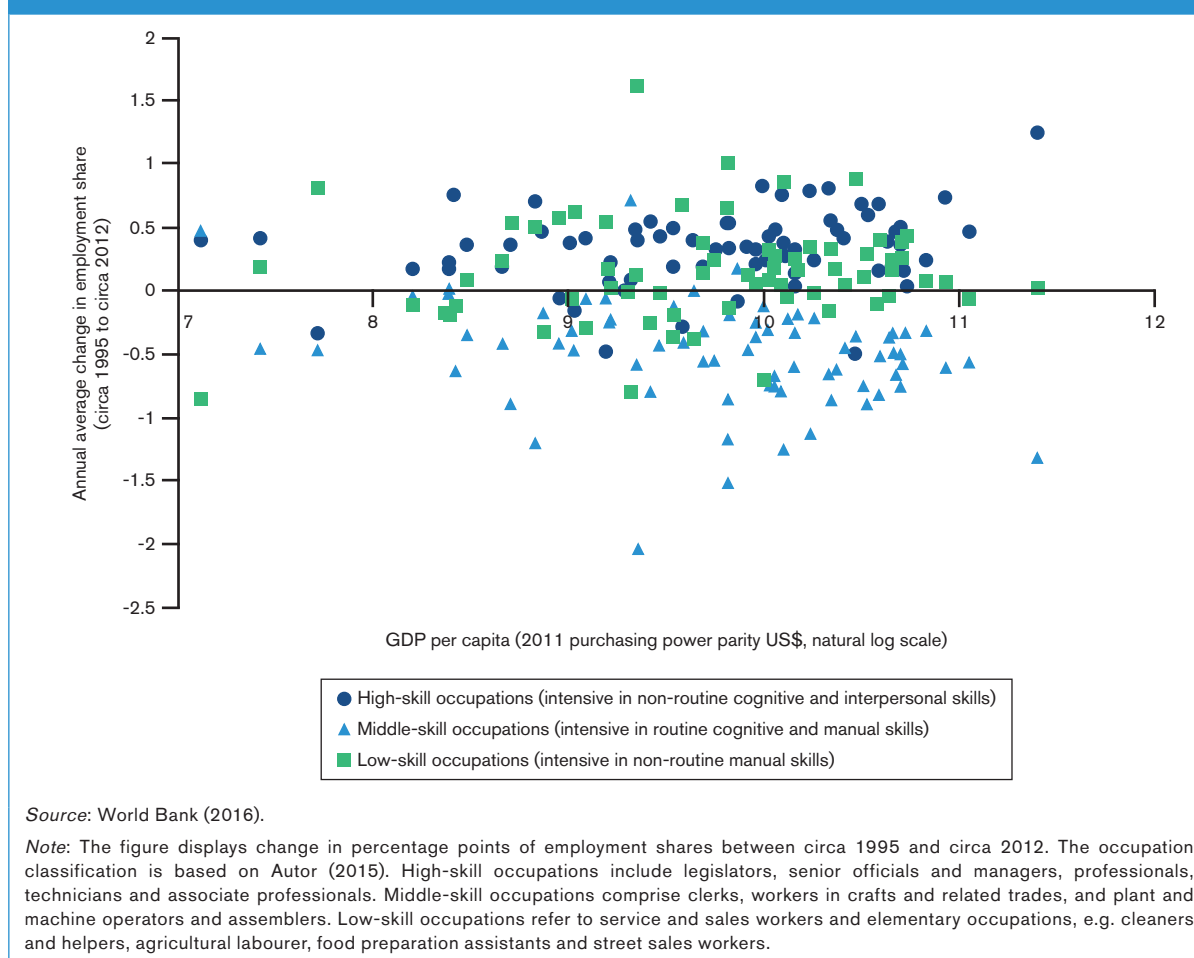
The polarization of employment in many developed countries during the last two or three decades has been widely documented. In particular, Goos and Manning (2007) show that employment shares over the preceding 25 years in the United Kingdom grew at the two extremes of the skills distribution, and fell at the middle of the skills distribution. Several studies have since then confirmed job polarization as a fact common to most developed economies – see Autor et al. (2006) for the United States, Spitz-Oener (2006) and Dustmann et al. (2009) for Germany, and Goos et al. (2009) for most European economies.

The phenomenon of polarization accelerated further in Europe and the United States during the Great Recession (Jaimovich and Siu, 2014; Verdugo and Allègre, 2017). Recent empirical evidence further shows that job polarization is widespread across most industries in high-income countries (OECD, 2017). In addition, the decline in the share of middle-skill occupations in total employment has been, on average, totally compensated for by the increase in the share of high-skill occupations in most industries. Industries for which the share of middle-skill occupations has declined, on average, the most include the pulp and paper industry, the chemical industry, transport equipment manufacturing, and finance, insurance, real estate and business services. In contrast, the hotel and restaurant industries and wholesale and retail trade have, on average, experienced a shift from middle- and high-skill occupations to low-skill occupations in most developed countries. In the case of the United States, only the labour market of the services sector seems to have become polarized (Cerina et al., 2017). Overall, job polarization experienced by most high-income countries tends to reflect the reallocation of employment from middle-skill to low- and high-skill occupations inside individual industries and, to a lesser extent, the reallocation of skill employment between industries (OECD, 2017).

As highlighted in Figure B.13, several developing countries have also experienced job polarization over the past two decades (World Bank, 2016). The decline in the share of middle-skill occupations in total employment has been relatively larger in Panama and the former Yugoslav Republic of Macedonia than in other developing countries, such as Chile, India, Mauritius, Sri Lanka and Uganda. Job polarization has also been documented for other developing countries, such as Brazil, Liberia, Mexico and Turkey (Maloney and Molina, 2016; de Vries, 2017).<sup>28</sup>

However, job polarization is not widespread across all developing countries, in particular countries with large natural resources endowments and commodity

Figure B.13: Evolution of the skill composition in employment (circa 1995 to circa 2012)



exporters. In several countries, such as El Salvador, Mongolia, Thailand and Ukraine, the declining share of middle-skill occupations has been associated with an increasing share of low-skill occupation and a decreasing share of high-skill occupations. In contrast, several economies, such as Costa Rica, Jamaica, Kazakhstan and the Russian Federation, have seen a drop in the share of low- and middle-skill occupations but an increase in the share of high-skill occupations. Botswana, China and Ethiopia are among the few developing countries that have experienced an increase in the share of middle-skill occupations and a decrease in the share of low-skill occupations. Conversely, the share of low-, middle- and high-skill occupations has remained relatively constant in certain countries, such as Peru (World Bank, 2016).

While, as explained above, job polarization seems to be pervasive across many industries (at least in many high-income countries), recent empirical research suggests that women and men may not necessarily be equally affected by job polarization. This seems to be the case for the labour market in the United States

between 1980 and 2008, where female workers experienced job polarization, while male workers did not (Cerina et al., 2017). More generally, the exposure to job polarization often changes over time, highlighting its dynamic nature.

## (ii) *The evolution of the skill premium varies greatly across countries*

As explained above, skills play a critical role in the labour market, including in relation to wages. Different levels and combinations of skills can imply different wage levels. Although different measures of the return to skills are used in the literature, one common indicator is the skill premium, defined as the ratio or per cent difference between the wages of skilled and unskilled workers.<sup>29</sup> Economists frequently use the rate of return to investment in tertiary education, often measured by the earnings gap between university and high school education, as a measure of the skill premium. Comparable cross-country data on the skill premium are, however, limited, in particular for developing and least-developed countries.

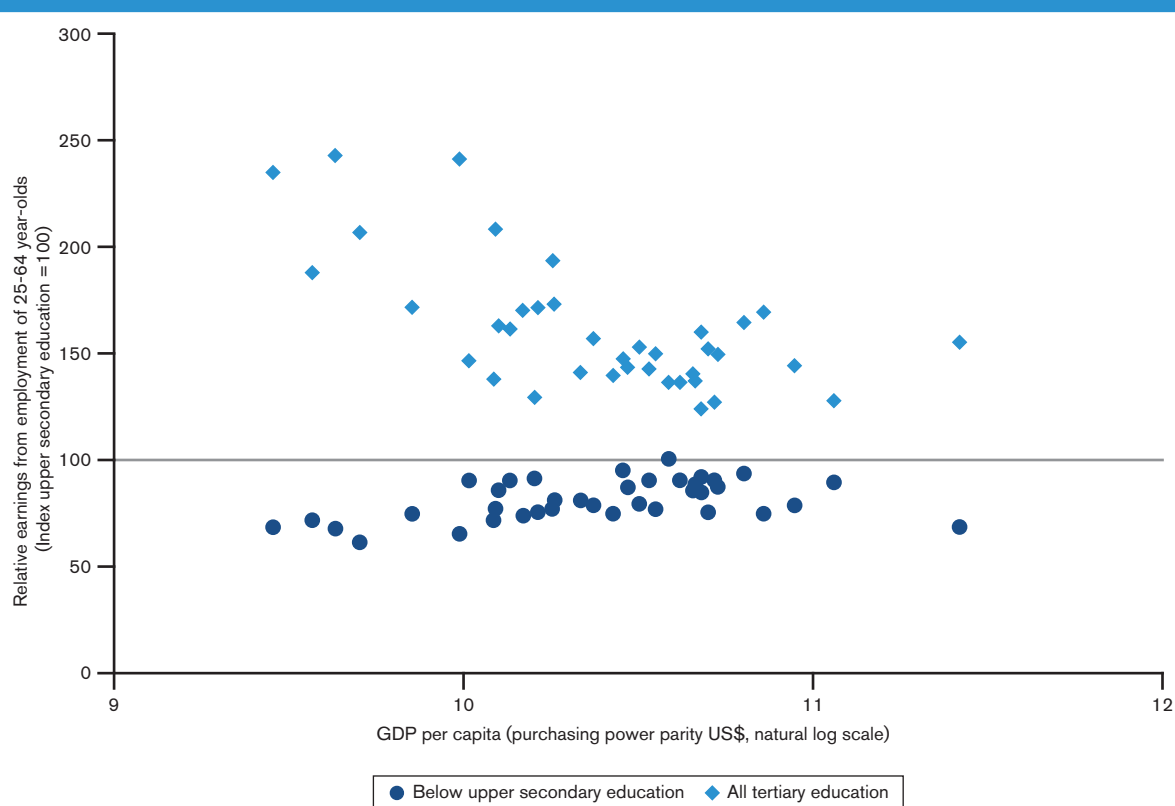
Empirical evidence confirms that high-skilled workers receive relatively larger wages than middle- and low skilled workers. Rates of return to investments in education are the highest for tertiary education across both developed and developing countries (World Bank, 2013). However, these general trends mask noticeable differences across countries. As shown in Figure B.14, the skill premium for tertiary education with respect to upper secondary education tends to be relatively larger in developing countries than in developed countries. For instance, the average skill premium is more than twice as high in Brazil than in high-income countries. Part of these differences between developed and developing countries reflect a lower share of the workforce with tertiary education in developing countries, as discussed previously. In fact, the skill premium tends to be relatively lower in many high-income countries with a relatively large supply of high-skilled workers.

The skill premium varies also across sectors and demographic groups. For instance, women often tend to have a better rate of return to tertiary education than males. Similarly, the rate of return to tertiary

education often tends to be higher in occupations that make more intensive use of information and telecommunication technologies compared to the rest of the economy (World Bank, 2013). Rates of return to investment in education tend also to be higher in (high-income) countries with a relatively high share of well-matched workers, i.e. whose educational attainments correspond to what is required for their jobs (OECD, 2015b).

A large body of empirical work has shown that the skill premium rose, albeit at a different pace, in many industrialized and developing countries in the 1980s and 1990s, such as Argentina, Australia, Brazil, Canada, Chile, Colombia, Germany, Japan, Hong Kong (China), India, Mexico and the United States (Parro, 2013; Pavcnik, 2011).<sup>30</sup> As shown in Figure B.15, some economies, such as China, India and the United States, have continued to experience an increase in the skill premium over the last 15 years. An increasing skill premium has also been documented for other Asian economies, such as Bhutan, Pakistan, the Philippines and Thailand between the mid-1990s and the mid-2000s (ADB, 2012). In some economies, such

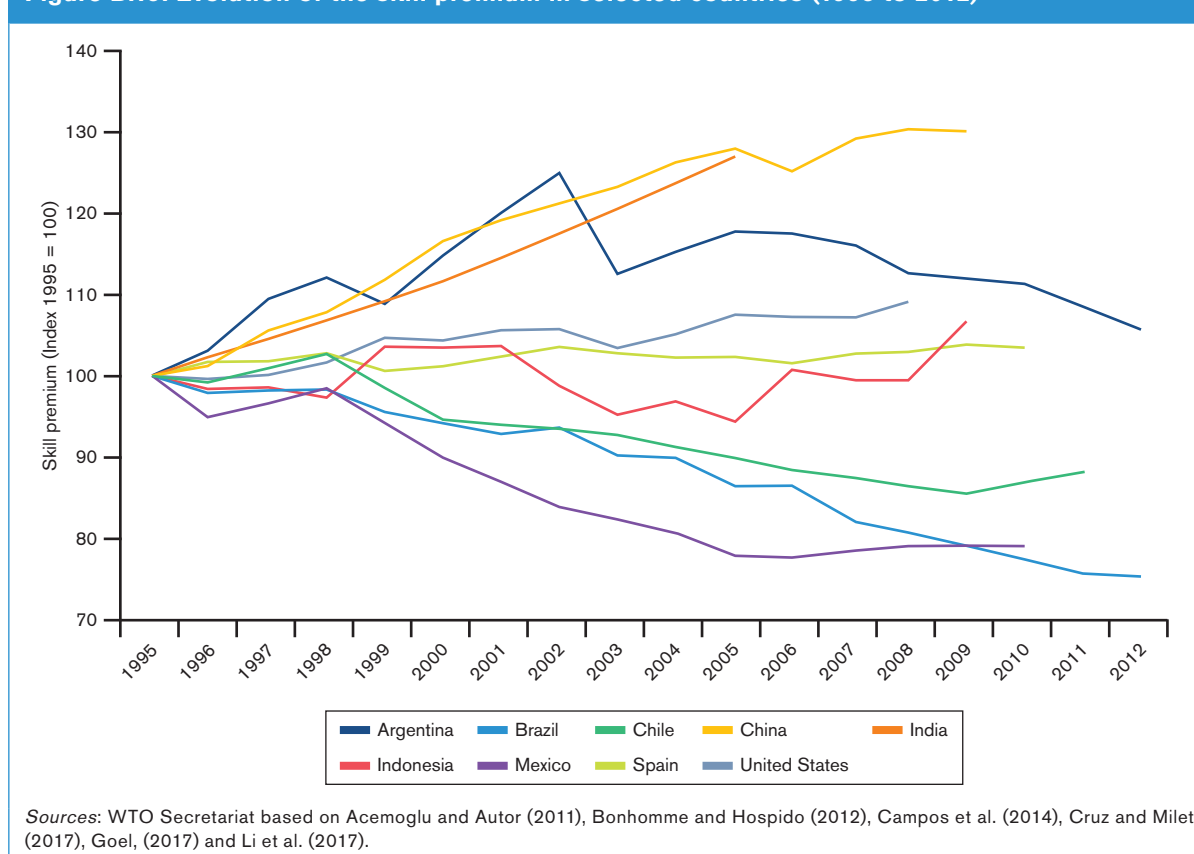
**Figure B.14: Relative earnings of adults working full-time by level of educational attainment (2014)**



Source: OECD (2016a).

Note: Tertiary education includes short-cycle tertiary, bachelor's, master's, doctoral or equivalent degrees. Both indexes of below upper secondary education and tertiary education are expressed in relative terms with respect to upper secondary and post-secondary non-tertiary education. Data cover 2014 or latest available year.



**Figure B.15: Evolution of the skill premium in selected countries (1995 to 2012)**

as China, the increase in the skill premium seems to have slowed down during the mid-2000s.<sup>31</sup>

In contrast, several other developed and developing economies have experienced a reduction in the skill premium over the last 15 years.<sup>32</sup> In some countries, such as Brazil, Chile and Mexico, the decline in the wage premium has been relatively steady. A similar downward trend was documented for Bolivia, Colombia, Ethiopia, and Paraguay in the mid-2000s and early 2010s (Cruz and Milet, 2017). In other countries, such as Argentina, the skill premium exhibited an upward trend during the mid-1990s followed by a downward trend through the 2000s. In the case of Ecuador, the decline in skill premium seems to have slowed at the end of the 2000s and early 2010s. Overall, the varying evolution of the skill premium highlights the important role of country-specific factors.

### 3. Forces driving labour market outcomes

This subsection reviews a number of important insights from labour economics to help explain the main forces that drive labour market outcomes.<sup>33</sup>

It first considers the competitive labour market model. This is the classic benchmark framework. It explains the central relationship between employment and wages in equilibrium, when all agents are satisfied with the employment decisions, given the market-clearing equilibrium wage rate, which equalizes labour supply and demand.

The subsection then discusses the more realistic search and matching labour market models which can explain wage differentials between employers and unemployment in equilibrium, two features of labour markets also discussed in Sections B.1 and B.2. Search and matching models are the modern-day reference frameworks for those more intricate labour market features. Search involves workers searching for jobs and employers posting vacancies and searching for workers. Matching involves employers and workers meeting for interviews. Bargaining involves individual workers or collectives (unionized workers) negotiating over the rent that additional employment creates at the employer (firm or industry). While important “stepping-stone” models, such as union-bargaining models, fair wage models or efficiency wage models, elucidate select features in isolation, the most comprehensive frameworks allow for search, matching and bargaining.

### (a) The competitive model

This subsection discusses the relationship between employment and wages in equilibrium and the effects of various external factors on this equilibrium in the classical competitive labour market model. It discusses the limitations of the model and shows how relaxing some of its basic assumptions can help explain unemployment.

#### (i) *Employment and wages*

Labour demand and labour supply play an important role in determining labour market outcomes, quite independently of whether the market reaches the competitive equilibrium or is impeded by forces that hamper adjustment. In labour markets, the agents that demand labour services are the employers, modelled as industries or firms in economic theory, while the suppliers of labour services are the workers. Employers combine labour and capital, as well as intermediate goods and services, to produce goods or services which they sell in product markets. The number of workers that firms demand thus depends on a number of factors: the demand for the good or services they produce; the costs of labour and capital, i.e. the wage rate and the user cost of capital; the relative price of intermediate goods; the substitutability between labour and capital; and the choice of technologies to which they have access. The wage rate that employers care about is the real wage rate, calculated as the nominal wage divided by the price of the firm's product bundle. The user cost of capital depends on the price of the capital goods, the depreciation rate, and the interest rate which captures the cost of financing the capital investment.

Workers, on the other hand, generally decide whether, where and how much they want to work. They depend on the wages for various occupations and take into consideration other options for spending their time. More specifically, workers can be thought of as making two sorts of decisions. They first decide whether and how much they want to work or, in other words, how they want to spend their time. Because the opportunity cost of leisure (i.e. the cost of preferring leisure to work) is the wage rate, the individual labour supply can be expressed as a function of the wage rate.<sup>34</sup> The second decision workers make relates to the choice of occupations and the specific region(s) in which to seek offers. Like employers, workers care about the real wage, which, for them, is the nominal wage divided by the consumer price index. Note that the consumer price index includes all consumption goods, i.e. more prices than those of the products the firm produces

and perhaps none of the prices of the firm's products if it only supplies intermediate goods.

In this subsection, we assume that workers have already decided how much they want to work and we focus on their choice of an occupation and of a particular employer.

If we consider the market for assembly workers (assemblers), the labour demand schedule represents the number of assemblers that firms wish to hire at any level of the wage rate, assuming that all other factors that affect the demand (e.g. user cost of capital, product demand, product price and technology, prices of intermediate inputs) are kept constant. The demand schedule is negatively sloped, meaning that a given increase in the wage rate leads firms to reduce their demand for labour. The reason for this is that firms hire workers as long as the revenue generated by the last worker hired (the marginal revenue) exceeds the market wage. A firm knows how much revenue it can generate if it hires one more assembler all else given. The firm then asks itself whether this incremental revenue exceeds the cost of the incremental worker, which is the wage rate. Only if it does will the firm hire the incremental worker. Labour demand is negatively sloped because adding more workers while keeping all other production factors fixed reduces the incremental revenue (which stays positive but declines with each additional worker). All workers of the same type command the same wage, so at higher wages employers contract fewer workers because the workers need to generate a sufficiently high revenue per worker to break even at the higher wage. The revenue less the cost of intermediate inputs (the value added) is the surplus that the employer can generate from labour and capital.

The labour supply schedule indicates the number of job-seekers who would be willing to work as assemblers at each level of the nominal wage rate, holding wages in other occupations constant. The labour supply curve has a positive slope if an increase in the wage rate of assemblers, keeping wage rates in other occupations constant, leads more people to be interested in becoming assemblers.<sup>35</sup>

In a competitive labour market, with homogeneous workers and firms, with no exchange costs, no wage-setting power on either side and with perfect information, the intersection of the labour supply and demand curves determines the market-clearing wage rate, which is the wage rate at which all the workers who wish to work at the prevailing wage rate are employed. Appendix B.2 shows graphically how the supply and demand of assemblers jointly determine

the market-clearing wage rate. Note that labour economists have proposed many alternative wage-setting models to capture certain observed features of labour markets. These models are discussed in Box B.3 and subsection B.3(b).

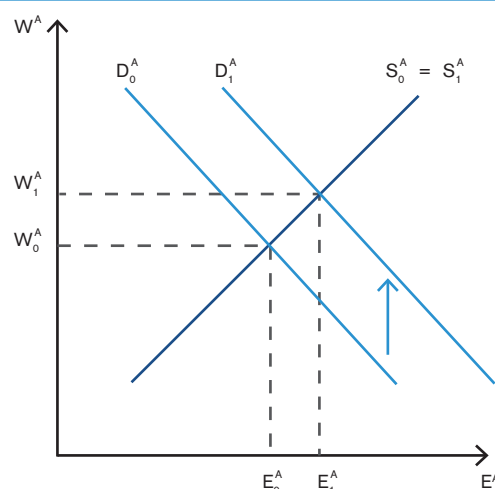
Changes in product demand, the user cost of capital, the prices of the firms' output, and technology translate into shifts of the labour demand schedule. An increase in the product demand for the goods and services produced by the firms which employ assemblers, for example, raises the marginal revenue and thus the demand for assemblers for any given employment level, because the product price increases as the same workers now encounter more demand for their products (see Figure B.16).

The effects of a fall in the user cost of capital are not as easy to predict. A fall in this cost leads the firm to install more capital (pair workers with more machinery), which makes all existing workers more productive and hence also raises their marginal revenue product. However, capital (machinery) also substitutes existing workers, so the net effect on the marginal revenue product curve and thus the direction of the shift of the labour demand curve is ambiguous. If the productivity effect dominates, the labour demand curve shifts up, while it shifts down if the substitution effect dominates.

Finally, technological change can take the form of either new products or of new production techniques. If it takes the form of a new product which substitutes for an older one, such as when computers replace typewriters, technological innovation lowers the demand for the old product while it raises the demand for the new product. This translates into a downward shift in the demand for labour used to produce typewriters and an upward shift in the demand for the workers who produce computers.<sup>36</sup> Some workers will thus need to change jobs and, in the presence of mobility obstacles, this may lead to unemployment, an issue which will be discussed below.

If, by contrast, technological innovation takes the form of automation, it can be seen as a reduction in the cost of capital relative to the cost of labour. As such, it affects the demand for labour through both a productivity and a substitution effect. It makes existing workers more productive and thus leads to an increase in the marginal product revenue of workers, but at the same time also leads to the substitution of capital for labour and thus a decrease in the marginal revenue product. Depending on which of the two effects dominates, automation can shift the demand for labour either up or down.

**Figure B.16: Effect of an increase in the demand for assembled products on the market for assemblers**



*Note:* Figure B.16 represents the market for assemblers with the upward sloping supply of assemblers  $S_0^A$  and the downward sloping demand for assemblers  $D_0^A$ . The increase in the demand for assemblers resulting from the increase in the demand for assembled products translates into an upward shift of the demand for assemblers from  $D_0^A$  to  $D_1^A$ . As a result of this upward shift of the demand curve, labour market equilibrium will change. At the initial equilibrium wage rate  $W_0^A$ , the shift in demand creates an excess demand, which, in the competitive model, pushes the wage rate up to  $W_1^A$  and raises the level of employment to  $E_1^A$ . The market will stabilize at the new equilibrium at a higher wage level and a higher level of employment.

Another factor that can shift labour demand is government policies. Trade opening, for example, like technology, may contract the demand for workers in import-competing firms and expand labour demand in export-oriented firms. This may have repercussions on employment in the market for certain occupations at the local or sectoral level in the presence of obstacles preventing seamless adjustment. Also, a payroll tax imposed on firms and workers makes it more expensive for firms to hire workers and would thus prompt firms to lower their demand for labour. Alternatively, a government subsidy that supports firms' hiring, such as a tax credit to firms for every worker they hire, would increase labour demand. In a competitive market, an increase (shift upwards) of the demand for labour will tend to raise employment while raising the wage rate, because workers can only be enticed to supply additional work if wages increase.

Finally, a number of factors can lead to shifts in the labour supply schedule. Changes in other wages than those of assemblers were held constant when drawing the supply schedule for assemblers. An increase in the wage rate of machinists, for example, would attract more persons to choose to work as machinists than as assemblers at any given level of the wage rate for assemblers. The supply schedule

**Box B.3: Wage-setting when labour markets are not competitive**

The usual supply-demand framework in perfectly competitive labour markets assumes atomistic agents, in the sense that neither workers nor firms have the ability to influence the equilibrium wage rate. This framework can also be used to explain market outcomes when either firms or workers have wage-setting power, but not when both have it at the same time. When both firms and workers have wage-setting power, the wage rate will be set through bargaining, in which case game-theory models with the strategic behaviours of market actors can be used to adequately explain wage-setting. This box briefly discusses wage-setting when either workers or firms have wage-setting power (for more detailed explanations, see Borjas (2013) and Ehrenberg and Smith (2012)).

**Wage-setting when firms have wage-setting power**

An economy has multiple labour markets. If workers were completely mobile across these labour markets, there would be no wage differential for the same occupations between these labour markets. If there are impediments to the mobility of workers (often called “mobility frictions” in the economic literature), there can be wage differentials for the same occupations across these labour markets because firms in each market can set wages depending on their own characteristics.

For example, consider a coal mine in an isolated small town. The coal mine (firm) is the only buyer of labour in this labour market, which is therefore referred to as a “monopsonistic market”. As mobility frictions make it costly for workers to move into or out of this specific labour market, the firm can act strategically so as to influence (manipulate) the market-clearing wage. Concretely, the coal mine can set its labour demand lower than it would if it had to take wages as given.<sup>37</sup> The mine’s strategically reduced labour demand depresses the local wage in the mining town, so that the monopsonistic employer can enjoy a lower wage bill than it usually would in a competitive labour market. In other words, both the wage rate and employment in a monopsonistic market are lower than in a competitive market, if all other factors are equal. Note that while the monopsonistic firm has the power to set wages, this choice is not entirely free, as it is still bound by its productivity, the labour supply it faces given the employment in the other monopsonistic labour markets, and competition in its product market.

**Wage-setting when unions have wage-setting power**

Workers exercise their power to set wages through labour unions, which are organizations of workers that bargain with firms with the purpose of improving the wage-related and non-wage-related conditions of employment of their members, including employment protection. Workers can become union members by paying a union membership fee.

Two important questions arise when analysing wage-setting in the presence of unions with supply-side market power. The first question regards how much wage-setting power unions have; this depends on labour market institutions (the power of unions to act on behalf of workers in setting or influencing wages is often legally guaranteed) and on the proportion of workers who are unionized, among other things. The second question regards the objective that the union is pursuing. Unions aim to raise wages, but they are also generally concerned with matters such as employment, the riskiness of labour income and working conditions. Because there are many answers to these questions, alternative models of wage-setting in the presence of unions have been elaborated.

One of the simplest models is the monopoly-union model, in which the union is assumed to care about both the wage and the employment level of its members. In this model, the union sets the wage and the firms respond by choosing the level of employment that maximizes their profits. Knowing how firms will behave, the union will set the wage rate at a level which maximizes its influence subject to the constraints of the resulting wage/employment combination on the demand curve. Given that this wage level is likely to be higher than the competitive wage rate, employment is likely to be lower than what it would be in a competitive market.

of assemblers would thus shrink (shift upwards). In a competitive market, this would put upward pressure on the wage rate and would lead to a contraction of assembler employment.<sup>38</sup> Demographic factors, often driven by changes in policy, also play a role, although

maybe more at the aggregate level. Immigration, for example, can increase labour supply (shift the labour supply curve downwards) as workers coming from abroad provide more labour to the domestic labour market. An increase in the labour force participation

of women at any wage level would also increase labour supply and, in the longer term, an increase in the birth rate could have a similar effect.

Whether and by how much a shift in the demand for labour affects employment and wages depends on the elasticity of labour supply to a change in the wage level. A distinction is often made between the short and the long run. The assumption is, typically, that labour supply is less elastic in the short run than in the long run. As a consequence, an increase in labour demand would raise the wage rate with little effect on employment in the short run, while the opposite would be true in the long run.

## (ii) *Unemployment*

The previous subsection introduced the competitive labour market model and used it to discuss the effects of a number of factors on the equilibrium wage and employment. This subsection presents the classical approach to unemployment, which builds on the competitive model.

In the perfectly competitive market model, competition drives the wage rate to the equilibrium level that clears the market. All the workers who wish to work at the prevailing wage rate are employed. The others choose not to be in the labour force at this level of the wage rate. In the pure competitive model, there can thus be no involuntary unemployment. A shift in labour supply or demand such as the ones discussed in the previous subsection would induce a change in the market clearing level of the wage rate and in the level of employment. Under the simplistic assumptions of the basic competitive model, however, adjustment would be swift and there would be no unemployment in the new equilibrium.

For unemployment to arise in the competitive model, it is necessary to relax the simplifying assumption that the wage rate is flexible and that it immediately adjusts to clear the market. The empirical literature seems to suggest that nominal wages are (partially) rigid downwards (i.e. the wage rate will not adjust downwards to clear the market when there is an excess supply of labour) but not upwards (Jacobsen and Skillman, 2004). Note that this does not necessarily mean that real wages are inflexible. Given the downward rigidity of nominal wages, however, real wages can only fall as a result of an increase in prices. Multiple reasons, which are discussed in this and the next subsection, can explain downwards wage rigidity.<sup>39</sup> If the market is otherwise assumed to be competitive, with homogeneous workers and firms, no frictions and perfect information, downwards rigidity can only be the result of government intervention.

If a minimum wage is set above the market-clearing level of the wage rate, for example, there will be an excess supply of workers. These workers would be willing to work at the going rate, which means that there would be involuntary unemployment. This very simple explanation, however, is not supported by the available evidence.<sup>40</sup> First, evidence does not support the finding that involuntary unemployment can only arise as a result of government intervention. Second, even assuming that unemployment arises because of governmental intervention, it is not clear that jobs would be available for the workers who would be willing to work. With perfect information, no one would be searching for jobs that are not available.

In the classical approach, which builds on the competitive model, there are three main reasons why the labour market may not clear, or, in other words, why the wage rate may not adjust to equalize labour supply and demand, which correspond to the three main categories of unemployment.

The first type of unemployment is the so-called “natural” or “frictional” unemployment, which is due to the fact that a significant number of people are between jobs at any point in time and that there is a natural asymmetry of information between the firms that post job vacancies (potential employers) and workers who are looking for a job (potential workers). Frictional unemployment will exist even when in the aggregate the demand for labour equals the supply.

The second type of unemployment is “cyclical” or “demand-deficit” unemployment. It arises because, when wages are rigid downwards, a decrease in labour demand during the downswing phase of a business cycle can generate unemployment.

The third type of unemployment is called “structural” or “transitional” unemployment. It arises in the presence of wage rigidities when there is a mismatch between the skills supplied and the skills demanded in a market or when there is excess demand for workers in one area and excess supply of workers in another area and workers cannot move across either occupations or regions because of mobility obstacles. Hereafter we examine the determinants of each of those three types of unemployment.

Natural or frictional unemployment is the unemployment that exists even when the labour market is in equilibrium with aggregate labour demand equal to aggregate labour supply. It results from the perpetual turnover of employment opportunities as employers adjust to changing economic conditions and workers move for jobs or other reasons, so that open job vacancies wait to be filled and workers search for new employment.



In an economy like the United States, for example, millions of workers move from job to job every quarter, in a process that economists call “churning”. The US Bureau of Labor Statistics reports that the number of job openings was at 5.7 million on the last business day of March 2017, which corresponds to 3.8 per cent of the sum of employment and job openings.<sup>41</sup> Over the month, hires and separations were at 5.3 million and 5.1 million, respectively. Within separations, the quits and the layoffs and discharges rates were at 2.1 per cent and 1.1 per cent, respectively.<sup>42</sup>

This ongoing turnover in the labour market implies that, at any moment in time, a number of workers is naturally unemployed between jobs. Many workers have already found a new job when they quit and will not spend a transitional time in unemployment (so-called job-to-job transitions). Other workers who either quit or are laid off, however, enter unemployment and stay unemployed for a period of time before they re-enter employment. It may also take time for new entrants in the labour force to find their first job.

Natural unemployment arises because of the presence of search and matching frictions on labour markets. Search and matching frictions are discussed in more detail in subsection B.3(b).

Cyclical unemployment occurs when a decline in aggregate demand in the output market causes the aggregate demand for labour to contract in the presence of downwards rigidity in real wages.<sup>43</sup> Appendix B.2 graphically explains how cyclical unemployment may arise. In principle, cyclical unemployment should disappear when the economy moves to the upswing phase of the business cycle and aggregate demand for labour shifts back upwards, raising employment to its pre-downswing level.<sup>44</sup> On average, a complete business cycle can last from five to six years, and therefore the related temporary shifts in labour demand occur over the course of these years (for example see Watson (1992) for the United States). When the decrease in the demand for output is more predictable and follows a determined pattern over the course of a single year, the unemployment that arises due to wage inflexibility is usually referred to as “seasonal unemployment”.

Transitional or structural unemployment arises either when job-seekers and job vacancies are in different regions and mobility frictions and wage rigidity impede adjustment, or in the presence of imbalances between the skills of job-seekers and the skills required for available job vacancies. When job-seekers and job vacancies are in different regions, wages, if they were flexible, would fall where labour supply exceeds labour demand which would increase demand and

decrease supply until equilibrium is reached. Similarly, in the absence of frictions between market segments, unemployed workers could move to regions or sectors where labour demand is stronger. Mobility obstacles, however, can be significant and can raise adjustment costs, slowing down or even preventing the smooth transition of workers between regions.

When the demand for skills changes and skill development systems are not sufficiently responsive, structural unemployment may also arise. If, for example, the demand for low-skill workers decreases while the demand for high-skill workers increases, low-skill workers who lose their jobs will need to be retrained. This may take time and involve significant costs, potentially leading to significant skill mismatches. Box B.4 discusses mobility frictions, Box B.5 describes skill mismatches and Box B.6 discusses assessments of the adjustment costs induced by mobility frictions.

As already mentioned above, in a dynamic economy, labour markets are constantly in flux. Every day new workers enter the labour force while some exit and others change jobs. At the same time, firms lay off some workers and open new vacancies. Many of the changes that take place are planned in advance and can be anticipated by workers and firms.

Labour markets, however, are also affected by shocks that cannot always be anticipated. These shocks can take many different forms, can be far-reaching or more limited in their scope, and can occur over a limited or an extended period of time. The types of shocks that can but do not need to generate structural unemployment are those that lead to the simultaneous destruction and creation of jobs either in different regions or with different skill requirements.

- Technological innovation is an obvious example. When the automobile was invented, the car and the oil industry expanded while the horse “industry” (stable owners, feed producers, trainers, etc.) declined.
- Changes in consumer taste can have similar effects, often in combination with technological change. Favourite destinations for tourists keep changing, and the music industry has transformed significantly over the years with the replacement of vinyl records by CDs, MP3s and more lately online music streaming.
- For given tastes, changes in *per capita* income lead to a shift in consumer expenses towards services, such as health care, and non-food merchandise.



**Box B.4: Mobility frictions**

This box briefly discusses two forms of mobility frictions: geographical frictions and frictions related to labour market regulations.

**Geographical frictions**

Geographical frictions account for a substantial share of total mobility costs. They are barriers affecting the reallocation of workers between regions, and may be related to physical geography and social networks, family ties, cultural barriers, language, housing, etc. They exist either because of a country's physical and cultural characteristics or because they are brought about by laws and institutions. In the first instance, where countries are large or ethnically and culturally diverse, geographical frictions tend to be considerable. For instance, physical distances have likely played a role in limiting the movement of workers in rural India as documented by Topalova (2010).

Geographical frictions can also be caused by specific legislation and institutions. McGowan and Andrews (2015 p. 16), for example, note that: "high transactions costs on buying and selling of dwellings (e.g. stamp duties, registration fees, etc.) may create lock-in effects in the housing market, with implications for residential and job mobility". Along the same lines, if the new jobs are created in a region with stricter rental regulations, workers that might like to move to this region will have a hard time in finding housing.

Restricting regulations on land use can produce a similar effect. As another example, Zi (2016) shows how China's internal passport system (hukou) influenced labour reallocation between regions in the aftermath of China's WTO accession in 2001. Geographical frictions are also discussed under mobility costs in the subsequent discussion of search and matching theories.

**Frictions related to labour-market regulations**

Another category of mobility frictions relates to labour market regulations which include wage-setting institutions, mandatory social benefits, the unemployment insurance system and different aspects of labour legislation, such as laws on minimum wage, employment protection legislation (EPL), and the enforcement of the legislation. While frictions in this area are a normal part of how labour markets operate, there may be cases where labour-market regulations cause frictions that significantly impede adjustments. Note that the debate in this area is about the degree of regulation and the design of regulation rather than the existence of regulation.

One example of labour-market regulation which can cause significant frictions is employment protection legislation. The ILO recently launched a research programme designed to record and measure employment protection legislation throughout the world, as well as develop a nuanced understanding of its impact on labour markets and economic development. This programme has led the ILO to develop a database, EPLex (available at <http://www.ilo.org/dyn/epllex/termmain.home>), which contains comparative information on laws and collective agreements governing employment protection in 95 countries over the period 2009 to 2014. The database is continuously updated to cover more countries and years.

Another labour market regulation much discussed with relation to frictions is occupational licensing laws, which may represent a barrier for job matches between firms and workers, as job vacancies requiring specific licences can be filled only with workers holding those specific licences. Examples include lawyers, financial advisors, pharmacists, doctors and even plumbers. In the United States, approximately one-quarter of jobs requires a government licence. The Council of Economic Advisors (CEA) et al. (2015) shows that during the past five decades, "the share of U.S. workers needing a license to do their job has grown roughly fivefold" and that this was mainly due to the creation of new licensed professions (Council of Economic Advisors (CEA), 2016). As these licences can be expensive, they may represent relevant employment barriers for those who are unable to obtain one. These licences may also represent a barrier for the licence-holders, as the patchwork of state regulations and variability in state reciprocity make it harder for workers in licensed occupations to move across state lines (Council of Economic Advisors (CEA), 2016; Kleiner, 1990).

**Box B.5: Skill mismatches**

The diversity of skill requirements is a labour-mobility barrier that impedes workers' transition between jobs (see the discussion in ILO-WTO (2017)). This barrier leads to skill mismatches, which are imbalances between skills offered and wanted in the labour market. Such an imbalance between the supply of and demand for skills can appear in a number of different ways, and at various levels, including the individual, the employer, the sector and the economy. For example, there can be skills shortages or surpluses (quantitative mismatches), vertical mismatches (the level of education or qualification of applicants is less or more than what is demanded by firms), horizontal mismatches (the type/field of education or skills of applicants does not correspond to what is demanded), and others.

In making a comparison between developed and developing economies, a study by the World Bank argues that: "... their wider skill set in general, such as computer skills or greater reading and writing comprehension, makes it easier for [American workers] to move between jobs than for workers in developing countries like Mexico" (Hollweg et al., 2014).

Skill mismatches can either exist as a standalone characteristic of the labour market, such as when there is a diversity of skill requirements across the jobs offered, or, as discussed below, they can be brought about by laws and institutions. Stand-alone skill mismatches occur when firms encounter difficulties in filling up their job openings due to the skill characteristics of the pool of potential candidates presently available. The World Bank (2016) shows that among the most required skills in today's economy are ICT skills, foundational cognitive skills (such as the ability to learn, to process and apply knowledge, to analyse and reason, and to evaluate and decide), complex problem-solving, critical thinking and expert communication.

Some evidence for this trend in skill requirements is reported for economies as diverse as Brazil, Malaysia, and the former Yugoslav Republic of Macedonia. The World Bank study points out that employers in developing countries search for ICT skills but cannot find them because there is a shortage of high-skilled workers due to a skill mismatch. In the former Yugoslav Republic of Macedonia, "43 percent of firms say ICT skills are very important for workers, but more than 20 percent say that workers lack them". Similar shortages of skilled workers are present also in other European economies. For example, the Council of the European Union reports that "about 36% of firms in the EU-27 experienced difficulties in hiring staff for skilled jobs in 2009" and that the shortfall of ICT professionals amounted to 700,000 jobs by 2015 (European Commission, 2012).

In addition, it is important to note that vertical skill mismatches can occur in both directions. For example, Leuven and Oosterbeek (2011) calculate that 21 per cent of workers are under-schooled and 26 per cent of workers are over-schooled in Asia in relation to the jobs on offer. The corresponding respective figures are 31 per cent and 30 per cent for Europe, 16 per cent and 37 per cent for the United States and Canada, and 21 per cent and 17 per cent for Latin America.

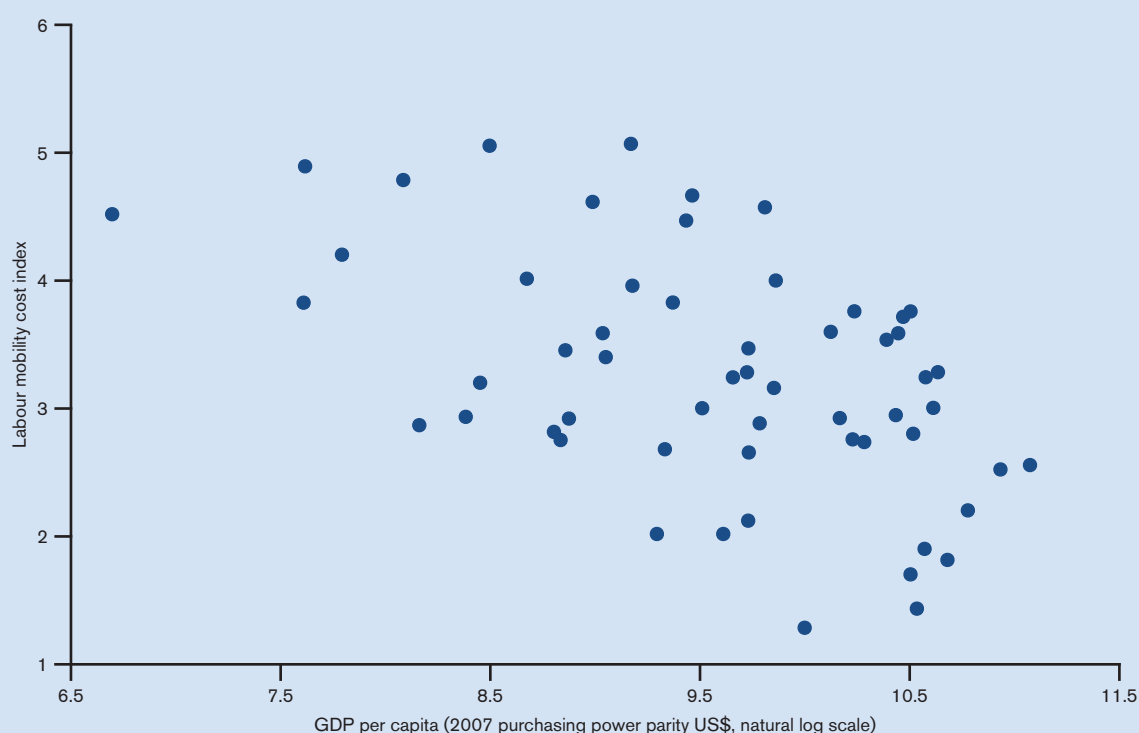
Second, skill mismatches can be caused by laws and policies. For example, policies that support narrowly skill-specific education can affect labour mobility negatively, as workers who receive an education only on some very specific skills find it more difficult to move to other employment when they lose their jobs i.e. when skill-specific education can lead to over-specialization. According to Lamo et al. (2011), skill-specific education in Poland led to an overspecialization of the labour force, which caused "to a large extent the much higher and persistent unemployment compared to Estonia during the period of EU enlargement".

- Yet another example would be an increase in oil prices which affects the automobile industry negatively but prompts oil producers to search for new oil fields that are viable for extraction at higher oil prices and stimulates the sustainable production of energy.
- Government policies and regulations can also have similar effects. Stricter environmental and safety regulations have almost eliminated mopeds in some high-income countries replacing them with alternative means of transportation.
- Last but not least, trade policies or changes in comparative advantage, which will be discussed in more detail in section D, affect import-competing industries differently from export-oriented ones or from the non-tradeable sector.

**Box B.6: Labour mobility costs**

Recent cross-country empirical evidence suggests that, on average, the obstacles to labour mobility are twice as high in developing countries as in developed countries (Artuç et al., 2015). The highest costs are estimated to be in South Asia, Latin America, and Eastern Europe and Central Asia, followed by the Middle East and North Africa, Sub-Saharan Africa, and East Asia and the Pacific. Labour mobility costs are negatively correlated with *per capita* GDP, as shown in Figure B.17. They are also negatively correlated with tertiary educational attainments and schooling quality, but they are uncorrelated with primary and secondary education enrolment. Finally, mobility costs are positively correlated with other frictions, distortions and constraints in the economy, such as time to export.

More recent analysis also suggests that, on average, sector mobility costs are higher than regional mobility costs, as highlighted in Figure B.18. Costs of mobility between sectors suggest that workers have industry- or occupation-specific skills that lose value or become entirely unusable as they switch between economic activities. The costs of moving to a new sector and region are higher than the costs of moving only to a new sector or region (Cruz et al., 2017). Country characteristics and differences between sectors, including the presence of a large informal sector, are important determinants of labour mobility costs. For instance, Arias et al. (2013) report that the estimated entry costs from informal into formal employment are about twice as high as switching jobs within the formal sector and around ten times higher than switching from formal to informal employment in Brazil and Mexico. Mobility costs may also vary across workers depending on age, education or other characteristics. For instance, evidence for the United States shows that mobility obstacles increase with age due to the high return on sectoral experience. These findings are confirmed by Dix-Carneiro (2014), who also shows that female and less-educated workers face relatively larger obstacles in Brazil.

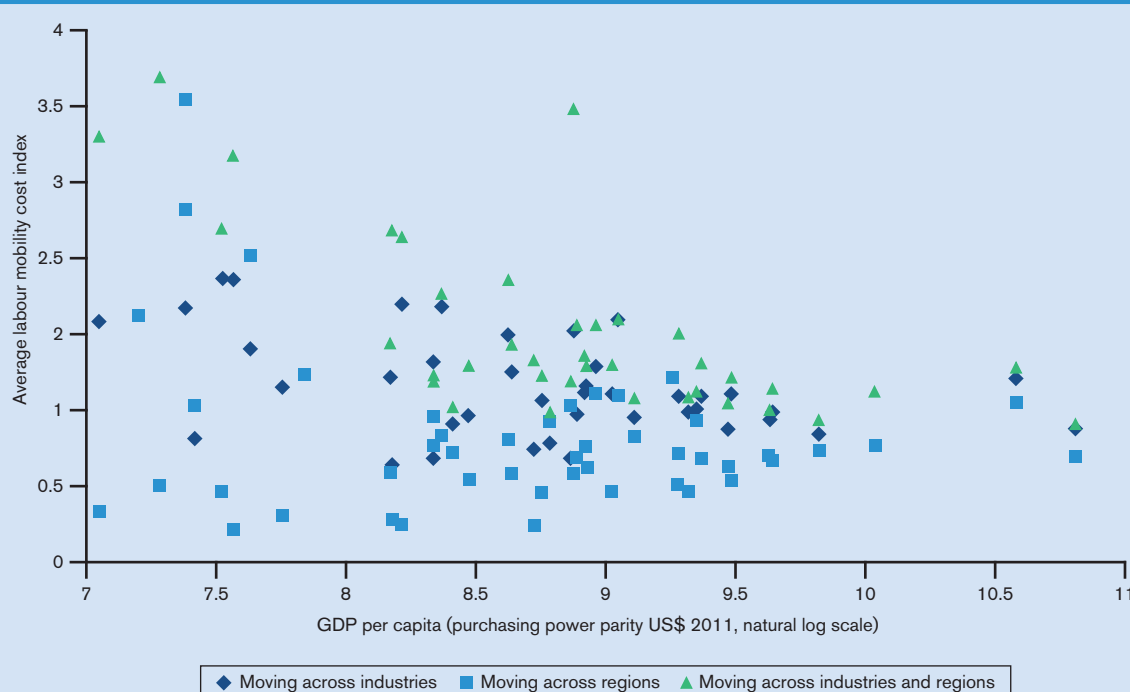
**Figure B.17: Labour mobility costs by level of economic development**

Source: WTO Secretariat based on Artuç et al. (2015), World Development Indicators (July, 2017).

Note: The labour mobility index measures a country's average labour mobility cost of moving industry. The index considers nine sectors: (1) non-manufacturing; (2) metals and minerals; (3) chemicals and petroleum products; (4) machinery; (5) food and beverages; (6) wood products; (7) textiles and clothing; (8) miscellaneous equipment; and (9) motor vehicles. The mobility cost index is measured in terms of average annual wage. Data range from 1990 to 2008 but vary from country to country depending on data availability.

## Box B.6: Labour mobility costs (continued)

Figure B.18: Sectoral and geographical labour mobility costs by level of economic development



Source: WTO Secretariat based on Cruz et al. (2017), World Development Indicators (2017).

Note: The index of moving across industries measures a country's average labour mobility cost of changing industry while staying in the same region. The index covers ten industry affiliations: (1) agriculture; (2) mining; (3) manufacturing; (4) public utilities; (5) construction; (6) commerce; (7) transport and communications; (8) financial and business services; (9) public administration; and (10) other services. The index of moving across regions measures a country's average labour mobility cost of moving across regions but staying in the same industry. The number of regions varies between countries (from four to fifteen in general). The index of moving across industries and regions measures a country's average labour mobility cost of changing industry and moving region. Each mobility cost index is measured in terms of average annual real wage. For instance, a mobility cost of 1.5 means 1.5 times the average real wage. Data range from 1981 to 2013 but vary from country to country depending on data availability.

How labour markets absorb such shocks and whether skill mismatches and imbalances arise depends on how the labour markets work. If rigidities and frictions are not too significant, adjustment may be smooth. If, on the contrary, they are significant, structural unemployment may arise. In the presence of mobility frictions or skill mismatches, the labour market is not fully integrated and competitive, at least not in the short run. It can be viewed as consisting of many labour markets "segmented" by type of occupations, by geographical regions, by sectors, etc. If economic shocks affect different "segments" of the labour market differently, and if wages are rigid downwards, unemployment can arise in the segments which are affected adversely. Box B.7 explains how a technological shock can generate structural unemployment in the presence of skill mismatches.

One type of labour market segmentation of particular relevance to developing countries is the segmentation between the formal and the informal parts of the

labour market. According to the World Bank (2013), available studies suggest that informality rates in developing countries range between 40 and 80 per cent of the employed labour force. In countries with limited social security, workers who lose a formal job and cannot find another job in the formal sector immediately may be obliged to take an informal job. This means that the informal sector may represent an important margin of adjustment to economic shocks affecting the labour market in developing countries. In the presence of wage rigidities in the formal segment and of mobility frictions, a contraction of the demand for formal labour may translate into an increase in informal employment rather than in unemployment.

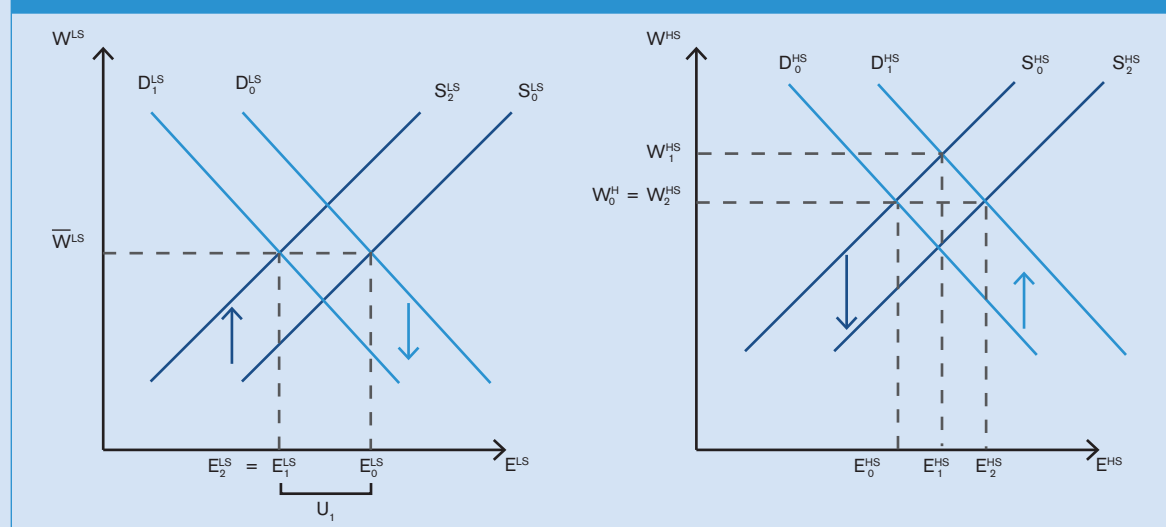
It should be noted that not much is known about the mobility of workers between the formal and informal segments of the labour market. A recent paper by Arias et al. (2013), however, finds that entry costs into informal employment are significantly lower than the costs of entry into formal employment (see Box B.6).

**Box B.7: Structural unemployment due to skills mismatches**

Figure B.19 represents the markets for low-skill and high-skill workers respectively. Initially, the two markets are assumed to be at their competitive equilibrium with the supply of low-skill workers equal to the demand of low-skill workers ( $S_0^{LS} = D_0^{LS}$ ) and the supply of high-skill workers equal to the demand of high-skill workers ( $S_0^{HS} = D_0^{HS}$ ). The equilibrium wage rate for high-skill workers  $W_0^{HS}$  is higher than the equilibrium wage for low-skill workers  $\bar{W}^{LS}$ . The difference between the two wage levels corresponds to the costs of acquiring skills. Starting from equilibrium, a technological shock such as the development of robots could be thought of as shifting down the demand for low-skill workers from  $D_0^{LS}$  to  $D_1^{LS}$  while simultaneously shifting up the demand for high-skill workers from  $D_0^{HS}$  to  $D_1^{HS}$ .

In the market for high-skill workers, the increase in demand will push up the wage from  $W_0^{HS}$  to  $W_1^{HS}$  in the short run. In the market for low-skill workers, the contraction of the demand would in principle push down the wage. If, however, the wage rate is not flexible downwards, unemployment will result. In the longer run, the wage difference and the unemployment should encourage more young people to invest in skills, and should encourage low-skill workers to upskill. This would shift the supply of low-skill labour up to  $S_2^{LS}$  and reduce low-skill unemployment. At the same time, the supply of high-skill workers would shift down to  $S_2^{HS}$ , accompanying the shift in demand which will contain the increase of the high-skill wage. This adjustment process may take time. And for some of the low-skill workers who lose their jobs, it may be difficult to acquire the skills that are in higher demand, particularly if they have been out of education for a long time.

The same figure can also be used to examine the effect of demand shocks on local labour markets in the presence of mobility frictions. Consider that Figure B.19 now represents the labour markets of two geographically separated regions. Assume that as a result of import competition, labour demand shifts down in the first local labour market while, as a result of an expansion in exports, labour demand shifts up in the second labour market. Assume again that because of wage rigidity, the contraction in labour demand results in unemployment in the first market, while the expansion in labour demand raises the wage in the second market. As in the previous case, this imbalance between local labour markets could quickly disappear if the unemployed workers in the first region can move to the region with the booming labour market. Unemployment in the first market would disappear while in the second market, the increase in labour demand would be accompanied by an increase in labour supply. In the presence of mobility obstacles, however, displaced workers will not relocate right away to a region with expanding export industries. For example, workers might not be able to move either because they do not wish to sell their house, or because different languages are spoken in the two regions.

**Figure B.19: Structural unemployment due to skills mismatches**

In the competitive labour market model, labour markets will converge towards equilibrium but frictions will slow down the adjustment process. How long it takes for workers unemployed in one particular market to find and get a job in another market depends on the nature and the size of mobility frictions. Certain mobility obstacles can be a short-run issue, for if workers are given time to move or train, they can be overcome in the long run. This means that in the short run, when frictions impede worker mobility across sectors, regions and occupations, economic upheavals that negatively affect some sectors, regions and/or occupations, but affect others positively, may have an impact on unemployment at the local level but not at the aggregate level. By contrast, in a “frictionless” long run, when workers move freely across sectors, regions and occupations, even the local effects should fade. The shocks may, however, affect the allocation of employment by region, by sector or by skill and they may have a persistent impact on earnings and job stability for some of those who are negatively affected.

## (b) Search and matching theories

The competitive model which has been considered so far typically assumes that buyers and sellers in the labour market can find partners effortlessly (without transaction and/or search costs), and only introduces frictions to explain unemployment. Historically, the problem with these approaches has been that they cannot explain unemployment in situations where individuals are actively searching for employment but cannot find jobs. This evidence has called for a new approach to understanding labour markets and alternative frameworks for evaluating the determination of wages, employment and unemployment.

The change came in the form of the search and matching theories of the 1970s, which allowed for a richer comprehension of agent interactions and had a profound effect on the understanding of the labour market. By shifting the focus from the “macro” level to individual interactions between various agents, these frameworks allowed for a more comprehensive and holistic analysis of a range of features of interactions between various stakeholders in a labour market exchange. For example, one strength of this approach is that it can help model movement between different labour market states which include the informal sector.<sup>45</sup>

While this subsection does not exhaustively cover the impressive range of literature encompassing all the nuances of search and matching theories, it provides an overview of the major strands of that literature and examples of prominent models. It does so by

relaxing the major assumptions of the competitive model of costless exchange, perfect information and homogeneity of workers and firms. It is important to note here that the delineation between different models is often difficult and is done for the sole purpose of clarifying the main ideas and concepts incorporated under them. In many cases, multiple models discussed below have significant overlaps in their theoretical constructions.

The main building blocks of contemporaneous models of labour markets are search and matching theories.

Search theory explicitly accounts for the fact that buyers and sellers have to find each other before they engage in a labour market exchange. Search theory models search as a process in which the actors are working under the constraints of uncertainty and imperfect information. Search theory emerged out of a need to base the explanation of employment and unemployment on solid microeconomic foundations.

Matching theory utilizes search theory to explain how individual labour market exchanges determine wage-setting, employment and unemployment at the aggregate level. Perhaps the most famous labour market matching model is the Diamond-Mortensen-Pissarides Model, which takes a demand side approach to unemployment and looks at the duration of unemployment for a worker as being determined by how long it takes for a worker to receive an offer.<sup>46</sup> This contrasts with the earlier supply-side approach of the literature, which calculated unemployment duration by how many offers an unemployed worker would reject before accepting one. It is a particularly realistic model explaining unemployment and is based on a combination of a stochastic model of labour turnover,<sup>47</sup> a model of labour-market tightness<sup>48</sup> and a bargaining model of wage determination<sup>49</sup> (Hall, 2012). The integration of the notion of labour-market tightness – in which employers choose job creation volumes in response to their returns – is an important innovation of the model. The job-filling rate and the job-finding rate are, in turn, determined by the tightness in the market.

The level of unemployment depends on the flow of individuals entering and exiting the labour market, the speed at which the unemployed find and accept new jobs and the conditions under which the bargaining over surplus (see below) takes place between employers and workers in the labour market exchange. Additionally, in the case of developing countries, the informal sector plays a critical role in modulating the flow of individuals between employment in the formal sector and unemployment. The theory of job search helps us understand what determines this speed and



the dynamics of the bargaining process. It suggests that labour market institutions and regulations (e.g. labour unions, minimum wage legislation) have an important influence on the cost of being unemployed, and ultimately on the duration of unemployment. If governments improve access to information on jobs for applicants and on applicants for employers, for example, the speed, efficiency and effectiveness of the search process tends to increase, which contributes to a reduction of unemployment. Similarly, the existence and the conditions of income support schemes for the unemployed affect the cost of being unemployed and thus also affect the speed at which they accept a new job.

Looking at exchange costs, contracts and imperfect information provides a way to visualize matching and search theories, as well as a framework to help understand how the labour market works, which will be useful for the discussion in the subsequent sections.

### (i) *Exchange costs*

In the competitive model, it is generally assumed that exchange costs are trivial or insignificant. However, exchange in the labour market can be decomposed into three distinct activities: matching, negotiation and enforcement. Each of these contributes to the costs of undertaking labour market exchanges and has an impact on wage-setting through its effect on the volume of exchanges and on the distribution of gains from labour market exchanges.

### **Matching**

Matching consists of the set of activities which are involved in bringing together prospective transacting parties (Jacobsen and Skillman, 2004). In terms of the labour market, this can involve a diverse set of parameters. This subsection focuses on the geographical relocation of workers or, in rare cases, of a firm, before extending the discussion to other dimensions of the matching process. In competitive models, costless matching means that if either party tries to modify wages to serve their interests, then they would lose all their prospective partners. However, empirical observations of existing labour markets show that exchange partners are not always available, immediately identifiable and instantaneously paired.

This means that there are significant costs attached to identifying suitable partners in a labour market exchange and then reaching them. In the simplest model, this has two main consequences in terms of the impact on wage-setting by influencing the distribution of market power and the volume of exchanges. First, if workers find it hard to come

across suitable alternative employment, then firms have greater power in wage-setting and can lower their wage rates below competitive levels. If both parties face significant costs in finding alternatives, a situation of bilateral market power arises. Therefore, the gains to either party are partially determined by who faces the greater costs of no deal. Second, the existence of matching costs reduces the supply of labour by reducing the volume of exchanges, as some workers are discouraged from entering the market due to the prospect of these costs. Many workers also leave the market after becoming discouraged by the difficulties to find a job. This has an impact on the relative bargaining power of both parties in a labour exchange. A range of models incorporate matching costs in a theoretical and/or empirical framework in order to assess their impact on wage-setting.<sup>50</sup>

A range of models utilize matching costs under slightly different frameworks and provide a richer picture of their influence on labour market outcomes. These include the mobility cost model and the wage distribution model.

The **mobility cost model** provides a basic framework for evaluating labour market search costs by assuming that mobility costs exist for all market participants and are attributable to the spatial nature of market interactions. These costs are augmented by imperfect information and uncertainty. This framework consists of a “matching function” which links the total number of buyers and sellers to the number of successful employment matches per period. The equilibrium in this model occurs when all individuals have chosen the personally optimal search intensity. Three main results of this model include:<sup>51</sup>

- i. a uniform wage rate where identical actors choose identical strategies if all actors are assumed to be homogenous;
- ii. positive and negative externalities due to the fact that each actor's choice of search intensity affects others;<sup>52</sup>
- iii. the possibility that the positive and negative externalities lead to a situation with multiple equilibria that are rankable on efficiency grounds.

The **wage distribution model** adds a non-uniform distribution of payoffs for a worker from job matches based on the assumption that workers and sellers are heterogeneous and that the returns to labour exchange are match-specific. In this case, choice is sequential and the worker needs to decide when to stop searching. The way to understand search behaviour of a representative worker in the

wage distribution model is through the concept of a reservation rate. This is the wage rate that is minimally acceptable to prospective workers given the expected costs and benefits of continued search. This reservation wage is affected by the underlying search conditions and this model enables testing links between search conditions and average search durations for workers. One main prediction of the model is that the expected duration of the job search increases in proportion to the magnitude of the reservation wage, so policies such as an increase in unemployment benefits therefore lead to a higher reservation wage and a higher rate of unemployment.

### **Negotiation**

Once an employer and a worker have met, e.g. at a job interview, the terms and conditions of the exchange of labour services need to be agreed upon. These can range from a succinct discussion on wages or entire career paths for well-defined and observable labour services, or can include intricate examinations of various dimensions of the contract and how it will be monitored or bolstered through profit-sharing incentives (e.g. the number and time of work hours, the range of skills required, labour intensities,<sup>53</sup> conditions for profit-sharing or stock options and their vesting, etc.). These negotiations can be further complicated by an increase in the number of parties on both sides, and if the gains are realized after the deal. The latter situation can lead to a discussion of contingencies (i.e. future events that cannot be predicted with certainty), which can often lead to several complications, as explored further in the subsequent discussion.

As with the case of matching costs, negotiation costs affect the volume of labour exchanges and the distribution of gains from these exchanges, both of which have an impact on wage-setting. The process of negotiations can essentially be viewed as parties in the labour exchange bargaining over the total surplus generated by the agreement (Manzini and Snower, 2002). A range of theoretical models explores how bargaining over surplus and relative negotiating power is integral to wage-setting.<sup>54</sup> Within negotiation, the differential preferences of both parties can also affect wage-setting. Workers may, for example, prefer a fair wage including a premium as a condition of exerting effort because it is considered fair that a more profitable firm pays a higher wage (Akerlof, 1982).

The main difference when collective bargaining is introduced in a labour market is that firms must negotiate with or lay off groups of workers instead of individual workers. Under such models, collective bargaining arrangements increase the wages of a

firm's incumbent labour force by eliminating the firm's option to replace individual workers during bargaining. This increase is conditional upon the existence of a net surplus to be shared,<sup>55</sup> the low costs of replacing individual workers, and the increasing average costs of replacing incumbents. Additionally, the ability of workers to coordinate work stoppage combined with an assumption that quasi-rents<sup>56</sup> exist leads to the situation where the right to strike increases worker payoffs, and the magnitude of this increase depends on the extent to which workers are able to exercise this right strategically (Jacobsen and Skillman, 2004).

### **Enforcement**

Once negotiations are complete, the set of activities which involve ensuring that the terms of exchange are fulfilled are referred to as "enforcement". These activities might include monitoring and/or providing appropriate incentives for the fulfilment of the terms of agreement. One important instrument for achieving enforcement is a contract and it constitutes a specification of agreed-upon terms of exchange that can be enforced by an outside agency, which is usually a judicial body. Contracts can be implicit (unwritten) or explicit (written) and they provide a bridge between agreement and execution. We discuss contracts further in the next section. The presence of enforcement costs also has significant effects on the magnitude of gains from labour exchange and the distribution of these gains.<sup>57</sup> In terms of the literature, efficiency wage theories, which are discussed in more detail below, have postulated that an absence of explicit contract enforcement can lead to involuntary unemployment, thereby reducing the volume of exchanges.<sup>58</sup>

#### **(ii) Contracts**

Complications in labour exchange are often laid down in legally enforceable contracts for third parties who can ensure their enforcement. Transaction costs, therefore, often take the form of contractual difficulties and can be thought of as direct and indirect costs related to the creation and enforcement of contracts. One way to model contracts is through the representation of a set of efficient bargaining points as the "contract curve". An important consequence of using a contract curve is to note that as long as wage-setting and employment correspond to the contract curve, there are no market inefficiencies.

An implicit contract is understood to exist when, due to a variety of reasons, such as the transaction being routine and of little importance, it is not considered important or necessary to write an explicit contract. Implicit contracts are especially important

in understanding issues such as earning insurance, where workers commit to employers for a long period of time in order to be insured against earning risk caused by macroeconomic fluctuations. For example, German and Japanese employers expect their workers to remain loyal to their firms. This implicit commitment allows firms to invest in education and training without having to fear that those training costs will benefit competitors if workers quit and move. Conversely, workers expect their firms to be loyal and to keep their workforces largely employed even through temporarily adverse times, perhaps at reduced hours or wages. Self-enforcement is an important feature of implicit contracts and workers can also not be forced to accept wages lower than available market alternatives. This would mean that under this theory, wages would be downwards rigid and upwards flexible (Jacobsen and Skillman, 2004).

Despite their importance, contracts are often incomplete along a range of parameters and lead to losses for all parties in an exchange. They often fail to account for contingencies which affect the eventual realization of gains from exchanges. This may be due to the sheer number of potential contingencies or due to the fact that outcomes are not readily describable in ways that satisfy judicial rules. This can lead to contracts being “incomplete” due to their failure to specify the rights and obligations of exchange parties under a situation which would be verifiable by an external enforcement agency. Fehr and Falk (1999) show that under conditions of incomplete labour contracts, wage levels may positively affect workers’ propensity to cooperate. Experimental double auctions<sup>59</sup> conducted as part of the study show that in the presence of complete labour contracts, employers accept and actively enforce wages close to the competitive level. Additionally, the issue of verifiability also arises when an external enforcement agent has to acquire a specialized ability in order to judge outcomes which are a function of the suitability and aptness of a given labour input rather than a quantity measured along a given dimension.

### *(iii) Asymmetric information*

Asymmetric information is when exchange partners are not equally informed of all conditions that are relevant to the transaction. This is often the case when one party has private information that they do not share with the other party. The literature on the issue is divided between two forms of asymmetric information, hidden state and hidden action. Hidden state is when one party knows something about a condition that affects potential gains that is not known by the other party and hidden action is when one party chooses a set of actions that affect the

magnitude of gains from exchange which is at least partially invisible to the other party. Hidden action creates the problem of incentive provision where it is hard to provide incentives for actions that cannot be observed by one of the parties and a good example of this is the choice of work intensity<sup>60</sup> by a worker. Hidden state leads to the problem of one of the parties not having complete information about the environment or characteristics of the other party which affects the gains and distribution from the exchange. In both of these cases, parties may gain from trying to learn about the condition or actions that are hidden from them. The two most common examples of the effects of the asymmetric information are adverse selection and moral hazard, as we will see hereafter.

#### **Adverse selection**

Adverse selection occurs when information asymmetry pertains to a prior condition and the possibility arises that the terms of the contract will affect the characteristics of the set of agents who seek an exchange relationship. Greenwald (1986) shows that when adverse selection is viewed in interactions between workers and current or future employers, job changers are primarily composed of lower-ability workers as firms court higher-ability workers. This will inhibit turnover by firms which are unwilling to hire from the job-changing pool except at low wages and by workers who, upon changing jobs, subsequently have less bargaining power and wages. An interesting observation from the literature is that workers who are laid off due to factors other than plant closures are likely to have lower earning losses in post-displacement employment as a group than workers who lose their jobs through plant closures because the former are of a higher quality because they are displaced from larger, higher-wage establishments (Krashinsky, 2002).<sup>61</sup> Additional evidence suggests that as firing costs increase, firms are increasingly likely to prefer hiring employed workers who are less likely to be low-performing (Kugler and Saint-Paul, 2004).

#### **Moral hazard**

Moral hazard may arise when workers can choose the level and amount of effort they put into a task but the employer can only observe the worker’s output. If there is uncertainty about the output, then the employer cannot discern whether a good product is just luck or the result of effort and whether a low-quality output is the result of bad luck or lacking effort. It may arise in the context of software programming, for example, where malfunctions may be the result of bad luck due to unsuccessful interfaces with other software, or

may be the result of a lack of programming effort on the part of the worker. A general solution is to provide incentives to the worker through profit-sharing, stock options, franchising and the like. Moral hazard plays a central role in many models which depict contractual relationships in the labour market. Johansson and Palme (2005) explore the moral hazard problem in the Swedish national sickness insurance and find that the overall prevalence of work absence increased after the reform.

Within the literature, there are two main ranges of models which incorporate asymmetric information. These are the fair wage models and the efficiency wage models.

### **Fair wage models**

Introduced by Akerlof and Yellen (1990), fair wage models assume that workers expect a premium as a condition for exerting effort when working in a more profitable firm. It explains persistent wage differentials within and between industries in the economy. The fundamental insight of the fair wage model is that workers might withhold effort if they perceive that they are being unfairly compensated. In these models, the existence of involuntary unemployment is explained by the fair wage exceeding the market-clearing wage. Firms will not hire unemployed workers at a lower wage because of the absence of a credible commitment mechanism to ensure that these workers will not have the same fairness considerations once hired.

An important innovation in the fair wage models has been the operationalization of the notion of fairness as aversion to inequity (Fehr and Schmidt, 1999). In this framework, workers are willing to give up some material payoff in order to resist inequitable outcomes. In Fehr and Schmidt (1999), the workers' reference outcome for judging the return to their work is the average of the wage rates of the peers of the other skill group and the own market-clearing wage instead of the payoff of the firm which was the case in Akerlof and Yellen (1990). In this framework, the main result is that inequity aversion leads to a positive correlation between wages and effort and provides an incentive to firms to pay workers above the competitive level. There has been strong empirical evidence from economics and experimental psychology backing up the importance of the notion of fair wages in determining wage outcomes.<sup>62</sup>

### **Efficiency wage model**

In the efficiency wage model, imperfect monitoring and the incentive to shirk on the part of the workers

leads to firms offering slightly higher (above-market) wages (Shapiro and Stiglitz, 1984). In efficiency wage models, firms use the number of workers to control the labour input and the wage rate as an instrument to ensure that each unit of effort from each worker is supplied at minimum cost (Pissarides, 2000). Efficiency wage models can be very useful in explaining involuntary unemployment, segmented labour markets and wage differentials across firms and industries for homogeneous workers. Empirical evidence has shown robust support for efficiency wage models in both developing and developed countries.<sup>63</sup>

### **(iv) Search and matching, trade and technology**

Search and matching in the labour market feature prominently in many of the mechanisms linking trade to labour market outcomes that have been explored in the recent literature. One line of research continues to assume competitive labour markets and introduces assortative matching (i.e. positive matching between agents who have similar characteristics) between heterogeneous workers and employers, with wages varying across employers as a result of differences in workforce composition and bargaining over the incremental surplus that an additional worker adds to an employer's business. Pure bargaining models in the presence of search and matching frictions generate similar wage outcomes and market segmentation as fair-wage and efficiency-wage models, including wage premia between industries and employers for otherwise equally skilled workers. The basic mechanism is that employers that generate a higher surplus in the product market share a part of the surplus with workers through bargaining.

Another line of research introduces labour market frictions so that workers with the same characteristics can be paid different wages by different firms. For example, efficiency or fair wages can result in wage variation across firms when the wage that induces worker effort, or is perceived to be fair, varies with the revenue (surplus) of the firm. In addition, search and matching frictions and the resulting bargaining over the surplus from production can cause wages to vary across firms.

Models with labour market frictions can also account for varying equilibrium levels of unemployment as globalization or technology changes. These models predict that unemployment can rise or decline with globalization, depending on specific characteristics of the labour market. In these models, globalization and technology can operate in similar ways and reinforce each other: technology that results in

productivity improvements can be akin to a reduction in variable trade costs; technology that alters the product appeal to consumers is similar in its equilibrium consequences to both those changes; technology and product-market access abroad reinforce each other, with technology raising the surplus from exporting and export-market access boosting the returns to technology adoption. In general, technologically more advanced firms and exporters generate a higher surplus, employ more workers, share the surplus by paying higher wages than their competitors to similarly able workers, and hire more skilled workers.

Several studies highlight the trade-induced changes in match quality as a key aspect of trade in terms of welfare, employment and wage inequality. More recent studies have started to complement the analysis of cross-industry and cross-firm matches with an analysis of within-firm matches. Findings from this broad line of research are discussed in more detail in Section D and in Muendler (2017).

## 4. Conclusions

This section presents a number of major trends in labour market outcomes and introduces some basic insights from labour economics and macroeconomics. It provides a context for a discussion of the labour market effects of trade and technology. It shows that, while trade and technology are important sources of change to be considered in subsequent chapters, institutional and political conditions, as well as inherent mobility frictions, shape the labour market performance regardless of the origins of economic changes.

Trends in labour force participation, employment-to-population ratios, the unemployment rate and real wages have not shown dramatic changes in aggregate labour market outcomes over the past two decades, other than those related to the Great Recession. The overall labour force participation rate has, on average, remained relatively constant in both high- and low-income economies, but has decreased in middle-income economies. These broad trends, however, mask large differences across countries, including between economies in the same region or with a similar level of economic development.

These different evolutions in labour force participation are associated with differences in changes in output growth in response to business cycle fluctuations, with differences in population growth, or with differences in the extent of the relative increase in the female participation in the labour force. Similarly, unemployment rates do not exhibit any long-term

trends but patterns remain highly country-specific, underscoring the diverse and idiosyncratic conditions prevailing in different countries. Also, while average hours worked decreased in higher-income countries, they increased in lower-income countries. Finally, real wages have been growing in recent years but at a slower pace than before the financial crisis. These broad trends, however, also hide large differences across countries, including between economies in the same region or with a similar level of economic development.

At a more disaggregated level, labour markets across many developed and developing countries have experienced profound changes in the last 25 years, with a sustained shift of employment from agriculture and manufacturing towards services. At the same time, the labour markets of many developed countries and several developing countries have become polarized due to the relative decline in the number of middle-skill/middle-paid jobs compared to the relative increase in the number of low-skill/low-pay and high-skill/high-pay jobs. Both phenomena may be relatively disruptive for workers who face the risk of job loss and having to switch jobs.

The diversity of outcomes across countries is in line with one of the main insights from labour economics introduced in Section B.3, which suggests that country-specific factors play an important role in explaining labour market outcomes. Section B.3 explains why the impact of technology and trade needs to be assessed in the context of the other major factors shaping supply and demand for labour and their influence on wages and employment, including macroeconomic conditions, labour market institutions and mobility frictions. The 2007/08 financial crisis, for example, delivered a profound shock to labour markets across many countries – irrespective of longer-term technology or trade-driven change – from which they are still recovering. This subsection examines in particular how search and matching frictions, mobility frictions or skills mismatches can prevent a smooth adjustment of the labour market, limiting the productivity gains from technology and trade, contributing to short-term unemployment, and widening the gap between the winners and losers from economic change.

Additionally, while the theoretical models and concepts discussed in this section broadly apply to all economies, it is important to note that there are salient differences between labour markets in developing and developed countries which may affect the analysis of the interlinkages between trade, technology and jobs. These include the higher segmentation of labour markets in developing

countries, high informality rates, ranging between 40 and 80 per cent of the employed labour force in developing countries, the larger share of employment in developing countries compared to developed

countries and the different role played by self-employment in developing countries, where better employment is usually found in wage employment instead of self-employment.



## Appendix B.1: Labour force participation rate

As discussed in Section B.1, the labour force participation rate is shaped by economic, demographic and social change. This appendix reviews some of these changes in detail.

Appendix Figure B.1 documents the sharp increase of the correlation between GDP growth and labour force participation rate since the Great Recession measured by the linear trend. While the correlation was statistically not different from zero prior to the Great Recession in 2007, it has turned positive (and statistically significant) since the end of the Great Recession in 2011.

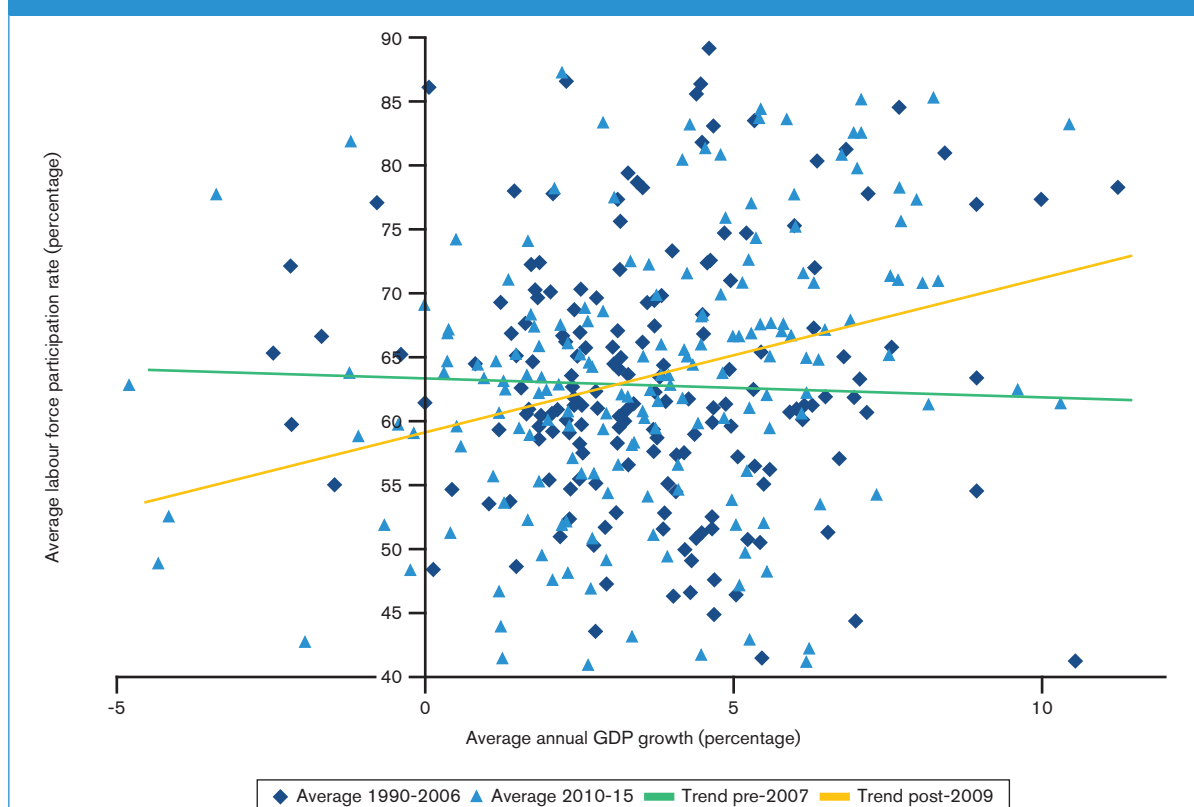
Besides business-cycle fluctuations, changes in labour force participation rate also reflect changes in population growth. As shown in Appendix Figure B.2, the correlation between the average annual change of labour force participation rate and the average annual change of prime working age population (aged 25-54), measured by the linear trend, is significantly stronger for economies with high total population growth (early and late demographic dividend countries) than

those with lower population growth (pre- and post-demographic dividend countries). However, given that the demographic dynamic remains specific to each country, the relationship between labour force participation rate and population growth differs significantly across countries.

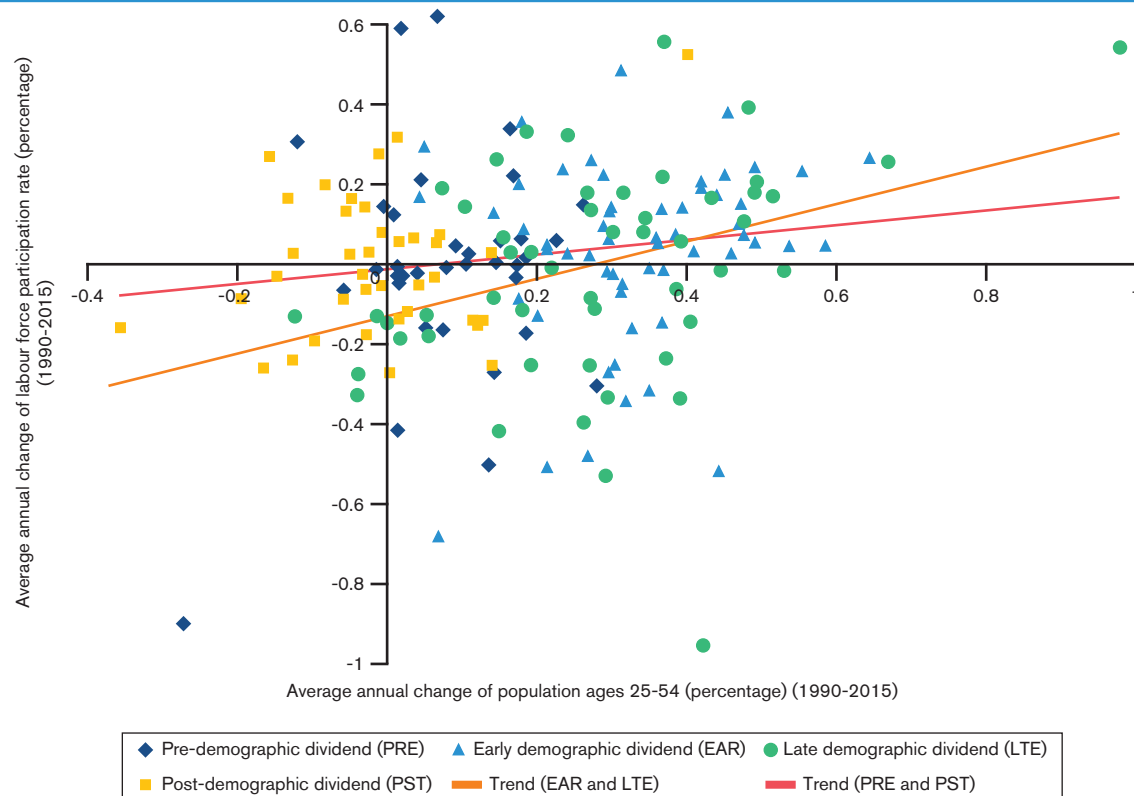
The evolution of labour force participation rate reflects also the relative decline in the labour force participation among the young aged 15 to 24 and the relative increase in the labour force participation among older individuals aged 54 to 64, as depicted in Appendix Figure B.3. Although the decline in the labour force participation among the young has been occurring in both developing and developed economies, the rise in labour force participation among older individuals tends to be larger in developed economies than in developing economies.

The expansion of secondary and tertiary education in the last 25 years explains also part of the different evolution of labour force participation rate across countries.

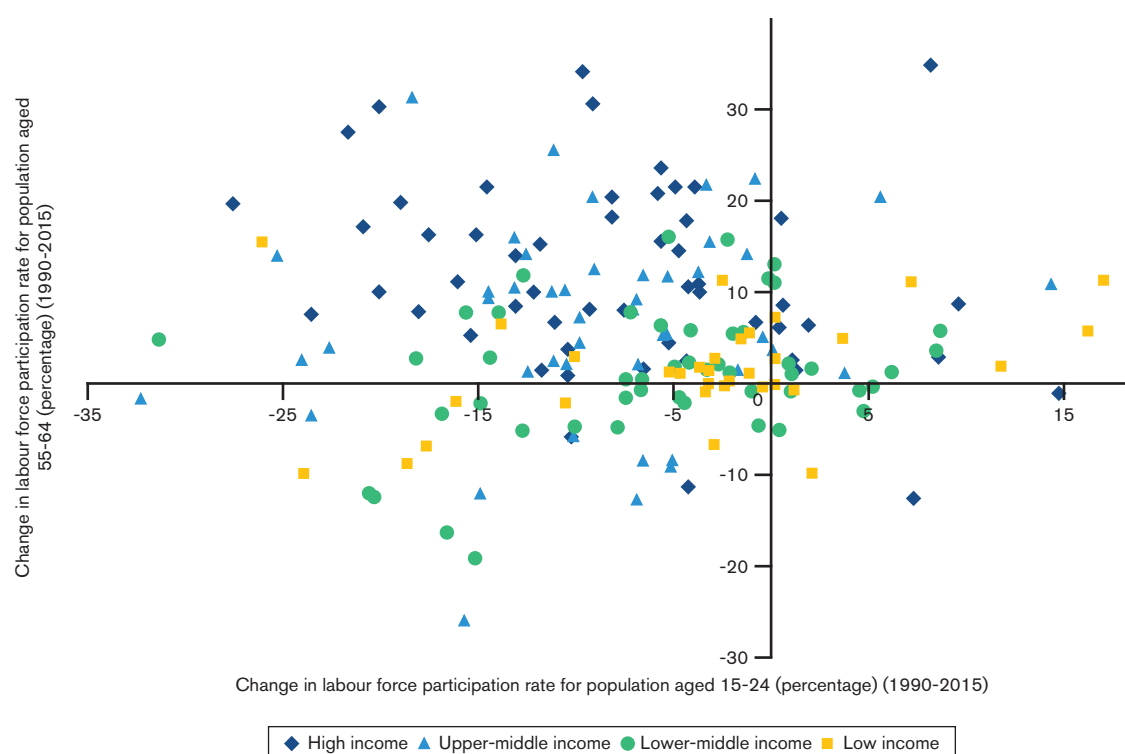
**Appendix Figure B.1: Labour force participation rate and output growth (1990 to 2015)**



Source: ILO, ILOSTAT database (July 2017), World Development Indicators (July 2017).

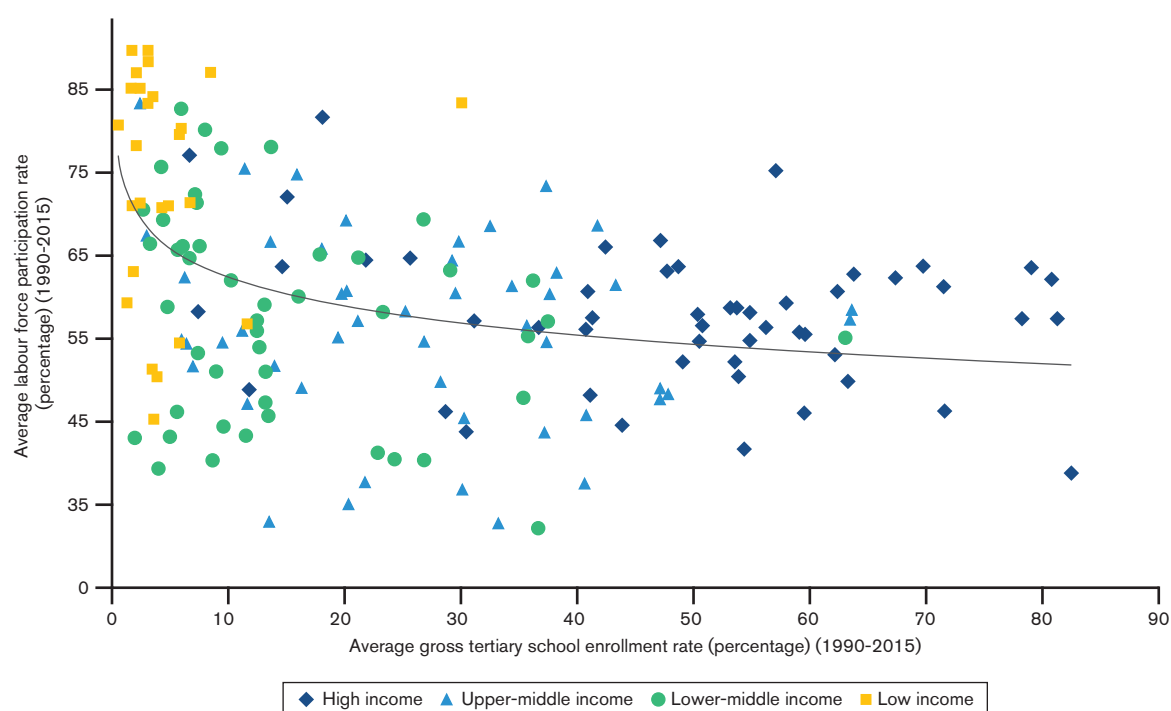
**Appendix Figure B.2: Labour force participation rate and population growth (1990 to 2015)**

Source: ILO, ILOSTAT database (July 2017).

**Appendix Figure B.3: Labour force participation rates for populations aged 15-24 and 55-64 years old (1990 to 2015)**

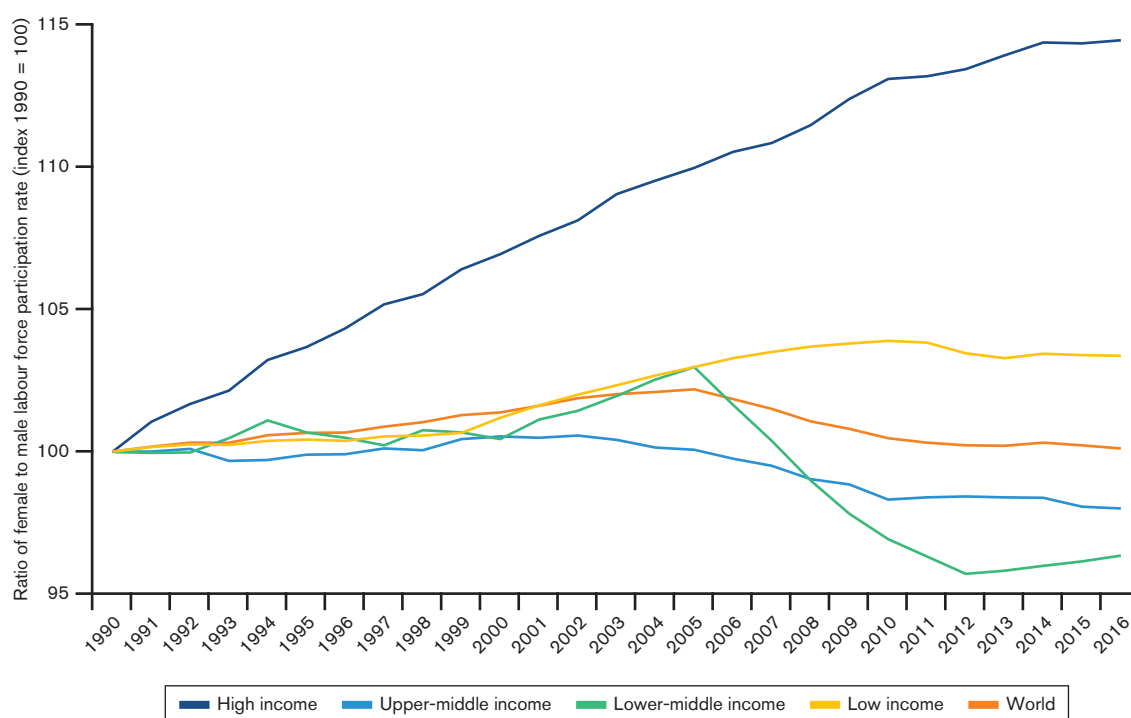
Source: ILO, ILOSTAT database (July 2017).

Appendix Figure B.4: Labour force participation rate and tertiary school enrolment (1990 to 2015)



Sources: ILO, ILOSTAT database (July 2017), World Development Indicators (July, 2017).

Appendix Figure B.5: Evolution of the ratio of female to male labour force participation rate (1990 to 2016)



Source: ILO, ILOSTAT database (July 2017).

As shown in Appendix Figure B.4, the labour force participation rate tends to be lower when the tertiary school enrolment rate is high, because part of the individuals pursuing higher education tends to be temporarily out of the labour market. However, the relationship between the tertiary education enrolment rate and labour force participation rate remains heterogeneous even among countries with a similar level of economic development.

The evolution of labour force participation rate is also driven by two opposite trends, namely the relative increase in the female participation in the labour force and the relative decrease in the male participation in the labour force. As depicted in Appendix Figure B.5, the ratio of female to male labour force participation has exhibited an upward trend in both low- and high-income countries, but a downward trend in middle income countries over the past 25 years.

## Appendix B.2: The competitive labour market model

### (a) The market for assemblers: a graphical analysis

Consider the market for a particular type of occupation, e.g. an assembler. To understand how the demand and the supply for assemblers react to changes in the wage rate and in their other determinants, and to see how they influence the competitive wage rate and employment on the market for assemblers, it is convenient to use a simple graphical representation of this market with the nominal wage rate of assemblers  $W^A$  on the vertical axis and the employment level  $E^A$  on the horizontal axis (see Appendix Figure B.6).

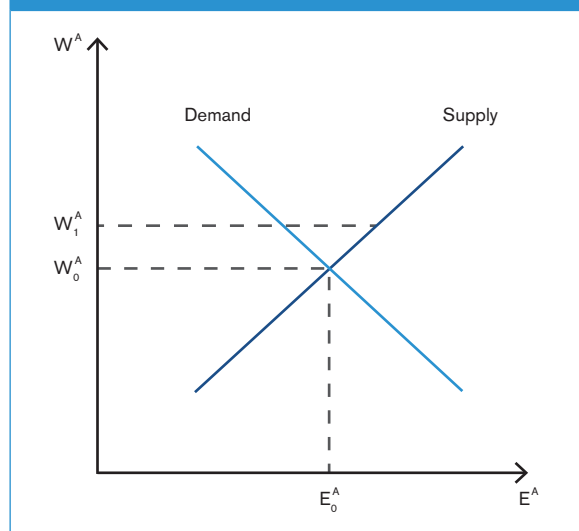
In Appendix Figure B.6, the labour demand schedule represents the number of assemblers that firms wish to hire at any level of the wage rate, assuming that all other factors that affect the demand (e.g. user cost of capital, product demand, product price, technology, and prices of intermediate inputs) are kept constant. The demand schedule is negatively sloped, as a given increase in the wage rate leads firms to reduce their demand for labour.

As for the labour supply schedule, it indicates the number of job-seekers who would be willing to work as assemblers at each level of the nominal wage rate, holding wages in other occupations constant. The labour-supply curve has a positive slope, as an

increase in the wage rate of assemblers, keeping wage rates in other occupations constant, leads more people to be interested in becoming assemblers. The slope of the labour supply curve reflects the sensitivity of the supply of labour to a change in the assembler wage rate. If the labour supply schedule is relatively flat, it means that a small increase in the market wage rate would have an important effect on the number of people interested in becoming assemblers. On the other hand, if the labour supply is relatively steep, it means that relatively few persons would respond positively in their labour supply to an increase in the wage rate of assemblers. In the extreme, when the labour supply schedule is vertical, then an increase in labour demand (an upward shift in the labour demand schedule) will only result in a higher wage but no additional employment.

A similar principle holds for the slope of the labour demand, which represents how responsive firms are to a change in the wage rate. If the labour demand is relatively steep, it means that firms would not strongly reduce their demand for assemblers in response to an increase in the wage rate. The sensitivity of supply or demand to changes in the wage can also be captured through the notion of elasticity. The elasticity of the supply of assemblers, for example, is defined as the percentage change in the supply of assemblers in response to a 1 per cent increase in wage. A relatively flat supply schedule is often described as an elastic supply.

**Appendix Figure B.6: Labour supply and demand for assemblers**

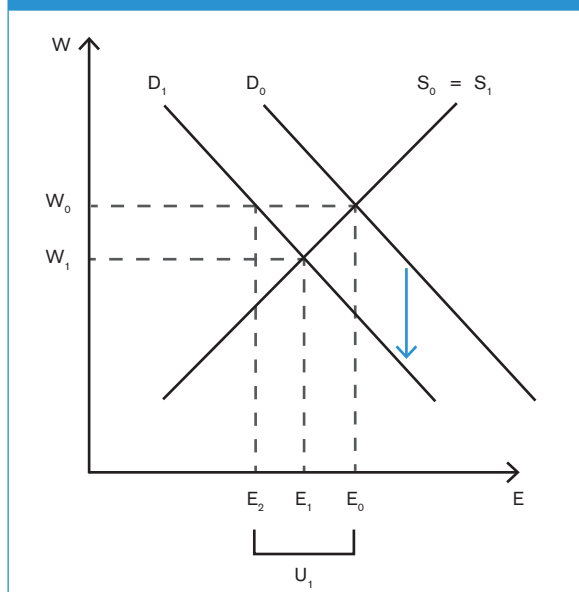


In a competitive labour market, with homogeneous workers and firms with no market power and with perfect information, the intersection of the labour supply and demand curves determines the equilibrium wage rate ( $W_0^A$ ). If the wage rate were set just above the equilibrium level, say at  $W_1^A$  labour supply would exceed labour demand which would put downwards pressure on the wage level. Similarly, if the wage level were set just below the equilibrium wage rate, excess demand for labour would raise the wage rate. The equilibrium level of the wage rate is sometimes called the market-clearing wage.

### (b) Cyclical unemployment in the competitive model

Appendix Figure B.7 represents the aggregate labour market, with aggregate employment and wages on, respectively, the horizontal and vertical axes. Initially,

Appendix Figure B.7: Cyclical unemployment



the labour market is in equilibrium, labour supply and demand meet to determine the equilibrium levels of employment,  $E_0$ , and wages,  $W_0$ . In this state of the economy, there is no unemployment other than frictional unemployment as, abstracting from natural

churn, the workers that would like to work are all employed, while the rest have chosen to remain out of the labour force. Suppose now that the economy enters the downswing phase of a business cycle and that the demand for final goods decreases. Firms produce less output and demand less labour, thus leading to a downward shift of the aggregate demand for labour, as is shown in Appendix Figure B.7.

If the wage rate were flexible downwards, it would fall to  $W_1$  and employment would decrease to  $E_2$ . However, for a number of reasons discussed in this report, wages may be rigid downwards. In the presence of wage rigidity, the wage rate would not fall to  $W_1$  following the decrease in labour demand but would instead remain at  $W_0$  while employment would shift to  $E_2$ . In this state of the economy, labour demand and supply do not clear and there is excess supply of labour. Indeed, at wage rate  $W_0$ , firms employ only  $E_2$  workers, while  $E_0$  workers would like to work for that wage. The difference between the level of employment in the economy, that is  $E_2$ , and the number of workers that would like to work at wage  $W_0$ , that is  $E_0$ , are the workers currently unemployed. As this unemployment is induced by the downswing phase of the business cycle, it is typically referred to as “cyclical unemployment”.



# Endnotes

- 1 Definitions of labour market indicators often differ across sources, making comparisons difficult. International organizations such as the Organisation for Economic Co-operation and Development (OECD) and the International Labour Organization (ILO) make efforts to harmonize data classifications to ensure cross-country comparability.
- 2 The International Labour Organization defines employment as persons of working age (typically aged 15 and older) who, during a short reference period, such as one week or one day, are engaged in any activity to produce goods or provide services for pay or profit. It encompasses paid employment (whether at work or with a job but not at work) and self-employment (whether at work or with an enterprise but not at work). The US Bureau of Labor Statistics defines employment as persons on the payroll who worked or received pay for the pay period that includes the 12<sup>th</sup> day of the reference month. Full-time, part-time, permanent, short-term, seasonal, salaried and hourly employees are included, as are employees on paid vacations or other paid leave. Proprietors or partners of unincorporated businesses, unpaid family workers, or persons on leave without pay or on strike for the entire pay period, are not counted as employed.
- 3 See WTO (2013) for a detailed discussion on the demographic transition and ageing.
- 4 Different factors can affect population growth and in particular the fertility rate, including rising incomes, higher educational attainment, family-friendly labour market institutions, and social and cultural changes such as increasing gender equality. Migration can also have an impact on population growth.
- 5 A similar pattern emerges when a population aged 16 and over is considered.
- 6 Over the last 25 years, education levels, including literacy rates, have continue to increase substantially in both developed and developing countries. Over the period 1950 to 2010, the average number of years of schooling among individuals aged 15 or over increased from 2.1 to 7.1 in developing countries and from 6.2 to 11.0 in developed countries (Barro and Lee, 2010). Countries in the Middle East and North Africa, Sub-Saharan Africa and South Asia achieved substantial, though uneven, progress in improving primary school access and increasing primary attainment rates.
- 7 See ILO (2017) for a discussion on female labour force participation over the past 20 years.
- 8 The unemployment rate is often criticized for providing a partial picture of the labour market. One shortcoming of the unemployment rate is that out-of-work individuals who stop looking for a job are counted as out-of-the-labour force, which reduces the unemployment rate in the particularly bad times. People in training are also not considered unemployed. Similarly, individuals in part-time employment may be looking for more work but their search goes unreported in the unemployment rate. That is why economists use at least two additional statistics: (1) the employment rate and (2) underemployment rate. Both variables are discussed in detail in the main text. See Sengenberger (2011) for a discussion on the issues related to the measurement of unemployment.
- 9 While employment growth in high-income countries is closely linked to the business cycle, (global) economic downturns often tend to have a limited impact on the employment growth in developing countries because of the relatively large incidence of self-employment or unpaid family work.
- 10 According to the ILO, employment in the informal economy is defined as the percentage of total non-agricultural employment, namely all jobs in unregistered and/or small-scale private unincorporated enterprises that produce goods or services meant for sale or barter. Self-employed street vendors, taxi drivers and home-base workers, regardless of size, are all considered enterprises (ILO, 2014a).
- 11 Although not discussed here, the informal employment rate also differs according to age groups and gender (ILO, 2016f; 2016g).
- 12 See Lee et al. (2007) for a discussion on the evolution of weekly working time trends in low- and middle-income countries.
- 13 As discussed next, workers can be broadly engaged in (1) wage employment, (2) self-employment and (3) unpaid family work.
- 14 Two main forms of underemployment can be distinguished: (1) invisible underemployment reflects a misallocation of labour resources, including the mismatch of occupation and skills; (2) visible (time-related) underemployment represents the involuntary part-time employment of individuals seeking or available for additional work. Invisible underemployment also encompasses the individuals partially unemployed because of a temporary, collective reduction in their normal work hours for economic, technical or structural reasons (Bollé, 1997).
- 15 In practice, an individual may fall in both categories.
- 16 General and specific human capital accumulation, such as the returns to employer, occupation, and industry tenure, has been identified as one of the main source of wage growth in high income countries. For instance, empirical evidence suggests that the main contributors to wage growth in the United States are the overall labour market performance and occupation tenure (Sullivan, 2010). Empirical evidence on the sources of wage growth in developing countries is scarcer and limited because of the lack of data availability. In a recent study on Indonesia, the returns to employer tenure are found to be higher than the returns to experience unlike in the United States. In addition, the returns to tenure in the formal sector are found to be relatively large representing the most important contributor of wage growth in Indonesia, while the return to tenure in the informal sector is not significant (Marinescu and Triyana, 2016).
- 17 The labour-income share has received increasing attention in the literature with a growing number of studies analysing the evolution and determinants of labour-income shares (ILO, 2011b; IMF, 2017; Schwellnus et al., 2017).
- 18 The ILO defines self-employment and unpaid work by contributing family workers as vulnerable employment because these forms of employment are less likely to have formal work arrangements, and are therefore more likely

to be associated with low or no employment protection, social security and effective representation, as well as low productivity and earnings, and higher uncertainty in income streams.

- 19 Although the number of working poor, defined as individuals living on less than US\$ 3.10 per day, has declined globally over the last 40 years, the levels of working poverty remain relatively high in many low- and lower-middle-income countries. Progress in reducing working poverty has slowed down in recent years, in part due to the Great Recession which increased the number of working poor in many countries. The incidence of working poor is different across demographic groups and tends to be higher among women and young people in both developed and developing countries (ILO, 2016g; 2017).
- 20 Most countries exclude agriculture from their measurements of informal economic activities.
- 21 The trend of the industry sector, which includes manufacturing among other industries, has evolved slightly differently. According to ILO estimates, the world share of industry employment in total employment increased from 19.5 per cent in 2000 to 21.8 per cent in 2011 followed by a period of relative stagnation and even small decline to 21.5 per cent in 2016. The average share of industry employment in total employment is relatively similar across many income groups and regions, ranging from 21.4 per cent in low-middle-income countries to 22.3 per cent and 24 per cent in high- and upper-middle-income countries in 2016, respectively. However, the average employment share in industry remains particularly low in low-income countries (8.3 per cent in 2016) and in Africa (12.9 per cent), in particular Sub-Sahara Africa (10.7 per cent), and the Caribbean (14.7 per cent).
- 22 The contribution of the services sector to GDP has also increased in many developed and developing countries.
- 23 Other skills classifications distinguish between cognitive, non-cognitive, and technical skills or between cognitive/problem solving, learning, personal/behavioural/ethical, and social and communication skills (World Bank, 2013).
- 24 Additional skill measures in the labour and macro-labour literatures include schooling years, active years in the labour force (potential labour market experience since a person's last educational degree), observed ability from aptitude or intelligence tests, and estimates of unobserved ability that is reflected in wages. See ILO-WTO (2017) for a discussion on skills measurement.
- 25 Training and skills development typically encompass three main elements. First, basic education enables individuals to acquire a basis for the development of their potential, laying the foundation for their future employability. Second, initial training enables individuals to acquire the core work skills, general knowledge, and industry-based and professional competencies necessary to facilitate the transition from education into the world of work. Third, lifelong learning enables individuals to maintain their skills and competencies as work, technology and skill requirements change (ILO, 2011a).
- 26 In many countries, migrant workers often tend to be over-represented in low-skill sectors (OECD, 2008).
- 27 Tasks performed by workers in elementary occupations usually include: selling goods in streets and public places, or from door to door; providing various street services; cleaning, washing and ironing; taking care of apartment houses, hotels, offices and other buildings; washing windows and other glass surfaces of buildings; delivering messages or goods; carrying luggage; door-keeping and property-watching; stocking vending machines or reading and emptying meters; collecting garbage; sweeping streets and similar places; performing various simple farming, fishing, hunting or trapping tasks; performing simple tasks connected with mining, construction and manufacturing, including product-sorting and simple hand-assembly of components; packing by hand; freight-handling; pedalling or hand-guiding vehicles to transport passengers and goods; and driving animal-drawn vehicles or machinery (<http://www.ilo.org/public/english/bureau/stat/isco/isco88/9.htm>).
- 28 Maloney and Molina (2016) further shows at a more disaggregated occupation level how the evolution of the occupations structure in many developing countries differ substantially over time and between countries. Some countries, such as the Dominican Republic, Ghana, Nicaragua, Viet Nam and Zambia, experienced an increase in employments in low-, medium-, and high skill occupations in the 2000s.
- 29 Different approaches have been used in the literature to estimate the skill premium. Some papers simply consider the relative wages between skilled and unskilled workers based on educational attainment (i.e., the ratio of highly to poorly educated wages). Yet, having a tertiary education does not necessarily imply that the tertiary education has caused the difference in pay. Other individual characteristics could explain the difference in wages. This is why the skill premium is often estimated econometrically by controlling for individual characteristics, such as gender, age, work experience and region. Different definitions of the skill premium have also been used, such as the wage ratios of non-production to production workers, of university to high school education or of high school to primary education.
- 30 Parro (2013) reports an increasing skill premium in China, Finland, Germany, India, Italy, Portugal, the Philippines, Spain, Sweden, Thailand, the United Kingdom and the United States between 1990 and mid-2000s, and in Colombia, Mexico and Uruguay between 1990 and 2000.
- 31 In the case of the United States, the skill premium also tends to be higher when the relative supply of skilled to unskilled workers is limited (Acemoglu and Autor, 2012).
- 32 Parro (2013) reports a declining skill premium in Austria, Canada, Denmark, France, Greece, Japan and the Republic of Korea between 1990 and the mid-2000s and in Chile between 1990 and 2000.
- 33 This subsection draws on a number of textbooks on labour economics including Ehrenberg and Smith (2012), Borjas (2013) and Jacobsen and Skillman (2004).
- 34 Workers choose the amount of consumption and leisure (and implicitly the amount of hours worked) that maximize their utility given a budget constraint, which depends on a given wage rate as the price of leisure and on non-labour income. Using this relationship, the optimal amount of leisure and the corresponding supply of labour can be expressed as a function of the wage rate.
- 35 In contrast to the labour demand, the relationship between the hours worked and the wage rate expressed by the labour supply is not unambiguous. Indeed, while we would expect that an increase in wages would lead workers to work more (substitution effect), an increase in wages could also lead workers to work less, as they might want to consume more hours of leisure once they are richer (income effect). Here

we consider only positively-sloped labour supplies, which is the standard case in which an increase in wages leads to an increase in employment, as the substitution effect dominates the income effect.

- 36 The discussion assumes that workers are linked to a single product in a specific production process. In multi-product firms, workers contribute to many products and labour demand effects of product innovations depend on economies of scope and cannibalization effects in the product market.
- 37 When a single employer faces an upward sloping labour supply schedule, its marginal expense curve lies above the labour supply curve reflecting the fact that marginal expense includes both the higher wage the firm pays to the extra workers and the additional cost of raising the wage for all other workers. The employer maximizes its profit by choosing the level of employment which equates its marginal expense to its marginal revenue and by setting the wage that allows it to get this optimal level of employment. In other words, the intersection of the labour demand curve and the marginal expense curve determines the optimal level of employment and the labour supply curve indicates the wage rate the firm needs to pay to get the optimal level of employment.
- 38 Many types of labour can contribute to production beyond the simple two factors case with labour and capital. Concretely, machinists and assemblers can enter the production process for the same product. Hence, there may also be a labour demand effect when the wage of machinists changes relative to the wage of assemblers.
- 39 Besides government interventions and the reasons discussed in the next subsection, other possible explanations of wage rigidity have been proposed. For example, if unions are strong enough, they may resist nominal wage cuts. Also, unemployment benefits and social welfare payments may serve as *de facto* nominal wage floors. As a further example, see the discussion in Ehrenberg and Smith (2012).
- 40 See the discussion of the available evidence in Jacobsen and Skillman (2004) for example.
- 41 See the definition of employment by the US Bureau of Labor Statistics in Box B.1. Job openings information is collected for the last business day of the reference month. A job opening requires that: 1) a specific position exists and there is work available for that position, 2) work could start within 30 days whether or not the employer has found a suitable candidate, and 3) the employer is actively recruiting from outside the establishment to fill the position. Included are full-time, part-time, permanent, short-term and seasonal openings. Active recruiting means that the establishment is taking steps to fill a position by advertising in newspapers or on the Internet, posting help-wanted signs, accepting applications, or using other similar methods. Jobs to be filled only by internal transfers, promotions, demotions or recall from layoffs are excluded. Source: US Bureau of Labor Statistics, Job openings and labour turnover, March 2017; [https://www.bls.gov/news.release/archives/jolts\\_05092017.pdf](https://www.bls.gov/news.release/archives/jolts_05092017.pdf)
- 42 The quits count includes voluntary separations by employees (except for retirements, which are reported as other separations). The layoffs and discharges count is comprised of the following: involuntary separations initiated by the employer and includes layoffs with no intent to rehire; formal layoffs lasting or expected to last more than seven days; discharges resulting from mergers, downsizing, or closings; firings or other discharges for cause; terminations of permanent or short-term employees; and terminations of seasonal employees. The other separations count includes retirements, transfers to other locations, deaths, and separations due to disability. Source: US Bureau of Labor Statistics, Job openings and labour turnover, March 2017; [https://www.bls.gov/news.release/archives/jolts\\_05092017.pdf](https://www.bls.gov/news.release/archives/jolts_05092017.pdf)
- 43 As discussed in the next subsection, another way to explain cyclical unemployment would be to argue that during a recession, vacancy postings decrease, while the number of workers searching for a job increases as a result of job losses in shrinking firms so that, overall, there are more unemployed workers in the search process.
- 44 In practice, workers unemployed for a significant period of time become less employable. Remedial measures may be required to keep them connected with the job market and prevent the rise of long-term unemployment.
- 45 In developing countries, the size and characteristics of the labour market make matching theories more realistic in their simulation of the labour market exchanges than the competitive models.
- 46 See a detailed description of the model in Mortensen and Pissarides (1994) and Shimer (2005).
- 47 This means that a random probability distribution which cannot be predicted precisely is used in order to simulate how workers get unemployed, find work and attain employment.
- 48 Labour market tightness is defined as the proportion of vacancies to unemployment. In a market where the proportion of vacancies to unemployment is relatively high, it is hard for employers to fill their vacancies. Hence we speak of a tight labour market.
- 49 The bargaining models of wage determination assume that wage levels are the result of negotiation between the relevant stakeholders in the labour exchange process (e.g. workers and employers).
- 50 Acemoglu (2001) analyses the effect of labour market regulation on the composition of jobs using a theoretical model where matching between firms and workers is dependent on the unemployment rate and the vacancy rate with the underlying assumption that search is undirected. Lise and Robin (2017) develop an equilibrium model of on-the-job search with heterogeneity of workers and firms, aggregate uncertainty and vacancy creation and assess the fit to US time series data in order to look at various labour market outcomes. Satchi and Temple (2006) develop a general equilibrium model with matching frictions in the urban labour market with the possibility of self-employment in the informal sector and the scope for rural urban migration in order to investigate the effects of different types of growth on wages and the informal sector.
- 51 See Jacobsen and Skillman (2004).
- 52 There could be strategic complementarities leading to coordination or negative externalities if a worker's increased search intensity reduces the prospect that other workers will achieve a match.
- 53 Labour intensity is the relative proportion of labour to other inputs in a production process.
- 54 See for instance Stole and Zwiebel (1996a; 1996b).
- 55 A worker's net surplus is revenue less expenses for intermediate goods and capital goods, or the labour-related part of value added.

- 56 Quasi-rents are defined as returns to a factor (for example labour or capital) which are in excess of what is needed in order to retain that factor in its current use (Jacobsen and Skillman, 2004).
- 57 A worker's or a manager's effort is hard to verify and enforce. However, observed results, such as output or success in the product market, can be used to design incentives that can be enforced.
- 58 See for example Shapiro and Stiglitz (1984) and MacLeod and Malcomson (1989).
- 59 A double auction is a process where buyers and sellers submit bids for the prices they are willing to buy and sell at respectively without the other's knowledge. An auctioneer then chooses a market clearing price. The buyers who bid higher than this price buy and the sellers who bid lower than this price sell.
- 60 Work intensity is a measure of the effort exerted in relation to the capacity of performing a particular job.
- 61 This labour market view is predicated on the idea that (i) the hidden state of a worker is his/her initially unobserved ability that can be learnt over time and (ii) the hidden state is a portable ability that matters to all employers to a similar extent. However, some initially unobserved abilities may be important matches for some employers, but unimportant for other employers. In that case, the type of layoff does not offer relevant information to the subsequent employer.
- 62 See for example Bewley (1998; 2002), Campbell and Kamlani (1997), Blinder and Choi (1990), or Kahneman et al. (1986).
- 63 See for example Velenchik (1997), Rebitzer (1995), or Rebitzer and Taylor (1995).