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Population ageing: Alternative measures of dependency and implications for the future of work

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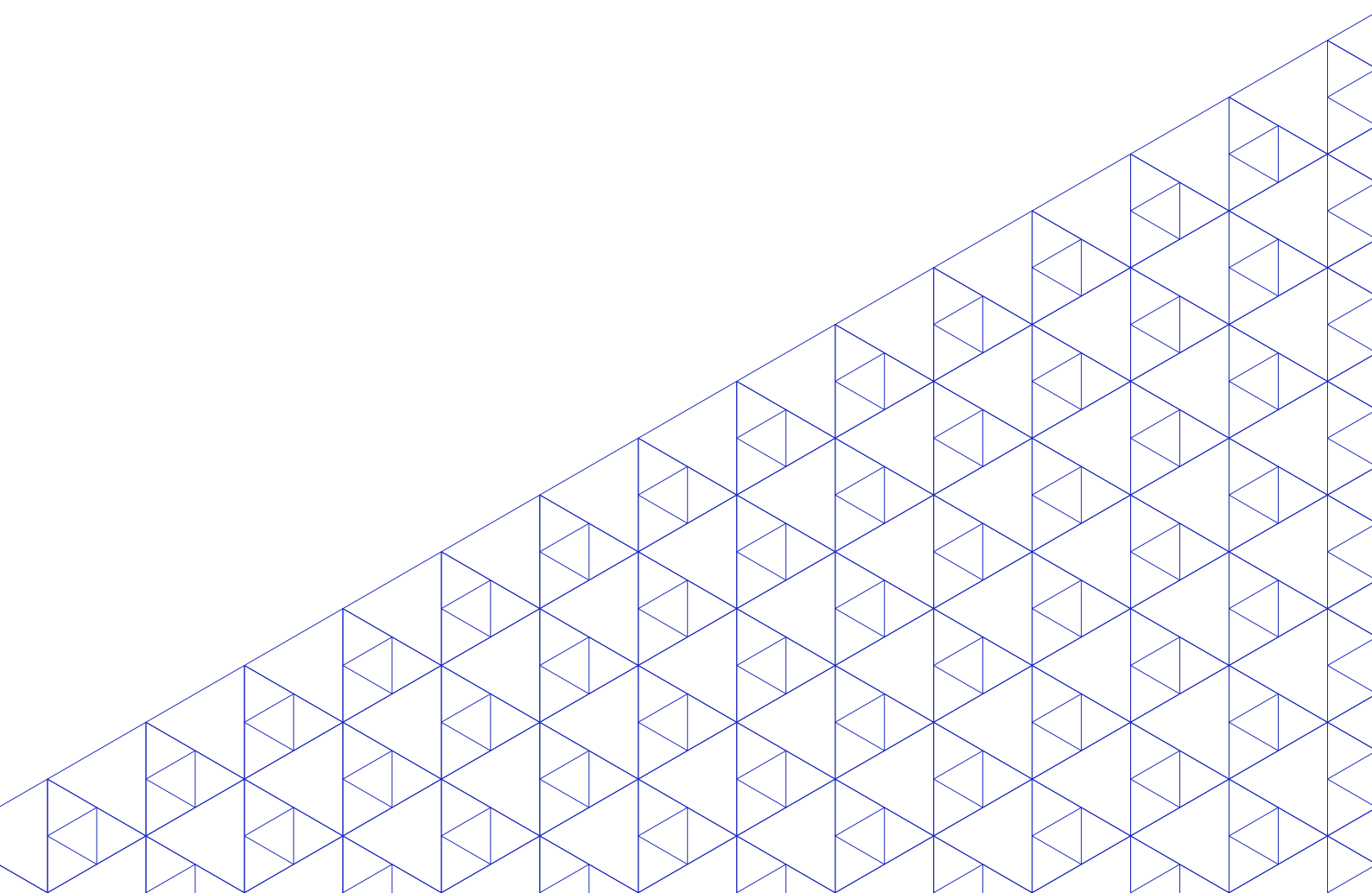


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► **POPULATION AGEING: Alternative measures of dependency and implications for the future of work**

Authors / Claire Harasty, Martin Ostermeier





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► Abstract

The world's population is getting older, a phenomenon that has important implications for the future of work. Persons aged 55 years and over are expected to outnumber all children aged 0 to 14 years by 2035 and the entire child and youth population aged 0 to 24 years by 2080. As a direct consequence of population ageing, the number of older workers aged 55 to 64 years is increasing and is set to equal one quarter of the global labour force by 2030.

This paper examines the projected labour force participation trends of older workers to 2030 and discusses the future of economic dependency for developing, emerging and developed countries. It introduces five alternative measures of economic dependency to account for the fact that persons of working age may not be working or may be facing employment conditions that compromise their capacity to support themselves and others. Such conditions include scenarios where workers are unable to work as many hours as they would like, or where they are in situations of vulnerable employment or working poverty. These alternative measures therefore not only take into account demographic and quantitative labour market characteristics, such as age structure, activity status and unemployment, but also consider qualitative dimensions such as underemployment, labour income and vulnerability.

Using a very rich ILO data set that provides a consistent series of labour market data for all countries with forecasts to 2024 and beyond, the paper provides estimates for these new dependency measures and makes a number of policy recommendations to address the impact of ageing on decent work.

► About the authors

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► Acronyms

ABDR	Activity-based dependency ratio
DDR	Demographic dependency ratio
EBDR	Employment-based dependency ratio
Eurofound	European Foundation for the Improvement of Living and Working Conditions
ILO	International Labour Organization
LFEP	Labour Force Estimates and Projections
LFPR	Labour force participation rate
LUDR	Labour underutilization dependency ratio
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing power parity
UNDESA	United Nations Department of Economic and Social Affairs
VEDR	Vulnerable employment dependency ratio
WPDR	Working poverty-based dependency ratio

▶ Introduction

The world's population is getting older, a phenomenon that has important implications for the future of work. In 2014, persons aged 55 years and over outnumbered young persons aged 15 to 24 years, and they are expected to outnumber all children aged 0 to 14 years by 2035 and the entire child and youth population aged 0 to 24 years by 2080 (UNDESA 2019b). In this context, it is important to analyse the ways in which future demographic shifts will impact the labour markets. First, smaller cohorts of young persons and larger groups of older persons will call for adjustments in the labour market, with consequences for the labour force participation of older women and men. With greater numbers of older workers in the labour force, workplaces will need to adapt in terms of occupational safety and health, working hours and work organization in order to enable the continuing participation of these workers in the labour market. Active ageing policies, including targeted retraining, reskilling and upskilling, will become necessary in order to retain the employability of older workers. Second, there will be an increased need for workers, services and industries to care for the elderly population. Large numbers of new jobs and enterprises will be created in sectors such as healthcare and long-term care (ILO 2018a), pharmaceuticals and housing adapted to the needs of older citizens. These new employment opportunities will require the acquisition of new skills, and these types of careers will need to be promoted. Third, the public debate places considerable attention on the impact that these demographic shifts will have on dependency rates, that is, the ratio of persons who are not of working age (0 to 14 years and 65 years and over) to that of the working-age population (15 to 64 years). These ratios are expected to rise in countries with ageing societies. As a result, a growing number of non-working-age persons will increasingly depend upon a shrinking number of persons of working age. This could slow down economic growth, generate lower tax revenues and threaten the financial sustainability of social protection systems. However, it is becoming increasingly apparent that the standard age-based dependency measure does not adequately capture the situation.

This paper is structured as follows: the first chapter takes a closer look at global population ageing and the labour force participation trends of older workers,¹ based on the projections of the International Labour Organization (ILO) and the United Nations Department of Economic and Social Affairs (UNDESA). In the second chapter, alternative measurements of dependency are proposed that take into account the fact that many working-age persons either do not participate in the labour market or face employment conditions that compromise their economic independence. Such conditions include situations where workers are unable to support any dependants or do not contribute through taxes and wealth creation to the financing of education, healthcare and social protection. These alternative measures are disaggregated by sex and based on age-specific indicators of labour market activity and unemployment, as well as on qualitative components of employment, such as income, working hours and vulnerability. In a demographic context of an ageing labour force, these new measures indicate possible policy directions for avoiding unsustainable dependency rates, which would undermine economic and social development. The report concludes with a summary of our findings and specific policy options.

¹ In this paper, older workers are defined as workers aged 55 years and over.

► 1 Population ageing and labour force trends among older age cohorts

As a population ages, so does the workforce. Globally, the share of older workers aged 55 to 64 years in the total labour force has been increasing since 2000 and will continue to rise significantly until 2030. This trend will be particularly marked in emerging and developed countries, where it will reach 13.2 per cent and 17.7 per cent of the workforce respectively, compared to 7.9 per cent in developing countries (ILO 2019c). In total, between 2000 and 2030, the share of older workers in the labour force will have increased by 2.5 per cent in developing nations, by 76 per cent in developed economies and by 80 per cent in emerging countries.

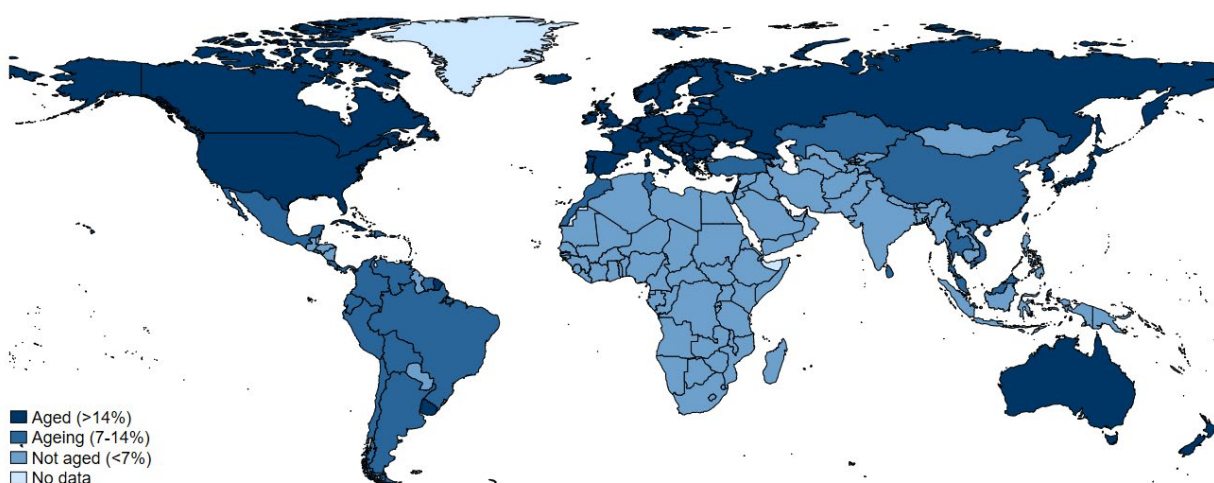
We use the ILO 2019 Labour Force Estimates and Projections (LFEP) database to analyse ageing trends globally and by broad income groups² and to assess their impact on labour force participation rates for women and men.

► The world is getting older: more than three quarters of countries will either be ageing or already aged by 2050

The following figures show the projected proportion of the population aged 65 years and over in the total population at country level for the years 2020 (figure 1 (a)), 2030 (figure 1 (b)) and 2050 (figure 1 (c)). Drawing from Oizumi et al. (2006), a country is categorized as an “aged” society when the share of persons aged 65 years and over reaches 14 per cent or more of the total population, as “ageing” when it accounts for between 7 and 14 per cent, and as “not aged” when it constitutes less than 7 per cent of the total.

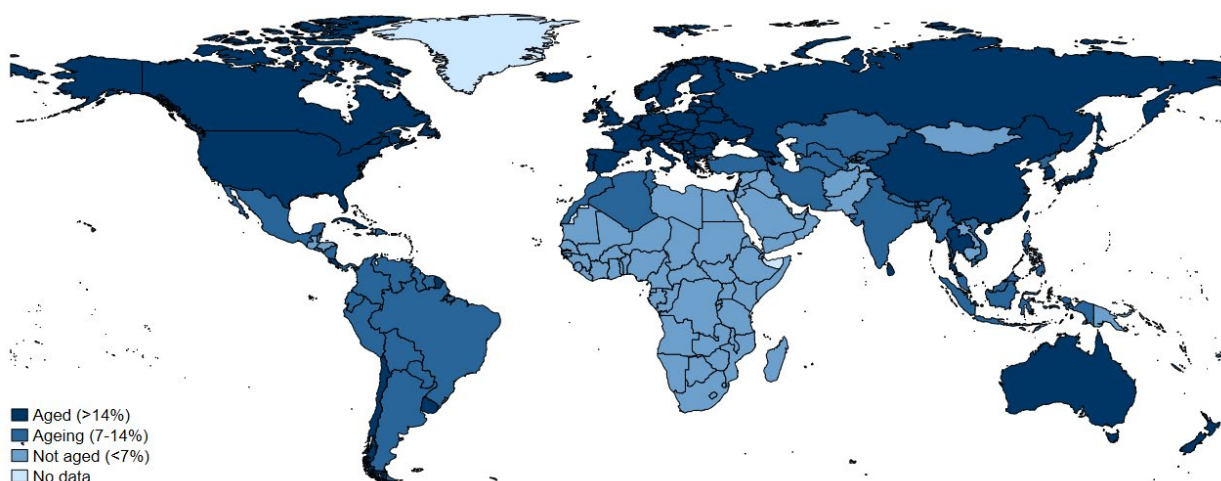
► **Figure 1. Global ageing status in 2020, 2030 and 2050: share of population aged 65 and over in total population**

► **(a) Global ageing status in 2020 (share of population aged 65 and over in total population)**

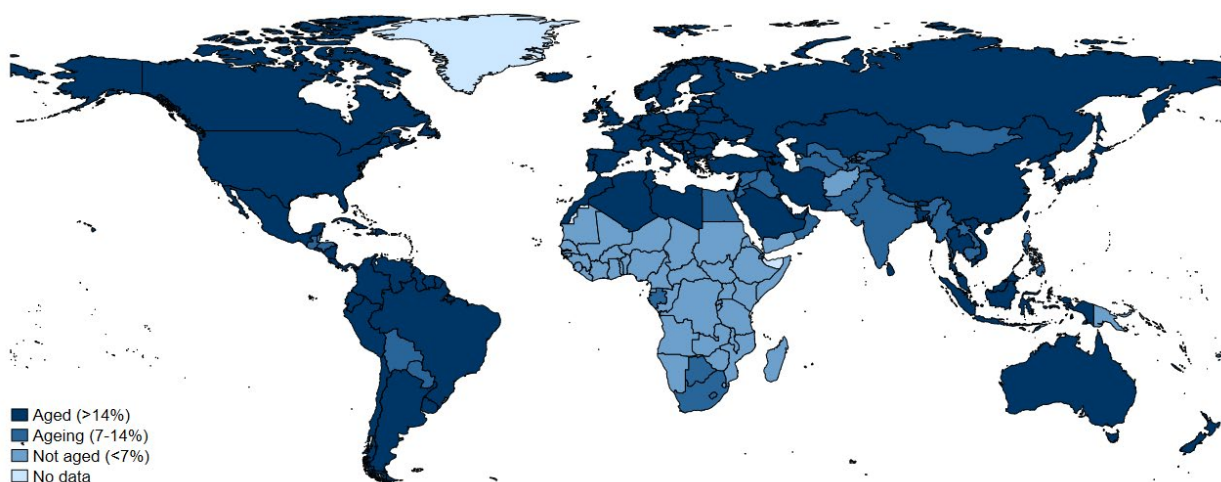


² The income groups utilized in this paper are based on the new ILO classification of countries by level of income, where the “developing countries” group corresponds to the World Bank low-income countries classification, the “emerging countries” group includes both lower- and upper-middle-income countries, and the “developed countries” group corresponds to high-income economies. See details of these income groupings in Annex, table A2.

► (b) Global ageing status in 2030 (share of population aged 65 and over in total population)



► (c) Global ageing status in 2050 (share of population aged 65 and over in total population)

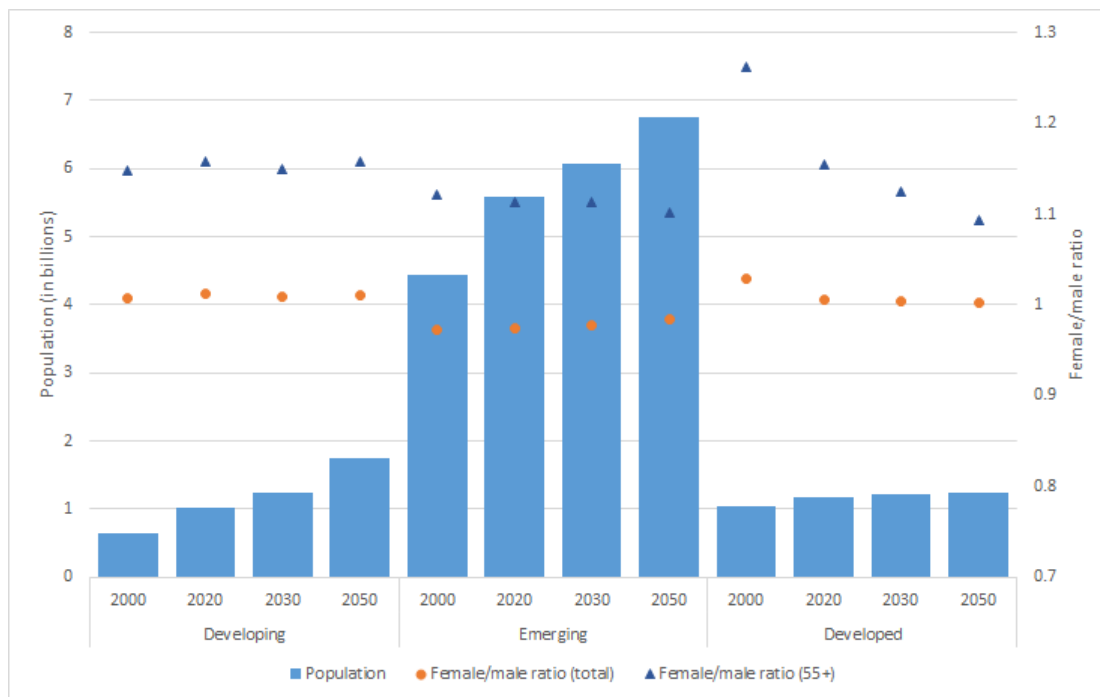


Source: calculations based on UNDESA World Population Prospects 2019.

In 2020, 54 countries are classified as aged societies, most of them developed countries (72 per cent), while another 42 predominantly emerging countries (79 per cent) are deemed to be ageing. By 2030, 51 countries will be ageing and 67 will be aged; in 2050, the ageing phenomenon will have progressed further, with 36 ageing and 111 aged societies. As a result, the number of countries immediately concerned by population ageing will increase significantly from 96 in 2020 to 147 in 2050 – that is, more than three quarters of all countries and around 87 per cent of the global population. The 16 most aged countries will have very high shares of older persons, who will account for more than 30 per cent of the total population. Sub-Saharan Africa will be home to the world’s most youthful populations, since more than 85 per cent of the region’s countries will not have begun this demographic transition, while Europe and Central Asia will have the oldest populations, as almost 92 per cent of countries in the region will have aged (see Annex, table A1 for a detailed overview by region).

The latest UNDESA (2019b) population projections to 2050 indicate that the global population will reach 9.7 billion, with major increases in emerging and developing countries (see figure 2). Overall, the numbers of women and men are about equal, although the female–male ratio is slightly smaller in emerging countries, with around 97 women per 100 men. At older ages, women outnumber men owing to their longer average life expectancy (UNDESA 2019a). However, the projected rise in life expectancy for men, which reflects improvements in economic and health conditions, will rebalance this situation over time, especially in developed countries.

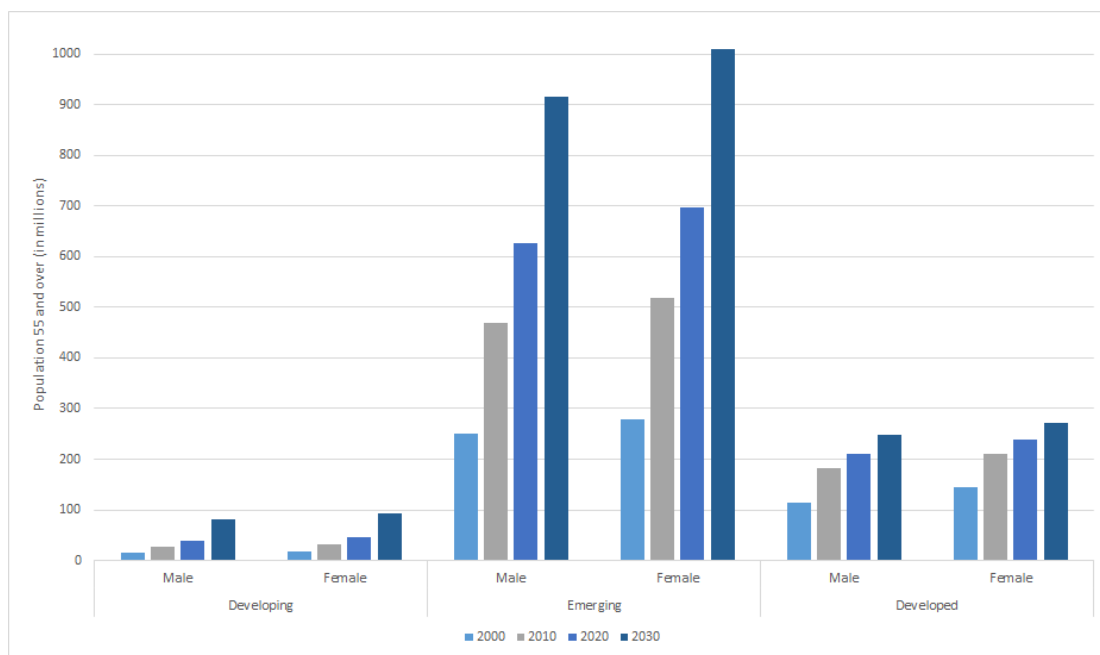
► **Figure 2. Total population (in billions) and female/male ratio, 2000–50**



Source: calculations based on UNDESA World Population Prospects 2019.

The vast majority of persons aged 55 years and over will be located in emerging countries, where almost 1.9 billion persons will be over 55 years of age in 2050 (see figure 3). However, the strongest increase in the over-55 population is expected to be seen in developing countries, where it will almost triple between 2020 and 2050 from a small base in absolute numbers. Over the same period, the over-55 age group will double in emerging countries and grow by a factor of 1.3 in developed countries. Compared to the total population, the share of the older cohort will be highest in developed economies (40 per cent), followed by emerging (28 per cent) and developing countries (14 per cent).

► **Figure 3. Population aged 55 years and over (in millions), by sex and income group, 2000–30**

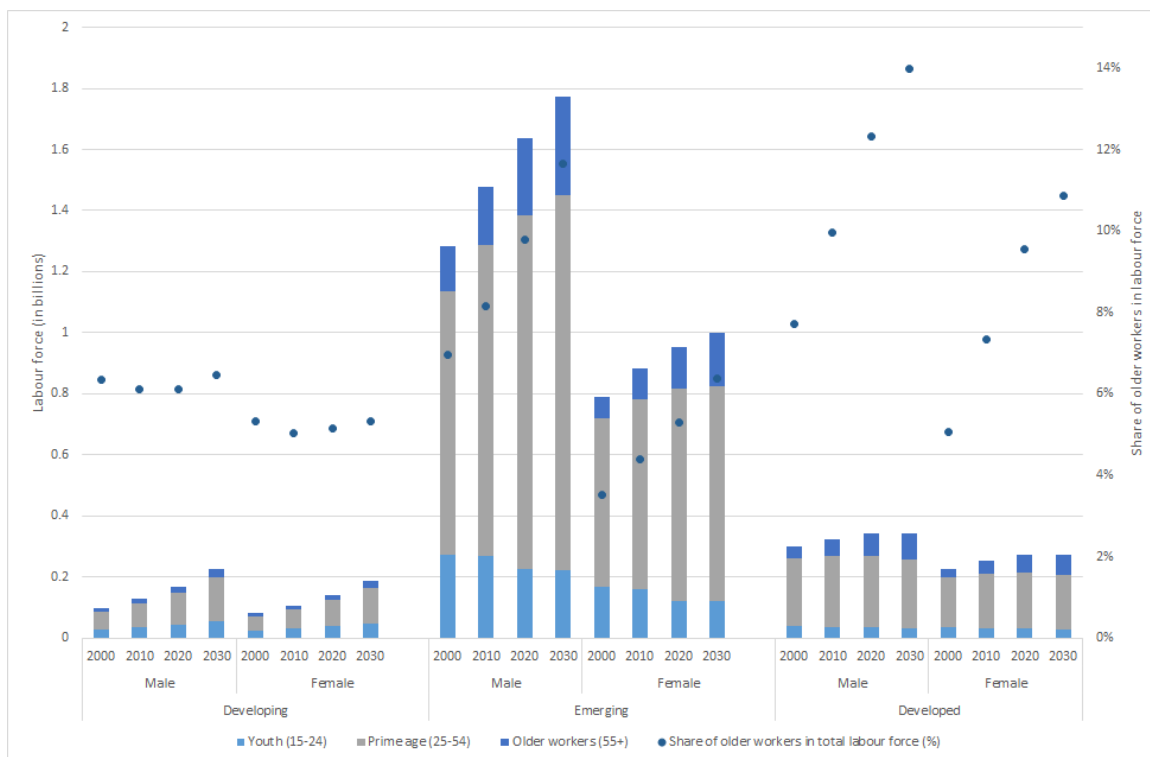


Source: calculations based on UNDESA World Population Prospects 2019.

► The proportion of older workers in the labour force is increasing worldwide

As a direct consequence of the population ageing process, there will be a growing number of older workers in the future labour force. It is common practice to define older workers as the share of the labour force aged 55 years and above (Samorodov 1999). Current data and projections show increasing trends in these numbers (see figure 4).

► Figure 4. Composition of the labour force (in billions) and share of older workers, by sex and income group, 2000–30



Source: calculations based on ILO LFEP database, July 2019 update.

Indeed, the labour force aged 55 years and over will grow consistently, with the highest growth rate occurring between 2020 and 2030 in developing countries (40 per cent), followed by emerging (28 per cent) and developed countries (14 per cent).

Emerging countries account for the highest absolute number of older workers: by 2030, some half a billion workers will be over the age of 55 years, accounting for around 18 per cent of the total labour force.

Around one quarter of all workers in developed countries will be over 55 years of age in 2030, making this the group with the largest share of older workers in the total labour force globally.

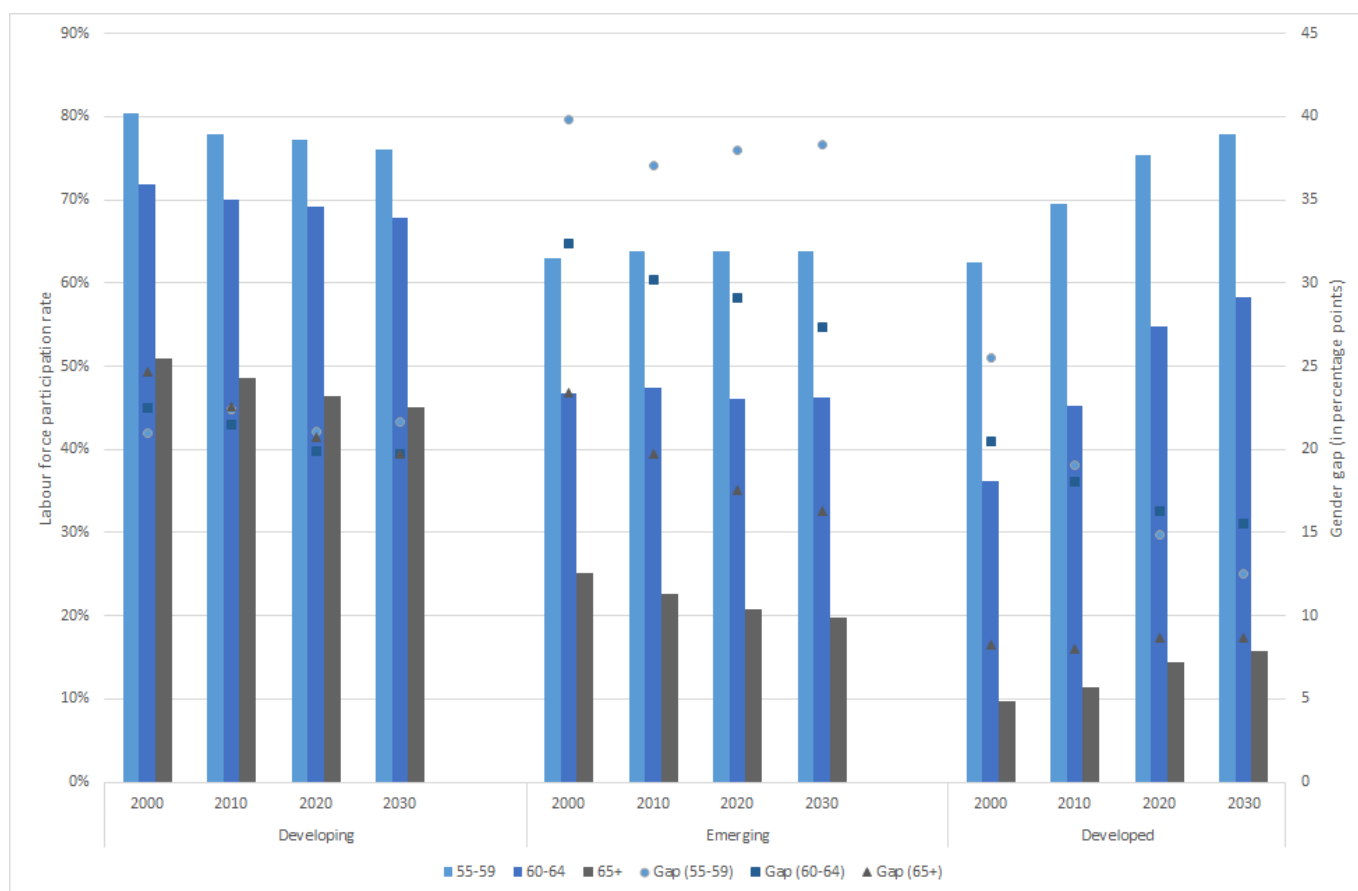
The picture is slightly different for developing countries, where both the absolute numbers and the shares of older workers remain modest but are projected to rise steadily over the coming years to reach 48.5 million, or 12 per cent of the labour force, by 2030.

Although there are no major gender differences in the expected increase in the proportion of older workers in the total labour force, there is a considerable levelling effect between women and men. Despite women making up the majority of the total over-55 age group (see figure 2), women's participation in the labour force will continue to be lower than men's. This trend holds true for developed and emerging countries alike.

► Trend reversal in older workers' labour force participation rates across development level

Breaking down the labour force participation rates (LFPRs) of older persons by age group reveals some interesting patterns. An early study of the LFPRs of older workers in 151 countries concluded that “countries with high national income per capita tend to have lower participation rates for older men and women” (Clark and Anker 1990, 21). As shown in figure 5, this pattern seems to be changing. While LFPRs are decreasing in developing countries, they are strongly increasing in developed countries, where they will overtake the levels seen in developing countries by 2030. In emerging countries, these rates are only falling for the 65 years and over cohort, remaining relatively stable for the other age groups.

► Figure 5. Labour force participation rate (in %) and gender gaps (percentage points), by income and age group, 2000–30



Source: calculations based on the ILO LFEP database, July 2019 update.

The decrease in LFPRs in developing countries can be attributed to the advances made in terms of pension system coverage and other social transfer systems (ILO 2017b), which gives older workers greater choice in deciding whether to remain in the labour market. Even so, the share of older workers in the labour force remains high in these countries: many work in the informal economy (ILO 2018b) and are not covered by any social protection benefits that would enable them to stop working while still receiving an income.

The increase in LFPRs in developed countries can be explained by two main factors. First, several countries have raised the statutory retirement age in recent decades, a trend that is likely to continue (OECD 2017). This translates almost automatically into a longer working life (Vogel, Ludwig and Börsch-Supan 2017). Second, the implementation of employment policies that promote active ageing, foster the retention and recruitment of older workers by enterprises, and address age discrimination has succeeded in keeping more workers aged 55 years and over in the labour market.

Gender gaps in labour force participation rates are high across all levels of development, reflecting the persistence of occupational and sectoral gender segregation and the uneven distribution of unpaid household and care work, even at older ages (ILO 2016a).

In developing countries, the gender gap in labour force participation lingers at around 20 percentage points across all age categories. Emerging economies reveal the highest gaps in LFPRs for workers aged 55 to 59 years (around 38 percentage points) and 60 to 64 years (around 30 percentage points). The gap is expected to decrease for workers aged 60 years and over but will remain high for those aged 55 to 59 years.

In developed countries, equal access to education, anti-discrimination laws and activation policies, such as the provision of childcare and maternity benefits, have enabled and encouraged women to participate in the labour market. The consequent narrowing of the gap in LFPRs is most significant for the 55 to 59 years age group, where it is expected to drop by 12 percentage points by 2030, compared to a projected decrease of five percentage points for the 60 to 64 years cohort. However, the gap is expected to increase slightly for workers aged 65 years and over.

► 2 Alternative economic dependency measures based on employment and decent work

Age dependency ratios provide information about how the demographic structure of a country impacts the proportion of non-working and working persons. In this definition of dependency, dependents are all persons under the age of 15 years or over the age of 64 years, while the working-age population comprises persons aged 15 to 64 years (Notestein et al. 1944; cited in Sanderson and Scherbov 2015, 691). Those who work are assumed to contribute to the financing of public services, such as education, health and pensions, through taxes and social security contributions. Those who do not work or who no longer work still make a contribution to the public financing system – through indirect taxes, for example – but are thought largely to benefit from the contributions made by the working population. Several variations of the age dependency ratio exist, such as the adult dependency ratio, which takes prolonged working lives into account by removing the upper threshold and hence defining dependency as the proportion of inactive persons (aged 0 to 14 years) compared to active persons (aged 15 years and over) in the population (Bussolo, Koettl and Sinnott 2015).

The problem is that these standard age dependency ratios disregard the fact that not all persons aged 15 to 64 years actually work. Some may still be in education; others may already have retired; and still others may be unemployed or may have chosen not to work for various reasons, such as those who may have become discouraged after unsuccessfully looking for work over a long period of time. Moreover, some children below the age of 15 years and some older persons over the age of 64 years may be part of the labour force, while many persons of working age may not. To address these limitations, alternative measurements have been developed, such as the economic dependency ratio (Wöss and Türk 2011), the labour-market-adjusted dependency ratio (Zuleeg 2007; Guerzoni and Zuleeg 2011) and the employment-based dependency ratio (Loichinger et al. 2014). These divide the number of potentially dependent persons – such as the unemployed, pensioners (old-age, early retirement, disability), home-makers and discouraged persons – by the number of persons in paid employment (Eurofound 2012).

While these alternative measurements of dependency provide a more accurate picture of the relationship between the economically active and inactive populations in quantitative terms, they still ignore important factors related to job quality – productivity and income levels, for instance – that determine whether a person can actually support dependants. In other words, economic dependency not only depends on the effective employment of the working-age population, but also on the quality of this employment and its contributive capacity. Informal employment that does not contribute to social security, and working poverty or subsistence self-employment that provide very low incomes and do not generate tax revenues, should not be considered as work that reduces the dependency burden.

In this paper, we present five new measures of employment-related dependency that not only take into account the demographic structure of the population, but also consider differences in the age and gender-specific characteristics of the labour market. Our measures include quantitative (activity status and unemployment) and qualitative (labour income, working hours and vulnerability) labour market dimensions. In combination with the standard age-based dependency ratio, these alternative dependency ratios allow us to analyse the causes of dependency in greater detail. A critical evaluation of each measure demonstrates that there is no single indicator which can fully capture all dimensions of economic dependency. Each proposed indicator has advantages over the others but also some limitations. They are therefore meant to provide researchers and policy makers with a set of measures, which allow for deeper analyses that provide insights into the most relevant policy areas for offsetting the effect of ageing on economic dependency in different contexts.

We use the ILO Labour Force Estimates and Projections (LFEP) database (July 2019 version), which provides a consistent series of labour market indicators for all United Nations' Member States, with

forecasts to 2030.³ These indicators can be disaggregated by age and sex to provide additional information on the characteristics of dependents and non-dependents. It also allows us to present results based on the broad income groups of developing, emerging and developed economies.

In line with the work of Loichinger et al. (2014) and Loichinger and Skirbekk (2016), this global analysis of demographic, economic and employment-based dependency ratios reveals the importance of age- and gender-specific employment levels, as well as their determinants, when discussing the challenges associated with population ageing. In this way, the consequences of high youth unemployment, low female labour force participation, old-age poverty, significant vulnerable employment and the high incidence of working poverty are highlighted and provide the basis for policy recommendations aimed at alleviating the economic burden of population ageing.

► The demographic dependency ratio

The demographic dependency ratio is the most commonly used measure of dependency. The young-age dependency ratio reveals the number of persons below the age of 15 years compared to those aged 15 to 64 years, while the old-age dependency ratio shows the proportion of persons aged over 64 years relative to those aged 15 to 64 years. The sum of both ratios is the total demographic dependency ratio (DDR).

$$DDR = \frac{\text{non working age population}}{\text{working age population}} \quad (i)$$

where:

- *working-age population* is the number of persons aged 15 to 64 years;
- *non-working-age population* is the number of persons aged 0 to 14 years and those aged 65 years and over.

This ratio assumes that children and the elderly are economically dependent upon persons aged 15 to 64 years. As the ratio increases, there may be an increased burden on the population in the labour force in order to maintain the upbringing and pensions of economically dependent persons.

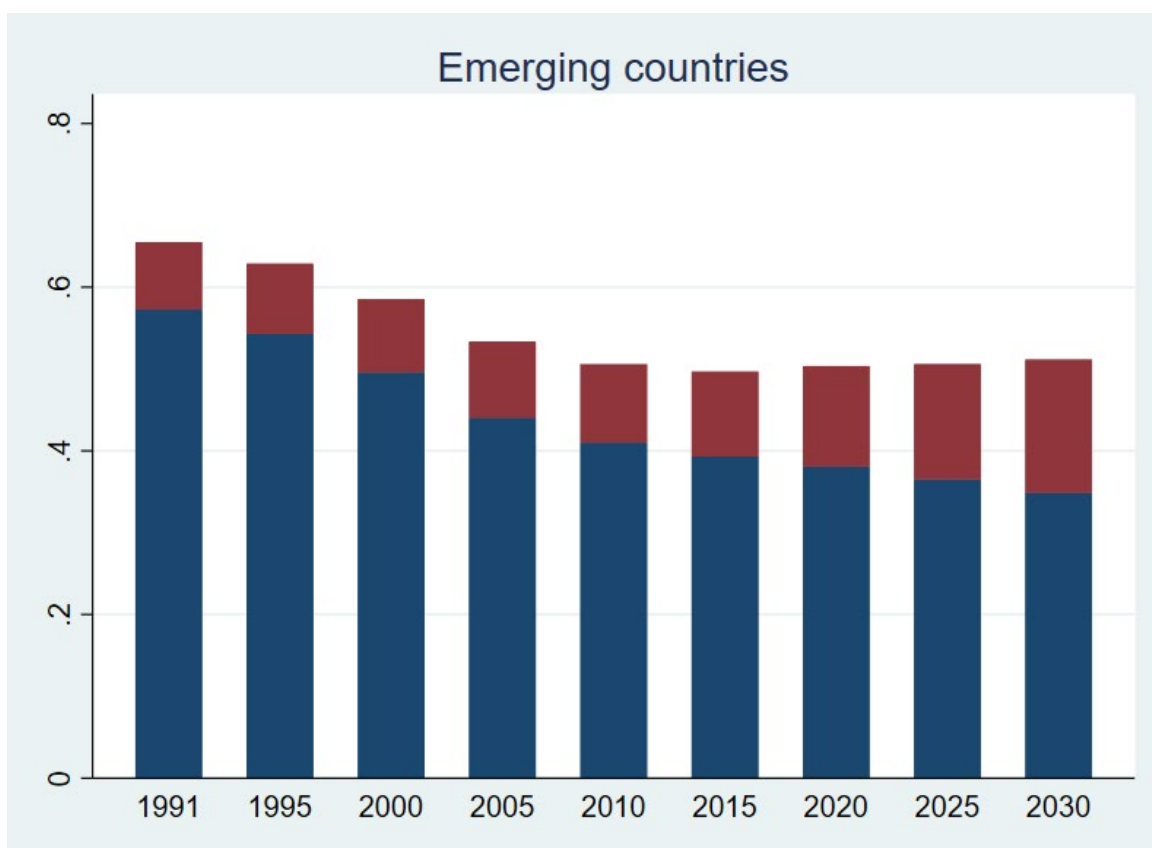
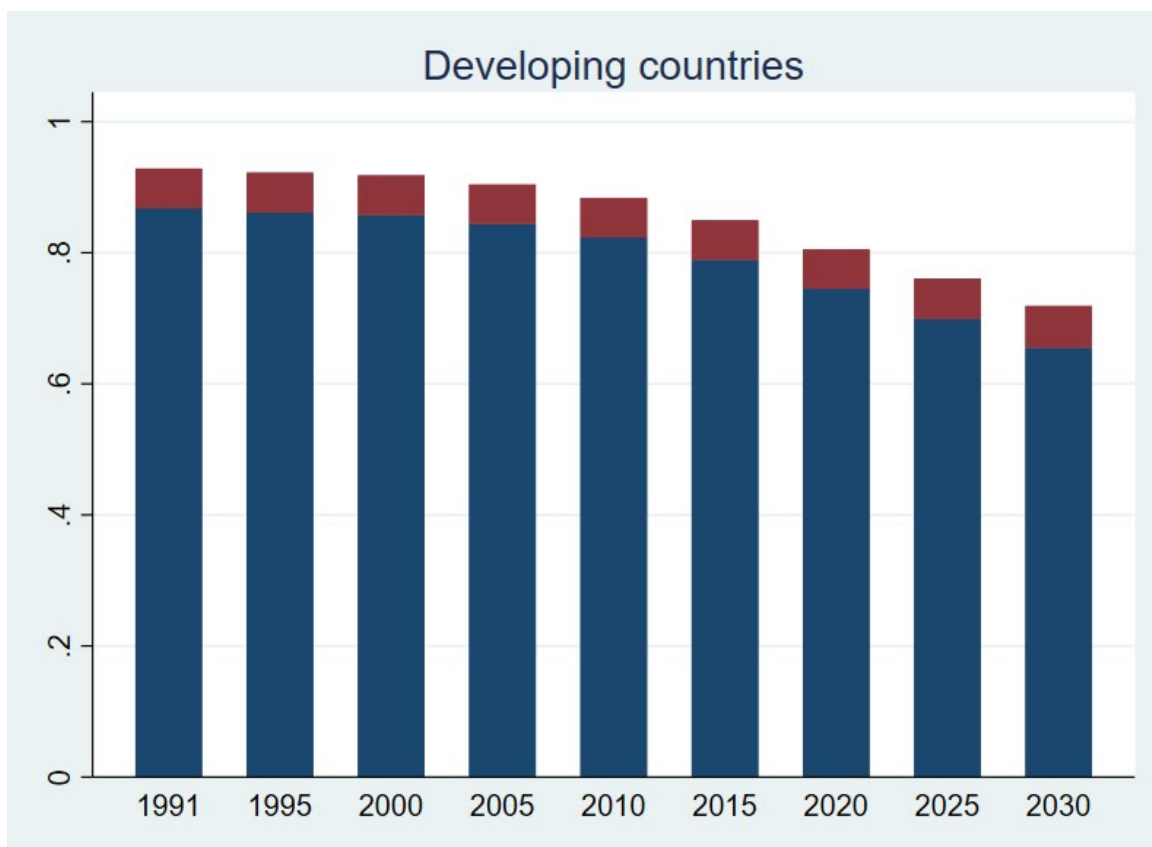
In developing countries, the total demographic dependency ratio decreased from 0.93 in 1991 to 0.81 in 2020 and is expected to further decrease to 0.72 by 2030 (see figure 6). This is due to a significant reduction in the child dependency ratio, although the old-age dependency ratio has been increasing slightly over time.

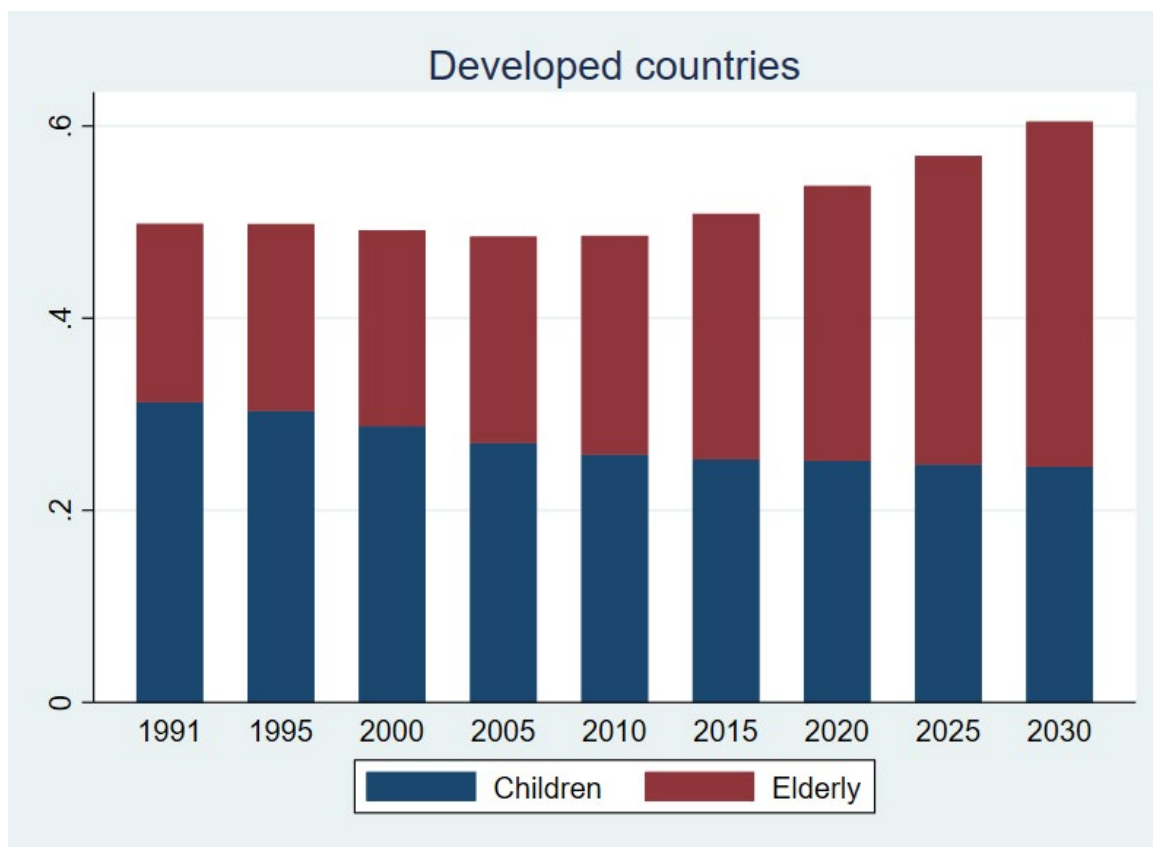
In emerging countries, the total demographic dependency ratio decreased by one quarter from 0.66 in 1991 to 0.50 in 2015 owing to a decline in the share of children in the total population. Since 2015, the ratio has remained stable and is expected to stay that way to 2030 due to a growing older population, which will offset the decrease in child dependency.

Developed countries experienced a slight decrease in the total dependency ratio – from 0.50 in 1990 to 0.49 in 2010 – largely driven by a shrinking younger population. Since 2010, the total ratio has started to rise again and is poised to grow by one quarter to the year 2030. This increase can be almost entirely explained by a rapidly ageing society, with the further shrinking of the child dependency ratio playing a minor role.

³ See ILO (2017a) for details of the LFEP database and the methodology applied.

► Figure 6. Demographic dependency ratio (DDR), by income group, 1991-2030





Source: calculations based on the ILO LFEP database, July 2019 update.

The DDR provides a good starting point for forecasting and discussing dependency burdens, especially in the context of shrinking youth and growing older populations worldwide. Its calculation is straightforward and requires only basic demographic information (i.e. age and sex) to be available for almost all countries. Moreover, the composition of the population changes slowly. This indicator therefore allows for accurate short- and medium-term projections of the data, especially with regard to the population aged 15 years and over.

However, there is no universal definition of the working-age population. The age thresholds usually correspond to societal standards for education and work eligibility and are anchored in national legislation. In order to enable international comparability, the ILO usually defines the working-age population as all persons aged 15 years and older. Furthermore, the demographic dependency ratio ignores the actual economic behaviour of persons aged between 15 and 64 years, such as age of entry to and exit from the labour market, employment status, and level of labour income. Instead, this ratio simply assumes fixed age limits in the labour markets and does not allow for a more sophisticated economic interpretation.

► Dependency measures based on employment

Activity-based dependency ratio

The first alternative measure of dependency is based on the economic activity status of the working-age population. Not everyone of working age is part of the labour force (i.e. working or available and seeking work) for a variety of reasons: young people may still be in school; adults may have taken early retirement or have chosen to stay at home due to care responsibilities, such as childcare or

elderly care; while others may not work for reasons of disability or long-term illness, or because they simply do not wish to work.⁴

This alternative dependency measure, called the activity-based dependency ratio (ABDR), restricts the “universe” of persons that support dependents to those that are in the labour force, namely all employed and unemployed persons, thus excluding those persons of working age who are not covered by these two statuses. As a result, the dependent population for the ABDR consists of: (a) children below the age of 15 years, (b) persons aged 15 to 64 years who are outside the labour force, and (c) older persons aged 65 years and over.

$$ABDR = \frac{\text{non working age} + \text{outside the labour force}}{\text{labour force}}$$

(ii)

where:

- *non-working-age* is the number of persons aged under 15 years or over 64 years;
- *outside the labour force* is the population aged 15 to 64 years that is not engaged in the labour force, i.e. neither employed (in paid employment or in self-employment) nor unemployed;
- *labour force* is the population aged 15 to 64 years that is engaged in the labour force, i.e. either employed or unemployed.

We divide the ratio into six sub-ratios based on the characteristics of the inactive population: a child dependency ratio (under 15 years of age); a sex-disaggregated dependency ratio for the youth population (aged 15 to 24 years) outside the labour force; a dependency ratio for the adult population (aged 25 to 64 years) outside the labour force, for both women and men; and an elderly dependency ratio (aged 65 years and over). This breakdown allows us to gain a more detailed picture of those working-age persons who are outside the labour market and are therefore likely to be dependent upon the support provided by those who are in the labour force.

As shown in table 1, the activity-based dependency ratio (ABDR) is much higher than the total demographic dependency ratio (DDR) for all three income groups. When all those who are outside the labour market are included, economic dependency doubles on average in developing and developed countries – by a factor of 1.9 and 2.0 respectively – and increases by a factor of 2.7 in emerging countries in 2020. This strong divergence between the two measures highlights the inaccuracy of the DDR as an indicator of economic dependency.

The ABDR is highest in developing countries (see figure 7). It remained stable between 1991 (1.56) and the early 2000s (1.55), at which point it started to fall, with the exception of a slight peak in 2010, probably in the aftermath of the 2007–08 global financial crisis. The ABDR for developing countries is expected to reach 1.41 in 2030. The main determinant of the ABDR in these countries remains the very high child dependency rate, which has been decreasing since 1991. The elderly dependency ratio is small: many of the countries in this group have not yet entered the ageing phase and will only do so in around 2030 (see Chapter 1). The other sub-ratios – youth and adults outside the labour force, disaggregated by sex – are also relatively small, illustrating the fact that, in the absence of any form of social protection, all those who are capable of working can and do undertake some form of economic activity. When it comes to gender, it is interesting to note that the share of adult women outside the labour force is on average three times higher than that of men. This could reflect the uneven distribution of household and care responsibilities between women and men, including at younger ages.

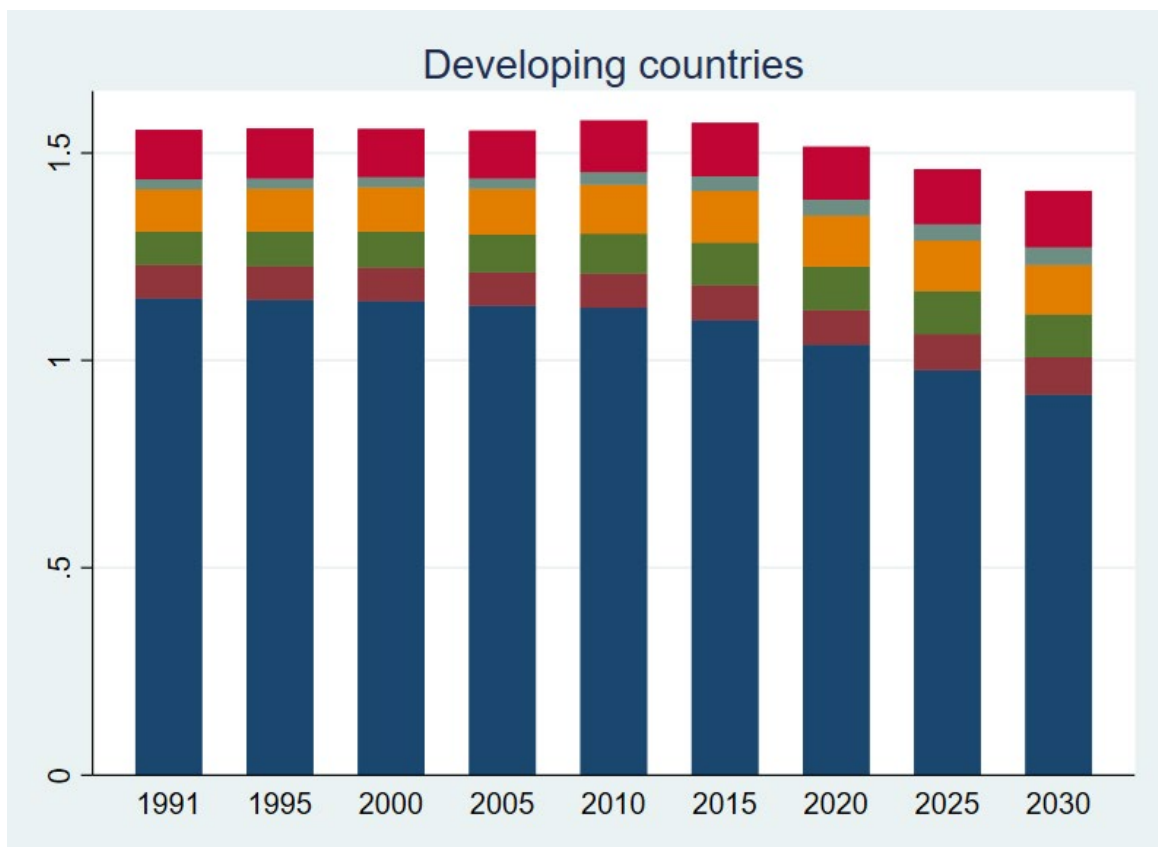
The ABDR in emerging countries fell from 1.36 in 1991 to 1.27 in 2005, mainly because of the sharp decrease in the child dependency ratio. However, it has been increasing ever since and is projected to reach 1.40 in 2030, just above the 1991 rate. While the increasing elderly dependency ratio is certainly the strongest driver of this change, the share of persons outside the labour market is also on a clear upward trend. This trend is most pronounced for adult women who are more likely than adult men to be outside the labour force.

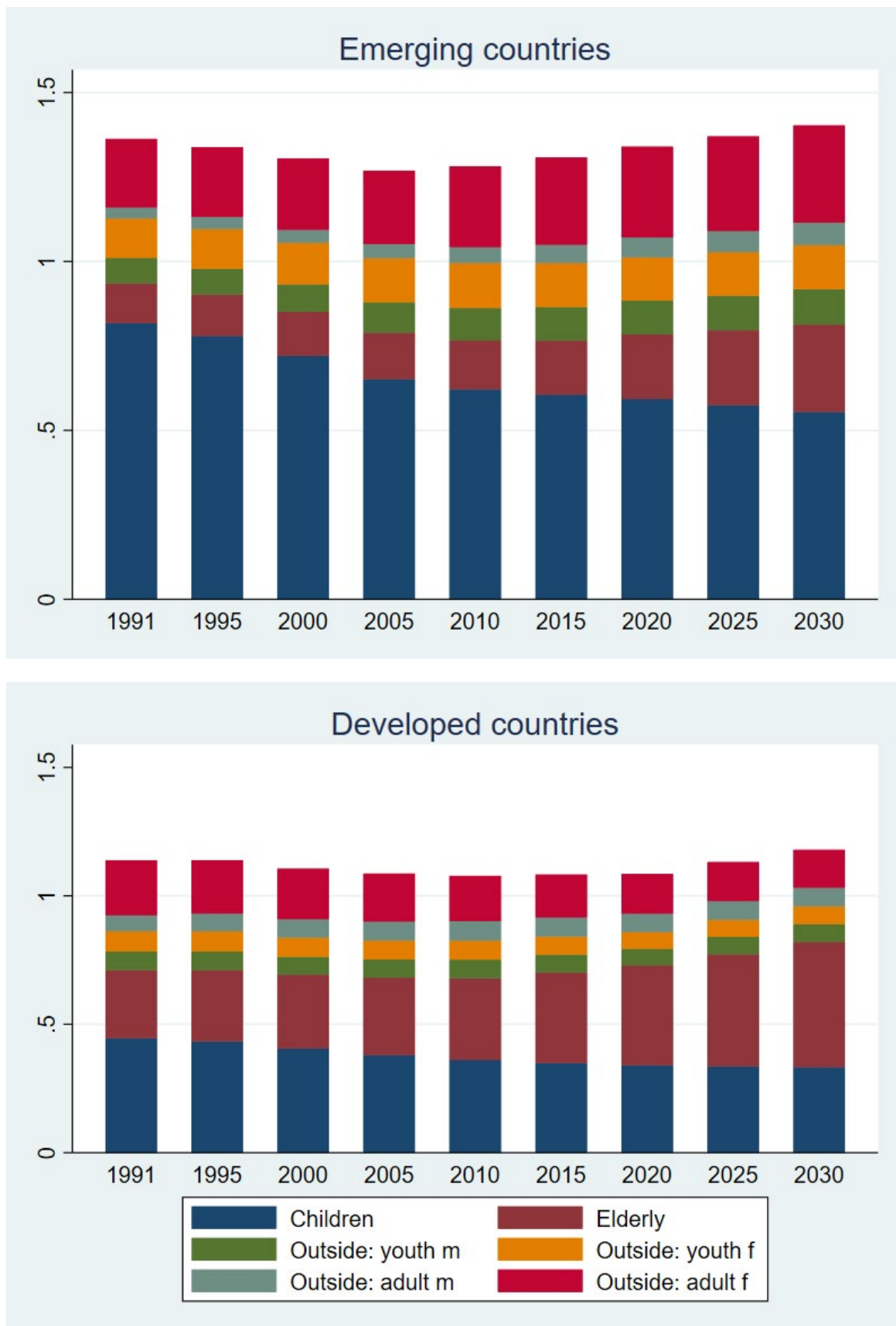
⁴ This also includes persons outside the labour force who may be involved in forms of work other than paid employment (e.g. own-use production work, volunteer work and unpaid traineeships), and therefore contribute to national production and to households’ livelihoods and well-being.

Although the ABDRs in emerging and developing countries are expected to converge by 2030, the ABDR in emerging countries tends to be slightly lower than in developing countries because of a considerably lower child dependency ratio. At the same time, this effect is partly offset by higher income levels and better social protection systems, which enable people to remain outside the labour market if they so wish.

In developed economies, the ABDR decreased from 1.14 in 1991 to 1.08 in 2010 and started rising again as of 2015 to reach 1.18 in 2030 – slightly higher than the level in 1991. While child dependency is declining, the elderly dependency rate has increased sharply since the 1990s, overtaking the child dependency ratio around the year 2015. The proportion of women outside the labour force has been decreasing significantly since 1991, a trend that is expected to continue, albeit at a slower pace. While this increase in the women’s activity rate partly explains the fall in the ABDR, it is not sufficient to counterbalance the sharp rise in the elderly dependency ratio.

► Figure 7. Activity-based dependency ratio (ABDR), by income group, 1991-2030





Source: calculations based on the ILO LFEP database, July 2019 update.

The ABDR provides a finer measure of economic dependency than the demographic dependency ratio. By factoring in the effective labour market participation of working-age persons, disaggregated by

sex and age group, it provides analysts and policymakers with more detailed information about how labour market participation levels influence dependency rates.

Since it is based on basic demographic and labour market information, data is available for a large number of countries and enables cross-country comparisons to be made. However, the simplicity of the data requirements, and in particular the binary nature of either being inside or outside the labour force, comes at a price: the ABDR does not provide any indication of the quality of employment for those persons who are in the labour force or any rationale as to why other persons are outside the labour force. Furthermore, it counts unemployed persons as non-dependents, which is misleading. Even assuming the existence of effective social security systems, such as unemployment benefits, unemployed persons are receiving transfers from other groups in society. And where such systems do not exist, even when unemployed persons draw on personal savings, they usually still depend on family members for their basic needs.

Employment-based dependency ratio

Our second employment-based alternative measure of dependency includes unemployed persons as dependents, in addition to persons outside the labour force. It thus assumes that those who are unemployed benefit from transfers from those who are employed. Such transfers can either be direct – through intrahousehold reallocations, for example – or indirect, such as through social security or public redistribution schemes. The denominator of the employment-based dependency ratio (EBDR) is limited to the employed population, while the numerator, or the dependent population, consists of: (a) children below the age of 15 years, (b) persons aged 15 to 64 years who are outside the labour force, (c) all unemployed persons aged 15 years and over, and (d) older persons aged 65 years and over.

$$EBDR = \frac{\text{non working age} + \text{outside the labour force} + \text{unemployed}}{\text{total employed}} \quad (\text{iii})$$

where:

- *non-working-age* is the number of persons aged under 15 years or over 64 years;
- *outside the labour force* is the population aged 15 to 64 years that is not engaged in the labour force;
- *unemployed* is all persons aged 15 years and over⁵ who are seeking and are available to start working for pay or profit in specified reference periods;
- *total employed* is all persons aged 15 to 64 years who are in work, either in paid employment or in self-employment.

We divide this ratio into eight sub-ratios based on the characteristics of the inactive population and the unemployed: a child dependency ratio; a sex-disaggregated dependency ratio for the youth population (aged 15 to 24 years) outside the labour force; a dependency ratio for the adult population (aged 25 to 64 years) outside the labour force, for both women and men; an unemployed ratio, also for women and men; and an elderly dependency ratio. This enables us to see the proportion of employed persons that is providing support to the other cohorts.

As table 1 shows, the employment-based dependency ratio (EBDR) is higher than the activity-based dependency ratio (ABDR), although the difference is small. This is mainly a reflection of relatively low shares of unemployed persons compared to persons outside the labour market, especially in emerging and developed countries.

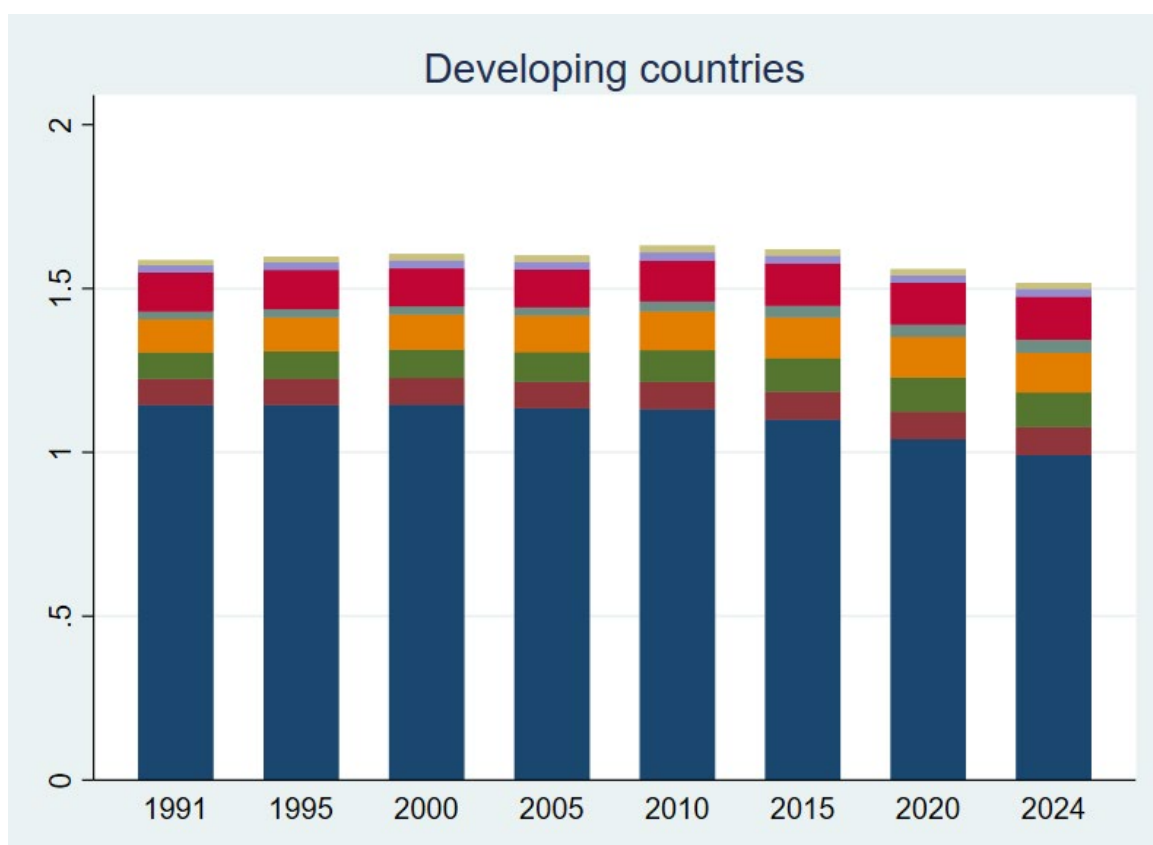
In developing countries, the EBDR remained stable at around 1.6 until 2015, when it started to decrease and is expected to fall to 1.52 in 2024 (see figure 8). The demographic component (child dependency and elderly dependency) clearly drives the dependency ratio, especially the child component. The addition of unemployed persons to the group of potential dependents plays only a minor role.

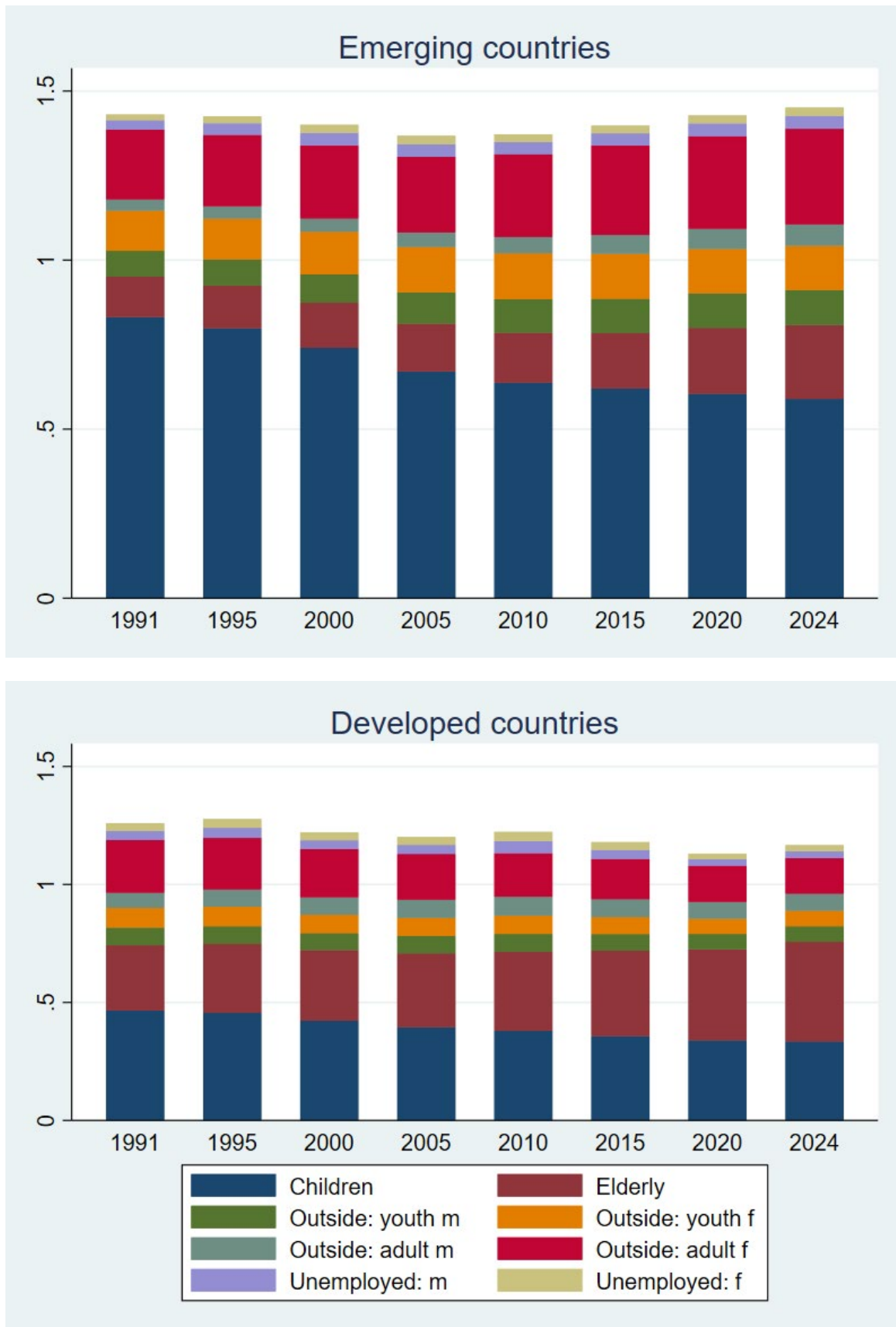
⁵ It should be noted that the ILO does not apply an upper-age threshold to its unemployment statistics. Therefore, persons aged 65 and over could be counted in both the non-working-age and the unemployed population groups. This could introduce an upwards bias and lead to an overestimation of the EBDR. However, this bias is thought to be rather small, since national legal retirement ages are projected to remain at around 65 years of age (see OECD 2017, for instance).

In emerging countries, the EBDR decreased from 1.43 in 1991 to 1.37 in 2010. It has been increasing ever since and is expected to reach 1.45 in 2024. The demographic component is behind this trend: there has been a strong decline in the child dependency ratio throughout the entire period and a marked increase in the elderly dependency ratio since 2005. Hence, ageing is and will continue to be an important determinant of dependency in these countries. Unemployment also plays a more pronounced role in this group of countries.

In developed countries, the EBDR has been fluctuating at around 1.22, reaching a low of 1.13 in around 2020. The latest projections suggest a slight tendency upward between now and 2024. The demographic component accounts for some three quarters of the dependency ratio, with the elderly component increasingly gaining in significance. Unemployment constitutes the smallest contributing factor.

► **Figure 8. Employment-based dependency ratio (EBDR), by income group, 1991–2024**





Source: calculations based on the ILO LFEP database, July 2019 update.

The EBDR offers valuable insights into the composition and distribution of potential dependents. From a conceptual point of view, it makes sense to include unemployed persons in the group of dependents. In addition to the problems discussed in relation to the ABDR in the previous section, however, the

EBDR suffers from a major shortcoming in the data: both the employment and unemployment rates are influenced by a large variety of factors that make it difficult to predict trends accurately, especially for the more distant future.⁶ While the explanatory power of the EBDR decreases for distant future predictions, it may still be an adequate indicator for policymakers to assess labour market needs in the nearer future. Nevertheless, the EBDR does not give any indication of the job quality of those in employment and assumes them to be non-dependents.

► **Table 1: Comparison of demographic-, activity-, and employment-based dependency ratios, by income groups, 2000-2030**

		DDR	ABDR	EBDR
2000	Developing countries	0.92	1.56	1.61
	Emerging countries	0.59	1.3	1.4
	Developed countries	0.49	1.11	1.22
2010	Developing countries	0.88	1.58	1.63
	Emerging countries	0.51	1.28	1.37
	Developed countries	0.49	1.08	1.22
2020	Developing countries	0.81	1.52	1.56
	Emerging countries	0.5	1.34	1.43
	Developed countries	0.54	1.09	1.13
2024	Developing countries	0.77	1.47	1.52
	Emerging countries	0.51	1.36	1.45
	Developed countries	0.56	1.12	1.17
2030	Developing countries	0.72	1.41	.
	Emerging countries	0.51	1.4	.
	Developed countries	0.6	1.18	.

Notes: DDR: demographic dependency ratio; ABDR: Activity-based dependency ratio; EBDR: Employment-based dependency ratio.

Projections of employment and unemployment figures based on econometric models are only available to the year 2024. As a result, estimates for the EBDR are not included for all years.

Interpretation: A ratio of 1.5 of the EBDR, for instance, can be interpreted as meaning that 15 persons not in employment (i.e. children below the age of 15 years, persons aged 15 to 64 years outside the labour force, unemployed persons aged 15 years and over, and older people aged 65 years and over) are thought to be economically dependent upon 10 persons in employment.

Source: calculations based on the ILO LFEP database, July 2019 update.

⁶ See ILO (2019b Appendix B) for more information on the ILO Labour Force Estimates and Projections.

► Dependency measures based on productive employment

In the following section, we are introducing three indicators based on the notions of *full-potential* and *productive employment*. Full-potential employment reflects the ability of an economy to utilize the available human resources to the full extent. Productive employment is defined as “employment yielding sufficient returns to labour to permit the worker and her/his dependents a level of consumption above the poverty line” (ILO 2012).

Labour underutilization as a proxy for non-productive employment

Even when workers are in employment, they may find themselves in a situation where they wish to work more paid hours; that is, they are time-related underemployed. The income generated by such involuntary part-time employment may not be sufficient to cover basic needs and may be a cause of in-work poverty (Warren 2015; McBride, Smith, and Mbala 2018). Alongside the unemployed and the inactive populations, persons in time-related underemployment form the underutilized labour force group. If we define productive employment as employment that generates an income sufficient to keep workers and their families above the poverty line, then we can use the labour underutilization indicator as a proxy for non-productive employment.

This alternative dependency measure can therefore be defined as the labour underutilization dependency ratio (LUDR), where the denominator is those persons who are fully employed – all employed persons who are not in time-related underemployment – and the numerator comprises the following dependents: (a) children below the age of 15 years, (b) persons aged 15 to 64 years who are outside the labour force, (c) all unemployed persons aged 15 years and over, (d) older persons aged 65 years and over, and (e) time-related underemployed persons aged 15 years and over.

$$LUDR = \frac{\text{non working age} + \text{outside the labour force} + \text{unemployed} + \text{underemployed}}{\text{full – potential employment}}$$

(iv)

where:

- *non-working-age* is the number of persons aged under 15 years or over 64 years;
- *outside the labour force* is the population aged 15 to 64 years that is not engaged in the labour force;
- *unemployed* is all persons aged 15 years and over who are seeking and are available to start working for pay or profit in specified reference periods;
- *underemployed* is all persons in employment who want to work additional hours, whose working time in all their jobs is below a specified threshold of hours and who are available to work additional hours if they are given the opportunity to do so;
- *full-potential employment* is the total number of employed persons minus the underemployed.

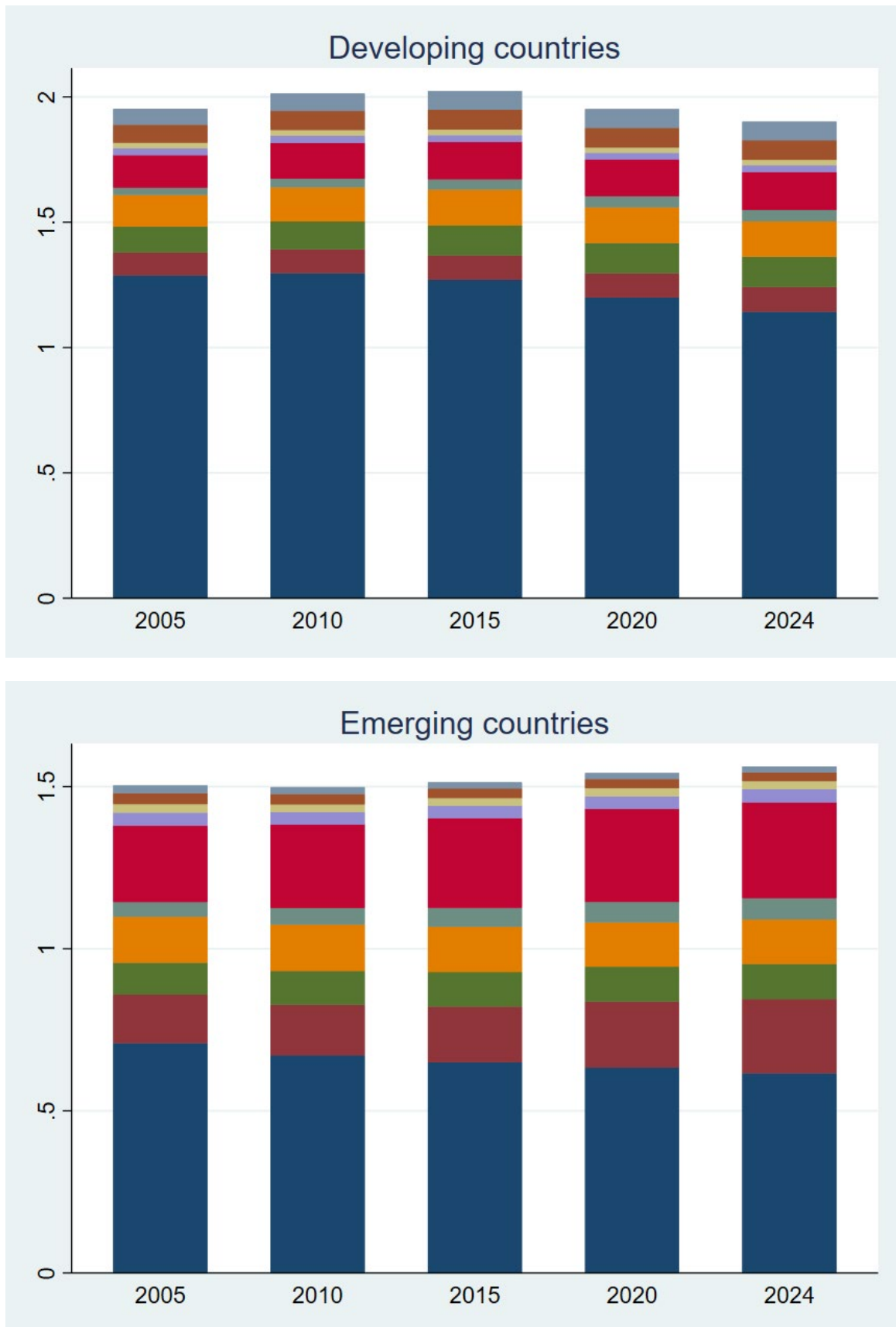
The breakdown of the LUDR follows the same metrics as the EBDR but includes involuntarily underemployed women and men. As expected, this increases the dependency ratio across all income levels (see table 2), most notably in developing countries, where it is on average 25 per cent higher than the EBDR. This reflects the reality of many workers in developing countries who cannot afford to be without employment and hence accept any kind of work, often with piece-rate or daily contracts.

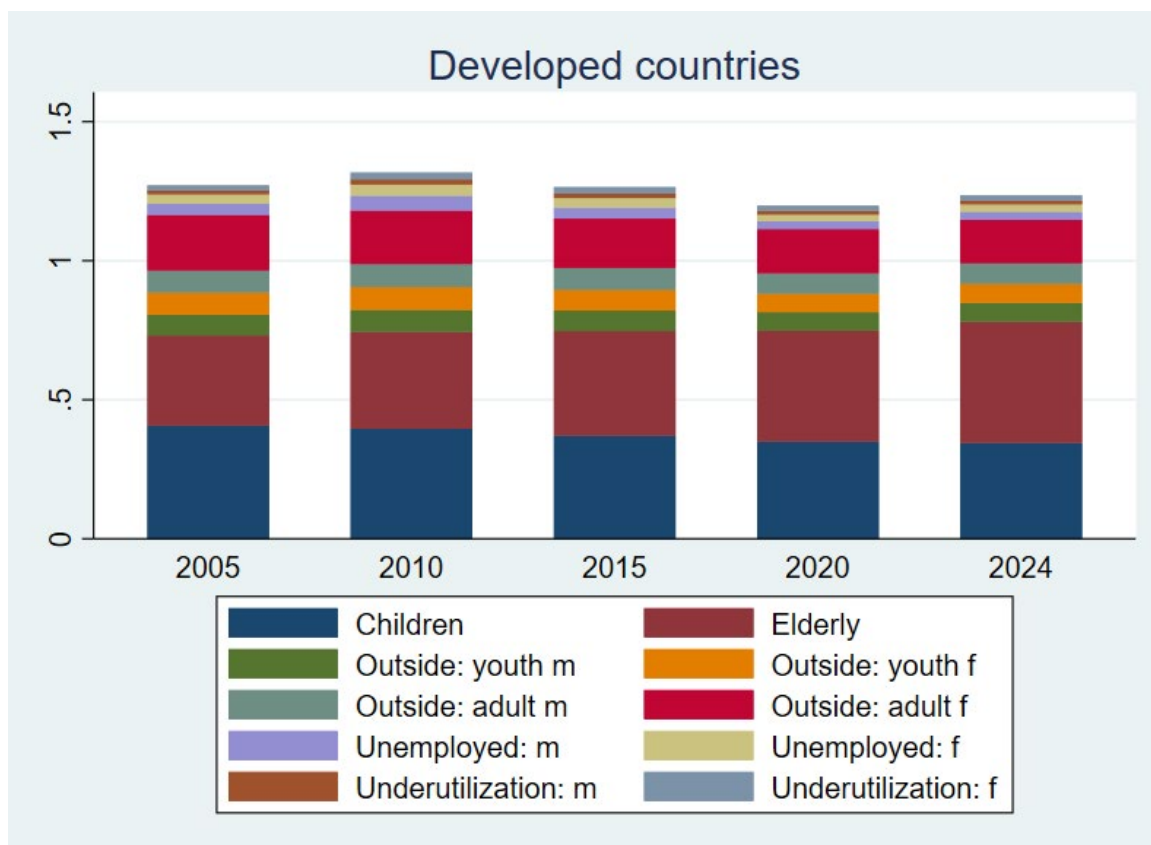
The LUDR in developing countries is projected to decrease from 2.0 in 2015 to 1.9 in 2024 (see figure 9). The contribution of the time-related underemployed to the overall dependency ratio remains stable at levels that are much higher than for unemployment. Thus, underemployment is a more relevant indicator of dependency than unemployment in developing countries.

The LUDR in emerging countries is increasing and is expected to reach 1.56 in 2024. This increase is largely being driven by population ageing, while the underemployment share is shrinking. Men seem to be more affected by time-related underemployment than women.

The LUDR is lowest in developed countries, where it is trending upward and is projected to reach 1.23 in 2024. Women are on average a third more likely to be in involuntary part-time employment than men.

► Figure 9. Labour underutilization dependency ratio (LUDR), by income group, 2005-24





Source: calculations based on the ILO LFEP database, July 2019 update.

While unemployment and inactivity indicate a lack of available jobs, time-related underemployment suggests a lack of available paid hours. The LUDR therefore sheds more light on the supply side of the labour market and demonstrates the untapped opportunities of the potential labour force, especially regarding women and youth not in employment, education or training (NEET). In terms of data, this measure shares the same limitations as the EBDR but is further constrained when it comes to historical data points.

The assumption that involuntary part-time workers are essentially dependents may not hold true in all cases. Nevertheless, time-related underemployment is a common feature of in-work poverty. The LUDR unites three key dimensions of labour force underutilization, and the breakdown and disaggregation by age and sex provides valuable information to enable policymakers to formulate targeted responses. Yet, labour underutilization is an imperfect proxy for unproductive employment. It doesn't capture the fact that workers can be employed full-time, but earn too little to keep themselves and their families above the poverty line. The working poverty rate as well as the rate of vulnerable employment therefore provide additional insights that may be useful to inform policy-making.

Working poverty as a proxy for non-productive employment

Not all of those who work are productively employed. Some workers in paid employment or self-employment may not earn enough to lift themselves and their families above the poverty line. In this case, they can be considered as being economically dependent, meaning that they rely on social or family transfers to live a decent life and cannot support others through their earned income. We define this type of dependency as the working poverty-based dependency ratio (WPDR), with the dependent population consisting of: (a) children below the age of 15 years, (b) persons aged 15 to 64 years who are outside the labour force, (c) all unemployed persons aged 15 years and over, (d) older persons aged 65 years and over, and (e) the working poor aged 15 years and over.

$$WPDR = \frac{\text{non working age} + \text{outside the labour force} + \text{unemployed} + \text{working poor}}{\text{productively employed}}$$

(v)

where:

- *non-working-age* is the number of persons aged under 15 years or over 64 years;
- *outside the labour force* is the population aged 15 to 64 years that is not engaged in the labour force;
- *unemployed* is all persons aged 15 years and over who are seeking and are available to start working for pay or profit in specified reference periods;
- *working poor* is the number of employed persons aged 15 years and over living in households with incomes below the international poverty line of US\$1.90 per day in purchasing power parity (PPP);
- *productively employed* is the total number of employed persons minus the working poor.

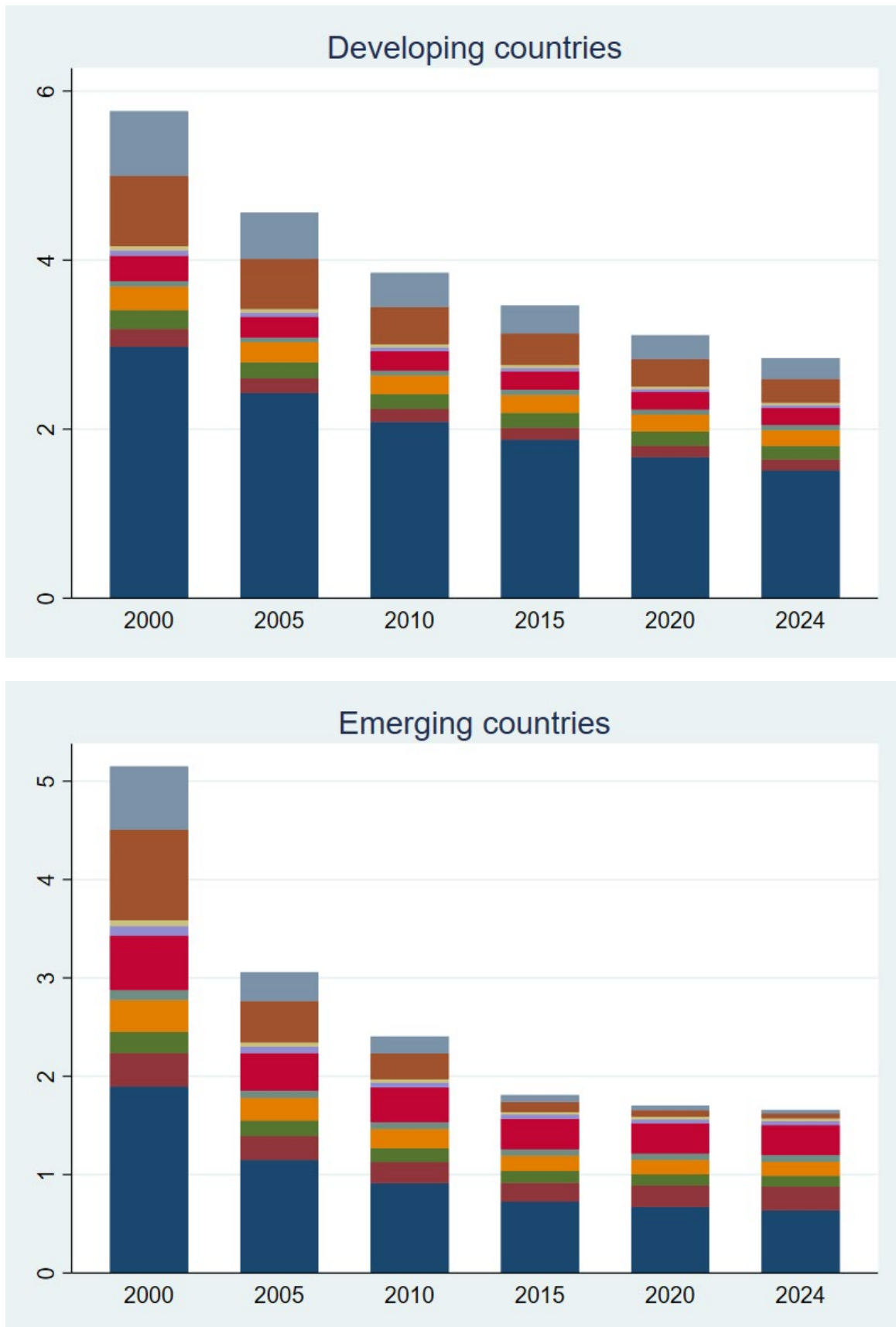
When adding the working poor to the dependency measure, the dependency ratio increases substantially in developing and emerging economies compared to previous measures (see table 2 and figure 10). The largest increase is seen in developing countries, where the WPDR is estimated at 2.84 in 2024. Despite the fact that the WPDR has decreased considerably since the year 2000, when it was 5.76, it is on average about 2.7 times higher than the EBDR, which only considers persons outside the labour force and the unemployed as dependents.

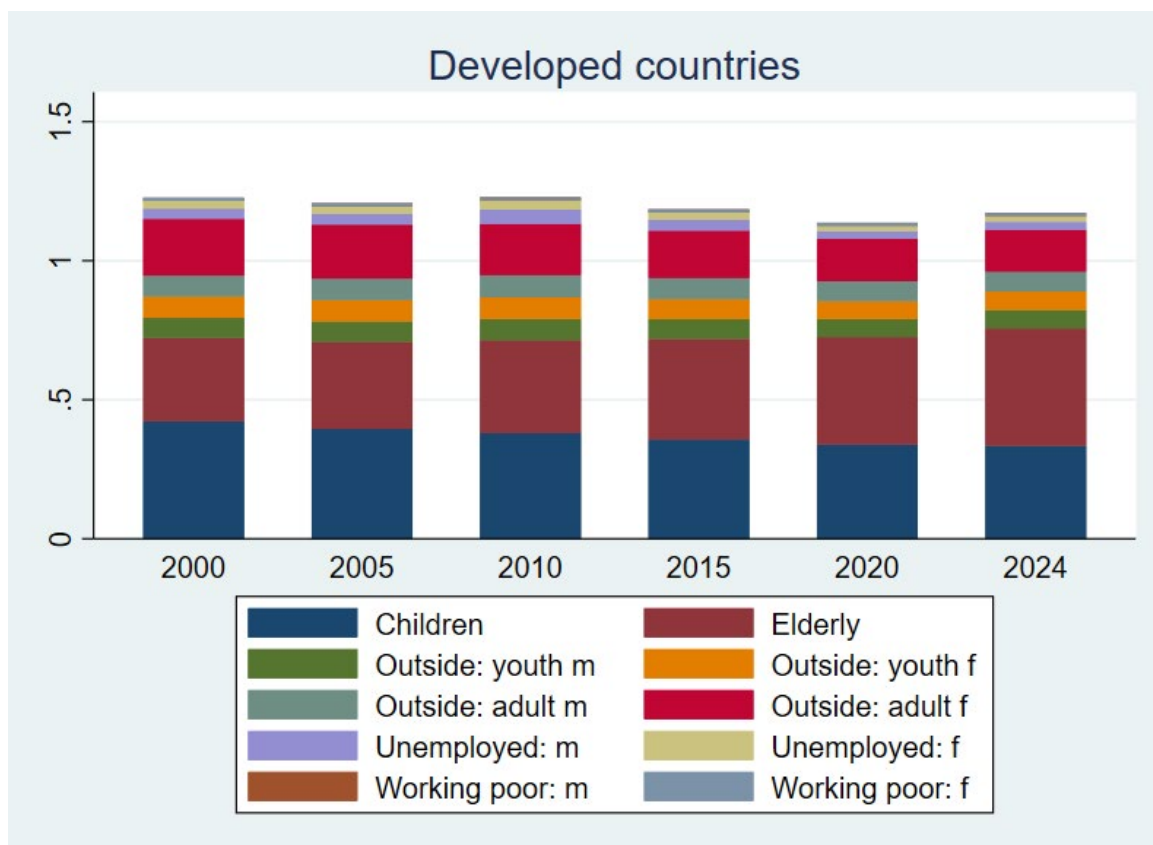
In emerging countries, the convergence of the EBDR and the WPDR is much more pronounced, although the WPDR is still some 15 per cent higher. This means that the number of working poor has decreased in this group of countries⁷ – mostly in China and India – and, consequently, so has its weight on the dependency measure. In emerging countries, the contribution of the child dependency ratio and the share of young and adult women outside the labour market are currently much higher than those of poverty and unemployment.

Since the working poverty rate, which is based on the international poverty line of US\$1.90 per day in purchasing power parity (PPP), tends to be zero in developed countries, the estimates for WPDR are practically identical to those for the EBDR.

⁷ Further information on the decline in working poverty can be found in ILO (2020b).

► Figure 10. Working poverty-based dependency ratio (WPDR), by income group, 2000–24



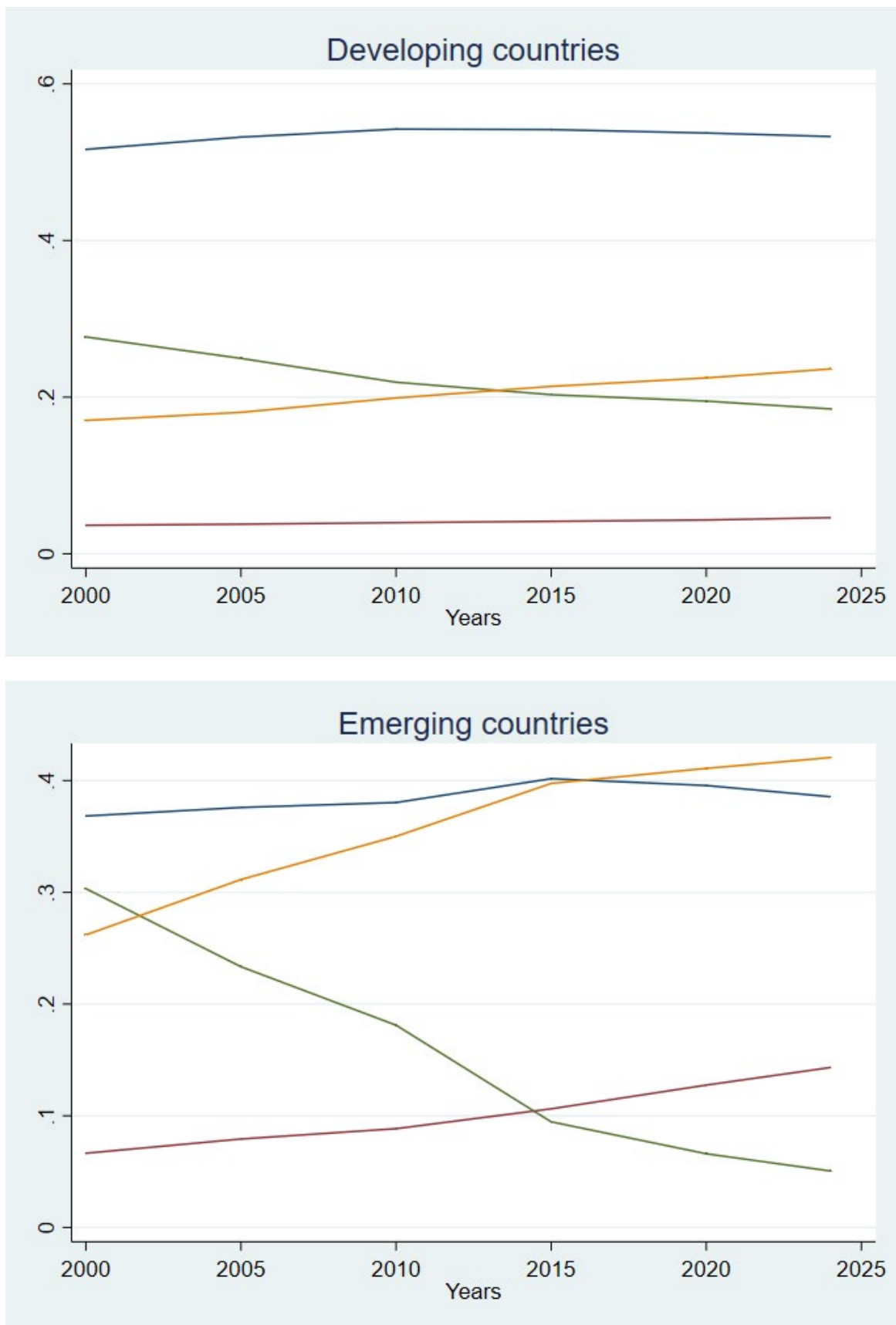


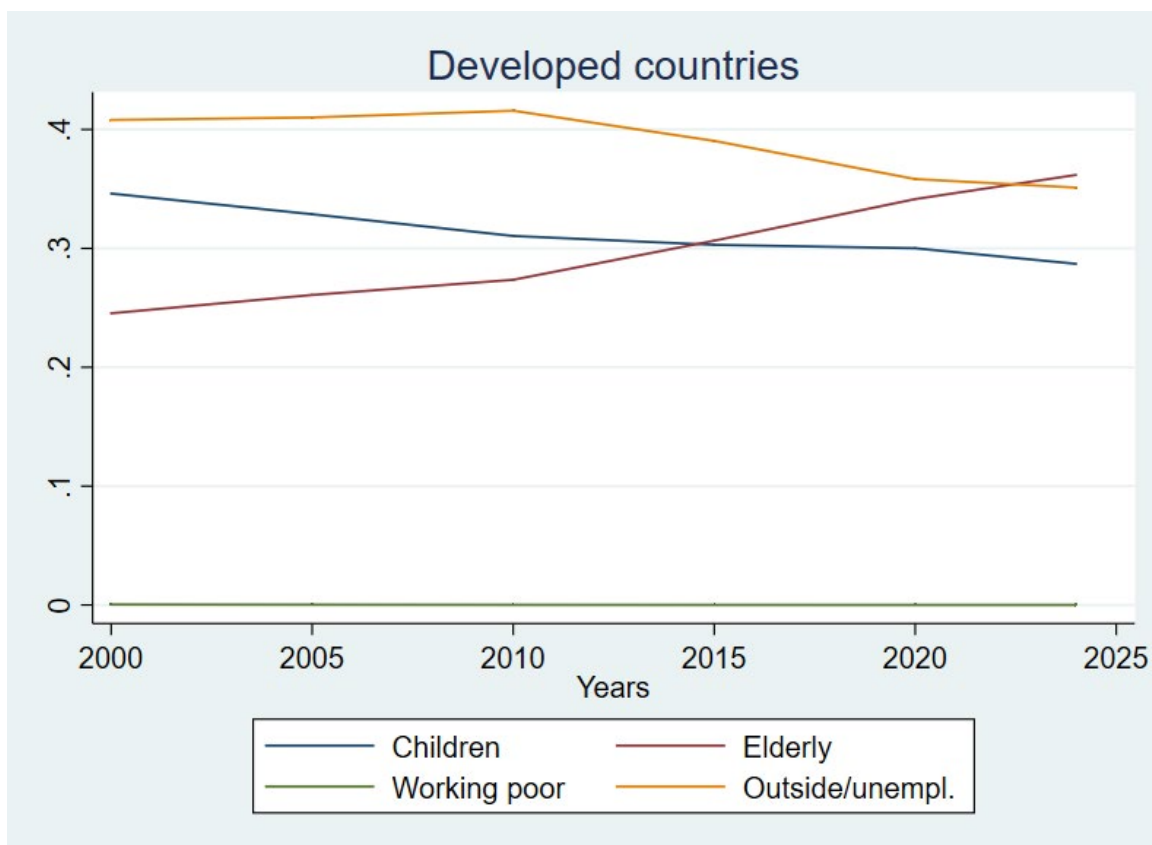
Source: calculations based on the ILO LFEP database, July 2019 update.

In developing countries, children will continue to contribute more than 50 per cent to the overall dependency rates, while the contribution of older persons remains relatively low at around 4.1 per cent (see figure 11). The share of the working poor will continue to decrease; however, persons outside the labour force combined with the unemployed exceeded the share of the working poor in 2015 and will continue to gain in significance.

The picture is very different in emerging economies, where the contribution of older persons is strongly increasing, while the share of children is slowly declining. The weight of working poverty in total dependency rates has sharply decreased and, although its pace of reduction has slowed since 2015, it is the least important contributor to the overall dependency ratio since that year. At the same time, the contribution of persons outside the labour market and the unemployed, which had been equal to that of working poverty in the early 2000s, has risen sharply, to the extent that it overtook the child dependency ratio in 2016.

► Figure 11. Breakdown of the WPDR over time, by income group, 2000–24





Source: calculations based on the ILO LFEP database, July 2019 update.

The working poverty-based dependency ratio adds an important element to the discussion on economic dependency by including a group that is very likely in need of support: workers who cannot lift themselves and their dependants above the poverty line.

Although internationally comparable data is only available from the year 2000 onwards and predictions are limited to the near future, an intertemporal and cross-country analysis can be carried out for around 73 per cent of countries. However, the WPDR suffers from additional limitations similar to those discussed for the EBDR, especially with respect to the working poverty rate, which is a product of the poverty and employment rate. The working poverty rate is based on the headcount index, which does not take intrahousehold inequality or depth of poverty into account. Moreover, different approaches (microeconomic versus macroeconomic) are applied for the calculation, reflecting different data availability and risking compromise of cross-country comparisons (see ILO 2019a; Ostermeier et al. 2015). However, the working poverty-based dependency ratio adds a valuable indication of employment quality and is a proxy for a measure of dependency that relates to (un)productive employment.

The analysis shows that having a job is no guarantee of decent living conditions. Too many workers – especially women and youth – do not earn enough to lift themselves and their family members above the poverty threshold. Targeted policies are needed to further accelerate the progress made over recent decades. This includes ensuring adequate earnings, sufficient working hours, a certain level of job security and access to social protection.

Vulnerable employment as a proxy for non-productive employment

Another way to capture work that may not be sufficiently productive to enable those performing it to support their dependents is to take account of vulnerable employment. According to the ILO definition, vulnerable employment includes contributing family workers and own-account workers. In the context of developing countries, own-account workers are for the most part engaged in petty trading or farming for own-consumption, mostly in the informal economy. This is very different from self-employed workers in high value-added services, such as doctors and freelance IT specialists. In developed countries, own-account workers would ideally capture all self-employed persons who are performing task-based

work (including on digital labour platforms), subcontracting to larger firms without an established employment relationship, or engaging in casual work; in other words, workers who are in non-standard and precarious forms of employment (ILO 2016b). However, vulnerable employment so defined does not capture all those in precarious wage employment and involuntary part-time wage employment.⁸

The vulnerable employment dependency ratio (VEDR) integrates vulnerable workers as dependents and comprises: (a) children below the age of 15 years, (b) persons aged 15 to 64 years who are outside the labour force, (c) all unemployed persons aged 15 years and over, (d) older persons aged 65 years and over, and (e) vulnerable workers.

$$VEDR = \frac{\text{non working age} + \text{outside the labour force} + \text{unemployed} + \text{vulnerable employment}}{\text{non vulnerable employment}} \quad (\text{vi})$$

where:

- *non-working-age* is the number of persons aged under 15 years or over 64 years;
- *outside the labour force* is the population aged 15 to 64 years that is not engaged in the labour force;
- *unemployed* is all persons aged 15 years or older who are seeking and are available to start working for pay or profit in specified reference periods;
- *vulnerable employment* is the sum of own-account workers (also known as self-employed workers without employees) and contributing family workers (also known as unpaid family workers);
- *non-vulnerable employment* is the total number of persons in employment minus those in vulnerable employment.

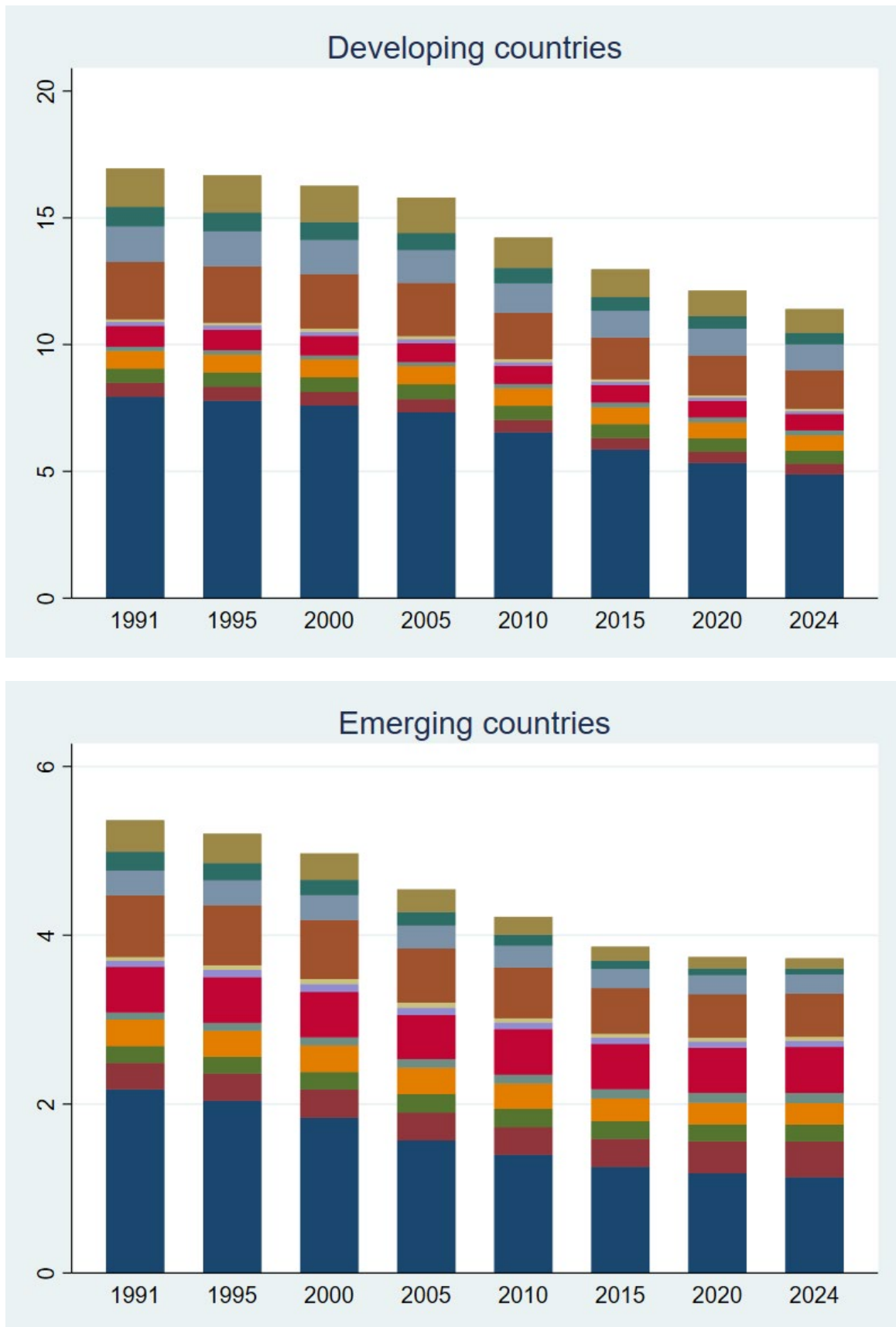
As shown in table 2, dependency increases significantly across all income groups when vulnerable employment is taken into account. In developing countries, the VEDR rises sharply by a factor of 8.5 compared to the EBDR and is predicted to reach 11.40 in 2024. This means that each non-vulnerable worker needs to provide support for more than 11 dependents. The total ratio has been decreasing constantly since 1991 (when it was 16.94, see figure 12); accordingly, the sub-ratio of vulnerable employment dependency will have more than halved by 2024. While men are more often engaged as own-account workers, women are more than twice as likely to work as contributing family members.

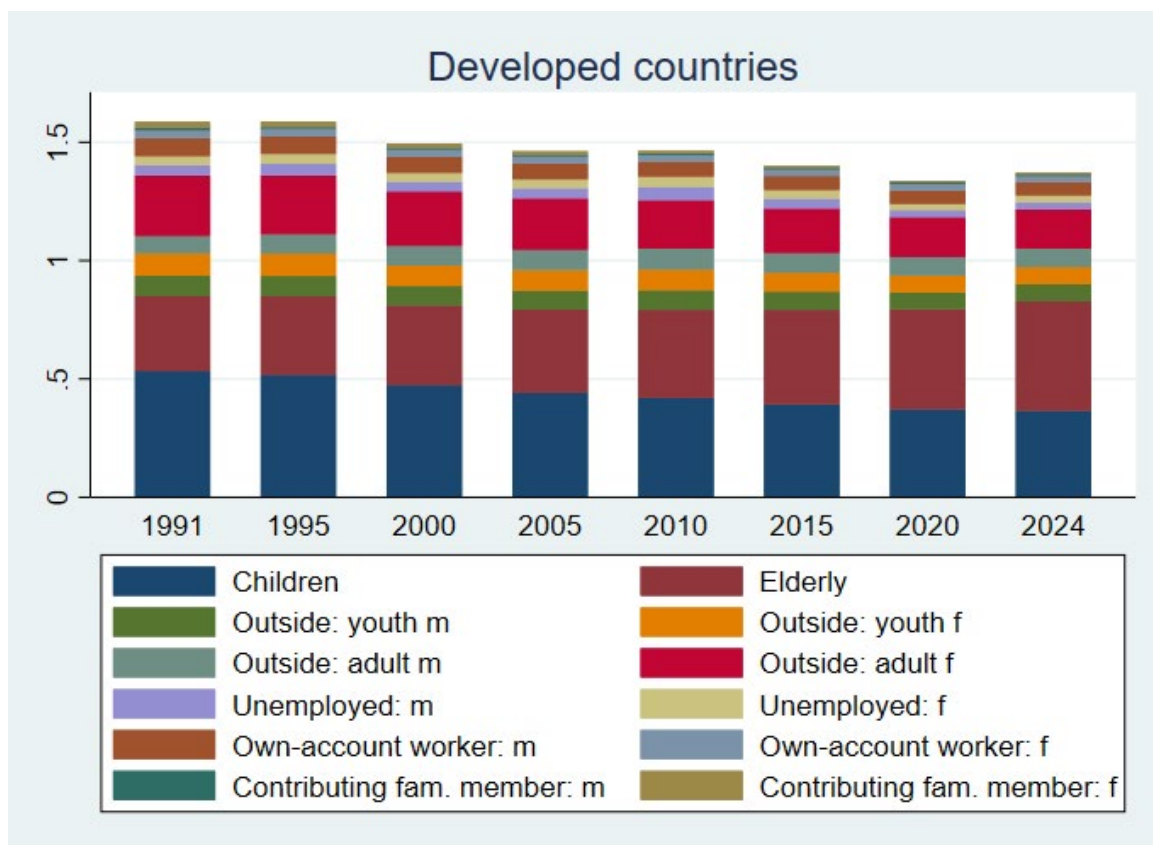
In emerging countries, the overall dependency ratio is considerably smaller than in developing countries. It will decrease from 5.36 in 1991 to 3.73 in 2024, mainly due to a shrinking child dependency ratio, although the share of vulnerable employment also fell by around three quarters. Nevertheless, the VEDR is on average three times higher than the EBDR. As with developing countries, men are disproportionately represented among own-account workers and women among contributing family members. The shares of both activities were shrinking for women and men until 2015 and have been stagnating ever since.

In developed countries, the increase compared to the EBDR is much smaller, since comparatively fewer workers are engaged as own-account workers or contributing family members. The VEDR is on average 1.2 times higher than the EBDR. While the total VEDR has been decreasing over time, it is projected to rise again and reach 1.37 in 2024 as a result of population ageing. The distribution of vulnerable employment follows the same gender pattern as for developing and emerging countries, although the discrepancy between women and men is the highest for contributing family members.

⁸ Loichinger and Skirbekk (2016) calculate an alternative dependency ratio for European Union countries that is based on actual number of hours worked. This measure is very relevant but difficult to compute and less relevant for developing countries, where this data is not available and where wage employment is often less than 20 per cent of total employment.

▶ Figure 12. Vulnerable employment-based dependency ratio (VEDR), by income group, 1991–2024





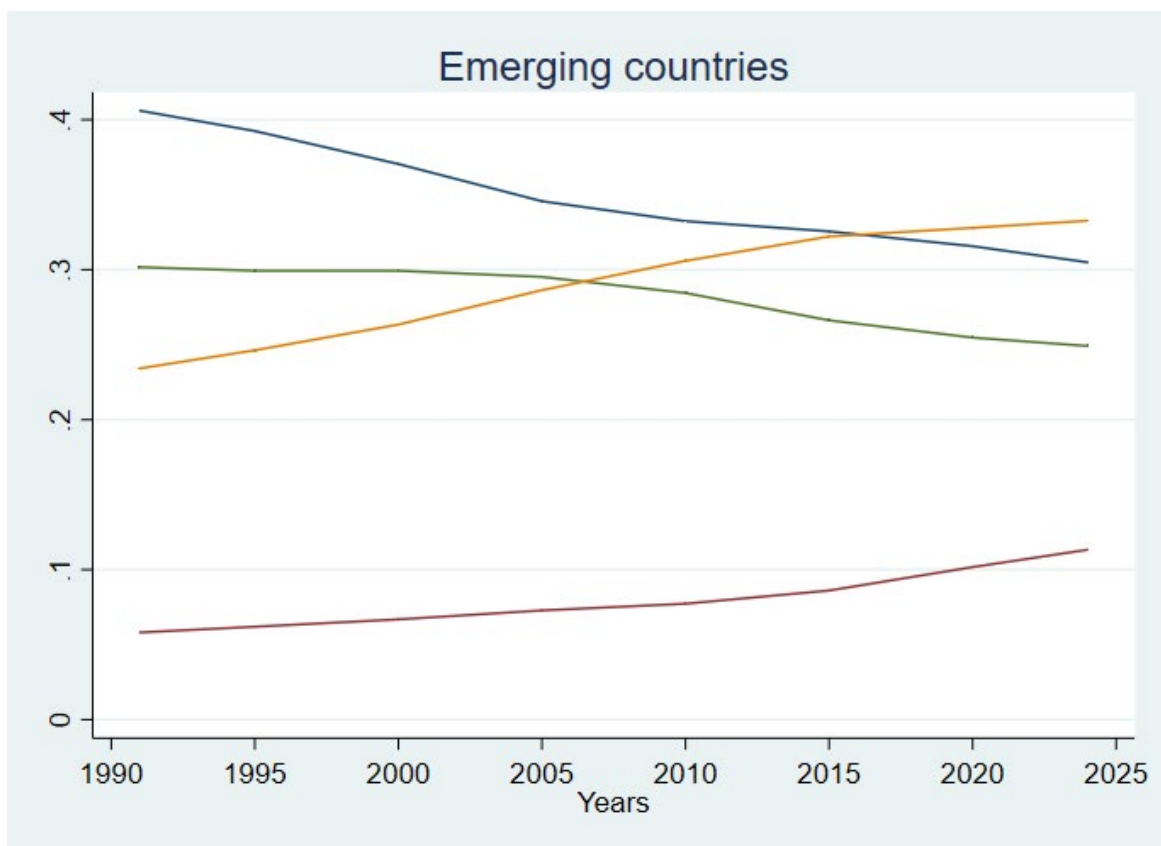
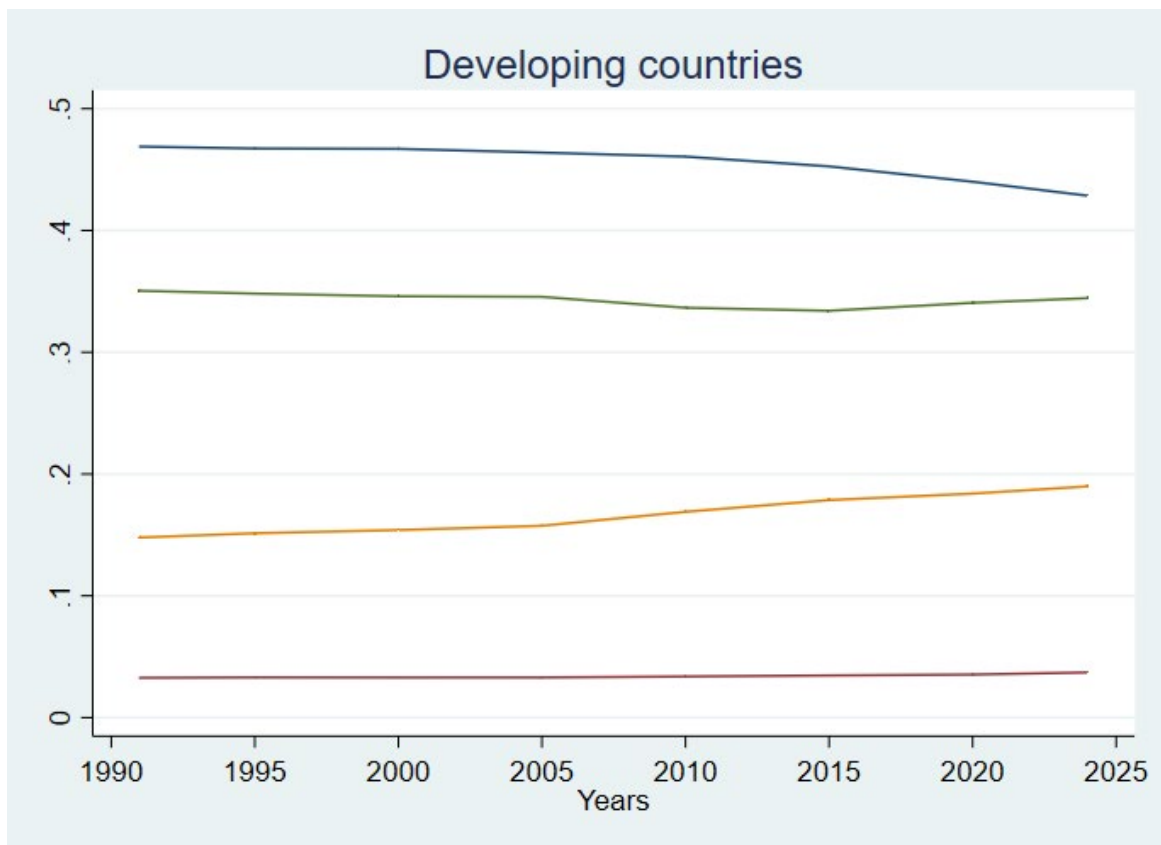
Source: calculations based on the ILO LFEP database, July 2019 update.

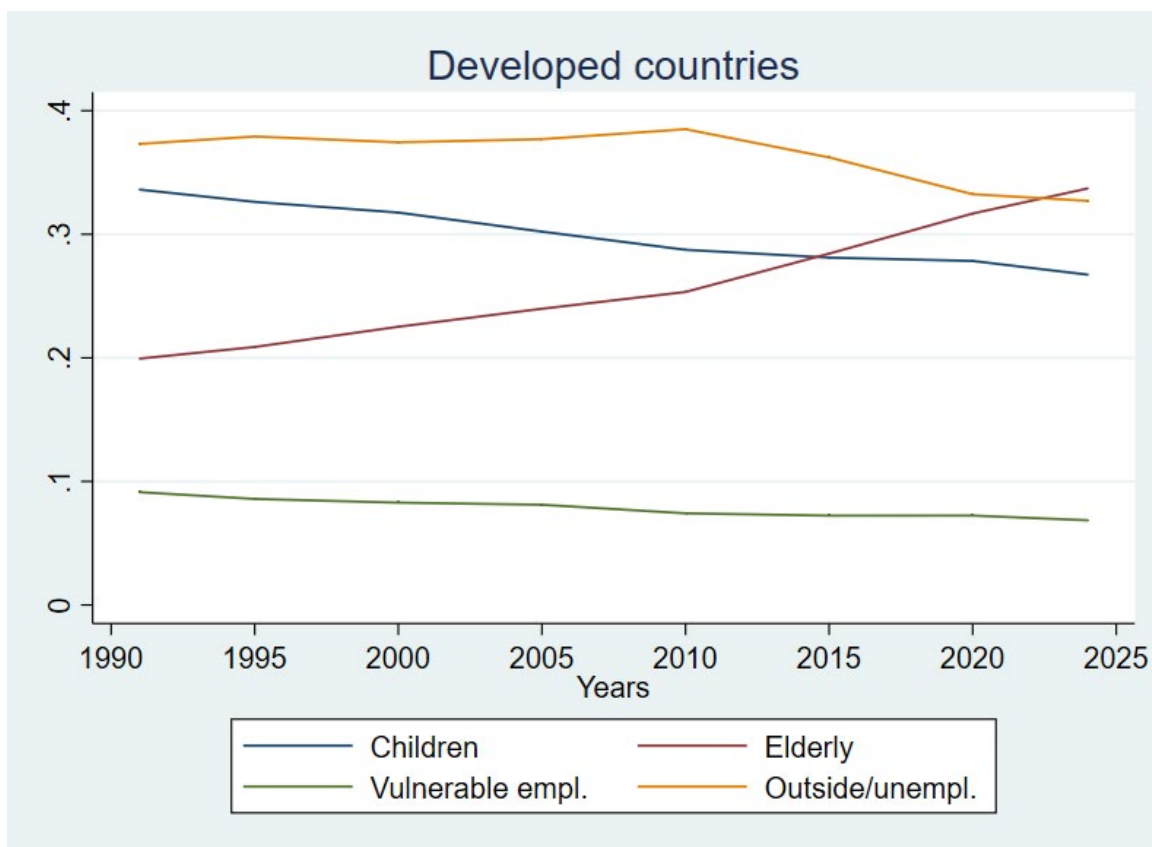
In developing countries, the vulnerable workers component of the total dependency ratio (34.4 per cent in 2024) is greater than that of persons outside the labour force and the unemployed (19 per cent in 2024) (see figure 13). Clearly, many people have no other choice than to engage in non-productive work owing to a lack of more decent employment opportunities combined with a lack of social protection. Although the total VEDR is decreasing over time, the share of vulnerability in the total dependency ratio is at a persistently high level. The proportions of children and older persons remain the same as in the WPDR.

In emerging countries, persons outside the labour force and the unemployed account for one third, and those in vulnerable employment for one quarter, of the VEDR in 2024. The trend indicates a decreasing share of vulnerable employment and a strongly increasing share of persons outside the labour force and the unemployed between 1991 and 2024. The turning point came in 2010, when the latter cohort became the most important component of the VEDR.

In developed countries, the contribution of older persons increased significantly, surpassing that of children in 2015. The contribution of persons outside the labour force and the unemployed to the overall dependency rate remained at a fairly constant and high level (around 37 per cent) until 2010, when it began falling. Nevertheless, it is still the most important factor of the VEDR, although the elderly dependency ratio is expected to draw level by 2024. The share of vulnerable employment has always been relatively low and has been slowly decreasing from 0.14 in 1991 to 0.09 in 2024.

▶ Figure 13. Breakdown of the VEDR over time, by income group, 1991–2024





Source: calculations based on the ILO LFEP database, July 2019 update.

The VEDR benefits from excellent data availability both in terms of country coverage and time dimension, although projections are limited to the near future. However, the concept of vulnerability is based on strong assumptions which call into question the specificity and relevance of the indicator. First, own-account workers and contributing family members form a very diverse group, ranging from subsistence farmers to productive and profitable enterprises. At the same time, many wage workers are in precarious employment – characterized by low levels of pay and employment protection, and by limitations on their freedom of association and collective bargaining – but are not captured by this indicator. The assumption that own-account workers and contributing family members are intrinsically more vulnerable than other persons is as questionable as the assumption that wage workers would by definition be less vulnerable. Thus, vulnerable employment could be more accurately defined on the basis of employment conditions rather than employment status (Ostermeier et al. 2015), which would then also allow vulnerable employees to be included.

Nevertheless, own-account workers and contributing family members represent a large part of the workforce – especially in developing and emerging economies – with the vast majority of these workers (85 per cent) engaged in the informal economy, which is often characterized by a lack of income security, access to labour rights and social protection (ILO 2018b). The vulnerable employment dependency ratio therefore adds another important dimension to dependency by including workers who are thought to be more vulnerable and hence more likely to be in need of support.

► **Table 2. Comparison of different dependency ratios, by income group, 2000–30**

		DDR	ABDR	EBDR	LUDR	WPDR	VEDR
2000	Developing countries	0.92	1.56	1.61	.	5.76	16.26
	Emerging countries	0.59	1.30	1.40	.	5.15	4.97
	Developed countries	0.49	1.11	1.22	.	1.22	1.49
2010	Developing countries	0.88	1.58	1.63	2.01	3.85	14.22
	Emerging countries	0.51	1.28	1.37	1.50	2.41	4.22
	Developed countries	0.49	1.08	1.22	1.32	1.22	1.46
2020	Developing countries	0.81	1.52	1.56	1.95	3.11	12.13
	Emerging countries	0.50	1.34	1.43	1.54	1.70	3.74
	Developed countries	0.54	1.09	1.13	1.20	1.13	1.34
2024	Developing countries	0.77	1.47	1.52	1.90	2.84	11.40
	Emerging countries	0.51	1.36	1.45	1.56	1.66	3.73
	Developed countries	0.56	1.12	1.17	1.23	1.17	1.37
2030	Developing countries	0.72	1.41	.	.	.	.
	Emerging countries	0.51	1.40	.	.	.	.
	Developed countries	0.60	1.18	.	.	.	.

Notes: DDR: demographic dependency ratio; ABDR: Activity-based dependency ratio; EBDR: Employment-based dependency ratio; LUDR: Labour underutilization dependency ratio; WPDR: Working poverty-based dependency ratio; VEDR: Vulnerable employment dependency ratio.

Projections of employment and unemployment figures based on econometric models are only available to the year 2024. Similarly, projections of time-related underemployment are only available from 2005. As a result, estimates for the EBDR, LUDR, WPDR and VEDR are not included for all years.

Source: calculations based on the ILO LFEP database, July 2019 update.

► Conclusion

The proportion of persons aged 55 years and over in the total population is set to increase significantly in all regions of the world over the coming decades. By 2050, more than three quarters of countries will either be ageing or already aged societies. As a direct consequence, the workforce will be ageing too. The number of workers aged 55 to 64 years will increase to represent between 12 per cent and 25 per cent of the total labour force by 2030. What are the implications for the labour market? Will all these persons work, whether by choice or necessity? If they do, what conditions will they face?

This paper shows that, according to the latest forecasts, labour force participation rates (LFPRs) for persons aged 55 years and over differ across income levels. In developing countries, the progress made in terms of pension system coverage and other social transfers is giving older workers greater choice in deciding whether to remain in the labour market. Consequently, LFPRs in developing countries are decreasing significantly. In emerging countries, LFPRs are generally lower than in developed countries and are decreasing for persons aged 65 years or over. The situation is different in developed countries, where social protection systems are well developed, but where an ageing population is driving pension system reforms and active ageing policies that increase the labour force participation rates of older workers.

The gender gap in labour market participation is highest in emerging countries. As a result of targeted policies, it is slowly diminishing with age across all income levels, with the exception of workers aged 65 years or over in developed economies. Despite the progress that has been made, gaps remain that require decisive action in order to ensure equal opportunities in the labour market.

Clearly, ageing is impacting the labour market the world over. In countries that have already aged or are ageing rapidly – mostly developed economies – the contributions of workers to pension schemes are needed in order to cater for a growing group of retirees. In the light of a shrinking workforce at the lower age band, more women and men will have to work until, and most likely beyond, the age of 64 years. In countries that are still to enter their full demographic transition, providing decent employment to the young and adult labour force is a precondition for ensuring access to social protection by older workers and to education by large cohorts of children. These are issues that are commonly referred to in the literature as economic dependencies. Although these are useful indicators, their explanatory powers in terms of the functioning of the labour market are seriously limited. This paper therefore introduces an additional concept related to decent employment. If those who work are not productively employed – that is, engaged in an activity that provides them and their household with an income sufficient to be free from poverty – then they cannot contribute effectively to the education and retirement of others.

This paper therefore proposes a set of employment-based dependency ratios that realistically reflect the capacity of persons who work to support those who do not, based on different proxies for non-productive employment. Three main proxies are used: (i) the labour underutilization rate, (ii) the working poverty rate, and (iii) the vulnerable employment rate. These new employment-based dependency ratios are useful measures for probing into the causes of dependency and informing employment policy choices. They have different strengths and can therefore be used selectively for different country contexts, allowing policy makers to formulate better targeted and country specific policies. It has been possible to calculate them thanks to a very rich data set produced by the ILO that provides a consistent series of labour market data for all countries with forecasts to 2024 and beyond. The analysis shows the importance of age- and gender-specific employment levels and employment quality when discussing the challenges associated with population ageing. Including the employment quality dimension reveals important challenges for the future. As ageing becomes a worldwide reality, improving the quality of employment will become a necessity in order to avoid a steep increase in employment-based dependency ratios.

Further research is needed with regard to the design of the indicators' components. First, the poverty threshold of US\$1.90/day (PPP) does not account for the fact that achieving the same set of capabilities may require a different set of goods and services in different countries. In addition, it may become unsuited to tracking the evolution of poverty across and within countries as they continue to develop. Second, the upper age limit of 64 years for the working-age population requires further examination since the reality of "retiring" differs significantly across the world. Third, the concept of vulnerability is based on strong assumptions and its definition would benefit from new empirical evidence.

The consequences for dependency rates represented by high youth unemployment, low female labour force participation, high rates of labour underutilization, significant levels of vulnerable employment and the high incidence of working poverty lead to some key policy messages. Overall, **absorbing more persons into productive employment should be a priority in order to respond to demographic change**. Bringing people into productive employment removes them from the group of dependents and enables them to provide for those who are in need of support. Investing in key economic sectors that have a high employment creation potential can significantly transform economies and lead to the creation of millions of decent jobs (ILO Global Commission 2019). In addition, a number of policy initiatives may be considered:

Activating the potential labour force: The findings from the different dependency measures showed that persons outside the labour force weigh heavily on dependency rates. A large proportion of the youth population is not in education, employment or training (NEET); moreover, young and adult women, in particular, are disproportionately excluded from the labour market, often because of their involvement in family-related care responsibilities (Elder and Kring 2016). Setting clear objectives in terms of employment rates and adopting the right policies to achieve these targets would aid considerably in decreasing dependency levels in rapidly ageing and already aged developed and emerging countries. Transformative care policies would yield women's higher participation in the labour market and thus contribute to greater gender equality, better economic outcomes and improved health and care provision in a given country.

Promoting the employment of older workers: The results presented in this paper support a targeted policy approach to the challenges posed by ageing societies. Rising life expectancy coupled with diminishing fiscal space will require an extension of the working age of older workers. To enable the prolonged participation of workers in the labour market, several obstacles must be overcome. At the enterprise level, workplaces and the organization of work must be adapted to the needs of older workers, such as by providing flexible working arrangements and removing physical barriers. Launching public awareness campaigns, working closely with employers' organizations and providing financial incentives to promote the hiring or retention of older workers could support such efforts. Public employment services should offer training opportunities and career guidance services tailored to the needs of older workers.

Creating better and productive jobs: Simply raising the employment rates of women, youth and older workers will not be enough. As the dependency measures based on proxies for productive employment demonstrate, the productivity and quality of these jobs matter, as has been shown by the dependency ratios based on labour utilization, working poverty or vulnerable employment rates. Moreover, increasing the productive employment rate of those most impacted by inactivity, working poverty or vulnerable employment will effectively reduce future dependency rates. Policies aimed at ensuring a better match of labour demand and supply, decreasing vulnerable employment and working poverty, and creating quality employment are urgently needed.

Investing in training and education throughout the life cycle: Our dependency ratios show that it is important to bring more persons into the labour force, in particular youth and women, but labour force participation trends also show that it will be critical to retain older workers in the labour force. An important element for ensuring the employability of all workers is to provide the opportunity for continuous retraining and upskilling. Employers and public employment services could provide targeted training to help overcome the potential difficulties that older workers face when using new technologies. Moreover, employers could promote working in intergenerational teams, which would increase knowledge exchange between younger and older workers and also break down prejudices and stereotypes.

Making social protection systems sustainable: The paper shows that when we only take into account the productively employed as those in a position to support others, dependency ratios become very high. Unsustainable dependency ratios will make the funding of social protection impossible. If there are too few persons of working age, and if too few of those are productively employed, fiscal revenues, both direct (through income tax) and indirect (through consumption tax), will remain low and below potential. Low fiscal revenues mean that governments will not be able to finance public policies to support productive employment creation or to finance social protection schemes aimed at those who are inactive (children at school, pensioners, persons with disabilities) or who are unemployed, vulnerable or in a situation of working poverty (cash transfers, unemployment or sickness benefits, and public employment schemes). It is therefore necessary to adapt social protection systems to demographic

change and enable them to continue to fulfil their key role in preventing and reducing poverty, enhancing income security and limiting inequality (Behrendt and Nguyen 2018). Ultimately, social protection systems will give older workers a real choice about whether to remain in employment and will lead to lifelong active societies (Seike 2016).

Strengthening labour market information systems: Dependency measures based on productive employment should be used for long-term projections in order to inform policymakers and influence policy decisions, something that has not been the case before now. The paper has highlighted the data needs to produce these indicators and a clear methodology to calculate them, which can help all labour market observatories across the world produce the productive employment-based dependency ratios.

Table A1. Ranking of countries and territories by ageing status (population aged 65 and over as % of total population) in 2020, 2030 and 2050

Rank (regional)	Rank (global)	Country	2020	Rank (regional)	Rank (global)	Country	2030	Rank (regional)	Rank (global)	Country	2050
East Asia and Pacific											
1	1	Japan	28.40	1	1	Japan	30.87	1	1	Republic of Korea	38.07
2	29	Hong Kong, China	18.20	2	8	Hong Kong, China	25.84	2	2	Japan	37.69
3	38	New Zealand	16.37	3	15	Republic of Korea	24.75	3	6	Taiwan, China	34.99
4	39	Australia	16.21	4	23	Taiwan, China	23.37	4	8	Hong Kong, China	34.68
5	41	Taiwan, China	15.85	5	29	Singapore	22.49	5	9	Singapore	33.27
6	42	Republic of Korea	15.79	6	41	New Zealand	20.54	6	18	Thailand	29.64
7	55	Singapore	13.35	7	45	Macao, China	20.25	7	21	Macao, China	28.91
8	56	Thailand	12.96	8	48	Thailand	19.61	8	37	China	26.07
9	61	Macao, China	11.97	9	50	Australia	19.32	9	54	New Zealand	23.85
10	62	China	11.97	10	62	China	16.87	10	60	Australia	22.78
11	67	Guam	10.54	11	66	Guam	14.64	11	65	French Polynesia	21.92
12	72	New Caledonia	9.70	12	71	French Polynesia	13.44	12	67	Brunei Darussalam	21.75
13	74	DPR Korea	9.35	13	73	New Caledonia	13.38	13	75	New Caledonia	20.49
14	77	French Polynesia	9.07	14	76	DPR Korea	12.70	14	76	Viet Nam	20.45
15	87	Viet Nam	7.87	15	83	Viet Nam	11.95	15	81	DPR Korea	19.70
16	95	Malaysia	7.18	16	93	Brunei Darussalam	10.20	16	82	Guam	19.19
17	98	Fed. States Micronesia	6.94	17	97	Fed. States Micronesia	10.07	17	93	Malaysia	17.00
18	104	Indonesia	6.26	18	98	Malaysia	10.03	18	102	Indonesia	15.86
19	105	Myanmar	6.24	19	101	Indonesia	9.17	19	114	Myanmar	13.18
20	107	Tonga	5.92	20	106	Myanmar	8.52	20	115	Fed. States Micronesia	13.13
21	109	Fiji	5.82	21	107	Fiji	8.13	21	125	Mongolia	12.00
22	111	Brunei Darussalam	5.57	22	110	Philippines	7.60	22	127	Philippines	11.80
23	112	Philippines	5.51	23	119	Mongolia	6.86	23	128	Cambodia	11.68
24	117	Samoa	5.08	24	120	Samoa	6.84	24	129	Fiji	11.16
25	123	Cambodia	4.85	25	122	Cambodia	6.69	25	133	Lao People's DR	10.41
26	133	Mongolia	4.31	26	123	Tonga	6.68	26	138	Samoa	9.14
27	134	Timor-Leste	4.28	27	130	Kiribati	6.17	27	139	Tonga	8.93
28	135	Lao People's DR	4.26	28	135	Lao People's DR	5.64	28	140	Kiribati	8.72

Rank (regional)	Rank (global)	Country	2020	Rank (regional)	Rank (global)	Country	2030	Rank (regional)	Rank (global)	Country	2050
29	136	Kiribati	4.21	29	142	Timor-Leste	4.97	29	147	Solomon Islands	7.02
30	140	Solomon Islands	3.67	30	145	Solomon Islands	4.41	30	150	Papua New Guinea	6.57
31	141	Vanuatu	3.61	31	146	Papua New Guinea	4.37	31	152	Timor-Leste	6.48
32	144	Papua New Guinea	3.57	32	148	Vanuatu	4.25	32	153	Vanuatu	6.45
South Asia											
1	66	Sri Lanka	11.23	1	64	Sri Lanka	15.43	1	62	Sri Lanka	22.58
2	102	India	6.57	2	104	India	8.57	2	72	Maldives	20.88
3	106	Bhutan	6.20	3	109	Bhutan	7.82	3	103	Bhutan	15.84
4	108	Nepal	5.83	4	113	Bangladesh	7.45	4	104	Bangladesh	15.81
5	115	Bangladesh	5.23	5	116	Nepal	7.07	5	112	India	13.75
6	132	Pakistan	4.35	6	121	Maldives	6.72	6	118	Nepal	12.85
7	142	Maldives	3.59	7	139	Pakistan	5.21	7	142	Pakistan	7.87
8	177	Afghanistan	2.65	8	172	Afghanistan	3.14	8	164	Afghanistan	5.42
Europe and Central Asia											
1	2	Italy	23.30	1	2	Italy	27.89	1	3	Spain	36.81
2	3	Portugal	22.77	2	3	Portugal	27.05	2	4	Greece	36.23
3	4	Finland	22.55	3	4	Greece	26.51	3	5	Italy	36.01
4	5	Greece	22.28	4	5	Lithuania	26.38	4	7	Portugal	34.81
5	6	Germany	21.69	5	6	Germany	26.18	5	11	Slovenia	32.14
6	7	Bulgaria	21.47	6	7	Finland	25.99	6	12	Poland	31.13
7	9	Croatia	21.25	7	9	Slovenia	25.46	7	13	Croatia	30.87
8	11	France	20.75	8	12	Croatia	25.08	8	14	Bosnia & Herzegovina	30.39
9	12	Slovenia	20.74	9	13	Spain	25.04	9	16	Germany	30.01
10	13	Latvia	20.69	10	14	Latvia	24.97	10	19	Austria	29.39
11	14	Lithuania	20.62	11	16	Netherlands	24.61	11	20	Lithuania	28.98
12	15	Estonia	20.37	12	17	France	24.13	12	22	Czechia	28.86
13	16	Sweden	20.33	13	18	Bosnia & Herzegovina	24.09	13	23	Slovakia	28.86
14	17	Denmark	20.16	14	19	Austria	23.69	14	24	Estonia	28.73
15	18	Hungary	20.16	15	20	Estonia	23.55	15	25	Switzerland	28.65
16	19	Czechia	20.14	16	21	Bulgaria	23.43	16	26	Bulgaria	28.63
17	20	Netherlands	20.03	17	22	Switzerland	23.39	17	27	Netherlands	28.00
18	21	Spain	19.98	18	24	Poland	23.22	18	28	Hungary	28.00
19	22	Belgium	19.25	19	25	Belgium	22.97	19	29	France	27.83
20	23	Romania	19.23	20	28	Denmark	22.60	20	30	Latvia	27.81

Rank (regional)	Rank (global)	Country	2020	Rank (regional)	Rank (global)	Country	2030	Rank (regional)	Rank (global)	Country	2050
21	24	Austria	19.20	21	30	Czechia	22.22	21	32	Romania	27.67
22	25	Switzerland	19.10	22	31	Sweden	22.15	22	33	Finland	27.57
23	26	Serbia	19.06	23	33	Hungary	21.98	23	34	Belgium	26.92
24	27	Poland	18.74	24	35	United Kingdom	21.52	24	35	Serbia	26.64
25	28	United Kingdom	18.65	25	36	Serbia	21.18	25	36	Ireland	26.62
26	31	Bosnia & Herzegovina	17.92	26	37	Romania	21.04	26	38	Cyprus	26.00
27	33	Norway	17.53	27	38	Slovakia	20.99	27	39	North Macedonia	25.65
28	34	Ukraine	16.95	28	40	Albania	20.73	28	40	Ukraine	25.52
29	36	Slovakia	16.70	29	42	Belarus	20.50	29	41	Albania	25.44
30	43	Montenegro	15.77	30	43	Norway	20.27	30	42	United Kingdom	25.34
31	44	Iceland	15.62	31	46	Iceland	20.11	31	43	Iceland	25.17
32	45	Belarus	15.58	32	47	Ukraine	20.01	32	47	Sweden	24.58
33	46	Russian Federation	15.51	33	49	Russian Federation	19.60	33	48	Luxembourg	24.50
34	47	Georgia	15.25	34	51	Montenegro	19.22	34	50	Denmark	24.23
35	49	Albania	14.70	35	52	Georgia	18.54	35	52	Belarus	24.00
36	51	Ireland	14.58	36	53	North Macedonia	18.24	36	53	Norway	23.95
37	52	North Macedonia	14.48	37	54	Cyprus	18.21	37	55	Montenegro	23.78
38	53	Cyprus	14.41	38	55	Ireland	18.14	38	58	Republic of Moldova	23.03
39	54	Luxembourg	14.39	39	56	Luxembourg	18.04	39	59	Russian Federation	22.86
40	58	Republic of Moldova	12.49	40	60	Republic of Moldova	16.96	40	66	Georgia	21.78
41	63	Armenia	11.80	41	61	Armenia	16.90	41	69	Armenia	21.39
42	79	Turkey	8.98	42	80	Turkey	12.34	42	73	Turkey	20.86
43	86	Kazakhstan	7.90	43	85	Azerbaijan	11.78	43	88	Azerbaijan	17.50
44	101	Azerbaijan	6.74	44	89	Kazakhstan	11.07	44	111	Kazakhstan	14.15
45	124	Uzbekistan	4.79	45	112	Uzbekistan	7.56	45	123	Uzbekistan	12.18
46	126	Turkmenistan	4.77	46	114	Kyrgyzstan	7.23	46	131	Turkmenistan	10.60
47	127	Kyrgyzstan	4.73	47	117	Turkmenistan	7.07	47	134	Kyrgyzstan	10.08
48	153	Tajikistan	3.18	48	141	Tajikistan	5.06	48	144	Tajikistan	7.50
Middle East and North Africa											
1	8	Malta	21.32	1	10	Malta	25.32	1	15	Malta	30.37
2	59	Israel	12.41	2	69	Israel	13.64	2	71	Lebanon	20.94
3	80	Tunisia	8.87	3	78	Tunisia	12.50	3	77	Tunisia	20.20
4	90	Morocco	7.61	4	81	Lebanon	11.99	4	78	Iran (Islamic Rep of.)	20.16
5	92	Lebanon	7.55	5	88	Morocco	11.16	5	80	Kuwait	19.73

Rank (regional)	Rank (global)	Country	2020	Rank (regional)	Rank (global)	Country	2030	Rank (regional)	Rank (global)	Country	2050
6	100	Algeria	6.74	6	100	Iran (Islamic Rep. of)	9.55	6	89	Morocco	17.46
7	103	Iran (Islamic Rep. of)	6.56	7	102	Algeria	8.94	7	91	Saudi Arabia	17.24
8	114	Egypt	5.33	8	111	Kuwait	7.58	8	95	Israel	16.58
9	122	Syrian Arab Republic	4.87	9	126	Djibouti	6.40	9	96	Libya	16.35
10	128	Djibouti	4.71	10	127	Egypt	6.38	10	99	United Arab Emirates	16.11
11	129	Libya	4.53	11	128	Libya	6.33	11	101	Algeria	15.89
12	138	Jordan	3.95	12	132	Saudi Arabia	6.05	12	110	Qatar	14.17
13	147	Saudi Arabia	3.50	13	133	Syrian Arab Republic	6.05	13	113	Syrian Arab Republic	13.50
14	148	Iraq	3.44	14	136	Bahrain	5.56	14	116	Bahrain	12.95
15	152	Occ. Palestinian Terr.	3.22	15	138	Jordan	5.55	15	117	Oman	12.86
16	160	Kuwait	3.04	16	140	United Arab Emirates	5.14	16	124	Djibouti	12.13
17	165	Yemen	2.93	17	143	Qatar	4.71	17	126	Jordan	11.84
18	176	Bahrain	2.65	18	144	Oman	4.44	18	137	Egypt	9.42
19	182	Oman	2.51	19	152	Occ. Palestinian Terr.	4.14	19	143	Occ. Palestinian Terr.	7.56
20	192	Qatar	1.69	20	159	Iraq	3.78	20	146	Iraq	7.08
21	193	United Arab Emirates	1.26	21	168	Yemen	3.38	21	158	Yemen	5.91
Latin America and Caribbean											
1	10	Puerto Rico	32.65	1	10	Puerto Rico	20.83	1	11	Puerto Rico	25.16
2	17	Cuba	29.83	2	32	Curaçao	17.67	2	26	Curaçao	22.88
3	31	Barbados	27.74	3	35	Barbados	16.70	3	32	Barbados	22.06
4	45	Chile	24.90	4	40	Cuba	15.89	4	34	Cuba	21.66
5	46	Curaçao	24.73	5	48	Uruguay	15.09	5	39	Aruba	20.74
6	51	Saint Lucia	24.06	6	50	Aruba	14.60	6	58	Chile	17.15
7	56	Costa Rica	23.66	7	60	Chile	12.24	7	59	Uruguay	17.15
8	57	Trinidad and Tobago	23.05	8	64	Trinidad and Tobago	11.51	8	63	Trinidad and Tobago	16.14
9	61	Brazil	22.72	9	65	Argentina	11.37	9	65	Costa Rica	15.11
10	64	Aruba	22.32	10	68	Saint Lucia	10.30	10	67	Saint Lucia	14.64
11	68	Uruguay	21.67	11	69	Costa Rica	10.25	11	68	Antigua and Barbuda	13.67
12	70	Colombia	21.01	12	70	St. Vincent and Gren.	9.91	12	70	Brazil	13.59
13	74	Antigua and Barbuda	20.79	13	71	Grenada	9.79	13	72	St. Vincent and Gren.	13.39
14	83	St. Vincent and Gren.	18.94	14	73	Brazil	9.59	14	74	Colombia	13.03
15	84	Peru	18.93	15	75	Antigua and Barbuda	9.33	15	75	Argentina	12.74
16	85	Jamaica	18.47	16	76	Jamaica	9.08	16	79	Grenada	12.45
17	86	Panama	17.82	17	78	Colombia	9.06	17	82	Jamaica	11.96

Rank (regional)	Rank (global)	Country	2020	Rank (regional)	Rank (global)	Country	2030	Rank (regional)	Rank (global)	Country	2050
18	87	Bahamas	17.64	18	81	Peru	8.73	18	84	Bahamas	11.79
19	90	Argentina	17.28	19	82	El Salvador	8.65	19	86	Peru	11.44
20	92	Mexico	17.03	20	83	Panama	8.54	20	87	Panama	11.30
21	94	Grenada	16.69	21	85	Venezuela (Bol. Rep.)	7.97	21	90	El Salvador	10.65
22	97	El Salvador	16.27	22	88	Bahamas	7.75	22	91	Guyana	10.31
23	98	Ecuador	16.19	23	89	Mexico	7.62	23	92	Dominican Rep.	10.24
24	100	Dominican Rep.	16.02	24	91	Ecuador	7.59	24	94	Mexico	10.20
25	105	Venezuela (Bol. Rep.)	15.33	25	93	Dominican Rep.	7.53	25	95	Venezuela (Bol. Rep.)	10.13
26	106	Nicaragua	14.93	26	94	Bolivia (Plurin. State)	7.49	26	96	Ecuador	10.10
27	108	Guyana	14.82	27	96	Suriname	7.14	27	99	Suriname	9.97
28	109	Suriname	14.37	28	97	Guyana	7.00	28	103	Bolivia (Plurin. State)	8.78
29	119	Honduras	12.84	29	99	Paraguay	6.81	29	105	Paraguay	8.52
30	120	Paraguay	12.77	30	110	Nicaragua	5.68	30	108	Nicaragua	7.99
31	121	Belize	12.76	31	116	Haiti	5.17	31	118	Belize	7.06
32	122	Bolivia (Plurin. State)	12.72	32	118	Guatemala	5.04	32	125	Honduras	6.66
33	130	Guatemala	10.95	33	119	Belize	5.01	33	129	Haiti	6.31
34	135	Haiti	10.08	34	120	Honduras	4.97	34	131	Guatemala	6.12
North America											
1	30	Canada	18.10	1	27	Canada	22.82	1	44	Canada	25.04
2	37	United States	16.63	2	44	United States	20.26	2	63	United States	22.35
Sub-Saharan Africa											
1	57	Mauritius	12.52	1	57	Mauritius	17.99	1	49	Mauritius	24.46
2	84	Seychelles	8.07	2	77	Seychelles	12.60	2	79	Seychelles	20.02
3	113	South Africa	5.51	3	115	Cabo Verde	7.16	3	107	Cabo Verde	14.83
4	121	Lesotho	4.95	4	124	South Africa	6.68	4	132	South Africa	10.49
5	125	Cabo Verde	4.79	5	134	Botswana	5.65	5	136	Botswana	9.98
6	130	Botswana	4.51	6	137	Lesotho	5.55	6	141	Lesotho	8.06
7	131	Eritrea	4.51	7	147	Rwanda	4.37	7	145	Gabon	7.43
8	137	Eswatini	4.01	8	149	Eritrea	4.23	8	148	Rwanda	6.91
9	139	Sudan	3.67	9	150	Sudan	4.20	9	149	Kenya	6.72
10	143	Namibia	3.59	10	151	Ghana	4.19	10	151	Namibia	6.50
11	145	Ethiopia	3.54	11	153	Namibia	4.13	11	154	Ghana	6.44
12	146	Gabon	3.53	12	154	Gabon	3.91	12	155	Eswatini	6.25
13	149	South Sudan	3.35	13	155	Sao Tome and Principe	3.90	13	156	Sao Tome and Principe	6.18

Rank (regional)	Rank (global)	Country	2020	Rank (regional)	Rank (global)	Country	2030	Rank (regional)	Rank (global)	Country	2050
14	150	Liberia	3.32	14	156	Eswatini	3.83	14	157	Ethiopia	6.05
15	151	Benin	3.28	15	157	Ethiopia	3.83	15	159	Comoros	5.74
16	154	Mauritania	3.18	16	158	Comoros	3.82	16	160	Sudan	5.68
17	155	Ghana	3.14	17	160	Liberia	3.78	17	161	Madagascar	5.63
18	156	Rwanda	3.12	18	161	Madagascar	3.73	18	162	Mauritania	5.56
19	157	Senegal	3.11	19	162	Mauritania	3.68	19	163	Liberia	5.53
20	158	Comoros	3.11	20	163	Benin	3.60	20	165	Zimbabwe	5.42
21	159	Madagascar	3.10	21	164	South Sudan	3.57	21	166	Eritrea	5.39
22	161	DR Congo	3.02	22	165	Congo	3.45	22	167	Congo	5.35
23	162	Zimbabwe	3.01	23	166	Kenya	3.43	23	168	Senegal	5.22
24	163	Sao Tome and Principe	3.01	24	167	Senegal	3.38	24	169	Togo	5.12
25	164	Guinea	2.95	25	169	Zimbabwe	3.33	25	170	Sierra Leone	4.92
26	166	Sierra Leone	2.93	26	170	Togo	3.27	26	171	Benin	4.84
27	167	Togo	2.91	27	171	DR Congo	3.18	27	172	South Sudan	4.69
28	168	Somalia	2.90	28	173	Sierra Leone	3.13	28	173	Malawi	4.59
29	169	Guinea-Bissau	2.89	29	174	Guinea	3.08	29	174	United Rep. Tanzania	4.51
30	170	Côte d'Ivoire	2.88	30	175	Côte d'Ivoire	3.05	30	175	Cameroon	4.51
31	171	Mozambique	2.86	31	176	United Rep. Tanzania	3.00	31	176	Guinea-Bissau	4.45
32	172	Central African Rep.	2.80	32	177	Guinea-Bissau	2.98	32	177	Zambia	4.17
33	173	Congo	2.76	33	178	Somalia	2.94	33	178	Burkina Faso	4.10
34	174	Nigeria	2.74	34	179	Nigeria	2.90	34	179	DR Congo	4.10
35	175	Cameroon	2.72	35	180	Central African Rep.	2.90	35	180	Uganda	4.03
36	178	United Rep. Tanzania	2.64	36	181	Cameroon	2.89	36	181	Côte d'Ivoire	3.98
37	179	Malawi	2.64	37	182	Burundi	2.88	37	182	Nigeria	3.96
38	180	Niger	2.60	38	183	Mozambique	2.84	38	183	Burundi	3.94
39	181	Gambia	2.53	39	184	Malawi	2.83	39	184	Guinea	3.93
40	183	Kenya	2.51	40	185	Burkina Faso	2.69	40	185	Gambia	3.91
41	184	Chad	2.50	41	186	Gambia	2.68	41	186	Mozambique	3.88
42	185	Mali	2.48	42	187	Niger	2.60	42	187	Mali	3.55
43	186	Burkina Faso	2.41	43	188	Chad	2.55	43	188	Central African Rep.	3.50
44	187	Equatorial Guinea	2.38	44	189	Angola	2.49	44	189	Chad	3.38
45	188	Burundi	2.38	45	190	Zambia	2.46	45	190	Angola	3.35
46	189	Angola	2.19	46	191	Mali	2.42	46	191	Equatorial Guinea	3.27
47	190	Zambia	2.13	47	192	Uganda	2.34	47	192	Somalia	3.08

Rank (regional)	Rank (global)	Country	2020	Rank (regional)	Rank (global)	Country	2030	Rank (regional)	Rank (global)	Country	2050
48	191	Uganda	1.99	48	193	Equatorial Guinea	2.21	48	193	Niger	2.71

Table A2. Income groupings

**Developed countries
(high income)**

Andorra
Antigua and Barbuda
Argentina
Australia
Austria
Bahamas
Bahrain
Barbados
Belgium
Brunei Darussalam
Canada
Channel Islands
Chile
Croatia
Cyprus
Czech Republic
Denmark
Estonia
Finland
France
French Polynesia
Germany
Greece
Guam
Hong Kong, China
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea, Republic of
Kuwait
Latvia
Liechtenstein
Lithuania
Luxembourg
Macau, China
Malta
Monaco
Netherlands
Netherlands Antilles
New Caledonia
New Zealand
Norway
Oman
Poland
Portugal
Puerto Rico
Qatar
Saint Kitts and Nevis
San Marino
Saudi Arabia
Seychelles
Singapore
Slovakia
Slovenia
Spain
Sweden
Switzerland

Taiwan, China
Trinidad and Tobago
United Arab Emirates
United Kingdom
United States
United States Virgin Islands
Uruguay

**Emerging countries
(middle income)**

Albania
Algeria
Angola
Armenia
Azerbaijan
Bangladesh
Belarus
Belize
Bhutan
Bolivia, Plurinational State of
Bosnia and Herzegovina
Botswana
Brazil
Bulgaria
Cabo Verde
Cambodia
Cameroon
China
Colombia
Congo
Cook Islands
Costa Rica
Côte d'Ivoire
Cuba
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Fiji
Gabon
Georgia
Ghana
Grenada
Guatemala
Guyana
Honduras
India
Indonesia
Iran, Islamic Republic of
Iraq
Jamaica
Jordan
Kazakhstan
Kenya
Kiribati
Kyrgyzstan
Lao People's
Democratic Republic

Lebanon
Lesotho
Libya
Macedonia, the former
Yugoslav Republic of
Malaysia
Maldives
Marshall Islands
Mauritania
Mauritius
Mexico
Micronesia, Federated
States of
Moldova, Republic of
Mongolia
Montenegro
Morocco
Myanmar
Namibia
Nauru
Nicaragua
Nigeria
Occupied Palestinian Territory
Pakistan
Palau
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Romania
Russian Federation
Saint Lucia
Saint Vincent and
the Grenadines
Samoa
Sao Tome and Principe
Serbia
Solomon Islands
South Africa
Sri Lanka
Sudan
Suriname
Swaziland
Syrian Arab Republic
Tajikistan
Thailand
Timor-Leste
Tonga
Tunisia
Turkey
Turkmenistan
Tuvalu
Ukraine
Uzbekistan
Vanuatu
Venezuela, Bolivarian
Republic of
Viet Nam
Western Sahara
Yemen
Zambia

**Developing countries
(low income)**

Afghanistan
Benin
Burkina Faso
Burundi
Central African Republic
Chad
Comoros
Congo, Democratic
Republic of the
Eritrea
Ethiopia
The Gambia
Guinea
Guinea-Bissau
Haiti
Korea, Democratic People's
Republic of
Liberia
Madagascar
Malawi
Mali
Mozambique
Nepal
Niger
Rwanda
Senegal
Sierra Leone
Somalia
Tanzania, United Republic of
Togo
Uganda
Zimbabwe

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