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Towards a reconceptualising of population ageing in emerging markets

Stuart Gietel-Basten, Sergei Scherbov and Warren Sanderson*

Abstract

Variously defined, the 'emerging markets' [EMs] are frequently held up as the countries that will shape global economic development in the 21st century. However, it is also often said that population ageing could limit growth in many EMs. In this paper, we explore the conventional measurements employed to demonstrate population ageing in EMs, and then move on to discuss whether these measurements are, indeed, 'fit for purpose' when studying EMs. Drawing on the literature on 'prospective ageing' (pioneered by Sanderson and Scherbov), we present an alternative set of ageing measurements based on a boundary for 'dependency' drawn from remaining life expectancy rather than chronological age. Using these measurements, population ageing – at least as defined here – can be seen as a much more manageable prospect for many EMs. We also examine the challenges and the opportunities for EMs associated with population ageing, and consider their potential advantages relative to the EU and North America in managing this trend.

1 Background

1.1 What are 'emerging markets'?

As is implied by the name, 'emerging markets' [EMs] are generally defined as countries in a transitional phase towards developing a full market economy based on

* Stuart Gietel-Basten (corresponding author), Department of Social Policy and Intervention, University of Oxford, UK; and Green Templeton College, Oxford
Email: stuart.basten@spi.ox.ac.uk

Sergei Scherbov, World Population Program, International Institute of Applied Systems Analysis, Austria; Vienna Institute of Demography/Austrian Academy of Science, Austria; and Russian Presidential Academy of National Economy and Public Administration, Russian Federation

Warren Sanderson, World Population Program, International Institute of Applied Systems Analysis, Austria; and Department of Economics, Stony Brook University, USA

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industrial modes of production and greater economic freedom. However, the term 'emerging markets', which was first coined by Antoine van Agtmael in 1981, is by no means uncontroversial. While it was initially seen as a more dynamic alternative to the expression 'third world' and to the politically incorrect term 'less-developed countries', the 'emerging markets' label has been questioned in terms of both its composition and its meaning. Organisations like Standard & Poors, the FTSE, the IMF, and Dow Jones have used different criteria in defining what constitutes an emerging market.

One definition of an emerging market, provided by Vladimir Kvint (2008; 2009), is as follows:

> *An Emerging Market is a society transitioning from a dictatorship to a free-market-oriented-economy, with increasing economic freedom, gradual integration with the Global Marketplace and with other members of the GEM (Global Emerging Market), an expanding middle class, improving standards of living, social stability and tolerance, as well as an increase in cooperation with multilateral institutions.*

Alternative groupings of countries and acronyms for these categories have recently gained currency, including the term 'BRICS', an acronym for Brazil, Russia, India, and China (and, in some cases, South Africa). BRICS, which was first coined in 2001 by Goldman Sachs chief economist Jim O'Neill, is thus used to refer to four (or five) large countries that are expected to play increasingly critical roles in shaping the global economy. More recently, the BRICS countries have been joined by the 'MINT' countries: namely, Mexico, Indonesia, Nigeria, and Turkey. Finally, the London Stock Exchange divides the 'emerging markets' category of countries into 'advanced emerging', 'secondary emerging', and 'frontier' markets.

In this paper, we use a special subset of 21 EMs for analysis, grouped into four quasi-regions.[1] Clearly, there are many question marks over the inclusion of some countries and the exclusion of others. However, we believe that the creation of this subset represents a reasonable attempt at assembling a group of countries that are broadly expected to play very significant roles in shaping the global economy in the 21st century.

1.2 Population ageing in emerging markets: The orthodox view

In addition to undergoing dramatic economic and political changes, EMs have experienced equally seismic demographic changes over the past 50 years. As Figure 1 shows, across the EMs there have been marked increases in life expectancy

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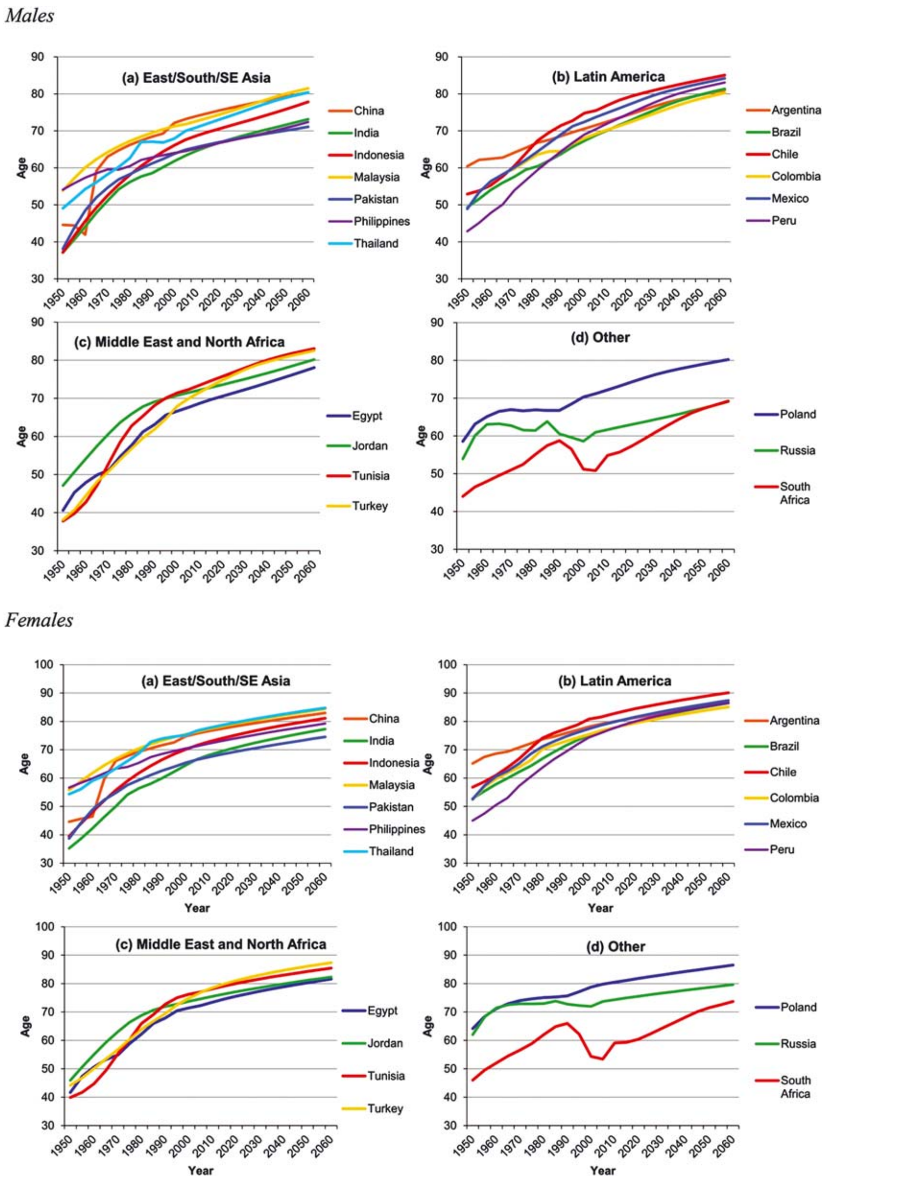
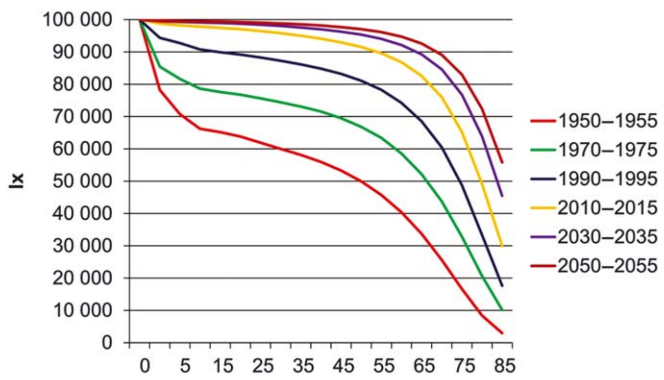
[1] China, India, Indonesia, Malaysia, Pakistan, the Philippines, and Thailand (East, South-East, and South Asia); Argentina, Brazil, Chile, Colombia, Mexico and Peru (Latin America); Egypt, Jordan, Tunisia and Turkey (Middle East and North Africa); Poland, Russia, and South Africa (other).

Figure 1:
Recent trends and forecasts of life expectancy at birth in four groups of EM countries. [a] Latin America; [b] E/SE/S Asia; [c] MENA; [d] Others



Note: CHN = China, IND = India, IDN = Indonesia, MYS = Malaysia, PAK = Pakistan, PHL = Philippines, THA = Thailand (East/SE/South Asia); ARG = Argentina, BRA = Brazil, CHL = Chile, COL = Colombia, MEX = Mexico, PER = Peru (Latin America); EGY = Egypt, JOR = Jordan, TUN = Tunisia, TUR = Turkey (Middle East and North Africa); POL = Poland, RUS = Russia, and ZAF = South Africa (Other).
Source: UNPD 2013

Figure 2:
Survivorship *(lx)* curve, Turkey, 1950–2060

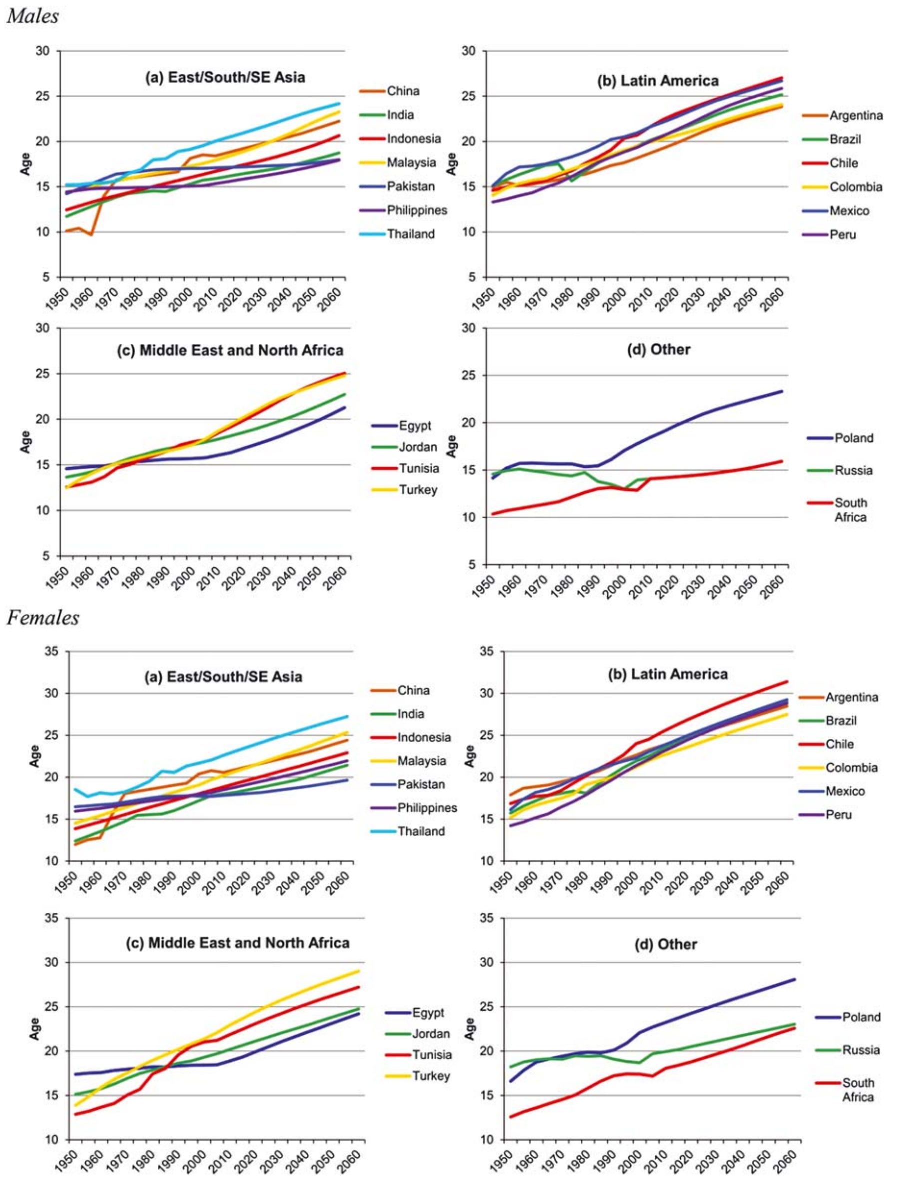


Source: UNPD 2013.

at birth for both males and females – albeit with some important outliers, such as South Africa and Russia, where previous mortality improvements have been thrown into reverse over the past two decades. Large shares of these overall improvements in life expectancy have been driven by reductions in mortality rates among infants and children (see Caselli et al. 2014 and Garbero and Pamuk 2014 for a review) and an increasing rectangularisation of the survival curve. Looking at Figure 2, we can see this pattern for Turkey: while the country saw dramatic improvements in early-age mortality during the mid-20th century, lower mortality at older ages has driven the overall mortality improvements in Turkey in recent years, and is projected to continue to do so in the future. Despite this caveat, as Figure 3 shows, there have been equally large improvements in life expectancy at age 60 for both males and females (again, with the same notable outliers). Thus, it is inaccurate to simply say that mortality improvements among older people have led to a trend towards 'ageing from above' in EMs. Rather, the recent improvements in mortality and health over the entire life course have led to increased survivorship rates; and, hence, to rising numbers of people surviving to older ages. Most of the scholarly literature, including a recent survey of population experts (see, for example, Caselli et al. 2014 and Garbero and Pamuk 2014) has forecasted that these mortality improvements will continue into the medium term.

It has also been argued that EM populations have 'aged from below' as a consequence of rapid declines in fertility. The often dramatic decreases in fertility can be seen in Figure 4. In 1950, all of the EMs in our dataset with the exception of Poland, Russia, and Argentina had total fertility rates [TFRs] above five, with all but three having TFRs above six. Today, only Pakistan, the Philippines, and Jordan have TFRs above three. Meanwhile, Thailand, China, Tunisia, Poland, Russia, Malaysia, Chile, and Brazil, all have TFRs below the replacement level; with China having

Figure 3:
Recent trends and forecasts of life expectancy at age 60 in four groups of EM countries. [a] Latin America; [b] E/SE/S Asia; [c] MENA; [d] Others



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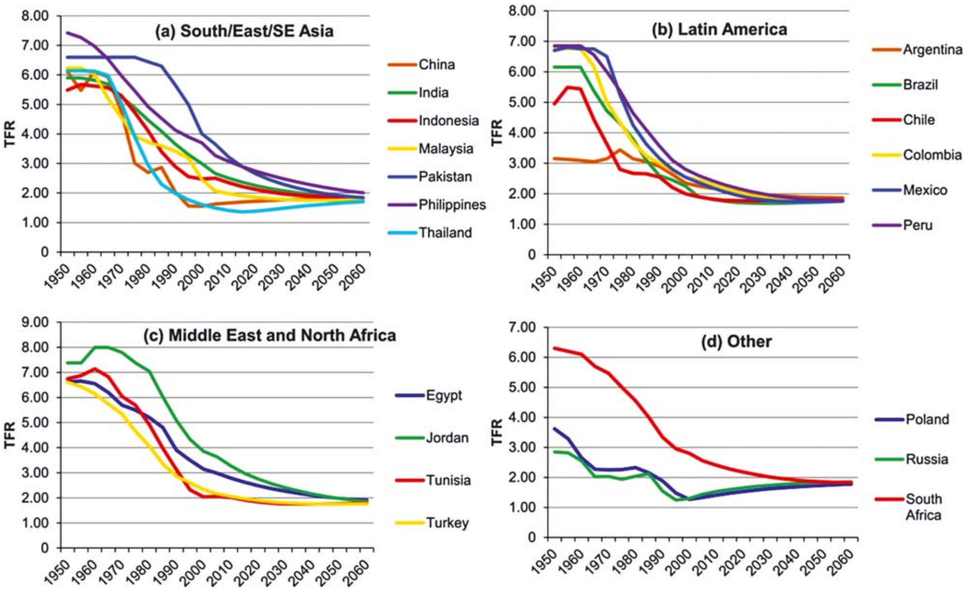
Source: UNPD 2013.

Figure 4:
Recent trends and forecasts of total fertility rates [TFR] in four groups of EM countries. [a] Latin America; [b] E/SE/S Asia; [c] MENA; [d] Others



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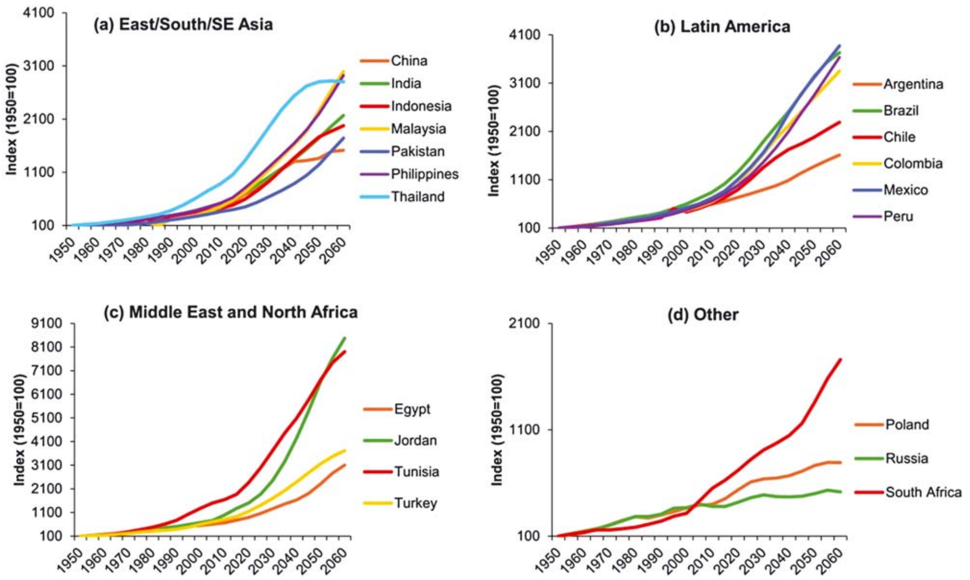
Medium fertility variant used.
Source: UNPD 2013.

one of the lowest fertility rates in the world. In India, 10 states currently have TFRs below two (for an overview of these recent trends, see Basten et al. 2014 and Goujon and Fuchs 2014). While the scale of the decline in fertility across the country set is very large, the *pace* at which this decrease has occurred – especially when compared to the trends in European countries, where the fertility decline began over a century ago – is breathtaking. It is therefore clear that the process of 'ageing from below' as a consequence of fertility decline has contributed substantially to the overall ageing of the populations in EMs.

Future patterns of fertility are, however, more uncertain. In Figure 4, we employed the medium variant of the UN's *World Population Prospects: 2012 Revision*. Yet in the literature and in a recent survey of experts, some scepticism about this indicator have been expressed. While space does not permit a full review of this debate here, it is important to note that the UN's assumptions regarding fertility are not universally accepted. The main points of contention are concerning the future paths of countries (such as China and Thailand) that are currently

Figure 5:
Recent trends and forecasts of the total population size aged 65+ in four groups of EM countries. [a] Latin America; [b] E/SE/S Asia; [c] MENA; [d] Others



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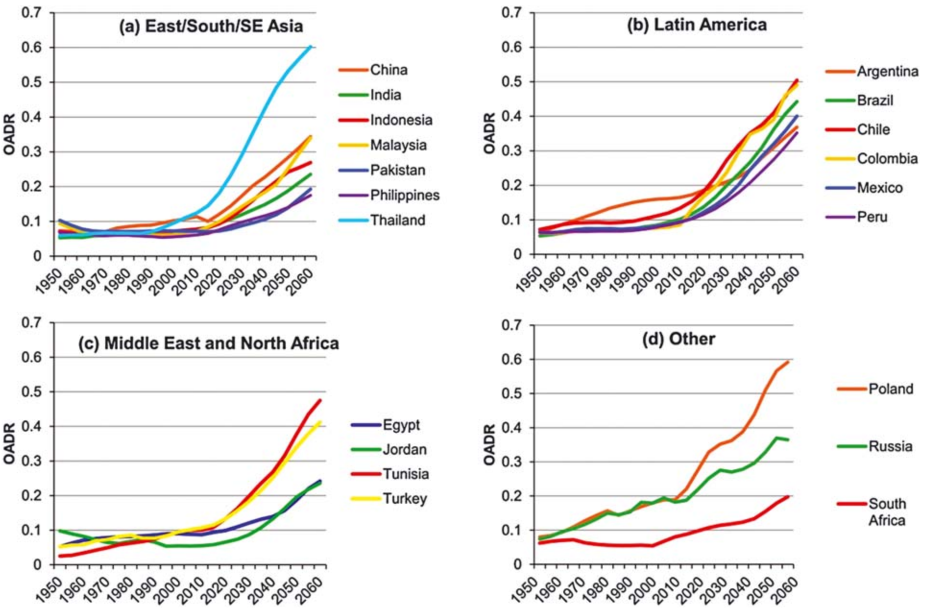
Medium fertility variant used.
Source: UNPD 2013.

characterised by very low fertility (see Basten et al. 2014 and Goujon and Fuchs 2014 for a review).

So how do these trends affect population ageing? First, we might consider the 'absolute' increases in the older population. Using the standard measurements employed by the UN and most scholarly and policy documents, Figure 5 shows the absolute increase in the total population aged 65 or older based upon an index of 100 in 1950. It would be fair to say that the increases are dramatic in all countries, although some are certainly more dramatic than others. For example, in Jordan and in Turkey the shares of the population aged 65+ are projected to increase more than 90-fold relative to the shares in 1950. Meanwhile, in Latin America and in Asia, increases of 20-fold and 30-fold are anticipated. What is crucial to note, however, is that the bulk of these increases are expected to occur in the next few decades; causing the increases that occurred in the 20th century to appear relatively modest by comparison.

Figure 6:
Recent trends and forecasts of the old-age dependency ratio (population aged 65+/population aged 20–64) in four groups of EM countries. [a] Latin America; [b] E/SE/S Asia; [c] MENA; [d] Others



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Medium fertility variant used.
Source: UNPD 2013.

However, in thinking about the management of population ageing, it is arguably more useful to consider the size of the older population *relative* to the sizes other age groups – and especially to the size of the population of 'working ages'. In making such comparisons, the old-age dependency ratio [*OADR*] is the 'go-to' measurement that is almost universally employed in scholarly, policy, and popular discourses on ageing. The sheer ubiquity of the *OADR* in the scholarly and the policy literature does not need to be demonstrated here. In the OADR, the population aged 65 or older counts as the numerator, while the population aged between a given lower bound (assumed to be 20 here) and 64 is the denominator. The people aged 65+ are deemed to be 'old' and 'dependent' upon those aged 20–64, who might be considered to be a sort of *de facto* labour force. The *OADRs* for the EM countries are displayed in Figure 6. The numbers represent the number of 'old people' who are 'dependent' upon each person aged (in this case) 20–64.

Looking at these *OADRs*, it is not difficult to see why population ageing is considered to be such a significant issue, or is even characterised as a *threat*: in the EMs, the OADRs are on track to increase sharply over the coming decades. Currently, the *OADRs* are below 0.17 for all of the EMs in our set except Argentina, Chile, Poland, and Russia. In other words, each person aged 20–64 is currently 'supporting' no more than 0.17 people aged 65+ in these countries. Meanwhile, the ratio is much higher in some non-EM countries: the OADR is 0.39 in Japan; and is between 0.30 and 0.35 in Germany, Italy, Sweden, and Greece. Among the EMs, the highest current *OADRs* are 0.24 in Poland, 0.20 in Russia, and 0.20 in Argentina. Although Chile and Thailand have *OADRs* of 0.17 and 0.16, respectively; South Africa, Egypt, Colombia, Peru, Mexico, Tunisia, Turkey, Brazil and China have *OADRs* of between 0.10 and 0.15 (in ascending order). Jordan, the Philippines, Pakistan, Indonesia, Malaysia, and India have current *OADRs* of between 0.07 and below 0.1 (again, in ascending order).

But by mid-century, these ratios look very different. In the Latin American EMs, there is a near uniform increase to between 0.39 (Peru) and 0.56 (Chile), with most of the OADRs clustered between 0.4 and 0.5. In E/SE/S Asia, China, and Thailand, the OADRs are projected to increase extremely rapidly and intensely, to between 0.54 and 0.65. Indeed, by 2050 the population of Thailand will be as 'old' as the populations of Germany and Singapore. Elsewhere in this region, the OADR is projected to rise to 0.37 in Malaysia and to between 0.20 and 0.29 in the remaining countries. Among the MENA EMs, the OADR is set to jump to 0.53 in Tunisia and to 0.45 in Turkey. Increases of 150% are projected for Egypt and Jordan. In the 'other' group, the OADR is expected to further increase to 0.40 in Russia and to 0.62 in Poland, and to double in South Africa.

Yet before we discuss the 'challenges' associated with population ageing, as indicated by the *OADR*; we would be well advised to pause and think a little more carefully about what this widely used measurement is actually telling us. Indeed, a growing body of literature has developed in recent years suggesting that the *OADR* might not be such a useful measurement when examining population ageing in industrialised/OECD countries. The reasons why this might be the case have been extensively reviewed elsewhere (see, for example, Scherbov et al. 2014; Sanderson and Scherbov 2013; and Spijker and MacInnes 2014), and will be only very briefly summarised here. There are two main criticisms of the reliance on the OADR. The first criticism concerns change over time: i.e., when the boundary of 'old age' and 'dependency' is fixed at age 65 over the complete forecast period, changes in life expectancy (and, by implication, health) are not taken into account. The second criticism is rather more fundamental, and challenges the very idea of what it means to be 'old' and 'dependent', regardless of which threshold age is chosen. The literature that has made this criticism has drawn on themes such as the separation of the pensionable age and the retirement age (which rarely occurs at 65); differences in health care expenditures among people aged 65 and older; the need to consider differences in pension systems (and their increasing privatisation); and issues related to 'active ageing', including a questioning of the notion of 'dependency'.

Elsewhere, Basten (2013) has argued that these criticisms are even more pertinent when considering non-European settings. For example, in Asian countries with very low levels of pension coverage and of state-provided support for older people – problems that are exacerbated by the large informal labour markets in many of these countries – the challenges relating to 'dependency' that the OADR implies are not adequately reflected. Again, even in countries that have pension systems, workers may be eligible to receive benefits before reaching age 65. Moreover, the existing systems differ in their levels of susceptibility to population ageing. For example, provident fund pension systems tend to be less vulnerable than pay-as-you-go systems.

While the EM country set is certainly heterogeneous in character, we suggest that there is a strong argument for reassessing the use of the *OADR* as the default/sole measurement of population ageing. In doing so, we must think carefully about what concerns us about population ageing, and about what precisely we mean by dependency. In the OECD context, we might think of dependency in terms of a tax-paying, formalised labour force transferring assets to an inactive, 'retired' population via the pension system and/or the medical/social care system.

First, we must consider the role of pensions. Again, this is not the place for an exhaustive review of the pension systems in the EM country set under analysis here (see Clements et al. 2014, and for reviews, see ssa.gov 2013a for Asia; ssa.gov 2013b for Latin America; ssa.gov 2014a for Africa and ssa.gov 2014b for Europe); not least because of the fast-changing, heterogeneous nature of these systems both between and *within* such countries, and given the complex web of conditions and eligibility criteria. Generally, however, we can state that pension provision in EMs is characterised by much lower replacement rates, lower levels of coverage, lower contribution levels, and stricter eligibility criteria than in EU states (although important exceptions exist, particularly in Latin America and Poland – see ssa.gov 2014a and 2014b; OECD 2013). Thus, in most of these countries, public pension expenditures represent a relatively small percentage of GDP (e.g., 0.7% in Pakistan and Indonesia compared to an OECD average of 8.4%). Furthermore, the pension systems that exist tend to differ from the PAYG systems of many European countries. For example, countries such as Malaysia and Indonesia have provident fund-type systems that rely less on intergenerational transfers, and are instead based primarily on fund/stock market performance. Thus, these systems are arguably less susceptible to population ageing. Finally, with the exception of most of the Latin American countries and Poland, the retirement age is significantly lower in the EMs than in the majority of European states, which suggests that there is a degree of leeway for future reform – a point we shall return to later. Indeed, if we were to take the age of pension eligibility as the boundary of old age and dependency, as implied by the European/historical context (see Sanderson and Scherbov 2013 and Basten et al. 2013 for a review); then a recalculated *OADR* would be significantly higher, and the sense that an 'ageing crisis' is occurring would be further exacerbated.

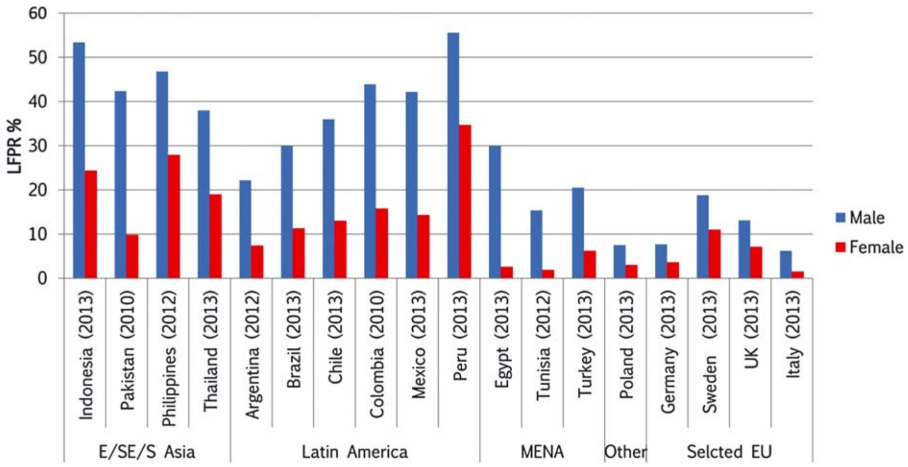
The second major concern raised in the literature relating to the 'problem' of population ageing is the potential growth in health care expenditures. Again, a comprehensive review of EM health care systems is not possible here (see, for example, WEF 2014), but some general points regarding the quality, the accessibility, and the funding of health care can be broadly made. In the WHO's 2010 ranking of world health systems, only Colombia ranks in the top 25, with Chile and Argentina ranking 33rd and 34th, respectively; although it should be noted that the per capita public expenditures on health in these Latin American EMs are relatively high. Even in EMs with nascent (or established) universal health care systems, the systems of long-term social care for the elderly tend to be weak (e.g., Deloitte 2014). Crucially, however, in both OECD and EM countries, health care expenditures are much more strongly correlated with proximity to death rather than with reaching a particular age (see Gray 2005 for a review). In other words, the number of people aged 65 and older only becomes truly relevant in terms of projected health care expenditures when considered in relation to the overarching mortality patterns (see Spijker and MacInnes 2014 for an example from the UK).

In making these two observations about the state of pension and health care provision in EMs, it important to note that we recognise that an unfair comparison is being made with Europe and with various other OECD countries. However, this is precisely the point. Much of the current framing of the 'ageing crisis' – and, indeed, the tendency to measure it using the *OADR* – is viewed through the lens of large-scale, formalised, post-industrial economies with very high levels of human capital, and in which very large transfers have historically taken place at around age 65. These conditions are very different in EMs, yet we often conceptualise ageing in these countries as occurring in similar ways.

A final point that relates to the notion of being 'dependent' after turning 65 refers to the literature on 'productive ageing'. In many OECD countries, this discourse is largely based around a narrative of 'active ageing', and of the contributions made by 'older'/retired people to civil society through voluntary activities, or to their families through child care arrangements (see, for example, Avramov and Maskova 2003). These notions have been mentioned in the literature on EM countries as well (see various chapters in Morrow-Howell and Mui 2012, especially Du and Yang 2012 for China). Yet another feature of active engagement in later life should also be highlighted: namely, labour force participation [LFP] among people aged 65+. As Figure 7 shows, LFP among this age group is generally much higher in EMs than in other European/industrialised economies. For males, the LFP rates are above 50% in Indonesia and Peru; above 40% in Colombia, Mexico, Pakistan, and the Philippines, and above 20% in Argentina, Brazil, Egypt, and Turkey. Female LFP rates are significantly lower, primarily because women have less access than men to employment.

While the active ageing agenda in OECD countries has largely been seen as a 'positive' challenge to activate older human and social capital, these higher LFP rates in EMs are not necessarily a positive sign. Indeed, as is frequently the case in many EM labour markets as a whole, large percentages of the elderly workforce are engaged in poorly paid labour in the informal sector, either as casual workers or as self-employed individuals in low skilled or unskilled occupations. As Amireddy

Figure 7:
Labour force participation among 65–69-year-olds, selected EMs, various surveys, 2010–2013



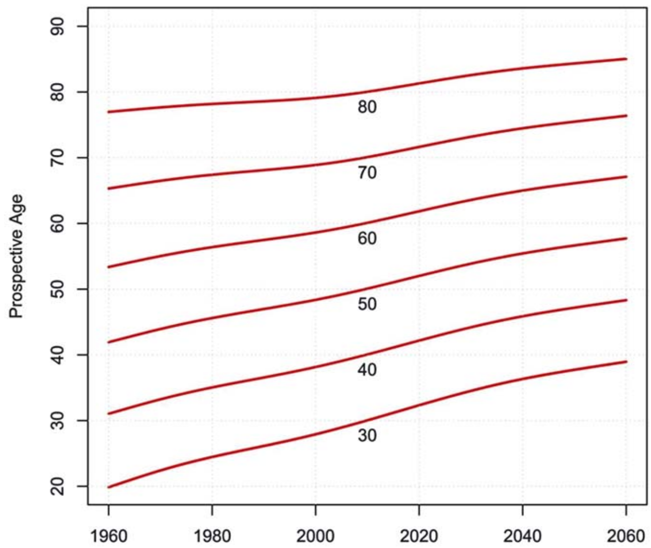
Source: ILOSTAT 2014.

(2013) noted, 'this suggests that given the inadequate social security for the majority of the older persons and the declining traditional support from adult children with the growth of nuclear families, continuing to work can be the only option for old age support for the majority in India'. However, it is not our place here to make a normative judgement as to the nature of elderly labour force engagement in EMs. Instead, our aim is merely to demonstrate that it is common for people in these countries to continue to work after age 65, and that the problem of 'dependency' among people aged 65+ might therefore be less acute than expected.

1.3 An alternative approach: Thinking prospectively?

Figure 8 provides an alternative approach to thinking about the relationship between increases in life expectancy and different time elements across the life course. Crucially, it helps to picture the difference between chronological age and prospective age. *Chronological* age refers to the number of years a person has lived, while *prospective* age refers to the number of years a person is expected to live. As Ryder (1975, p. 16) remarked: 'To the extent that our concern with age is what it signifies about the degree of deterioration and dependence, it would seem sensible to consider the measurement of age not in terms of years elapsed since birth but rather in terms of the number of years remaining until death'. This approach guides our exercise here. Looking at the graph, we can see that at the centre is the index (set at 2010) of both chronological and prospective age. Keeping remaining life

Figure 8:
Trajectories of constant prospective ages (α-ages) over time, Turkey, males (standard 2010)



Source: authors calculations based on UNPD 2013.

expectancy [*RLE*] constant, we can see why a 60-year-old – in this example, a man in Turkey – with a *RLE* of 60 in 2010 would be equivalent to a 67-year-old in 2060, and to a 53-year-old in 1960. In other words, when we compare the life expectancies of men in Turkey over this 50-year period, the expression '40 is the new 30' seems to apply. But for the older population under analysis here, we could say that '70 is the new 65'; and that by 2050, '65 is the new 60'. Aside from life expectancy, it is highly likely that the health status of these three 'older men' are going to be entirely different when their age is measured chronologically. This concept has been elucidated at length elsewhere by Sanderson and Scherbov and others. For an extended discussion of prospective age, please see, for example, Scherbov et al. (2014), Sanderson and Scherbov (2013, 2007 and 2005), Basten (2013), and Spijker and Macinnes (2014).

Sanderson and Scherbov have developed a number of new methods for measuring age that take these changes in life expectancy into account. In estimating the 'prospective old age dependency ratio' [*POADR*], a fixed *RLE* must first be established. The *RLE* is set at the point at which a person is defined as 'old' or 'dependent'. This point then changes as total life expectancy increases (or decreases) (see Figures 1 and 3).

Various studies (e.g., Basten et al. 2013) have tried to identify a suitable *RLE* reflecting the boundary at which the final period of dependency begins. However, as suggested above, before we can define the RLE, we must first engage in a fundamental reappraisal of what we mean by ‘old’ and ‘dependent’; and, indeed, determine much more precisely what it is we want to measure. In the literature, there is a general consensus that the *RLE* should be 10–15 years. Sanderson and Scherbov (2010) have suggested basing this boundary on an *RLE* of 15 years [hereafter RLE_{15}], as this was the remaining life expectancy of 65-year-olds in many low mortality countries in the 1960s and the 1970s. This figure can then be compared with earlier conceptualisations of what it means to be ‘dependent’. More importantly, however, based on international evidence of health and social care expenditures (see, for example, Zweifel et al. 1999 and Gray 2005), we can assume that ill health, morbidity, and the need for long-term care are most likely to fall within this period of life. Thus, RLE is defined as a period of ‘physical dependency’ during which people are likely to need expensive forms of care.

In the remainder of this paper, we will first calculate the age at which *RLE* equals 15, and present this as an alternative ‘boundary’ for the construction of ‘dependency’. Using this new boundary, we will then proceed to calculate a new series of dependency ratios. These ‘prospective’ old-age dependency ratios could be seen as alternatives to the traditional old-age dependency ratio.

2 Data and methods

For this exercise, we utilise the input data from the UN’s *World population prospects: 2012 revision*, including the UN life tables (l_x) that are graduated to single years of age and time. We use single year population totals based upon the medium fertility variant of the UN’s projections. For a critique of these assumptions, see the discussion section below.

To recap, we compare the *POADR* and the *OADR* with the formulas below:

$$OADR = \frac{\textit{number of people aged } 65 \textit{ and over}}{\textit{number of people aged } 15\text{–}64}$$

$$POADR = \frac{\textit{number of people} \geq \textit{age at } RLE = 15}{\textit{number of people aged} \geq 20 \textit{ and} \leq \textit{age at } RLE = 15}$$

The results will be presented for each EM country grouped into four quasi-regions. The limitations of a universal application of this dataset to all countries under analysis here are addressed in the discussion section below.

3 Results

3.1 RLE_{15} as a new boundary of 'dependency' in EMs

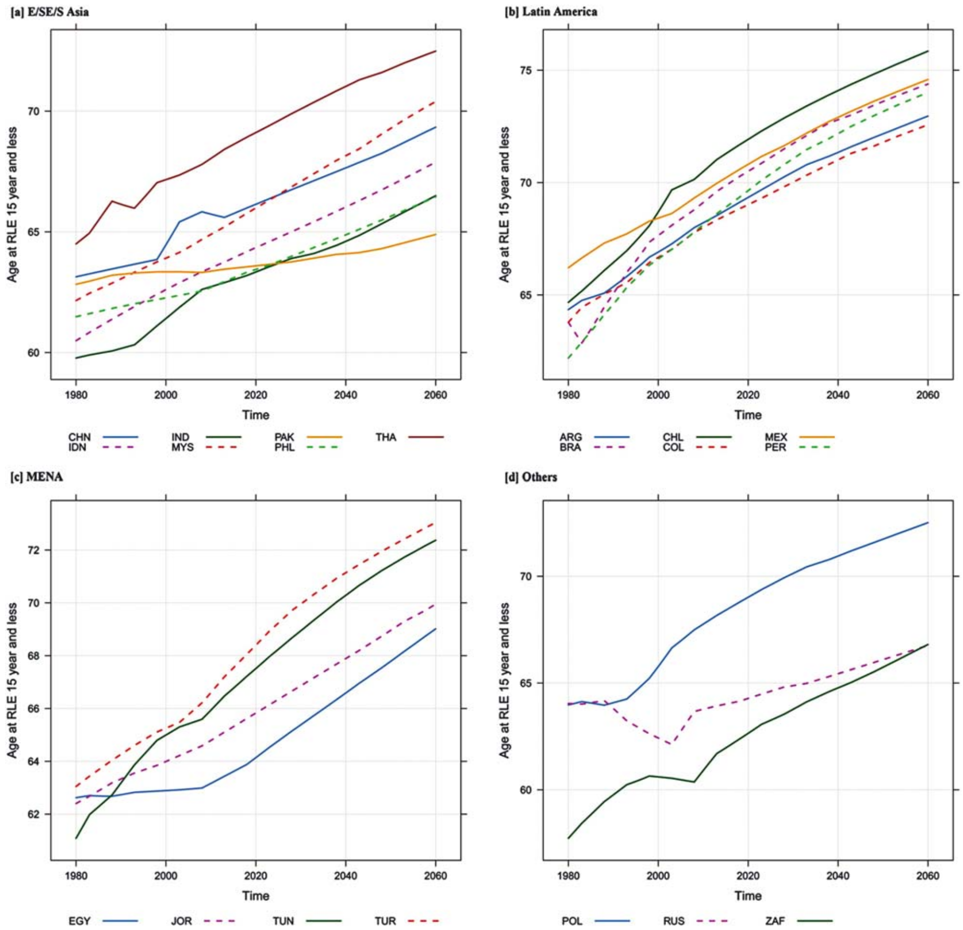
As Figures 9a–d demonstrate, the ages at which the RLE_{15} begins clearly differ significantly both temporally and spatially, and are largely determined by the recent histories of mortality patterns in the respective EMs. We can immediately see that the dramatic recent (and projected) improvements in mortality are radically altering the age at which the RLE_{15} begins. Returning to the prospective ages presented for Turkey in Figure 8, we can see that Turkey is far from being an isolated example. When we look at the Latin American EMs, we can comfortably argue that in Chile, for example, '70 is the new 65', and that by the end of the forecast period, '76 will be the new 70'. Such scenarios can be presented throughout the dataset. If, for example, we compare in Tunisia life expectancies 30 years in the past with life expectancies 30 years in the future, we can say that '70 is the new 60'.

Thus, it is clear that there is little justification for using 65 as a pivotal 'boundary year' after which a person enters a period of 'old age' and 'dependency', based on the construction of dependency outlined above. For some countries, the age at which the RLE_{15} begins has been well above age 65 for two or even three decades. In the E/SE/S Asian EMs, the age at which the *RLE* at age 65 became greater than 15 years was reached in Thailand in the early 1980s, in China in the early 2000s, and in Malaysia very recently (Figure 9a). In the Latin American EMs, for example, all of the countries had passed this point by the early 1990s (Figure 9b). When we look at the remaining EMs, we see that this threshold was broken in the past 15 years in Jordan, Tunisia, Turkey, and Poland (Figures 9c–d). This indicates that for these countries, *the 'boundary' of 'dependency' was set too low in the past*, based on this particular construction of dependency. The natural corollary of assumption is that for the period until the age at which RLE_{15} starts exceeded 65, the 'boundary' of 'dependency' had been set too low for these countries.

But what about the countries for which the RLE_{15} still starts below age 65? For example, in the E/SE/S Asian EMs, the age at which the RLE_{15} starts is not projected to rise above 65 until the mid-2020s in Indonesia, the early 2040s in India and in the Philippines, and the early 2060s in Pakistan. Elsewhere, the age at which the RLE_{15} starts is forecast to rise above 65 in Egypt in the late 2020s, in Russia in the mid-2030s, and in South Africa in the early 2040s. Thus, the implication here is that based on this particular construction of dependency, *the 'boundary' of 'dependency' is set too high in our forecasts* until this point is reached.

In sum, if we consider RLE_{15} as an alternative 'boundary' of 'dependency' based upon a set of assumptions about the concentration of ill health and other care needs, it becomes clear that the persistent use of the chronological age of 65 as a boundary does not reflect the dynamic nature of shifting patterns of mortality and life expectancy.

Figure 9:
The age at which RLE_{15} begins in four groups of EM countries. [a] E/SE/S Asia; [b] Latin America; [c] MENA; [d] Others

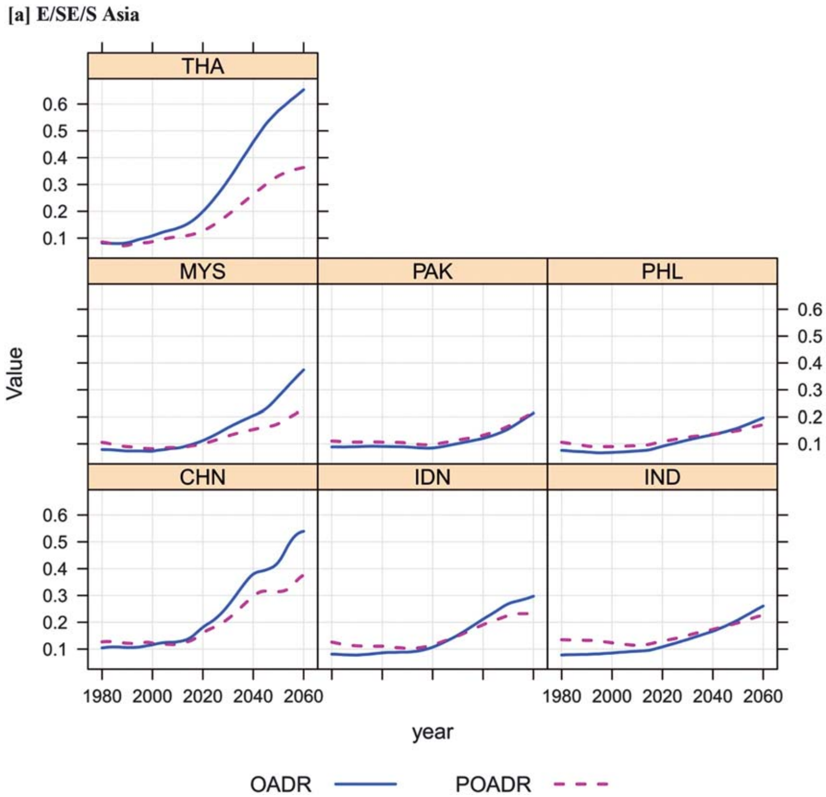


Note: CHN = China, IND = India, IDN = Indonesia, MYS = Malaysia, PAK = Pakistan, PHL = Philippines, THA = Thailand (East/SE/South Asia); ARG = Argentina, BRA = Brazil, CHL = Chile, COL = Colombia, MEX = Mexico, PER = Peru (Latin America); EGY = Egypt, JOR = Jordan, TUN = Tunisia, TUR = Turkey (Middle East and North Africa); POL = Poland, RUS = Russia, and ZAF = South Africa (Other).
Source: authors calculations based on UNPD 2013.

3.2 Prospective old-age dependency ratios for EMs

As we noted above, Sanderson and Scherbov have developed an alternative set of measurements that translate the shifting patterns of RLE_{15} as a 'boundary' of 'dependency' into a ratio. As we explained above, the prospective old-age

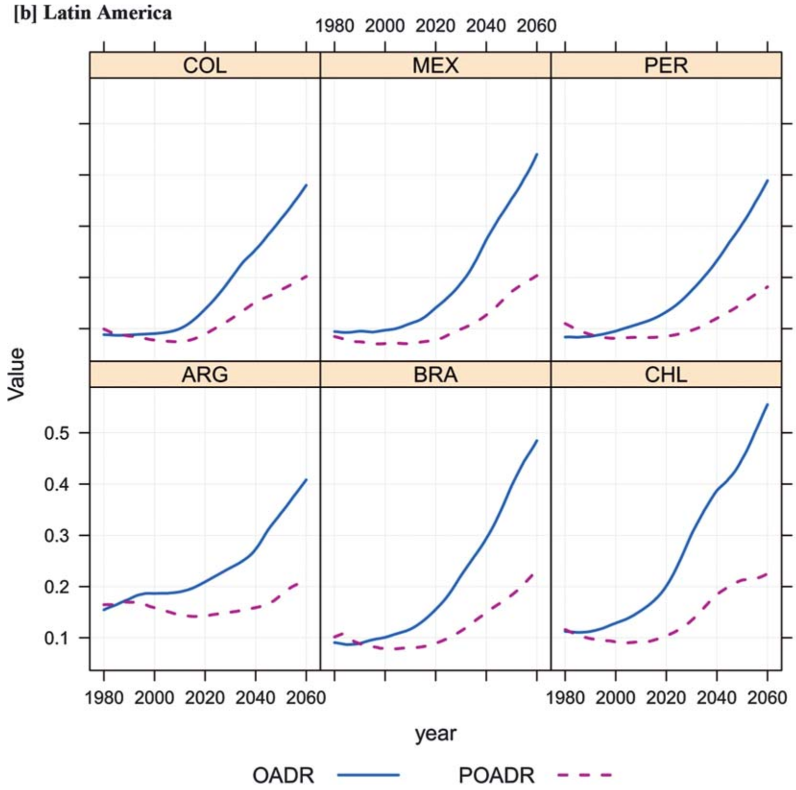
Figure 10a:
Comparing *OADR* with *POADR* in four groups of EM countries. [a] E/SE/S Asia; [b] Latin America; [c] MENA; [d] Others



dependency ratio [*POADR*] takes the denominator as a fixed lower bounded age (here, 20 chronological years of age) through to a dynamically changing upper bound effectively set at the point at which the *RLE* is 16 years. The numerator is taken to be the entire population aged at or above the age in the life table at which the *RLE* is (or is forecast to be) 15 years. Figures 10a–d compare the 'standard' *OADR* with the *POADR* calculated for each EM country. (Note that the complete schedules of *OADR* and *POADR* for all EMs are reproduced in Appendix A. Furthermore, for purposes of comparison, an abridged dataset of *POADR*s for other countries can be downloaded from this website).

Each of the Latin American EMs is characterised by significant gaps between the *OADRs* and the recalculated *POADR*s, largely due to the relatively low fertility rates coupled with strong improvements in mortality patterns in these countries. By the end of the forecast period, the *OADRs* in Argentina, Colombia, Mexico, and Peru

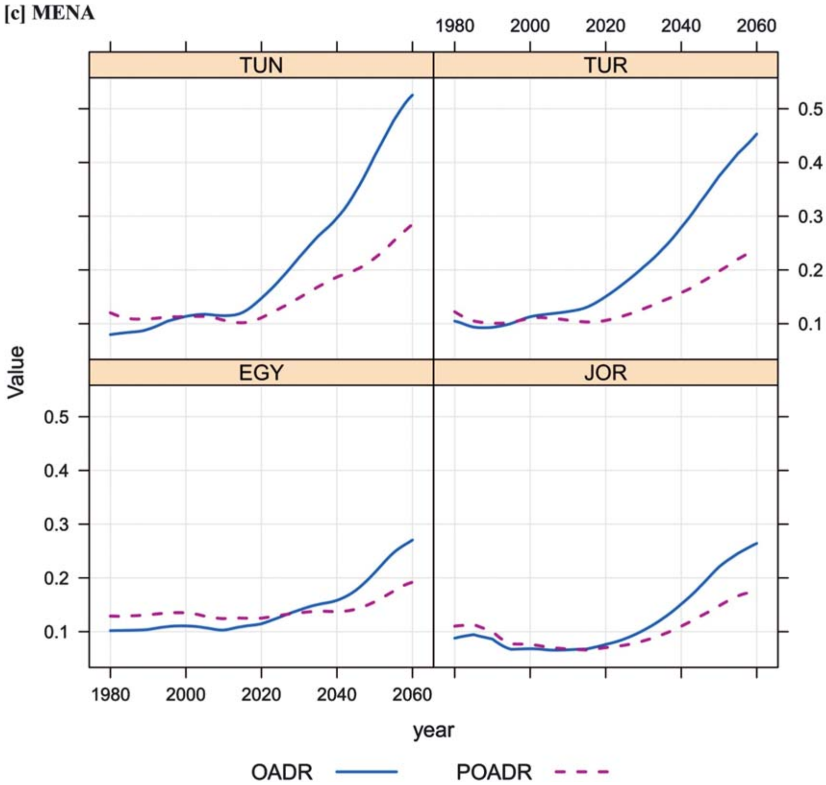
Figure 10b:



are around twice as high as the *POADRs*, with this multiple rising to around 2.5 in Brazil and to almost 3.0 in Chile.

In E/SE/S Asia, the picture is more mixed. In Thailand, there is a large difference between the forecast *OADR* and the *POADR* owing to this country's very low fertility rate and improvements in mortality. More modest differences can be found in Indonesia, Malaysia, and China. However, given China's population size and economic power, even a relatively modest difference in the 'dependency ratio' could have important ramifications not just for China itself, but for the region as a whole. The differences between the *OADR* and the *POADR* are much smaller in the other EMs in the region, even at the end of the forecast period. In Pakistan and the Philippines, the pace of population ageing is relatively slow due to persistently high fertility rates, and the differences between the ratios are also small. A final point regarding national heterogeneity should be made here. In all of the countries in this region – indeed, in all of the EMs – there are important regional differences in fertility and mortality levels and in migration patterns; and, hence, in degrees of population ageing. It is important to keep this regional heterogeneity in mind when

Figure 10c:

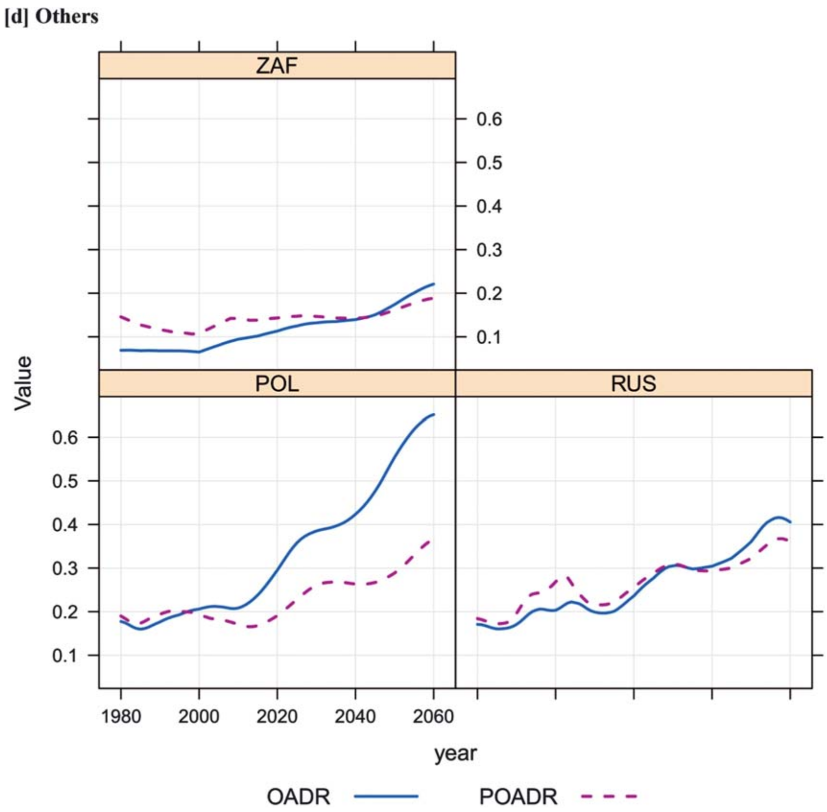


considering the world's two population 'billionaires': China and India. Given their sheer size and the power exercised by their provincial-level governments, we can expect to observe substantial regional variation within China and India.

The MENA EMs also represent something of a 'mixed bag.' In both Tunisia and Turkey, there are very large differences between the *POADRs* and the *OADRs* by mid-century, with the prospective-based ratio being roughly half as large as the *OADRs*. Again, these gaps are largely attributable to the relatively low fertility rates and strong improvements in mortality in these counties. In Jordan and Egypt, by contrast, higher fertility rates and worse mortality conditions result in lower overall *OADR*s; and thus in smaller, but still notable, gaps between the *OADR*s and the *POADR*s.

Finally, in the category of 'other EMs', we again see large differences. Low fertility and mortality improvements in Poland lead to rapid ageing under the *OADR* measurement: i.e., to a ratio of 0.65 by 2050. However, under a scenario using prospective calculations, this increase is much more modest, from around 0.18 today to 0.35 by mid-century. Russia's very poor mortality track record contributes to the

Figure 10d:



Note: CHN = China, IND = India, IDN = Indonesia, MYS = Malaysia, PAK = Pakistan, PHL = Philippines, THA = Thailand (East/SE/South Asia); ARG = Argentina, BRA = Brazil, CHL = Chile, COL = Colombia, MEX = Mexico, PER = Peru (Latin America); EGY = Egypt, JOR = Jordan, TUN = Tunisia, TUR = Turkey (Middle East and North Africa); POL = Poland, RUS = Russia, and ZAF = South Africa (Other).
Source: authors calculations based on UNPD 2013.

relatively modest differences between the *OADR* and the *POADR* in that country. Finally, in South Africa, relatively high fertility and relatively poor mortality conditions lead to lower overall rates of ageing.

A final point can be made that links back to the previous discussion on setting the *RLE* at 15 years. For a large number of the analysed countries, the *POADR* had been *higher* than the *OADR* in the recent past. Indeed, in some countries (Egypt, Indonesia, India, Pakistan, South Africa, and Russia), the *POADR* is *still* higher than the *OADR* today; albeit usually by very modest amounts. This implies that based on our construction of dependency, ageing may have been ‘undermeasured’ in the past when the *OADR* alone was used.

4 Discussion

There are, of course, a large number of limitations to our exercise. The first concerns the 'independent' population, or the denominator. For consistency, we set the lower bound at 20 years of chronological age across the entire country set. It, is, however, clear that this cut-off point is much more appropriate for some countries rather than for others. Compare, for example, Pakistan and Brazil, where the 2010 labour force participation rates of males aged 15–19 were higher than 50%; with Russia and Poland, where the same rates were lower than 10% (ILOSTAT 2014). The second concern relating to the calculation of the denominator is that the 'nature' of these denominators could differ across the EMs, as this denominator is weakly defined not only in our calculations, but also in the *OADR*. In assuming that the total number of people between age 20 and > RLE_{15} represent a *de facto* labour force, we do not take into account the very different characteristics of these 'working-aged' populations across this rather heterogeneous group of EMs. For example, countries differ in the degree to which their labour market is formalised, and in their levels of labour force participation, particularly among women. Moreover, it is clear that the structural issues surrounding pensions and old-age care liabilities are not the same across countries. As we noted in the background section above, we need to account for differences across countries not only in the types of pensions that are prevalent, but in current levels of liability for pension and care provision.

A second point of criticism lies in the definition and use of RLE_{15} as a boundary for 'dependency'. First, there is clearly an issue relating to the creation of binary 'dependent' and 'independent' populations. Just as proponents of the OADR are foolish to assume that people become 'old' and 'dependent' upon reaching their 65th birthday, proponents of the POADR could very well be open to the same charge for assuming that people become dependent upon reaching the age at which RLE equals 15 years. Second, setting the RLE at 15 years is arbitrary, and is based on relatively little solid empirical evidence. Third, by applying this boundary across the entire population, differences in health and mortality (by, for example, gender, occupation, and class) are ignored. The importance of this problem is emphasised in Sanderson and Scherbov 2014, which utilises survey data to measure the speed of ageing across population subgroups in the US. Fourth, the use of RLE_{15} over the entire projection period does not allow for further delays in the onset of morbidity and ill health, and thus for a potential decrease in the number of years spent in so-called 'dependency'.

The final criticism revolves around the assumptions employed in the exercise. Again, for consistency, we have used the latest UN *World Population Prospects* for all countries. Assumptions regarding future improvements in mortality are taken for granted here, even though these improvements may not occur. However, the scholarly consensus regarding the fertility assumptions employed by the UN – especially in settings characterised by very low fertility – is much less solid (see, for example, Basten et al. 2014).

While all of these limitations are significant, it is also important to note that we do not intend to present these alternative measurements of population ageing as some kind of panacea. In the first section of the paper, we demonstrated why the conventional means of measuring population ageing using the old-age dependency ratio is increasingly obsolete in Europe and North America, and – arguably, even more so – in many EMs.

In the current paper, we have attempted to present just one of the alternative approaches that could be used to study (and measure) population ageing and 'dependency' in EMs. This alternative measurement is just another tool that can be added to the demographer's toolkit, and that can be recommended to policy-makers and other stakeholders in EMs. If this measurement approach empowers policy-makers to take a more 'rational' view of population ageing – i.e., a perspective that takes into account improvements in health and longevity, and that guides them away from a worst-case scenario of a seemingly unavoidable future characterised by intense and rapid population ageing, as the *OADR* projections tend to show – and thus to avoid 'policy paralysis', then it will prove useful.

Finally, the real contribution of these alternative measurements is that they might lead policy-makers and other stakeholders in EMs to think much more carefully and deeply about what the precise challenges of an ageing population actually are. Only by designing and executing improved measurements can demographers identify where the future stresses might lie in different scenarios of population ageing. Since the EM economies are, by their very nature, 'emerging', the future implications of an ageing population are likely to be very different in these countries than in the OECD or the EU countries. Arguably, the EMs still have substantial opportunities for harnessing the demographic dividend. For example, they could formalise the labour market (which would increase contributions to existing pension systems and help in the development of future social welfare programs); they could further develop their human capital and their technological assets (to increase productivity); and they could encourage the provision of services through the private sector. In sum, if we compare the EMs with the countries of Europe, we can see that the current nature of ageing and of 'dependency' (and the boundaries of 'old age' and 'dependency') differ considerably between them, but so does the outlook for the future.

Acknowledgments

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Appendix: *OADR* and *POADR* for EMs, a subset of countries

Country	Measure	1980	1990	2000	2010	2013	2020	2030	2040	2050
ARG	POADR	0.165	0.169	0.159	0.145	0.143	0.142	0.150	0.159	0.184
BRA	POADR	0.102	0.088	0.079	0.081	0.081	0.089	0.113	0.149	0.183
CHL	POADR	0.116	0.098	0.092	0.091	0.093	0.104	0.134	0.184	0.213
CHN	POADR	0.127	0.122	0.122	0.119	0.126	0.160	0.213	0.297	0.314
COL	POADR	0.099	0.086	0.078	0.075	0.077	0.089	0.118	0.152	0.176
EGY	POADR	0.129	0.131	0.135	0.124	0.126	0.125	0.135	0.137	0.156
IDN	POADR	0.126	0.112	0.111	0.102	0.103	0.115	0.149	0.191	0.225
IND	POADR	0.135	0.133	0.123	0.114	0.116	0.130	0.151	0.173	0.198
JOR	POADR	0.110	0.101	0.076	0.068	0.067	0.070	0.083	0.110	0.148
MEX	POADR	0.085	0.074	0.071	0.071	0.073	0.078	0.099	0.127	0.172
MYS	POADR	0.105	0.089	0.082	0.085	0.089	0.101	0.129	0.153	0.175
PAK	POADR	0.110	0.106	0.106	0.102	0.099	0.097	0.114	0.132	0.166
PER	POADR	0.110	0.088	0.081	0.083	0.083	0.085	0.097	0.120	0.150
PHL	POADR	0.106	0.092	0.090	0.092	0.094	0.108	0.124	0.136	0.149
POL	POADR	0.190	0.194	0.192	0.171	0.165	0.191	0.261	0.263	0.289
RUS	POADR	0.184	0.196	0.268	0.217	0.217	0.255	0.308	0.293	0.322
THA	POADR	0.086	0.073	0.087	0.105	0.108	0.127	0.187	0.264	0.332
TUN	POADR	0.120	0.109	0.114	0.106	0.102	0.111	0.148	0.187	0.222
TUR	POADR	0.122	0.101	0.110	0.107	0.104	0.106	0.128	0.158	0.198
ZAF	POADR	0.146	0.117	0.107	0.142	0.138	0.143	0.147	0.142	0.161
ARG	OADR	0.155	0.175	0.186	0.190	0.193	0.209	0.237	0.273	0.343
BRA	OADR	0.091	0.089	0.101	0.117	0.126	0.155	0.221	0.294	0.396
CHL	OADR	0.113	0.112	0.129	0.153	0.164	0.201	0.302	0.388	0.449
CHN	OADR	0.105	0.106	0.116	0.127	0.133	0.181	0.262	0.380	0.425
COL	OADR	0.088	0.088	0.090	0.100	0.108	0.138	0.197	0.254	0.314
EGY	OADR	0.102	0.104	0.111	0.103	0.107	0.115	0.140	0.158	0.210
IDN	OADR	0.081	0.078	0.086	0.089	0.091	0.107	0.152	0.212	0.269
IND	OADR	0.078	0.080	0.085	0.092	0.094	0.108	0.136	0.166	0.208
JOR	OADR	0.088	0.086	0.068	0.066	0.067	0.076	0.103	0.151	0.221
MEX	OADR	0.094	0.095	0.097	0.110	0.115	0.141	0.189	0.273	0.353
MYS	OADR	0.079	0.073	0.073	0.084	0.091	0.112	0.160	0.205	0.275
PAK	OADR	0.088	0.089	0.090	0.088	0.086	0.084	0.101	0.120	0.155
PER	OADR	0.084	0.085	0.095	0.111	0.116	0.133	0.174	0.233	0.304
PHL	OADR	0.076	0.069	0.068	0.073	0.075	0.091	0.114	0.134	0.159
POL	OADR	0.178	0.176	0.206	0.208	0.222	0.295	0.385	0.423	0.554
RUS	OADR	0.171	0.171	0.203	0.199	0.197	0.236	0.305	0.304	0.360
THA	OADR	0.082	0.083	0.109	0.137	0.148	0.199	0.316	0.458	0.575
TUN	OADR	0.080	0.090	0.114	0.115	0.116	0.147	0.223	0.297	0.412
TUR	OADR	0.105	0.093	0.113	0.123	0.126	0.151	0.205	0.279	0.374
ZAF	OADR	0.069	0.068	0.065	0.094	0.099	0.113	0.132	0.139	0.174

Note: CHN = China, IND = India, IDN = Indonesia, MYS = Malaysia, PAK = Pakistan, PHL = Philippines, THA = Thailand (East/SE/South Asia); ARG = Argentina, BRA = Brazil, CHL = Chile, COL = Colombia, MEX = Mexico, PER = Peru (Latin America); EGY = Egypt, JOR = Jordan, TUN = Tunisia, TUR = Turkey (Middle East and North Africa); POL = Poland, RUS = Russia and ZAF = South Africa (Other); POADR = prospective old age dependency ratio, OADR = old-age dependency ratio.
Source: authors calculations based on UNPD 2013.