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## Demographics will reverse three multi-decade global trends

### Working paper

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# DEMOGRAPHICS WILL REVERSE THREE MULTI-DECADE GLOBAL TRENDS

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## Abstract:

For over three decades now, global real interest rates have fallen, and inflation and real earnings in the advanced economies have followed suit, while inequality has risen sharply. Each of these long-term trends have been studied extensively, but independently. We argue, however, that these trends are not independent of each other. Rather, they have been driven by an unprecedented change in demography since the 1980s, plus the integration of the labour forces of China and Eastern Europe into the global economy. The latter alone added 120% to the world's labour force, just at the same time as the post-war cohort came of working age.

As global demography turns, all three trends will reverse. Real interest rates will rise because the savings rate will fall by more than the fall in the investment rate. Inflation and wage will both grow at a faster pace. A shrinking labour force will raise wages, bolstered by the increase in productivity and a rising tax burden to look after the elderly. As these dynamics play out, inequality will fall. Endogenously.

What could derail our hypothesis? Two things. First, a possible though highly unlikely scenario in which politicians renege on their commitments to their ageing populations, forcing everyone to start saving more almost instantaneously. Second, and far more likely, the unprecedented increase in leverage globally could stall the increase in real interest rates and inflation. In this stand-off, however, we argue that the slow but inexorable end of the decline in real interest rates will force deleveraging over the next 5-10 years. Beyond that, demography will dominate in the global economy again.

JEL codes: J11, J18, E43, D64, E31, H63

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# DEMOGRAPHICS WILL REVERSE THREE MULTI-DECADE GLOBAL TRENDS

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## INTRODUCTION

Real interest rates have been falling since the early 1980s, for over 35 years now, supporting asset prices. Over that period, real labour earnings in the advanced economies have been declining too. But perhaps the most talked about development of the last three decades is the meteoric rise in inequality within countries, at the same time as inequality between countries has been falling. All three trends have clearly been researched extensively, but individually, and independently of the others.

We argue that analysing these trends separately and locally is the wrong approach. Instead, we argue that all three trends need to be examined together, in a global context. Specifically, we argue that demographic developments over the last 35 years have driven falling real interest rates and wages, and rising inequality within countries as well as some of the falling inequality between DM and EM economies.

Can demographics really explain all three trends? If we include the integration of the gigantic labour forces of China and Eastern Europe into the global economy, then global demographic dynamics do help to explain all three trends. But if that is correct, then the demographic reversal that the global economy will witness over the coming decades will also reverse the fall in real interest rates and inflation, while inequality will fall.

We believe we approach the critical role of demographics differently from others in three ways. First, we attach a great deal of importance to the role of China, both in the past and in the future. Second, we argue that the political economy of the social safety net in the advanced economies will play a critical role in driving our results. Third, in an extension of our first point, we take what we think is a truly global approach to the discussion of demographics, looking collectively at the global labour supply and the global prices of labour and capital. By contrast, much of the literature that looks at demographics in an international context examines local demographic dynamics of two (or more) economies and then discusses spillovers to and from neighbouring economies.

We make our argument in five parts. The first section details the extraordinary demographic dynamics we have seen over the last 35 years, and their impending reversal. The second and third sections explain our main propositions - why real interest rates will rise thanks to ageing, and then why wages and inflation will rise, while inequality will fall amidst a political confrontation between the elder cohorts and the prime working age population. Section 4 looks at the contrasting evidence, from other research as well as the experience of Japan and North Asia. Finally, the last section looks at the prospective changes that could mitigate (some may argue overturn) some of the effects of ageing - the rise of India and Africa, greater participation of the elderly, and debt.

## Section 1: The Demographic Sweet Spot... Slowly Turning Sour

### 1.1 The demographic sweet spot...

**The demographic sweet spot of the 1970s-1980s started with falling birth and fertility rates:** World population grew fast, at nearly 2% per annum until about 1990, (see [Exhibit 1](#)). Then, as birth rates and fertility rates in both DM and EM fell ([exhibit 2](#)), world population growth slowed down to about 1.25% per annum until about now. World population growth in 2040 will, however, be higher either than in the developed economies (DM) or our categorisation of the emerging economies (EM), because there is yet another category of countries, defined as least developed regions and countries, mostly in Africa<sup>1</sup>, where population growth is predicted by the UN to remain much higher through 2040.

**But the fall in the dependency ratio was the critical factor and it is this fall that created the 'sweet spot' for the global economy.** The combination of fertility and longevity were both responsible for pushing dependency ratios lower. Besides the decline in fertility, which came earlier, it is the increase in longevity (see [Exhibit 3](#)) that has really created quite an impact. This combination of an earlier fall in fertility and later rise in longevity pushed the

dependency ratio lower to create the demographic 'sweet spot'. How? Put simply, the ratio of those in working age rose sharply relative to the dependent young (since the birth rate was falling) and to the old (since the population was still growing fast and longevity was slower to increase as much)

### **...made Sweeter By China**

**The 'sweet spot' was made much sweeter by China and Eastern Europe from 1990:** Most studies on interest rate and wage dynamics in the US and advanced economies do mention China, but not as the prime driver of these dynamics. We believe that perhaps even more important for recent trend developments in labour has been the role of China.

**China has played a very well-known role in lowering global real interest rates:** China's share of world trade (average of exports plus imports) increased from slightly less than 2% in 1990 to almost 12% by end-2014. The asymmetric integration of China into the world economy is what really made a difference to these dynamics. China's economic markets joined the global economy but its financial markets did not. China's labour force joined the global economy with a capital/labour ratio that was well below global standards, but China's financial border was closed and that allowed China's domestic real interest rate to remain very low in order to drive capital accumulation at home.

Imposing strict capital controls and pegging the currency allowed monetary policy to remain extraordinarily easy for a very long time in order to maximise internal growth. As a result, there was a shift of overall investment out of the rest of the world into China. Furthermore, the savings ratio was boosted in China through corporate/SOE and household savings, especially owing to the lack of social safety net and the collapse of the family safety net as the 'one child' policy took hold. Thus, despite an already-high investment ratio, the savings ratio climbed even higher, creating a savings glut channelled back into the US Treasury bond market. On both counts real interest rates outside China fell as ex ante investment fell relative to ex ante saving.

**And then there was Eastern Europe.** Over a similar time span, communism collapsed in the USSR and Eastern Europe. Like China's economy, these countries had until been more or less isolated and then joined the global economy with the fall of communism. In these countries labour was abundant and quite well- educated, but capital and management were limited. A fruitful combination followed. The West supplied much of the management; the East supplied the labour.

**The numbers associated with this integration are staggering.** Counting just the potential workforce, the working population in China and Eastern Europe, aged 20-64, was 820 million in 1990, 1,120 million in 2014, whereas the available working population in the industrialised countries was 685 million in 1990, 763 million in 2014 (see [Exhibit 4](#)). That represents a one-time increase of 120% in the workforce available for global production.

### **1.2 Do these demographic developments really explain our three trends?**

We have already argued earlier that demographic developments over the last 35 years do help explain the fall in real interest rates thanks to a pick-up in ex ante savings over investment. To add to that, if the supply of labour, relative to capital, jumps up, its price (the wage rate) will fall. This is the key to what has happened in the last 35 years. With its supply increasing, not only will wages be lower, but the marginal productivity of labour will also be less.<sup>2</sup> That is exactly what we saw in DM economies as real wages there fell consistently. The two combined to raise inequality within the advanced economies. Declining real wages and a smaller share of labour in national output naturally meant that inequality rose. Thus, we attribute rising inequality, along with falling real rates and real earnings, to demographic dynamics in the global economy.

<sup>2</sup>In equilibrium, the wage rate should equal the marginal productivity of labour. As the effective labour supply cheapens, managers spend less effort, and invest less capital, in order to raise productivity, to hold down unit labour costs. A contrary effect is that the less productive firms and sectors in industrialised countries will succumb first to competition from China and Eastern Europe, leaving the higher productivity firms/sectors in operation in those countries.

### **1.3 The 'Sweet Spot' Will Now Turn**

**World population growth will slow down further:** Global population growth has fallen to about 1.25% now. It will now decline further to about 0.75% per annum by 2040, according to the UN (see [Exhibit 1](#)). Within this, population

growth in developed economies has fallen from over 1.0% per annum in the 1950s to below 0.5% around now, and may fall to near 0% by 2040.

**The 'sweet spot' will now disappear quite fast and turn:** In particular, the dependency ratio - the ratio of workers to the elderly in the population will now worsen rapidly. We are at the point of inflection, and the rate of decline is predicted to steepen for DM, EM and especially China and Germany, about now (see [Exhibit 5](#)). The result of this is that the total working age population in the world, having grown fast between 1970- 2005, will now grow much less rapidly. In DM and North Asia, it will show outright declines and at the same time the ratio of workers to the elderly is worsening sharply.

**What's more, the aged need more labour-intensive care, taking up even more of a dwindling supply of labour:** As societies age, the demand for medical services will naturally rise. However, age-related medical conditions rely on labour far more intensively. Dementia, for example, will require more patient care via carers. Unlike the illnesses we worry about the most today, age-related illnesses do not sharply diminish patient lifespans. In DM economies where labour is relatively expensive, a shift towards further labour- intensive patient care will add to labour supply and wage pressures.

What will the macroeconomic implications of this change be? We move on to those next, starting with our most controversial inference.

## Section 2: Our Key Proposition: Ageing Will Raise the Equilibrium Real Interest Rate

We argue that that ageing will lower both desired savings and desired investment, but desired savings will fall by more. The resulting imbalance will require the real interest rate to rise for the market to clear. Just as the real interest rate fell since the 1980s thanks to a decline in desired investment borne out of the demographic sweet spot we described above, real interest rates will reverse course along with demographic trends and the resulting changes in savings and investment dynamics.

This is clearly our most controversial proposition, and much of the pushback we receive is based on the argument that demographics will lower potential output growth and hence real interest rates. We agree wholeheartedly with the first one, but not the second. Indeed, there is much less reason to believe the two are connected than many believe. We discuss below first the path to determining the equilibrium real interest rate and then delve into some of the dynamics that will drive savings lower but keep investment from falling by as much or more.

### 2.1 What Determines the Equilibrium Real Interest Rate?

**a. The role of growth in determining the equilibrium real interest rate is exaggerated:** It is commonly assumed that an intrinsic relationship exists between potential output growth and the equilibrium real interest rate. Laubach and Williams's (2001) popular model uses the Ramsey framework to impose a long-term factor that is common to both potential output growth and the equilibrium real interest rate. That assumption, more than anything else, drives their estimates of the equilibrium real interest rate over their estimation period. However, this assumption does not find adequate support in the data.

In an empirical study designed to investigate the determinants of the equilibrium real interest rate in the US, Hamilton et al, 2015, finds that the only significant relationship of US real rates is that they are co-integrated with real rates in the rest of the world. Growth plays a part, as do many other factors, but shows no dominant relationship in determining the equilibrium real interest rate using data from 1858-2014.

**b. The focus needs to be global, not local - and needs to explicitly factor in China:** Rather than look for explanations of falling real rates in any one country at a time, the focus needs to be on global factors. Ex post, savings have to equal investment in a closed economy, i.e., the world. So, if one points to a particular country, say China, where savings have exceeded investment and there is a current account surplus, then by definition there is another country (or countries such as the UK or US) where savings have been below investment, and there is a current account deficit. What we need to look at is the ex-ante desired savings versus investment dynamics on a global scale, and think of the equilibrating price as a global price.

Most of the demographics studies that we have seen take one of two routes. One set of studies looks only at national demographic trends and tries to explain wages and consumer price price changes through local dynamics. Studies

about Japan are the classic example here. The other set includes a model of two or more countries with differing demographic trends that determine local prices, which then impact the domestic and foreign economies. We think both could go a step further because and consider truly global labour force dynamics that set global prices. And nothing we have seen pays more than lip service to what we believe is the crucial factor - China.

**c. The 'right' approach needs to look at ex ante savings and investment dynamics:** Rather than use growth as the determinant of the equilibrium real interest rate, we use the standard classical theory that in the medium and longer run (after the temporary effect of central bank policy on local real short-term rates dissipates), real interest rates move to adjust differences in ex ante savings and ex ante investment, falling when desired savings are greater than desired investment, and vice versa. So the declining trend in real interest rates over recent decades, 1980-2015, is prima facie evidence that ex ante savings have exceeded ex ante investment over this period.

Cyclically too, much of the perceived link between growth and interest rates, we suspect, comes from observing a decline in both growth and interest rates during economic slowdowns and connecting the two. The decline in real interest rates cyclically also has more to do with the behavior of ex-ante investment relative to ex-ante savings, and in particular the greater amplitude of the swings in investment relative to those of savings. As desired investment falls sharply (while desired savings tend to remain more steady) towards the trough of the cycle, so do interest rates. Similarly, an increase in desired investment relative to savings during expansions leads to higher interest rates.

## 2.2 Demographics will push both savings and investment lower – but which one will fall more?

The main problem is that demographic changes normally have the same directional effect both on ex ante saving and on ex ante investment. Slower population growth will lower the saving ratio, but will equally lessen the need for more capital, houses, equipment, etc. However, this doesn't tell us whether the K/L ratio will fall or rise, thereby raising or lowering the marginal productivity of capital. With both ex ante S and ex ante I moving in the same direction, assessing the likely balance between the two becomes problematical.

### A. Why Savings Will Fall

The behaviour of household savings according to the life-cycle hypothesis in the presence of a social safety net, and the impact of ageing on China's savings explain why savings will fall.

#### The Life Cycle and the Social Safety Net

If all retirement consumption was provided by prior savings, then the age-related profile of consumption should be downwards sloping, since younger generations benefit from higher life-long earnings. The life-cycle hypothesis suggests that the consumption of an individual should be constant over time. Myopia, and underestimation of longevity, would cause an even greater downwards slope to age-related consumption. But actually the data show ([exhibit 6](#)) that age-related consumption is flat, or even rising, with age. This must, and does, imply considerable transfer from workers to the old.

Why? We argue there are two reasons for this. First, spending on medical services increasingly dominates the spending patterns of the elderly, especially in the final year of life ([exhibit 6](#) shows a sharp upward spike in DM consumption). Much of this is provided for free by the public sector (NHS in the UK; Medicaid and Medicare in the US). Second, most DM economies have a safety net to prevent the elderly who cannot afford medical attention from their personal resources to keep them from falling into destitution.

*Our key political economy assumption is that the safety net will remain in place, keeping savings from rising proportionally with longevity.* While there is bound to be some scaling back on commitments, the pension and healthcare safety net will more or less remain in place. This will be incorporated into the savings habits of individuals, keeping them from saving more in anticipation of retirement.

Almost inevitably, health expenditures will rise further ([exhibit 7](#)), while retirement age simply hasn't kept up with longevity. Both health expenditures and expenditures on public pension transfers ([exhibit 8](#)) will continue to rise along with the ageing of DM societies. So far, measures to encourage labour force participation by raising the retirement age have simply not materialised except in a handful of places which have enforced a modest increase in retirement age. Longevity, on the other hand has gone up significantly thanks to medical advances and might go up further still if the science of ageing makes rapid advances. As a result, the gap between longevity and retirement age has been increasing in line with increases in longevity.

## **China's Effect: Excess Savings from the Past Will Dwindle With Ageing**

Everything about China is enormous; its demographic dynamics have been and remain remarkable, and the consequential movements in its savings and investment ratios have been extraordinary. As China's labour force dynamics change direction, the savings-investment balance within and even outside China will change as a result.

*Demographics and China's extraordinary savings will fall:* Prior to modern times, the (relatively few) old in China were cared for in the extended family. But the one-child policy, extended for too long, has meant that support has gotten more and more scarce for the aged. With an insufficient social safety net, personal savings rose to plan for retirement. Add to this the incentive on the managers of state-owned enterprises to retain, rather than pay out, profits, and the explanation of these extraordinary savings ratios becomes clearer.

What will happen in the future? Although a higher proportion of the old work in Asia than in Europe or North America, increasing longevity will increase the dependency ratio, in China and elsewhere (see [Exhibits 9-10](#)).

The result will be a decline in the personal sector savings ratio and in China's current account balance; indeed, this has already begun (see [Exhibit 11](#)).

*China's ageing will reduce excess savings among oil exporters:* The economic impact of China on the world economy has been great. One dimension of this has been to impart upward pressure on the price of raw materials, including notably oil. Much oil has been produced in relatively sparsely populated countries (Saudi Arabia and the Gulf, Norway). With China's growth declining, and with the need to shift from fossil fuel to renewables, the net savings and current account surpluses of the petro-currency countries are likely to erode.

Indeed, all those countries which have had current account surpluses (large net savings) are either ageing rapidly (China and Germany), or are likely to see their relative advantage reduce (the petro-currency countries).

## **B. Why Investment will fall by less**

A smaller population naturally requires less investment, but we argue that the reluctance of the old to move and corporate behaviour will help explain why investment will remain supported.

### **Housing and the Reluctance of the Old to Move: Supporting Housing Investment**

A large proportion of overall capital, and of personal wealth, is tied up in housing and housing-related infrastructure. Many expect that as population growth slows down, the demand for housing will slow down sharply as well. However, that does not take into account the preferences of the old. As nations get richer, the old stay in their existing homes rather than go to live with their children. Moving is stressful, and the old who already own their homes do not have to do so ([exhibits 12, 13](#)). As the young come of age and gain financial independence, they will not move into existing housing vacated by the elderly, but will move into new houses that have to be built. In our view, a shift in the balance of the population of a given size towards more old and fewer workers will *raise*, not lower, the desired stock of housing. That will support residential and housing-related investment.

*Could social behaviour change? Could the elderly sell their homes and live together with their extended family?* This could of course happen. But we think it is more likely to happen in EM economies than in DM economies. In the latter, breaking long-standing social mores would require that pressures from demographics become substantially worse before any such changes become widespread.

There is a potential policy problem here, but it has not yet been tackled seriously. This will likely need to be addressed.

### **How Will the Corporate Sector Respond? The Capital/Labour Ratio Will Rise, Not Fall**

One aspect of the demographic impact that doesn't suggest a ready answer is the behaviour of the corporate sector. There are two polar arguments. The traditional argument is that the corporate sector will respond to demographic headwinds by slowing down the rate at which it accumulates capital so that the capital/labour ratio (K/L) falls.

Our view is that the corporate sector is likely to respond by *raising* the K/L ratio, i.e., by adding capital to compensate for the factor of production that is getting scarcer and more expensive – labour.

We make this argument for two reasons:

*a. Rising cost of labour, falling cost of capital goods:* We cannot think of any other time in history when the prices of the two main factors of production were moving as clearly in opposite directions. Even before demographics start pushing wage growth up, the price of capital goods has already collapsed. As wages begin to rise, compensating for more expensive labour will be easier thanks to a lower cost of capital goods. The resulting increase in productivity will somewhat temper the increase in wages and inflation.

The savings and investment lens gives us another way to view this response. Given significantly cheaper capital goods, the cost of accumulating a given stock of capital uses up a smaller amount of the economy's stock of savings. To some extent, this can counter the savings deficit created by ageing demographics and somewhat temper the rise in both the interest rate and wages.

*b. Historical experience after the oil shock provides evidence of such substitution:* Manufacturing in many economies which faced favourable/unfavourable shocks to the price of an input of production has undergone a change in the capital/labour ratios in a significant way. Data over 1972-1988 from manufacturing plants in the US, Davis, Haltiwanger and Schuh (*Job Creation Destruction*, 1996) show that the 1970's oil price shock led to the demise of energy-intensive manufacturing. Plants, employment and wages all shrank as the US economy reacted strongly to protect itself against the then-current and future fluctuations in the price of oil. The opposite effect can be seen in economies that were net producers of energy. The hollowing out of Russia's knowledge-intensive manufacturing sector within an oil-dependent economy showcases this transformation all too well.

*When it comes to technology, we take an agnostic view:* We fully expect technology to have a significant impact on productivity and the real interest rate but we prefer to take an agnostic view. Why? We have no particular expertise in predicting the pace of innovations. Indeed, it is difficult to tell whether much of the debate around technology is about the pace of innovations or whether it is properly recorded in the statistics. Gordon (2012), for example, argues that productivity in the US has fallen since 1973 and is unlikely to pick up from here. But Mokyr et al (2014) argue that statistics do not adequately capture technology and hence are misleading. Given that this issue is unlikely to be resolved any time soon, we prefer to remain agnostic on this topic in our note.

*c. Why hasn't capex already responded to the demographic challenge? For structural and cyclical reasons.*

Structurally, it is still early days and perhaps until recently relocation of production abroad remained an alternative and attractive option. The demographic headwind and the associated increase in wages has not yet affected large parts of the advanced economies. Even in Japan, China and Korea, where these demographic pressures are already starting to show, they are still in relatively early stages, with some wage pressure beginning to be evident in Japan's labour market and the labour force in all three economies shrinking already.

Even at this early stage, signs of a new capex cycle are already being seen in Japan. The economies of China and Korea, with excess capacity still a problem, are naturally not showing the same response. Most of the advanced world resembles Japan in two ways: i) Labour is already costly and will become even more costly in an absolute and relative sense; and ii) The manufacturing sectors have seen neither the large capex growth nor an increase in private sector debt of their EM counterparts. Advanced economies are therefore more likely to show a response to demographics that resembles Japan's more recent experience rather than China's or Korea's (and Japan's previous experience too).

Cyclically, the incentives for the corporate sector to engage are only slowly falling in place. Global capacity still likely has some slack left, but this slack is closing faster than most would have anticipated just a few months ago. The output gap in the US has yet to become distinctly positive. At the same time, US corporate profits are at extremely high levels compared to their 65-year history (see [Exhibit 14](#)). The high level of profitability reduces the incentive of corporates to indulge in capex. New political forces, however, could revitalise comatose capex faster than economics alone would eventually have done.

### **SECTION 3: Implications for Inflation, Inequality and Politics**

**How do we pull together the overall macroeconomic conclusions?** It would have been quite a task. Fortunately a group of Birkbeck economists (Aksoy et al, 2015) have undertaken an econometric, and theoretical, study of the



consequences of such demographic changes. Since we largely accept both the direction of travel, and rough magnitudes, of most of their results, we have simply reproduced their main table in [Exhibit 15](#).

Their main conclusions, which we agree with, are:

- Overall growth and total hours worked will slow down as ageing advances (which we can see because  $\beta_3$  – which represents the coefficient on the aged profile of the population – is negative for growth and even more so for total hours worked).
- Both the proportion of young and old are inflationary for the economy - this can be seen clearly by the (quote coefficients)
- Both the investment ratio and the personal savings ratios fall thanks to demographics – as seen by a negative value for  $\beta_3$  for both investment and the personal savings ratios.

These conclusions fit in with our own thinking about the effects of demographics.

- Growth is the first and most obvious casualty and decline in overall growth and total hours worked will inevitably fall. However, human happiness is linked to per capita GDP and that measure is likely to look a lot more benign.
- Both, higher proportions of young and old are inflationary, and it is only the working cohort that can be deflationary for the economy. Both of the former are net consumers and it is only the latter cohort that can offset the demand it creates for goods and services by producing those goods and services.
- We agree with the decline in both the investment and personal savings ratio results as well, adding only (as we have before) that we think savings will fall faster than investment.

Below, we elaborate further on why we believe inflation will rise, and offer two other implications of ageing - falling inequality and a worsening political confrontation that will be linked to protecting the social safety net.

#### **Implication #1: Ageing will raise, not lower, inflation**

*Inflation will be the inevitable consequence of the tax wedge that plugs the gap between inadequate savings and rising spending.* If we are right in our political economy assumption that the social safety net will remain in place, then the age profile of consumption will continue to be flat or even upward sloping. The ineluctable conclusion is that tax rates on workers will have to rise markedly in order to generate transfers from workers to the elderly. Workers, however, would not be helpless bystanders. Labour scarcity will put them in a stronger bargaining position. They will use that position to bargain for higher wages. This is a recipe for recrudescence of inflationary pressures. Today's inflation is a cyclical rebound that has shocked the bond market, but the world is still not ready to think about inflation that is likely to remain with us structurally. Central banks will, soon enough, have to revert their normal behaviour. The ZLB was largely the consequence of a combination of a China effect, an unprecedented demographic backdrop and a deep cyclical shock. None of these will be ingredients in the future.

*Ageing is inflationary empirically too.* Juselius and Takats (2016) uncover an empirical relationship - “a puzzling link between low-frequency inflation and population-age structure: the young and old (dependents) are inflationary whereas the working age population is disinflationary”. They use data from 22 countries between 1955 and 2014 and their analysis shows that 6.5% of the disinflation in the US from 1975 to today can be accounted for by age-structure. The age-structure, they argue, “is forecastable and will increase inflationary pressures over the coming decades”. The intuition behind this result is simple. An increase in consumption by itself creates an inflationary impulse for a given basket of goods and services. The act of production has the ability to expand the stock of goods and services for a given level of consumption and is therefore disinflationary. Dependents (the young and the old) are purely consumers and hence generate an inflationary impulse, whereas workers can offset this inflationary impulse through production. If the workers in the society outweigh dependents in the economy (as was the case during the demographic sweet spot) the world will go through a period of disinflation as it has for the last few decades. The next few decades, when dependents outstrip workers, the pendulum will swing the other way, with the inflationary forces in the economy exceeding the disinflationary ones.

## Implication #2: Piketty Is History

As Piketty (2014) and Atkinson (2015) have reminded us, inequality within most countries has risen in recent decades. Inequality between countries, however, has fallen as Asia has caught up with Europe. The huge positive supply shock to world labour means that this was to be expected. Why?

For at least three reasons:

*a. A positive labour supply shock lowered DM wages and productivity:* Thanks to the positive labour supply shock, the return to labour fell relative to the return to capital. This created greater inequality within an economy but greater equality between countries, with the marginal productivity (real wage) in China and Eastern Europe rising relative to the West (and Japan).

*b. Relocation of production led to higher inequality:* Employers in DM could and did relocate production to China or Eastern Europe. Along with the downward pressure on manufactured goods prices, this led to deflationary pressures, both on DM domestic demand and on DM inflation. As a direct result, monetary policy became more expansionary, and nominal and real interest rates trended downwards. The process started around 1980-82, just after the turn of the demographic cycle. Lower yields raised asset prices, and exacerbated the increasing inequality within each country.

*c. The relocation helped to raise the savings rate in China and raised the returns to capital:* Providing the capital (and the management) to make these additional workers productive was easier than might have been expected. The dependency ratio in China (and Eastern Europe) was falling fast between 1975 and 2010 (see [Exhibit 16](#)). With fewer children to support them later in their old age, and an inadequate social safety net, the growing population of China (and East Europe) saved even more voraciously than needed to match the high investment ratios, leading to massive export surpluses, and the well-known imbalances and savings glut. Moreover, governance issues encouraged (excessive) corporate saving in several countries, e.g., China and Japan, and insufficient investment in others, e.g., the US and UK (Smithers, 2013).

So, we believe that demographic trends were one of the main causes of rising (within country) inequality in recent decades; and it was nothing to do with some innate tendency for returns to capital to exceed growth ( $r > g$ ), Piketty (2014).

## The Demographic Future of Inequality

The coming reversal of these demographic trends will mean that future inequality is likely to reverse too. Rising wages will mean a larger share of national output for labour and falling inequality within economies. We argue that the capital/labour ratio will rise, and this could mean that inequality declines at a slightly slower pace because capex is more likely to replace lower-skilled jobs and hence affect lower-income workers adversely. But we do not expect capex growth to be excessively strong and think education levels will rise over time, both of which dampen a potential reinforcement of inequality via the capex channel.

There is likely to be a clear dividing line between economies that will face slower growth (those with adverse demographics in DM and North Asia) and those whose growth can continue to rise (India, Indonesia and Africa). Beyond this demographic dividing line, EM economies have the ability to play catch-up with DM economies, given their lower starting point, but this will depend on the usual set of factors starting from (and sometimes ending with) administrative abilities and policy.

Inequality has been cited as one of the more important drivers of excess saving. At higher income levels, much more of the income feeds through into saving rather than spending. If inequality is going to fall, this trend should reverse, and more spending for any given increase in income should be expected.

Piketty is history, not the ineluctable future. If these global demographic trends, as we argue below, drove inequality higher, then their reversal could lower inequality too. Labour had lost much of its power to command higher wages between 1980 and 2010. Now labour will become increasingly scarce. The labour share of income, having trended down in most DM economies since 1970, is now likely to rebound.

## Implication #3: The Political Economy of Demographics - a clash of ages

The prime working age population and the aged are likely to find themselves in a political battle. The aged will become a powerful political force as their cohort swells due to ageing. It is this political power that we think will keep administrations from reneging too much on their pension obligations. The prime working age population will be a

dwindling cohort but they will possess an important commodity whose price is likely to stay on an upward trend - labour. What the young give up by way of political power to the elderly, they will try and counter-balance by seeking higher wages. Their bargaining position, however, may not be impregnable given they can hardly withhold their own supply of labour, i.e., they will not be abstain from working for long periods of time.

Brexit and Mr. Trump's elections both show a demographic divide, with the older sections of the population both voting for the result and the younger segments of the population against. The debate, we believe, is primarily about immigration and frustration over low income growth. The political divide of the future will be over the elderly protecting their social safety net and the working age population their income.

## SECTION 4: Opposing Views and the Contrary Experience of Japan

### 4.1 Opposing Views

If we believe that the shift to a rapidly ageing population will lead to higher real interest rates, then why have other experts who have studied this issue come to an opposite conclusion?

In the case of Krueger and Ludwig (2006), our difference is primarily one of political assumption. We assume that political and social pressures will continue to maintain age-related consumption on a slightly upwards trend, financed by increased tax transfers from the younger workers, with pension benefits continuing to rise in line with average incomes. In contrast, Ludwig and Krueger generally assume that taxes on workers are held constant, so that the per capita replacement rate (the transfers) to the old decline, as the population ages. Naturally, in this case the workers have to save much more, thus imparting a large downward bias on the system. Thus, Ludwig and Krueger write on p. 30/31 that, *"keeping pension benefits constant and adjusting taxes, on the other hand, has dramatic consequences for the evolution of interest rates and wages, relative to the benchmark scenario of fixing tax rates for social security. With fixed benefits, the incentives to save for retirement are drastically reduced, relative to the benchmark. In addition, the substantial increase in tax rates.... And the corresponding reduction in after tax wages make it harder to save. Therefore, despite the decline in the fraction of households in working age (and diminished incentives to work because of higher payroll taxes) now the capital-labor ratio remains roughly unchanged, because of the large reduction of household savings. Consequently, the increase in wages and decline in returns is much less pronounced in this scenario"*.

Lu and Teulings (2016) provide an interesting angle to arguing that low fertility rates will mean the equilibrium real interest rate will remain for a very long period of time. Their analysis looks at global matters but they pay less attention to China than we would do. In the economies of their choice, the benefits of the social safety net vary widely, and we would expect savings behaviour of equally old citizens of these economies to differ in line with those provisions.

A recent study from the Fed by Gagnon et al (2016) has been widely publicized in both the press and in FOMC member speeches. Its key prediction is that demographics will keep real interest rates low in the US for a very long time. Our now-familiar critique applies here too. Their data is rich but only domestic in its scope. To account for open-economy effects, they point to Krueger and Ludwig to argue that open-economy models wouldn't change their estimates much. When it comes to the behaviour of real interest rates, they argue "real interest rates are proportion to TFP growth in a broad class of models, meaning interest rates should fall if productivity growth falls". We have argued earlier against this line of reason and remind readers again of the results of Hamilton et al (2016) which provide empirical evidence that stands at odds with such assumptions.

Just as we have reservations about the approach taken in the literature to analyse the effects of demographics, we argue that the experience of Japan and North Asia tells us less about the future impact of global demographic changes than historical developments in that part of the world would suggest.

### 4.2 Does the experience of Japan and North Asia tell us what demographics will do to growth, inflation and interest rates? In our view, not necessarily:

Japan's demographics turned at a time that the rest of the world was awash with labour, while North Asia's demographic dynamics are changing at a time when its growth choices have left behind an economic hangover that is not primarily the result of the changes in its labour force.

*Japan's* demographics turned in the early 1970s when global demographic pressures were still benign. While Japan's labour was getting scarce, labour was abundantly available in the rest of the world. Japan's corporates could, if they wanted to, offshore production and keep wages from rising. In fact, that's exactly what they did. Production was offshored, and employment moved from manufacturing to services, where a sectoral excess supply of labour kept wage growth controlled.

*North Asia's* demographics are now turning but the starting point is one of severe over-investment and over-indebtedness. During the period when excessive investment is being retrenched, growth will be weak, the capital/labour ratio could easily fall even though labour supply is shrinking and deflationary pressures could remain persistent because of excess capacity. These effects may get attributed to, but are not necessarily related to, demographics.

The demographic turn that is coming will happen when almost the entire world that is capable of advanced production systems is ageing at the same time.

Of course, India and Africa continue to have a fast-growing population, but large scale emigration from these countries into DM is out of the question for the foreseeable future, and for reasons set out later, we doubt whether an influx of capital and management into these continents can transform them, at least not rapidly, into future workshops of the world.

## Section 5: What are the three main risks to our thesis?

We see three obstacles that stand in the way of the effects of ageing playing out as we describe above.

### **Risk #1: The social safety net is withdrawn**

The first is that we may be wrong in assuming that the social safety net in the advanced economies will remain in place, keeping individuals from saving enough for retirement and forcing rapid dissaving upon retirement. This political economy assumption is more a matter of judgement but the difficult experience of Greece and Southern Europe in raising the retirement age shows just how difficult it is to take away public entitlements. The experience of the last ten years, and the political weight of the growing cohorts of the old, would seem to support our (politico-economic) assumption that medical services and pension benefits for the old will continue to be upgraded, in line with standards in the rest of the economy, rather than that taxes on workers will be held constant, with the implication that standards of living and medical provisions for the aged would decline, possibly quite sharply. Any the administration that moots reneging on the bulk of pension obligations, we feel, would be booted out of power. While we concede freely that a dramatic change in pension obligations would challenge our thesis severely, we are comfortable that this change will not be easy at all to implement.

### **Risk #2: Mitigants - higher participation rates and the rise of India/Africa - could offset demographic pressures**

The second is the set of mitigating factors that could be stronger than we expect them to be. Participation rates among the over-65s could rise faster than expected, India could become the powerhouse that China was, and robotics/technology could make labour redundant.

#### **Can the participation rate rise? It already has.**

A pick-up in the participation rate in the advanced economies has already begun some 20 years ago. [Exhibit 17](#) shows the bottoming of participation rates but it also shows big differences in the level of participation among the advanced economies. Part of this could be due to idiosyncratic factors but [exhibit 18](#) suggests at least another explanation for these differences - the generosity of the pension system. The more generous pensions systems show a correspondingly lower participation rate. Germany's generous pension system, for one, results in the lowest participation rate while the far more parsimonious US system elicits a much higher participation rate.

There is also the question about willingness and ability to participate - and the factor that connects the two is education. [Exhibit 19](#) shows that the level of education shows a clear relationship among the over-65s. Just about a quarter of the men in the over-65s and less than a sixth of the women participate in the labour force when they have less than a high school education. This participation rate increases linearly with education. Two-thirds of men and just

over half of women among the over-65s remain in the labour force if they have obtained a professional degree or a doctorate. Gordo and Skirbekk (2013) argue that the over-65s in Germany that have stayed in the labour force have tended to move into jobs that require more cognitive skills. Identifying an age-productivity curve, Skirbekk (2003) argues that productivity tends to decline in the older cohorts of the labour force much faster in jobs that require problem-solving, learning and physical skill. Productivity doesn't decline much when the job requires experience and verbal skills. This should imply greater participation from the more educated ranks of the over-65s, leading to an increase in the demand for jobs that can use cognitive skills and experience.

**Can India and Africa offset demographic headwinds to the rest of the world? Numerically, yes. Economically, the offset is much harder.**

Since Brexit, Europe's frictions over migrants, and the election of Mr. Trump, the optimism around immigration being an effective offset for ageing has died a quick death. But if labour cannot be imported into ageing economies, why not export capital instead to economies with growing populations, produce there and import finished goods from there? Some of this will naturally happen, but exporting capital to economies where the labour force is growing is not easy.

There won't be another 'China' for a long time, if ever. The starting point for India and African economies could also allow rapid growth for sure ([exhibit 20](#)), but the ability of these economies to transform themselves into the next China is questionable. Perhaps the economy best suited to marry its generous demographics to an extensive inflow of capital is India. However, such a change is unlikely to occur over the next few years, and could only happen over the next decade with the help of significant tailwinds to the domestic and global economy, in our view.

A major factor in keeping India and Africa from becoming economic powerhouses is the lack of an administrative infrastructure. Such infrastructure is critical to help deploy domestic or imported capital to take advantage of the growing supply of labour. The World Bank's Ease of Doing Business index (see [Exhibit 21](#)) shows how much more progress both India and EM in general have to make on creating better business conditions. India's administration has recently embarked on a series of administrative improvements that are likely to help the economy accumulate capital faster. However, in our view, this could raise growth above its historical average of around 6% or so, but its economic size is still far too small for such a growth rate to have a global impact. Some African economies do score better, and a few even better than China. However, these economies do suffer from weaker human capital compared to India.

*Are robotics not the next 'solution'?* As we have argued earlier, we do think that capex will rise in a way that raises the K/L ratio and we have little doubt that robotics will be an important part of that story. In our view, however, most technological promises become realities only very slowly. The science of robots has made tremendous progress in terms of cost and efficiency over the last decade, and we may turn out to be wrong in how quickly they take over the workspace, but thus far we see the potential being exploited more in the manufacturing sector where repetitive tasks have always been at risk.

**Risk #3: Debt could delay the inevitable**

The risks we discuss above could provide slow-moving offsets to our main thesis, but one issue that will keep real interest rates and inflation from rising quickly over the next few years is debt. The world is still awash with debt, and the increase in leverage has been encouraged by interest rates being pushed to historic lows in the advanced economies and in North Asia. If US real interest rates rise or threaten to rise quickly, debt servicing will become more difficult, in turn putting downward pressure on spending and real interest rates more generally.

*The genesis of leverage.* The trend of increasing leverage, we argue, has been endogenous to the decline in inflation and real interest. The consequent increase in asset prices, particularly in fixed income assets, led to the expansion of the financial sector globally. Collectively, these conditions fostered a higher willingness and ability to issue and pay back debt. Tax laws helped too. Tax regimes in most economies favour debt rather than equity, which further encouraged the build-up of debt.

*There are three paths to deleveraging - but our preferred method is to issue more equity-like instruments.*

- Historically, inflating away debt or forgiving it have played an important role. Both will feature in this episode too, but we doubt they will play the lead. A very high level of inflation will be needed to make a dent in the real burden of debt - this will be hard to generate. Even if it was possible to raise inflation, we doubt that inflation-targeting central banks would allow inflation to rise rapidly initially. Forgiving debt is far trickier than it sounds. Even though we owe the debt

to ourselves, the distribution of assets in the economies will mean that savers and financial institutions will suffer the most if forgiveness is adopted as the prime strategy for deleveraging.

- Making the debt permanent. Converting bonds into consols will mean that the debt never leaves the system. However, because the principal never needs to be repaid, the collateral that guarantees payments looks adequate and coupon payments become easier to make. 'Renegotiations' like this will also be tricky, and even if default is avoided in a strict sense, managing expectations about how far such renegotiations will go and the complications of marking-to-market will become very important.

- Our preferred method is to issue more equity-like instruments. The problem with debt instruments is their lack of state-contingency, i.e., that the fixed servicing cost of debt stands at odds with fluctuations in revenues and asset returns. There are solutions that can be considered for households, corporates, banks and governments to design optimal equity-like instruments that can reduce leverage and allow the servicing of the new liability to fluctuate in line with the state of the world at a point in time. The debt-equity swaps that have been underway in China's banking sector for quite a while now are a step in the right direction. We look also to the new proposals being put forward by House Speaker Paul Ryan and the Chairman of the Ways and Means Committee Kevin Brady to change the incentives in the US corporate sector towards favouring equity rather than debt with great interest.

*Debt will delay the inevitable, rising dollar interest rates will force the world to deal with debt.* The demographic sweet spot is already behind us, and both the equilibrium real interest rate and inflation have probably already stopped falling. That removes an important support for the bond market after a 35-year stretch. Cyclically, the ongoing improvement in the US economy well in advance of the rest of the world is already pushing up global interest rates. While an increase in US yields is endogenous from the point of view of the US economy, higher global yields will eventually be an exogenous shock to economies that still have high leverage in their economies. We feel that leverage will have to be dealt with somehow or the other over the next 3-5 years thanks to this mix of structural and cyclical forces.

Beyond that, demographic forces will have a much freer rein to assert themselves. We don't know what the future will look like precisely. It will not, however, be anything like the past, of that we are sure.

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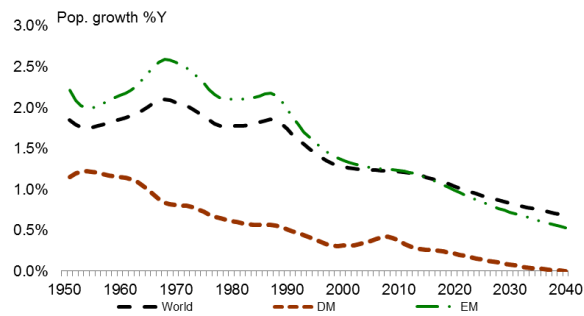
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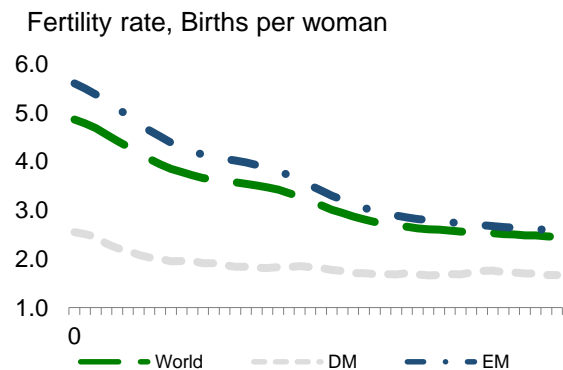
## EXHIBITS

**Exhibit 1: Global Population Growth Has Further to Slow**



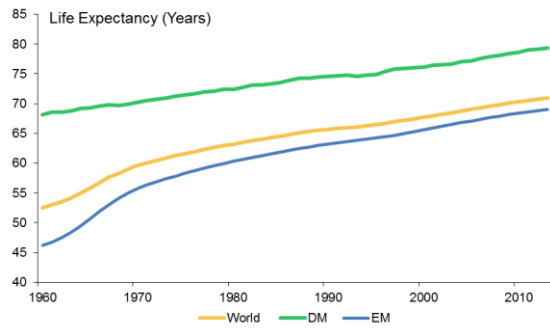
Source: UN Population Statistics

**Exhibit 2: Fertility Rates Have Collapsed Worldwide**



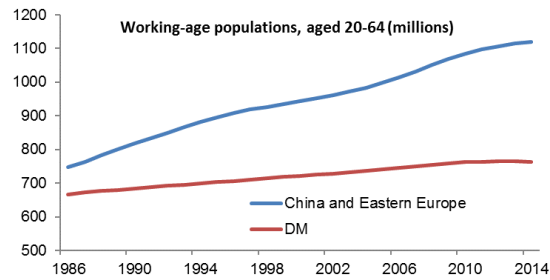
Source: World Bank; Note: DM includes high-income countries (OECD and non-OECD); EM includes low and middle-income countries

**Exhibit 3: Life Expectancy: Up Sharply in EM, Rising Slower in DM**



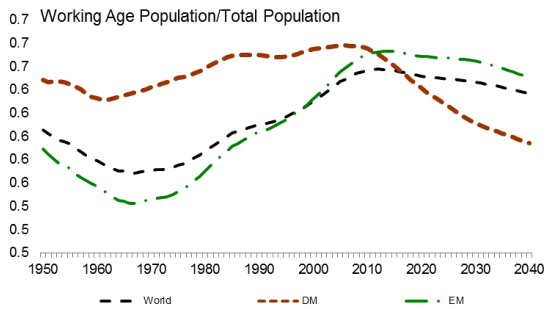
Source: UN Population Statistics

**Exhibit 4: The Positive Labour Supply Shock from China and Eastern Europe**



Source: UN Population Statistics

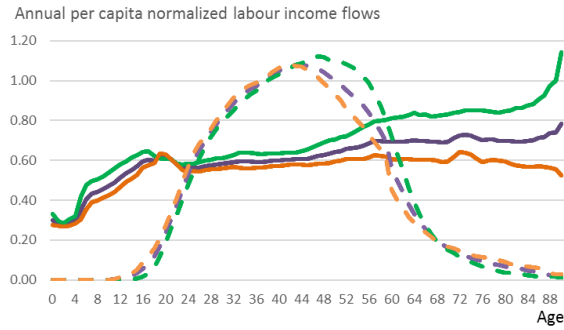
**Exhibit 5: Working Age Population Was Rising in Both DM and EM, But Should Fall Now**



Source: UN Population Statistics



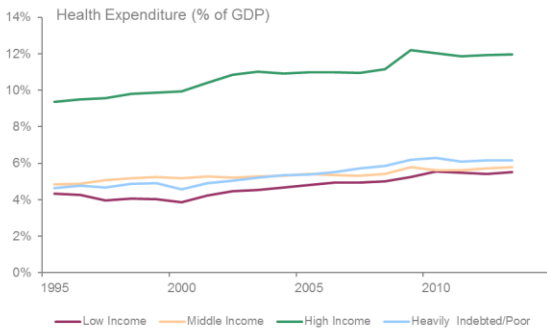
### Exhibit 6: Consumption Rises Over the Life Cycle



Source: National Transfer Account

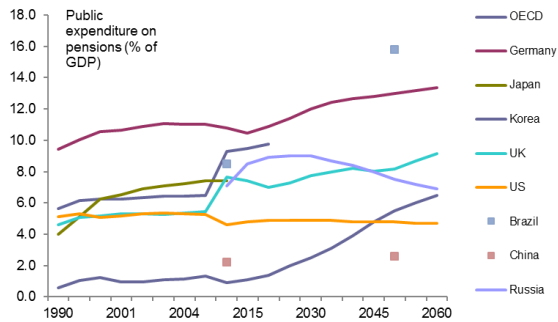
Note: Values are normalized by dividing the simple average of labour income for individuals 20-49 years old.

### Exhibit 7: Health Expenditure Rising Globally



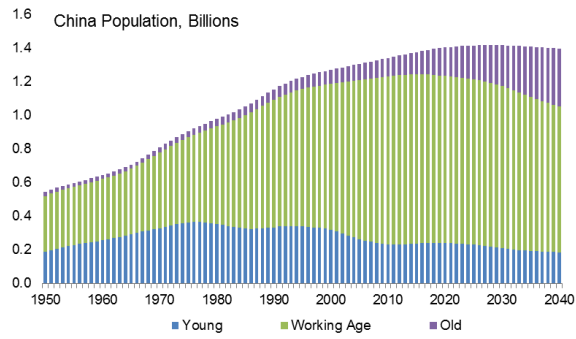
Source: World Bank

### Exhibit 8: Public Expenditure on Pensions Will Continue to Rise



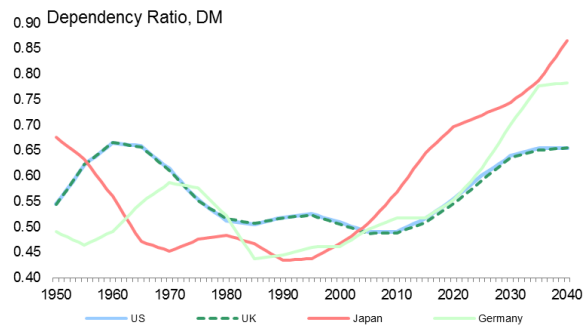
Source: OECD

**Exhibit 9: The Size of the Working Age Population is Already Falling in China**



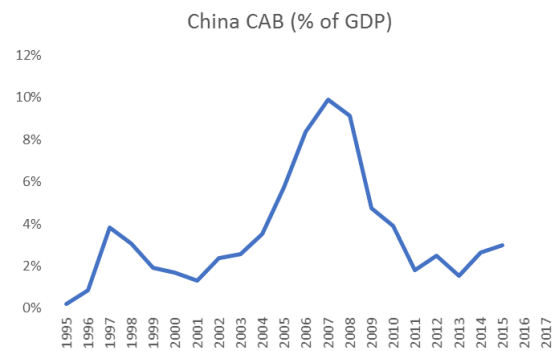
Source: UN Population Statistics

**Exhibit 10: The Dependency Ratio is Rising in Key DM Economies**



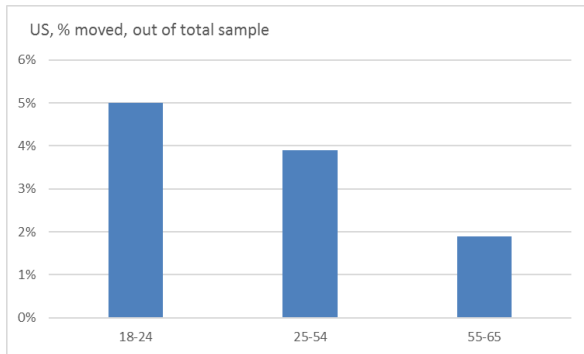
Source: UN Population Statistics

**Exhibit 11: China's Current Account Balance Has Fallen Sharply From Its Peak**



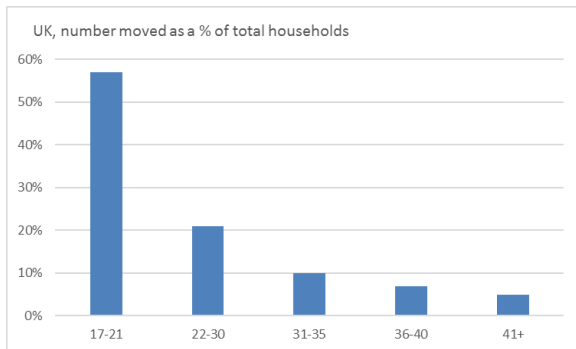
Source: IMF

**Exhibit 12: Older People Less Likely to Move in the US**



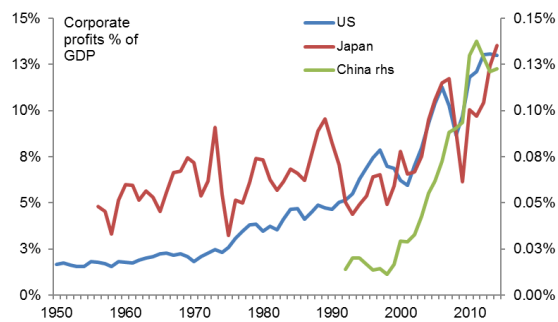
Source: Hernandez-Murillo et al, 2011

**Exhibit 13: ...And in the UK As Well**



Source: Meen et al, 2005

**Exhibit 14: Corporate Profits at Very High Levels**



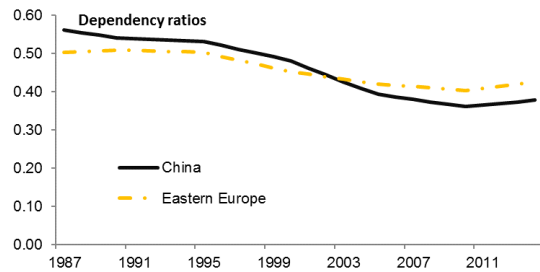
Source: National Source

### Exhibit 15: Economic Effects of Demographic Change

	$\beta_1$	$\beta_2$	$\beta_3$
	(young 0-21)	(working 21-60)	(old 60+)
Growth Rate	0.02	0.12	-0.14
Investment Ratio	0.03	0.17	-0.2
Personal Savings Ratio	0.28	0.31	-0.59
Hours Worked	-0.64	1.53	-0.89
Inflation	0.68	-0.85	0.17

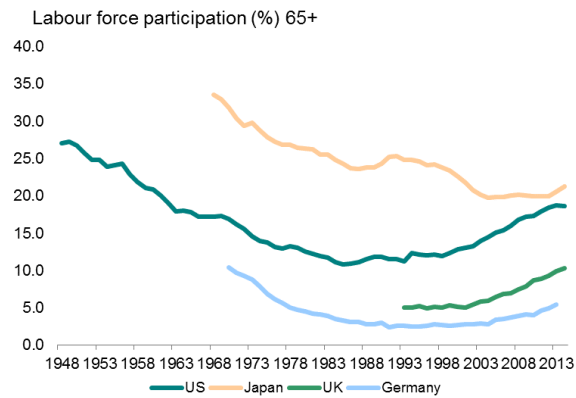
Source: Aksoy et al, Birkbeck 2015

### Exhibit 16: The Dependency Ratio in China and Eastern Europe Was Falling, But is Now Turning Up



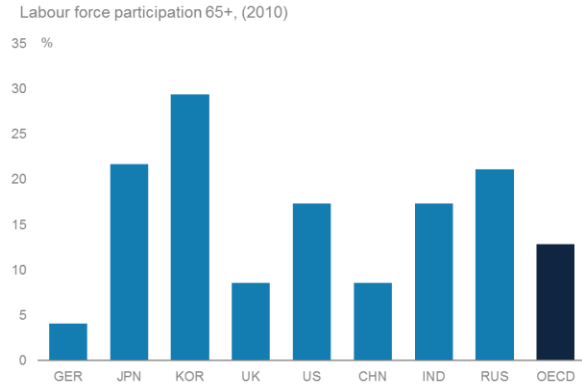
Source: UN Population Statistics

### Exhibit 17: The Participation Rate for the Over-65s Has Been Rising for 20 Years Already



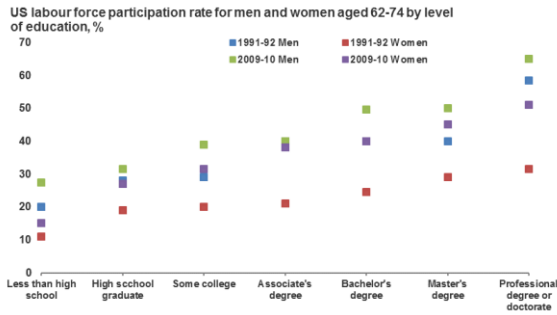
Source: OECD

**Exhibit 18: Labour Force Participation For the Over-65s is Higher in Economies With Less Generous Pensions**



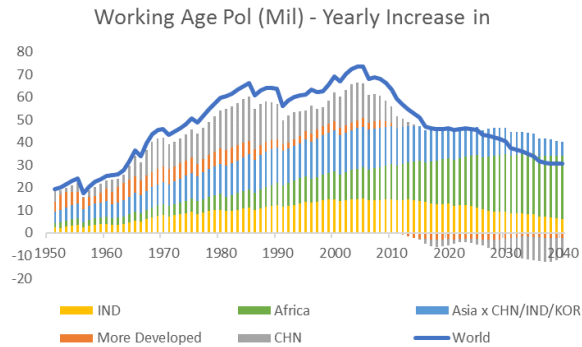
Source: OECD

**Exhibit 19: Labour Force Participation is Higher for the Educated and For Men**



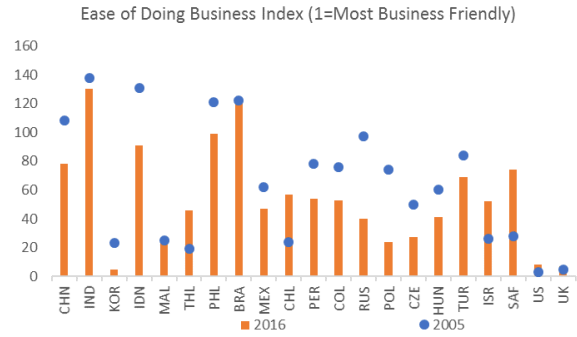
Source: Gary Burtless, Brookings Institute, The Economist

**Exhibit 20: Growth in Working Age Population Will Come Mostly From India and Africa**



Source: UN Population Statistics

**Exhibit 21: Ease of Doing Business: Better Than a Decade Ago, But Still a Long Way to Go**



Source: World Bank