

The Long View

How will the global economic order change by 2050?

February 2017



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Key abbreviations

G7: group of advanced economies of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States

E7: group of emerging market economies of Brazil, China, India, Indonesia, Mexico, Russia and Turkey

GDP at PPP: gross domestic product at purchasing power parity adjusts for price level differences across countries and provides a better measure of the *volume* of goods and services produced in an economy

GDP at MER: gross domestic product at market exchange rates provides a better measure of the *value* of goods and services produced in an economy and converts a country's GDP in national currencies to US\$ based on current market exchange rates

Foreword

The long view: how will the global economic order change by 2050?

After a year of major political shocks with the Brexit vote and the election of President Trump, it might seem brave to opine on economic prospects for 2017, let alone 2050.

However, I still think it is important to take a longer term view of global economic prospects that looks beyond the short-term ups and downs of the economic and political cycle, which are indeed very difficult to forecast. Instead our approach in this report, based on a rigorous modelling approach, focuses on the fundamental drivers of growth: demographics and productivity, which in turn is driven by technological progress and diffused through international trade and investment.

Such forces saw America progress through the 19th and early 20th centuries to become the largest economy in the world despite a civil war, various other conflicts with foreign powers, three presidential assassinations, and numerous economic and financial crises.

These forces also helped global economic growth to bounce back strongly from two world wars and a Great Depression to reach record levels in the post-war decades. Looking ahead, we think they will see emerging economies come to dominate the 21st century. By 2050 we project China will be the largest economy in the world by a significant margin, while India could have edged past the US into second place and Indonesia have risen to fourth place. The EU27's share of global GDP could have fallen to below 10%. We also think the world economy will more than double in size between now and 2050, far outstripping population growth.

I think this kind of long-term view, looking beyond short-term economic and political cycles, is particularly useful for policymakers and businesses in areas like pensions, healthcare, energy and climate change, transport, housing and other types of infrastructure investment.

Challenges for policymakers

Of course, we should not dismiss political shocks like Trump or Brexit to the extent they point to deeper structural shifts, notably a populist backlash against globalisation, automation and the perceived impact of these trends in increasing income inequality and weakening social cohesion.

These trends pose real policy challenges across the developed world and beyond and, as we discuss in Section 4 of this report, there is no silver bullet to address these concerns. They require determined efforts by governments to boost the quality of education and training, and address perceived unfairness through well-targeted fiscal policies. They also require real political leadership to resist calls for increased protectionism and maintain momentum on longer term issues like climate change and global poverty reduction.

Opportunities for business

From a business perspective, there is also a need to look beyond short-term economic volatility in both advanced and emerging economies and develop strategies that have the right balance of flexibility and patience.

As we discuss in Section 5 of the report, this requires a clear focus on identifying and building on core capabilities, while remaining flexible enough to ride out short term political and economic storms of the kind we have seen in both advanced and emerging economies in recent years.

Overall, though, I remain optimistic that governments and businesses can rise to these challenges and deliver the continued increases in global living standards that we project in this report.



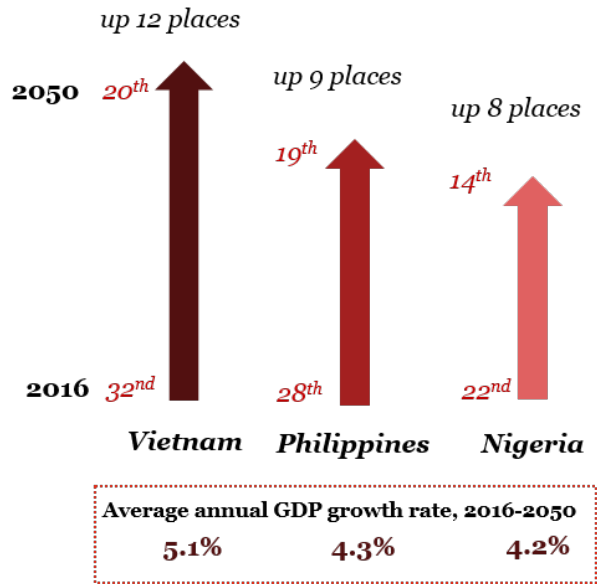
John Hawksworth
Chief Economist, PwC UK

Emerging markets will dominate the world's top 10 economies in 2050 (GDP at PPPs)

	2016	2050	
China	1	1	China
US	2	2	India
India	3	3	US
Japan	4	4	Indonesia
Germany	5	5	Brazil
Russia	6	6	Russia
Brazil	7	7	Mexico
Indonesia	8	8	Japan
UK	9	9	Germany
France	10	10	UK

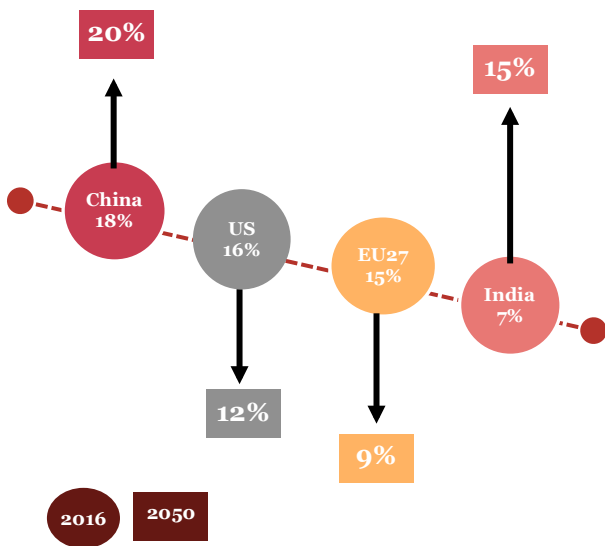
E7 economies
 G7 economies

Vietnam, the Philippines and Nigeria could make the greatest moves up the rankings by 2050



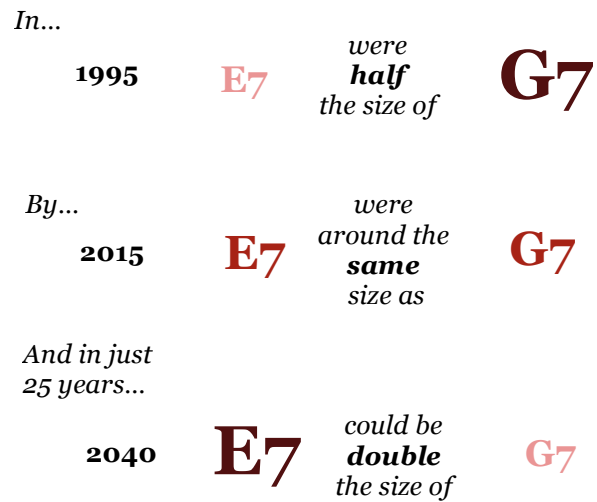
The US and Europe will steadily lose ground to China and India

Share of world GDP (PPPs) from 2016 to 2050...



Sources: IMF for 2016 estimates, PwC analysis for projections to 2050

Global economic power will shift to the E7 economies



G7: US, UK, France, Germany, Japan, Canada and Italy
 E7: China, India, Indonesia, Brazil, Russia, Mexico and Turkey

1. Summary: The world in 2050

Key findings

1. We project that the world economy could more than double in size by 2050, assuming broadly growth-friendly policies (including no sustained long-term retreat into protectionism) and no major global civilisation-threatening catastrophes.
2. Emerging markets will continue to be the growth engine of the global economy. By 2050, the E7 economies could have increased their share of world GDP from around 35% to almost 50%. China could be the largest economy in the world, accounting for around 20% of world GDP in 2050, with India in second place and Indonesia in fourth place (based on GDP at PPPs).
3. A number of other emerging markets will also take centre stage – Mexico could be larger than the UK and Germany by 2050 in PPP terms and six of the seven largest economies in the world could be emerging markets by that time.
4. Meanwhile, the EU27 share of world GDP could be down to less than 10% by 2050, smaller than India.
5. We project Vietnam, India and Bangladesh to be three of the world's fastest growing economies over this period. UK growth has the potential to outpace the average rate in the EU27 after the transitional impact of Brexit has passed, although we project the fastest growing large EU economy to be Poland.
6. Today's advanced economies will continue to have higher average incomes, but emerging economies should make good progress towards closing this gap by 2050. This will open up great opportunities for businesses prepared to make long-term investments in these markets. But this will require patience to ride out the storms we have seen recently in economies like, for example, Brazil, Nigeria and Turkey, all of which still have considerable long-term economic potential based on our analysis.
7. To realise this growth potential, emerging market governments need to implement structural reforms to improve macroeconomic stability, diversify their economies away from undue reliance on natural resources (where this is currently the case), and develop more effective political and legal institutions.

1.1 Our approach

In this report, we present our latest long-term economic growth projections, providing an update to our 2015 results. We project GDP to 2050 for 32 of the largest economies in the world, which together currently account for around 85% of global GDP. We hope this analysis will be of interest to policymakers around the world, businesses making long-term investments, academics, students and economic commentators. These long-term growth projections will also feed into other PwC projects and reports.

Our analysis uses a robust long-term economic growth model from the academic literature that accounts in a rigorous way for projected trends in demographics, capital investment, education levels and technological progress to estimate potential long-term growth rates. We assume broadly growth-friendly (but not perfect) policies and no major civilisation-threatening global catastrophes (e.g. nuclear war, asteroid collisions) over the period to 2050. Full technical details of our methodology are contained in Appendix A.

We are aiming to identify broad long-term trends, abstracting from short-term economic and political cycles. We are not claiming to be able to make precise forecasts of GDP in 2050, which is clearly not possible looking that far ahead, but we do believe it is possible to trace out the broad shape of economic power shifts over this period. We also look at the impact of a range of alternative assumptions on our long-term growth projections (in Section 2.4 of the report).

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To complement our modelling projections we also include:

- commentaries on five emerging markets (China, Nigeria, Colombia, Turkey and Poland) from PwC senior economists or partners in these countries;
- interviews with three leading academics - Professor Marvin Zonis, Professor Branko Milanovic and Professor Michael Jacobides – on the uncertainties around our projections, the challenge of income inequality, the need for institutional reform and the implications of our analysis for business strategy; and
- summaries of a range of other PwC research and case study analysis to draw out the implications of the long-term global economic trends we project for public policy and business.

1.2 GDP projections to 2050

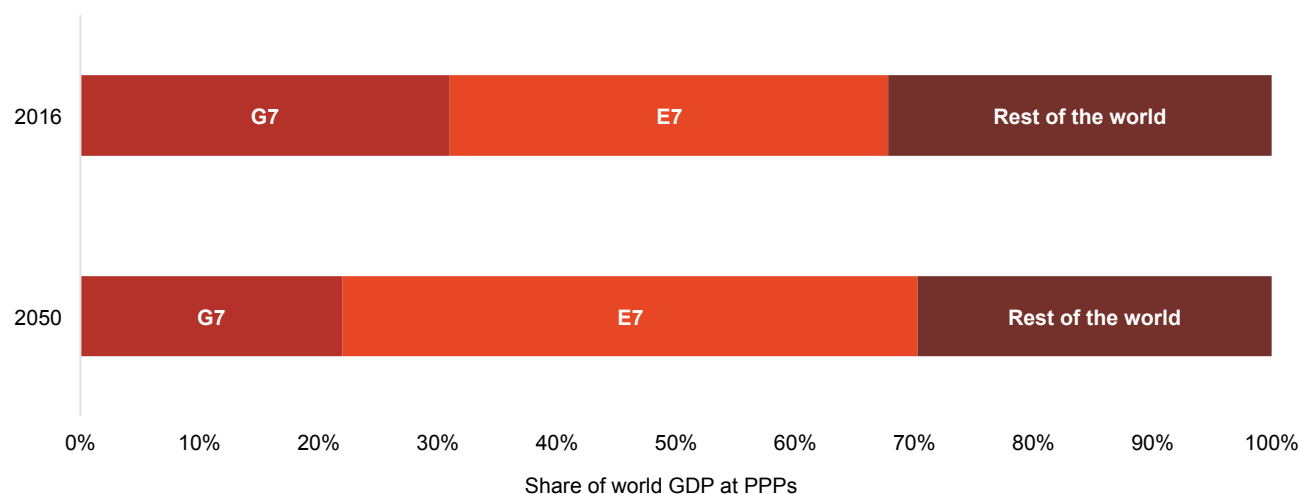
Global economic growth will be driven by emerging market economies, which will gradually increase their share of world GDP over time

We project that the world economy will double in size by 2042, growing at an annual average rate of around 2.6% between 2016 and 2050.

We expect this growth to be driven largely by emerging market and developing countries, with the E7 economies of Brazil, China, India, Indonesia, Mexico, Russia and Turkey growing at an annual average rate of almost 3.5% over the next 34 years, compared to just 1.6% for the advanced G7 nations of Canada, France, Germany, Italy, Japan, the UK and the US.

We will continue to see the shift in global economic power away from established advanced economies, especially those in Europe, towards emerging economies in Asia and elsewhere. As shown in Figure 1, the E7 could comprise almost 50% of world GDP by 2050, while the G7's share declines to only just over 20%.

Figure 1: Projected change in shares of world GDP from 2016 to 2050



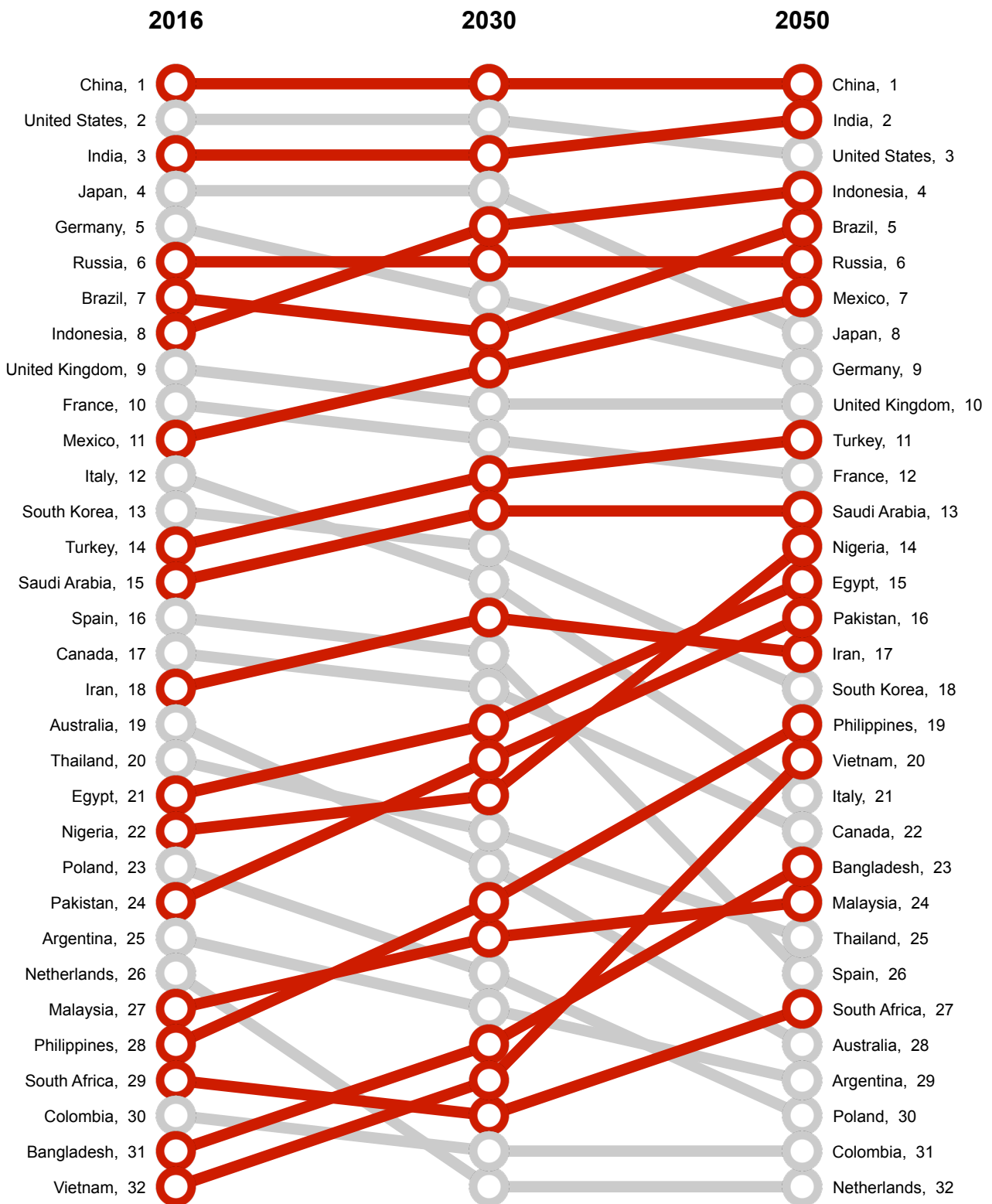
Sources: IMF for 2016 estimate, PwC projections for 2050

In fact, China has already overtaken the US to become the world's largest economy in purchasing power parity (PPP) terms¹, while India currently stands in third place and is projected to overtake the US by 2040 in PPP terms. By 2050, France will no longer be among the world's ten largest economies on this basis, with the UK falling to 10th place, while Indonesia could rise to 4th place by 2050 (see Figure 2). By 2050, six of the seven largest economies in the world could be today's emerging economies in PPP terms according to our projections.

¹ PPP estimates of GDP adjust for price level differences across countries, providing a better measure of the *volume* of goods and services produced by an economy as compared to GDP at current market exchange rates, which is a measure of *value*.

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Figure 2: Projected GDP rankings (at PPPs)



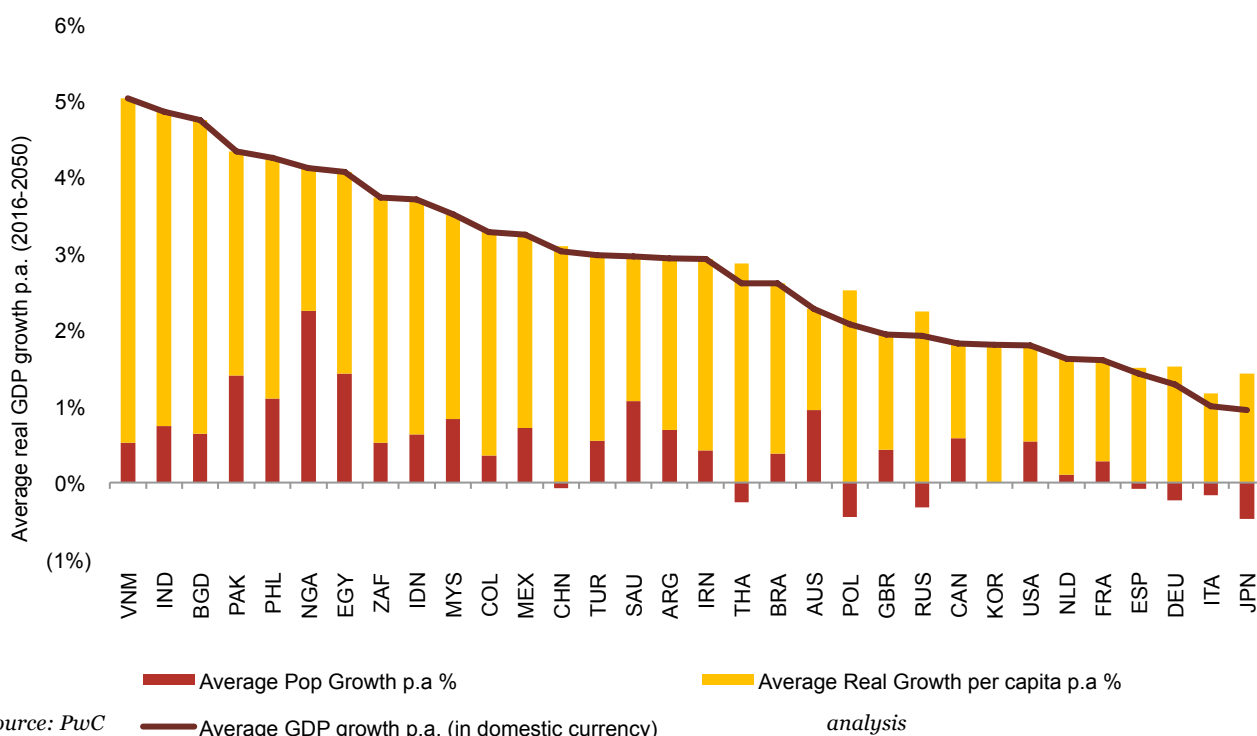
Sources: IMF for 2016 estimates (updated for Turkey due to recent major statistical revisions), PwC projections for 2030 and 2050

When looking at GDP measured at market exchange rates (MERs)², we do not see quite such a radical shift in global economic power, reflecting the lower average price levels in emerging economies. But China still emerges as the largest economy in the world before 2030 and India is clearly the third largest in the world by 2050, so there is still a considerable shift in economic power towards Asia in particular whichever measure we use.

We will see a number of new emerging markets taking centre stage

By 2050, emerging economies such as Mexico and Indonesia are likely to be larger than the UK and France, while Pakistan and Egypt could overtake Italy and Canada (on a PPP basis). In terms of growth, Vietnam, India and Bangladesh could be the fastest growing economies over the period to 2050, averaging growth of around 5% a year. Figure 3 shows the projected average annual GDP growth rate over the next 34 years for all of the 32 countries we modelled. Total GDP growth is also broken down into how much is attributable to population growth and how much to real GDP per capita growth.

Figure 3: Projected average real GDP growth p.a., 2016-2050



Nigeria has the potential to be the fastest growing large African economy and could move up the GDP rankings from 22nd place to 14th by 2050. But Nigeria will only realise this potential if it can diversify its economy away from oil and strengthen its institutions and infrastructure. Colombia and Poland also exhibit great potential, and are projected to be the fastest growing large economies in their respective regions, Latin America and the EU (though Turkey is projected to grow faster within the wider European area).

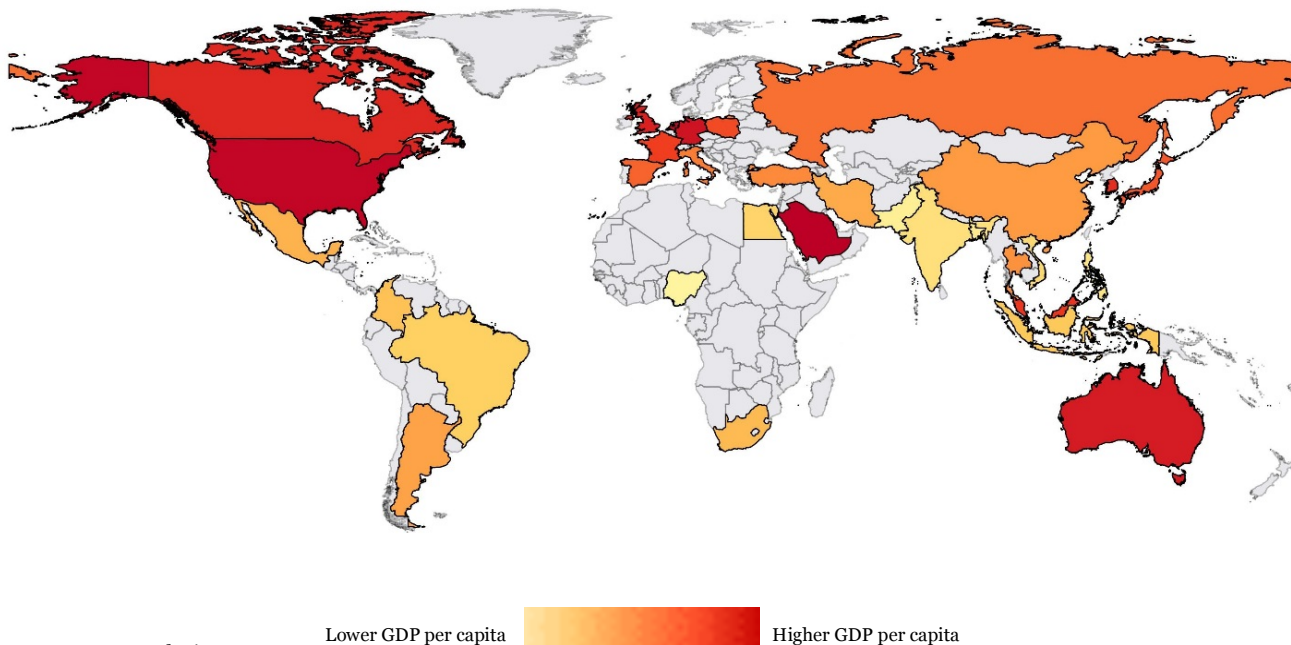
As Figure 3 shows, growth in many emerging economies will be supported by relatively fast-growing populations, boosting domestic demand and the size of the workforce. This will, however, need to be complemented with investment in education and an improvement in macroeconomic fundamentals to ensure there are sufficient jobs for growing numbers of young people in these countries.

Today’s advanced economies will continue to have higher average incomes, but by 2050 emerging economies should make good progress towards closing this gap

² The difference between GDP at PPP and MER estimates reflects that price levels in lower income countries are lower than that in advanced economies, meaning the *value* of their goods and services produced results in a lower GDP estimate.

With the exception of Italy, all of the G7 continue to sit above the E7 in our rankings of GDP per capita in 2050. China achieves a middling rank by 2050, while India remains near the bottom, as illustrated in Map 1. India's GDP per capita trajectory over the next 34 years is markedly different to its overall GDP progression, illustrating that while strong population growth can be a key driver of GDP growth, it can also make it more challenging to boost average income levels.

Map 1: Projected real GDP per capita in 2050



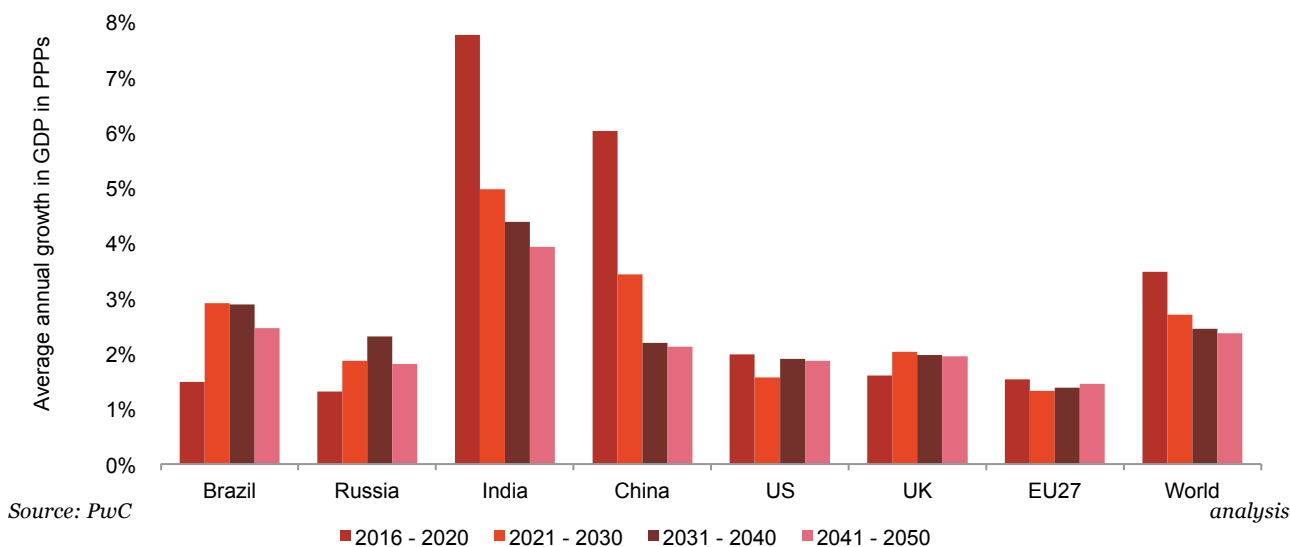
The gap is closing, however. In 2016, US GDP per capita was around four times the size of China's and almost nine times that of India's. By 2050, these gaps are projected to narrow to around double China's and around three times India's, demonstrating long-term income convergence.

The world economy will slow down over time, with a marked moderation in growth rates after 2020

We project annual global economic growth to average around 3.5% over the next 4 years to 2020, slowing down to 2.7% for 2021-2030, 2.5% for the decade after that, and 2.4% for 2041-2050. This will occur as many advanced economies experience a marked decline in their working-age populations. At the same time, emerging market growth rates will moderate as these economies mature, which is consistent with academic research³ on the tendency for growth rates to 'regress to the mean' in the long-run.

This is illustrated in Figure 4, with the growth rates of the largest emerging economies moderating over time to converge to around 2% in the very long run in line with the major advanced economies. India and Nigeria are the two of the main exceptions to this, with growth remaining higher for longer due to their lower initial average income levels providing greater scope for catch up growth.

³ For example, see the analysis by Pritchett and Summers (2014) here: <http://www.nber.org/papers/w20573>

Figure 4: Projected growth profiles for larger economies

1.3 Challenges for policymakers in achieving sustainable long term growth

To realise this economic potential, emerging market governments need to implement structural reforms to improve their macroeconomic fundamentals and institutions

The report details the great potential that emerging economies have to grow and prosper over the coming decades. But to realise this potential, they must undertake sustained and effective investment in education, infrastructure and technology. Adverse global conditions and a falling oil price over recent years have highlighted the importance of diversified economies for long-term sustainable growth. Underlying all of this is the need to develop their political, economic, legal and social institutions to generate incentives for innovation and entrepreneurship, creating secure and reliable economies in which to do business.

Looking forward, the global economy faces a number of challenges to prosperous economic growth. Structural developments, such as ageing populations and climate change, require forward-thinking policy which equips the workforce to continue to make societal contributions later on in life and promotes sustainable development. Falling global trade growth, rising inequality and increasing global uncertainties are intensifying the need to create diversified economies which create opportunities for everyone in a broad variety of industries.

1.4 Opportunities for business – winning in emerging markets

Businesses need to adopt flexible, dynamic and patient strategies to navigate these rapidly evolving and maturing emerging markets

Emerging market development will create many opportunities for business. These will arise as these economies progress into new industries, engage with world markets and as their populations – which will also be more youthful on average than in advanced nations – get richer. As these emerging countries develop their institutions, fostering social stability and strengthening their macroeconomic fundamentals, they will become more attractive places to do business and live, attracting investment and talent.

These economies are rapidly evolving and often relatively volatile, however, so companies will need dynamic and flexible operating strategies to succeed in them. Businesses should be prepared to adjust their brand and market positions to suit differing and often more nuanced local preferences. An in-depth understanding of the local market and consumers will be crucial, which will often involve working with local partners.

This report contains several examples of how businesses (e.g. Kellogg's in India, Walmart in Brazil and General Motors in China) have overcome challenges and ultimately been successful in combining their global best practices with flexible adaptation to local business and consumer environments.

Businesses also need to be patient enough to ride out the short term economic and political storms that will inevitably occur from time to time in these emerging markets as they move towards maturity. But the numbers in our report make clear that failure to engage with these markets means missing out on the bulk of the economic growth we expect to see in the world economy between now and 2050.

2. Introduction

2.1 Background to our World in 2050 reports

Our first 'World in 2050' report was published in March 2006, featuring projections for potential GDP growth for 17 leading economies over the period to 2050. Our initial model covered:

- the 10 largest advanced economies: the **G7** (US, Canada, UK, France, Germany, Italy and Japan), Australia, Spain and South Korea; and
- the seven largest emerging economies, which we referred to collectively as the **E7** (China, India, Brazil, Indonesia, Mexico, Russia and Turkey).

We subsequently updated our projections in March 2008, January 2011, January 2013 and February 2015. With each new edition up to 2015, more countries were added to our model, which now also covers:

- Argentina, Saudi Arabia and South Africa to complete coverage of the G20;
- the Netherlands, as a key European advanced economy;
- Poland and Malaysia, as two fast-growing medium-sized countries; and
- Bangladesh, Colombia, Egypt, Iran, Nigeria, Pakistan, the Philippines, Thailand, and Vietnam as additional relatively large emerging markets.

As such, our World in 2050 model now includes 32 countries, together accounting for around 85% of world GDP. Our analysis suggests that this group of countries should have a high probability of including at least the 25 largest economies in the world in 2050. Given the considerable uncertainties that come with any such long-term projections, we cannot say, however, that these will necessarily be the largest 32 economies in the world in 2050.

2.2 What have been the drivers of historical emerging market growth?

Over the past few decades we have seen the beginning of a radical shift in global economic power towards many leading emerging markets. Across emerging and developing countries, as defined by the IMF, growth has averaged 5.8% per annum since 2000, considerably higher than the 1.8% seen by advanced nations. As background to our forward projections, we conducted some additional analysis for this edition of our World in 2050 report into the drivers of emerging and developing economy growth over the past fifteen years⁴.

We used a robust econometric growth model, based on a review of the academic literature, in which initial GDP per capita, investment, government debt and education levels were the key potential explanatory variables for real GDP per capita growth. We then augmented this with primary commodity exports as a percentage of GDP, as this is a key sector for many emerging markets.

As Table 1 below shows, we found that all variables considered had a statistically significant impact on growth, explaining around 40% of the variance in real GDP per capita growth across 114 emerging and developing economies in 2000-15⁵ (see Appendix A for further technical details of these results).

⁴ This was initially published as a PwC Economics in Business blog article by Hannah Audino on 'What drives emerging markets growth?': http://pwc.blogs.com/economics_in_business/2016/11/what-drives-emerging-markets-growth.html

⁵ This is a relatively good fit for a simple cross-sectional regression of this kind.

Table 1: Results of our econometric analysis into the drivers of emerging market GDP per capita growth, 2000-2015

Variable	What impact does the variable have on GDP growth?	Is the impact statistically significant?
Initial GDP per capita in 2000	Negative	Highly significant
Average investment as a % of GDP (2000-15)	Positive	Highly significant
Average secondary school enrolment , % (1995-2000)	Positive	Highly significant
Average debt as a % of GDP (2000-15)	Negative	Highly significant
Average primary commodity exports as a % of GDP (2000-15)	Positive	Significant

Source: PwC analysis based on data from IMF, World Bank, UNCTAD

Our key results are as follows:

- **Initial GDP per capita:** we find a significant negative relationship between initial average income levels in an economy and subsequent GDP per capita growth; this reflects the fact that, other things being equal, a low initial level of economic development provides more opportunities for catch-up with higher income countries by making use of their technologies and ideas.
- **Investment:** this is a key determinant of economic growth, with a one percentage point increase in investment being associated, on average, with a 0.15 percentage point increase in annual average real GDP per capita growth. Investment can raise economic growth by supporting infrastructure development in key areas like energy and transport, boosting technological progress and so increasing productivity.
- **Education:** a one percentage point increase in secondary school enrolment is associated with a 0.05 percentage point rise in real GDP per capita growth. While this is a smaller impact than for investment, the benefits from education are more likely to accrue over longer periods of time as better educated school leavers enter the workforce.
- **Government debt:** we find a negative relationship between government debt and growth, but the impact is of a relatively smaller magnitude compared to the other variables in the model. High levels of debt can make governments vulnerable to financial and currency crises, particularly if these involve heavy borrowing from overseas, and so tend to be associated with greater macroeconomic instability, higher inflation and slower long-term growth on average.
- **Commodity exports:** strong demand and many years of high commodity prices for most of the past 15 years had a positive impact on growth in emerging markets, but the magnitude of this effect was relatively small and falling oil prices in recent years have reversed the beneficial impact of commodity exports on emerging market growth. Therefore, we do not include this factor in our long run model.

These results reinforce the modelling approach we have taken in this World in 2050 report, providing statistical support for the key variables we have used to project long-run economic growth such as initial productivity levels, capital investment and education as described further in the following section.

2.3 Our modelling approach

We used the International Monetary Fund's World Economic Outlook (October 2016) estimates for GDP in 2016 as the starting point for our projections. We then used our long-term economic model to estimate trend growth rates to 2050. These longer term trend growth estimates, which abstract from shorter term cyclical trends, are driven by the following key factors:

- Growth in the working age population and, hence, the potential workforce (based on the latest UN population projections);
- Increases in human capital, which we proxy here by average education levels across the adult population;
- Growth in the physical capital stock, which is driven by capital investment net of depreciation; and
- Total factor productivity (TFP) growth, which is driven by technological progress and catching up by lower income countries with richer ones by making use of their technologies and processes.

Our model is broadly consistent with the results of our econometric model on the drivers of emerging market growth discussed in Section 2.2, capturing investment and education as two of the primary determinants of economic growth. Government debt is one of the variables used to inform judgments on TFP catch-up rates for emerging economies.

Emerging economies have stronger potential growth than the current advanced economies on most of these measures, although it should be stressed that this assumes they continue to follow broadly growth-friendly policies. In this sense, the projections are of *potential* future GDP growth if such policies are followed, rather than *predictions* of what will actually happen, bearing in mind that not all of these countries may be able to sustain such policies in the long-run in practice.

There are, of course, also many other uncertainties surrounding these long-term growth projections, so more attention should be paid to the broad trends indicated rather than the precise numbers quoted in this report. We consider these uncertainties further in the scenario analysis in Section 3.4 of this report.

The broad conclusions we reach on the shift in global economic power from the G7 to the E7 economies should, however, be robust to these uncertainties, provided that there are no catastrophic shocks (e.g. global nuclear war, asteroid collisions, extreme global climate change etc.) that derail the overall global economic development process.

We provide more details of our modelling approach and key assumptions in Appendix A at the end of this report.

2.4 What has changed since our February 2015 report?

We have made two main changes to our model since 2015:

1. We have updated all historical data in the model so that the base year is now 2016, rather than 2014, and we also use the latest update of the UN's population projections⁶. Our detailed assumptions on future trends in key input variables has also been revised to reflect actual trends over the past two years and the latest thinking of PwC and external experts.
2. We have reduced the assumed US trend labour productivity growth rate from 2% to 1.5% per annum, reflecting accumulating evidence that potential growth has fallen in the US. This can be attributed to factors including the US's ageing population, a plateau of educational attainment, and rising household and government deficits generating financial instability⁷. These factors are also related to the concept of

⁶ <https://esa.un.org/unpd/wpp/>

⁷ For further discussion on the 'six headwinds' causing faltering productivity growth in the US, identified by Professor Robert Gordon see: http://www.cepr.org/sites/default/files/policy_insights/PolicyInsight63.pdf

secular stagnation⁸, in which an increasing propensity to save and a decreasing propensity to invest dampen demand, so impeding growth in the long run.

Despite these changes, the broad story of shifting global economic power that we reported in February 2015 (and indeed in earlier World in 2050 reports back to 2006) remains robust. China, India and other leading emerging markets are projected to move steadily up our rankings of the largest economies in the world over the period to 2050. But the precise projections have changed to reflect the latest available data.

2.5 Structure of this report

The remainder of this report is structured as follows:

- **Section 3:** outlines the key results of our model, focusing on projected GDP levels, growth rates and average income trends to 2050. It also includes analysis of three alternative downside scenarios to capture some of the uncertainties around our main scenario projections, which are also discussed further in an interview with Professor Marvin Zonis. The quantitative analysis in this section is complemented by commentaries on long-term prospects for their economies by senior PwC economists and business experts in China, Nigeria, Colombia and Turkey.
- **Section 4:** discusses five key challenges facing policymakers seeking to achieve sustainable long-term growth: falling global trade growth, demographic change, climate change, rising inequality and growing global uncertainties. The discussion here includes a commentary by our senior economist in Poland on how long-term prospects there are being affected by demographic trends and other factors, and also an interview with Professor Branko Milanovic, a leading expert on global income inequality trends. This wide-ranging section also examines the fundamental role of well-developed and stable institutions for sustainable economic and social development, including an interview with Professor Michael Jacobides that discusses both these issues and some of the implications for business strategy that we consider in more detail in the next section.
- **Section 5:** considers how businesses can make the most of the opportunities from the growth of emerging markets, drawing on recent research by the PwC Growth Markets Centre and the practical experience and insights of Strategy&, PwC's strategy consulting practice. This section examines the ways in which emerging markets are different to operate and conduct business in than advanced economies and discusses, with the help of three case studies, how businesses can adopt flexible but patient strategies in order to navigate these markets most effectively as they develop and mature.
- **Appendix A:** sets out full technical details of our modelling approach to project GDP to 2050, as well as the results of our econometric analysis of the drivers of historical GDP growth.
- **Appendix B:** includes more detailed results of our projections using GDP at market exchange rates.

⁸ This concept has received recent attention from economists, including Larry Summers: <http://larrysummers.com/2016/02/17/the-age-of-secular-stagnation/>

3. Global growth projections to 2050

Key findings

1. Growth in the E7 will continue to outpace that of the G7 with annual average growth of around 3.5% between 2016 and 2050, while the G7's growth will be slower at around 1.6% per annum.
2. Europe will steadily lose ground relative to the Asian giants. The EU's share of world GDP (at PPPs) is expected to fall from around 15% to just 9%, while China's rises to around 20% and India's to 15%. The US's share of world GDP will also fall, potentially to around 12% by 2050.
3. By 2050, India could overtake the US to be the world's second largest economy in GDP at PPP terms, and Indonesia could be the world's fourth largest economy. Six of the seven largest economies could be today's emerging markets by 2050.
4. Vietnam, India and Bangladesh could achieve annual average growth of around 5% over the next 34 years. Nigeria could achieve growth of around 4% per annum if it can diversify and reform its economy.
5. Given economic growth is subject to many economic, political, social and environmental uncertainties, we also analyse some of the risks to growth and present three possible downside scenarios

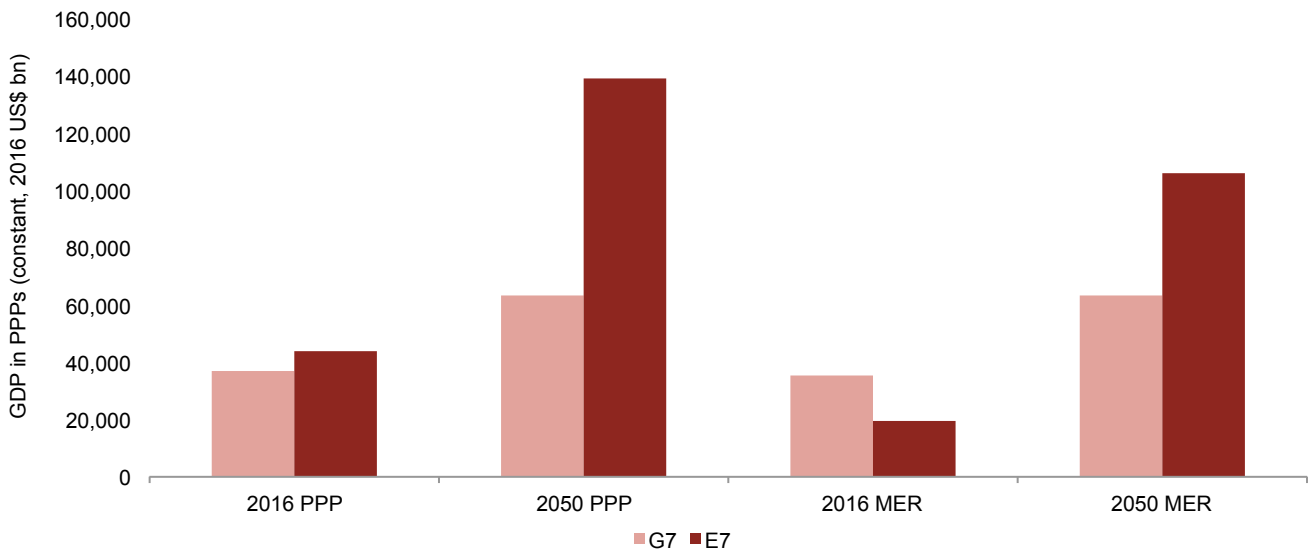
3.1 Relative size of leading economies

3.1.1 Global economic power shifts from G7 to E7

In 1991, the E7 were 35% the size of the G7 in PPP terms. Twenty-five years later, these emerging economies had overtaken the G7. Looking forward to another 25 years, the E7 could be double the size of the G7 by 2040, marking a significant shift in global economic power.

GDP at PPP exchange rates is a measure of the goods and services produced in a given economy, after correcting for price level variations across countries. When looking at GDP at market exchange rates, the speed of change is slightly more muted, as shown by Figure 5. In MER terms, the E7 have yet to overtake the G7 and were just over half the size of the G7 in 2016, reflecting the much lower average price levels in emerging economies than advanced economies at current MERs. In comparison to GDP at PPPs, we project that the E7 will be around one and a half times the size of the G7 by 2050, overtaking it by 2030. The difference between these two measures of GDP are explained in more detail below and in Appendices A and B.

Figure 5: Relative size of G7 and E7 economies, 2016 and 2050

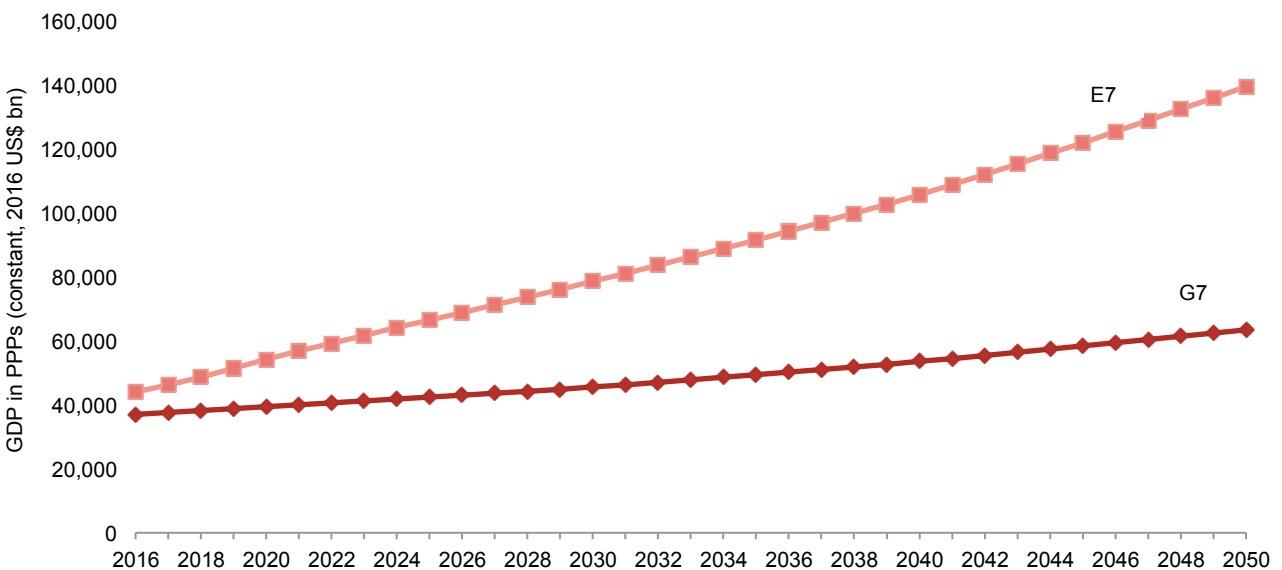


Sources: IMF for 2016 estimates, PwC projections for 2050

The E7 economies will remain the driving force behind global economic growth, continuing to exhibit strong GDP growth rates of around 3.5% p.a. between 2016 and 2050. Growth should continue at the relatively high rates of over 5% we have seen over the past decade until 2020, at which point they will taper off progressively to around 3% by 2050. Projected growth rates for the E7 and other economies are discussed in more detail in Section 3.2 below.

In comparison, we project the G7 economies to grow at a markedly slower average rate of around 1.6% per annum during the period 2016-2050, as shown in Figure 6. This is slightly slower than we had projected in our 2015 report, which partly reflects the fact that the recovery over the last two years has not been as strong as anticipated, but is primarily due to a more general reassessment of US trend productivity growth as discussed in Section 2.4 above. As the US sets the global technological frontier in our model, this also translates to slower growth in other economies.

Figure 6: Growth paths of the E7 and G7 economies in PPP terms

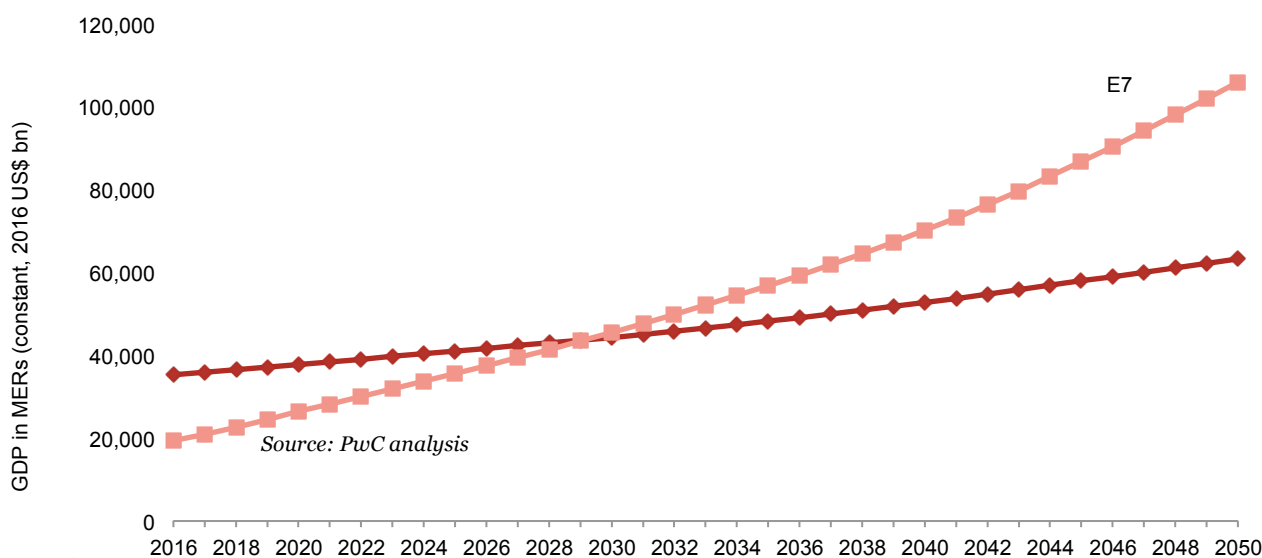


Source: PwC analysis

The long view: how will the global economic order change by 2050?

For the G7, its growth path remains largely unchanged when looking at GDP in MER terms. But Figure 7 shows the rather different projected growth trajectory of the E7 economies for GDP at MERs. On this basis, the E7 have yet to overtake the G7, doing so by around 2030 on our projections.

Figure 7: Growth paths of the E7 and G7 economies in MER terms



Emerging markets are much larger using PPPs than market exchange rates

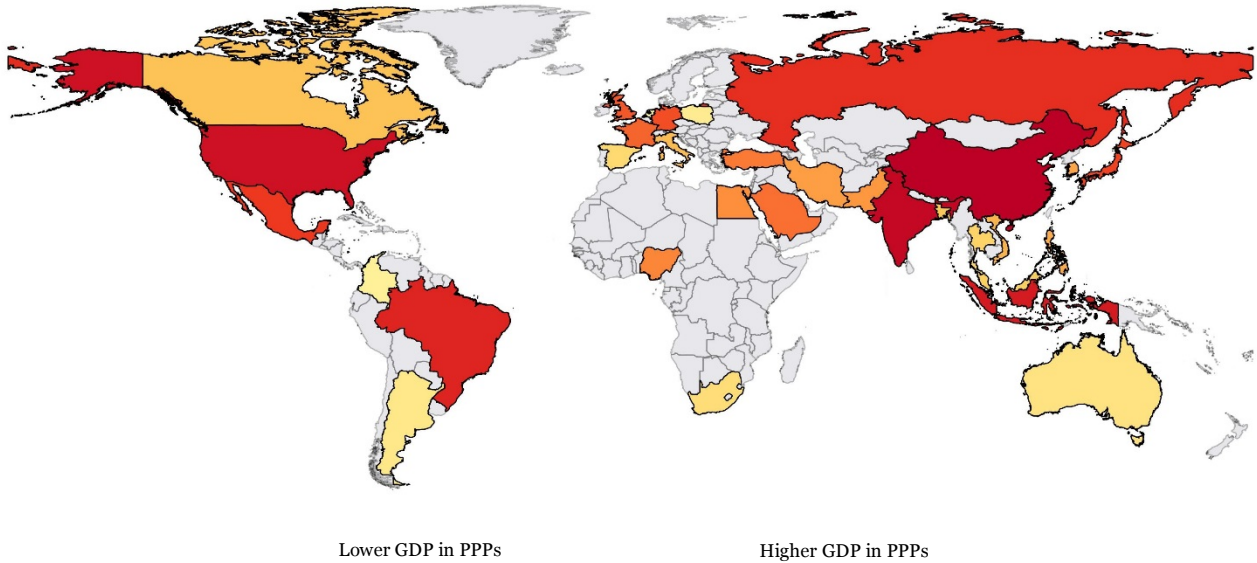
As noted above, the difference between the PPP and MER estimates reflects the fact that the price levels in the E7 are, on average, still well below G7 levels when they are compared using current MERs. In the long-run, as emerging markets develop, their prices will increase towards the levels seen in advanced countries due to some combination of nominal exchange rate appreciation and/or higher price inflation. Higher prices will cause a long-run real currency appreciation for these economies, resulting in a convergence of GDP at PPPs and MERs. We have seen this convergence happen in the past with fast-growing economies such as Japan in the 1960s-1980s and South Korea in the 1970s-1990s.

We have fed this effect into our model through an econometric equation, which has been estimated based on past data. In our model, GDP at MERs converges towards GDP at PPP, but this is a very gradual process and full price level convergence will not be complete by 2050 in most emerging markets. Currently, the E7's GDP at MERs is around 45% of the value of its GDP at PPPs (both in US dollar terms). By 2050, the GDP of the E7 at MERs will be around three-quarters of its PPP value. However, these real exchange rate projections are highly uncertain, so we focus on our results for GDP in PPP terms for the rest of this section. Our results for GDP at MERs are discussed in more detail in Appendix B.

3.1.2 Projected shifts in global power by 2050

The G7 and E7 economic groups currently account for similar shares of world GDP, at 31% and 37% respectively in PPP terms. Over the next few decades, the G7's share will fall to around 20% of world GDP, while the E7 will increase their share to comprise almost 50% of world GDP by 2050, continuing the shifts in global power we have seen in recent decades away from Europe and towards Asia, as illustrated in Map 2.

Map 2: Projected GDP in PPPs in 2050

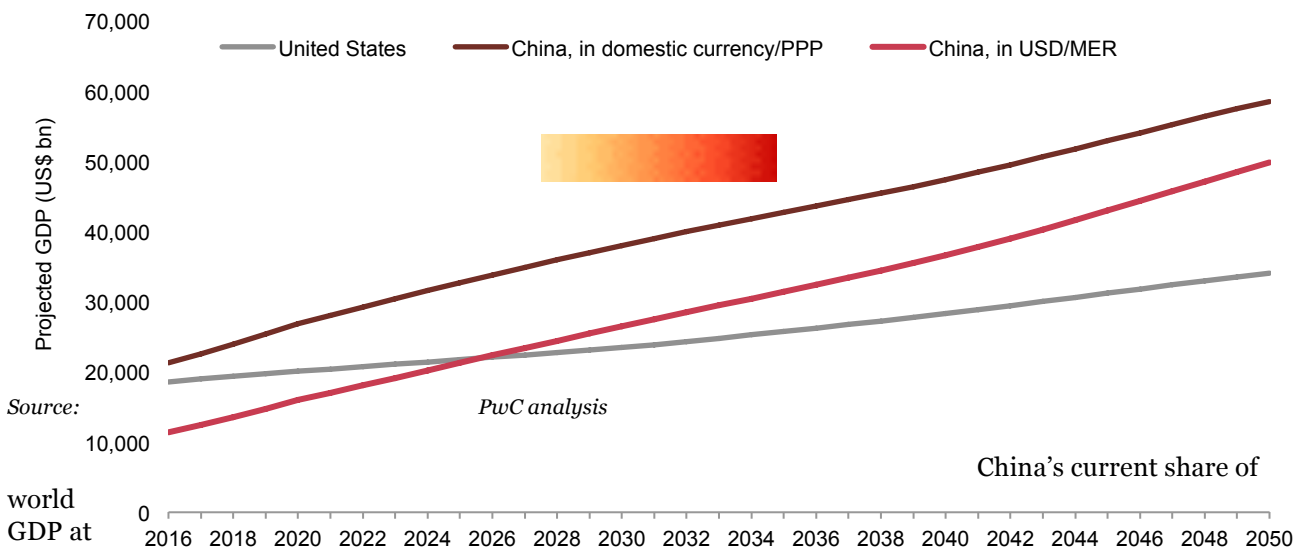


Source: PwC analysis

China and India could be the two largest economies in the world by 2050

This shift of global economic power towards the emerging economies will largely be driven by China and India. China is already the largest economy in the world in PPP terms, having overtaken the US in 2014. It is not yet the largest economy in GDP at MERs, but we project that China should overtake the US to take first place on this basis before 2030 (see Figure 8). This is subject to our assumptions on the degree of convergence of China’s market exchange rate with the PPP exchange rate, which are plausible but nonetheless subject to uncertainty.

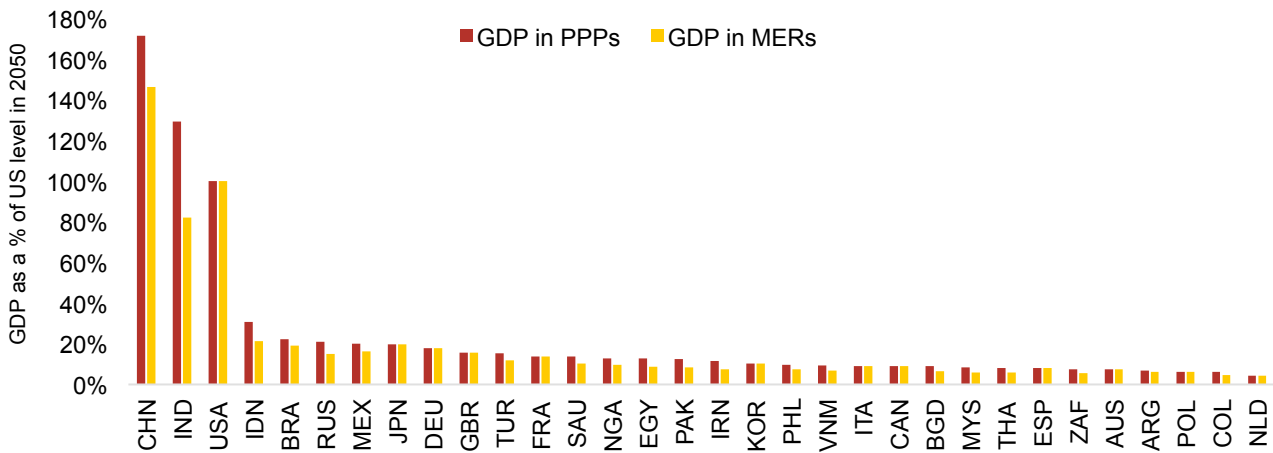
Figure 8: Projected GDP growth paths of China and the US



China’s current share of world at PPPs stands at almost 18%, just above the US share of around 16% (see Figure 10). This is projected to increase to a peak of around 21% in 2030, before falling slightly to 20% by 2050. Further details of our views on China are provided by our chief economist there, Allan Zhang in Box 1 below. In comparison, the US’s share of global GDP is projected to fall gradually but steadily to just below 12% in 2050.

The long view: how will the global economic order change by 2050?

Figure 9: Relative GDP at PPPs and MERs as a % of US levels in 2050



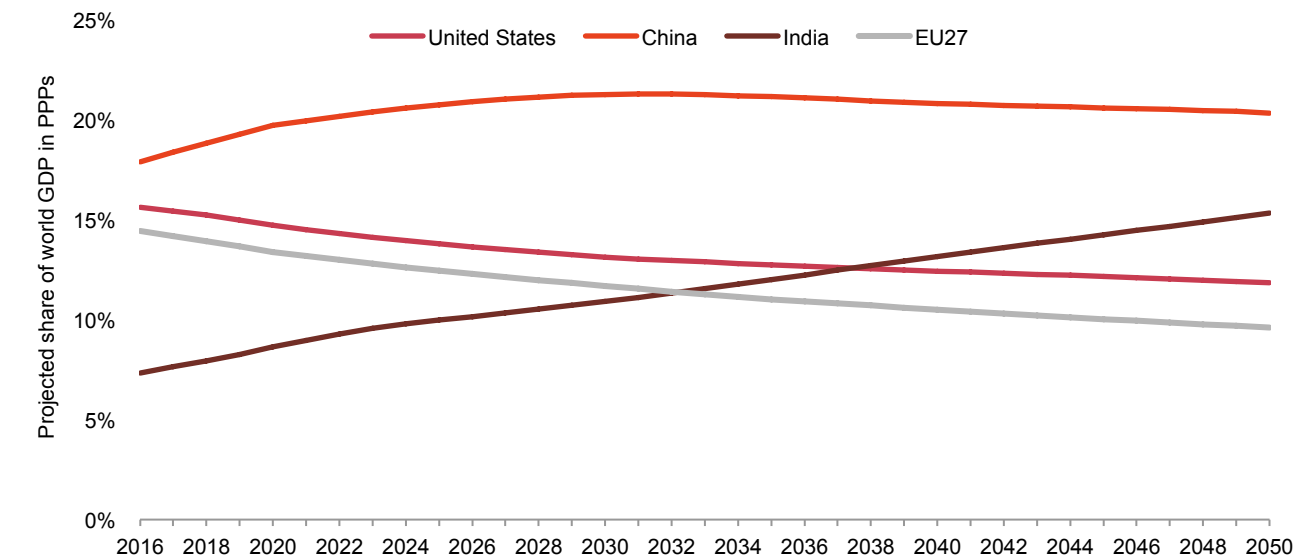
Source: PwC analysis

India currently comprises 7% of world GDP at PPPs, which we project to rise steadily to over 15% by 2050. This is a remarkable increase of 8 percentage points, gaining the most ground of any of the countries we modelled. Our model indicates that India has the potential to overtake the US as the second largest economy in the world by 2040 in GDP at PPPs. Looking at GDP in MERs, India is unlikely to overtake the US in the rankings and, as shown by Figure 9, there remains a relatively large difference between India’s GDP at PPPs and MERs even in 2050 because India’s price level is still likely to be well below advanced economy levels. This is reflected in its relatively low income per capita levels and is discussed further in Section 3.3 below.

Europe set to steadily lose ground relative to the Asian giants

The rise of China and India will also reduce the share of world GDP accounted for by Europe, with India projected to be larger than the EU27⁹ by 2035. As a result, the EU’s share of the world economy (at PPPs) is projected to fall steadily from almost 15% to 9% by 2050. While the exact extent and timing of these shifts is subject to considerable uncertainty, the general direction of change is clear.

Figure 10: Share of world GDP in PPP terms for the ‘Big 4’ economies



Source: PwC analysis

⁹ Unless otherwise stated, ‘EU’ in this report refers to the EU27 excluding the UK, since we assume the UK will leave the EU before 2020, which is early on in our projection period.

Box 1: China's long-term economic growth prospects

China is currently undergoing a transition from an export- and investment-driven economy to one that is consumption and services oriented.

Nonetheless, fixed investment remains a key driver of China's economic growth for the moment. In 2015, fixed investment steadily rose to a new high of 38 trillion yuan (US\$5.7 trillion), accounting for around 50% of total GDP, thanks to the government's strong push for infrastructure investment. This trend is likely to continue in the coming years as urbanisation moves ahead and new government initiatives are rolled out, such as the Belt and Road, Beijing-Tianjin-Hebei city cluster, Yangtze River Economic Belt and International Industrial Capacity Cooperation initiatives. Investment is also a powerful tool to help maintain an average annual GDP growth rate of around 6.5% in order to achieve the goal of doubling GDP and GDP per capita by 2020 (relative to 2010) as set out in the 13th Five-Year Plan.

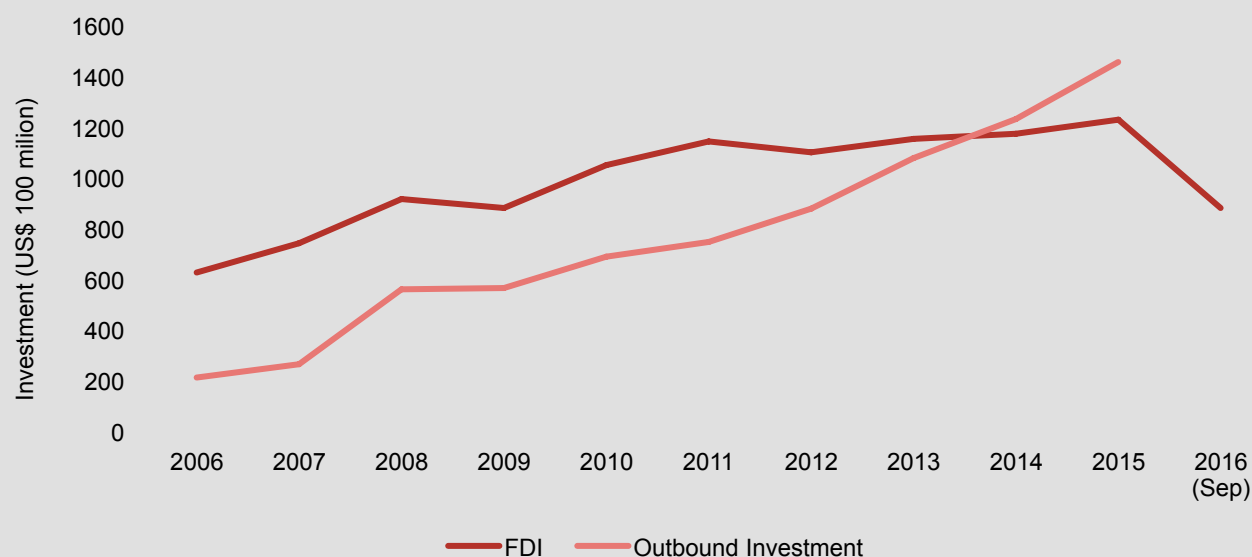
Going forward, the key challenges for investment are twofold: diminished marginal returns and low levels of private investment, which accounts for over 60% of total investment. In the first three quarters of 2016, private investment grew by only 2.5%, as compared to 21% for the state sector, due to lack of business confidence. The government will need to make sure that future funds will flow into productive projects instead of the "zombie enterprises".

Meanwhile, exports have lost steam, declining by 7.5% year-on-year, and imports contracted by 8.2% in the first three quarters of 2016. Total imports and exports are expected to contract further in the near future due to slower global economic growth and sluggish demand.

In contrast, the services sector has maintained its strong growth momentum, rising to 52.8% of GDP in the third quarter of 2016, while consumption remained robust, contributing 71% to GDP growth, which is 13% higher than a year ago. By 2030, services are expected to rise further to around 70% of GDP and China's rising middle-class could generate a consumption market of US\$6 trillion, the largest in the world.

Meanwhile, China remains one of the most attractive destinations for foreign direct investment, which rose from US\$110bn in 2010 to US\$136bn in 2015, providing valuable technologies and management skills to nurture China's modern industries. As China moves up the value chain, more and more Chinese companies choose to directly acquire foreign brands, technologies and market networks. China's outbound investment shot up from US\$75bn in 2011 to US\$150bn in 2015, making China a net global investor (see chart). These two-way investment flows will help improve China's productivity, which is currently only around 20% of average OECD levels, thus providing further impetus to its future economic growth.

Figure 11: China's FDI vs outbound investment



Source: China National Bureau of Statistics

However, demographic changes pose a severe challenge to China's long-term growth. According to the National Bureau of Statistics, China's working-age population between the ages of 16 and 59 has declined for three straight years since 2012, with the over 60 population reaching 222 million in 2015, accounting for around 16% of the overall population. The total workforce is predicted to decline to about 700 million people by 2050, when one in three people in China will be aged over 65. The "two children" policy came too late to make much difference to this trend. The ageing society and shrinking working population will push up labour costs significantly and could undermine China's competitiveness and economic vitality unless offset by strong technology-driven productivity gains.

Rising bad debt levels represent another key risk factor. China's total debt is believed to be around 280% of GDP, with corporate debt rising quickly to 160% of GDP, the highest level among the major world economies. Non-performing loans of the banking sector, though officially standing at less than 2% in 2016, could be much bigger if judged by international accounting standards.

China's ongoing supply-side structural reform will play a critical role in nurturing the long-term growth potential and saving the country from falling into the middle-income trap. Streamlining regulation, lowering business costs, creating a pro-innovation environment and developing strategic industries and the services sector are important measures in unleashing the vitality of the private sector and boosting growth. Reducing inventories of residential properties will be vital in avoiding a Japanese-style housing bubble. Yet reducing industrial overcapacity will have a knock-on effect on short-term GDP growth.

Looking ahead, China still has great potential for growth. Its urbanisation process is still at a relatively early stage, and its services sector has a lot of scope to catch up with economies like the US in terms of quality, sophistication and business range, in particular as regards producer services such as logistics, information, financing and commercial services. Reform of state-owned enterprises, if properly handled, could shatter monopolies and create new business opportunities worth trillions of dollars.

To a large extent, China's success will depend on how the government enforces the principle of "letting market forces play a decisive role in resource allocation" as adopted by the 18th Party Congress. So long as the reform agenda progresses further, China is likely to forge ahead to become the world's largest economy before 2030 as our projections suggest, though growing at a relatively slower rate in the long-run than in recent decades.



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Indonesia could be the fourth largest economy in the world by 2050

Looking beyond the top three countries, we see a marked movement of emerging economies up the rankings into the top 10, with a corresponding fall in the rankings of today's advanced economies. With the exception of Turkey, the E7 economies will dominate the top 7 places, with Indonesia, Brazil, Russia and Mexico taking 4th to 7th places in 2050. Table 2 shows how the rankings of GDP at PPPs changes from 2016 to 2030 and 2050.

Table 2: Projected rankings of economies based on GDP at PPPs (in constant 2016 \$bn)

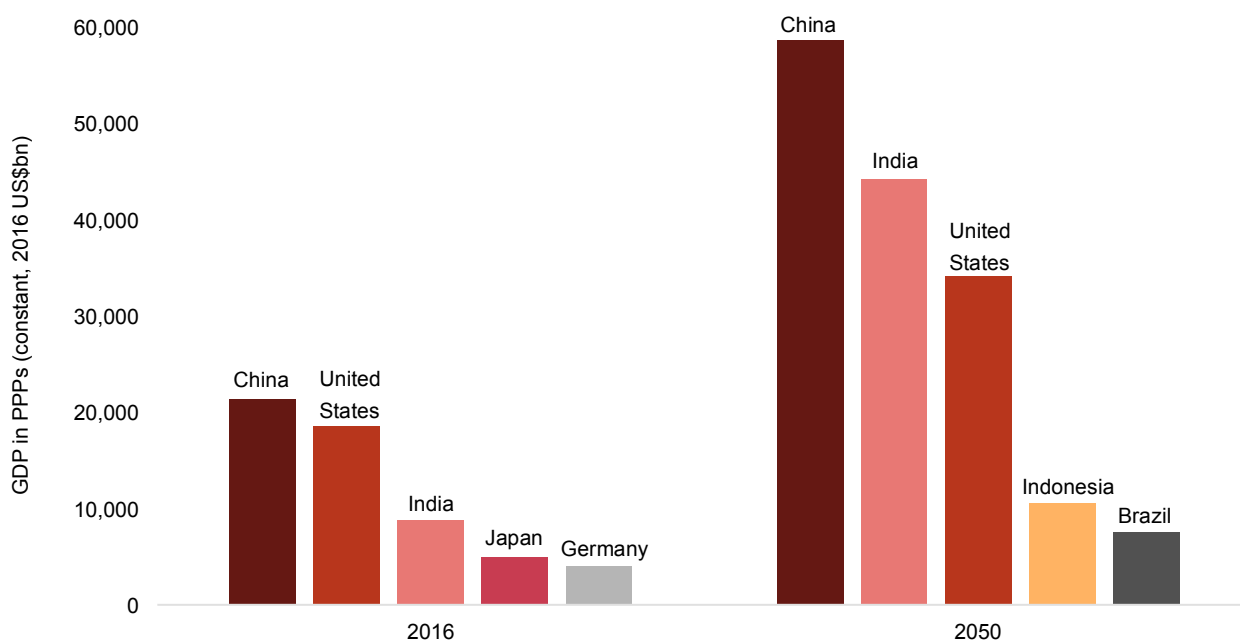
GDP PPP rankings	2016 rankings		2030 rankings		2050 rankings	
	Country	GDP at PPP	Country	Projected GDP at PPP	Country	Projected GDP at PPP
1	China	21269	China	38008	China	58499
2	United States	18562	United States	23475	India	44128
3	India	8721	India	19511	United States	34102
4	Japan	4932	Japan	5606	Indonesia	10502
5	Germany	3979	Indonesia	5424	Brazil	7540
6	Russia	3745	Russia	4736	Russia	7131
7	Brazil	3135	Germany	4707	Mexico	6863
8	Indonesia	3028	Brazil	4439	Japan	6779
9	United Kingdom	2788	Mexico	3661	Germany	6138
10	France	2737	United Kingdom	3638	United Kingdom	5369
11	Mexico	2307	France	3377	Turkey	5184
12	Italy	2221	Turkey	2996	France	4705
13	South Korea	1929	Saudi Arabia	2755	Saudi Arabia	4694
14	Turkey	1906	South Korea	2651	Nigeria	4348
15	Saudi Arabia	1731	Italy	2541	Egypt	4333
16	Spain	1690	Iran	2354	Pakistan	4236
17	Canada	1674	Spain	2159	Iran	3900
18	Iran	1459	Canada	2141	South Korea	3539
19	Australia	1189	Egypt	2049	Philippines	3334
20	Thailand	1161	Pakistan	1868	Vietnam	3176
21	Egypt	1105	Nigeria	1794	Italy	3115
22	Nigeria	1089	Thailand	1732	Canada	3100
23	Poland	1052	Australia	1663	Bangladesh	3064
24	Pakistan	988	Philippines	1615	Malaysia	2815
25	Argentina	879	Malaysia	1506	Thailand	2782
26	Netherlands	866	Poland	1505	Spain	2732
27	Malaysia	864	Argentina	1342	South Africa	2570
28	Philippines	802	Bangladesh	1324	Australia	2564
29	South Africa	736	Vietnam	1303	Argentina	2365
30	Colombia	690	South Africa	1148	Poland	2103
31	Bangladesh	628	Colombia	1111	Colombia	2074
32	Vietnam	595	Netherlands	1080	Netherlands	1496

Sources: IMF for 2016 estimates, PwC projections for 2030 and 2050 (Note that Turkish GDP has been revised significantly upwards from the IMF estimate for 2016 due to revisions made subsequently by the Turkish national statistical office)

The long view: how will the global economic order change by 2050?

One interesting development is the increase in the gap between the third and fourth largest economies over time (see Figure 12). In 2016, the third (India) largest economy was around 175% larger than Japan, the fourth largest economy. In 2050, this gap could grow to around 325% between the US (the third largest) and Indonesia (the fourth largest).

Figure 12: Increasing gap between the third and fourth largest economies



Source: PwC analysis

Fast population growth could boost GDP in Nigeria and Pakistan, but only if jobs can be created for young people in these countries

The largest movers over the next 35 years are projected to be Nigeria, Vietnam and Pakistan. Nigeria, which currently ranks in 22nd place, could move up to 14th though this is dependent on diversifying its economy and addressing weaknesses in institutions and infrastructure, as discussed further in Box 2. Vietnam could move from 32nd to 20th, and Pakistan could move from 24th to 16th. Other strong emerging market performers include Bangladesh who moves from 31st to 23rd and the Philippines, which moves up 9 places to 19th by 2050.

All of these emerging countries tend to benefit from strong population growth; however, their progress will depend on being able to generate enough jobs for the young people in their countries. If they cannot do this, it could be a cause of political instability. For all these countries, therefore, our projections should be seen as indicating the *potential* for growth, rather than a guarantee that this potential will be realised. The public policy implications of this are discussed in more detail in Section 4.

The UK could grow faster than most other large EU countries in the long-run, despite the medium-term drag from Brexit

The UK holds its position in the GDP rankings relatively well compared to other advanced economies despite the medium term dampening impact on growth from Brexit¹⁰, falling just one place from 9th in 2016 to 10th in 2050 (at PPPs). The UK's position is sustained by its relatively larger projected working age share of the

¹⁰ We assume the impact occurs over the period to 2020, based on latest IMF medium-term projections of the impact of Brexit on UK GDP growth. These are broadly similar to our own earlier projections in a report for the CBI on Leaving the EU in March 2016, although the IMF projections are more up to date. We do not try to estimate economic contagion effects of Brexit on other large EU economies considered in this report, since most studies suggest these would be relatively small, though this is a downside risk to our projections for these countries in the short to medium term, particularly in relation to political developments like the French presidential elections.

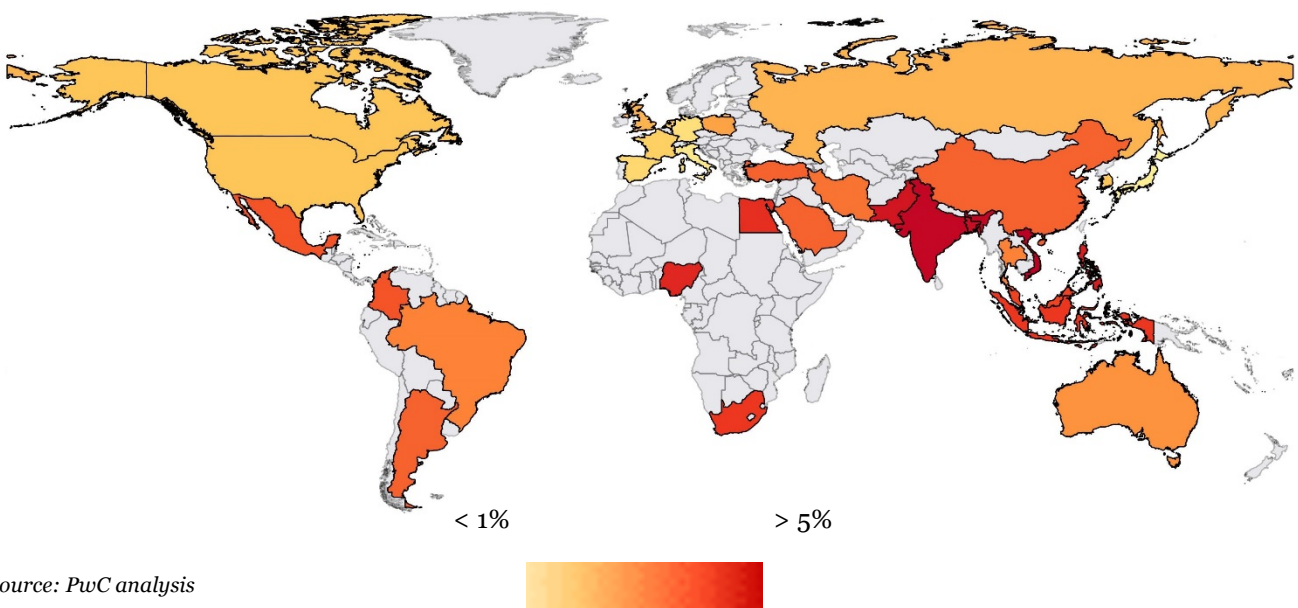
population, although this does depend on the country remaining open to talented people from around the world after Brexit.

In comparison, Germany and France could both fall to 9th and 11th places respectively and Japan is likely to fall out of the top 5 to 8th place by 2050. In these countries, it is not the case that their economic fundamentals decline significantly over time, but rather that their performance relative to certain emerging markets has worsened. Italy falls the furthest down the rankings of the G7, dropping 9 places to 21st, as its ageing population and slow productivity growth take their toll and it is overtaken by many faster-growing emerging economies.

3.2 Projected real GDP growth

The top 15 fastest growing large economies over the next 34 years are all developing and emerging market economies, with 9 being from South and Southeast Asia, as shown in Map 3. This is in line with established theory of economic convergence that, other things being equal, a low initial level of economic development provides more opportunities for catch-up with higher income countries.

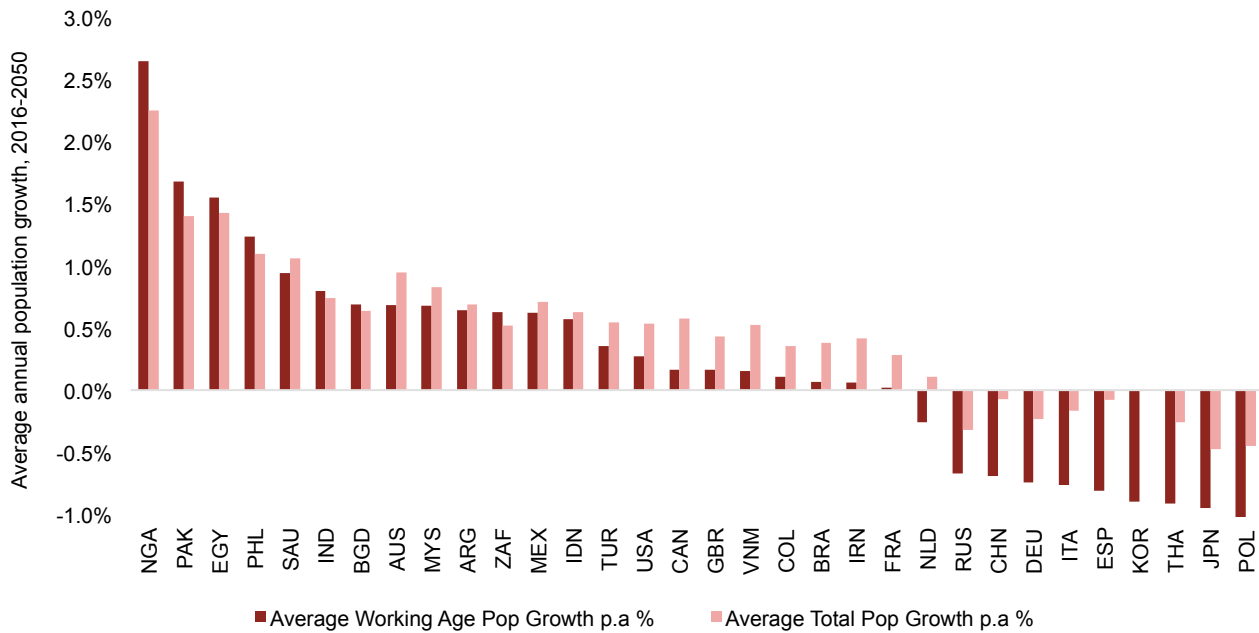
Map 3: Average annual real GDP growth rate, 2016-2050



Source: PwC analysis

As previously touched upon, strong population growth will be a key driver of overall GDP growth in many of today's emerging market and developing countries, boosting their potential workforce and domestic consumer markets. Figure 13 shows that the growth in the working age populations of many emerging markets, including Nigeria, Pakistan and India, will outstrip growth in the total population. In contrast, for many advanced economies, such as Japan, Italy and Germany, their populations will actually shrink in size by 2050. This contraction will predominately be driven by a fall in the working age population; across the G7 economies, average growth in the working age population will be negative over the period 2016-2050 at -0.3% per annum.

Figure 13: Average annual total vs working age population growth, 2016-2050

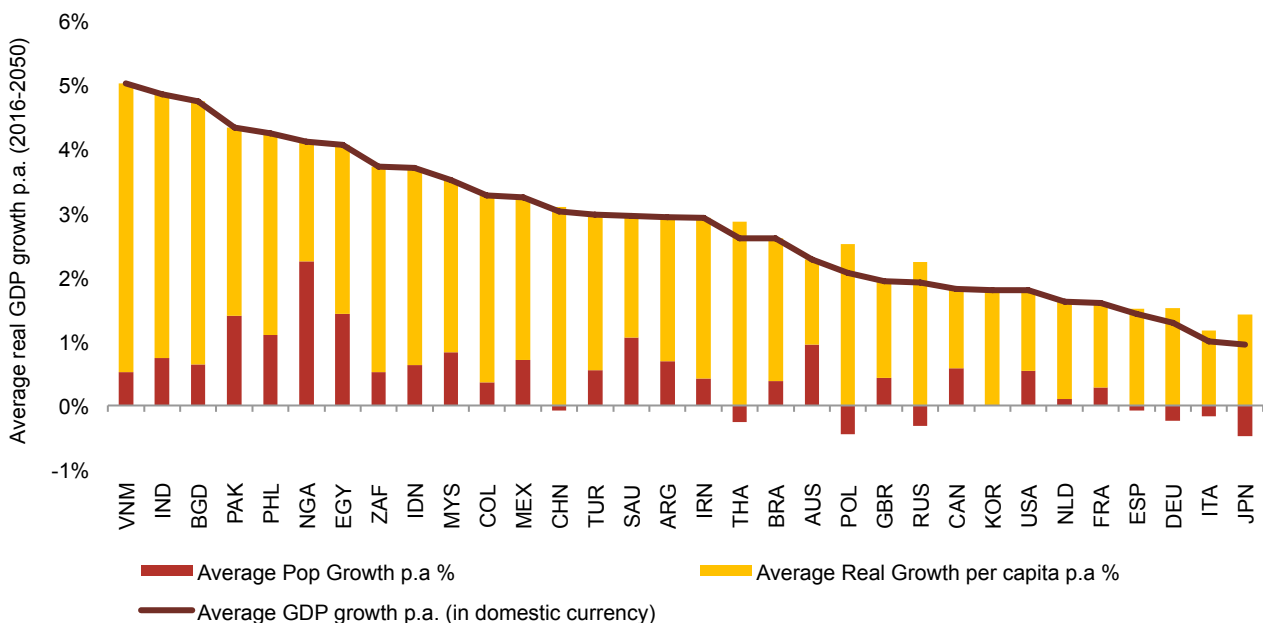


Source: UN population projections

For emerging markets to achieve long-term sustainable economic growth, it is important to ensure their growing workforces are productive. To assess this better, we have broken projected real GDP growth into two components as shown in Figure 14 below:

1. Average population growth; and
2. Average growth in GDP per capita, which is closely related to labour productivity growth.

Figure 14: Breakdown of the components of average real GDP at PPPs growth (2016-2050)



The long view: how will the global economic order change by 2050?

Source: PwC analysis

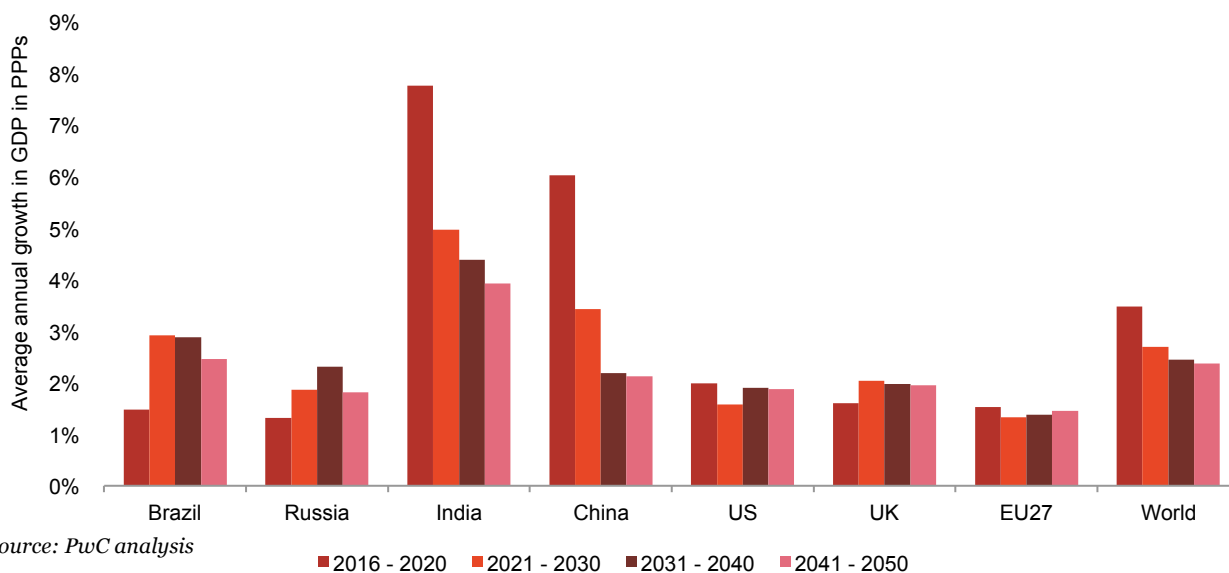
Developing and emerging market economies have the highest growth potential – but realising this depends on sustained investment and reform

Figure 14 above shows the average real GDP growth per annum for each country in our model over the period 2016-2050. Notable features of these projections are that:

- **Vietnam, India and Bangladesh** have the potential to be the fastest growing economies between 2016 and 2050 with average annual growth of around 5%. These countries will benefit from their youthful and fast growing working-age populations, boosting domestic demand and output. But as Figure 14 shows, growth in these countries is driven even more by real GDP per capita growth, suggesting capital investment and technological progress will deliver real labour productivity-enhancing benefits. For these countries to realise this potential, growth needs to be supported by sustained economic reforms, strengthening macroeconomic fundamentals, institutions and, crucially, mass education to ensure their rapidly growing working populations contribute productively to long-term economic growth, as discussed further in Section 4.
- **Nigeria** is projected to be the fastest growing African economy in our model, growing at an average rate of 4.2% per annum. However, this is predominately driven by population growth, which is projected to increase by around 2.3% a year on average to 2050, the fastest growing total population of the 32 countries covered. In contrast to our previous 2015 edition, in which we projected Nigeria to be the fastest growing economy of the countries we modelled, Nigeria is now expected to be only the sixth fastest. This reflects the slowdown of the Nigerian economy over the last two years as a result of a fall in oil prices. Nigeria will average around 2% annual growth to 2020, with growth then picking up speed in the decades following to average almost 4.5% p.a. between 2041 and 2050. Along with South Africa, Nigeria is one of the few to see a marked acceleration of annual average growth over the next few decades, as opposed to a moderation. To support long-term sustainable growth, Nigeria needs to develop a broader-based economy, diversifying its exports to ensure its growth is not dampened by global price or demand shocks. Alongside this, Nigeria should develop its institutions and infrastructure, supporting long-term productivity growth (see Box 2 below for further discussion of these issues).
- **Colombia** is projected to be the fastest growing of the large Latin American countries we have included in this study, slightly ahead of Mexico and more clearly ahead of Brazil and Argentina. Box 3 provides some further discussion of Colombia's long-term growth potential and how it can realise this.
- **Turkey and Poland** emerge as the fastest growing European economies in this study, reflecting their lower initial level of income and so catch-up potential, as well as more favourable economic fundamentals than Russia on our assessment. Box 4 below discusses the potential for stable economic growth in Turkey and Box 5 in Section 4 provides further discussion of Poland's long-term economic potential as well as the demographic challenges it faces in achieving this growth.
- Over the period to 2050, **China** is projected to achieve average annual growth of around 3% per annum, greater than the growth of any of the advanced economies in our model but well below the rapid growth rates seen since 1980, during which time Chinese GDP growth has averaged 9.6% a year. We expect China's growth to remain strong at around 6% for the remainder of this decade, falling steadily over the following decades to average around 2% per annum for the period 2040-2050 (see Figure 15), converging to the long-run growth rates of today's advanced economies. This moderation will occur as China continues to transition from an export-led economy to a consumer-driven one (as discussed further in Box 1 above). China's population growth is actually projected to be negative, on average, between 2016 and 2050, accentuated by its one-child policy for the past three decades. As China's population ages and real labour costs increase, we are likely to see global multinationals shift some of their off-shoring jobs from China to other relatively cheaper economies, such as Vietnam, Bangladesh and Indonesia. In conjunction with rising labour costs, continued real income growth and domestic demand will push up prices, meaning China's exporters' competitive advantage over Western

counterparts may weaken. But China will, at the same time, become more attractive as a domestic market for Western companies to sell into and do business in as its economy rebalances and matures.

Figure 15: Growth projections for selected major economies compared to the world



For the advanced economies, growth is projected to be much lower on average compared to the emerging economies between 2016 and 2050, but annual rates will remain roughly in line with the advanced economy growth we have seen over the past decades at around 1.5-2%.

As shown in Figure 14 above, in many advanced economies population growth is projected to be low, and in some cases negative (e.g. Japan and Italy). In these countries, demographic developments will tend to act as a drag on economic growth, as ageing populations reduce productivity and absorb government spending. The challenge of keeping growth going despite ageing populations is discussed further in Section 4 below.

The UK is projected, despite the medium-term drag from Brexit, to be the fastest growing economy of the G7 on average over the whole period to 2050, with annual average growth of around 1.9% (see Table 3 below). This is mostly due to demographic factors but also the UK's relatively flexible economy. This depends, however, on the UK being successful in the long run in developing its trade and investment links with faster-growing emerging economies, to offset a likely weakening of trade and investment links with the EU after Brexit¹¹.

¹¹ UK trade prospects after Brexit are discussed in more detail by Andrew Sentance, our senior economic adviser, in an article in our November 2016 UK Economic Outlook report here: <http://www.pwc.co.uk/ukey>

Box 2: Five ways in which Nigeria can support inclusive growth

Nigeria has enjoyed improved social and economic performance over the past decade, but is facing significant headwinds following the adverse shock to the oil price since mid-2014, and more recently significant production shortages following pipeline vandalism in the Niger-Delta region. In 2016, the economy officially slid into recession for the first time in recent years as key sectors contracted sharply across three quarters. Foreign exchange shortages and high inflation have hampered the growth of manufacturing and services, with administrative controls put in place by the Central Bank resulting in a reduction in foreign direct investment and foreign portfolio flows.

Whilst the consensus reached by OPEC to reduce production by as much as 1.2mpbd from January 2017 could provide a much needed boost to Nigeria from somewhat higher oil prices, the country's long-term economic success will be determined by how much diversification is achieved over the next few decades. According to our long term projections, Nigeria could become the 14th largest economy in the world by 2050, and record average growth of around 4% per annum in the long-run assuming the country succeeds in economic diversification. Growth will be largely driven by demographic changes, as Nigeria is poised to experience strong increases in both total population and working age population between 2016 and 2050. This projection follows modest growth of around 2% per annum till 2020, which takes into consideration the adjustment from the impact of low oil prices.

Although Nigeria faces some tough choices, this episode represents a potential tipping point for positive change as the government becomes forced to address the sources of vulnerability in order to achieve inclusive growth and sustainable development. These include:

Improving tax collection: Nigeria is a low-taxed economy compared to its peers with the tax-to-GDP ratio estimated at just 8%, the second lowest in Africa and the fourth lowest in the world. Excluding oil and gas revenues, tax receipts are estimated at just 3% of GDP, which provides significant potential to raise revenues. If these could be increased to the Sub-Saharan African economies' average of 18% of GDP, Nigeria could potentially raise its tax revenues to around \$104 billion, the equivalent of Morocco's total GDP in 2013. Higher tax revenues would reduce government borrowing and encourage financial institutions to offer funds at lower interest rates, thereby boosting the real economy.

Economic diversification: Nigeria's potential advantages for future growth include a large consumer market, a strategic geographic location as a hub for Africa, and a young and entrepreneurial population. The first step in harnessing this opportunity requires deliberate efforts to improve value-adding activity in the non-oil economy, particularly in agriculture and the services sectors. Forward linkages to agri-processing and other services such as logistics, as well as backward integration to input supply sectors could improve farm incomes, increase employment and improve domestic food security as well as deepen import substitution. With a large population of urban, young people, Nigeria also has the potential for accelerated growth of its digital economy as it leverages technology to generate improved social and economic outcomes.¹²

Corruption: Corruption has a long run negative impact on growth, primarily through a reduction in investment in human and physical capital. If Nigeria reduces corruption, there is a significant opportunity to boost GDP levels. For example, if corruption in Nigeria could be reduced in the long-run to estimated levels in Malaysia, we estimate that annual GDP could rise by over \$500 billion by 2030. Deliberate efforts to reduce corruption will complement the Nigerian government's diversification drive.¹³

Easing the constraints to business: A weak business environment is holding back Nigeria's economic growth potential and slowing down the pace of development. Nigeria ranked 169th out of 190 countries in the World Bank's 2017 Ease of Doing Business Index, lower than Niger, Madagascar and Sierra Leone. Amongst the "large countries", which we define as those with a population in excess of 50 million, Nigeria ranked 25 out of the 27 countries within this category, only ahead of Bangladesh and the DR Congo. Other than protecting minority investors and getting credit, Nigeria ranks low on all other indicators and will need to

¹² Nigeria: Looking beyond oil, PwC: <http://www.pwc.com/ng/en/publications/nigeria-looking-beyond-oil-report.html>

¹³ The impact of corruption on Nigeria's economy, PwC: <http://www.pwc.com/ng/en/publications/impact-of-corruption-on-nigerias-economy.html>

particularly focus on improving electricity supply, simplifying the tax collection process and improving trading across borders so as to leverage its position as the hub of West Africa.

Increasing labour productivity: Nigeria has the advantage of a large workforce of over 70 million, but the majority are under-skilled. It is imperative to equip workers with the skills needed to keep pace with an economy in transition like Nigeria. Average productivity of a worker in Nigeria is very low at US\$3.24/hr relative to US\$19.68/hr in South Africa and US\$29.34/hr in Turkey¹⁴. Improvements in productivity will require investments to ensure a broad availability of good quality education as well as relevant vocational training to improve value-added activity across key sectors such as manufacturing and services.

Between now and 2050, over half of global population growth will occur in Africa so that there will be 2.4 billion Africans in 2050, more than three times Europe's population. Nigeria's population alone is estimated to be around 400 million in 2050, equivalent to around 56% of Europe's population, making it the third most populous country in the world. Hence, the challenge over the next few years is ensuring output growth keeps pace with population growth while the country transitions from an oil economy to a non-oil economy.



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Box 3: The prospects for stable growth in Colombia

Colombia, like many other countries, has been adversely affected by the relatively subdued performance of the global economy during the last few years. Therefore, the pace of the economic growth in Colombia has slowed down from 4.4% in 2014 to 3.1% in 2015 and is projected to have been around 2.2% in 2016¹⁵. Depressed oil and commodities prices have also affected the economy in Colombia since mid-2014, as with other Latin American countries.

Although there has been a slowdown in Colombia, however, it hasn't been as deep as in most other countries in the region¹⁶. It is important to recognize, therefore, that the Colombian economy remains stable and is expected to expand at moderate rates over the following few years. The IMF, for example, projects the Colombian economy to grow by 2.7% in 2017 and 3.8% in 2018.

Growth in Colombia over recent years has been driven by the financial services industry (whose share of GDP has risen from 19.9% in 2014 to 20.6% in Q3 2016¹⁷) and the social services sector (stable at 15.4% of GDP since 2014). The oil & gas sector also continues to contribute to economic growth, although its share of GDP has fallen from 7.2% in 2014 to 6.6% in Q3 2016).

¹⁴ OECD (2016), GDP per hour worked (indicator). doi: 10.1787/1439e590-en (Accessed on 13 December 2016), National Bureau of Statistics (NBS), <http://www.nigerianstat.gov.ng/download/432>

¹⁵ IMF, World Economic Outlook Database, October 2016

¹⁶ In 2015 and 2016, Brazil, for example, experienced negative economic growth.

¹⁷ Colombia National Administrative Department of Statistics (DANE), November 2016, for this and other national statistics quoted in this box.

Over the last 2 years the infrastructure and construction sector has also made an important contribution to the longer term economic development of Colombia with the 4th generation roads that are being developed, as well as social housing construction.

The Colombian government has also been actively promoting the agribusiness sector (6.2% of GDP in 2015) as well as the industrial manufacturing sector (11% of GDP in 2015) in order to promote long-term economic growth.

Other aspects which have helped to create a stable environment for the economy have been:

- The government achieved the lowest *unemployment rate* in years at an estimated 8.5% in 2016 and it is expected to remain in single digits going forward.
- The *inflation rate* rose to around 6-7% in 2015-16 as a result of the El Niño climate effect¹⁸ and the marked depreciation of the Colombian peso in recent years due in particular to weak oil prices. However, these are temporary factors and the Central Bank is expected in the long-term to bring inflation back down to within its 2-4% target range.
- The deficit in the *trade balance* also rose from 1.7% of GDP in 2014 to 5.3% of GDP in 2015 due to the effect of lower oil and other commodity prices and subdued global growth, but is projected by the IMF to moderate over time as these effects fade.

Colombia's history since the mid-20th century has been scarred by violence that has evolved from political confrontation during the early 1950s, to communist groups turned guerrillas and a war against drug trafficking groups and organized crime. After 50 years of armed conflict with the guerrilla group FARC, in late 2016, a peace agreement has been approved by the Congress. The peace agreement should bring Colombia greater social and economic development and, with this, improved life quality and economic inclusion for the regions affected by the armed conflict.

Furthermore, a major tax reform has been in force since 1st January 2017, which will introduce important changes to the tax system as well as to the economy itself. This tax reform aims to reduce the public sector deficit and reduce the tax burden for businesses by increasing the value added tax and broadening the tax base.

These positive developments bring great opportunities for strong long-term growth for Colombia, but also some challenges for the country, requiring investments in education, health and infrastructure and employment generation to fully realize this potential.



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¹⁸ A repeated climate phenomenon which sees a rise in the Pacific Ocean temperature. In 2015 and 2016, a lack of rainfall and high temperatures resulted in a severe drought which lowered agricultural yields and pushed up prices.

Box 4: Turkey's journey to maturity

2016 was a challenging year for Turkey as the country has struggled against the failed coup attempt and its subsequent ramifications. Moreover, security risks and geopolitical issues remain high on the agenda for Turkey.

Uncertainty related to these factors lowered both consumption and investment appetite, which led the economy to post a year-on-year contraction of 0.2% in Q3 2016 in calendar adjusted terms and a quarter-on-quarter drop of 2.7% in seasonally adjusted terms. In the first three quarters of 2016, the annual growth rate averaged just 2.4%, which is below its long-term potential rate.

In terms of inflation, sharp depreciation of the Turkish lira and tax hikes pushed consumer price inflation up to 8.5% at the end of 2016 and, despite relatively low oil prices in 2016 on average, the balance of payments posted a slight deterioration as tourism revenues shrunk. However, fiscal indicators such as central government budget and public debt ratios to GDP continued to be relatively healthy (better than the EU Maastricht criteria).

Despite the challenges it has faced, Turkey has legislated to introduce auto-enrolment in its private pension system (from 1 January 2017) and establish a Turkish sovereign wealth fund, which should be beneficial for the country's key macroeconomic indicators (i.e. savings, external balance etc.) in the medium to long term.

Turkey's misfortune was the dominance of the political agenda in the last couple of years which hindered progress on structural reforms. Turkey has held two general elections, one presidential election and one local election during 2014 and 2015. In the first half of 2017, there will another referendum regarding constitutional change.

Turkey has shown its intention to ensure economic stability by launching 25 primary transformation programs in its 10th Development Plan for 2014-2018. However, both global conditions and domestic volatility have prevented the programs being fully functional as yet.

But if Turkey can overcome its short term political uncertainties and focus its attention on reforms in all needed areas, the country can provide great long-term business opportunities with its favorable demographics and geopolitical position. According to our estimates, Turkey has the potential to grow at an annual average rate of around 3% over the next 34 years – the fastest of the European countries in this study - compared to 1.6% on average for the G7 countries. Therefore the country is projected to become the world's 12th largest economy as of 2030 in PPP terms and will reach 11th by 2050 if it manages to implement significant structural reforms. In this case, Turkey could also maintain its second position in 2050 within the E7 countries in terms of GDP per capita in PPP terms.

As we emphasize in this report, from time to time, short term economic and political storms will inevitably occur in all emerging economies as they move towards maturity. This also applies to Turkey, but if businesses and other investors are patient, then there could be significant gains to be realized in the longer term.



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Table 3: Breakdown of the components of average real GDP growth (2016-2050)

Country	Average population growth p.a.	Average real growth per capita p.a.	Average GDP growth p.a. (in domestic currency)
Vietnam	0.5%	4.5%	5.0%
India	0.7%	4.1%	4.9%
Bangladesh	0.6%	4.1%	4.8%
Pakistan	1.4%	2.9%	4.4%
Philippines	1.1%	3.1%	4.3%
Nigeria	2.3%	1.9%	4.2%
Egypt	1.4%	2.6%	4.1%
South Africa	0.5%	3.2%	3.7%
Indonesia	0.6%	3.1%	3.7%
Malaysia	0.8%	2.7%	3.5%
Colombia	0.4%	2.9%	3.3%
Mexico	0.7%	2.5%	3.3%
China	-0.1%	3.1%	3.0%
Turkey	0.5%	2.4%	3.0%
Saudi Arabia	1.1%	1.9%	3.0%
Argentina	0.7%	2.2%	2.9%
Iran	0.4%	2.5%	2.9%
Brazil	0.4%	2.2%	2.6%
Thailand	-0.3%	2.9%	2.6%
Australia	0.9%	1.3%	2.3%
Poland	-0.4%	2.5%	2.1%
United Kingdom	0.4%	1.5%	1.9%
Russia	-0.3%	2.2%	1.9%
Canada	0.6%	1.2%	1.8%
United States	0.5%	1.3%	1.8%
South Korea	0.0%	1.8%	1.8%
Netherlands	0.1%	1.5%	1.6%
France	0.3%	1.3%	1.6%
Spain	-0.1%	1.5%	1.4%
Germany	-0.2%	1.5%	1.3%
Italy	-0.2%	1.2%	1.0%
Japan	-0.5%	1.4%	0.9%

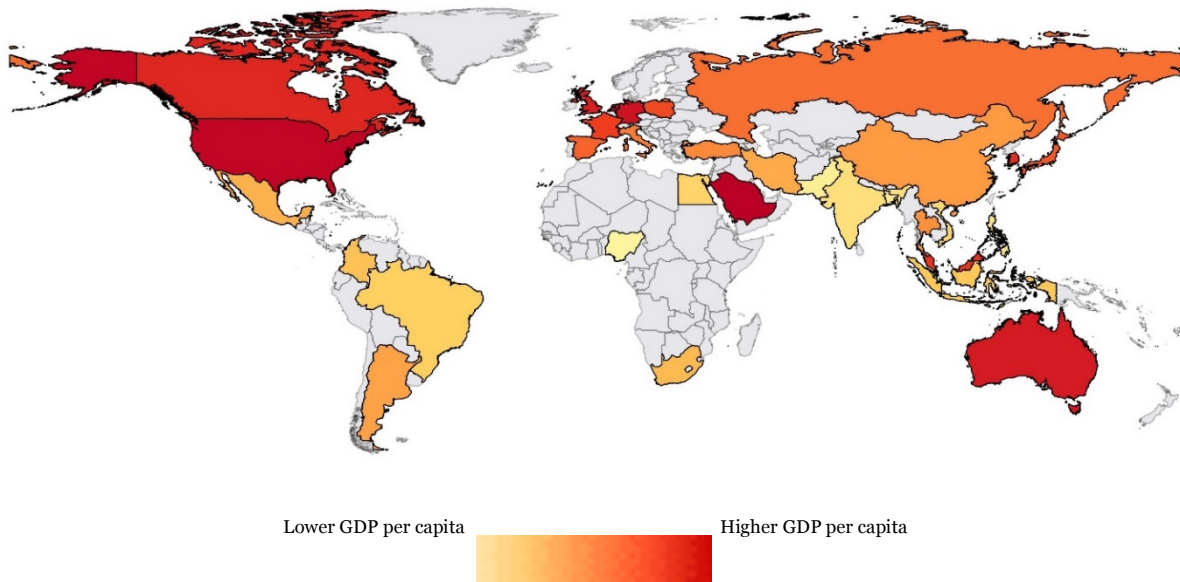
Source: PwC analysis

The long view: how will the global economic order change by 2050?

3.3 Relative income levels

Looking at growth in GDP at PPPs tells of a marked shift towards the emerging economies in 2050. But it is also important to consider how far this economic growth is expected to translate into improved average living standards for their people. When looking at GDP *per capita* in PPP terms, we do not see such a marked rise of emerging markets, with GDP per capita remaining relatively higher in Europe and North America as depicted in Map 4 compared to Map 2.

Map 4: Projected GDP per capita in 2050 (at PPPs)

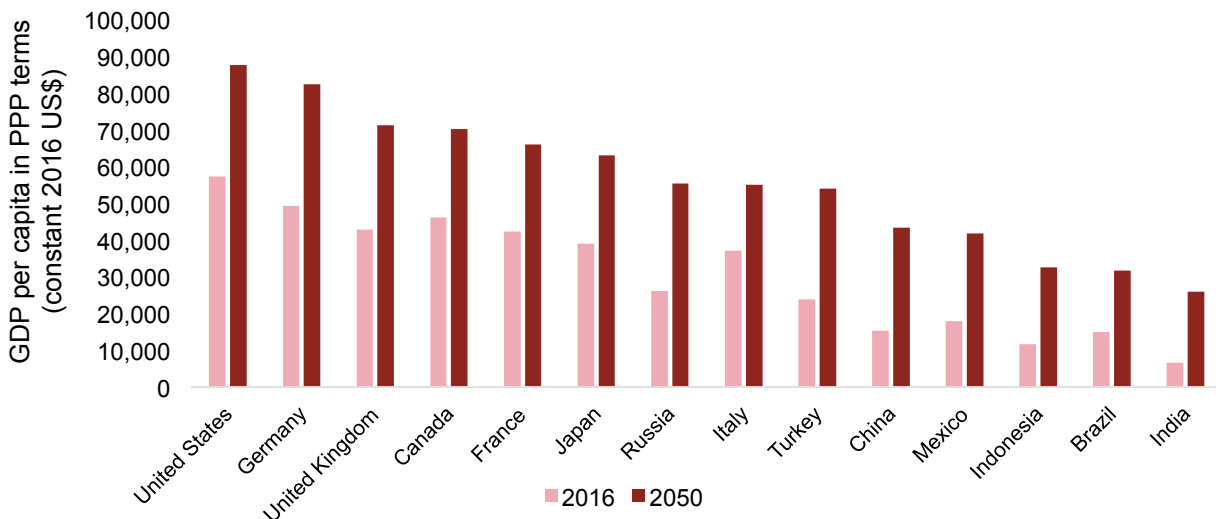


Source: PwC analysis

Average income levels remain lower in the E7 in 2050, but they will close some of the gap with the G7 in long run

Figure 16 ranks GDP per capita at PPPs for the G7 and E7 economies. With the exception of Italy, which we project to be broadly on a par with Russia in 2050, all of the G7 continue to sit above the E7 in 2050. The US continues to sit highest of the G7 countries in the average income rankings in 2050. Germany, Canada and the UK also feature near the top.

Figure 16: GDP per capita in PPP terms for the G7 and E7 economies



The long view: how will the global economic order change by 2050?

Source: PwC analysis

The most notable difference in the GDP per capita rankings compared to overall GDP is India. From overtaking the US to become the second largest economy, India ranks 28th in terms of GDP per capita at PPPs in 2050 and sits at the bottom of the E7. Similarly, China only has a middling rank among the E7 economies on this measure.

But China and India are closing the income gap with those at the top. In 2016, US GDP per capita was almost four times the size of China's and almost nine times the size of India's. By 2050, these gaps are projected to close to around double China's and around three times India's, demonstrating long-term income convergence.

Nonetheless, our analysis shows that while population growth will be a key driver of overall GDP growth, it can have partly offsetting negative effects on average income growth. This could occur if, for example, an economy is not investing enough in both human and physical capital because of an abundance of cheap labour. GDP per capita is generally a superior measure of economic development, better capturing how the average person is benefiting from broader economic growth¹⁹. This measure is of particular interest to consumer-focused businesses, who will be interested in how the spending power of households is developing over time when considering their growth and expansion strategies.

3.4 Risks to growth

Making such long-term projections is subject to many economic, political, social and environmental uncertainties. As such, it is important to consider some alternative scenarios. We have focussed here on the downside risks which may moderate the results of our main model, although there could also be some upside factors we have not considered here (e.g. a major new technological advance in an area like nuclear fusion that could revolutionise energy use in the same way as steam power or electricity did in past centuries).

We have devised three scenarios, each one building on the assumptions made in the previous one to create a cumulative set of three possible downside risks:

- **Scenario 1:** trend annual US labour productivity growth decrease by 0.5 percentage points, from 1.5% to 1%, representing a deceleration in global technological progress within the structure of our model;
- **Scenario 2:** convergence speeds for total factor productivity (TFP) levels²⁰ reduce by half, and trend annual US labour productivity growth decrease by 0.5 percentage points; and
- **Scenario 3:** investment to GDP ratios decrease by a quarter, convergence speeds (for TFP levels) decrease by half, and annual trend US labour productivity growth decreases by 0.5 percentage points.

A wide range of risks could cause growth to fall below the potential indicated by our model

These scenarios reflect the structure of our model (i.e. US labour productivity, convergence rates and investment to GDP ratios are key inputs into our model that we can adjust to conduct sensitivity and scenario analysis), but they also indirectly reflect the impact of a broader range of risks, for example:

- Political instability may deter investment in emerging markets, dampening the rate of catch-up. The role of institutions and government stability is discussed more widely in Section 4.2, while Box 4 below discusses other possible pitfalls on the path to prosperity.
- Natural disasters and continuing climate change may act as a setback in some developing countries, depleting stocks of infrastructure and agriculture, and holding up productivity growth.

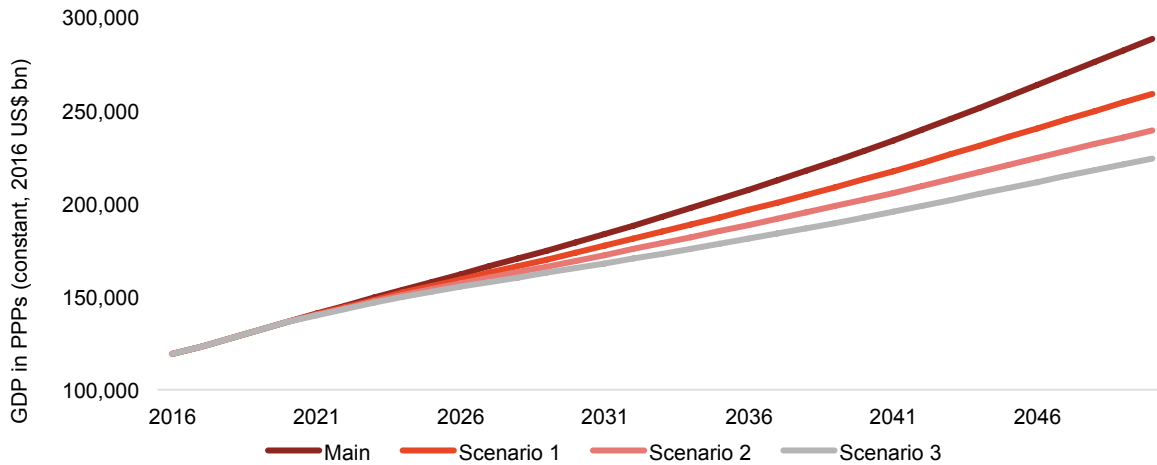
¹⁹ Although for the full picture here we also need to look at how the overall income distribution is changing, as discussed further in Section 4 below.

²⁰ Total factor productivity growth is the portion of output that cannot be accounted for by growth in the primary factors of production, capital and labour. As such, this residual growth represents technological progress.

Our scenario analysis shows that:

- In the most severe downside scenario (Scenario 3), projected average annual growth rates for the world fall by 0.75 percentage points, with the size of the world economy in 2050 being around 22% smaller compared to our main scenario (see Figure 17).

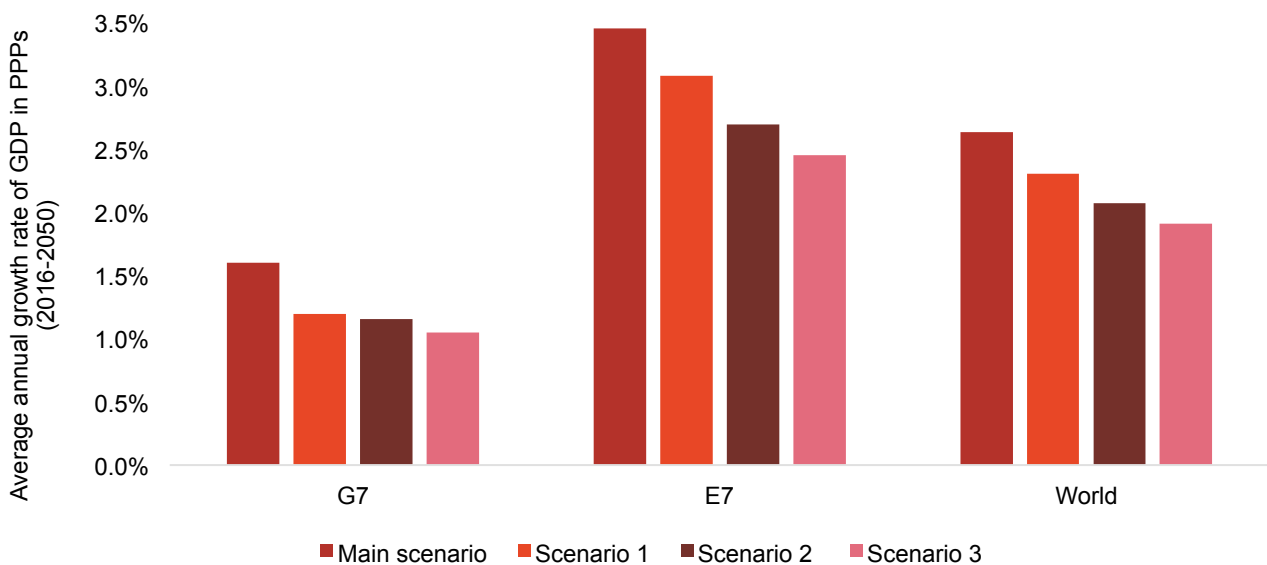
Figure 17: Projected world GDP in PPPs under the downside scenarios



Source: PwC analysis

- For the E7, average growth per annum up to 2050 will fall by 1 percentage point to 2.4%, while the G7's growth will be reduced by 0.6 percentage points to 1% in Scenario 3. The direction of change of the main scenario will continue, but the speed of these trajectories will occur to a lesser extent by 2050; for example, the E7 economies will no longer be double the size of the G7 by 2050 in terms of GDP at PPPs. Under Scenario 3, it could take India an additional 8 years to overtake the US in PPP terms and it is not expected to overtake the EU by 2050 in this downside case.
- The growth of the E7 economies is more sensitive to reduced TFP convergence speeds, while the majority of the fall in the G7 growth rate is driven by a fall in US labour productivity as these more advanced economies are already closer to the US' technology frontier (see Figure 18).

Figure 18: Average annual growth rate of the G7, E7 and the world for the downside scenarios



The long view: how will the global economic order change by 2050?

Source: PwC analysis

Box 5: Pitfalls on the path to prosperity – a discussion with Professor Marvin Zonis

The main projections in this report take a broadly optimistic view of the prospects for the major world economies in the long run. As our alternative scenarios show, however, this relatively benign outcome is not guaranteed at the global level and there could also be some individual countries that fail to realise their potential for various reasons. In this box, we summarise a discussion with Professor Marvin Zonis of Chicago University on three of the most important such potential pitfalls:

- Excessive reliance on high population growth to drive GDP growth
- The (potential) curse of natural resources
- Ideologies that are less open to trade, investment and new technologies

1. Excessive reliance on high population growth

As highlighted in Figures 13 and 14 above, some countries have relatively high projected GDP growth rates over the period to 2050 due in large part to relatively high working age population growth rates. This is particularly true of Nigeria, Pakistan, Egypt, the Philippines and (to a somewhat lesser degree) Saudi Arabia.

Within our model, high working age population growth delivers a ‘demographic dividend’, but in practice this is crucially dependent on productive jobs being available for the additional young people who will come into the labour force in the coming decades. This in turn requires the right institutional environment to be created in which private sector companies can grow and create these jobs (as discussed further in Section 4.2 of this report). If this does not happen, and a lot of (in particular) young men end up unemployed or underemployed, then history shows this can be a recipe for social and political unrest of the kind seen, for example, in parts of the Middle East and North Africa in recent years.

2. The potential curse of natural resources

Natural resources such as oil, gas and precious metals can bring wealth to a nation but, particularly if this happens early in the economic development process, it can also become a curse if not handled correctly. This is because such wealth may be captured by a narrow elite at the top of developing economies and not distributed widely across the population – many African and Latin American countries have long suffered from this curse, initially through the actions of European colonial powers and later under post-independence rulers. Then, all too often, a cycle begins where a group excluded from the elite challenges the power holders in order to capture the natural resource revenues for themselves - to get a piece of the “cake” as it is called in many African countries. Instability takes hold, diminishing the chances for economic growth.

As well as leading to large wealth inequalities, there can also be other adverse economic effects such as:

- Reducing the incentives for wealth-creating entrepreneurship, as opposed to manoeuvring for political influence in order to get a large slice of the natural resource pie;
- Making economies vulnerable to fluctuations in commodity prices, as we have seen since mid-2014 with many commodity exporters; and
- Crowding out manufacturing exports if currencies rise too high as a result of natural resource finds.

All of these points mean that diversification away from natural resources is a key requirement for sustained long-term growth in many of the economies we consider in this study, notably Nigeria, Saudi Arabia, Russia, Brazil and South Africa. See Box 2 above for further discussion of this topic for Nigeria.

3. Ideologies that hamper trade, investment and technology transfer

Economy history suggests strongly that, while ‘infant industry’ protection can sometimes play a useful role in early stages of development, longer term progress does depend on a reasonable degree of openness to international trade and investment as a way of spreading new technologies and ideas across borders. This

enables the ‘catch-up’ growth in total factor productivity that is a key feature of the long-term growth model used in this study.

While a broad range of political and religious regimes may support such growth, history also shows that certain ideologies can be harmful for long-term prosperity, whether it be the isolationist regimes of China and Japan between the 16th and early 19th centuries, the communist regimes of the former USSR and China in the 1960s and 1970s, or North Korea today.

In terms of the countries we consider in this study, we assume that all will remain broadly open to international economic activity and exchanges of ideas and technologies, but there would be downside risks if either political or religious regimes were to come to power on a lasting basis that closed the door to this kind of economic openness. As discussed further in Section 4 below, this applies also to the wider backlash against globalisation we have seen in some advanced economies recently, as well as to emerging economies.



This box is based on a discussion between **Marvin Zonis, Professor Emeritus, Booth School of Business, University of Chicago** (pictured above) and **John Hawksworth, Chief Economist, PwC UK**.

4. Challenges for policymakers – achieving sustainable growth

Key findings

1. Our projections reveal the considerable long-run economic potential of emerging economies, but realising this potential will require governments to implement growth-friendly policies that attract businesses, investment and talent.
2. Policy makers should look to revive stagnating global trade growth, engaging in global markets, sharing best practice, and supporting the fluid movement of goods, services and people around the world.
3. In the face of rising inequality in many economies, governments also need to ensure the benefits of growth are shared more broadly across society. In particular, they need to support education and life-long learning to create vibrant and dynamic workforces, mitigating the impact of ageing populations.
4. Governments need to make concerted efforts to tackle climate change and align growth with long-term environmental sustainability.
5. Underpinning all of these policy actions needs to be strong, reliable and trust-worthy institutions that develop strong macroeconomic fundamentals and enact structural reform. In this way, emerging economies will generate the correct political, social and economic incentives to support long-term innovation and growth.

4.1 How can governments realise the economic potential of their countries?

Our projections show that today's emerging market and developing economies have considerable long-term economic potential. Nonetheless, governments are facing a number of challenges which could threaten long-term sustainable growth, not just in emerging market and developing countries, but also in advanced economies. It is beyond the scope of this report to cover all of these potential challenges, but we focus here on five topics that seem particularly pressing at the moment:

- stagnant global trade growth: how to revive globalisation;
- demographic change: how to empower an ageing population;
- climate change: how to align growth with sustainability;
- rising inequality: how to share the benefits of growth; and
- increasing global uncertainty: how to create dynamic and diversified economies.

This section considers each of these five topics in turn, discussing how governments can address these challenges to sustainable long-term growth, drawing on past PwC research and practical experience as well as studies by other experts.

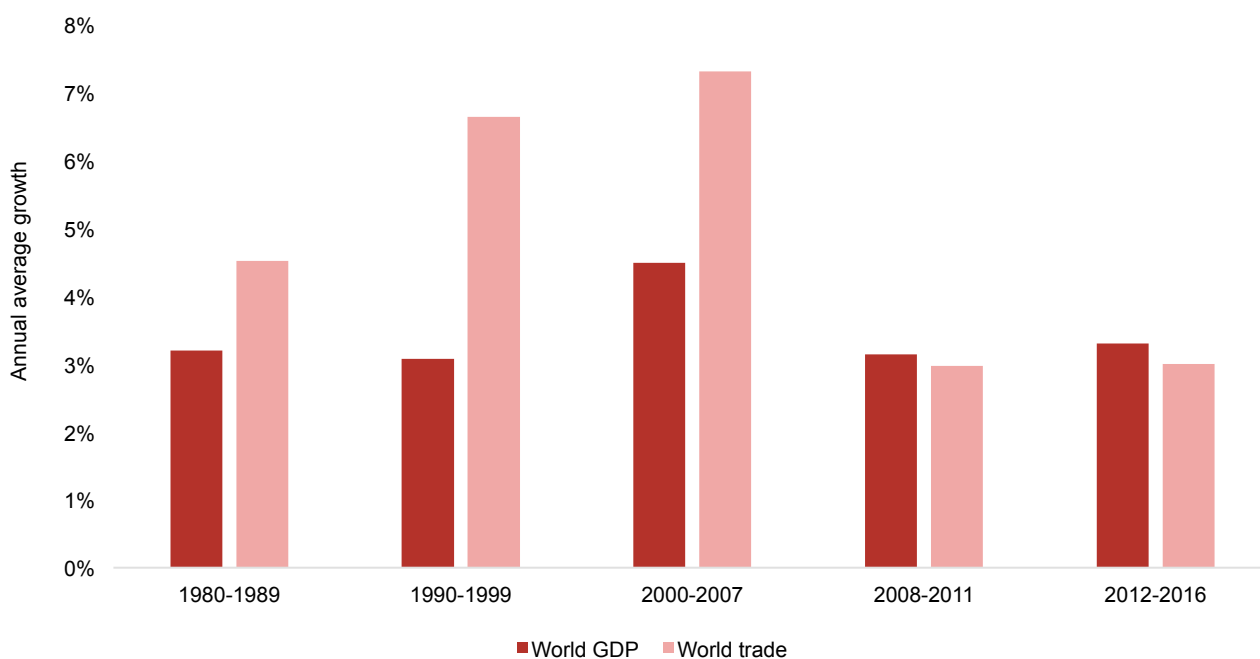
We include a commentary in Box 6 by our senior economist in Poland on how long-term growth prospects in that country are being affected by demographic pressures and how the government there is planning to meet this challenge. We also include in Box 7 an interview with Professor Branko Milanovic on trends in income inequality and what might be done about them, a topic where he is a leading global expert.

We then go on in Section 4.2 to present some more general reflections on the critical role that better economic, political and social institutions can play in meeting these challenges. This is also a topic featured in our interview with Professor Michael Jacobides in Box 8, which also bridges into the discussion of business implications in the following section of this report.

4.1.1 Stagnating global trade growth: how to revive globalisation

In 2016, world trade grew at only around 2%, its slowest rate since the 2008-9 financial crisis. For decades, trade grew at around 1.5-2 times the rate of the global economy. But since the financial crisis, trade growth has actually been marginally lower than GDP growth, at around 3% per annum as compared to 3.2% for GDP (see Figure 19).

Figure 19: Slowing growth in world trade relative to global GDP growth



Source: IMF

Cyclical factors have likely played a large part in this, with weak consumption and investment appetites still lingering on from the financial crisis. The slowdown in China and the anaemic recovery in much of Europe have further reduced global demand in recent years. But there are also structural factors at play, suggesting global trade growth may be settling down on a new, lower trajectory. These include China's transition away from a manufacturing and export-led economy and the quickening pace of automation, which has allowed domestic firms to produce many of the parts they previously imported. The growth of the digital economy is changing the nature of globalisation, shifting it from physical transportation to a digital set of orders, which has shortened global supply chains thanks to new manufacturing technologies such as 3D printers.

As more countries have engaged with global markets over the last decade, it has become increasingly hard to achieve new global trade deals that benefit all players. There have been some positive regional developments, such as the launch of the ASEAN Economic Community (AEC) and the Tripartite Free Trade Area (TFTA) in

Africa²¹, but the breakdown of the latest set of WTO negotiations, the ‘Doha round’, illustrates the difficulties of co-ordinating globally. Our own latest CEO survey shows that concerns about the threat to globalisation are also top of mind for many global chief executives of leading companies²².

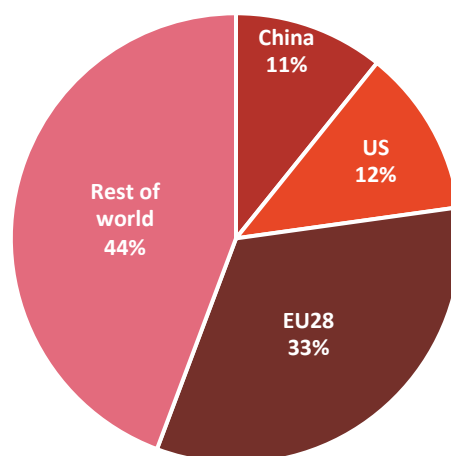
Globalisation is also often associated with rising inequality (discussed further in Section 4.1.4 below), resulting in a lack of popular support for further trade agreements. This has brought protectionism back into the policy spotlight, as illustrated by the new US administration’s preference to withdraw from the Trans-Pacific Partnership (TPP)²³. Progress has also been slow on the proposed US-EU Transatlantic Trade and Investment Partnership deal.

For emerging markets in particular, globalisation is key to their development²⁴. Opening up to new talent, technology and ideas will boost productivity and potential output. It also provides businesses with new opportunities and consumer markets in which to sell, incentivising innovation to retain a competitive advantage. Emerging markets should utilise this opportunity on their path to maturity while their labour costs are relatively cheaper than in advanced economies; China’s experience since the 1980s is a prime example of how opening up gradually to global markets and gaining a competitive cost advantage over Western counterparts can boost growth (just as Japan did from the 1950s onwards and South Korea and other ‘Asian tigers’ did from the 1960s).

Figure 20 shows how concentrated global trade is among a few key players. This suggests there is potential for many more emerging markets to engage, particularly through regional trade agreements among themselves. Governments in these countries should seek integration in the global economy and incentivise and support businesses to compete in these new markets.

For advanced economies, governments should continue to pursue mutually beneficial trade deals, including regional trade agreements, and encouraging emerging markets to engage. It will be important here that the new US administration, while renegotiating trade deals it considers less favourable, does not retreat into the kind of protectionist shell that damaged world growth in the 1930s – as noted in Section 3.4 above, this is one of the key downside risks to our global growth projections.

Figure 20: Share of world trade (exports + imports), 2015



Source: IMF

²¹ The TFTA is a proposed free trade agreement between the Common Market for Eastern and Southern Africa, Southern African Development Community and the East African Community. It was signed by all 27 member states in 2015 and is pending ratification by national parliaments.

²² See our 2017 Global CEO survey for details: <http://www.pwc.com/gx/en/ceo-agenda/ceosurvey/2017/gb>

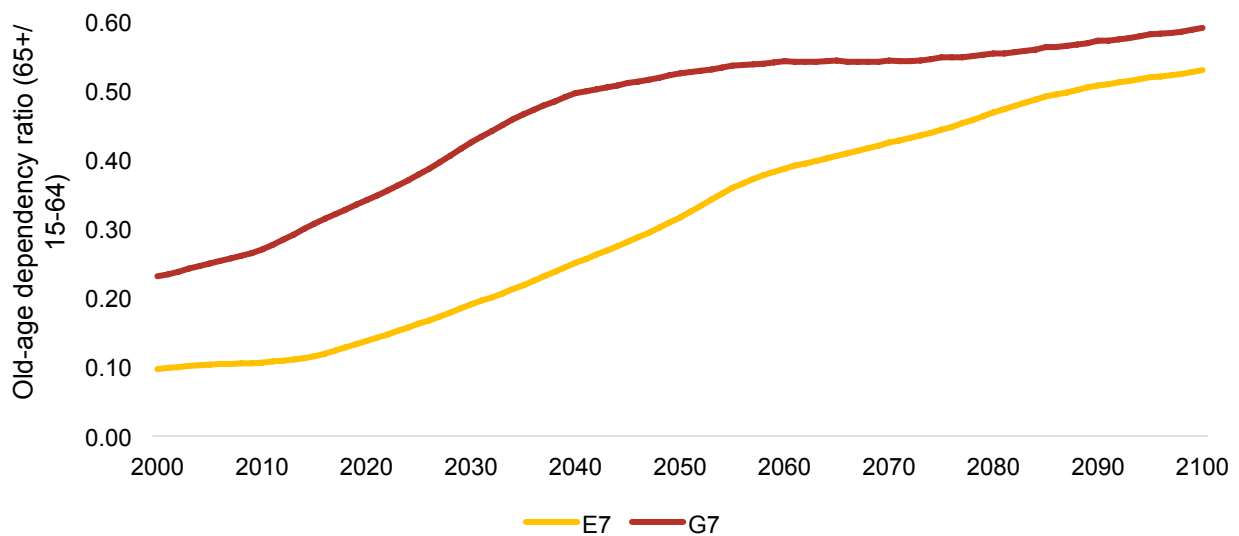
²³ The TPP is a proposed trade agreement among 12 Pacific Rim countries, including the US, Mexico, Japan and Canada. The proposal was signed in 2016 and is currently awaiting ratification, but President Trump has said he will block it.

²⁴ History shows there can be a case for ‘infant industry’ protection early in economic development, as shown by the examples of the US and Germany in the 19th century. But this needs to be unwound over time and combined with strong incentives for successful domestic companies to export, as in the strategies followed since the 1950s by Japan, South Korea and, more recently, China. See J. Studwell, ‘How Asia works: success and failure in the world’s most dynamic region’, Profile Books (2013) for an insightful discussion of this topic, including supporting academic references and company case studies.

4.1.2 Demographic change: how to empower an ageing population

As a country develops towards advanced economy status, it tends to go through a period of demographic change. Birth rates generally decline as education improves, infant mortality falls and women become more active members of the workforce. In conjunction with increased longevity from improved living standards and developments in healthcare, a country's dependency ratio²⁵ tends to rise. This is a well-established phenomenon in advanced economies and the trend is projected by the UN to continue into the middle of the 21st century before levelling off somewhat (see Figure 21). The old-age dependency ratio²⁶ of the G7 economies is currently around 0.3. This means that for every 3 working-age people, there is someone aged over 65. The UN projects this could increase to around 0.5 by 2050 and, looking further ahead, to 0.6 by the end of the century.

Figure 21: Projected increase in the old-age dependency ratio of the G7 and E7 to the end of the century



Source: UN population projections

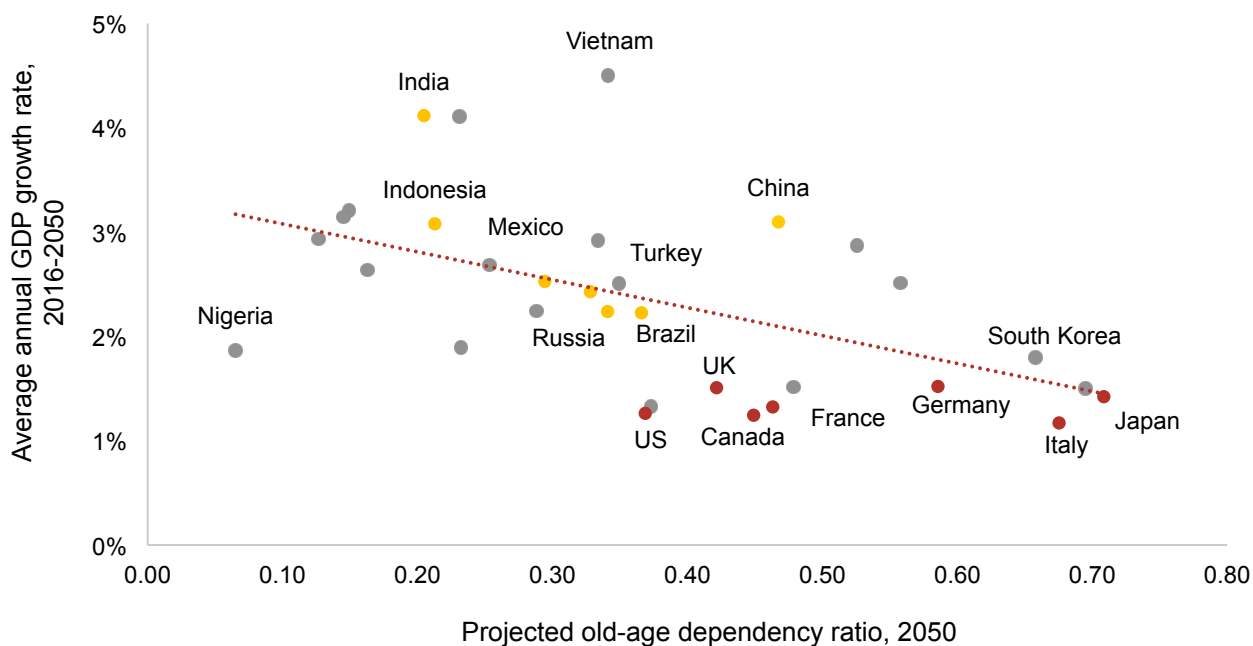
But this change is not unique to advanced countries. Globally, the fastest growing segment of the population will be those aged over 60. We are already starting to see this demographic change in emerging markets too. The old-age dependency ratio of the E7 has been largely flat over the last 20 years, but it is now starting to rise and is projected by the UN to increase from around 0.1 today to around 0.3 by 2050, as shown in Figure 20.

Longer lives are good news, but an ageing population could impede economic growth. As the working-age proportion of the population falls, the workforce will eventually shrink unless people work for longer, reducing output and productivity. Further, a greater proportion of dependents will put a strain on healthcare services and government resources, as tax revenues fall and pension pay-outs swell. In our model, a lower average annual growth rate over the period 2016-2050 is associated with ageing populations, as shown in Figure 22. Italy and Japan are projected to have an old-age dependency ratio of around 0.7 by 2050, contributing to them being projected to be two of the slowest growing economies over the next 34 years.

²⁵ Dependency ratio is defined as the proportion of those aged 0-14 and 65+ relative to the working-age population aged 15-64.

²⁶ Old-age dependency ratio is defined as the proportion of those aged 65+ relative to the working-age population aged 15-64.

Figure 22: Relationship between the projected old-age dependency ratio in 2050 and the average annual GDP growth rate, 2016-2050



Sources: PwC analysis, UN population projections

Tackling an ageing population requires a forward-looking approach and governments of emerging markets should learn from the experience of advanced economies to start taking action now. Raising the state pension age has been a key policy feature of many European countries, but this needs to be complemented by policies to develop flexible labour markets which support working later on in life. These could include tightening regulation around labour market age discrimination and encouraging businesses to provide training to ensure older workers continue to have relevant skills for today's workplace.²⁷ Alongside this, governments should also pursue policies to better enable women to both work and raise a family. Policies could include more generous parental leave allowances, access to affordable childcare and tougher legislative protection against gender discrimination.²⁸

The Nordic countries are currently leading the way in terms of developing flexible labour markets to accommodate both older workers and working mothers. Norway has used financial incentives to encourage older workers to remain in the workforce for longer, designing a pension system which allows flexible retirement. Sweden has encouraged female labour-force participation whilst also having one of the highest birth rates in Europe through shared parental leave and fostering cultural change.

For emerging markets, the focus today should be on boosting productivity and innovation. The potential output of an economy is determined not only by the number of workers, but also by how productive they are. Governments need to implement structural reforms to enhance efficiency, making valuable long-term investments in technology and science to support research and development. In addition, governments also need to support the economy to provide jobs for their fast-growing young populations. They should also encourage businesses to provide lifetime training to workers, ensuring they continue to have relevant and valuable skills to support employment as they age.

Box 6 below features some further discussion of demographic challenges in the case of Poland.

²⁷ For a wider discussion on how governments can utilise their older workers better, see our latest Golden Age Index report: <http://www.pwc.co.uk/services/economics-policy/insights/golden-age-index.html>

²⁸ This is discussed further in our Women in Work Index report: <http://www.pwc.co.uk/services/economics-policy/insights/women-in-work-index-2016.html>

Box 6: Meeting the demographic challenge in Poland

According to our latest model projections, Polish GDP will grow at an average real rate of around 2% per annum over the period to 2050. This is noticeably less than the projected long-term growth rate in our February 2015 report (2.7%). The reduction of projected long-term growth for Poland is related to unfavourable changes in demographic projections and to the general downgrading of global growth prospects.

According to the latest UN long term population growth projections, Poland will suffer the deepest reduction in both total and working age population among the countries analysed. Total population in Poland will decrease on average by 0.4% per annum over the period to 2050 and the working age population will shrink by slightly more than 1% per annum. This has contributed to weaker growth potential for the country.

Two main factors are driving the poor demographic situation in Poland: very low fertility rates and immense emigration outflows seen over the last several years. According to the UN, the average fertility rate in Poland between 2015 and 2020 will be 1.33, one of the lowest figures globally. The Polish Central Statistical Office has recently published the new emigration figures. In 2015, there were 2.4 million Polish people living abroad – around 20% more than in 2010 and 65% more than in 2005. It means that the ratio of the number of emigrants to the total population is already above 6%. Most of these migrants are of childbearing age, so the emigration not only decreases the current population, but also seriously weakens the population growth potential of the country.

The most popular explanations for these adverse demographic trends relate to the relatively poor income potential for the majority of young workers in Poland and insufficient public support for parents. The former is a consequence of Poland's recent growth model which has focussed on building a competitive advantage based on low labour costs, while the latter results from underdevelopment of child care infrastructure and general government budget constraints.

These factors were, among others, at the top of political agenda in Poland during the last general elections in 2015, which led to a change of government. Immediately after the elections, the new government announced a new programme of financial support for parents, the so called "500+ program". Since April 2016, each family has received 500 zloty (around 110 euros) per month for each child, starting from the second one. This represents significant financial support for families, as the current average net wage in Poland is 3000 zloty.

On the other hand, this also implies significant additional budget expenditures reaching 1.2%-1.3% of GDP per year. The costs of this program, being one of the series of socially oriented policies, is to be at least partially financed by improved tax collection. The size of the gap between actual and expected VAT revenues in Poland, for example, is around 2.5% of GDP according to PwC estimates, which could be reduced over time.

Moving towards innovation-based growth

Apart from more generous social spending, the new government also announced a new programme of economic development aimed at gradually shifting the paradigm of economic development from wage competitiveness to innovation and international expansion of Polish companies. Implementation of this ambitious programme will be supported by a series of government-led industrial and scientific initiatives (co-financed initially by the EU).

The mixture of more generous social policy and innovation-based economic growth is intended to lead to more sustainable (socially viable) economic growth in the long term. The successful implementation of this programme will strongly depend, among other factors, on the quality and effectiveness of state institutions. This remains one of the most serious challenges from the point of view of the long term economic development of Poland in the face of both demographic and global headwinds.

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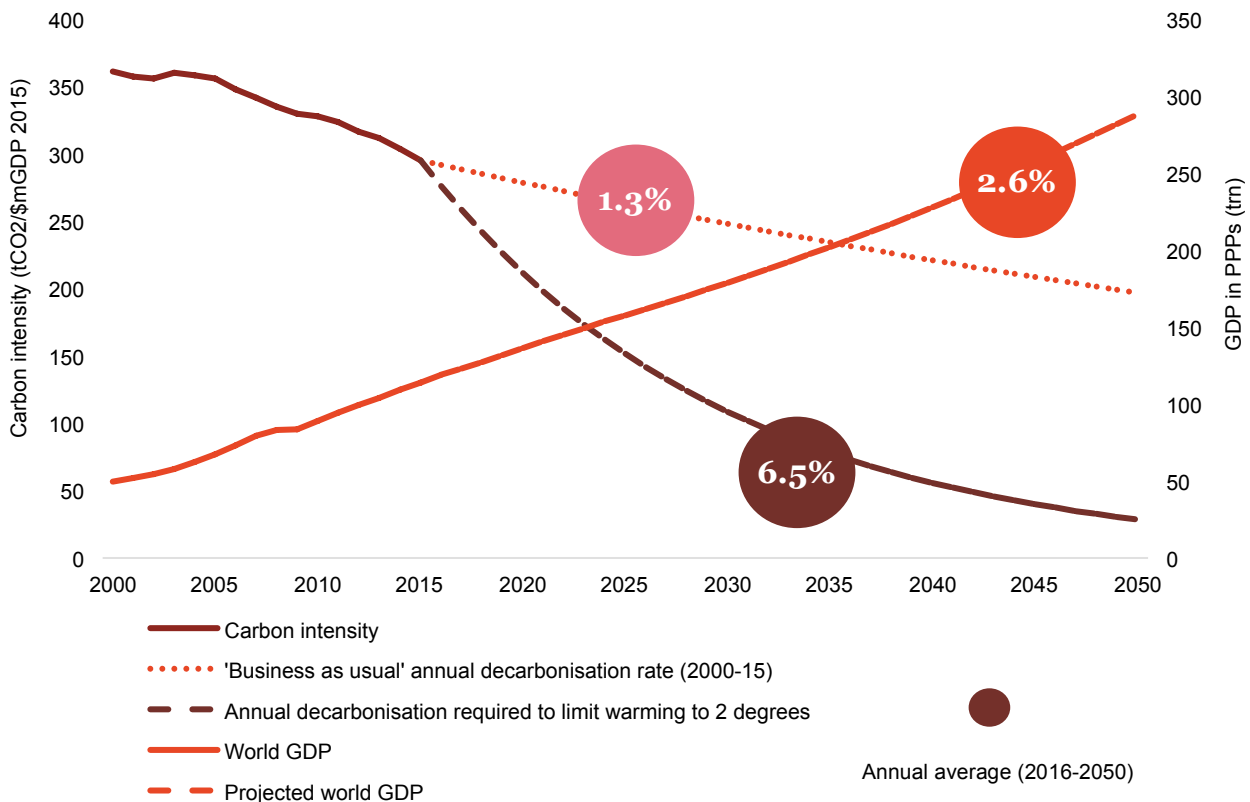
4.1.3 Climate change: how to align growth with sustainability

Carbon emissions have slowly decoupled from economic growth this century. While emissions in OECD countries have fallen gradually, emerging economies have seen their contribution to climate change grow. Greater manufacturing output and infrastructure development will increase CO₂ emissions and demand for land for housing, business and transport will rise, potentially resulting in environmental damage. As consumers get richer, their use of cars and planes will increase and their demand for electricity and heating will rise.

Climate change poses a number of risks to economic growth in the medium to longer term. There are the physical risks that the increasing frequency and severity of natural disasters pose to infrastructure, capital stock, agriculture and people. These risks are likely to be concentrated in countries which are already warmer, particularly those in the tropics, which also tend to be poorer. This has considerable implications for the potential growth of emerging markets, especially those where subsistence or commercial agriculture is a significant part of the economy. As well as social instability, climate change could also pose a threat to financial stability, as emphasised by Bank of England governor Mark Carney²⁹, with significant implications for insurance and risks to investors in fossil fuel companies from toughening regulation on climate change.

In November 2016, the Paris Agreement came into effect, with governments across the world agreeing to limit the increase in global average temperatures to well below 2°C. To achieve this, we estimate that the world must decarbonise at a rate of 6.5% every year to 2100, as illustrated in Figure 23. In 2015, global carbon intensity³⁰ fell by 2.8%. While this was a record fall, it still falls way short of what is needed in the longer term.

Figure 23: Projected decarbonisation rate required to meet the Paris Agreement and projected world GDP



Sources: BP, Energy Information Agency, World Bank, IMF, UNFCCC, National Government Agencies, PwC analysis

²⁹ <http://www.bankofengland.co.uk/publications/Documents/speeches/2016/speech923.pdf>

³⁰ Defined as tCO₂ per \$m GDP

If they wish to achieve this kind of decarbonisation, governments in advanced nations need to take the lead, investing heavily in renewables, nuclear and carbon capture technology to reduce emissions from fossil fuels. They need to incentivise businesses and households to consider their carbon footprint – this could be through national campaigns, financial incentives or regulation. The Financial Stability Board’s Task Force on Climate-related Financial Disclosures recently delivered recommendations for high-quality and consistent company reporting on exposure to climate-related risks.³¹ The growth of the sharing economy may also provide innovative ways to lower carbon footprints, with new platforms promoting the sharing of everything from cars to office space.

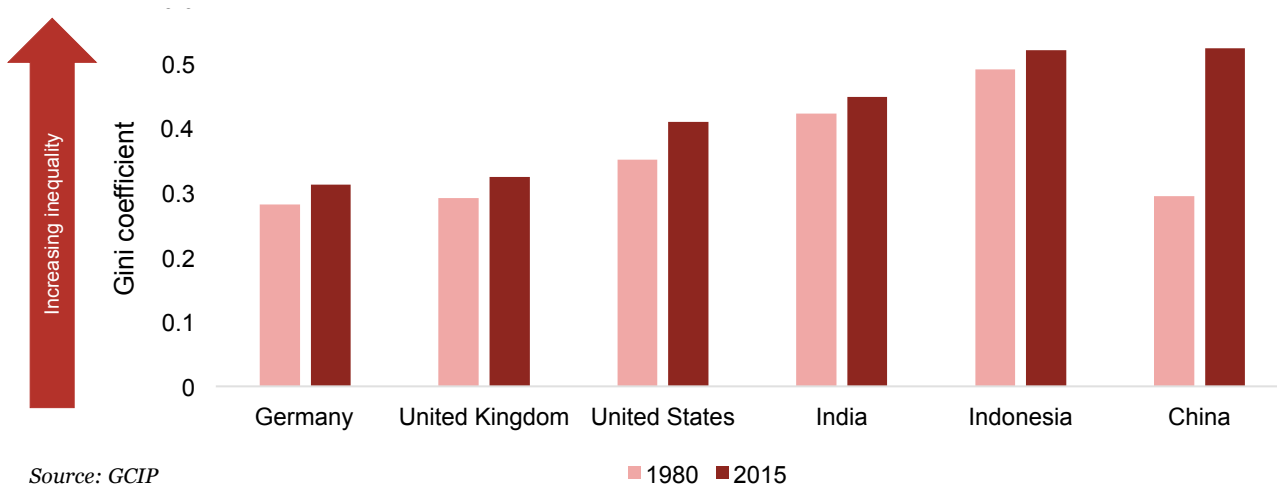
Advanced economies need to lead by example. In May 2016, Portugal ran entirely on wind, hydro and solar renewable energy sources for four and a half days, setting an unprecedented example in Europe. In the UK, for the second year running, consumption of coal fell by over 20% in 2015³². The UK’s declining carbon intensity has been primarily driven by its shift away from heavy industry to services over the last decade, but has also been supported by various policy initiatives. These include five “carbon budgets” since 2008, which have set in law a cap on the level of carbon emissions in the UK over a five-year period, and investment in low carbon energy innovations and nuclear power. Other EU countries and Canada have also made progress with the implementation of a carbon price. It will be critical to see what policies the new US administration, which has been critical of the Paris Agreement, pursues in this area.

For emerging economies, it is important that governments take action now to align their potential economic growth with sustainable development. In China, coal consumption may have peaked, but whether this is the result of the economic slowdown or more structural changes, including its transition away from manufacturing, air quality regulations and a crackdown on inefficiency, remains to be seen. Governments in emerging markets are working to address climate change risks and learning from technology developments and policy initiatives in other countries. They are also making technological advances of their own, which is likely to bring them economic benefits in the long run.

4.1.4 Rising inequality: how to share the benefits of growth

In both G7 and E7 economies, levels of income inequality – as measured by the Gini coefficient³³ - have risen since 1980 (see Figure 24 for selected countries). The causes of this rise in inequality – and what to do about it - are discussed further in the interview with Professor Branko Milanovic in Box 7 below.

Figure 24: Gini coefficient since 1980 in selected G7 and E7 economies



³¹ <https://www.fsb-tcfd.org/publications/recommendations-report/>

³² The UK continues to occupy a leading position in our Low Carbon Economy Index, which provides further discussion on how the G20 economies are decarbonising their economies: <http://www.pwc.co.uk/services/sustainability-climate-change/insights/low-carbon-economy-index.html>

³³ The Gini coefficient is a measure of the distribution of a nation’s income; 0 represents perfect equality, while 1 represents perfect inequality, i.e. all income accruing to the wealthiest 1% of the population.

For the E7, inequality has risen (particularly in China) but might moderate in future as these countries develop stronger institutions to provide education, healthcare and social security, and as workers are engaged in more valuable employment and gain more bargaining power (as happened in the US and Europe in the period from the 1920s through to the 1970s with the rise of organised labour movements and associated political parties).

Inequality is not just a matter of social justice, but can also act as a drag on economic growth. Recent research by the IMF³⁴ has found that, on average, a one percentage point increase in the income share of the top 20 percent lowers GDP growth by 0.08 percentage point in the following five years. These findings contradict previous thinking that the benefits of growth will trickle down to those at the bottom³⁵. In fact, the findings show that a more equal society could increase economic growth, with a one percentage point increase in the bottom 20%'s income share being associated with a 0.38 percentage point increase in growth over the following five years. This may occur through greater standards of living boosting productivity or equality generating the right incentives for individuals and businesses to invest in education and innovation. Greater economic inequality may also lead to social friction and potentially undesirable political outcomes.

Governments should therefore work to ensure the benefits of globalisation, technological progress and economic growth are shared broadly across society. Globally, the Nordic countries, as well as some of the core European countries such as Austria and Germany, have some of the lowest levels of inequality. This can be attributed to their strong focus on providing equal educational opportunities through universal access to high quality education, as well as their generous welfare systems which redistribute income from the wealthy to the less well-off.

Of the countries in our model, South Korea made some of the largest strides in lowering income inequality, with its Gini coefficient falling by a third since 1990. While much of this can be attributed to a general rise in prosperity from economic growth, the government has reinforced this through investment in education, supporting average years of total schooling increasing from 8.1 years in 1980 to 12.1 years in 2010. Going forward, South Korea, along with many other emerging markets, need to focus on developing their welfare system. South Korea's public social spending is still well below the OECD average of 21%, at just 10%, and its welfare system is considered to have one of the weakest impacts on redistribution of the OECD³⁶. As emerging markets develop, a priority should be ensuring growth flows more evenly throughout society, learning from public policies pursued in the Nordic countries, for example.

Box 7: Income inequality and what to do about it – an interview with Professor Branko Milanovic

What have been the key drivers of rising income inequality in recent decades?

In very general terms, the main drivers of income inequality within nations – the global picture is different as countries have generally moved closer to each other in incomes in recent decades – are technological change, globalisation and domestic economic policies.

So what, if anything, can governments do about this?

Depending on your opinion of what the key driver is, then the prescription is very different. For many, technological change is considered to be the key driver, with many arguing that technological change is biased in favour of highly-skilled labour, often replacing non-skilled, routine labour, and so increasing inequality. If this is your opinion, there is little that one can actually do about that other than palliative measures to help those who have lost their jobs as you would generally not want governments to stand in the way of technological change, even if that were possible.

³⁴ IMF Staff Discussion Note (June 2015), "Causes and Consequences of Income Inequality: a Global Perspective" - <https://www.imf.org/external/pubs/ft/sdn/2015/sdn1513.pdf>

³⁵ For example, see <http://www.laffercenter.com/the-laffer-center-2/the-laffer-curve/>

³⁶ As discussed in www.oecd.org/els/strengthening-social-cohesion-in-korea.htm

But if your view is that globalisation is the main driver of the three, then the situation is a little bit different. In that case, you at least have the option of reversing that, whether through increased tariff rates or taxation of outsourcing, for example - though whether that would be desirable is another question.

And third, if you really believe that it is domestic economic policies which are mostly responsible for the increase in inequality, then you have political tools to try to stop that, such as increases in taxation of higher income groups, increased social transfers, re-training and so on. So, I think, depending on which one of the three drivers you prioritise, I think that the views about what should be done are very different.

However, I also believe that, while we can conceptually divide the reasons for the increased inequality into these three different factors, we cannot really apportion a percentage of responsibility to each of them. It's simply too complicated as the three processes are closely inter-linked. Technological change, for example, facilitates globalisation, as do certain domestic economic policies aimed at allowing markets to operate more freely and giving incentives for wealth generation. But globalisation also influences the type of technological change we have, and similarly limits the range of feasible economic policies that can be implemented. So disentangling the three drivers is much more difficult in practice and policy needs to reflect these complexities.

So, given these constraints, what should the priorities be for policymakers?

Well looking back first at history, I believe that the policies that were responsible for the reducing income inequality in the rich world from 1945 to 1980 were those of mass education, heavy taxation – particularly very high marginal tax rates – and large social transfers. And I actually think that all of these three policies have reached their limit.

For mass education you're not going to have the same bang-for-the-buck gain by further extending periods of study as you did when countries were going from, say, 8 years of average education in the earlier stages of economic development to 13 or 14 years now. And I think there is a general reluctance, particularly in the middle classes at least in the US, to further increase taxes and social transfers, because I think that people are much more sceptical about the ability of governments to make a positive difference now as compared, say, to the 1960s.

That then leads me to the conclusion that what the rich countries might actually want to do is to make the distribution of endowments more equal. And that has two parts; one is ownership of assets, which is extremely concentrated and which would need to be much more broadly shared. In the US, around 30% of the population have zero net assets. The situation is not much different in other rich countries. So that would suggest measures such as tax incentives and other instruments (e.g. employee share ownership schemes and promotion of wider home ownership) to encourage greater access to assets by lower and middle income groups.

The other part is actually working on improving the quality of education so that people are better equipped for the future world of work. This is different from mass education in the past because the focus here is on quality, and especially on equalisation of quality of education between the so-called “elite” private schools and public schools. One reason why returns from education are so uneven is because job opportunities and wages differ strongly as a function of the schools people attend. Making access more equal is necessary, but not sufficient to reduce wage inequality. It needs to be complemented by improvement in the quality of public schooling, especially in the United States.

Of course, there would be further gains to such a policy. It would make future generations more adaptable to technological change, since we can't predict exactly what new jobs will be created by further technological advances. I am optimistic (based on the lessons of history) that there will be such new types of jobs in the future, even if robots take over some of our existing jobs.

There is no magic bullet here because, as I said, income inequality is a complex phenomenon that changes only slowly. But I think governments need to engage positively with the impacts of globalisation and technological change, not try to stand in their way, nor to ignore their possible negative distributional consequences.



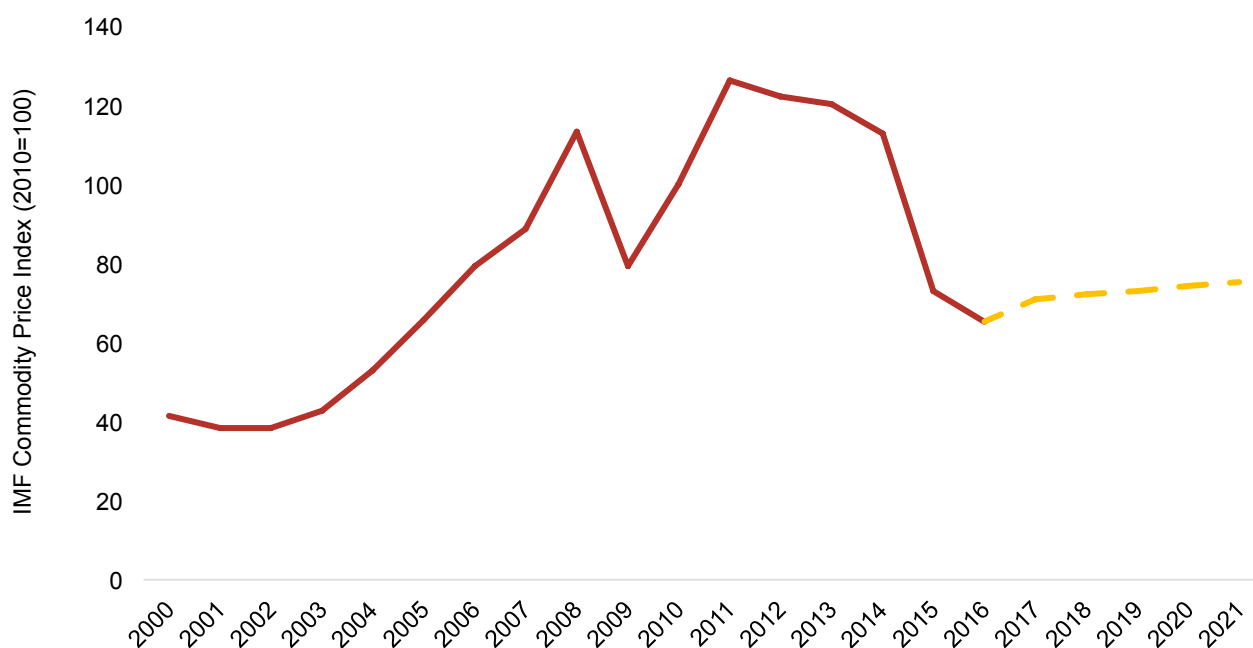
Branko Milanovic is Visiting Presidential Professor and Luxembourg Income Study Senior Scholar at the City University of New York Graduate Center. He was previously Lead Economist in the World Bank's research department and has written extensively on issues relating to income inequality. His most recent book is *Global Inequality: A New Approach for the Age of Globalization* (Harvard University Press, 2016).

4.1.5 Increasing global uncertainty: how to create dynamic and diversified economies

We are entering a period of considerable political, social and economic uncertainty. This stems from many of the challenges described above, such as a climate change, stagnating global trade growth and the future role of technology, as well as considerable political uncertainty from, for example, the UK's vote to leave the EU and the election of President Trump in the US. As the world has become more interconnected, uncertainty can have wide-reaching affects. The 2009 global financial crisis is just one example of how shockwaves can spread across the world.

The recent decline in oil prices is another such example. The global slowdown has been compounded by a growing switch away from oil towards other fuels, resulting in low demand. In conjunction with rising US shale oil production, prices fell sharply from mid-2014 to early 2016, as shown in Figure 25. Despite some recovery during the course of 2016, the IMF is projecting commodity prices to remain well below their highs of 2010-14 for at least the next five years. These external factors have had a considerable impact on the growth of many emerging market commodity exporters over the past two years. Russia, for which commodity exports comprise around 20% of GDP, entered recession in 2015, while Nigeria also experienced negative economic growth in 2016, after averaging impressive growth of almost 7.5% since 2000. Saudi Arabia and Brazil have also seen a marked slowdown in GDP growth over the past two years, going into a serious recession in the latter case.

Figure 25: IMF commodity price index over time, 2010=100



Source IMF World Economic Outlook (October 2016)

All of this highlights the importance of diversifying a country's export base, and the economy as a whole. Many emerging markets tend to rely on a small number of industries, often linked to natural resources, especially regarding exports, which makes growth susceptible to shocks such as volatile oil prices. A lack of diversification also makes it hard to develop flexible economies which adjust to changing consumer demands and preferences, as well as more structural shifts such as a move towards renewable energy sources. Technological progress and continued automation is also increasing the need to create more dynamic economies, in order to ensure there are productive employment opportunities in a variety of sectors going forward.

Emerging markets have begun to make progress in diversifying their economies. According to UNCTAD's index of export concentration, the majority of emerging markets in our model have seen an improvement, most notably in Nigeria. Nigeria has seen foreign investment, which has long been focused in the oil sector, move towards power, agriculture and mining and its rapidly expanding consumer class is creating opportunities for the growing retail sector. As Nigeria continues to develop its infrastructure and transport networks, it is also expected to see a boost to its manufacturing industry. In contrast, Saudi Arabia remains heavily dependent on oil and has seen no improvement in its export concentration index as yet, though it is also now aiming to diversify its economy.

In response to growing global uncertainty, governments of emerging markets should follow a two-pronged approach. First, they should continue to develop strong institutions, as discussed further below, and macroeconomic fundamentals. This will ensure they remain attractive places to do businesses and invest in, as well as helping to mitigate any compounding impacts of global shocks from, for example, high inflation or government debt.

Second, they should continue to invest in infrastructure, to aid the development of other industries, and education, to develop a broadly skilled and flexible workforce. Emerging markets could take note of the German dual education system, which engages students in vocational training in businesses alongside formal school lessons, allowing students to gain both theoretical and applied skills.

4.2 The critical role of institutions

Navigating these global challenges will require careful and forward-looking policy responses. Underpinning this is the quality of institutions (see also the discussion with Professor Michael Jacobides in Box 8 below, which also links to our discussion of business implications in Section 5).

To develop resilient economies, countries need stable governance that supports broad-based growth throughout society and strong macroeconomic fundamentals³⁷. These could include:

- An **independent and credible central bank** which acts to keep inflation around a stable target, reducing volatility and mitigating the risks of currency crises;
- A **fair and efficient tax regime** which redistributes income amongst society, supports social development, such as education and healthcare, and sets out a clear and stable taxation policy applicable to all businesses;
- An **appropriate degree of intellectual property rights protection** which ensures individuals and businesses are rewarded for their innovations, stimulating technological progress and entrepreneurship;
- **Effective environmental regulation** which promotes sustainable economic growth; and
- **High levels of trust** which encourages businesses to operate within a country and promotes social cohesion.

These institutions influence the political, social and economic incentives of individuals and businesses and are therefore fundamental to emerging markets being able to attract, and retain, talent, investment and business. This is key to boosting productivity and inspiring innovation to move these emerging economies along their technological frontier.

Developing and emerging economies tend to perform worse on measures of governance than advanced nations. This is especially true regarding the World Bank's control of corruption and regulatory quality³⁸. Over the last

³⁷ For a further discussion, see PwC's ESCAPE index: <http://www.pwc.co.uk/services/economics-policy/insights/escape-index-mapping-how-markets-emerge.html>

two decades, the average score across the E7 have actually deteriorated in these measures, driven primarily by Brazil and Mexico, who have experienced a rapid fall in their control of corruption score due to various political scandals in recent years, and Russia.

For these countries, a lack of improvement in these governance measures is a likely contributor to their relatively low investment to GDP ratios, relative to others in the E7 and other emerging markets. For example, Brazil's investment to GDP ratio of 18% stands as the lowest of the E7, compared to China, at 45%, and India and Indonesia at almost 35%. In fact, Brazil has seen a fall in its investment to GDP ratio since 2000.

One measure where the E7 have made a notable improvement (with the exception of Brazil, which has seen little change) is regarding government effectiveness. This captures the perceptions of the quality of public services and the credibility and accountability of the government to implement sound economic and social policies. Of the G7, China has made the most progress in this regard, as it has developed public services such as education and transport, and strengthened its economic institutions; for example, China has one of the least variable inflation rates of the E7 countries.

But there is still progress to be made. While emerging markets have made headway, their scores still sit way below those of the average advanced economy. Improving political, legal and economic institutions will leave governments better placed to implement many of the policies discussed earlier in this chapter, such as supporting labour market inclusion, making welfare systems more effective and introducing climate change regulation in an economically efficient way. This will help to deliver long-term economic growth that is environmentally sustainable and socially inclusive.

Box 8: How institutions underpin economic development and the evolving nature of global business strategy – an interview with Professor Michael G. Jacobides

What do you think are the key driving forces behind long-term growth variations across economies?

The factors you consider in your model – demographics, investment, education, technological catch-up – are clearly significant, but I would particularly emphasise the critical importance of the quality of institutions in long-term economic success or failure.

If we look at the rise of the West, for example, the development of economic and financial institutions like banking in Medici-era Florence, joint stock companies in the England and the Netherlands, and professional management of large companies in the US played a significant role in propelling economic growth from the 16th to the 20th centuries. This was supported by political systems that invested in public goods (including health and education as well as physical infrastructure) and provided legal systems that protected property rights and provided a conducive environment for long-term business investment.

More recently, we can see the importance of strong institutions in the rise of Asian economies like Singapore. This was essentially a small fishing community with no significant natural resources that transformed itself into a leading regional financial and trading centre through creating a favourable environment to do business, steered by a 'benevolent dictatorship'. This allowed Singapore to pull away from its Malaysian neighbour in terms of economic growth just as we see even more dramatically with the US and Mexico, North and South Korea, or East and West Germany before reunification. Differences in the quality of institutions, in addition to broad economic policies are at the heart of these different long-term economic development paths³⁹.

We can see these divergences now in Africa too if you compare the quality of governance in, say, Nigeria and Botswana. Or if you compare the deep-set problems now facing Venezuela after oil prices fell back as

³⁸ Regulatory quality captures perceptions of the ability of the government to implement sound policies and regulations that promote investment and private sector development. For further information on all the World Bank Governance indicators, see: <http://info.worldbank.org/governance/wgi/index.aspx#doc>

³⁹ For more details see, for example, the discussion in D. Acemoglu and J. Robinson, 'Why Nations Fail', Crown Business (2012): <http://whynationsfail.com/summary/>

compared to, say, Chile's improving plight. The root of macroeconomic imbalances are often to be found on ineffective government and governance: The Greek crisis, for instance, was fundamentally shaped by its failing public administration and worsening legal system, and its inability to bounce back relates to the fact that we have been focusing on macroeconomic symptoms rather than structural and institutional causes.⁴⁰ Italy's worsening position, and its grim prospects are also due to its malfunctioning polity. So whether it recovers or continues its slide will depend on whether we believe they can fix their institutions, not only their macroeconomic imbalances.

The challenge is that economic development and institutional improvement can lead to either a virtuous circle, with improvements begetting growth, or a downward spiral with contraction driving rent-seeking and institutional decay. Look at Turkey: because of both politics and the weakening of institutions, the economy is stalling. Will it rebound, or will the Erdogan rule preside over an unstable period of Turkey missing out on the potential that the model predicts? The evolution of institutions, and the strength and timing of reform programmes will shape global economics. Will the GCC's be able to improve their fundamentals, reduce their dependence on oil and become better places for business, combatting corruption? It will all hang in the political and institutional balance.

Looking ahead institutional development will also be key to whether India, for example, can emulate the success of China, shaking off the rather old-fashioned bureaucracy that has dampened its growth rate in the past. China's future will also depend on how polity and institutions improve over time.

Turning to business strategy, do you see an increasing threat to Western companies from emerging market competitors from countries like China and India?

Yes - but before we look at globalisation, we need to consider strategic changes. We've seen the early stages of a dramatic transformation where previously stable multi-domestic sectors – from telecommunications to financial services to healthcare – have given way to globally interdependent ecosystems. This changes the nature of competition with the “dis-integration of production and integration of trade”, as Feenstra mentioned. We also see the increase in opportunities for firms – be they based in emerging or developed economies – to find new ways to add and capture value on a global basis.

Given this new competitive reality, it's important to note that we've also recently witnessed rapid change in the technological arena. Much like Japan and Korea did a few decades ago, China and India are moving up the food chain, as we can see from the growing share of new global patents taken out by Chinese companies – which in 2014 filed for more patents than those from the US and Japan combined, according to the WIPO (www.wipo.int). Companies like Huawei and ZTE may have started as contract manufacturers but they are now major giants. The success of Xiaomi shows that design capabilities have grown as well, and Alibaba is a formidable company in the service area. In many cases, these companies have benefited from a form of 'infant industry' protection in their domestic market in China, which provides a great springboard for them to expand globally. Indian companies like Tata have stopped being subcontractors to Western companies, and have begun acquiring companies, especially in the UK, in heavy and advanced manufacturing.

So how can international companies respond to these challenges?

There is no silver bullet, but it does put more of a premium than ever on having a business strategy that is dynamic enough to respond to both the opportunities and challenges that emerging markets present. For large companies this typically involves creating a global ecosystem of suppliers and partners to support development and marketing of products and services, focusing on capturing most of the value in their ecosystem.⁴¹

We should also remember that there aren't only challenges but also opportunities. Consider, for instance, the success of teleradiology companies based in the UK who orchestrate the provision of remote diagnostics from

⁴⁰ See the chapter by Jacobides in Vayanos et al, *Beyond Austerity : Reforming the Greek Economy*, MIT Press (2017) <https://mitpress.mit.edu/books/beyond-austerity>

⁴¹ See M.G. Jacobides and J.P. MacDuffie, 2013, “How to Drive Value your Way”, *Harvard Business Review*, Vol 91, No. 7: 92-100 (<https://hbr.org/2013/07/how-to-drive-value-your-way>)

global networks of radiologists around the globe. If opportunity abounds, the question becomes who can take advantage of it and become the bottleneck - this could be either a Western or emerging market company, and it will all depend on effective strategy and strong execution. The world is becoming less forgiving and more exciting.

At the same time, you also need 'patient capital' that is prepared to ride out the inevitable ups and downs of markets, which has been in short supply in recent times in countries like the US and the UK. This is one area where Asian companies may have a competitive edge, where there seems to be a more strategic view of company success. Being able to leverage the needs of various actors and use them to strengthen your company's position will become crucial.

And how should policymakers in the West respond?

The danger is that there is a reversion to crude protectionism that is too focused on supporting declining industries with strong political leverage. The focus of any industrial strategy should rather be on new technological areas with long-term growth potential, which may indeed need support in the initial stages of their development.

As in other areas, however, the key to getting this right is strong government departments and regulators that can make decisions in the long-term interests of the economy as a whole, rather than being captured by special interests. So, in the end, it does come back to the quality of institutions.



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5. Opportunities for business – winning in emerging markets

Key findings

1. Variability is an inevitable feature of emerging markets as they mature, but businesses should not shy away from engaging with these markets given their long-term growth potential.
2. PwC's framework for operating in emerging markets (based on our extensive experience as professional advisers in this field) outlines the importance of developing flexible and innovative business models that adapt to local operating conditions and exploit new technological 'go-to-market' channels.
3. We illustrate how this strategic framework can be applied in practice through three case studies of Western businesses that entered emerging economies and overcame serious challenges to become leading players in local markets. Walmart, for example, is now Brazil's third largest supermarket chain after employing local workers and developing local advertising to appeal specifically to its new customer base. Kellogg has established itself as a leading cereal producer in India after overcoming some initial challenges, while GM has done the same in the Chinese car market.

5.1 What are the opportunities and challenges for businesses in emerging markets?

Variable economic growth is a normal feature of maturing emerging markets

A central message of this report is the relatively strong long-term growth prospects of emerging markets and we therefore focus particularly on these markets in this section of our report. But, as the last few years have shown, economic volatility is a key feature of emerging markets relative to most advanced economies. As emerging market growth has slowed over recent years and commodity prices have fallen from their mid-2014 peaks, some of these economies have become less attractive investments from a short term perspective. Variable growth fosters uncertainty for businesses and is often the result of high and unstable inflation, common to commodity exporting markets, which can drive up production costs and lower domestic consumption.

But variability is an inevitable feature of emerging markets as they mature to stable economies.⁴² Businesses should not shy away from engaging with these markets, especially considering that our projections indicate the E7 economies could be more than twice as large as the G7 in PPP terms by 2050. While growth may be volatile in the short-term, factors currently dampening growth, such as weak commodity prices, are unlikely to have such a large long-term impact in most emerging markets, particularly if they can diversify their economies so as to be less dependent on natural resources, as discussed in Section 4 above.

Consumer markets vary more widely in emerging than advanced economies, requiring more flexible business strategies

⁴² This point is developed in more detail in the latest annual report of the PwC Growth Markets Centre, 'Winning in maturing markets' (January 2017), which draws on a broad range of PwC research and practical experience in working in these kind of markets. This section draws on material from that report, which is available here:

<http://www.pwc.com/gx/en/issues/high-growth-markets/publications/winning-in-maturing-markets.html>

Along with economic uncertainty, consumer segments also vary widely across emerging markets in terms of basic preferences and consumer characteristics, and indeed will generally show a higher degree of variation than is typical in developed countries. As discussed in PwC's 'Bridging Growth Markets Voids'⁴³ report, this variance in consumer characteristics is due to 'institutional voids' which make for an unpredictable business environment. These voids could be in the form of a lack of infrastructure, insufficient local supplies, or a lack of coordinated distribution channels. Collectively, they create unique consumer markets with unique business challenges that require companies to adopt flexible business strategies.

In addition, consumer markets are further differentiated by customer behaviours which change as disposable income rises, as well as the residual loyalty that consumers have to domestic brands. This makes adopting a differentiated business model critical to succeeding in developing markets. But emerging markets also present considerable opportunities to businesses due to the rapid growth in the size and wealth of their consumer base, which will on average also be much more youthful than in advanced economies.

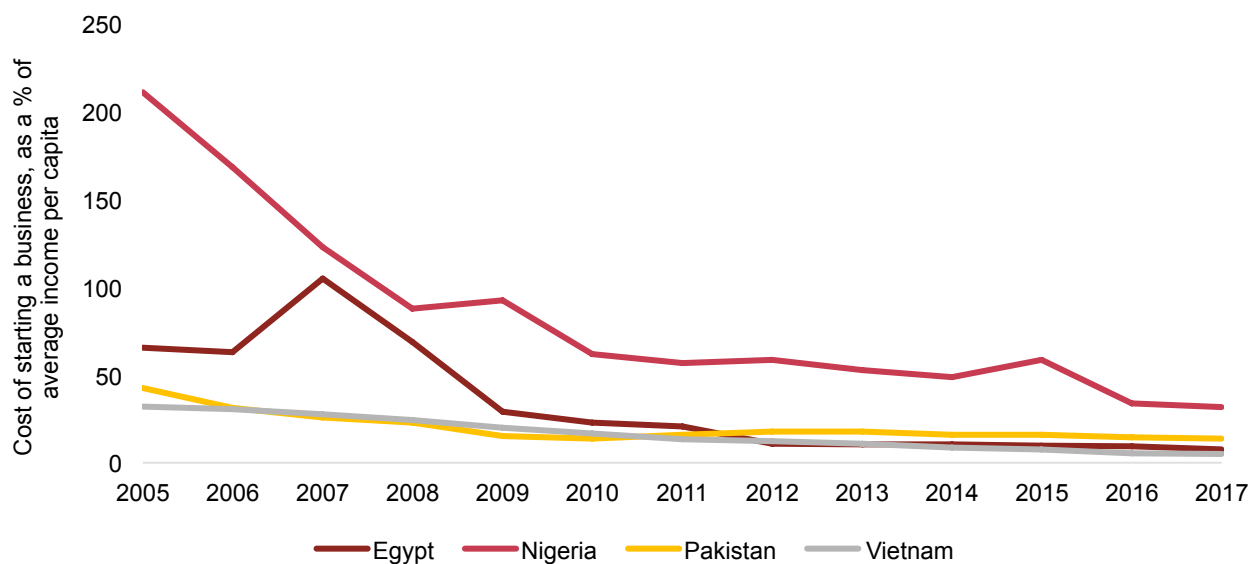
Emerging markets are becoming more business-friendly and dynamic places to do business

Despite the 'institutional voids' referred to above, emerging economies are becoming easier places for businesses to navigate and, as the Walmart case study in Box 7 illustrates, can provide businesses with strong growth opportunities.

World Bank rankings, for example, show that many emerging market economies have seen a marked improvement in their ease of doing business over the past decade, becoming much more attractive places to do business and operate in.⁴⁴ For some of the fastest growing economies identified in this report, improvements have been considerable (see Figure 26 below). In Nigeria, for example, the cost of starting a business was more than twice average income per capita in 2005, but has fallen significantly to around 30% of average income levels in 2016 – still high but moving in the right direction.

Figure 26: Cost of starting a business is falling in emerging economies

Source: World Bank



The same pattern can be observed in other key growth markets, in which processes such as gaining licenses and permits as well as notifying the relevant authorities is becoming easier. Although institutional difficulties remain, investing in these markets now may be worthwhile so as to capture the future growth in these economies.

⁴³ <http://www.pwc.com/gx/en/issues/high-growth-markets/publications/bridging-growth-markets-voids.html>

⁴⁴ World Bank, 'Doing Business': <http://www.doingbusiness.org/rankings>

5.2 How can businesses utilise emerging market potential?

An in-depth understanding of the economic and social differences of emerging markets is required to tailor operating models

Underpinning successful operation in emerging markets must be an in-depth understanding of the market and operational landscape of these economies. Businesses need to understand the fluctuations in emerging market dynamics and should adopt flexible strategies accordingly, tailoring existing businesses models and organisation structures to realise competitive advantage in these new markets. This will support them in utilising the many opportunities arising in emerging markets, which include the existence of large infrastructure gaps, expected shifts in demographics and consumer demands, and the emergence of new technologies and operating models.

In order to succeed, companies cannot withhold investments and adopt a 'wait and see' approach or they risk losing out to more nimble domestic and foreign competitors, a point underlined by the interviews carried out by our Growth Markets Centre⁴⁵. Rather, companies should adopt flexible, robust and innovative business models, which in many cases may be fundamentally different to those used in developed markets as discussed further below. Walmart (see Box 9) provides an example of a firm which only succeeded in an emerging market after completely changing its business operating model to suit the requirements of the Brazilian market.

Box 9: How Walmart adapted its operating market to the Brazilian market⁴⁶

Walmart was optimistic when it entered the Brazilian market in partnership with Lojas Americanas, the country's leading department store chain, as it sought growth outside the relatively saturated US market. The firm invested \$120m in its first year in the market, seeking to make the most of its buying power, efficient store management and the effective use of technology in supply chain management. However, despite high demand for its low price products, the company registered a loss of \$16.5m in its first year, as some products were left untouched and sales managers were incentivised to decrease prices below their optimal levels.

The overarching problem facing Walmart was its failure to adapt its operating model to adjust to the needs of the Brazilian market. Firstly, consumers visited department stores less frequently and were accustomed to dynamic 'high-low' pricing strategies common to many Brazilian retailers, in which products were originally sold at a premium price and heavily discounted in due course. Finally, these problems were compounded by the institutional voids referenced above, such as the relatively poor technology of local Brazilian suppliers and the lack of coordination amongst local distributors.

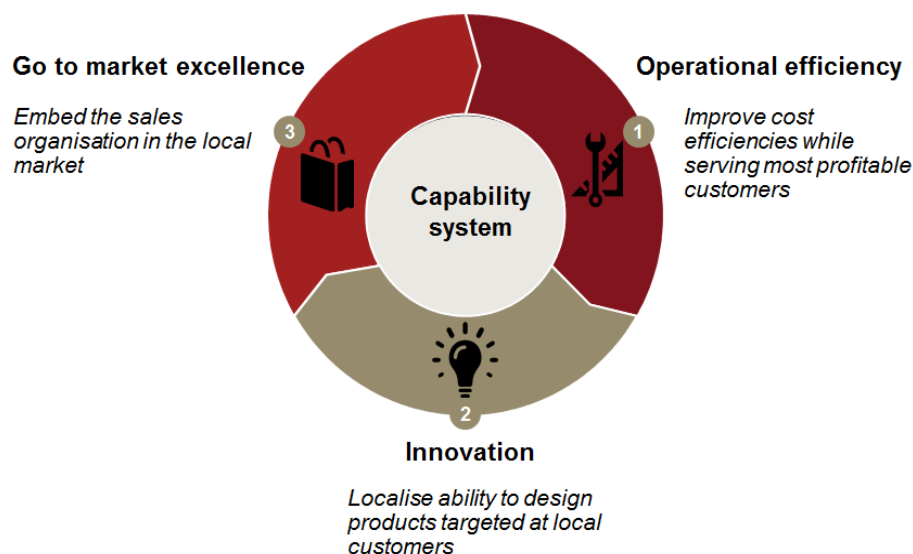
To resolve these issues, Walmart focussed on the areas in which it possessed competitive advantage such as superior customer service and a broad merchandise mix. It employed local workers and developed local advertising to successfully launch private labels. Following these changes, Walmart became Brazil's third largest supermarket chain, with sales of \$7.5bn in in 2013, serving an average of 1 million customers daily. Only after overhauling its operating strategy did Walmart succeed in the Brazilian market.

⁴⁵ PwC's Growth Markets Centre: <http://www.pwc.com/gx/en/issues/high-growth-markets.html>

⁴⁶ This case study, along with others from our practical experience, is described further in PwC's Bridging Growth Market Voids report here: <http://www.pwc.com/gx/en/issues/high-growth-markets/publications/bridging-growth-markets-voids.html>

PwC's Strategy& has developed a framework of core capabilities which businesses should consider when exploring emerging markets (Figure 27). We discuss each of the three elements of this in turn below.

Figure 27: PwC framework for businesses operating in emerging markets



1. Operational efficiency

Underlying any successful business strategy are strong core capabilities, achieved through continuously improving productivity and efficiency in their production and supply chains. Controllable internal costs such as wages, suppliers and materials should be differentiated from external costs such as regulatory compliance and interest payments. This allows companies to identify their cost drivers, and thus the potential levers of change used to manage costs in changing emerging markets⁴⁷. For instance, rising wages in emerging markets could encourage increased automation of manual labour processes as part of a more general optimisation of manufacturing activities in these locations. Another cost driver could stem from frequently changing consumer preferences, which could be managed by improved supplier sourcing.

Further to obtaining clear oversight over costs, companies should adopt appropriate levels of governance, which both protect their brand and remain workable in emerging markets. For multinationals, a global governance framework may be impractical, and firms should consider the level and frequency of reporting necessary to manage the business. Furthermore, fiscal models used in mature economies may be inappropriate for emerging markets, due to uncertain data, developing IT capabilities and differing tax and regulatory challenges.

Due to these differences, companies investing in emerging markets should consider adopting more decentralized management functions, such as supply chain management. This would allow for differing governance frameworks to be adopted in developing economies, while also adopting global best practices where appropriate. Identifying local strategic partners may help to mitigate these difficulties, and should be considered in markets which are likely to continue to mature for years to come.

2. Innovation

For sustainable and long-term success in emerging markets, companies need to innovate. This could take the form of: developing agile processes and asset-light business models; adapting technological systems to local conditions; designed localised products to appeal to emerging market customer segments; or achieving cost

⁴⁷ This is a key feature of PwC's 'Strategy that Works' framework. Leinwand, P., Mainardi, C., with Kleiner, A., Strategy That Works. 2016: Harvard Business School Publishing, p161.

efficiencies in the distribution mechanism. Recent research by PwC⁴⁸ highlighted the importance of research and development (R&D) spending, finding it to be strongly correlated with premium operating margins.

Innovation is often a stepwise process, with companies acquiring new capabilities along the way, such as enhanced customer intelligence, new cross-sector and international business relationships, and intellectual property. Box 10 illustrates the challenge to large firms in matching the smaller entrepreneurial companies in emerging markets like India, confounded by the difficulty of building on brands established in significantly different developed markets. Kellogg's case emphasises that innovation does not need to be restricted to new products, but is vital in accommodating the complex local consumption behaviour and tastes in emerging markets. It also highlights the value of developing a strong brand to establish a unique position in these new markets. Businesses should not be afraid to have a flexible identity, adapting their propositions to suit new markets; this forms a key feature of PwC Strategy&'s 'Strategy that Works' framework⁴⁹.

Box 10: How Kellogg's re-positioned its products to succeed in the Indian market⁵⁰

Kellogg's, a leading producer of cereal, ventured into the Indian market in 1994 as a result of rising competition and stagnating demand in its key Western markets. Initially, the company adopted a similar marketing strategy as in the US and the UK, positioning its cornflakes as a healthier breakfast option. However, this strategy did not appeal to Indian consumers, who were more accustomed to hot breakfast foods. By April 1995, monthly sales in India had declined by 25%, failing to retain customers as well as costing more than other local options.

The company then began to modify its business strategy, aligning it to the local market. To attract new customers, Kellogg's began to offer introductory promotions, lowering prices and repositioning products as "fun" cereals, rather than nutritious ones. Kellogg's also successfully localised the brand by adopting more local words such as Iron 'Shakti' and Calcium 'Shakti'. To support this new brand positioning, the company launched new sugar-coated products, such as Frosties. Regarding operations, the company shifted all sourcing, including packaging, to India. This both reduced costs and helped to consolidate its market position by widening its distribution presence.

Kellogg's went on to play a major role in quadrupling the size of the Indian breakfast cereals market from INR 150 million in 1995 to INR 600 million by the year 2000, moving on to acquire an almost two-thirds market share by then. Kellogg's has maintained its market lead and is setting up an R&D centre in India to further strengthen its technical capabilities and successful tailoring of products for the Indian market.

3. Go to market excellence

Though operational efficiency and innovation are key to addressing the unique nature of emerging markets, rapidly changing consumer behaviour and new technologies and sale channels require companies to re-think their go-to market capabilities. Consumers in emerging markets are getting richer, but what distinguishes them from consumer markets in advanced countries is that they remain relatively more price sensitive. This is partially because their relative income levels are still lower, so consumers will spend relatively more time searching for the lowest prices. It is also likely a result of the numerous digital and non-digital sales channels now available to customers, giving them more information on where the lowest prices can be found.

Tailoring go-to-market strategies should be focussed on increasing the channels available to consumers for purchases to create a fully integrated digital and in-store experience. The rapid growth in internet usage in

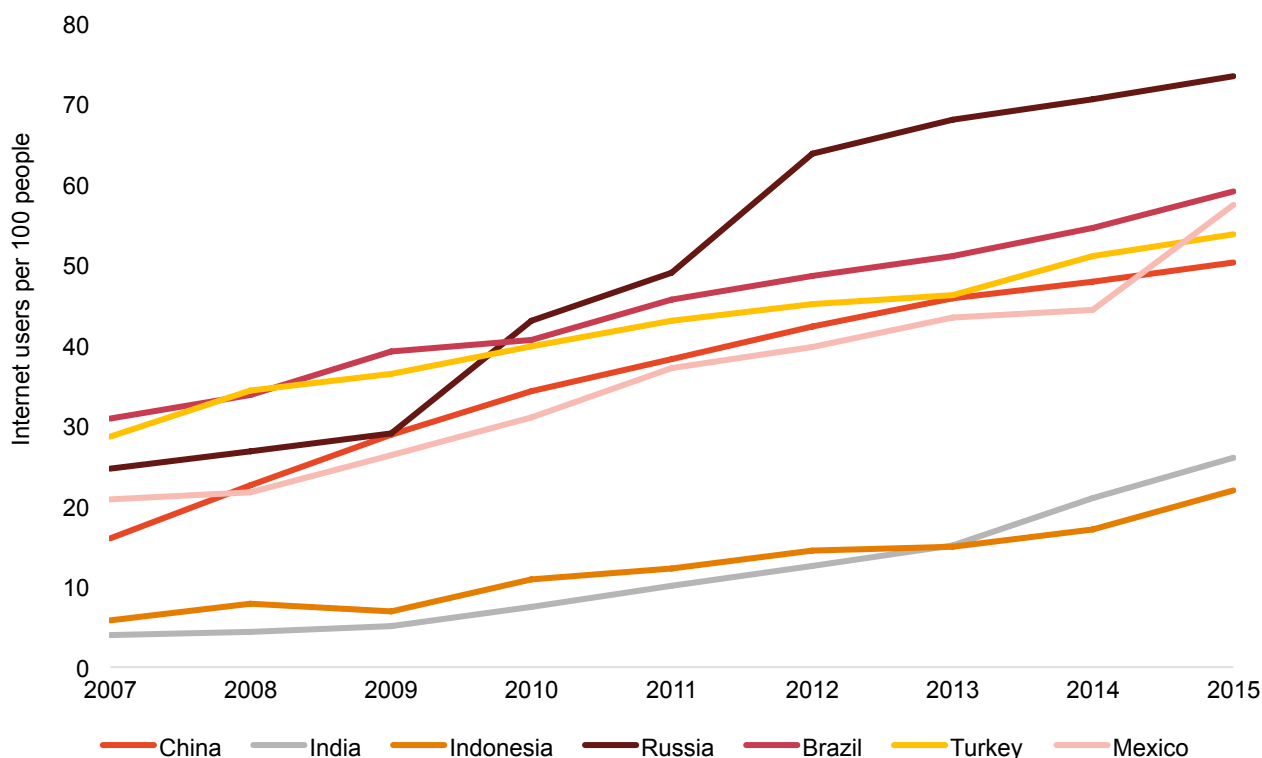
⁴⁸ PwC, 'Breakthrough innovation and growth': <https://www.pwcaccelerator.com/pwccaccelerator/docs/pwc-breakthrough-innovation-and-growth.pdf>

⁴⁹ For more details see: <http://www.strategyand.pwc.com/strategythatworks>

⁵⁰ For more details of this case study, and others like it from PwC practical experience, see: <http://www.pwc.com/gx/en/issues/high-growth-markets/publications/winning-in-maturing-markets.html>

emerging markets over the previous 15 years, displayed in Figure 28, gives retailers in these market the ability to reach new consumers in more effective ways to promote and sell their products.

Figure 28: Growth of internet users in the E7 countries



Source: World Bank

Establishing strategic local partnerships could also be important for new entrants to target future growth in emerging markets, with a focus on understanding local consumer preferences and competing with domestic brands that initially have a better understanding of the local market. General Motors is one case (see Box 11) in which a strategic partnership provided the basis for strong growth in an emerging market through an emphasis on innovation.

Box 11: How General Motors adopted a local focus in China⁵¹

Since 2001, General Motors (GM) has adopted a more locally-focused operating structure by developing regional production facilities, which enables it to serve consumers more quickly and maintain a lean inventory with efficient local logistics. In addition, it has also adapted its sales and marketing approaches to be more locally appealing whilst retaining certain functions at a global level to maintain economies of scale.

In line with this general approach, the ownership and responsibility of GM's operations in China are divided across three entities: GM Headquarters, GM China and its joint venture Shanghai GM (SGM, with the Shanghai Automotive Industry Corporation). GM Headquarters still retains control for many key capabilities, such as technology innovation, quality standards, market research and segmentation as well as product design and global brand management.

⁵¹ For more information on this case study, and others drawn from practical PwC experience, see our Growth Markets Centre report here: <http://www.pwc.com/gx/en/issues/high-growth-markets/publications/bridging-growth-markets-voids.html>

The Chinese regional entity, GM China, has the responsibility to develop product and portfolio plans for the region and executes the global brand strategy to be locally relevant and appealing. However, it is GM's local joint venture, SGM, which has the responsibility for the day-to-day manufacturing operations and the autonomy to manage the pricing and promotion strategies and local dealer relationships.

In addition to developing an effective regional operating model, GM has also managed to navigate the challenges of IP and technology protection to enable it to be the leading foreign original equipment manufacturer in R&D and production across China. GM in China has surpassed US sales and is capturing 13% of the Chinese market. China is now also a key sourcing hub for GM, with 50% of all production being sold abroad.

Businesses need to adopt flexible, dynamic and patient strategies to navigate these rapidly evolving and maturing emerging markets

It is clear that emerging markets are evolving and have a number of distinctive characteristics. This requires companies to strengthen their core capabilities through continuous improvement of the productivity of their existing systems and processes in often rapidly changing markets. This will involve a combination of applying global best practices while also remaining flexible to local conditions as Walmart did in Brazil.

In addition, R&D may provide the key for large multinational firms struggling to match the activities of smaller, local entrepreneurial enterprises, and helping to adapt products to the nuanced preferences of local consumer segments as Kellogg's did with its cereals in India.

Finally, companies may have to reposition their go-to-market strategies in order to successfully appeal to quickly changing consumer preferences and buying habits. This requires an agile business model and the use of local partnerships, as GM did in China, to navigate the complex dynamics of emerging markets.

Combining these capabilities can provide a strong foundation for successfully operating in emerging markets as they grow and mature. Business strategies need to be flexible and dynamic as our case studies illustrate, but also patient enough to ride out the political and economic storms that will inevitably affect many emerging markets from time to time. This would, for example, apply to economies like Brazil, Turkey and Nigeria today, which have been through a period of turbulence recently but, as our projections show, still have considerable long-term growth potential as consumer and business markets.

Appendices

Appendix A: Our modelling approach

A1. Model structure

In line with established economic theory and a large number of previous research studies, we adopt a simplified model of long-term economic growth⁵² in which the shares of national income going to capital and labour are assumed to be constant⁵³. GDP growth in this model is driven by assumptions on four key factors, which we discuss in turn below:

- Demographics, specifically growth in the working age population;
- Growth in the quality of labour ('human capital'), which is assumed to be related to current and projected average education levels in the workforce;
- Growth in the physical capital stock, which is determined by new capital investment less depreciation of the existing capital stock; and
- Technological progress, which drives improvements in total factor productivity (TFP).

In addition, the model also makes assumptions about future trends in real market exchange rates relative to PPP rates. These feed into the projections of GDP at market exchange rates as discussed in Appendix B below.

In applying this approach we take the US as our benchmark economy, as this is assumed to be at the 'global frontier' in terms of technology and so productivity. US GDP growth is modelled in a somewhat simpler manner based on UN working age population projections and assumed labour productivity growth of 1.5% per annum. As noted in Section 2 above, this productivity growth is lower than our assumption of 2% in our 2015 report and has been revised based on emerging research on the relative stagnation of US productivity.⁵⁴ As described further below, other countries are then assumed to catch up gradually with US productivity levels over time (at rates that vary by country depending on their circumstances).

One limitation of our model that is worth noting up front is that, although it does allow for linkages between country performance due to shifts in the global technological frontier, it does not allow for performance in one country (except the US) to affect performance in other countries directly. Capturing these inter-linkages would require a much more complex modelling approach covering trade and investment flows between countries. Our approach limits the value of the model for global simulation purposes, but is much more tractable for the purposes of producing long-term growth projections for individual countries. Furthermore, our assumptions are chosen in a manner that is intended to be broadly consistent across countries, so that they constitute a plausible 'main scenario' for the world economy as a whole.

⁵² The model goes back to the Nobel Prize-winning work of Solow (1956, 1957), which has remained the standard academic approach ever since the late 1950s and was later applied empirically by Denison (1985) and many others. A well-known more recent example of a research study on this topic is D. Wilson and R. Purushothaman, 'Dreaming With BRICs: The Path to 2050', Goldman Sachs, Global Economics Paper No.99, October 2003. This applies a similar growth modelling approach to four leading emerging market economies, except that it does not explicitly include human capital in its calculations. Given the importance of this factor, we prefer to make our assumptions on this variable explicit, as in many earlier academic studies (e.g. Hall and Jones (1998) and Barro and Lee (2001)).

⁵³ More formally, we assume a Cobb-Douglas production function with constant returns to scale.

⁵⁴ This is discussed further in research on secular stagnation by Larry Summers (<http://larrysummers.com/2016/02/17/the-age-of-secular-stagnation/>) and faltering innovation in the US by Robert Gordon (http://www.cepr.org/sites/default/files/policy_insights/PolicyInsight63.pdf).

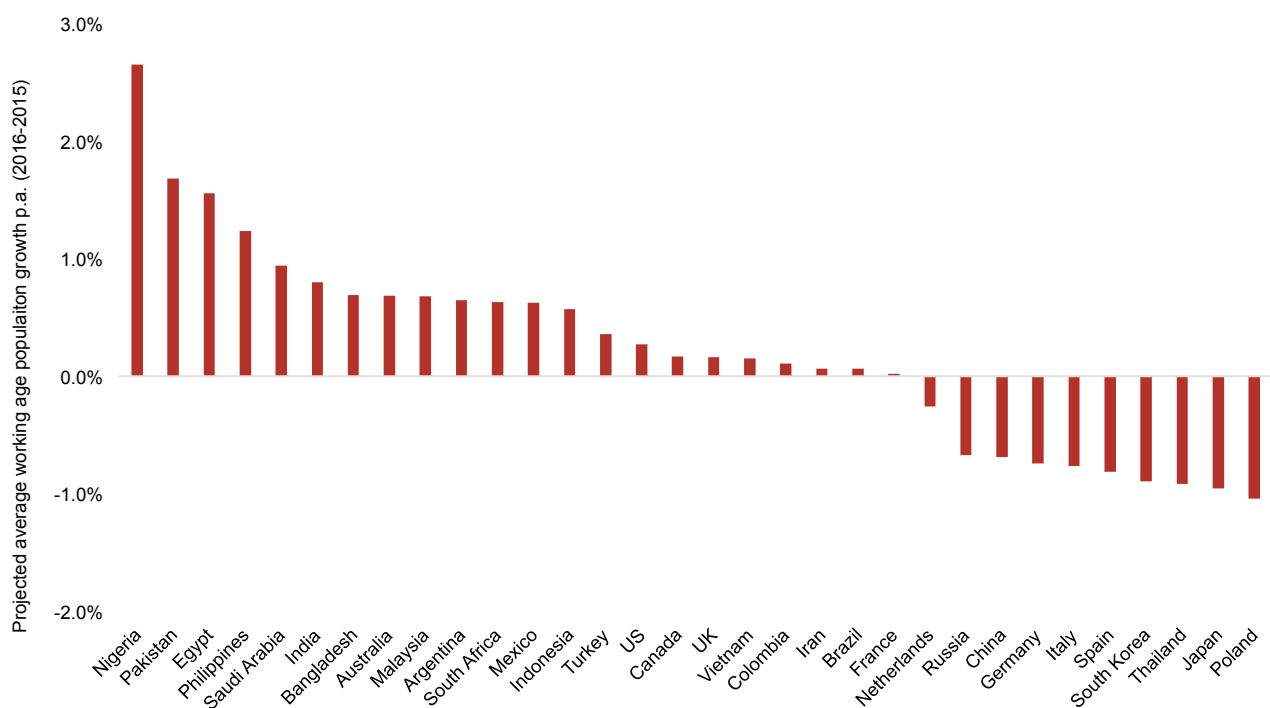
A.1.1. Demographics

We use the latest UN projections for the population aged 15-64 as a proxy for labour force growth (these include net migration). Some economies might be able to achieve faster growth here if they can raise their employment rates, but any such effects are difficult to predict and we have therefore not included them in our base case estimates.

In all but seven of the countries considered in this study⁵⁵, the working age (15-64) share of total population is projected to fall between 2016 and 2050. This is the counterpart of the fact that all 32 countries (including those projected not to see a fall in their working age population share) are projected to see a rising share of their populations aged 65 or over. Korea, Spain, Thailand, China and Poland are expected to see the largest declines in the share of the prime working age group over the period to 2050. Significant ageing effects are therefore by no means confined to the existing developed countries, but are also important for some of the major emerging market economies.

If we look instead at expected growth in working age populations (see Figure A1), then there are more countries with positive growth rates due either to relatively high birth rates (e.g. Nigeria, Philippines, India) and/or immigration rates (e.g. the US). But all of the OECD countries in Europe are facing declining working age populations, except the UK and France where they are projected to be broadly static. This is also true of Japan, South Korea, Thailand, China and Russia. The impact of a declining, ageing population is particularly significant in restricting Russia's ability to increase its share of world GDP in a similar way to other large emerging economies. An ageing population also acts as a drag on Chinese growth in the longer term relative to that of India.

Figure A1: UN estimates of average working-age population growth to 2050 (% p.a.)



Source: PwC analysis

⁵⁵ Bangladesh, Egypt, India, Pakistan, Philippines, Nigeria, and South Africa are projected by the UN to see a small rise in the share of those aged 15-64 of the total population, by an average of 3% points.

A.1.2 Education

In common with several past academic studies, we have based our estimates of the human capital stock on the data on average years of schooling for the population aged 25 and over from Barro and Lee (2001). We then follow the approach of Hall and Jones (1998), which in turn was based on the survey of international estimates of the returns to schooling in countries at different levels of economic development by Psacharopoulos (1994). Specifically, for the first four years of education, we assume a rate of return of 13.4%, corresponding to average estimates for sub-Saharan Africa. For the next four years, we assume a return of 10.1%, corresponding to the average for the world as a whole. For education beyond the 8th year, we assume estimated OECD average returns of 6.8%. This approach leads to estimates of the stock of human capital per worker as an index relative to the US.

We then assume that the average years of schooling of the over-25 population rises over time in each country at rates derived by extrapolating forward from trends over the past 5-20 years (the weight given to past averages over 5, 10 or 20 years varies across countries depending on what we consider to be the best indicator of underlying trends in education levels in each country). In line with trends over this past period, average years of schooling are assumed to rise at the slowest rate in the US, reflecting their higher starting point. This allows other countries to catch up with estimated average US levels of human capital per worker.

The fastest educational catch-up rates are assumed to be seen in Asian countries such as India and Indonesia, which is consistent with trends in recent periods and is an important factor in their relatively strong projected growth performance. Russia and Poland, with relatively high initial average education levels, make some further progress but have less scope for rapid catch-up in this area.

A.1.3. Capital investment

We began with estimates from King and Levine (1994) of capital stock to output ratios in the mid-1980s. These ratios are projected forward to our 2016 base year using data on investment as a % of GDP from the Penn World Tables (v. 8.0) database up to 2014, supplemented by IMF data for more recent years. We assume a uniform 5% annual depreciation rate of the existing capital stock both in this calculation and in the forward-looking projections, which is consistent with the 4-6% depreciation rates generally assumed in the academic literature. The resulting capital-output ratios in 2016 vary from around 1.2 in Nigeria to 3.7 in Japan (the UK ratio is around 2.6).

Looking forward, we assume that initial average annual investment/GDP ratios, which vary from around 6% in Nigeria to around 37% in China, adjust gradually to long run investment levels after 2025 that vary more narrowly from 8% in Nigeria to around 25-30% in some Asian emerging economies (see Table A1 below).

These assumptions reflect the view that, with declining marginal returns on new investment over time, the very high investment/GDP ratios seen in China and other Asian emerging markets will tend to decline in the long run as these economies mature (as has happened with Japan since the early 1990s).

In line with similar past studies, we assume for simplicity that capital has a constant 1/3 share in national output, with labour having a 2/3 share. While labour shares have declined in many advanced economies in recent years, it is not at all clear if this will continue in the long run, so we prefer to make this simpler assumption to avoid over-complicating the model.

Table A1: Investment rate assumptions

	Investment as a % of GDP	
	Initial rate (2016)	After 2025
Argentina	17%	18%
Australia	26%	22%
Bangladesh	23%	25%
Brazil	19%	19%
Canada	22%	17%
China	37%	21%
Colombia	20%	20%
Egypt	15%	17%
France	22%	18%
Germany	22%	20%
India	27%	25%
Indonesia	27%	24%
Iran	30%	19%
Italy	20%	18%
Japan	25%	20%
South Korea	31%	24%
Malaysia	28%	28%
Mexico	20%	20%
Netherlands	22%	22%
Nigeria	6%	8%
Pakistan	16%	17%
Philippines	21%	26%
Poland	20%	20%
Russia	18%	18%
Saudi Arabia	21%	25%
South Africa	18%	24%
Spain	24%	19%
Thailand	29%	29%
Turkey	21%	21%
United Kingdom	19%	18%
United States	21%	17%
Vietnam	21%	26%

Source: PwC assumptions informed by historical data from IMF

A.1.4. Technological progress

This factor is assumed to be related to the extent to which a country lags behind the technological leader (assumed here to be the US) and so has the potential for ‘catch-up’ through technology transfer, conditional upon levels of physical and human capital investment (as set out above) and other more institutional factors such as political stability, openness to trade and foreign investment, the strength of the rule of law, the strength of the financial system and cultural attitudes to entrepreneurship. These latter institutional factors are not readily quantifiable through a single index, but are reflected in our assumptions on the relative speed of technological catch-up in each country.

In some cases (e.g. India, Indonesia and Brazil), we assume a slower rate of technological progress in the short term, but assume the pace of catch-up accelerates in the longer term as these countries strengthen their institutional frameworks. In the longer term, the rate of catch-up is assumed to converge to an annual rate of

1.5% of the total factor productivity gap with the US, which is in line with the results of past academic research⁵⁶ suggesting typical long-term catch-up rates of around 1-2% per annum.

It is important to stress that this approach is only intended to produce projections for long-term trend growth. It ignores cyclical fluctuations around this long-term trend, which history suggests could be significant in the short term for emerging economies in particular, but which we cannot hope to predict more than a year or two ahead at most. It also ignores the possibility of major adverse shocks (e.g. political revolutions, natural disasters or military conflicts) that could throw countries off their equilibrium growth paths for longer periods of time, but which are inherently impossible to predict. At the same time, our modelling ignores the possibility of a sudden leap forward in the technological frontier (here represented by US labour productivity growth, which as noted above we assume to increase at a steady 1.5% per annum rate in real terms, reflecting recent historic trends) due to some major new wave of innovation either from new breakthrough discoveries not imagined yet, or innovative application of existing technologies.

A2: Historical GDP growth analysis

To support our modelling approach outlined in the above section, we conducted econometric analysis to investigate whether emerging market growth has been driven by the same fundamental variables as the growth of established nations. It is widely accepted in the literature that capital investment, education and technological progress are the key drivers of economic growth in advanced economies⁵⁷. But it is possible that drivers may be different in emerging economies.

We developed an econometric model to analyse what was driving growth over the ‘golden era’ of emerging market and developing country growth, 2000-2015. We used a standard cross-sectional model in which average annual GDP per capita growth over the period 2000-15 was regressed on: initial GDP per capita in 2000, average investment as a percentage of GDP, average government debt as a percentage of GDP, and average secondary enrolment rates. The model was also augmented with average primary commodity exports as a percentage of GDP, as these are a key component of GDP for many emerging markets.

As Table A2 below shows, all variables were found to have a statistically significant impact on real GDP per capita growth since 2000. The significance of the negative coefficient on initial GDP per capita levels provides evidence of convergence with advanced economies as lower income economies have greater potential to catch up with richer countries. In line with academic research, investment is a fundamental driver of growth. Government debt lowers economic growth by increasing instability and often resulting in tighter fiscal policy. The magnitude of the impact of education is lower than for capital investment, but the benefits of education will more likely accrue in the long-run⁵⁸, as skilled students enter the workforce.

We find that primary commodities have a statistically significant impact on growth, due to many years of high and rising prices for most of the past 15 years, but the magnitude of this impact is low compared to investment and education. These results underpin the methodology applied in our model, as well as reinforce some of the key policy implications outlined in Section 4, that emerging markets should focus on their macroeconomic fundamentals and creating diversified economies.

⁵⁶ As summarised, for example, in Chapter 6 of *Macroeconomics and the global business environment* by David Miles and Andrew Scott (John Wiley & Sons, 2004).

⁵⁷ For example, see the work of Robert Solow which uses a typical Cobb-Douglas production function, in which output is determined by labour and capital input, combined with productivity:

http://www.jstor.org/stable/1884513?seq=1#page_scan_tab_contents

⁵⁸ The variable was lagged by five years to capture some of the longer term impact of education.

Table A2: Results of our econometric analysis into the historical drivers of emerging market growth, 2000-2015

	Number of observations	114
	R ²	0.423
	F-test	16.03
Dependent variable: Average annual GDP per capita growth, 2000-15		
	Coefficient	P-value
Initial GDP per capita, 2000	-1.701	0.000
Average investment as a % of GDP, 2000-15	0.149	0.000
Average government debt as a % of GDP, 2000-15	-0.023	0.000
Average secondary enrolment, %, 1995-2000	0.045	0.000
Average primary commodity exports as a % of GDP, 2000-15	0.026	0.042
Constant	11.488	0.000

Source: PwC analysis

A3: Real exchange rates: PPPs vs. MERs

GDP at PPPs is a better indicator of average living standards or volumes of outputs or inputs, because it corrects for price differences across countries at different levels of development. In general, price levels are significantly lower in emerging economies so looking at GDP at PPPs narrows the income gap with the advanced economies compared to using market exchange rates.

However, GDP at MERs is a better measure of the relative size of the economies from a business perspective, at least in the short term. For long run business planning or investment appraisal purposes, it is crucial to factor in the likely rise in real market exchange rates in emerging economies towards their PPP rates. This could occur either through relatively higher domestic price inflation in these emerging economies, or through nominal exchange rate appreciation, or (most likely) some combination of both of these effects.

When estimating GDP at market exchange rates in 2050, a similar methodology is therefore adopted as in the original 'World in 2050' report where market exchange rates are converging to PPP rates with different converging factors depending on the type of economy. This leads to projections of significant rises in real market exchange rates for the major emerging market economies due to their higher productivity growth rates, although these projected MERs still fall some way below PPP levels in 2050 for the least developed emerging markets. We have, however, updated our methodology here with new econometric estimates of how this emerging market real exchange rate appreciation is related to relative productivity growth.

For the advanced economies, we assume that real exchange rates converge very gradually to their PPP rates at a steady pace over the period from 2016 to 2050. This is consistent with academic research showing that purchasing power parity does hold in the long run, at least approximately, but not in the short run.

In Appendix B we look in more detail at our results for GDP at MERs, which make use of these assumptions on real exchange rate movements over time.

Appendix B: Additional projections for GDP at market exchange rates

Table B1 shows the summary of GDP projections for 2016, 2030 and 2050 measured at market exchange rates. Most of the broad findings from the projected rankings based on GDP at PPPs (Table 2 in the main text) continue to hold: China overtakes the US as the largest economy in the world while India moves strongly up the rankings by 2050. Indonesia, Brazil and Mexico take their place within the top 10 rankings by 2050.

Table B1: GDP at MER rankings (at constant 2016 US\$bn)

GDP at MER rankings	2016 rankings		2030 rankings		2050 rankings	
	Country	GDP at MER	Country	Projected GDP at MER	Country	Projected GDP at MER
1	United States	18562	China	26499	China	49853
2	China	11392	United States	23475	United States	34102
3	Japan	4730	India	7841	India	28021
4	Germany	3495	Japan	5468	Indonesia	7275
5	United Kingdom	2650	Germany	4347	Japan	6779
6	France	2488	United Kingdom	3530	Brazil	6532
7	India	2251	France	3186	Germany	6138
8	Italy	1852	Brazil	2969	Mexico	5563
9	Brazil	1770	Indonesia	2449	United Kingdom	5369
10	Canada	1532	Italy	2278	Russia	5127
11	South Korea	1404	South Korea	2278	France	4705
12	Russia	1268	Mexico	2143	Turkey	4087
13	Australia	1257	Russia	2111	South Korea	3539
14	Spain	1252	Canada	2030	Saudi Arabia	3495
15	Mexico	1064	Spain	1863	Nigeria	3282
16	Indonesia	941	Australia	1716	Italy	3115
17	Turkey	830	Turkey	1705	Canada	3100
18	Netherlands	770	Saudi Arabia	1407	Egypt	2990
19	Saudi Arabia	638	Poland	1015	Pakistan	2831
20	Argentina	542	Netherlands	1007	Spain	2732
21	Poland	467	Iran	1005	Iran	2586
22	Nigeria	415	Argentina	967	Australia	2564
23	Iran	412	Egypt	908	Philippines	2536
24	Thailand	391	Nigeria	875	Vietnam	2280
25	Egypt	340	Philippines	871	Bangladesh	2263
26	Philippines	312	Thailand	823	Poland	2103
27	Malaysia	303	Pakistan	776	Argentina	2103
28	Pakistan	284	Malaysia	744	Malaysia	2054
29	South Africa	280	Bangladesh	668	Thailand	1995
30	Colombia	274	Vietnam	624	South Africa	1939
31	Bangladesh	227	Colombia	586	Colombia	1591
32	Vietnam	200	South Africa	557	Netherlands	1496

Sources: IMF for 2016 estimates (updated for Turkey), PwC projections for 2030 and 2050

Table B2 below shows the annual average growth rates measured in MERs for each country from the period to 2050. It is similar to Table 2 in the main text, but it also shows the additional contribution of projected real exchange rate movements to the average growth rates measured in constant US dollar terms. This table shows that:

- The projected real exchange rate movements from our model give a further boost to growth in dollar terms for the emerging economies relative to the advanced economies.
- On the other hand, Australia is projected to experience very gradual real currency depreciation against the US dollar as its market exchange rates is currently above PPP rates. This contributes negatively to Australian growth when measured in US dollars at MERs as compared to the domestic currency real growth projections. For most advanced economies, however, this real exchange rate effect is zero or positive but relatively small, reflecting the fact that their exchange rates are already not far from PPP rates against the US dollar.

Table B2: Breakdown of components of average real growth in GDP at MERs (2016-2050)

Country	Average Pop Growth p.a %	Average Real Growth per capita p.a %	% of growth due to MER	Average GDP growth p.a. (in USD)
India	0.7%	4.1%	2.8%	7.7%
Vietnam	0.5%	4.5%	2.4%	7.4%
Bangladesh	0.6%	4.1%	2.2%	7.0%
Pakistan	1.4%	2.9%	2.6%	7.0%
Egypt	1.4%	2.6%	2.5%	6.6%
Philippines	1.1%	3.1%	2.1%	6.3%
Nigeria	2.3%	1.9%	2.1%	6.2%
Indonesia	0.6%	3.1%	2.5%	6.2%
South Africa	0.5%	3.2%	2.1%	5.8%
Malaysia	0.8%	2.7%	2.3%	5.8%
Iran	0.4%	2.5%	2.6%	5.5%
Colombia	0.4%	2.9%	2.0%	5.3%
Saudi Arabia	1.1%	1.9%	2.2%	5.1%
Mexico	0.7%	2.5%	1.7%	5.0%
Thailand	-0.3%	2.9%	2.3%	4.9%
Turkey	0.5%	2.4%	1.8%	4.8%
Poland	-0.4%	2.5%	2.5%	4.5%
China	-0.1%	3.1%	1.4%	4.4%
Russia	-0.3%	2.2%	2.3%	4.2%
Argentina	0.7%	2.2%	1.1%	4.1%
Brazil	0.4%	2.2%	1.3%	3.9%
South Korea	0.0%	1.8%	1.0%	2.8%
Spain	-0.1%	1.5%	0.9%	2.3%
Australia	0.9%	1.3%	-0.2%	2.1%
United Kingdom	0.4%	1.5%	0.2%	2.1%
Canada	0.6%	1.2%	0.3%	2.1%
Netherlands	0.1%	1.5%	0.4%	2.0%
France	0.3%	1.3%	0.3%	1.9%
United States	0.5%	1.3%	0.0%	1.8%
Germany	-0.2%	1.5%	0.4%	1.7%
Italy	-0.2%	1.2%	0.5%	1.5%
Japan	-0.5%	1.4%	0.1%	1.1%

Source: PwC analysis

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