**Global Economics Paper**

# The Path to 2075 — Slower Global Growth, But Convergence Remains Intact

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- Two decades since we first set out long-term growth projections for the BRICs economies, we are updating and expanding those projections to cover 104 countries out to 2075. We identify four major themes for the global economy:
- **Theme #1: Slower global potential growth, led by weaker population growth.** Our projections imply that global growth will average a little under 3% per year over the next ten years and will be on a gradually declining path, primarily reflecting slower labour force growth. Global population growth has halved over the past 50 years, from 2% per year to less than 1%, and is expected to fall to close to zero by 2075.
- **Theme #2: EM convergence remains intact, led by Asia's powerhouses.** Although real GDP growth has slowed in both developed and emerging economies, in relative terms EM growth continues to outstrip DM growth. Our projections imply that the world's five largest economies in 2050 (measured in real USD) will be China, the US, India, Indonesia, and Germany (with Indonesia displacing Brazil and Russia among the largest EMs). By 2075, with the appropriate policies and institutions, Nigeria, Pakistan and Egypt could be among the world's largest economies.
- **Theme #3: A decade of US exceptionalism that is unlikely to be repeated.** The US's relative performance has been stronger than expected over the past decade. However, history suggests it is unlikely to repeat this over the next decade. US potential growth remains significantly lower than that of large EM economies, and we expect some of the US Dollar's exceptional strength of recent years to be unwound over the next 10 years.
- **Theme #4: Less global inequality, more local inequality.** Twenty years of EM convergence has resulted in a more equal distribution of global incomes. However, while income inequality *between* countries has fallen, income inequality *within* countries has risen. This poses a major challenge to the future of globalisation.

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# 1. Four Major Themes for the Global Economy

We thank Jan Hatzius, Andrew Tilton, Kamakshya Trivedi, Hui Shan, Andrew Matheny, Goohoon Kwon and Santanu Sengupta for their helpful comments.

It is almost twenty years since we first set out long-term growth projections for the BRICs economies and a little over ten years since we updated and expanded those projections to cover 70 emerging (EM) and developed (DM) economies.[1] Eleven years on, we are updating, expanding and extending our long-term projections, incorporating new data and new methods. Our revised projections now cover 104 countries, and we have extended our projection horizon from 2050 to 2075.

In the period since our 2011 projections, the global economy has been buffeted by a number of secular challenges and economic shocks: disappointing productivity growth in the aftermath of the Global Financial Crisis (GFC), a rise in global protectionism, the Covid-19 pandemic and, more recently, the war in Ukraine. Despite these headwinds, most of the key features of both our 2003 and 2011 projections have remained intact. However, others now need to be re-visited.

In our updated projections, we identify four major themes for the global economy:

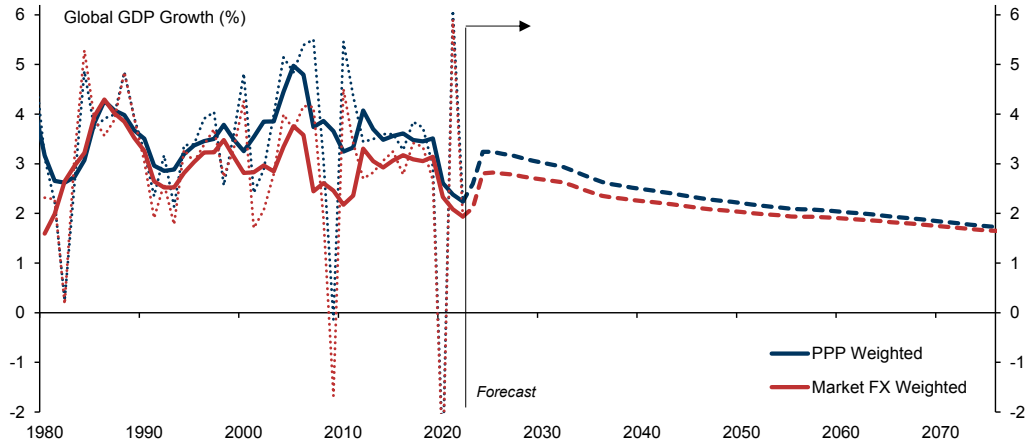
**Theme #1: Slower global potential growth, led by weaker population growth.** Global growth has slowed from an average of 3.6% per year in the 10 years to the Global Financial Crisis, to 3.2% per year in the decade prior to the Covid pandemic (measured on a market-weighted basis). The slowdown has been relatively broad-based, affecting both developed and emerging economies. It has reflected a combination of both slower global population growth and weaker productivity growth, with the latter appearing to be linked to a slowdown in the pace of globalisation.[2] Our projections imply that we have passed the high-water mark of global potential growth, with global growth averaging 2.8% between 2024 and 2029 and on a gradually declining path thereafter (Exhibit 1).

Most of this projected slowdown is due to demographics. Global population growth has halved over the past 50 years, from around 2% per year to less than 1% currently, and UN population projections imply that it will fall to close to zero by 2075 (Exhibit 2). While some of this slowdown had previously been anticipated, population projections are also being revised lower (the global population is now expected to peak at around 10 billion people, having previously been expected to rise to more than 11bn). This is a 'good problem' to have, in that global population control is a necessary condition for long-term environmental sustainability. Nevertheless, this adjustment to weaker population growth and ageing populations presents a number of economic challenges (most notably, from rising healthcare and retirement costs). The number of DM and EM countries for which population ageing represents a serious economic challenge is likely to rise steadily over the coming decades.

[1] The BRICs acronym was coined by Jim O'Neill, our former Chief Economist, in the 2001 publication ("Building Better Global Economic BRICs", *GS Global Economics Paper*, 30 November 2001). However, the first set of long-term growth projections for the BRICs and other economies didn't appear until 2003 ("Dreaming with BRICs: The Path to 2050", *GS Global Economics Paper*, 1 October 2003). These projections were then updated and extended to include 70 economies in 2011 ("The BRICs 10 Years On: Halfway Through the Great Transformation", *GS Global Economics Paper*, 7 December 2011).

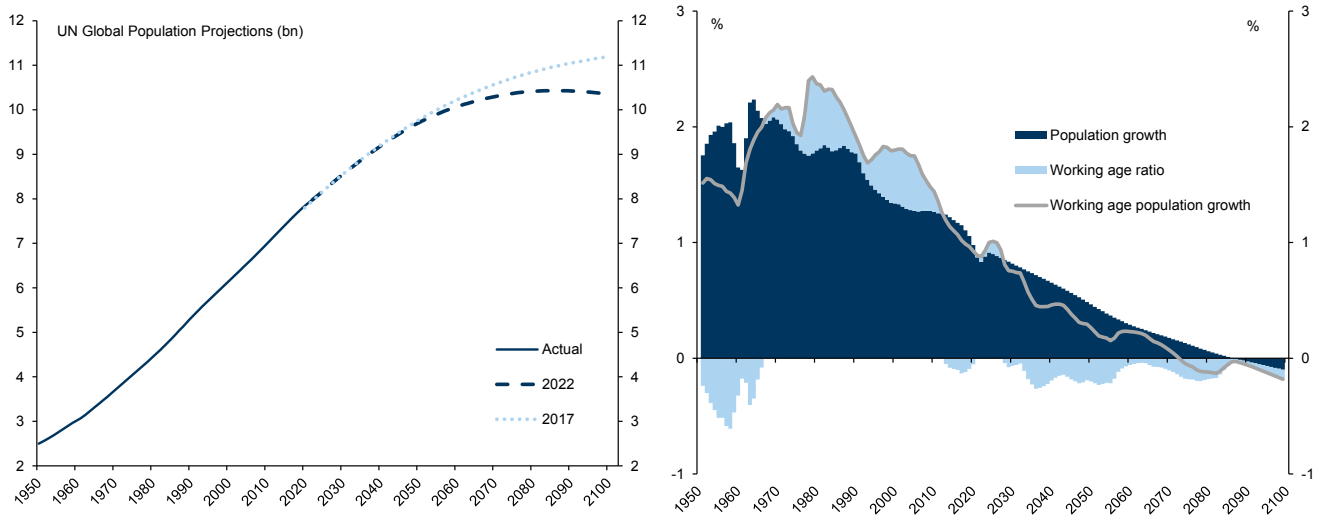
[2] "Is the World Deglobalizing, Slowbalizing or Newbalizing?", *Global Economics Comment*, 18 April 2022.

**Exhibit 1: Global Potential Growth on a Gradually Declining Path**
Global GDP growth; solid line - 5Y centred average; dotted line - annual growth




Source: Goldman Sachs Global Investment Research, IMF

**Exhibit 2: Global Population Growth Has Halved Since the 1960s/70s and The Projected Peak Population is Now Falling**
UN global overall population and working-age population projections

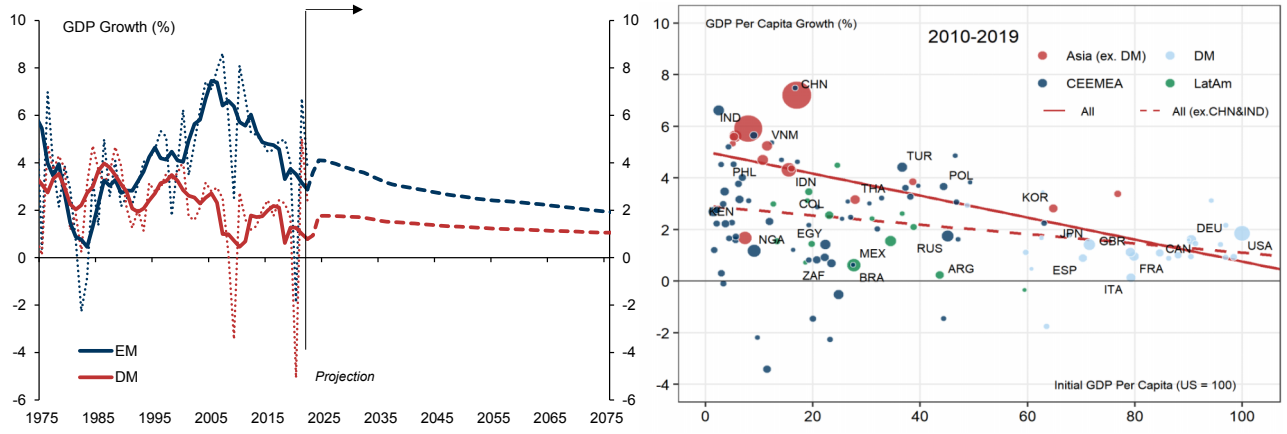



Source: United Nations (UN), Goldman Sachs Global Investment Research

**Theme #2: EM convergence remains intact, led by Asia's powerhouses.** While real GDP growth has slowed in both developed and emerging economies, in relative terms EM growth continues to outstrip DM growth (Exhibit 3). The pace of this convergence has slowed slightly relative to the 2000s but is significantly faster than in the decades prior to this (when cross-country income convergence was the exception rather than the norm). Maintaining income convergence implies that the share of global GDP accounted for by EMs will continue to rise over time[3]; their incomes will converge slowly towards developed economy levels; and the distribution of global income will shift towards this growing group of 'middle-income' economies.

[3] The slowdown that we expect in global potential GDP growth would be larger were it not for the increasing share of global GDP accounted for by (relatively fast-growing) EMs.

**Exhibit 3: Although Growth Has Slowed in Both DMs and EMs, EM Income Convergence Remains Intact**
EM vs. DM growth comparison (LHS); scatterplot of GDP per capita versus gap vs. US (LHS)




Source: Goldman Sachs Global Investment Research

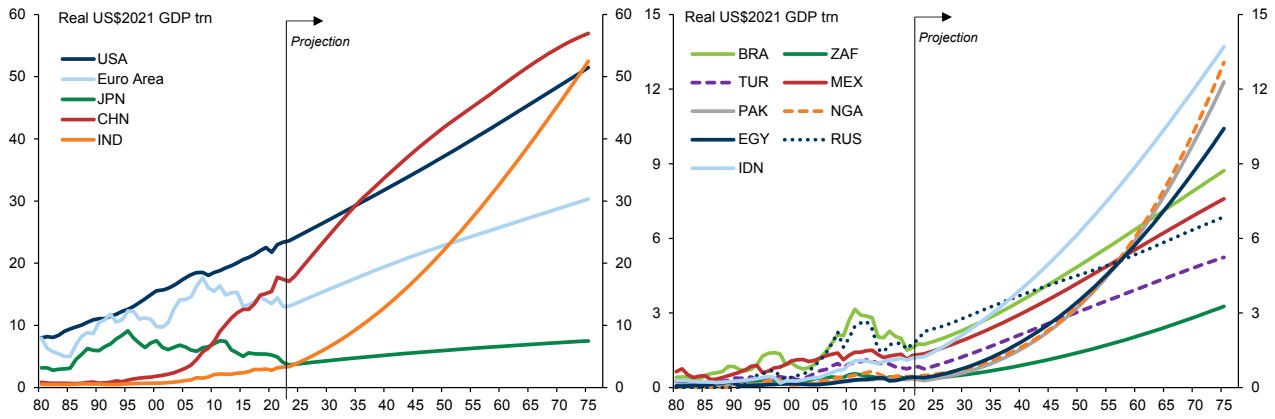
Although GDP growth disappointed our 2011 projections in the majority of economies, the pattern was far from uniform. China, India, and Indonesia all slightly outperformed our forecasts, while Russia, Brazil, and Latin America more generally significantly underperformed our projections. As a consequence, we expect that the weight of global GDP will shift (even) more towards Asia over the next 30 years. In 2050, our projections imply that the world's five largest economies (measured in USD) will be China, the United States, India, Indonesia, and Germany (with Indonesia displacing Brazil and Russia among the list of largest EMs over this horizon; Exhibit 4). If we extend the projection horizon to 2075, the prospect of rapid population growth in countries such as Nigeria, Pakistan and Egypt imply that – with the appropriate policies and institutions – these economies could become some of the largest in the world (Exhibit 5).

**Exhibit 4: Our Projections Imply that China, the United States, India, Indonesia, and Germany Will be the World's Five Largest Economies in 2050**
World's largest economies (measured in USD)

| *Ranking* | 1980 | 2000 | 2022 | 2050 | 2075 |
|---|---|---|---|---|---|
| 1 | United States | United States | United States | China | China |
| 2 | Japan | Japan | China | United States | India |
| 3 | Germany | Germany | Japan | India | United States |
| 4 | France | United Kingdom | Germany | Indonesia | Indonesia |
| 5 | United Kingdom | France | India | Germany | Nigeria |
| 6 | Italy | China | United Kingdom | Japan | Pakistan |
| 7 | China | Italy | France | United Kingdom | Egypt |
| 8 | Canada | Canada | Canada | Brazil | Brazil |
| 9 | Argentina | Mexico | Russia | France | Germany |
| 10 | Spain | Brazil | Italy | Russia | United Kingdom |
| 11 | Mexico | Spain | Brazil | Mexico | Mexico |
| 12 | Netherlands | Korea | Korea | Egypt | Japan |
| 13 | India | India | Australia | Saudi Arabia | Russia |
| 14 | Saudi Arabia | Netherlands | Mexico | Canada | Philippines |
| 15 | Australia | Australia | Spain | Nigeria | France |

Source: Goldman Sachs Global Investment Research

**Exhibit 5: China to Overtake US in Around 2035, While India Should Catch up By 2075; EM Leaderboard to Change Significantly by 2075**
GDP level projections in Real (2021) USD trillion

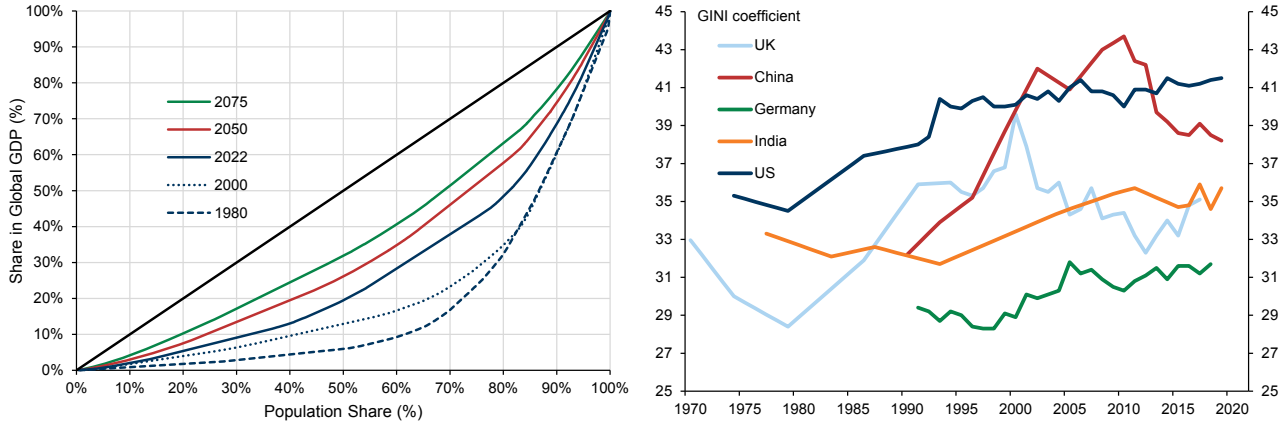



Source: Goldman Sachs Global Investment Research

**Theme #3: A decade of US exceptionalism that is unlikely to be repeated.** Uniquely among large, developed economies, the US slightly outperformed our long-term real GDP growth projections over the past decade. Moreover, with the Dollar also appreciating sharply over this period, the relative USD value of the US economy significantly outstripped our expectations. It is not unusual for individual countries to significantly out- or underperform long-term projections of this type over 5- to 10-year periods – indeed, other countries outperformed by more than the US. The question is whether this outperformance is likely to be repeated over the next decade. On balance, we think not. US potential growth remains significantly lower than that of large EM economies, including China and (especially) India. Moreover, the US Dollar's exceptional strength in recent years has resulted in it rising significantly above its PPP-based fair value, and this deviation implies that it is more likely to depreciate over the coming 10 years.

**Theme #4: Less global inequality, more local inequality.** Twenty years of EM convergence has resulted in a more equal distribution of global incomes. This has been an underappreciated benefit of globalisation over the past 20-25 years and our projections imply that it will continue. However, while income inequality *between* countries has fallen, income inequality *within* countries has risen. And, as governments are responsible for (and ultimately held accountable for) national rather than global developments, the global perspective is not well represented politically. This presents a major challenge to the process of globalisation.

**Exhibit 6: Cross-Country Inequality to Continue Declining, While Within-Country Inequality Remains High**
Global Lorenz Curve – closer to the 45-degree line implies less inequality (LHS); GINI coefficients for major economies (RHS)




Source: Goldman Sachs Global Investment Research, World Bank

**Key long-term risks: Protectionism and climate change.** The future is uncertain, and the long-term future especially so. Of the many risks to our projections, we view two as particularly important for world growth and income convergence.

- First, the risk that populist nationalism leads to increased protectionism and a reversal of globalisation. Populist nationalists have gained power in several countries and the supply chain disruptions during the Covid pandemic have resulted in an increased focus on on-shoring and supply chain resilience. At least to date, this has led to a slowdown rather than a reversal of globalisation, in our assessment. However, the risk of a reversal is clear. Globalisation has been a powerful force in reducing income inequality across countries but, to ensure that it continues to do so, greater efforts need to be made to share its benefits more equally within countries.
- Second, the risk of environmental catastrophe presented by climate change. We reject the view that economic growth and environmental sustainability are incompatible – many countries have been able to 'de-couple' economic growth from carbon emissions, so there is no practical reason why this should not be achievable for the global economy as a whole. But achieving sustainable growth requires economic sacrifices and a globally coordinated response, both of which will be politically difficult to achieve.

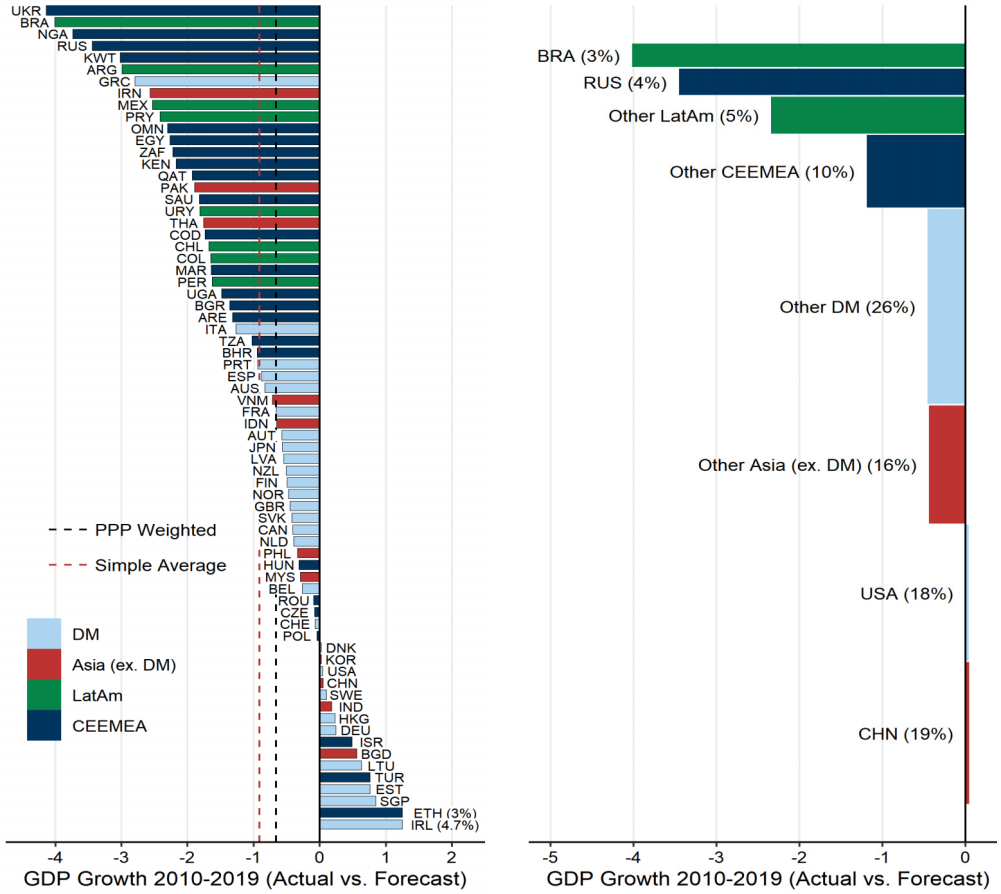
# 2. Back to the Future — Lessons from the Past for What Lies Ahead

The 10 years following the creation of the BRICs acronym in 2001 represented a golden era for emerging market economic and financial market outperformance. Between the early 2000s and the 2007/08 Global Financial Crisis (GFC), growth was unusually strong in most economies and especially so in EMs, fuelled by exceptionally rapid globalisation. And, while the Global Financial Crisis drove developed economies into a deep and lengthy recession, the majority of EMs weathered that storm relatively well. For most economies and in most respects, our first set of BRICs projections underestimated the speed of EM convergence over the subsequent 10 years.

The same was not true for the 10 years after that. In Exhibit 7 we compare actual GDP growth for the period 2010-2019 with our 2011 projections.[4] GDP growth has undershot our 2011 estimates by an average of 0.6 percentage points per year (based on a PPP-weighted average). The most notable underperformers have been Russia, Brazil, and Latin America more generally. That said, the cross-country performance has been mixed, with the world's two largest economies – the US and China – matching our projections and India slightly surpassing them.

[4] We run the comparison between 2010 and 2019 (rather than between 2010 to 2020) to avoid capturing the effects of the Covid pandemic on GDP, most of which we expect to be recouped over time.

**Exhibit 7: GDP Growth Has Averaged 0.6pp Weaker than We Expected in 2011**
Cross-Country Comparison of Forecast Errors (2010-2019, LHS); GDP Weighted Forecast Errors (RHS)



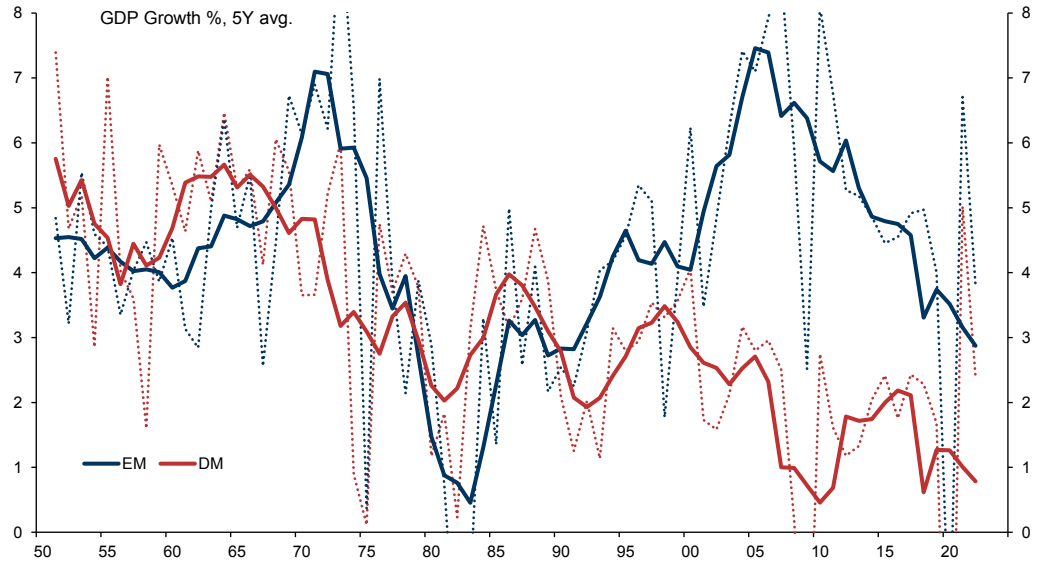

Source: Goldman Sachs Global Investment Research

## A Smaller Gap Between EM and DM Growth

To improve our projections of the future, we must first learn the lessons from the past. Exhibit 8 displays EM and DM annual GDP growth on a PPP-weighted basis since 1950. EM GDP growth only started to outstrip DM GDP growth consistently from the mid-1990s onwards. Prior to this, EM convergence was the exception rather than the rule.[5]

[5] It is worth noting that there was no obvious pattern to our projection of 'hits' and 'misses' over the past 10 years. The cross-country growth performance was largely unrelated to income levels (i.e., it is not generally the case that DM countries did better on average than EM countries). Terms of trade developments were one partial differentiator: countries suffering from terms of trade deteriorations fared worse, on average. But, given the inherent uncertainty of commodity price developments, it is difficult to draw lessons from this for our forecasts of future economic growth.

**Exhibit 8: EM Outperformance Only Became the Norm in the late 1990s; The Gap Between EM and DM Growth Has Narrowed in Recent Years But Remains Substantial**
GDP growth rates for EM and DM economies (solid line - 5Y avg., dotted line - individual years)

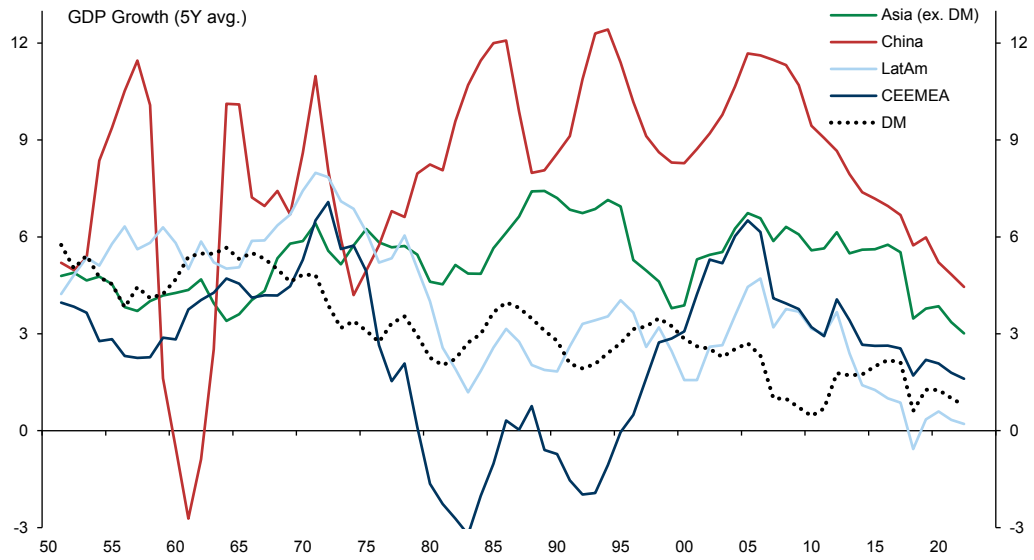



Source: IMF, The Conference Board, Goldman Sachs Global Investment Research

To better understand the geographical drivers of EM's outperformance, Exhibit 9 plots GDP growth for China, emerging Asia ex. China, CEEMEA, Latin America and the DM aggregate on a 5-year rolling basis. By far the largest part of EM's GDP growth outperformance vs. DM has been driven by Asian economies, and by China in particular. CEEMEA economies have also outperformed the DM average since 2000, albeit to a lesser extent, which represents a marked change from the late-1980s/early-1990s, when the CEEMEA region was the most prominent underperformer.[6] Lastly, GDP growth in Latin America has fluctuated around the DM average, underperforming the DM aggregate in recent years, having outperformed in the late 2000s and early 2010s.

[6] The collapse of the Communist regimes in Russia and CEE in 1989/1990 was the most important cause of CEEMEA's poor economic performance during this period. In addition, growth was relatively weak in Africa and the Middle East during the 1980s and 1990s.

**Exhibit 9: GDP Growth in China and EM Asia Has Consistently Outstripped DM Growth Since the 1980s, CEEMEA Has Outperformed Since 2000, While the Performance of LatAm Remains Mixed**
GDP growth (%, 5Y avg.)




Source: IMF, The Conference Board, Goldman Sachs Global Investment Research

## Asia Continues to Lead the Way, But EM Convergence Has Become More Generalised

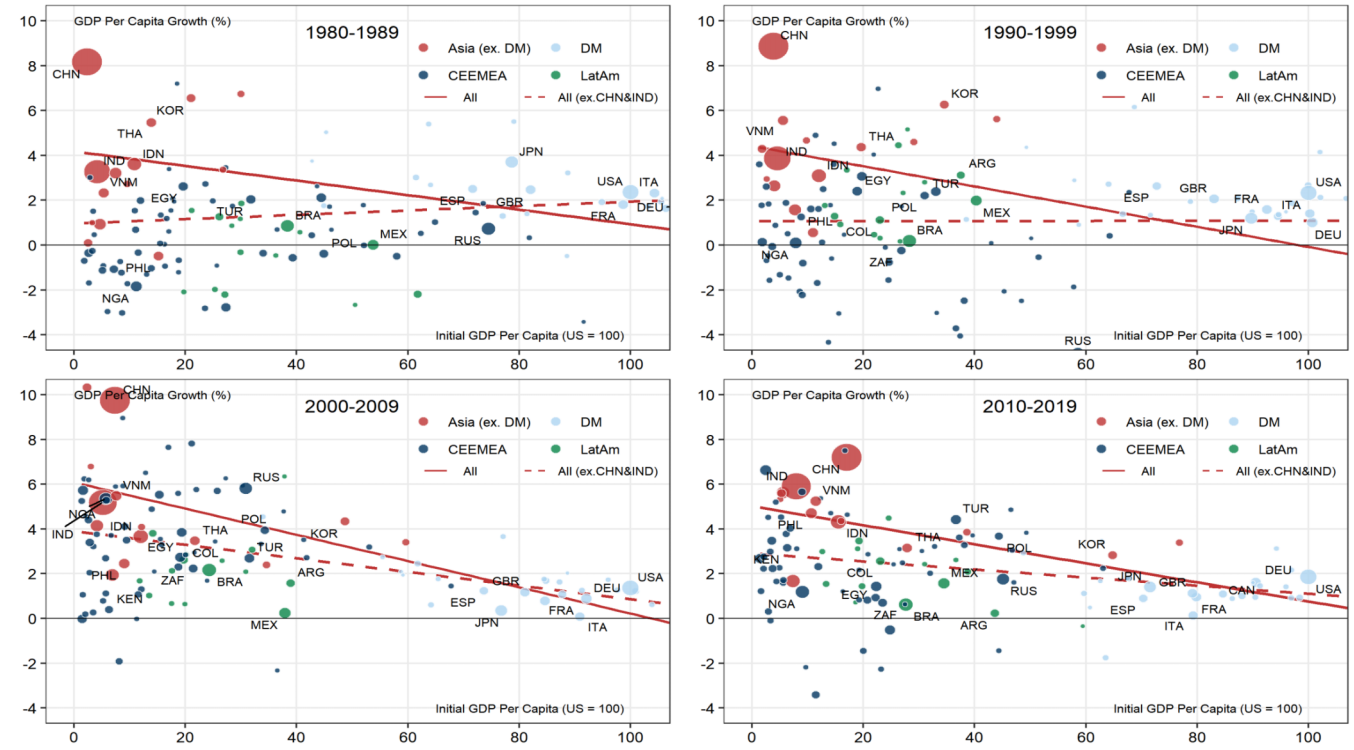
Given the outsized role that Asian economies have played in the EM convergence story, it is tempting to conclude that the narrative of EM convergence is primarily, or even exclusively, a story of Asia's convergence. However, convergence has become more generalised across EMs since the turn of the century.

Exhibit 10 plots average GDP per capita growth against initial GDP per capita levels for EM and DM economies across four separate decades (1980-1989, 1990-1999, 2000-2009, 2010-2019).[7] GDP per capita is measured relative to the US (US = 100). We also show the population-weighted lines of best fit for all 122 economies (and separate regression lines that exclude China and India).

[7] Our sample for this comparison includes 122 DM and EM economies. We exclude GCC oil-exporting economies from our sample, due to distortions to productivity measures from commodity price cycles.

**Exhibit 10: GDP Per Capita Growth Has Been Faster in Low-Income Economies than in High-Income Economies, Especially Since 2000; China and India Have Displayed Rapid Convergence**

Scatterplots by decade of GDP per capita vs. relative GDP per caita to US; bubble size - population




Source: Goldman Sachs Global Investment Research

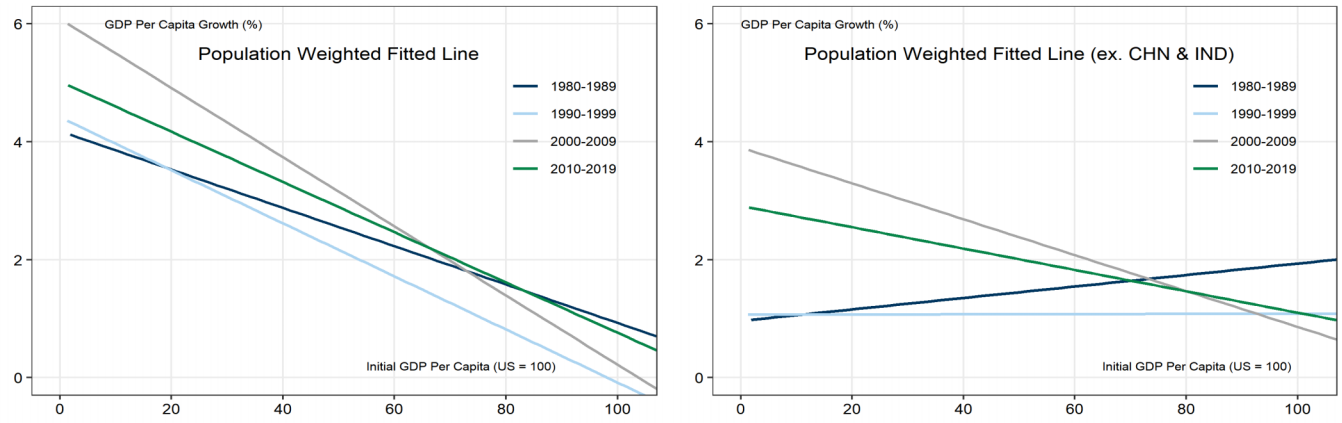
The **1980s** and **1990s** were characterised by weak average GDP per capita growth and an absence of economic convergence between developed and emerging market economies (excluding China and India, the line of best fit is slightly upward sloping, implying that relatively rich economies had faster GDP per capita growth). Among DM economies, economic growth was relatively strong in the US and Western Europe and, among EMs, growth was accelerating across East Asian economies. However, GDP per capita growth remained relatively weak in Latin America, Africa, Eastern Europe, Central Asia, and the Middle East during the 1980s and 1990s.

The **2000s** were characterised by strong average GDP per capita growth *and* income convergence between emerging market and developed economies. While GDP per capita growth slowed in the US and Western Europe, this was more than offset by an acceleration in Latin America, Africa, the Middle East and, in particular, in Eastern Europe and Central Asia. Growth in East Asian economies remained robust. The line of best fit of the relationship between GDP per capita growth and GDP per capita levels was strongly downward-sloping, implying that there was significant convergence between relative poor and rich economies. This is true both including and excluding China and India.

Over the decade prior to Covid (**2010-19**), there was a slowdown in average GDP per capita growth in both DM and EM economies. However, in contrast to the pre-2000 period, growth remained significantly faster in relatively poor EM economies than in relatively rich DM economies.

These two features of the past decade – ongoing convergence, but a downward shift in average GDP per capita growth rates – are evident in Exhibit 11, which displays how the relationship between GDP per capita growth and GDP per capita levels has changed over time.

**Exhibit 11: GDP Per Capita Has Converged Rapidly Since 2000; But Per Capita Growth has Slowed Everywhere Since 2010**
The relationship between GDP per capita growth and GDP per capita levels over time: total sample (LHS); excl. China and India (RHS)




Source: Goldman Sachs Global Investment Research

**These two features are especially relevant as we look to the future. First, there has been a generalised slowdown in economic growth in the past decade that has affected both DM and EM economies. Second, the process of EM-DM convergence has nevertheless remained largely intact.**

How rapid is this rate of convergence? Over the past two decades, GDP per capita growth in a country with 50% of the GDP per capita level of the US has been around 2.5pp higher than in an average developed economy with a productivity level close to that of the US.[8] Over a 10-year period, productivity levels in such a country would rise from 50% of US levels to around 65% of US levels.

## Slower Global Growth Due to Weaker Labour Force Growth and 'Slowbalisation'

While EM convergence has remained intact, potential growth appears to have declined in both EM and DM economies over the past decade. As a consequence, global growth has slowed from an average of 3.6% per year in the 10 years to the Global Financial Crisis, to 3.2% per year in the decade prior to the Covid pandemic (measured on a market-weighted basis).

This slowdown reflects a combination of demographic factors and a deceleration in global productivity growth. The slowdown in world labour force growth had been underway since the early 1990s but the pace of this decline picked up after 2010. Looking forward, population projections suggest that demographics will remain a drag on global growth.

[8] The slope of the regression line for 2000-2020 is around 0.05.

The reason(s) for the deceleration in global productivity growth are more open to interpretation, with two explanations commonly proposed:

- A slowdown in the pace of technological progress, which is likely to be relatively permanent in nature and which policymakers can do little to alleviate.[9]
- A slowdown in the pace of globalisation in the aftermath of the Global Financial Crisis.

In our view, the cross-country data are more consistent with the second of these two explanations. If the slowdown in global growth had been due to a reduction in the pace of technological innovation, one would expect it to have been felt most acutely in the US and other economies at or close to the productivity/technological 'frontier'. Farther away from the frontier, where there are substantial productivity gains to be made by simply implementing and replicating pre-existing technologies, one would expect productivity growth to have continued relatively unimpeded. The fact that the slowdown has similarly affected EM and DM economies argues against the technological explanation.

Instead, the timing and ubiquity of the slowdown are more easily reconciled with it being caused by a stalling in the process of trade globalisation. Exhibit 12 displays global goods trade – merchandise imports and exports – as a share of GDP. This rose sharply from the mid-1990s to the Global Financial Crisis but has stalled since the GFC.[10]

**Exhibit 12: Global Goods Trade Peaked as a Share of GDP in 2008**


Source: IMF, World Bank, Goldman Sachs Global Investment Research, Fouquin & Hugot (2016)

[9] The leading proponent of the techno-pessimist view is the economic historian Robert Gordon. His argument is essentially that, for all the technological wizardry of recent innovations (such as smart phones and social media), their contribution to productivity growth is more limited than the generation of innovations that preceded them.

[10] We include a World ex-China series in this exhibit because developments in China's trade have been sufficiently significant to materially affect the global aggregate. China's trade/GDP share has fallen from 64% to 34% over the past 10/15 years, reflecting its 'localisation' strategy of onshoring a greater share of the inputs into production.

Globalisation is not simply about goods trade – it encapsulates the growth in the cross-border movement of goods, capital, people, technologies, data, and ideas.[11] Broadly defined, we have argued that the term slowbalisation – slowing growth in cross-border moves – better describes trends for goods, capital, and people over the past 10-15 years than deglobalisation – outright declines in cross-border flows and stocks. Nevertheless, with the period of rapid globalisation now behind us, it seems unlikely that the global economy will regain the rates of productivity growth achieved during the 2000-2010 decade. Moreover, the possibility of an outright reversal is a key risk to the global outlook.

## Box 1: The Conditions for Growth

Standard (neo-classical) growth theory suggests that relatively poor, low GDP per capita economies should grow at a faster rate than relatively rich, high GDP per capita countries. This result follows directly from the assumption of diminishing marginal returns on capital: in less developed economies (where capital is scarce) the return on capital should be higher than in rich economies (where capital is plentiful); in turn, the relatively high returns on capital in less developed economies should attract investment, increasing the capital stock and raising standards of living.

However, prior to the late 1990s, cross-country studies found little evidence of poor countries growing faster than rich countries, irrespective of other factors – i.e., these studies found little evidence of 'absolute' or generalised convergence. Rather, most studies of this type found that convergence only tends to occur among economies that exhibit certain common characteristics or conditions.[12] Such convergence is said to be 'conditional'.

What conditions promote economic growth? Several ingredients are repeatedly found to be critical[13]:

1. **Institutional quality:** 'Institutions' are broadly defined in this context to cover everything from well-defined property rights and fair tax systems to the consistent application of the rule of law. Simply put, there is little incentive to invest if property ownership and/or revenues are at risk of being arbitrarily expropriated.[14]
2. **Openness to trade:** Openness to trade and FDI provides access to larger markets and new technology, and is consistently found to be a necessary condition in driving long-term economic growth.
3. **Education:** As economies grow rapidly, they require a steady supply of skilled workers, meaning that more years of schooling are a prerequisite for sustaining economic development.
4. **Macro stability:** An unstable macro environment can hinder economic development by making future returns more uncertain and by distorting prices and incentives.
5. **Infrastructure quality:** Transport infrastructure, reliable electricity supply and, increasingly, internet access are important elements in ensuring ongoing development.

[11] One issue that we do not address in this piece is the increasing difficulty that statisticians face in measuring GDP as output shifts away from tangible goods and towards technology and tech-related services. As technology becomes more important, these measurement issues are rising over time. Consequently, official data are likely to overstate the slowdown in productivity growth.

[12] A key paper in this literature is Barro and Sala-i-Martin (1992), 'Convergence', *Journal of Political Economy*,

While studies consistently find these conditions to be important determinants of growth, attempts to rank the relative importance of these factors often struggle to produce consistent results. In our view, this is because economies need to meet a minimum threshold across a broad range of factors to successfully achieve convergence. And, until countries have met these minimum thresholds, it is not possible to compensate for a missing factor with more of another.

What explains the fact that economic convergence has become more generalised since the late 1990s? Our preferred interpretation is that more economies began to implement the reforms required to bring about conditional convergence – in other words, the convergence is still conditional rather than absolute in nature, but the 'right' conditions exist across more economies.

100, 2, 223-251.

[13] It is also important to highlight the factors that do not appear to play a role in driving long-term GDP growth. In particular, it is difficult to discern any straightforward relationship between average tax levels and either GDP per capita levels or growth: there are rich economies with high taxes, poor economies with low taxes, and vice versa.

[14] The importance of institutions in economic development has been championed by the economist Daron Acemoglu. See, in particular, his 2012 book (with James Robinson) "Why Nations Fail: The Origins of Power, Prosperity, and Poverty".

# 3. Our Long-Term Projections — The Rising Importance of Major EMs

Even incorporating all the lessons from past performance, the risks involved in projecting far into the future remain substantial. We view the results of this process less as a forecast and more as a method of uncovering broad global dynamics and their long-term implications. Nevertheless, we think there is significant value in pinning down the main drivers of growth, gathering all the information we have on these, and incorporating that information into a coherent model. The forecast model that we use, together with the changes we have made relative to our previous projections, are discussed in Box 2 and set out in detail in an appendix. The outputs from this exercise are based on a unified approach and, due to the absence of country-specific considerations, may differ from our country forecasts (although, in practice, our medium-term projections are typically close to our existing estimates of potential growth).

Exhibit 13 provides a high-level summary of our projections for the major regional aggregates, broken down by decade. Because of the large swings in GDP growth generated by the Covid pandemic, the 2024-29 column provides the cleanest indication of what our model indicates for near-term potential growth.[15] Our projections imply that global growth in 2024-29 will be faster than in 2020-24, but slower than in the 2010-19 decade (2.8% vs. 3.2%, based on market FX weights). We project that EM growth will continue to outstrip DM (3.8% vs. 1.8%), with more than half of this difference due to (relatively predictable) demographic factors rather than (less predictable) productivity growth differentials. We expect Asia (ex-DM) to remain the fastest-growing region but, reflecting a marked slowdown in Chinese potential growth, it is also projected to see the largest deceleration relative to 2010-19.

[15] We use estimated data for 2022 and GS or IMF forecasts for 2023. The model forecast then 'kicks in' from 2024 and beyond.

**Exhibit 13: A Gradual Slowdown in Global Economic Growth, With EM Growth Continuing to Outstrip DM**

| | 2000-2009 | 2010-2019 | 2020-2029 | 2024-2029 | 2030-2039 | 2040-2049 | 2050-2059 | 2060-2069 | 2070-2079 |
|---|---|---|---|---|---|---|---|---|---|
| **Market FX Weighted** | | | | | | | | | |
| World | 2.7 | 3.2 | 2.4 | *2.8* | 2.5 | 2.1 | 2.0 | 1.8 | 1.7 |
| DM | 1.6 | 1.9 | 1.5 | *1.8* | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 |
| EM | 5.7 | 5.1 | 3.6 | *3.8* | 3.2 | 2.6 | 2.3 | 2.1 | 1.9 |
| Asia (ex. DM) | 7.6 | 6.7 | 4.1 | *4.2* | 3.1 | 2.4 | 2.1 | 1.8 | 1.5 |
| CEEMEA | 4.8 | 3.5 | 2.6 | *3.2* | 3.3 | 3.1 | 3.0 | 2.9 | 2.7 |
| LatAm | 2.8 | 2.4 | 2.3 | *3.0* | 3.1 | 2.7 | 2.3 | 1.9 | 1.6 |
| **PPP Weighted** | | | | | | | | | |
| World | 3.8 | 3.8 | 2.8 | *3.2* | 2.8 | 2.4 | 2.1 | 1.9 | 1.8 |
| DM | 1.6 | 1.9 | 1.4 | *1.8* | 1.6 | 1.4 | 1.2 | 1.1 | 1.1 |
| EM | 6.0 | 5.2 | 3.6 | *4.0* | 3.4 | 2.8 | 2.5 | 2.2 | 2.0 |
| Asia (ex. DM) | 7.6 | 6.6 | 4.2 | *4.4* | 3.3 | 2.6 | 2.2 | 1.9 | 1.6 |
| CEEMEA | 5.0 | 3.5 | 2.9 | *3.4* | 3.5 | 3.3 | 3.1 | 3.0 | 2.8 |
| LatAm | 3.0 | 2.5 | 2.3 | *3.0* | 3.1 | 2.7 | 2.3 | 1.9 | 1.6 |
| **Real US$ Growth** | | | | | | | | | |
| World | 4.1 | 2.1 | 2.7 | *4.2* | 3.6 | 2.9 | 2.5 | 2.3 | 2.0 |
| DM | 2.4 | 0.5 | 1.1 | *2.3* | 2.0 | 1.6 | 1.4 | 1.3 | 1.1 |
| EM | 8.9 | 5.0 | 4.5 | *6.2* | 4.9 | 3.8 | 3.1 | 2.7 | 2.3 |
| Asia (ex. DM) | 9.8 | 7.5 | 4.9 | *6.6* | 4.8 | 3.5 | 2.8 | 2.4 | 2.0 |
| CEEMEA | 10.6 | 2.3 | 4.6 | *5.9* | 5.4 | 4.4 | 3.8 | 3.5 | 3.2 |
| LatAm | 5.3 | 1.8 | 3.0 | *5.1* | 4.6 | 3.7 | 3.0 | 2.4 | 1.9 |

Source: Goldman Sachs Global Investment Research

Exhibit 14 provides a breakdown for major economies. Our projections imply that China is undergoing a marked slowdown in potential growth (from 7.7% in 2010-19, to 4.0% in 2024-29, and 2.5% in 2030-39). Most of this slowdown is driven by demographic factors, and it results in China's potential growth rate falling well below a number of its Asian peers (India, Indonesia, and the Philippines).

Following a decade in which LatAm economies significantly underperformed their convergence potential, we expect growth to gradually accelerate over the next 10 years before decelerating once again in the outer decades. Growth in CEEMEA is expected to remain relatively stable, aided over time by an increasing contribution from African economies.

**Exhibit 14: Real GDP Growth Projections for Major Economies by Decade**
Real GDP growth projections (Market FX weighted)

| | Real GDP Growth Projections (%) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2000-2009 | 2010-2019 | 2020-2029 | 2024-2029 | 2030-2039 | 2040-2049 | 2050-2059 | 2060-2069 | 2070-2079 |
| World | 2.7 | 3.2 | 2.4 | *2.8* | 2.5 | 2.1 | 2.0 | 1.8 | 1.7 |
| DM | 1.6 | 1.9 | 1.5 | *1.8* | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 |
| United States | 1.9 | 2.3 | 1.7 | *1.9* | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 |
| Germany | 0.8 | 2.0 | 0.7 | *1.2* | 1.3 | 1.1 | 0.9 | 0.9 | 1.0 |
| Japan | 0.5 | 1.2 | 0.6 | *0.9* | 0.8 | 0.7 | 0.7 | 0.6 | 0.5 |
| United Kingdom | 1.6 | 2.0 | 1.4 | *2.0* | 1.9 | 1.6 | 1.5 | 1.3 | 1.2 |
| Canada | 2.1 | 2.3 | 1.7 | *2.1* | 2.0 | 1.9 | 1.7 | 1.6 | 1.6 |
| Australia | 3.1 | 2.6 | 2.3 | *2.5* | 2.4 | 2.1 | 1.8 | 1.7 | 1.5 |
| Asia (ex. DM) | 7.6 | 6.7 | 4.1 | *4.2* | 3.1 | 2.4 | 2.1 | 1.8 | 1.5 |
| China | 10.3 | 7.7 | 4.2 | *4.0* | 2.5 | 1.6 | 1.1 | 0.9 | 0.5 |
| India | 6.9 | 6.9 | 5.0 | *5.8* | 4.6 | 3.7 | 3.1 | 2.5 | 2.1 |
| Indonesia | 5.3 | 5.4 | 3.8 | *4.3* | 3.6 | 3.0 | 2.6 | 2.3 | 2.0 |
| Korea | 4.9 | 3.3 | 2.0 | *1.9* | 1.4 | 0.8 | 0.3 | -0.1 | -0.2 |
| Thailand | 4.3 | 3.6 | 1.9 | *2.8* | 2.4 | 1.9 | 1.4 | 1.1 | 0.9 |
| Philippines | 4.5 | 6.4 | 4.4 | *6.0* | 4.9 | 4.1 | 3.5 | 3.1 | 2.7 |
| CEEMEA | 4.8 | 3.5 | 2.6 | *3.2* | 3.3 | 3.1 | 3.0 | 2.9 | 2.7 |
| Russia | 5.5 | 2.1 | 0.3 | *1.2* | 1.6 | 1.2 | 1.2 | 1.3 | 1.1 |
| Turkey | 4.0 | 5.9 | 4.2 | *3.5* | 2.9 | 2.1 | 1.7 | 1.4 | 1.1 |
| Saudi Arabia | 3.5 | 3.5 | 2.8 | *2.9* | 3.2 | 2.5 | 2.0 | 1.7 | 1.4 |
| Poland | 3.9 | 3.7 | 2.8 | *3.3* | 1.9 | 1.1 | 0.7 | 0.5 | 0.4 |
| Egypt | 5.0 | 4.4 | 4.7 | *4.8* | 5.3 | 4.4 | 3.8 | 3.2 | 2.7 |
| South Africa | 3.6 | 1.7 | 1.8 | *2.8* | 3.6 | 3.4 | 2.9 | 2.6 | 2.2 |
| LatAm | 2.8 | 2.4 | 2.3 | *3.0* | 3.1 | 2.7 | 2.3 | 1.9 | 1.6 |
| Brazil | 3.4 | 1.4 | 1.9 | *2.4* | 2.8 | 2.5 | 2.1 | 1.7 | 1.5 |
| Mexico | 1.5 | 2.7 | 1.8 | *3.0* | 3.0 | 2.6 | 2.2 | 1.7 | 1.4 |
| Argentina | 2.6 | 1.4 | 2.6 | *3.3* | 3.1 | 2.6 | 2.2 | 1.8 | 1.5 |
| Colombia | 3.9 | 3.7 | 3.4 | *3.4* | 3.3 | 2.7 | 2.2 | 1.7 | 1.4 |
| Chile | 4.2 | 3.3 | 2.1 | *2.3* | 2.4 | 2.0 | 1.6 | 1.4 | 1.2 |
| Peru | 5.0 | 4.5 | 3.3 | *4.2* | 4.0 | 3.5 | 2.9 | 2.5 | 2.1 |

Source: Goldman Sachs Global Investment Research

Exhibit 4 and Exhibit 5 combine our GDP projections with our long-term real exchange rate projections, to project the real US Dollar value of major economies over time. Our projections imply that China will overtake the US economy as the world's largest economy around 2035. This is around 10 years later than our 2011 projections, primarily reflecting the downward revisions we have made to Chinese potential growth. Given the recent pessimism around China's growth prospects, some readers may be surprised that we expect China to overtake the US even at this horizon. However, three points are worth bearing in mind in this regard: First, China has already closed most of the gap with US GDP (China's GDP has risen from 12% of the US in 2000 to a little under 80% currently). Second, despite significant downward revisions, potential growth in China remains significantly higher than the US on our revised estimates (4.0% vs. 1.9% for 2024-29). Third, in addition to differences in potential growth, we expect some of the US Dollar's real overvaluation vs. the Chinese Yuan to be unwound over the next 10-15 years.

In 2050, we project that the world's five largest economies will be China, the United States, India, Indonesia, and Germany (with Indonesia displacing Brazil and Russia among the list of largest EMs over this horizon).

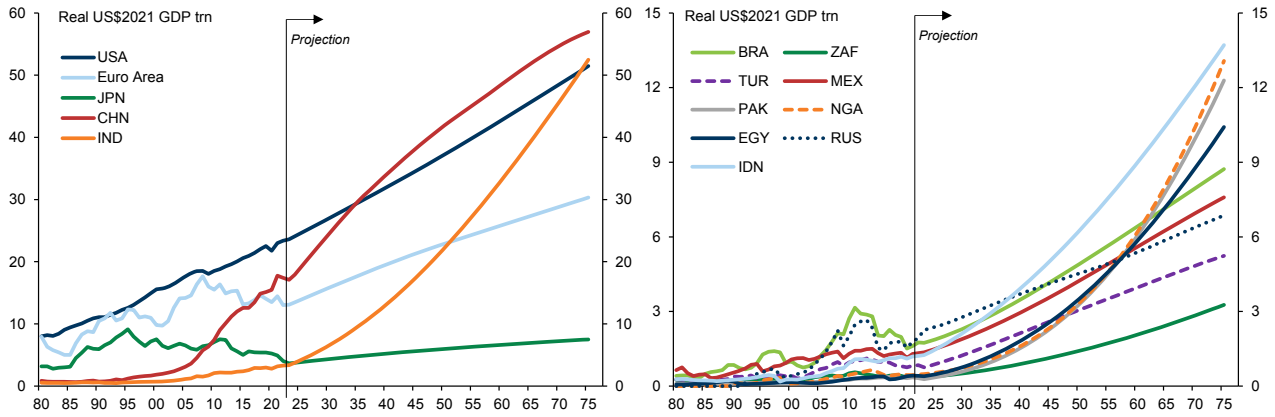
If we extend the projection horizon to 2075, the world's three largest economies are China, India and the US, with India (just) overtaking the US. Interestingly, US potential GDP growth is expected to be materially faster than China's at that horizon, as a result of its better demographic outlook. The prospect of rapid population growth in countries such as Nigeria, Pakistan and Egypt imply that – with the appropriate policies and institutions – these economies could become some of the largest in the world.[16]

**Exhibit 15: Our Projections Imply that China, the United States, India, Indonesia, and Germany Will be the World's Five Largest Economies in 2050**
World's largest economies (measured in USD)

| Ranking | 1980 | 2000 | 2022 | 2050 | 2075 |
|---|---|---|---|---|---|
| 1 | United States | United States | United States | China | China |
| 2 | Japan | Japan | China | United States | India |
| 3 | Germany | Germany | Japan | India | United States |
| 4 | France | United Kingdom | Germany | Indonesia | Indonesia |
| 5 | United Kingdom | France | India | Germany | Nigeria |
| 6 | Italy | China | United Kingdom | Japan | Pakistan |
| 7 | China | Italy | France | United Kingdom | Egypt |
| 8 | Canada | Canada | Canada | Brazil | Brazil |
| 9 | Argentina | Mexico | Russia | France | Germany |
| 10 | Spain | Brazil | Italy | Russia | United Kingdom |
| 11 | Mexico | Spain | Brazil | Mexico | Mexico |
| 12 | Netherlands | Korea | Korea | Egypt | Japan |
| 13 | India | India | Australia | Saudi Arabia | Russia |
| 14 | Saudi Arabia | Netherlands | Mexico | Canada | Philippines |
| 15 | Australia | Australia | Spain | Nigeria | France |

Source: Goldman Sachs Global Investment Research

**Exhibit 16: China to Overtake US Around 2035, While India Should Catch up By 2075; EM Leaderboard to Change Significantly by 2075**
GDP level projections in Real (2021) USD trillion




Source: Goldman Sachs Global Investment Research

Exhibit 17 sets out our 2075 GDP level projections, broken down by population and GDP per capita levels. Two points are notable:

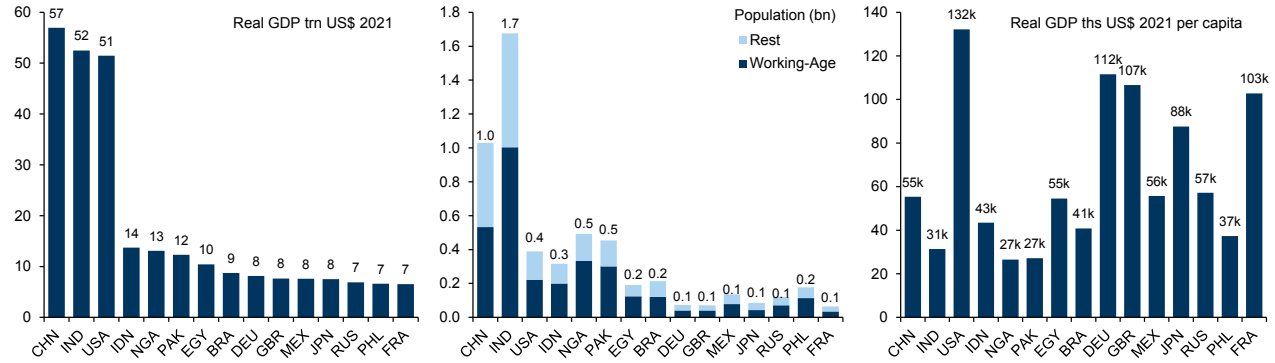
- First, there is a large gap between the largest three economies (China, India and the US) and all other economies (although the Euro area represents a fourth economic superpower, if it is treated as a single economy). Thus, although Indonesia, Nigeria and Pakistan are projected to be fourth, fifth, and sixth in the 2075 GDP rankings,

[16] Note that this is true despite our projections factoring in a slower rate of absolute convergence than our 2003 or 2011 projections.

each of them are projected to be less that one-third of the size of China, India and the US.

- Second, while China and India are projected to be larger than the US by 2075, our projections imply that the US will remain more than twice as rich as both (and five times as rich as countries such as Nigeria and Pakistan).

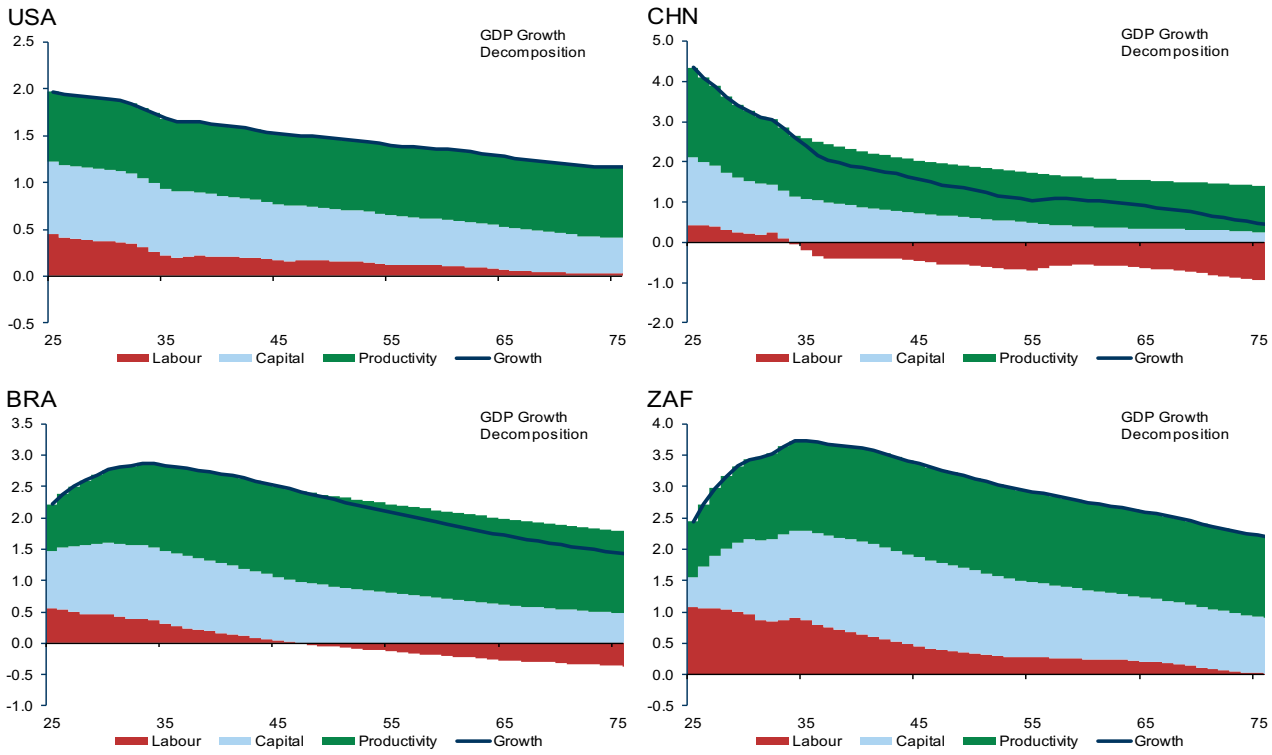
**Exhibit 17: China and India are Projected to be Larger than the US by 2075, But the US Will Remain More than Twice as Rich as Both**
Real GDP levels, population and GDP per capita at 2075




Source: Goldman Sachs Global Investment Research

Exhibit 18 sets out a decomposition of our growth projections by factor for the US, China, Brazil, and South Africa. Growth is projected to slow over time in most economies, owing to a smaller contribution from labour force growth, but this decline is expected to be particularly marked in China. Brazil and South Africa's exceptionally weak performance in the past 10-15 years is expected to be partially reversed over time, as the significantly negative contribution from productivity momentum is assumed to wane.

**Exhibit 18: Gradual Growth Decline For Most Economies: Demographics a Large Drag for China, While Brazil and South Africa's Exceptionally Weak Performance is Expected to be Partially Reversed**
Decomposition of growth projections by factor




Source: Goldman Sachs Global Investment Research

In Exhibit 19 we compare our updated projections with our 2011 forecasts. In almost all cases our projections are less optimistic than they were 11 years ago. However, the downward revisions are generally larger for LatAm economies than for Asia, while the pattern is mixed in CEEMEA (with large downward revisions in Russia and South Africa, but relatively limited revisions to projected growth in Poland and Turkey).

**Exhibit 19: Less Optimistic on the Future: A Decadal Analysis of Updated vs 2011 Forecasts for Average GDP Growth Rates**

Old Forecasts are in brackets, 2010-2019 data refer to realised growth; Shading reflects the degree to which forecasts/outturns deviate from previous projections

| Real GDP Growth Projections Comparison | 2010-2019 | 2020-2029 | 2030-2039 | 2040-2049 |
|---|---|---|---|---|
| DM | | | | |
| United States | 2.3 (2.2) | 1.7 (2.1) | 1.7 (2.2) | 1.5 (2.2) |
| Japan | 1.2 (1.8) | 0.6 (1.8) | 0.8 (1.4) | 0.7 (1.3) |
| Germany | 2 (2) | 0.7 (1.4) | 1.3 (1.3) | 1.1 (1.6) |
| United Kingdom | 2 (2.6) | 1.4 (2.7) | 1.9 (2.4) | 1.6 (2.3) |
| Australia | 2.6 (3.3) | 2.3 (3) | 2.4 (2.8) | 2.1 (2.5) |
| Canada | 2.3 (2.8) | 1.7 (2.4) | 2 (2.4) | 1.9 (2.4) |
| Asia | | | | |
| China | 7.7 (7.5) | 4.2 (5.4) | 2.5 (3.5) | 1.6 (2.9) |
| India | 6.9 (6.9) | 5 (6) | 4.6 (5.7) | 3.7 (5.1) |
| Indonesia | 5.4 (6) | 3.8 (5.6) | 3.6 (5) | 3 (4.4) |
| Korea | 3.3 (3.4) | 2 (2.2) | 1.4 (1.7) | 0.8 (1.5) |
| Thailand | 3.6 (5.1) | 1.9 (4.4) | 2.4 (3.7) | 1.9 (3.3) |
| Philippines | 6.4 (6.8) | 4.4 (6.9) | 4.9 (6.4) | 4.1 (5.8) |
| CEEMEA | | | | |
| Russia | 2.1 (5.3) | 0.3 (4) | 1.6 (2.8) | 1.2 (1.8) |
| Turkey | 5.9 (5.4) | 4.2 (4.7) | 2.9 (3.9) | 2.1 (3.1) |
| Saudi Arabia | 3.5 (4.7) | 2.8 (4.6) | 3.2 (4.1) | 2.5 (3.1) |
| Poland | 3.7 (4.1) | 2.8 (3.3) | 1.9 (2.8) | 1.1 (1.8) |
| Egypt | 4.4 (6.4) | 4.7 (6.1) | 5.3 (5.4) | 4.4 (4.5) |
| South Africa | 1.7 (3.8) | 1.8 (3.8) | 3.6 (4) | 3.4 (3.8) |
| LatAm | | | | |
| Brazil | 1.4 (5.4) | 1.9 (4.7) | 2.8 (4) | 2.5 (3.1) |
| Mexico | 2.7 (5) | 1.8 (4.6) | 3 (3.9) | 2.6 (3.2) |
| Argentina | 1.4 (4.8) | 2.6 (4.1) | 3.1 (3.8) | 2.6 (3.1) |
| Colombia | 3.7 (5.1) | 3.4 (4.9) | 3.3 (4.3) | 2.7 (3.8) |
| Chile | 3.3 (4.5) | 2.1 (3.9) | 2.4 (3.4) | 2 (3) |
| Peru | 4.5 (5.8) | 3.3 (5.3) | 4 (4.6) | 3.5 (3.9) |

Source: Goldman Sachs Global Investment Research

## Box 2: Our Modelling Framework

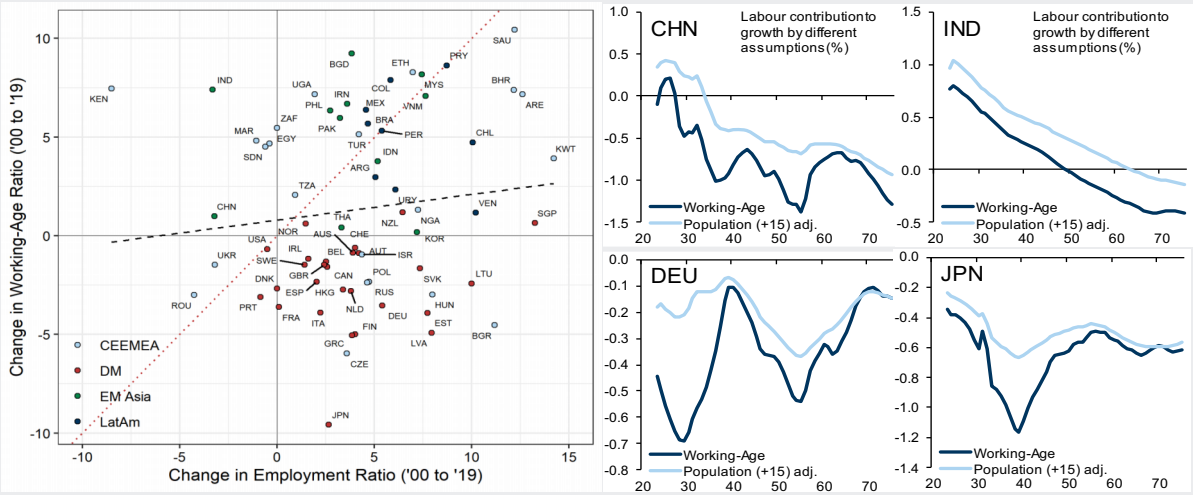
We use a simple but effective model of economic growth in our projections, which we first introduced in 2003 and which we discuss in detail in the Appendix. In this model, potential GDP growth is a function of the number of people in the workforce, the amount of capital they have to work with and technical progress. In addition to this growth process, we project that less developed countries can grow richer in part as their exchange rates appreciate towards purchasing power parity (PPP) levels.

As part of our new projections, we have refined the details of each of these channels, drawing lessons from the experience of the past decade and before. These changes make the projections more intuitive and empirically plausible, without changing the basic elements. The main components are:

- **Labour Force Growth.** Our labour force forecasts are based on United Nations' population projections. However, where we previously took growth in the working age population (those aged 15-64) as an approximation for labour force growth, we now adjust for the fact that the link between working age population ratios and labour force participation ratios is far from one-to-one, because people tend to retire later as populations age. This adjustment is based on the historical relationship between changes in working age ratios and employment and, all else equal, it has the effect of boosting projected labour force growth in countries with ageing populations.

**Exhibit 20: Labour Force Participation Is Weakly Related to Working-Age Population Rate, Which Implies Smaller Drag in Projections**

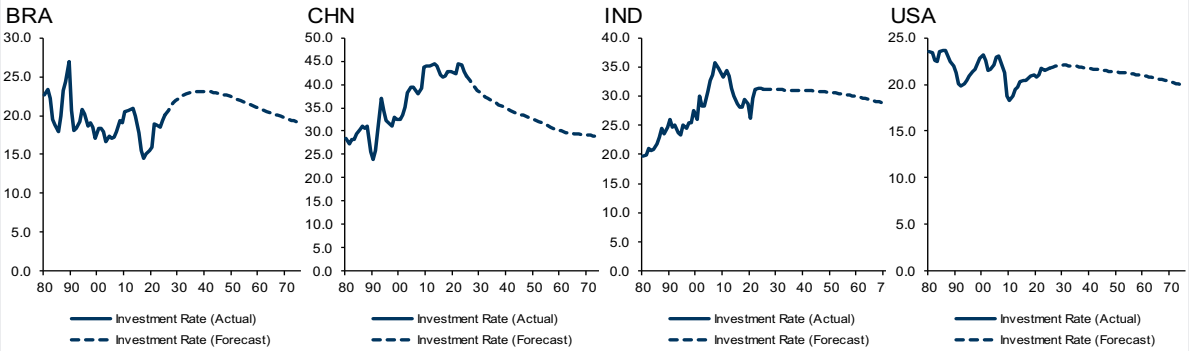
Change in working-age ratio vs. change in employment ratio (between 2000 and 2019, LHS); labour force contribution to growth in projections (RHS)




Source: Goldman Sachs Global Investment Research, The Conference Board

- **Capital Accumulation.** We explicitly calculate country-specific initial capital stock levels and model each country's investment rate as a function of demographics and its own history, which allows for investment rates to vary over time. As previously, we use the fact that investment rates appear to be linked to dependency ratios – the higher the share of working-age population relative to the young and the elderly, the higher the investment rates.

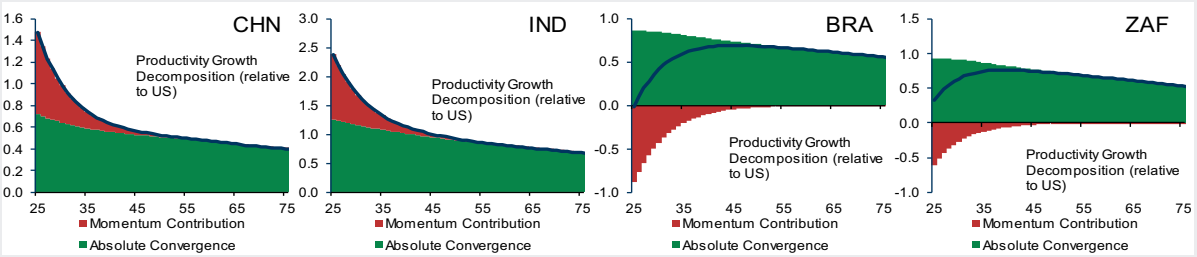
**Exhibit 21: Investment Rates Modelled as a Function of Past Investment Rates and Changing Demographics**
Actual and projected investment rates (% of GDP) for selected economies




Source: Goldman Sachs Global Investment Research, IMF

- **Technical Progress.** We model technical progress (or total-factor productivity (TFP) growth) as a process of catch-up/convergence to the technological frontier, which we assume to be the US. For each country, the pace of convergence reflects a combination of both absolute and conditional convergence factors. Absolute convergence is modelled as a decreasing function of GDP per capita levels relative to the US. The absolute convergence term is fitted to the cross-country experience over the past 40 years and lower than in our previous projections. For conditional convergence, we previously modelled this explicitly as a function of economic, political and social factors in each country (as captured by our Growth Environment Scores (GES)). However, we found that the out-of-sample performance of these scores as predictors of future convergence was poor. We therefore take a more agnostic view of which conditions are necessary to drive convergence and instead draw inference from the performance of productivity itself: while it is difficult to identify in real time whether the 'right' factors are in place to drive future convergence, each country's recent productivity performance reveals a lot about whether it has the 'right' factors in place today. Consistent with this observation, we find that convergence 'momentum' plays an important role in determining future convergence (i.e., if a country had the conditions in place to successfully converge over the previous decade, we find that it typically displays a higher pace of convergence over the subsequent decade, all else equal). This momentum factor is then modelled to 'decay' over time.

**Exhibit 22: We Model Technical Growth as a Function of Absolute Convergence and Convergence Momentum**
Decomposition of technical productivity growth relative to US

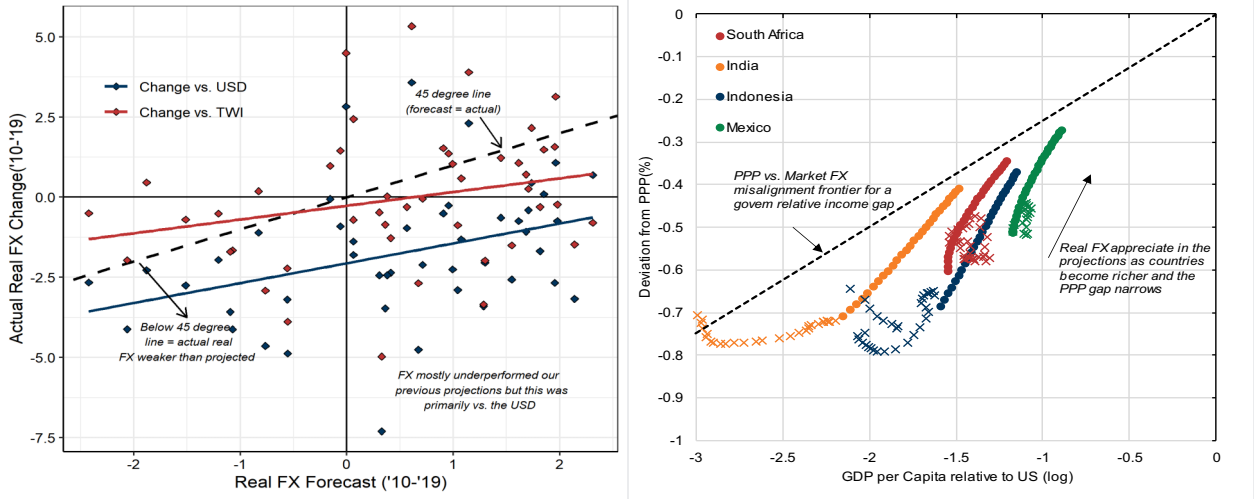



Source: Goldman Sachs Global Investment Research

- **Exchange Rate Trends.** We model real exchange rates as a function of relative productivity growth differentials (the Balassa-Samuelson effect), while also taking account of a country's deviation from PPP at the starting point. In our model, a country's real exchange rate path is determined by two processes:

(1) convergence towards its PPP equilibrium rate as it grows richer; and (2) convergence towards the 'normal' deviation from PPP for a given relative income level (based on the historical and cross-sectional data). Over the past 10 years this model has worked relatively well, with one very prominent exception: the US Dollar itself. However, the fact that the Dollar has been stronger over the past 10 years than its PPP exchange rate would predict implies that it is more likely to depreciate over the coming 10 years.

**Exhibit 23: Exchange Rates Have Converged Towards Their PPP Values, But Much Less so vs. the USD**
Realised vs. predicted real FX forecasts (vs. USD and on trade-weighted basis, LHS); projected real FX path (RHS, crosses are historical 10Y moving avg. paths)




Source: Goldman Sachs Global Investment Research

# 4. Global Implications — Slower Global Growth, Reduced Global Inequality

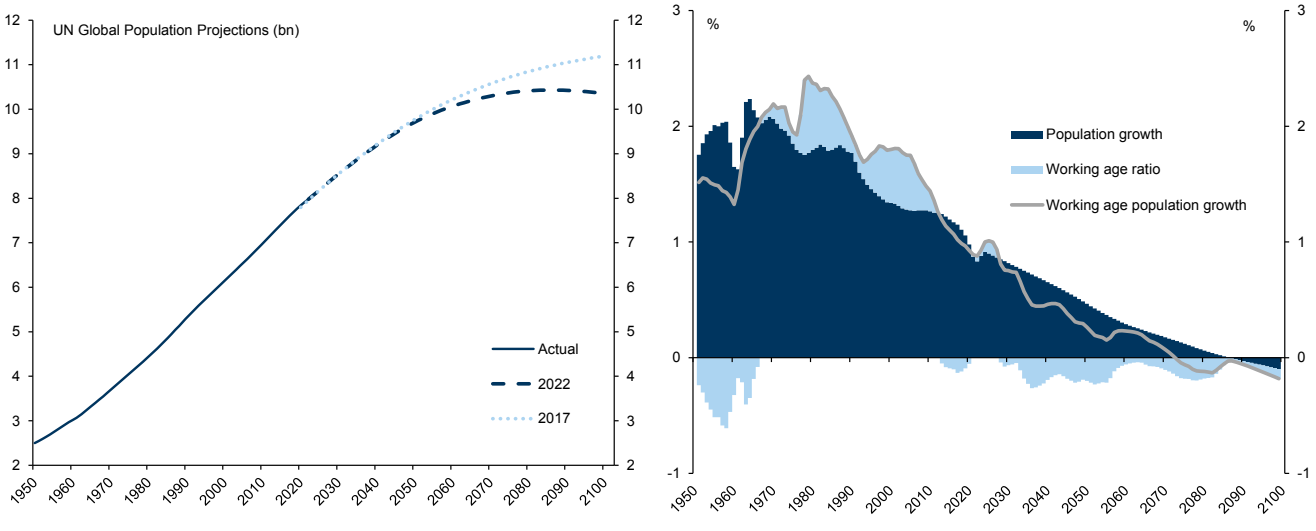
Global growth has slowed from an average of 3.6% per year in the 10 years to the Global Financial Crisis, to 3.2% per year in the decade prior to the Covid pandemic, and the slowdown has been relatively broad-based. Our projections imply that global growth will average 2.8% between 2024 and 2029 and will be on a gradually declining path.

## Declining Global Population Growth — A 'Good Problem' to Have

The most important factor in this decline is demographics. Global population growth has halved over the past 50 years, from around 2% per year to less than 1% currently, and UN population projections imply that it will fall to close to zero by 2075 (Exhibit 24). While some of this slowdown had previously been anticipated, population projections are also being revised lower (the global population is now expected to peak at around 10 billion people, having previously been expected to rise to more than 11bn).

In making its long-term population projections, the UN tends to be relatively conservative in incorporating recent demographic trends. Fertility rates fell sharply in many economies during the Covid pandemic and have only partially recovered since then. In our view, this skews the risks around the UN's projections to the downside.

**Exhibit 24: Global Population Growth Has Halved Since the 1960s/70s and The Projected Peak Population is Now Falling**
UN global overall population and working-age population projections




Source: United Nations (UN), Goldman Sachs Global Investment Research

This slowdown in population growth is a 'good problem' to have, in that global population control is a necessary condition for long-term environmental sustainability. Nevertheless, the adjustment to weaker population growth and ageing populations presents economic challenges (most notably, from rising healthcare and retirement costs). The number of DM and EM countries for which population ageing represents a serious economic challenge is likely to rise steadily over the coming decades.

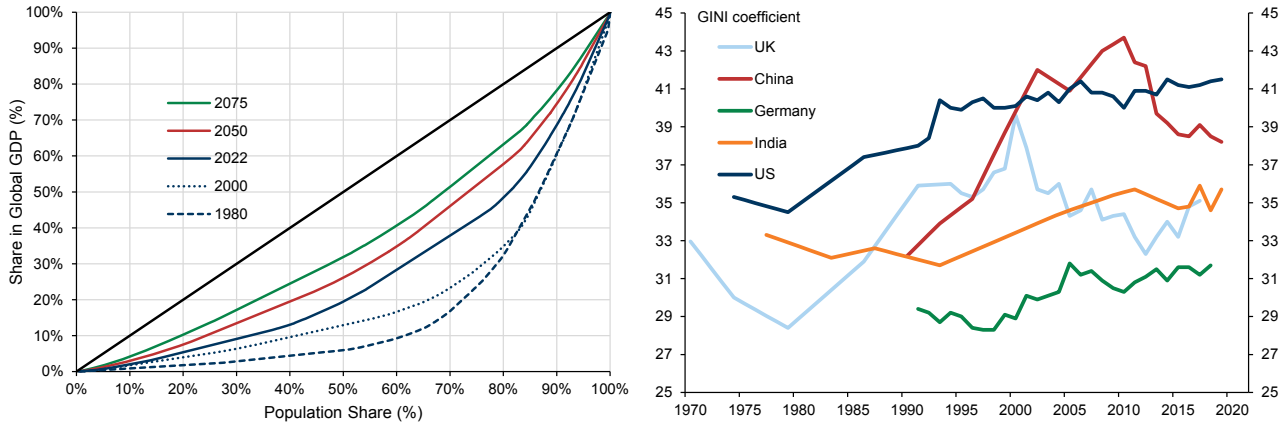
## Reduced Global Inequality, Increased Local Inequality

Between 2000 and 2022 there has been a significant reduction in global inequality – reflected in a flattening of the global Lorenz curve[17] – due to the income convergence of relatively poor economies. Our projections imply that income convergence will result in the curve becoming significantly less arched by 2050, as a growing group of middle-income countries account for a much larger share of global GDP (Exhibit 25).

This is a surprising result for many and runs counter to the perception that globalisation has and will continue to drive rising inequality.[18] These two views can be reconciled by the fact that, while income inequality *between* economies has been falling, income inequality *within* most economies has risen since the late 1970s. Moreover, these two trends are likely to be at least partly linked: globalisation has resulted in the increased integration of large EMs with large amounts of (relatively unskilled) labour and limited capital into the global economy, pushing up the price of labour in EMs but pushing down the price of unskilled labour in DM economies.

Because political choices are set locally rather than globally, the rise in inequality at a national level presents a major policy challenge to the process of globalisation.

**Exhibit 25: Cross-Country Inequality to Continue Declining, While Within-Country Inequality Remains High**
Global Lorenz Curve – closer to the 45-degree line implies less inequality (LHS); GINI coefficients for major economies (RHS)




Source: Goldman Sachs Global Investment Research, OECD

## Box 3: How Fast Does the World Grow?

How fast does the world grow? The answer depends very much on how one weights countries together to calculate global growth.[19]

Because countries report GDP in local currencies, it is not possible to sum the levels of GDP across a

[17] The Lorenz curve is constructed by mapping out the share of global GDP accounted for by the share of population of countries as we move from poorest to richest. The more 'bowed' the curve is, the more unequal the distribution. The 'Gini coefficient' – the most used measure of income inequality – measures the area between the Lorenz curve and the 45-degree line of perfect equality.

[18] We first discussed this phenomenon in "The Expanding Middle: The Exploding World Middle Class and Falling Global Inequality", *Global Economics Paper*, 7 July 2008.

[19] "How Fast Does the World Grow?", *GS Global Economics Analyst*, 27 October 2021.

number of countries (unless those countries use a common currency, as is the case in the Euro area). Rather, aggregate growth rates are calculated by weighting each country's growth rate, with weights that reflect the relative size of economies.

To calculate these weights, each country's GDP needs to be converted into a common currency (in practice, the US Dollar). But what exchange rates should one use to make this conversion? Two different methodologies are typically used:

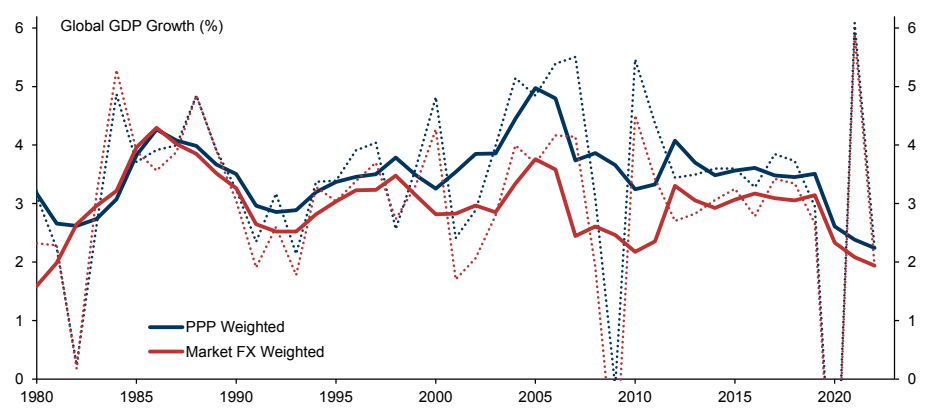
- One approach is to use **purchasing power parity (PPP)** exchange rates, which calculate the rate at which the currency of one country would have to be converted into that of another country to buy the same amount of goods and services in each country. PPP-based weights adjust for the fact that goods and services are typically cheaper in relatively poor economies than in rich economies. For this reason, PPP-based weights are better designed to capture the welfare implications of global growth.
- The second approach is to use **market exchange rates** to convert each country's GDP into a common currency. This approach makes no adjustment for differences in spending power across economies but the weights accurately reflect the Dollar value of each economy's GDP. For this reason, market FX weights are the more appropriate methodology from the perspective of financial markets and this is the weighting scheme that we now use in calculating global and regional aggregates.

Importantly, PPP-based exchange rates, in adjusting for cost of living differences across economies, give a larger weighting to relatively poor (i.e., EM and Frontier) economies than market-based weights. And, because EMs and Frontier economies have grown faster than DMs since the mid-1990s, global GDP growth calculated using PPP-based weights has been higher than growth calculated using market-based weights.

Exhibit 26 compares the 5-year rolling averages of global GDP growth calculated using market- and PPP-based weights. The gap between the two measures increased to more than 1pp per year during the BRICs boom period (2000-2010) but has since fallen back.[20] Between 2010 and 2019, global GDP growth calculated using market-based weights averaged 3.2% vs. 3.8% using PPP-based weights.

[20] A separate reason why the gap between global GDP growth calculated using PPP-based weights and market-based weights has shrunk is because PPP exchange rates are now closer to market rates (i.e., the weighting schemes are now more similar).

**Exhibit 26: PPP-Based Weights Typically Show Higher Global Growth than Market-Based Weights**
Global GDP growth using PPP and market-based weights




Source: IMF, World Bank, Goldman Sachs Global Investment Research

## Key Long-Term Risks: Protectionism and Climate Change

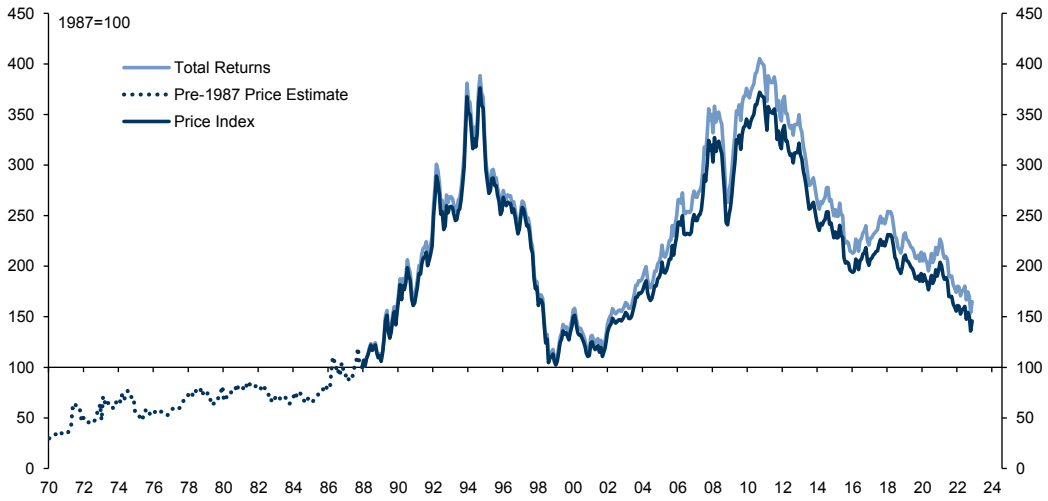
Of the many risks to our projections, we view two as particularly important for world growth and income convergence.

- First, the risk that populist nationalism leads to increased protectionism and a reversal of globalisation. Populist nationalists have gained power in several countries and the supply chain disruptions during the Covid pandemic have resulted in an increased focus on on-shoring and supply chain resilience. At least to date, this has led to a slowdown rather than a reversal of globalisation, in our assessment. However, the risk of a reversal is clear. Globalisation has been a powerful force in reducing income inequality across countries but, to ensure that it continues to do so, greater efforts need to be made to share its benefits more equally within countries.
- Second, the risk of environmental catastrophe presented by climate change. We reject the view that economic growth and environmental sustainability are incompatible – many countries have been able to 'de-couple' economic growth from carbon emissions, so there is no practical reason why this should not be achievable for the global economy as a whole. But achieving sustainable growth requires economic sacrifices and a globally coordinated response, both of which will be politically difficult to achieve. This risk is especially relevant to the long-term economic outlook of low-income economies with geographies that are especially exposed to climate change. With limited financial means to protect themselves against the costs of climate change, out-migration from these economies could dampen the demographic shifts that are projected to drive GDP growth.

# 5. Investment Implications — EM Unlikely to Continue to Underperform

In the period since our 2011 projections, GDP growth in EM economies has continued to outperform DM growth, albeit to a lesser extent than was the case in the 2000-10 decade. Yet, despite this growth outperformance, EM total equity returns have significantly underperformed DM equity returns in the past decade, having significantly outperformed in the previous decade (Exhibit 27).

**Exhibit 27: EM Equity Returns Have Exceeded DM Returns Significantly Over Time, But There Have Also Been Two Extended Periods of Underperformance**
MSCI EM Equity Prices and Total Returns Relative to MSCI World Developed Index




Source: Goldman Sachs Global Investment Research, Eikon Datastream, Bloomberg

What accounts for this underperformance over the past decade, and is it likely to be sustained over the next decade? In our view, there are three contributing factors, only one of which is likely to continue to apply in the coming decade:

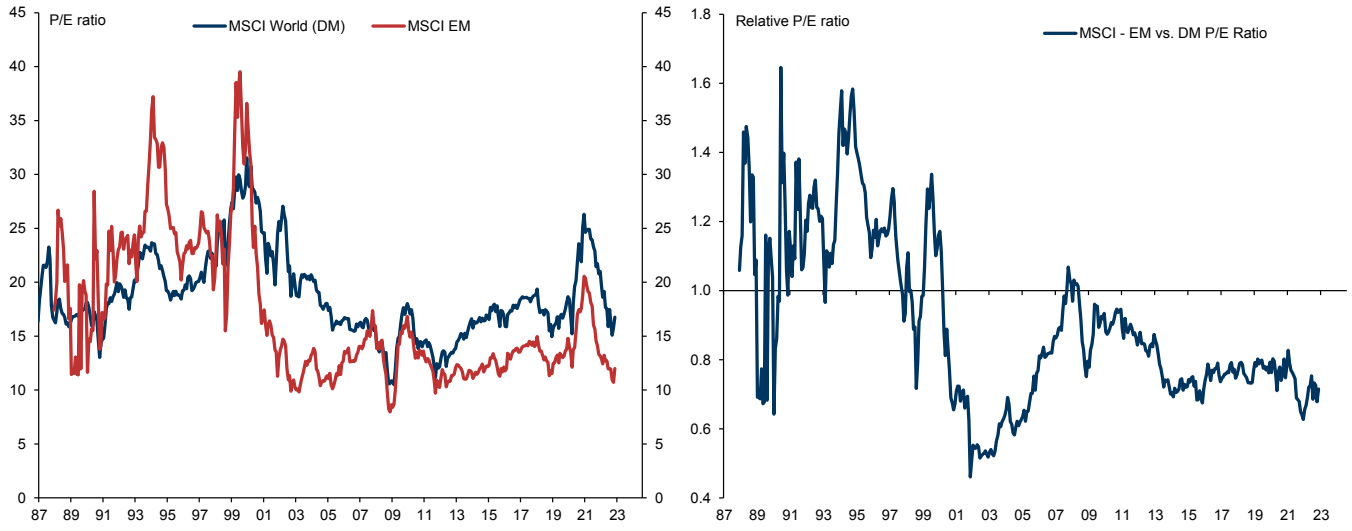
1. **Financial markets reward and penalise unanticipated shifts in trends but are indifferent to the predictable continuation of trends.** The significant outperformance of EM economies in the 2000s represented a marked shift relative to previous decades, surprising market participants in the process and resulting in significant EM asset price outperformance. Although EM economies have continued to outgrow DM economies over the past decade, they have done so by less than in the 2000s, undershooting expectations in the process and contributing to EM asset price underperformance. Now, however, following more than a decade of underperformance, EM equity valuations look unusually cheap, both in absolute terms and (especially) relative to their DM peers.[21] This suggests that the bar for positive surprises is lower than it was a decade ago (Exhibit 27).

[21] Whether EM equities 'should' trade at a P/E premium or a discount to DM equities ultimately depends on the balance between the potential for superior earnings growth in EMs (which argues for a premium) vs. the additional risk/volatility associated with that growth (which argues for a discount). In practice, apart from a brief period during the Global Financial Crisis, EM equities have traded at a significant discount to DM equities since the turn of the century.

2. **Equity earnings growth is a function of both changes and levels of growth.** Because margins are cyclical, earnings growth is as much a function of changes in GDP growth as it is a function of the level of GDP growth. One reason why EM equity earnings have underperformed DM equity earnings since 2010 is that, while EM GDP growth has outpaced DM, it has done so by less than was the case between 2000 and 2010. We expect EM GDP outperformance to stabilise in the coming years relative to DMs, contributing to a stronger EM EPS performance.

3. **EM earnings outperform by less than GDP, even in the long run.** In previous research we analysed the long-term relationship between GDP and earnings growth across EM and DM economies and found evidence that earnings growth for a given rate of GDP growth is lower in EMs than in DMs.[22] A key reason for this is that, while Foreign Direct Investment (FDI) from DM to EM economies is an important driver of EM GDP growth, the earnings from that investment are repatriated back to the DM investor companies (i.e., the output of the investment counts as EM GDP but the earnings from that investment are recorded as DM earnings). Nevertheless, although EM earnings growth has failed to keep pace with its GDP outperformance, over longer horizons EM earnings have still outperformed significantly. Over the 35-year history of the MSCI EM index, EM EPS growth (in real US Dollars) has averaged +5.0% per year vs. +2.7% in DM.

**Exhibit 28: EM Equities Trade at a Discount to DM Equities, Despite Stronger Growth Prospects**
MSCI EM and MSCI World (DM) P/E Ratios, Absolute and Relative




Source: Goldman Sachs Global Investment Research, Eikon Datastream, Bloomberg

Following more than a decade of DM equities outperforming EM equities, one often hears that this trend (and US equity outperformance, in particular) represents a fixed fact. However, as Exhibit 27 shows, EM equities have tended to outperform over the very long run, and the past decade has been an exception rather than the norm. More specifically, there are also reasons to believe that the factors that drove DM equity outperformance over the past decade are unlikely to persist over the next.

[22] "EM Long-Term Growth and Equity Earnings – Stronger Growth, (Somewhat) Better Earnings", *EM Macro Themes*, 25 May 2019.

# Appendix 1: Our Methodology in Detail

In this section we describe in more detail our modeling approach and assumptions for constructing long-run projections. The basic framework is identical to that set out in our original BRICs projections and our 2011 update. However, we have adjusted how we model the main inputs into that model – labour, capital and TFP (Total Factor Productivity) – to reflect new empirical observations and academic findings.

The starting point is a simple Cobb-Douglas model of economic growth that is common in the academic literature, where GDP (Y) is a function of labour (L) and capital inputs (K), and level of technological progress (A). GDP growth is then simply a function of the growth rates of the inputs and productivity (technical) growth.

$$Y = A \cdot K^{\alpha} \cdot L^{1-\alpha}$$

$$\underbrace{\Delta Y\%}_{GDP\ growth} = \underbrace{\Delta A\%}_{productivity\ growth} + \underbrace{\Delta K\% \cdot \alpha}_{capital\ contribution} + \underbrace{\Delta L\% \cdot (1-\alpha)}_{labour\ contribution}$$

In the academic growth literature, some researchers expand this basic equation further, for example by explicitly modelling labour quality improvements (e.g., via increasing educational attainment) or factoring in effective utilisation of resources. However, for our purposes, we stick to the simpler formulation, as it provides a more parsimonious model of the main drivers of growth and experience suggests there is no forecasting advantage from breaking the inputs into narrower sub-components.

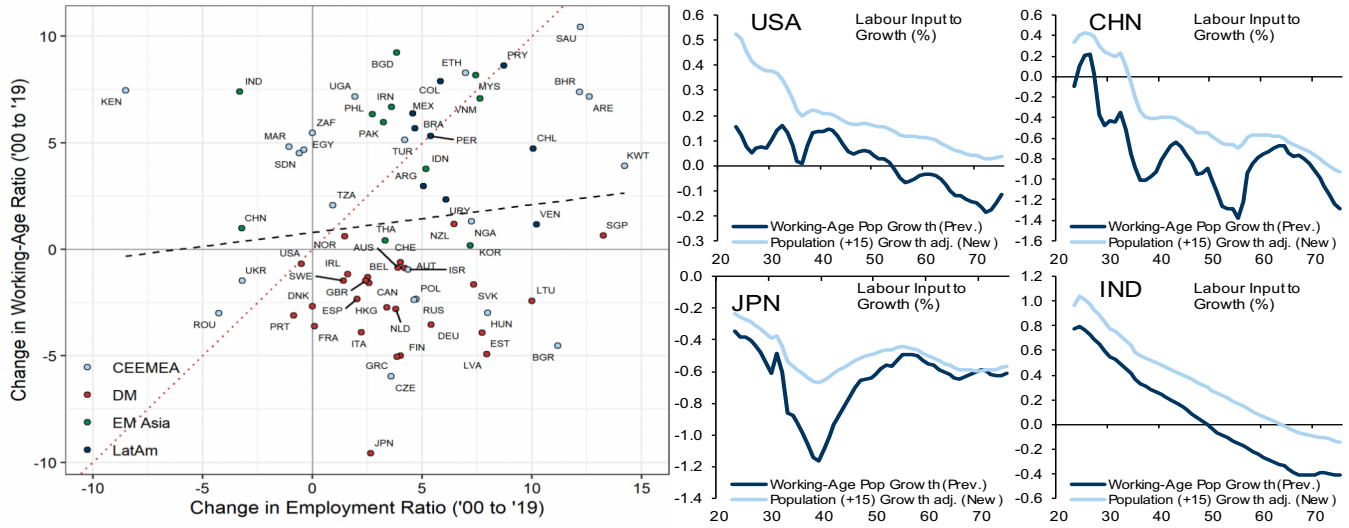
### Labour Force

As before, we use the United Nations' (UN) demographic projections in modeling labour inputs. The UN projections were last updated in August 2022 and they provide age- and gender-specific demographic projections for all countries to 2099. Previously, to link this to GDP growth, we assumed that labour grew in line with working-age population (15-64). This implicitly assumed that the share of working-age people and participation in the labour force followed a one-to-one relationship.

Over the past 20 years, however, we have found that employment rates as a share of total population have largely outperformed changes in working-age population ratios – specifically, we find that a decline in the working-age population ratio of 1pp was typically associated with a decline in the employment ratio of only 0.25pp (Exhibit 29, LHS).

**Exhibit 29: Working-Age Population and Employment Weakly Related; Our New Assumptions Imply Smaller Drag on Growth From Demographics**

Changes in working-age and employment ratios (vs. total population), between 2000-2019 (LHS); comparison of labour impact on growth under previous and new assumptions




Source: Goldman Sachs Global Investment Research, United Nations (UN), The Conference Board

One of the main reasons for this is that, as life expectancy and health outcomes improve, people can choose to retire later and therefore extend their participation in the labour force. For this reason, growth in the working-age population becomes too restrictive and pessimistic an assumption for labour force growth.[23] Therefore, when modelling labour input growth, we take the growth rate of population above 15 years old, and adjust the working-age population ratio impact by the empirical relationship. Effectively, this implies that our labour input is modelled as:

$$\underbrace{\Delta L\%}_{\substack{labour\\ input}} = \underbrace{\Delta Pop^{+15}\%}_{\substack{Population\\ growth\ of\ above\\ 15\ years\ old}} + \underbrace{\Delta\left(\frac{WPop}{Pop}\right)\% \cdot 0.25}_{\substack{Change\ in\ working-age\\ population\ ratio}}$$

In practice, this implies that the drag from deteriorating demographics in the projections is smaller for economies with ageing populations (Exhibit 29, RHS).

## Capital and Investment

We model the change in capital inputs as before, with the contribution to growth from capital depending on i) the initial stock of capital at the start of the projections, and ii) investment rates. Measuring the stock of capital and its effective use is notoriously difficult. While there some sources that provide annual estimates across countries (e.g., Conference Board, Penn World Tables), we instead make our own estimates of capital

[23] 'Effective' retirement ages (i.e., the age at which workers actually exit the workforce on average) are typically much lower than statutory retirement ages. Much of the increase in 'effective' retirement rates observed in the past 20 years across countries has come from a reduction in the early retirement rate, rather than from an extension of working lives beyond the statutory retirement age.

stock using what is referred to in the literature as an 'inventory-based' approach. This relies on determining the initial stock of capital by assuming that capital stock (K) at the start depends on investment (I), growth of capital (g) and the depreciation rate (delta):

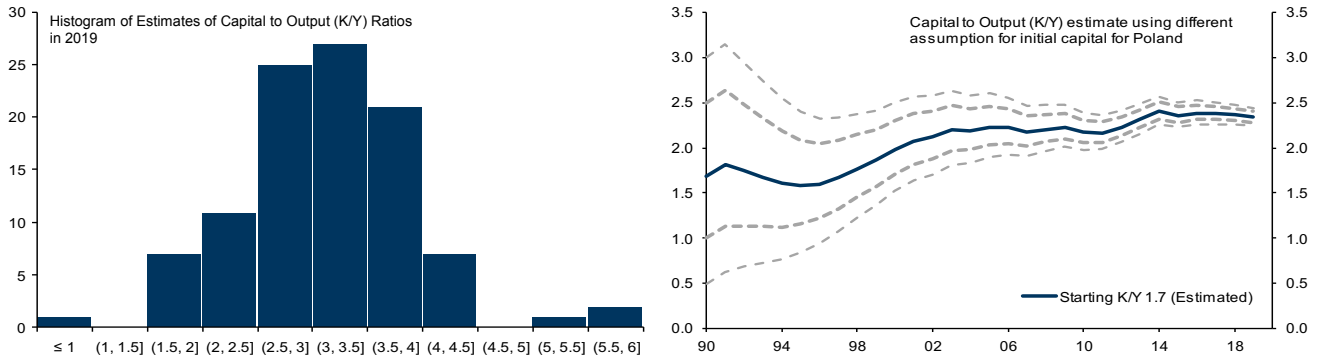
$$\underbrace{K_0}_{\substack{initial\ capital\\ stock}} = \underbrace{\frac{\bar{I}_{t0-10}}{g+\delta}}_{\substack{average\ investment\ (I)\ divided\ by\\ average\ growth\ of\ K\ (g)\\ and\ depreciation\ rate\ (\delta)}}$$

We then model total capital stock as a function of investment and depreciation rates:

$$\underbrace{K_t}_{\substack{capital\\ stock}} = \underbrace{I_t}_{investment} + \underbrace{(1-\delta)\cdot K_{t-1}}_{\substack{previous\ capital\\ stock\ \ adj.\ for\\ depreciation}}$$

As discussed in the 2011 projections, a number of economies (notably, those that went through a post-communist transition), experienced episodes of significant reductions in their capital stock. While this introduces complexities in accurately accounting for historical growth developments, the importance of the initial stock of capital declines over time and is thus less relevant in determining capital stock levels in our projections (Exhibit 30). This owes to the fact that, if the capital stock was underestimated at the starting period, the depreciation rate would 'penalise' capital too little, and capital stock would rise more quickly, and vice versa if the capital stock was overestimated. The longer the period we use in calculating the capital stock, the less important the initial capital stock calculation becomes.

**Exhibit 30: With More Observations, the Capital-to-Output Ratios Are Less Dependent on Initial Capital Stock Assumptions**
Histogram of estimate capital-to-output (K/Y) ratios in 2019 (LHS); estimated capital-to-output ratios under different initial capital stock assumptions for Poland




Source: Goldman Sachs Global Investment Research

The second part of modelling capital input is the investment rate. Here we keep the previous modelling approach of assuming that investment rates depend on the dependency ratios (i.e., the larger the share of children and the elderly in the population, the lower the investment rate). The only deviation from the previous approach is that we update sensitivities based on the empirical experience of the past 11 years.

$$\underbrace{I_{i,t}}_{Investment} = \alpha + \underbrace{\beta \cdot I_{i,t-1}}_{\substack{Investment \\ last\ period}} + \underbrace{\varphi \cdot Dep_{i,t}}_{\substack{Dependency \\ Ratio}} + \underbrace{\gamma_i + \mu_t}_{\substack{country\ and\ time \\ fixed\ effects}}$$

### Productivity and Convergence

The last, but arguably most important, component in our growth modelling is technical progress or Total Factor Productivity growth, which we express as a function of i) absolute convergence, and ii) conditional convergence.

As before, **absolute convergence** is modelled as a function of the distance from the 'productivity frontier', which we assume to be the US, with countries with relatively low GDP per capita levels displaying faster productivity growth, all else equal. This term is fitted to the cross-country experience over the past 40 years and lower than in our previous projections.

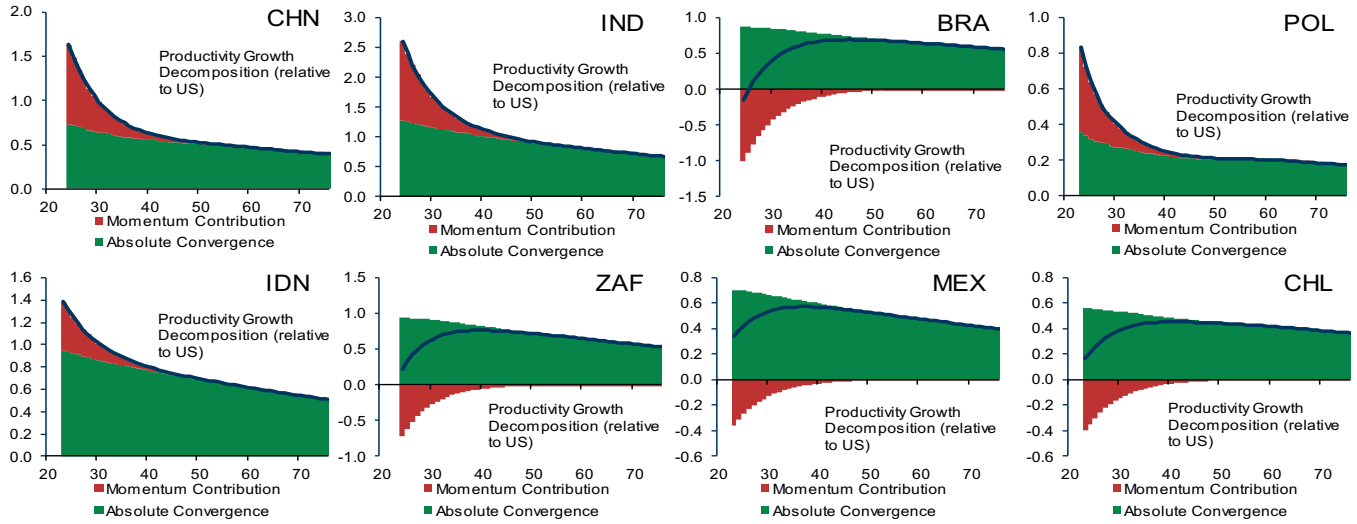
Previously, we modelled **conditional convergence** as a function of a 'growth-friendly environment', which we measured using our proprietary 'Growth Environment Scores' (GES). However, while the GES scores were relatively good at explaining past cross-country differences in productivity growth, we found that their *ex ante* predictive power of future productivity growth was poor.

Given the difficulties in identifying *ex ante* which factors are likely to determine future productivity growth, we now take a more agnostic approach and instead draw inference from the performance of productivity itself: while it is difficult to identify in real time whether the 'right' factors are in place to drive future convergence, each country's recent productivity performance reveals a good deal about whether it has the 'right' factors in place today. Consistent with this observation, we find that convergence 'momentum' plays an important role in determining future convergence (i.e., if a country had the conditions in place to successfully converge over the previous decade, we find that it typically displays a higher pace of convergence over the subsequent decade, all else equal). Relative to the absolute convergence benchmark, our model allows for countries to either be 'rewarded' or 'penalised' based on their recent productivity performance. This momentum factor then 'decays' exponentially with a half-life of five years.

$$\underbrace{\Delta A\%_{i,t}}_{\substack{productivity \\ growth}} = \underbrace{\Delta A_{US}\%}_{\substack{US\ productivity \\ growth\ (+0.75\%)}} + \underbrace{\beta \cdot \ln\left(\frac{Y^{PC}_{i,t}}{Y^{PC}_{US,t}}\right)}_{\substack{GDP\ per\ capita \\ relative\ to\ US \\ (absolute\ conergence)}} + \underbrace{\gamma \cdot \ln\left(\frac{Y^{PC}_{i,t-1}/Y^{PC}_{i,t-11}}{Y^{PC}_{US,t-1}/Y^{PC}_{US,t-11}}\right) \cdot \ln\left(\frac{Y^{PC}_{i,t}}{Y^{PC}_{US,t}}\right)}_{\substack{GDP\ per\ capita\ growth \\ relative\ to\ US\ over\ 10\ years \\ (momentum\ contribution)}}$$

Among the largest economies, at the start of our projections, the most positive convergence momentum was for India and China. By contrast, the most negative convergence momentum was by Brazil and South Africa (Exhibit 31).

**Exhibit 31: Our Convergence Framework 'Rewards' Countries That Have Outperformed in the Last 10 Years, and 'Penalises' Underperformers**
Decomposition of productivity growth relative to US by different factors




Source: Goldman Sachs Global Investment Research

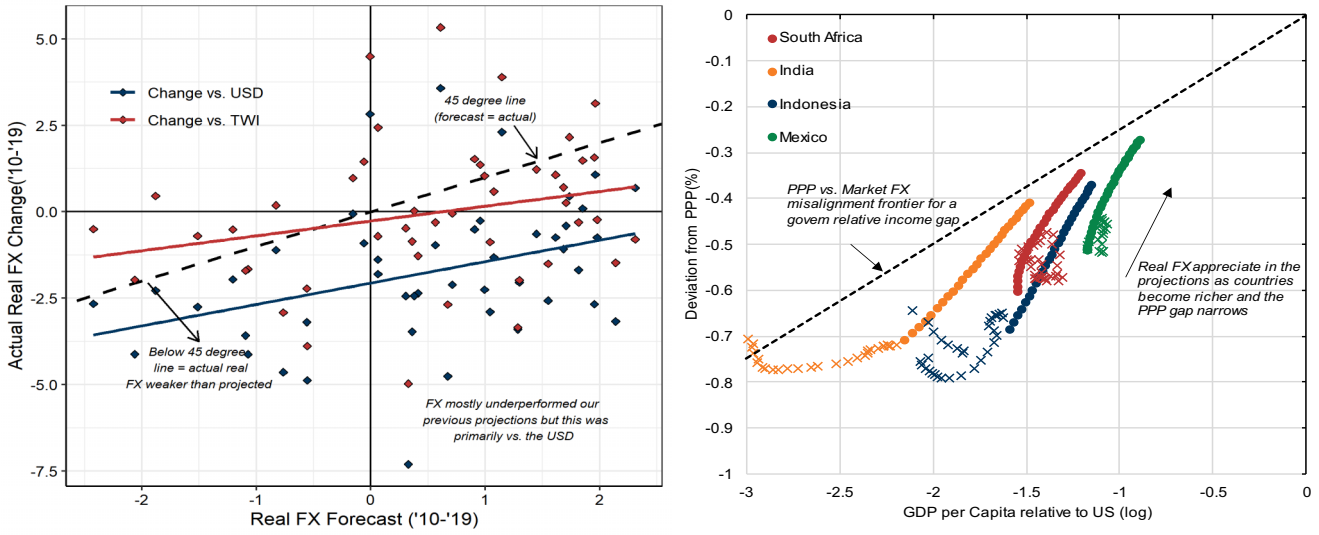
## Exchange rates

In modelling the level of GDP in real US Dollars, we also need to reflect the impact of real exchange rate changes over time. As previously, we continue to think of long-term changes in exchange rates as being primarily a function of relative productivity growth differentials. The idea is that countries' exchange rates tend to approach their PPP equilibrium values as they grow richer over time (otherwise known as the 'Balassa-Samuelson' effect). Furthermore, we also factor in the deviation of exchange rates relative to predicted PPP levels.

One important example – where this modelling plays a significant role in our projections – is China. Over time, we expect China's real exchange to appreciate, both because it is growing richer and because its current deviation from its PPP value is larger than one would expect given its relative income level (i.e., it is more undervalued relative to PPP than other countries at a similar income level).

Over the past 10 years, using PPP rates to forecast long-term real exchange rates in this way has worked well, but with one very important exception: the US Dollar itself (Exhibit 32). However, it is not unusual for individual exchange rates to deviate in this way over 5- or 10-year periods – it just *seems* more notable when that country is the US. While we do not expect a reversal of the US Dollar's strength in the short term, history suggests that a partial reversal (at least) is likely over the longer-term horizons (>5 years) that are the focus of our projections. We therefore continue to think that the underlying framework is the right way to think about future changes in real exchange rates.

**Exhibit 32: Previous Model Has Done Reasonably Well After Adjusting for Dollar Effects**
Realised vs. predicted real FX forecasts (vs. USD and on trade-weighted basis, LHS); projected real FX path (RHS, crosses are historical 10Y moving avg. paths)




Source: Goldman Sachs Global Investment Research

More formally, real exchange rate appreciation is modelled as:

$$\underbrace{\%\Delta FX_{i,t}}_{\substack{Change\ in \\ real\ FX}} = \underbrace{\beta \cdot \ln\left(\frac{Y_{i,t}^{PC}/Y_{US,t}^{PC}}{Y_{i,t-1}^{PC}/Y_{US,t-1}^{PC}}\right)}_{Change\ in\ relative\ income} + \alpha \cdot \left[\beta \cdot \ln\left(Y_{i,t}^{PC}/Y_{US,t}^{PC}\right) - \underbrace{\ln\left(\frac{PPP_{i,t-1}}{FX_{i,t-1}}\right)}_{\substack{PPP\ \ market\ FX \\ misalignment}} + \right]$$

Practically, this means that real exchange rates appreciate steadily over time, where the initial misalignments are low, but much faster or slower depending on the extent of the misalignment.

# Appendix 2: Forecast Summary

| | Real GDP Growth Projections (%) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2000-2009 | 2010-2019 | 2020-2029 | 2024-2029 | 2030-2039 | 2040-2049 | 2050-2059 | 2060-2069 | 2070-2079 |
| **World** | 2.7 | 3.2 | 2.4 | *2.8* | 2.5 | 2.1 | 2.0 | 1.8 | 1.7 |
| **DM** | 1.6 | 1.9 | 1.5 | *1.8* | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 |
| United States | 1.9 | 2.3 | 1.7 | *1.9* | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 |
| **Euro Area** | 1.4 | 1.4 | 1.2 | *1.6* | 1.4 | 1.1 | 1.0 | 0.9 | 0.9 |
| Germany | 0.8 | 2.0 | 0.7 | *1.2* | 1.3 | 1.1 | 0.9 | 0.9 | 1.0 |
| France | 1.5 | 1.4 | 1.2 | *1.7* | 1.5 | 1.3 | 1.2 | 1.2 | 1.1 |
| Italy | 0.5 | 0.3 | 0.9 | *1.4* | 1.0 | 0.7 | 0.6 | 0.5 | 0.5 |
| Japan | 0.5 | 1.2 | 0.6 | *0.9* | 0.8 | 0.7 | 0.7 | 0.6 | 0.5 |
| United Kingdom | 1.6 | 2.0 | 1.4 | *2.0* | 1.9 | 1.6 | 1.5 | 1.3 | 1.2 |
| Australia | 3.1 | 2.6 | 2.3 | *2.5* | 2.4 | 2.1 | 1.8 | 1.7 | 1.5 |
| Canada | 2.1 | 2.3 | 1.7 | *2.1* | 2.0 | 1.9 | 1.7 | 1.6 | 1.6 |
| **Asia (ex. DM)** | 7.6 | 6.7 | 4.1 | *4.2* | 3.1 | 2.4 | 2.1 | 1.8 | 1.5 |
| China | 10.3 | 7.7 | 4.2 | *4.0* | 2.5 | 1.6 | 1.1 | 0.9 | 0.5 |
| India | 6.9 | 6.9 | 5.0 | *5.8* | 4.6 | 3.7 | 3.1 | 2.5 | 2.1 |
| Korea | 4.9 | 3.3 | 2.0 | *1.9* | 1.4 | 0.8 | 0.3 | -0.1 | -0.2 |
| Bangladesh | 5.6 | 6.6 | 6.3 | *6.6* | 4.9 | 3.8 | 3.0 | 2.5 | 2.0 |
| **ASEAN** | 4.9 | 5.2 | 3.2 | *3.9* | 3.4 | 2.9 | 2.5 | 2.1 | 1.9 |
| Indonesia | 5.3 | 5.4 | 3.8 | *4.3* | 3.6 | 3.0 | 2.6 | 2.3 | 2.0 |
| Thailand | 4.3 | 3.6 | 1.9 | *2.8* | 2.4 | 1.9 | 1.4 | 1.1 | 0.9 |
| Philippines | 4.5 | 6.4 | 4.4 | *6.0* | 4.9 | 4.1 | 3.5 | 3.1 | 2.7 |
| Malaysia | 4.7 | 5.4 | 2.9 | *3.6* | 3.5 | 2.9 | 2.2 | 1.8 | 1.5 |
| **CEEMEA** | 4.8 | 3.5 | 2.6 | *3.2* | 3.3 | 3.1 | 3.0 | 2.9 | 2.7 |
| Russia | 5.5 | 2.1 | 0.3 | *1.2* | 1.6 | 1.2 | 1.2 | 1.3 | 1.1 |
| Turkey | 4.0 | 5.9 | 4.2 | *3.5* | 2.9 | 2.1 | 1.7 | 1.4 | 1.1 |
| Kazakhstan | 8.6 | 4.4 | 2.7 | *3.1* | 3.2 | 2.8 | 2.8 | 2.8 | 2.5 |
| **CEE** | 3.8 | 3.0 | 2.5 | *2.9* | 1.8 | 1.2 | 0.9 | 0.8 | 0.7 |
| Poland | 3.9 | 3.7 | 2.8 | *3.3* | 1.9 | 1.1 | 0.7 | 0.5 | 0.4 |
| **MENAP** | 4.7 | 3.8 | 3.3 | *3.6* | 3.9 | 3.4 | 3.1 | 2.8 | 2.5 |
| Egypt | 5.0 | 4.4 | 4.7 | *4.8* | 5.3 | 4.4 | 3.8 | 3.2 | 2.7 |
| Saudi Arabia | 3.5 | 3.5 | 2.8 | *2.9* | 3.2 | 2.5 | 2.0 | 1.7 | 1.4 |
| Pakistan | 4.7 | 4.0 | 5.0 | *6.0* | 5.9 | 5.3 | 4.7 | 4.0 | 3.4 |
| **SSA** | 5.2 | 3.8 | 4.2 | *5.4* | 6.0 | 5.5 | 4.9 | 4.2 | 3.7 |
| South Africa | 3.6 | 1.7 | 1.8 | *2.8* | 3.6 | 3.4 | 2.9 | 2.6 | 2.2 |
| Nigeria | 8.3 | 3.8 | 3.6 | *4.6* | 6.3 | 6.1 | 5.4 | 4.6 | 3.9 |
| Ghana | 5.3 | 6.7 | 4.3 | *5.0* | 5.2 | 4.9 | 4.5 | 4.1 | 3.6 |
| Ethiopia | 8.6 | 9.6 | 8.6 | *10.7* | 8.2 | 6.6 | 5.5 | 4.7 | 4.0 |
| **LatAm** | 2.8 | 2.4 | 2.3 | *3.0* | 3.1 | 2.7 | 2.3 | 1.9 | 1.6 |
| Brazil | 3.4 | 1.4 | 1.9 | *2.4* | 2.8 | 2.5 | 2.1 | 1.7 | 1.5 |
| Mexico | 1.5 | 2.7 | 1.8 | *3.0* | 3.0 | 2.6 | 2.2 | 1.7 | 1.4 |
| Argentina | 2.6 | 1.4 | 2.6 | *3.3* | 3.1 | 2.6 | 2.2 | 1.8 | 1.5 |
| Colombia | 3.9 | 3.7 | 3.4 | *3.4* | 3.3 | 2.7 | 2.2 | 1.7 | 1.4 |
| Chile | 4.2 | 3.3 | 2.1 | *2.3* | 2.4 | 2.0 | 1.6 | 1.4 | 1.2 |
| Ecuador | 3.9 | 2.8 | 2.2 | *3.3* | 3.3 | 3.2 | 2.8 | 2.5 | 2.1 |
| Peru | 5.0 | 4.5 | 3.3 | *4.2* | 4.0 | 3.5 | 2.9 | 2.5 | 2.1 |

Source: Goldman Sachs Global Investment Research

| | Real GDP US$ trn (2021) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | 2075 |
| **World** | 50.3 | 79.4 | 86.6 | 121.4 | 171.6 | 227.9 | 291.4 | 363.9 | 402.5 |
| **DM** | 39.0 | 50.7 | 49.5 | 58.3 | 70.7 | 82.9 | 95.0 | 107.5 | 113.8 |
| United States | 15.6 | 18.5 | 21.8 | 27.0 | 32.0 | 37.2 | 42.8 | 48.6 | 51.5 |
| **Euro Area** | 9.8 | 15.5 | 13.5 | 15.8 | 19.6 | 22.9 | 25.9 | 28.8 | 30.3 |
| Germany | 3.0 | 4.2 | 4.0 | 4.4 | 5.3 | 6.2 | 6.9 | 7.7 | 8.1 |
| France | 2.1 | 3.3 | 2.7 | 3.2 | 3.9 | 4.6 | 5.4 | 6.1 | 6.5 |
| Italy | 1.7 | 2.6 | 2.0 | 2.3 | 2.7 | 3.1 | 3.4 | 3.6 | 3.8 |
| Japan | 7.5 | 7.1 | 5.2 | 4.4 | 5.2 | 6.0 | 6.7 | 7.2 | 7.5 |
| United Kingdom | 2.5 | 3.1 | 2.9 | 3.3 | 4.3 | 5.2 | 6.1 | 7.1 | 7.6 |
| Australia | 0.6 | 1.5 | 1.4 | 1.8 | 2.3 | 2.8 | 3.3 | 3.9 | 4.3 |
| Canada | 1.1 | 2.0 | 1.7 | 2.3 | 2.8 | 3.4 | 4.1 | 4.8 | 5.2 |
| **Asia (ex. DM)** | 5.0 | 14.1 | 24.2 | 40.9 | 64.5 | 90.6 | 119.4 | 150.9 | 167.0 |
| China | 1.8 | 7.4 | 15.5 | 24.5 | 34.1 | 41.9 | 48.6 | 54.8 | 57.0 |
| India | 0.7 | 2.1 | 2.8 | 6.6 | 13.2 | 22.2 | 33.2 | 45.8 | 52.5 |
| Korea | 0.9 | 1.4 | 1.7 | 2.0 | 2.6 | 3.1 | 3.3 | 3.4 | 3.4 |
| Bangladesh | 0.1 | 0.2 | 0.4 | 0.8 | 1.7 | 2.8 | 4.1 | 5.5 | 6.3 |
| **ASEAN** | 0.9 | 2.2 | 2.7 | 4.8 | 8.6 | 13.3 | 18.6 | 24.6 | 27.8 |
| Indonesia | 0.3 | 0.9 | 1.1 | 2.2 | 4.0 | 6.3 | 9.0 | 12.1 | 13.7 |
| Thailand | 0.2 | 0.4 | 0.5 | 0.7 | 1.2 | 1.7 | 2.2 | 2.6 | 2.8 |
| Philippines | 0.1 | 0.3 | 0.4 | 0.7 | 1.4 | 2.5 | 3.9 | 5.6 | 6.6 |
| Malaysia | 0.2 | 0.3 | 0.4 | 0.6 | 1.2 | 1.8 | 2.5 | 3.2 | 3.5 |
| **CEEMEA** | 3.2 | 8.8 | 8.5 | 15.1 | 25.2 | 38.3 | 55.7 | 78.6 | 92.1 |
| Russia | 0.4 | 2.0 | 1.5 | 2.8 | 3.7 | 4.5 | 5.4 | 6.4 | 6.9 |
| Turkey | 0.4 | 1.0 | 0.8 | 1.3 | 2.2 | 3.1 | 4.0 | 4.8 | 5.2 |
| Kazakhstan | 0.0 | 0.2 | 0.2 | 0.3 | 0.6 | 0.9 | 1.3 | 1.8 | 2.1 |
| **CEE** | 0.5 | 1.4 | 1.5 | 2.3 | 3.5 | 4.4 | 5.2 | 5.9 | 6.3 |
| Poland | 0.3 | 0.6 | 0.6 | 1.0 | 1.5 | 1.9 | 2.2 | 2.4 | 2.5 |
| **MENAP** | 1.2 | 2.4 | 2.8 | 5.2 | 9.3 | 14.9 | 22.3 | 31.6 | 36.9 |
| Egypt | 0.2 | 0.3 | 0.4 | 0.8 | 1.9 | 3.5 | 5.8 | 8.8 | 10.4 |
| Saudi Arabia | 0.3 | 0.7 | 0.7 | 1.5 | 2.4 | 3.5 | 4.5 | 5.6 | 6.1 |
| Pakistan | 0.1 | 0.2 | 0.3 | 0.6 | 1.6 | 3.3 | 6.1 | 9.9 | 12.3 |
| **SSA** | 0.4 | 1.2 | 1.1 | 2.1 | 4.4 | 8.5 | 14.9 | 24.1 | 29.9 |
| South Africa | 0.2 | 0.5 | 0.4 | 0.5 | 0.9 | 1.4 | 2.1 | 2.8 | 3.3 |
| Nigeria | 0.1 | 0.5 | 0.4 | 0.8 | 1.6 | 3.4 | 6.2 | 10.4 | 13.1 |
| Ghana | 0.0 | 0.1 | 0.1 | 0.1 | 0.3 | 0.5 | 0.8 | 1.2 | 1.5 |
| Ethiopia | 0.0 | 0.0 | 0.1 | 0.3 | 0.7 | 1.6 | 2.9 | 4.9 | 6.2 |
| **LatAm** | 3.1 | 5.7 | 4.3 | 7.2 | 11.2 | 16.0 | 21.3 | 26.8 | 29.6 |
| Brazil | 1.0 | 2.7 | 1.5 | 2.3 | 3.5 | 4.9 | 6.4 | 8.0 | 8.7 |
| Mexico | 1.1 | 1.3 | 1.1 | 1.9 | 3.0 | 4.2 | 5.6 | 6.9 | 7.6 |
| Argentina | 0.5 | 0.5 | 0.4 | 0.7 | 1.0 | 1.4 | 1.8 | 2.2 | 2.4 |
| Colombia | 0.2 | 0.4 | 0.3 | 0.5 | 0.9 | 1.4 | 1.9 | 2.4 | 2.6 |
| Chile | 0.1 | 0.3 | 0.3 | 0.4 | 0.5 | 0.7 | 0.9 | 1.1 | 1.2 |
| Ecuador | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.5 | 0.6 | 0.7 |
| Peru | 0.1 | 0.2 | 0.2 | 0.4 | 0.6 | 1.0 | 1.4 | 1.8 | 2.1 |

Source: Goldman Sachs Global Investment Research

| | Real GDP per capita US$ thsd (2021) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 | 2070 | 2075 |
| **World** | 9.0 | 12.7 | 12.4 | 16.2 | 21.7 | 27.7 | 34.7 | 43.1 | 47.7 |
| **DM** | 44.5 | 54.3 | 50.6 | 58.4 | 70.2 | 82.4 | 95.6 | 109.4 | 116.4 |
| United States | 55.1 | 59.5 | 64.8 | 76.7 | 87.3 | 99.2 | 112.3 | 125.5 | 132.2 |
| **Euro Area** | 30.8 | 46.6 | 39.9 | 46.9 | 58.9 | 70.9 | 83.5 | 97.2 | 104.3 |
| Germany | 36.3 | 51.5 | 48.6 | 53.2 | 65.9 | 78.6 | 90.7 | 104.2 | 111.6 |
| France | 35.3 | 52.2 | 42.6 | 48.3 | 59.2 | 70.5 | 82.9 | 96.1 | 102.8 |
| Italy | 30.6 | 44.0 | 33.1 | 39.6 | 49.6 | 59.2 | 70.2 | 82.2 | 88.0 |
| Japan | 59.4 | 55.3 | 41.8 | 36.8 | 47.0 | 57.5 | 68.9 | 81.2 | 87.6 |
| United Kingdom | 42.9 | 48.9 | 42.9 | 47.9 | 60.2 | 72.5 | 85.7 | 99.8 | 106.6 |
| Australia | 31.9 | 70.1 | 55.1 | 64.4 | 75.1 | 86.7 | 98.8 | 112.3 | 119.4 |
| Canada | 36.8 | 58.6 | 45.2 | 56.4 | 64.7 | 74.5 | 85.4 | 97.0 | 103.1 |
| **Asia (ex. DM)** | 1.6 | 3.9 | 6.1 | 9.8 | 14.9 | 20.6 | 27.4 | 35.5 | 39.9 |
| China | 1.4 | 5.5 | 10.9 | 17.3 | 24.7 | 31.9 | 40.3 | 50.4 | 55.4 |
| India | 0.7 | 1.7 | 2.0 | 4.3 | 8.2 | 13.3 | 19.6 | 27.1 | 31.3 |
| Korea | 18.7 | 28.8 | 33.0 | 39.3 | 53.6 | 67.7 | 81.8 | 95.2 | 101.8 |
| Bangladesh | 0.7 | 1.1 | 2.3 | 4.4 | 8.4 | 13.5 | 19.7 | 26.9 | 31.0 |
| **ASEAN** | 2.3 | 5.0 | 5.5 | 8.9 | 15.1 | 22.5 | 31.1 | 41.1 | 46.6 |
| Indonesia | 1.3 | 3.8 | 4.1 | 7.5 | 12.9 | 19.8 | 28.2 | 38.0 | 43.4 |
| Thailand | 3.0 | 6.1 | 7.3 | 10.1 | 17.0 | 25.0 | 34.0 | 44.0 | 49.3 |
| Philippines | 1.6 | 2.7 | 3.4 | 5.5 | 9.9 | 15.7 | 23.1 | 32.1 | 37.3 |
| Malaysia | 6.8 | 11.1 | 10.6 | 17.0 | 29.5 | 44.2 | 59.2 | 75.1 | 83.5 |
| **CEEMEA** | 3.0 | 7.1 | 5.7 | 8.8 | 12.9 | 17.6 | 23.3 | 30.6 | 34.8 |
| Russia | 2.9 | 14.0 | 10.6 | 19.9 | 27.2 | 34.1 | 42.1 | 52.1 | 57.2 |
| Turkey | 6.5 | 13.1 | 8.9 | 14.3 | 23.2 | 32.1 | 41.3 | 51.5 | 56.7 |
| Kazakhstan | 1.8 | 11.0 | 9.4 | 16.1 | 25.5 | 35.4 | 47.4 | 62.5 | 70.5 |
| **CEE** | 5.4 | 14.2 | 15.4 | 24.5 | 38.2 | 51.4 | 64.2 | 78.5 | 86.1 |
| Poland | 6.8 | 15.3 | 16.3 | 25.6 | 40.2 | 54.1 | 66.4 | 80.0 | 87.4 |
| **MENAP** | 3.9 | 6.4 | 6.2 | 9.8 | 15.3 | 22.0 | 30.2 | 40.3 | 45.9 |
| Egypt | 2.2 | 3.2 | 3.7 | 6.3 | 12.9 | 22.0 | 33.5 | 47.1 | 54.6 |
| Saudi Arabia | 13.3 | 22.1 | 20.4 | 36.1 | 54.2 | 71.9 | 90.2 | 110.5 | 120.6 |
| Pakistan | 0.9 | 1.3 | 1.4 | 2.2 | 4.8 | 9.0 | 14.9 | 22.5 | 27.1 |
| **SSA** | 1.4 | 3.0 | 2.3 | 3.3 | 6.0 | 9.9 | 15.4 | 22.8 | 27.2 |
| South Africa | 4.9 | 9.9 | 6.0 | 8.0 | 12.9 | 19.3 | 27.3 | 37.2 | 42.6 |
| Nigeria | 0.8 | 2.8 | 2.1 | 2.9 | 5.1 | 8.9 | 14.4 | 22.0 | 26.5 |
| Ghana | 0.9 | 2.1 | 2.3 | 3.3 | 5.5 | 8.7 | 13.2 | 19.4 | 23.1 |
| Ethiopia | 0.2 | 0.4 | 0.9 | 1.9 | 4.0 | 7.3 | 11.8 | 18.1 | 21.9 |
| **LatAm** | 6.9 | 11.3 | 7.7 | 11.9 | 17.7 | 24.8 | 33.0 | 42.3 | 47.4 |
| Brazil | 5.7 | 13.8 | 7.1 | 10.4 | 15.3 | 21.3 | 28.3 | 36.3 | 40.8 |
| Mexico | 11.0 | 11.6 | 9.0 | 14.3 | 21.2 | 29.5 | 39.2 | 50.0 | 55.7 |
| Argentina | 13.0 | 12.7 | 9.0 | 15.2 | 20.9 | 27.2 | 34.5 | 42.5 | 46.7 |
| Colombia | 3.8 | 7.9 | 5.5 | 9.8 | 16.4 | 24.4 | 33.3 | 43.1 | 48.5 |
| Chile | 7.7 | 15.7 | 13.6 | 18.3 | 26.2 | 35.0 | 44.0 | 54.2 | 59.8 |
| Ecuador | 2.2 | 5.7 | 5.9 | 7.8 | 11.2 | 15.5 | 21.0 | 27.6 | 31.4 |
| Peru | 2.9 | 6.3 | 6.4 | 9.8 | 15.5 | 22.7 | 31.1 | 41.0 | 46.5 |

Source: Goldman Sachs Global Investment Research

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