Economics

21 February 2011

Global Growth Generators

Moving beyond ‘Emerging Markets’ and ‘BRIC’

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Economics

21 February 2011 | 88 pages

Global Economics View

Global Growth Generators: Moving beyond 'Emerging Markets' and 'BRIC'

- We intend to systematically research the global generators of growth for the future - in this note, we focus on countries, but in principle our universe encompasses regions, cities, commodities, asset classes, activities, and products.
- We expect strong growth in the world economy until 2050, with average real GDP growth rates of 4.6% pa until 2030 and 3.8% pa between 2030 and 2050 – as a result, world GDP should rise in real PPP-adjusted terms from 72 trillion USD in 2010 to 380 trillion USD in 2050.
- Developing Asia and Africa will be the fastest growing regions, in our view, driven by population and income per capita growth, followed in terms of growth by the Middle East, Latin America, Central and Eastern Europe, the CIS, and finally the advanced nations of today.
- China should overtake the US to become the largest economy in the world by 2020, then be overtaken by India by 2050.
- 'This time it's different': many EMs have either opened up already or are expected to do so, and have reached a threshold level of institutional quality and political stability.
- For poor countries with large young populations, growing fast should be easy: open up, create some form of market economy, invest in human and physical capital, don't be unlucky and don't blow it. Catch-up and convergence should do the rest.
- Bangladesh, China, Egypt, India, Indonesia, Iraq, Mongolia, Nigeria, Philippines, Sri Lanka and Vietnam have the most promising (per capita) growth prospects – they are our 3G countries.
- Institutions and policies are more important for growth once countries have achieved a fair degree of convergence.
- Growth will not be smooth. Expect booms and busts. Occasionally, there will be growth disasters, driven by poor policy, conflicts, or natural disasters. When it comes to that, don't believe that 'this time it's different'.

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Global Growth Generators

1. Introduction

This note introduces the Global Growth Generators or 3G: the countries that over the next 5, 10, 20 and 40 years are expected to deliver high growth and profitable investment opportunities.

We set out a framework for thinking about the drivers of global growth and investment opportunities.

This note introduces the Global Growth Generators or 3G: the countries, regions, cities, trade corridors, sectors, industries, firms, technologies, products and asset classes that over the next 5, 10, 20 and 40 years are expected to deliver high growth and profitable investment opportunities. Global Growth Generators/ 3G – short for global sources of growth potential and of profitable investment opportunities - aims to be an organising concept and mnemonic label to help organise research, analysis and commentary throughout the firm – a lens or prism to help researchers, analysts, strategists and finance professionals organise facts, insights, ideas and conjectures about what drives growth and investment opportunities all over the world.

We set out a framework for thinking about the drivers of global growth and investment opportunities, and offer a first illustration of this framework to 'countries' – asking the question: what are likely to be the future drivers of growth at the country level? We recognise that countries, or nation states, are not the only, and in many instances not even the most useful units of analysis. Regions (both sub-national and multi-national), cities (especially mega-cities), sectors, trade corridors, industries, firms, technologies, products and asset classes are worthy of attention and study in their own right. But countries are a good place to start, if only because the economic, business and political discussion of future growth generators has historically been conducted in terms of countries.

The proposed change in terminology is *necessary* because it points to a different approach to thinking about the future drivers of growth and profitable investment opportunities anywhere in the world. It is necessary *now* because catchy acronyms and labels have spawned unhelpful taxonomies of countries that have become obstacles to clear thinking about future growth and profit opportunities. Developing/Emerging vs. developed/advanced/mature, BRIC, the Next Eleven, the 7 Percent Club are no more helpful concepts for Citi's global client base than the Magnificent Seven or the Nine Nazgûl.

The expression 'Global Growth Generators' is not simply a new name or label for the same collection of countries currently known as EMs. Indeed, we hold the view that some countries currently in the EM category are not necessarily among the future global growth generators. And in principle, there could be countries that are not currently classified as EMs that could become, or could become again, sources of global growth. Certainly when we don't focus on countries as the fundamental unit of analysis but on industries, sectors or firms, it is clear that there are now and always will be, high growth industries in low-growth mature economies, and high-growth firms in low-growth industries and low-growth advanced economies.

We don't therefore propose to replace the term "emerging markets" with the term "Global Growth Generators". We propose instead to use the term "Global Growth Generators" to tag those countries, regions, cities, sectors, trade corridors, industries, firms, products or asset classes that we consider likely to thrive in our globally integrated economy, with high growth rates and high returns to investment during the coming decades.

We use growth in the sense of "sustained and sustainable growth." This excludes both cyclical recoveries and 'production' that represents capital depreciation, broadly defined, including the depletion of non-renewable or exhaustible natural resources. There can be legitimate and profitable investment opportunities associated with resource-depleting activities, but they should not be mislabelled as 'growth'.

We elaborate on these issues in the sections that follow.

We produce forecasts until 2050 for real GDP and real GDP per capita for 58 countries, 10 regional aggregates, and the world.

We produce forecasts for real GDP and real GDP per capita for 58 countries, 10 regional aggregates and the world until 2050. These forecasts are informed by country-specific forecasts from Citi's local economists around the world, historical growth rates and academic studies on long-run growth performance and convergence.

We expect the world economy to grow by 4.2% pa between 2010 and 2050, increasing world real GDP from $72trn to $380trn.

We are fairly optimistic about the prospects for real GDP growth over the next four decades. We expect 4.6% pa growth in world real GDP, measured at 2010 purchasing power parity (PPP) adjusted US dollars, between 2010 and 2030 and 4.2% pa growth between 2010 and 2050. Real GDP growth will mainly be driven by growth in real GDP per capita, but the world population is also predicted to increase.

Developing Asia and Africa will be the fastest growing regions – the economic centre of gravity of the world will continue to shift eastwards.

The fastest growing regions according to our forecasts are Africa (7.0% pa growth in real GDP between 2010 and 2050) and Developing Asia (5.4% pa). Other regions that are relatively poor today, like Central and Eastern Europe, the Commonwealth of Independent States, Latin America and the Middle East are also predicted to enjoy robust growth, while today's advanced industrialised nations are only expected to grow modestly. As a result, the share of world real GDP (at PPP USD) accounted for by North America and Western Europe is expected to fall from 41% in 2010 to just 18% in 2050, while Developing Asia's share is predicted to rise from 27% of world GDP to 49% in 2050. We expect China to overtake the US to become the largest economy in the world by 2020 – to be in turn overtaken by India by 2050.

'This time it's different' – increased openness and a modicum of institutional and political stability imply that prospects for growth in poor economies have much improved.

We expect broad and sustained growth in real GDP per capita in today's poorer economies. This would much reduce the – often enormous – gap between their per capita incomes and those of today's richest economies, i.e. we expect catch-up or convergence in per capita incomes. The past few decades had seen little of such convergence until late in the past century. But the reasons for our optimism lie in the fact that many poor economies have opened up and reached the modicum of institutional quality and political stability that are needed for fast growth and rapid catch-up. In addition to these three drivers, we identify high rates of capital formation (to be financed mainly by domestic savings) and human capital (demographics, the health and education of the workforce) as the main forces underlying sustained growth.

The most promising countries are composed of the young and the poor - Nigeria, India, Vietnam, Mongolia, Bangladesh, Iraq, Indonesia, Sri Lanka, the Philippines, China and Egypt are our '3G countries' – but growth will be bumpy.

According to these criteria, we identify the 11 countries which have the most promising growth prospects – Bangladesh, China, Egypt, India, Indonesia, Iraq, Mongolia, Nigeria, Philippines, Sri Lanka and Vietnam are our 3G countries. All of these countries are poor today and have decades of catch-up growth to look forward to. Some of them (Nigeria, Mongolia, Iraq and Indonesia) also have large natural resource endowments that we hope will be more beneficial than they so often have been in the past. Iraq is recovering from numerous wars. All but China have favourable demographics.

Mexico, Brazil, Turkey, Thailand and a few other countries are predicted to enjoy robust growth, but would need to implement major adjustments, including raising domestic saving and investment rates substantially, to join the list of 3G countries. Other countries, including Iran and North Korea could find it easier to join the 3G set, once they achieve the political transitions or transformations required to release their economies (and societies) from their decades-old straitjackets.

Growth will be bumpy. There will be busts as well as booms. Beware of any proclamations of an end of volatility. Poor policies, conflict and natural disasters will change the growth equation for some countries in a negative way. But there is little doubt in our minds that the prospects for broad, sustained growth in per capita incomes across the world have not been as favourable as they are today for a long time, possibly in human history.

2. Identifying the drivers of future growth and investment returns

As a global bank, Citi pursues growth and profitable investment opportunities wherever they may exist. The identification of observable characteristics of countries, regions, cities, enterprises and other economic entities that help predict future growth and profit potential is therefore key to Citi's success.

2.1. Companies as Global Growth Generators

Global Growth Generators need not be countries – they could be companies, such as the Global Growth Companies of the World Economic Forum.

One characteristic of the likely 3G members that we would like to draw attention to here, is the fact that they need not be *countries* but could be cities or regions within countries or regions spanning parts or all of multiple countries – like the tri-country European region spanned by Maastricht in the Netherlands, Liege in Belgium and Aachen in Germany. Or they could be enterprises or other growth incubators, such as universities or science parks. Indeed they could be sectors or industries that may or may not favour specific countries, or technologies, products or process, asset classes, commodities, or specific kinds of activities that can be pursued by a range of actors to promote growth and profitable investment opportunities.

A nice example of Global Growth Generators other than nation states is the Global Growth Companies (GGC) of the World Economic Forum (WEF). The WEF recently (in 2007) created a Community of 'Global Growth Companies' The declared purpose of this initiative is "... identifying those players that in addition to showing consistently high growth rates, through their new technologies and innovative business models, act as disruptors of traditional industries. Global Growth Company members come both from fast-growing emerging markets and from established economies."

As of August 2010, the GGC Community counted more than 250 member companies in 60 countries distributed across all continents except Antarctica. Eligible Global Growth Companies have annual revenue between USD 100 million and USD 5 billion, an average year-to-year growth rate of 15%, and are required to be engaged in building a global business beyond their traditional markets.[1] Many of these fast-growing companies originated from and are based in slow-growing countries (see World Economic Forum (2011)).

[1] GGC members are also required to be committed to having a positive effect on the economies and societies in which they operate. It is not clear how this is verified.

2.2. No Emerging Markets, Submerging Markets or Advanced Economies …

The term 'Emerging Markets' is used abundantly, but definitions are few and far between, and most of those are not very useful.

Research aimed at discovering the drivers and observable correlates of growth and profitability requires the systematic structuring and organisation of data, using taxonomies and classification schemes. We believe that some of the most common, leading classification schemes are, at best, unhelpful and at worst obstacles to understanding and appropriate action. Among these are EM and BRIC…

The expression 'Emerging Markets' is clearly past its sell-by date. It 'emerged' as a politically correct alternative to the no longer acceptable designation *(successful) developing countries*. The expression *'developing countries'* itself was a less offensive alternative to *'underdeveloped countries* 'or *'third world'.* Other antecedents include the misleading '*South*' and the uninformative *'poor countries'*. 'Third world' has overtones of 'third class' - the 'first world' consisted of the pre-1980 OECD countries (Western Europe, the US and Canada, Japan, Australia and New Zealand) and the 'second world' the centrally planned communist countries of Central and Eastern Europe (CEE) and the Soviet Union. 'South' is geographically incorrect: most countries commonly included in the 'developing countries' category are actually in the Northern Hemisphere. 'Poor countries' – or rather countries with many poor people – is unhelpful because there can be many reasons for widespread poverty.

The use of the term 'Emerging Markets' is very common – so common indeed that it has become hard to get around it – but clear definitions are few and far between and useful definitions are virtually nonexistent. Some agencies use 'inductive classifications', simply providing lists of countries with a label attached to them, without explaining the meaning of the label or the reason for attaching a specific country to a specific label. The IMF falls into this category. At the highest level of aggregation, the IMF's 'World', which includes 183 countries, just has two categories, 'Advanced economies', consisting of 33 countries, and 'Emerging and developing economies', with 150 countries.[2] The 'Advanced economies' includes all 16 countries that were members of the Euro area at the end of 2010, but not Estonia, which joined the Euro area on January 1, 2011, and is classified in the 'Emerging and developing economies' category.[3][4]

[2] The 33 Advanced economies are Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong SAR, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan Province of China, United Kingdom, and United States.

[3] The IMF's 'Advanced economies' also includes all the G7 countries, labeled 'Major advanced economies (G7)'. Note that there is overlap among the IMF's sub-categories, which therefore don't constitute a partition of the whole: France, Germany and Italy are part of both the G7 and the Euro area. The category 'Newly industrialized Asian economies' contains 4 countries. 'Other advanced economies (Advanced economies excluding G7 and euro area)' is composed of 13 countries. Note that the 'Newly industrialized Asian Economies' are a subset of the 'Other advanced economies' category. So the 33 'Advanced economies' contain the 13 'Other advanced economies', the G7 countries and the 13 Euro are members that are not part of the G7.

[4] The 'Emerging and developing economies' category contains 15 countries brought together under the heading 'Central and eastern Europe'. Clearly, the geographic label leads to errors of omission and commission. Czech Republic, Slovenia and Slovakia clearly are geographically part of CEE, and indeed Vienna is East of Prague. Most of Turkey's landmass is in Asia.

The IMF's Commonwealth of Independent States contains 13 countries. Two of these, Georgia and Mongolia, are not members of the Commonwealth of Independent States, but "are included in this group for reasons of geography and similarities in economic structure". "Developing Asia" contains 26 countries.[4] It leaves out the country with the largest land mass in Asia, which is Russia, as well as the Central-Asian CIS countries. The 'ASEAN-5' category, consisting of 5 countries, is a sub-set of 'Developing Asia'.[4] 'Latin

The hodgepodge of IMF country classifications lacks a consistent set of clearly defined principles. At the other end of the spectrum we can find attempts at classification schemes based on analytical or conceptual considerations. An example of this can be found in Investor.com, which gives us a very restrictive definition of Emerging Market: *"A financial market of a developing country, usually a small market with a short operating history."*[5] Apart from having an exclusively financial focus, it would, even on its own terms, seem to exclude Brazil. It's clear, but does not seem to be well-designed to focus on characteristics that are likely to be of economic or financial interest.

Then there are the circular or overly vague definitions. For example, Business.com defines developing countries as: *"All nations not considered developed. Collectively called the 'South'. See also Least Developed Countries."*[6] When we follow the link to 'developed' we find: *"Characteristic of a component, item, or process which exists, is workable, and can be offered for sale."*[7]

The World Bank's current definition of a Developing Country is a country that has a gross national income (GNI) of D11,456 or less per capita. That definition has changed over time, with the threshold GNI level rising steadily. Why this discriminates between countries in a way that is interesting or relevant for development strategies, growth potential, returns to investment or anything else that is actionable, is not clear.

In our view, if the term 'emerging markets' means anything at all, it singles out national economies that are rapidly evolving from a predominantly rural/agricultural/traditional services structure of production with low per capita productivity and real income to an urban/manufacturing-industrial/modern services structure of production with significantly higher levels of productivity and per capita real income. But apart from sounding somewhat patronising, the term 'emerging market' at best describes a process, or rather the outcome of a process. It does not help us understand the causal factors driving growth, the necessary and sufficient conditions that cause countries, regions or communities to move from decades - even centuries in the case of China and India - of economic stagnation or even decline, to sustained growth of productivity and output.

The term 'emerging market' also begs the question of what it excludes. What is the orthogonal complement of an emerging market? A mature economy? An advanced economy (industrial or post-industrial)? A 'submerging market' perhaps, that is, a nation with a history of or prospects of sustained relative decline?

We don't believe that grouping countries and singling them out for special attention simply because they all happen to have grown quite rapidly for a number of years at more or less the same time is likely to constitute a useful, replicable methodology for identifying the future winners in the growth and investment returns stakes. Our aim is to identify countries, regions, cities, industries, sectors, technologies, enterprises, products and asset classes that have the potential for fast future growth and for profitable investment opportunities and to identify any common causal factors, or clusters of factors, behind this superior prospective performance.

America and the Caribbean' is made up of 32 countries.[4] Twenty countries constitute the category 'Middle East and North Africa'.[4] Forty four countries constitute 'Sub-Saharan Africa'.[4]

[5] http://www.investorwords.com/1693/emerging_market.html

[6] http://www.businessdictionary.com/definition/developing-countries.html

[7] http://www.businessdictionary.com/definition/developed.html

2.3. Instead focus on fundamental drivers of sustained, high economic growth and superior returns to investment

We intend to establish verifiable, observable criteria that will enable us to select the future generic global growth generators and the future generators of outstanding returns to private investment on the basis of fundamental analysis of economic, political and social determinants of growth.

We hold the view that the categories 'emerging markets' (EMs), 'advanced economies' (AEs), 'developing countries', 'BRICs' (Brazil, Russia, India and China), 'Next Eleven' (emerging economies—Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, Philippines, South Korea, Turkey and Vietnam) or the Growth Markets (BRICs plus Mexico, South Korea, Turkey and Indonesia) are all labels belonging to classification schemes that either have outlived their usefulness or are unlikely to ever have any. On the basis of fundamental analysis of economic, political and social determinants of growth, we intend to establish verifiable, observable criteria that will enable us to select the future generic global growth generators and the future generators of outstanding returns to private investment (always remembering that growth and investment returns are likely to be most imperfectly correlated, especially over short horizons).

The rest of this essay will address the question as to which countries are likely to be the Global Growth Generators/3G of the 21st century. The object of our enquiry is, at least in principle, the universe of all countries. We try to determine which set or sets of complementary or opposite factors favour or inhibit high growth. Our approach should be able to explain both why some countries have high growth rates and why others do not. Global refers not just to the scope of the list of likely candidates, but to our belief, motivated in Section 3 below, that globalisation and regional and global integration have been and continue to be powerful drivers of growth, without which the economic miracle of global growth lifting hundreds of millions out of poverty[8] seen over the past 30 years could not have happened.

History and fundamental analysis will inform, but not constrain our views of who the members of the 3G should be. Lessons can be learned from history, but analysis, design and action can be driven by flashes of insight and by a creative imagination that transcends the shackles of empiricism and history. In what follows, we also make use of 'informal', 'local' expertise – the insights of our globally dispersed economics team into the local drivers of growth in the economies they live in, work in and study every day. We then aggregate/synthesize/transform this into a global growth scenario for the next 40 years, using not just our 'home-made' country forecasts, but the lessons about growth and convergence contained in the literature.

As noted in Section 1, the expression 'Global Growth Generators' is not simply a new name or label for the same collection of countries currently known as EMs. Indeed, we hold the view that some countries currently in the EM category are not necessarily among the future global growth generators. Possible examples are Russia and Argentina. Properly measured sustainable growth rates for Russia (allowing for the fact that most of its natural resource-based industries extract non-renewable resources) could well be disappointing because poor demographics and enterprise-unfriendly economic governance and institutions produce an unfavourable investment climate that discourages domestic capital formation. Argentina's sustainable growth prospects are limited, despite an abundance of renewable resources, by weak economic governance and institutions, and by protectionist and populist policies that have produced almost a century of secular stagnation and huge swings in economic activity.

[8] See Millennium Development Goals Indicators, Statistical Annex: Millennium Development Goals, Targets and Indicators, 2010.

Some countries currently not put in the EM category could, in principle, be global growth generators, including some countries currently classified as Advanced Economies or Mature Economies. Examples could be, say, Ireland (once it gets over its sovereign and banking crises), Canada, Australia and even the US, given the right structural reforms and notwithstanding its unfavourable export exposure to the world's fastest growing economies (Figure 60 and Figure 61). To those who view the US as doomed to rapid relative decline, we would recommend an extended period of reflection on why so many of the highly profitable, commercially successful breakthroughs at the frontier of knowledge and know-how continue to occur there, from Microsoft and Apple to Facebook, Skype and Google. Even the non-market driven free and open source software (FOSS) movement, although a truly global example of decentralised, non-market-mediated voluntary cooperation, has many of its roots in the US and finds its European giants, like Linus Torvalds (the father of Linux – perhaps the most important operating system of the past 20 years), emigrating to the US. Even though in the end no AE makes it into our 3G list, this is in part the result of our judgment that the institutional and policy changes required to transform some AEs into 3G countries – such as the encouragement of large-scale immigration and radical welfare state reform – are unlikely to be implemented.

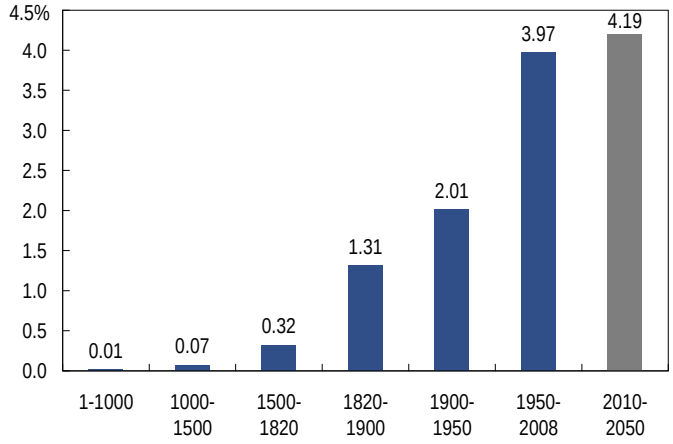
A more likely reservoir of potential 3G members not currently classified as EMs are countries that, for a variety of historical reasons, have persistently underperformed relative to their potential – often because they have been prevented by dysfunctional political and economic regimes from deeper integration into the global economy – but for which there is a reasonable prospect that these (man-made) obstacles to growth and global integration could be removed in the not too distant future. Examples of such countries include Iran, North Korea and Myanmar.

3. Globalisation, Growth and Catch-up: the story thus far and beyond

Sustained and widespread growth in GDP and GDP per capita only began with the Industrial Revolution

Sustained and widespread growth in GDP and GDP per capita is a relatively recent phenomenon (Figure 1 and Figure 2). For most of human history, living standards evolved at a barely perceptible pace. For substantial lengths of time living standards remained constant at very low levels or even regressed. With the beginning of the Industrial Revolution in the UK during the second half of the 18th century, growth rates of GDP per capita increased markedly in the still limited number of industrialising nations (some West-European nations, the USA and, after the Meiji restoration, Japan). Growth rates of GDP rose by even more, as the Agricultural Revolution (in Britain from the beginning of the 18th century) and rising productivity and prosperity brought by the Industrial Revolution also led to a step rise in the rate of population increase. We expect growth in world GDP and growth in world GDP to be brisk over the next four decades.

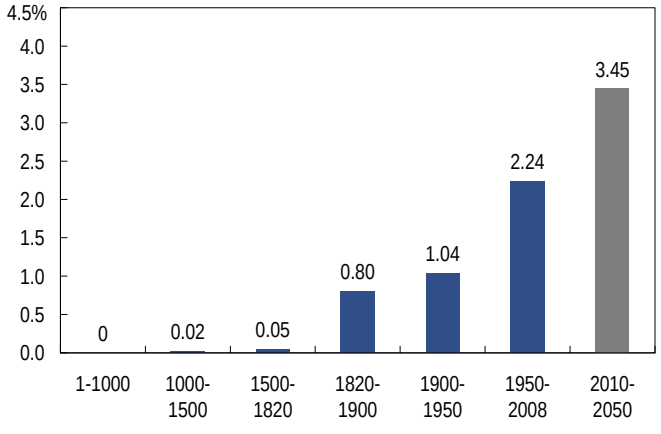
Figure 1. Average world real GDP growth (% YoY) AD1 to 2050



Note: Calculations until 2008 are based on the Angus Maddison dataset (in 1990 PPP-based International Geary-Khamis dollars). 2010-2050 data are our own projections.

Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

Figure 2. Average world real GDP per capita growth (% YoY) AD1 to 2050



Note: Calculations until 2008 are based on the Angus Maddison dataset (in 1990 PPP-based International Geary-Khamis dollars). 2010-2050 data are our own projections.

Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

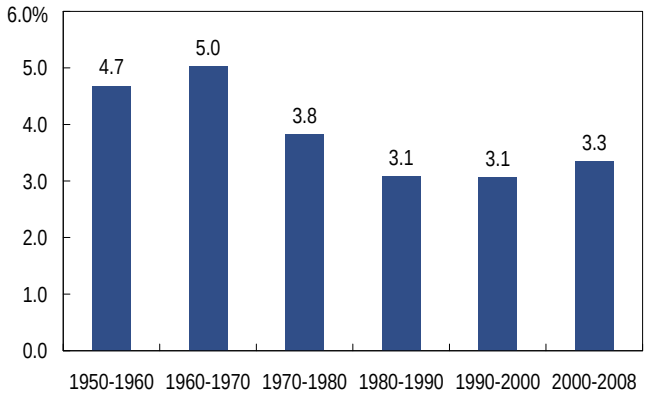
3.1. The Evolution of World GDP

Post-war reconstruction, globalisation, the spread of the market economy, catch-up and convergence of productivity and technological change shifting the technology frontier have driven global growth since the end of the second World War

Since the end of the second World War, the speed of increase in world GDP and living standards has been raised further (Figure 3 and Figure 4). In the immediate aftermath of the War, this was the result of recovery and rebuilding of war-damaged nations.

But since then, two remarkable economic phenomena have transformed the world. The first is *globalisation*, the second *productivity and real income convergence* or *catch-up* – the eruption of sustained rapid economic growth in countries accounting for most of humanity but, as late as 1980, for very low shares of global GDP.

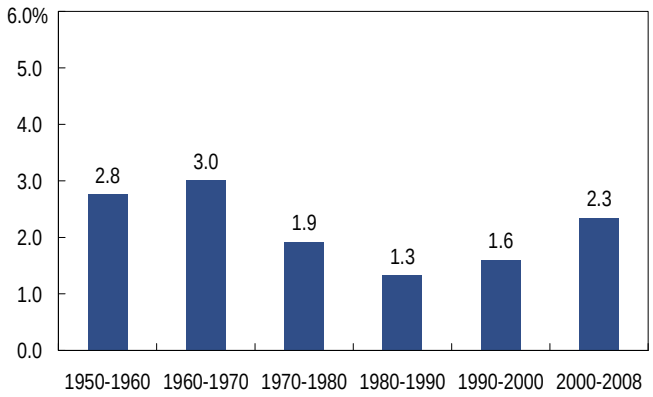
Figure 3. Average world real GDP growth (% YoY) 1950-2008



Note: GDP measured in 1990 (PPP-based) International Geary-Khamis dollars

Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

Figure 4. Average world real GDP per capita growth (% YoY) 1950-2008



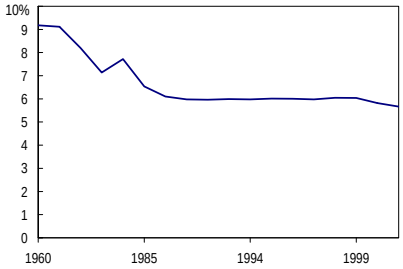
Note: GDP measured in 1990 (PPP-based) International Geary-Khamis dollars

Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

The man-made side of globalisation has been reversed in the past – and could be reversed again

Globalisation is the steady decline in importance of national boundaries and geographical distance as constraints on the mobility of just about everything – good, neutral and bad. People, goods and services, factors of production and their owners, financial capital, enterprises, technology, brand names, knowledge, ideas, culture and values, crime, financial contagion, terrorism and contagious and infectious diseases all move more easily across national frontiers than at any time since the beginning of World War I. It affects virtually every nation and region in the world. Globalisation is driven, first, by *technological advances* reducing the cost of transportation, mobility and communication, and second, by *deliberate political decisions* to reduce or even to eliminate man-made barriers to international mobility (Figure 5, Figure 6 and Figure 7).

Figure 5. US freight transportation expenditures (% of GDP) 1960-2001

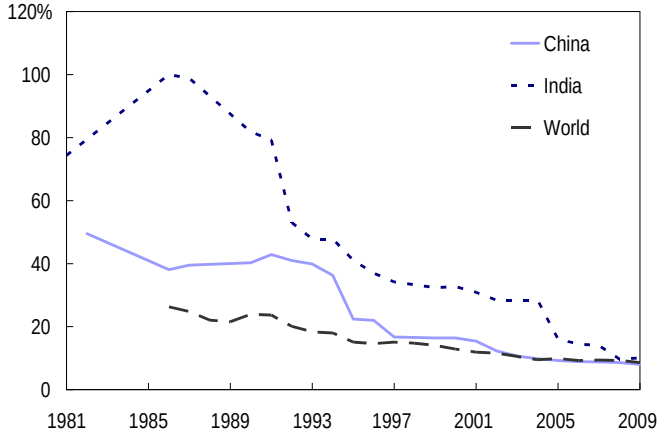


Source: *National Transportation Statistics* by Research and Innovative Technology Administration; Citi Investment Research and Analysis

The first of these two driving forces – technology – would appear to be irreversible, although occasional setbacks to the processes reducing the cost of transportation, mobility and communication do occur. A recent example is the global increase in the cost of air travel and in other costs of engaging in international trade that resulted from the response to terrorist attacks, especially since 09/11.

The political forces driving the lowering of man-made obstacles to international trade and mobility cannot be taken for granted. They have been reversed in the past. They could be reversed again. All around us we can see new examples of protectionism through trade restrictions, controls on capital inflows or outflows, barriers to FDI, limitations on immigration and/or emigration and even, in a few cases, of attempts by governments to build firewalls around their countries to control the content of information accessed and transmitted through social networks like Twitter or Facebook, using the Internet or mobile phones. Between 1870 and 1914, international trade in goods and services was as free as it is today. International lending and borrowing were also highly developed and subject to few official restrictions. The range of financial instruments traded internationally was of course much more restricted than it is today. However, mobility of people, including international migration, was less restricted during the Gold Standard days than it is today.

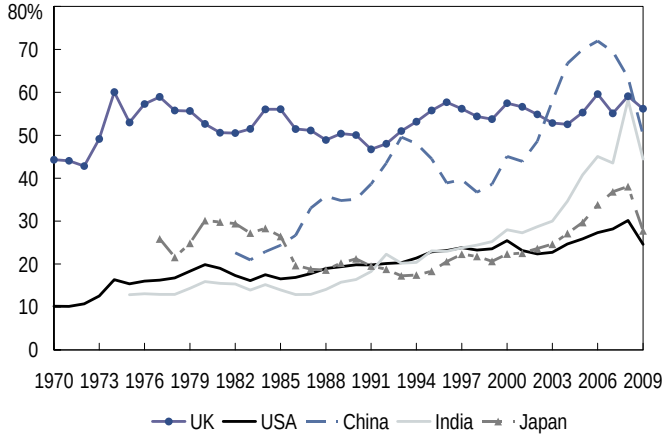
Figure 6. Selected countries - Average MFN applied tariff rates (% of value) 1981-2008



Note: All tariff rates are based on unweighted averages for all goods in ad valorem rates, or applied rates, or MFN rates whichever data is available in a longer period. Missing values interpolated. MFN stands for Most Favored Nation.

Source: World Bank Data on Trade and Import Barriers; Citi Investment Research and Analysis

Figure 7. Selected countries - Trade openness (% of GDP) 1970-2009



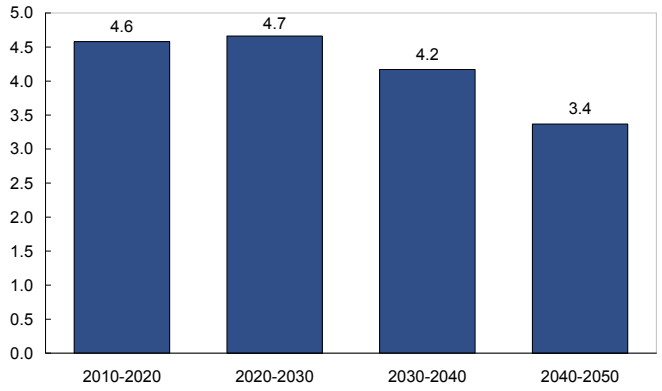
Note: Openness is calculated as the sum of Exports and Imports divided by GDP, all in current USD

Source: IMF Direction of Trade database; Citi Investment Research and Analysis

We expect the world economy to grow by 4.6% pa between 2010 and 2030 and 3.8% pa between 2030 and 2050

In our view, globalisation and catch-up in productivity and incomes have not nearly run their course. We expect annual average growth in world GDP, measured in constant purchasing power parity (PPP) adjusted US dollar terms, to be 4.6% pa between 2010 and 2030, and 3.8% pa between 2030 and 2050. While such growth rates look high in relation to the experience of the previous three decades, they are not high by the standards of the postwar period.

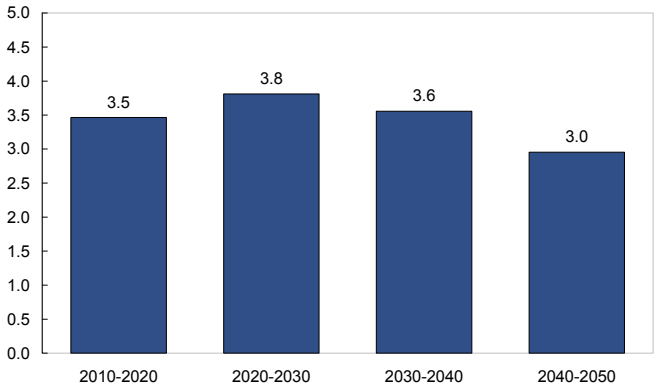
Figure 8. Average world real GDP growth (%YoY) 2010-2050



Note: in 2010 PPP USDD

Source: Citi Investment Research and Analysis

Figure 9. Average world real GDP per capita growth (%YoY) 2010-2050



Note: Note: in 2010 PPP USDD

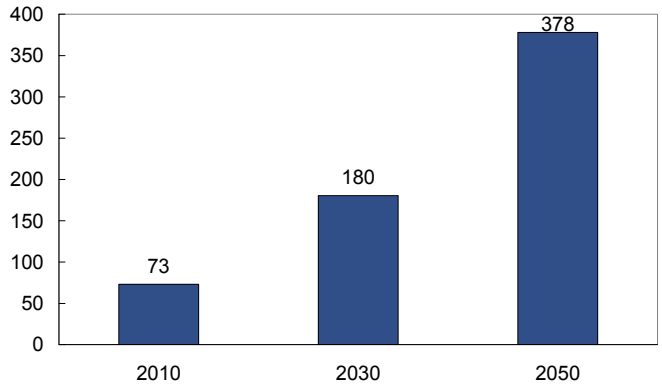
Source: Citi Investment Research and Analysis

As a result, world GDP would rise from $73trn in 2010 to $180trn in 2030 and $378 in 2050

As a result, we expect the size of the world economy to increase substantially from levels observed today. According to the IMF, world GDP, measured at PPP US dollars, amounted to $73trn in 2010. According to our forecasts, world GDP will more than double to $180trn by 2030, measured in comparable units, i.e. constant 2010 PPP US dollars, and then more than double again to $378trn by 2050.

Growth in GDP will partly be driven by further increases in population (Figure 11) but we expect the bulk of the gains to be derived from sustained and widespread increases in incomes and living standards, as measured by GDP per capita (Figure 9).

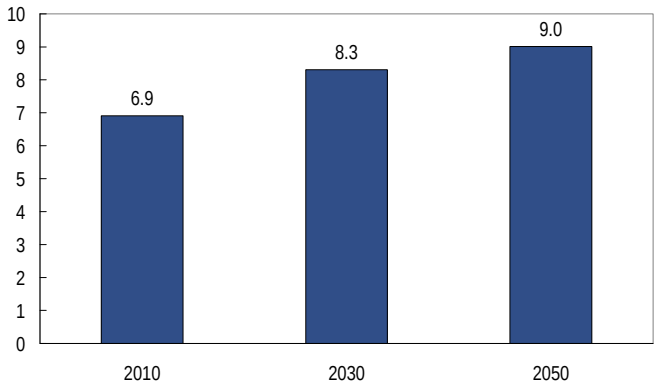
Figure 10. World GDP (2010 USD Trn)



Note: in trillion 2010 PPP USD

Source: Citi Investment Research and Analysis

Figure 11. World population (in billions)



Source: U.N. Populations Statistics; Citi Investment Research and Analysis

3.2. The Composition of World GDP

Sustained growth of aggregate and per capita GDP has gradually spread from Western Europe and North America to Asia, South America, the Middle East and, finally, Africa.

Sustained growth of aggregate and per capita GDP has spread from a limited number of advanced industrial countries (the US, Canada, most of Western Europe, Japan, Australasia) first to a number of East Asian economies, including South Korea, Hong Kong, Taiwan and then to a growing number of Asian, Latin American and, more recently, also African countries. The natural resource-rich countries of the Middle East also achieved high and rising levels of per-capita GDP as the OPEC cartel gained strength following the 1973 and 1979 oil price shocks. After the fall of Communism in Eastern and Central Europe in 1989, and the break-up of the Soviet Union at the end of 1991, the former communist and centrally planned economies adopted, with varying degrees of success, more market-oriented methods of economic organisation. For the first time in history, economic growth became the rule globally rather than the exception. The most successful poorer countries, designated first as underdeveloped countries, then as developing countries and more recently as emerging markets, began to grow significantly faster than rich mature industrial countries, with a material prospect of convergence or catch-up of productivity and per capita income levels in the long run. Within a generation of starting its rapid growth phase, the largest of these rapidly growing but still poor countries, China, had overtaken Japan as regards aggregate GDP and began to close in on the USA.

Figure 12 to Figure 15 illustrate a number of stylised facts about growth over the past four decades.[9] First, Japan's growth rates (in terms of real GDP and real GDP per capita) in the decades after the second World War were nothing short of spectacular. Second, growth was very widespread between 1950 and 1970, with both developing and advanced economies growing at substantial rates. Third, growth has been much more volatile in emerging markets than in the advanced economies, where growth has slowed in the last three decades.

[9] Our regional aggregates rely on the following classification, for historical data as well as our forecasts:

Africa: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Democratic Republic of, Congo, Republic of, Côte d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Ethiopia, Gabon, Gambia, The, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Western Sahara, Zambia, and Zimbabwe.

Developing Asia: Bangladesh, Bhutan, Cambodia, China, Fiji, Hong Kong, India, Indonesia, Kiribati, Lao People's, Democratic Republic, Malaysia, Maldives, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, South Korea, Sri Lanka, Taiwan, Thailand, Tonga, Vanuatu, Vietnam

Central and Eastern Europe: Albania, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Former Yugoslav Republic of, Malta, Poland, Romania, Slovak Republic, Slovenia, and Turkey.

Commonwealth of Independent States: Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyz, Republic, Moldova, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan. Mongolia, which is not a member of the Commonwealth of Independent States, is included in this group for reasons of geography and similarities in economic structure

Latin America and Caribbean: Antigua and Barbuda, Argentina, Bahamas, The, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Netherlands, Antilles, Nicaragua, Panama, Paraguay, Peru, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela

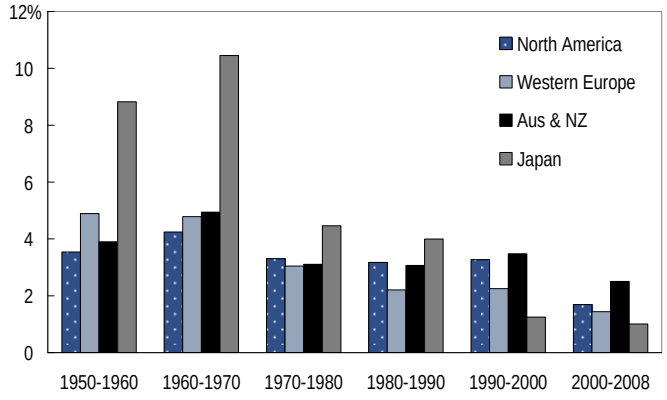
Middle East: Bahrain. Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen, Gaza

North America: Canada, United States

Western Europe: Andorra, Austria, Belgium, Denmark, Finland, France, Iceland, Ireland, Italy, Germany, Gibraltar, Liechtenstein, Luxembourg, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, United Kingdom

Only in emerging economies have we observed negative growth rates in GDP, and even more in GDP per capita, for substantial lengths of time.

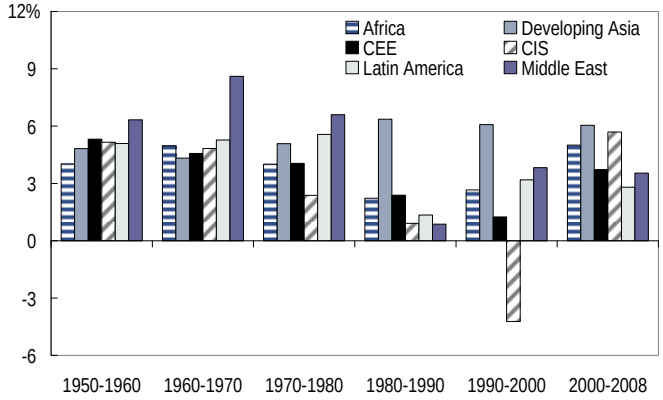
Figure 12. Advanced Economies - Average real GDP growth (% YoY) 1950-2008



Note: GDP measured in 1990 International Geary-Khamis (PPP) dollars. Aus - Australia, NZ – New Zealand

Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

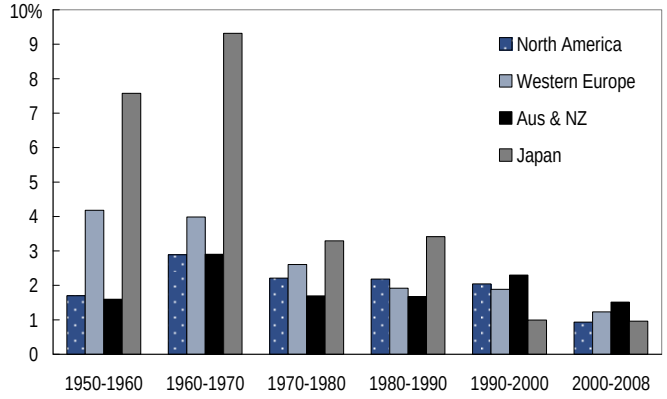
Figure 13. Emerging Economies - Average real GDP growth (% YoY) 1950-2008



Note: GDP measured in 1990 International Geary-Khamis (PPP) dollars. CEE - Central and Eastern Europe, CIS – Commonwealth of Independent States.

Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

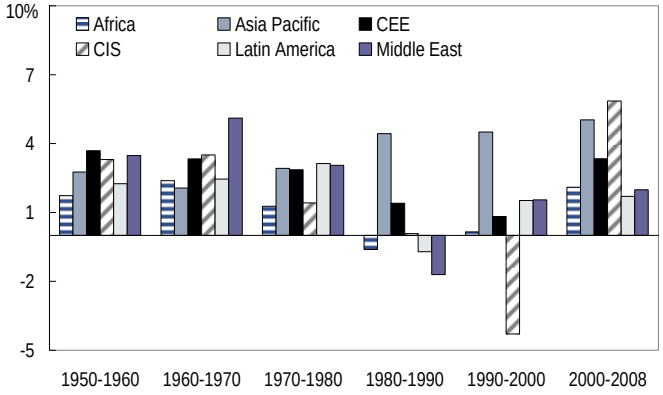
Figure 14. Advanced Economies - Average real GDP per capita growth (% YoY) 1950-2008



Note: GDP per capita measured in 1990 International Geary-Khamis (PPP) dollars. Aus – Australia, NZ- New Zealand

Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

Figure 15. Emerging Economies - Average real GDP per capita growth (% YoY) 1950-2008



Note: GDP per capita measured in 1990 International Geary-Khamis (PPP) dollars. CEE - Central and Eastern Europe, CIS – Commonwealth of Independent States.

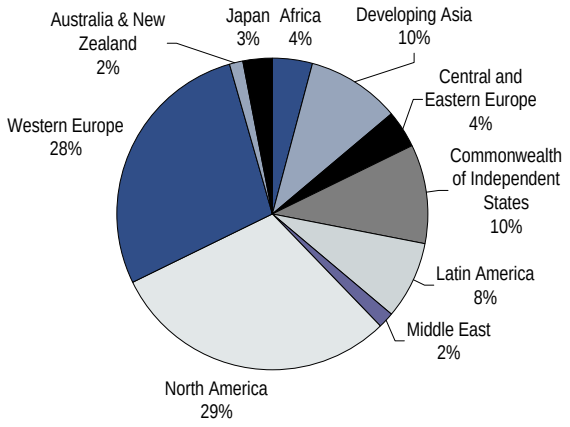
Source: Angus Maddison Historical Statistics of the World Economy:1-2008AD, Citi Investment Research and Analysis

EMs accounted for only 38% of world GDP in 1950, 52% in 2010 and are expected to account for 79% in 2050.

In 1950, the combination of Western Europe, North America (Canada and the US), Japan and Australia & New Zealand accounted for 62% of world GDP in PPP terms and only 22% of world population. 20 years on, those same regions accounted for the same share of world GDP (19% of world population) even though the composition had changed, as Japan's economy grew very rapidly.

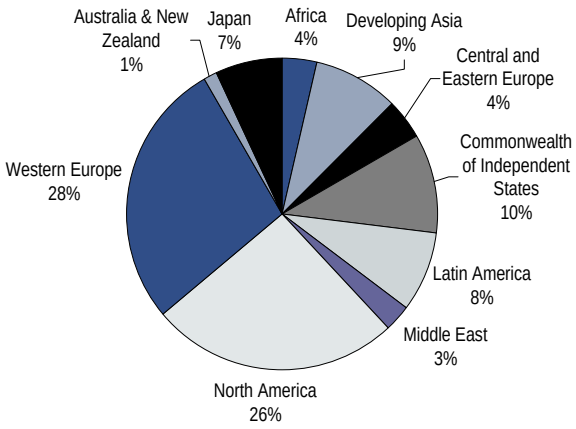
By 1990, the share of the advanced industrialised nations in world GDP had still only fallen slightly, to 58% (15% of world population). It has only been in the last two decades that the GDP share of countries outside the advanced industrialised nations has risen markedly. By 2010, developing Asia's share of world GDP had risen to 27% of world GDP, from 14% in 1990 and 9% in 1970. At the same time, the share of the advanced industrialised nations fell to just over half the size of the world economy (51%), with 13% of the world population.

Figure 16. Composition of world real GDP 1950



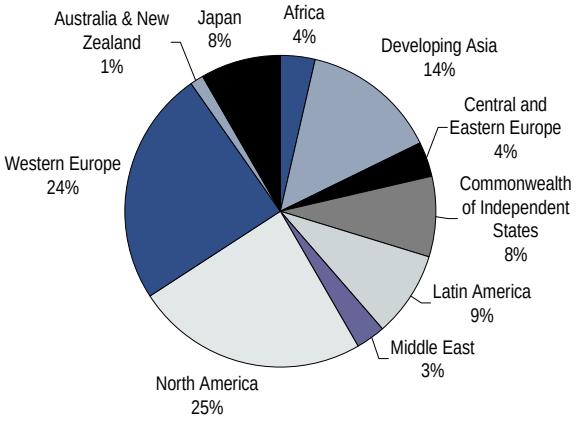
Note: GDP levels calculated taking regional GDP (CID) data for 2008 from IMF, then calculating back to 1950 using regional growth rates from Angus Maddison dataset
Source: IMF World Economic Outlook; Angus Maddison Historical Statistics of the World Economy:1-2008AD; Citi Investment Research and Analysis

Figure 17. Composition of world real GDP 1970



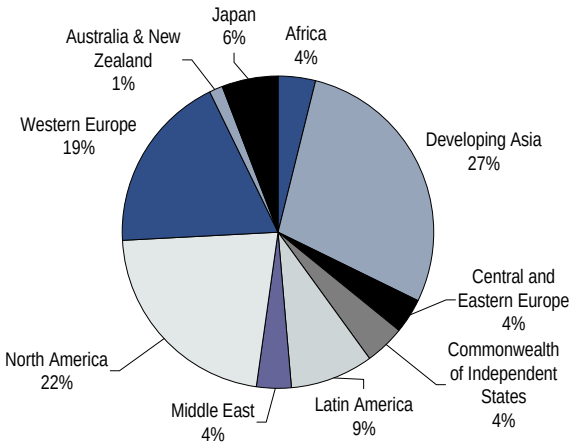
Note: GDP levels calculated taking regional GDP (CID) data for 2008 from IMF, then calculating back to 1970 using regional growth rates from Angus Maddison dataset
Source: IMF World Economic Outlook; Angus Maddison Historical Statistics of the World Economy:1-2008AD; Citi Investment Research and Analysis

Figure 18. Composition of world real GDP 1990



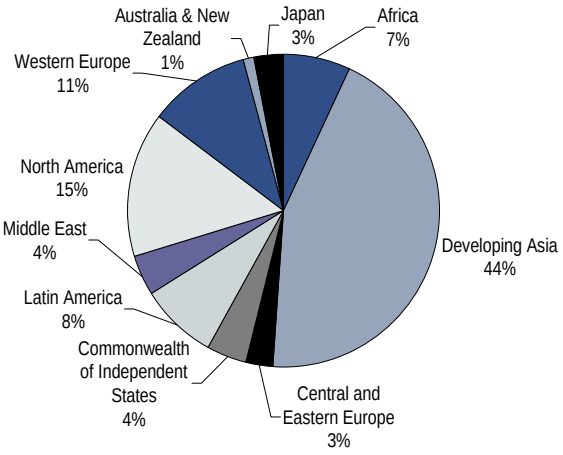
Note: GDP levels calculated taking regional GDP (CID) data for 2008 from IMF, then calculating back to 1990 using regional growth rates from Angus Maddison dataset
Source: IMF World Economic Outlook; Angus Maddison Historical Statistics of the World Economy:1-2008AD; Citi Investment Research and Analysis

Figure 19. Composition of world real GDP 2010



Note: GDP Based on PPP Valuation of Country GDP (CID)
Source: IMF World Economic Outlook; Citi Investment Research and Analysis

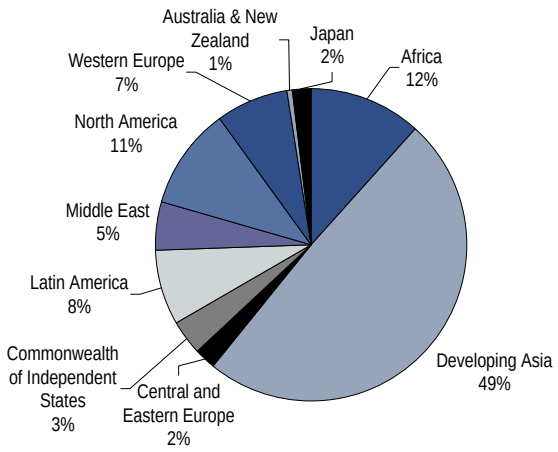
Figure 20. Composition of world real GDP 2030



Note: GDP levels calculated taking regional GDP (CID) data for 2010 from IMF, then calculating forward to 2030 using regional real growth rates based on Citi forecasts

Source: IMF World Economic Outlook; Citi Investment Research and Analysis

Figure 21. Composition of world real GDP 2050



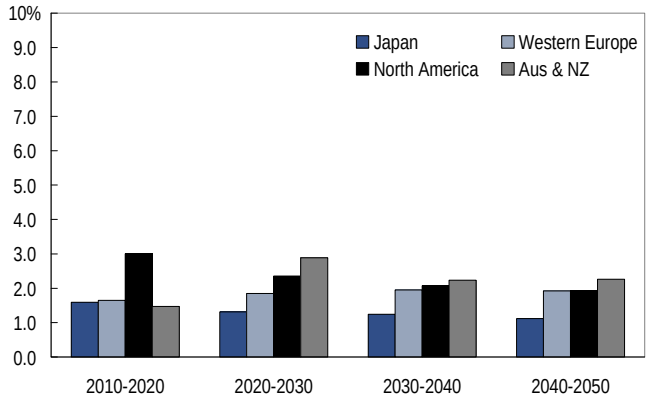
Note: GDP levels calculated taking regional GDP (CID) data for 2010 from IMF, then calculating forward to 2050 using regional real growth rates based on Citi forecasts

Source: IMF World Economic Outlook; Citi Investment Research and Analysis

The shift of economic power from West to East is set to continue for the foreseeable future. Our projections imply that the share of Developing Asia in world GDP will be 44% by 2030, and 49% by 2050. Meanwhile, the share of Western Europe (19% in 2010, 11% in 2030 and 7% in 2050) and North America (22% in 2010, 15% in 2030 and 11% in 2050) is set to decline further.

The reason for the momentous change in the regional shares of world GDP is that we expect many currently poor regions to grow rapidly (Figure 23), in particular Developing Asia and Africa. At the same time, we forecast modest, but not insignificant growth in today's advanced industrialised nations (Figure 22).

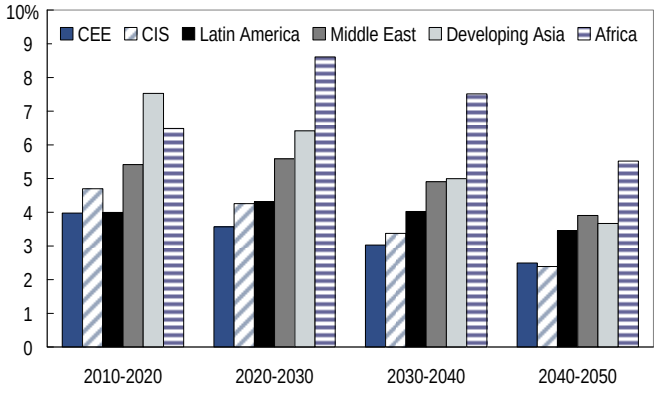
Figure 22. Advanced Economies - Average real GDP growth (% YoY) 2010-2050



Note: measured in 2010 PPP USD. Aus - Australia, NZ - New Zealand

Source: Citi Investment Research and Analysis

Figure 23. Emerging Economies - Average real GDP growth (% YoY) 2010-2050



Note: measured in 2010 PPP USD. CEE - Central and Eastern Europe, CIS – Commonwealth of Independent States.

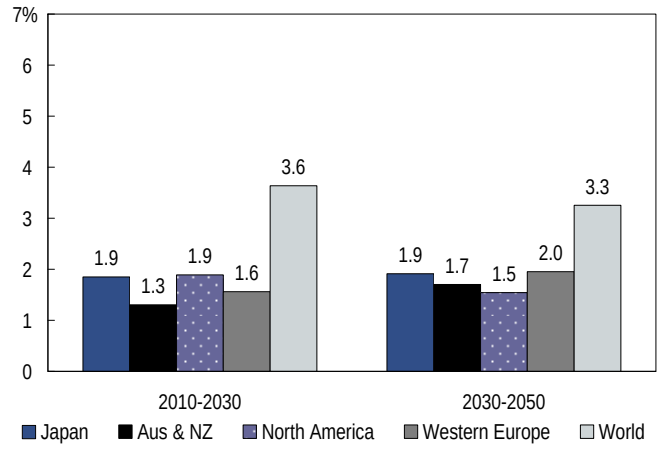
Source: Citi Investment Research and Analysis

3.3. Catch-up and Income Convergence

Rapid GDP growth should be accompanied by sustained growth in GDP per capita, particularly in Asia and Africa.

Figure 16 to Figure 23 document a substantial increase in the size of the economies of Asia, Africa and other parts of the emerging world – a development that has only begun. The population in these parts will continue to increase, but in each of the fast growing regions of the world, we expect increases in real per capita GDP to be the main drivers of real GDP growth.

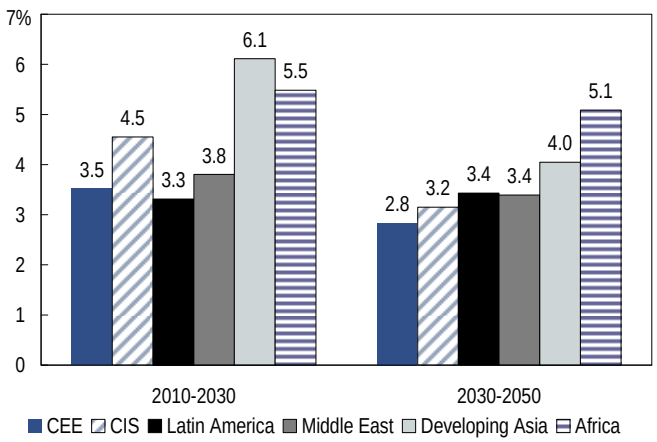
Figure 24. Advanced Economies – Average real GDP per capita growth (% YoY) 2010-2050



Note: GDP per capita measured in 2010 PPP USD. Aus - Australia, NZ- New Zealand

Source: Citi Investment Research and Analysis

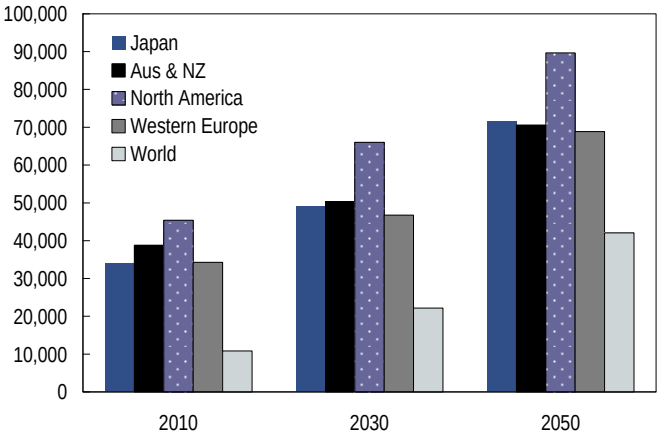
Figure 25. Emerging Economies – Average real GDP per capita growth (% YoY) 2010-2050



Note: GDP per capita measured in 2010 PPP USD. CEE - Central and Eastern Europe, CIS – Commonwealth of Independent States.

Source: Citi Investment Research and Analysis

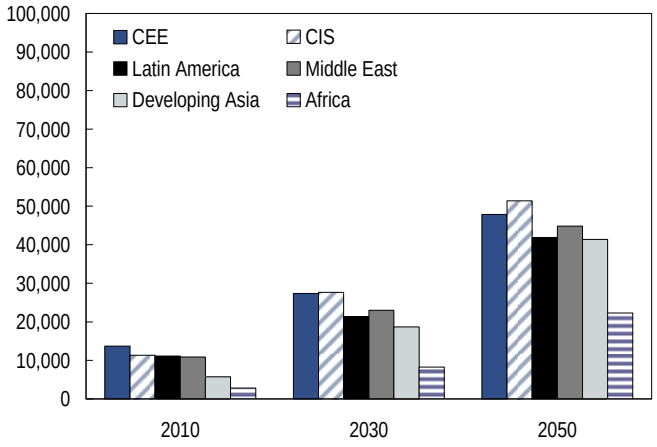
Figure 26. Advanced Economies – Average real GDP per capita 2010-2050



Note: GDP per capita measured in 2010 PPP USD. Aus - Australia, NZ- New Zealand

Source: Citi Investment Research and Analysis

Figure 27. Emerging Economies – Average real GDP per capita 2010-2050



Note: GDP per capita measured in 2010 PPP USD. CEE - Central and Eastern Europe, CIS – Commonwealth of Independent States.

Source: Citi Investment Research and Analysis

For GDP per capita, average growth rates are again expected to be highest for Developing Asia and Africa. We expect growth in real GDP per capita in Developing Asia to be 6.1% pa between 2010 and 2030 and 4.0% pa between 2030 and 2050. For Africa, we expect growth rates of 5.5% pa and 5.1% pa for those two periods. But increases in per capita income are also expected to be high in Central and Eastern Europe (3.5% pa between 2010 and 2030, 2.8% pa between 2030 and 2050), the CIS (4.5% pa and 3.2% pa), the Middle East (3.8% pa and 3.4% pa) and Latin America (3.3% pa and 3.4% pa). As Figure 13 shows, these growth rates are not out of line with the historical averages, once 'disaster periods', such as the 'lost decade' in Latin America and the period after the fall of communism in Central and Eastern Europe and the CIS are disregarded.

In the advanced economies, we expect per capita growth to be similar to recent history at between 1.5% and 2.0% pa over the forecast period.

Other things being equal, poorer countries should grow more quickly than richer countries.

Other things being equal, poorer countries tend to grow faster than richer countries, i.e. there is catch-up and convergence in productivity, income and living standards. This is because growing when one is within the productivity frontier should comparatively easy. All one needs to do is move towards the frontier by heeding the lessons learnt and importing or imitating the technologies developed by the innovators. Countries at the frontier, however, can only grow by pushing out the frontier itself, which tends to be harder.

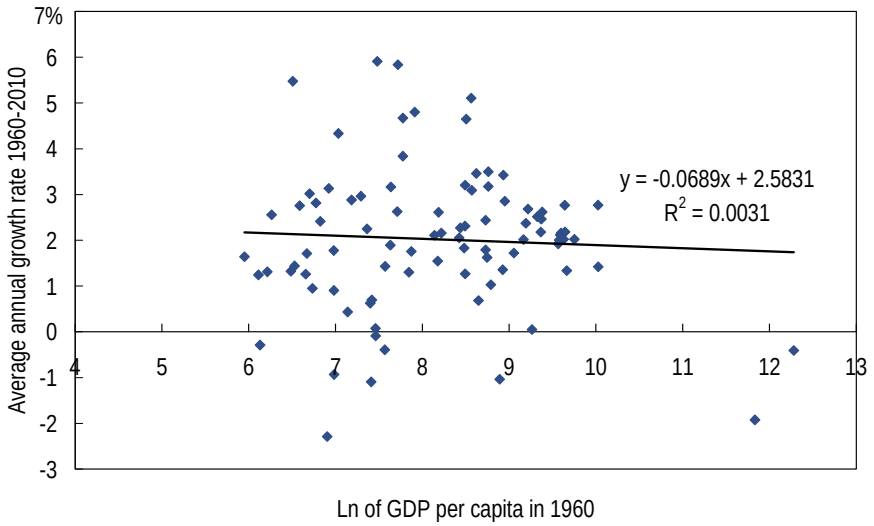
But historically, the relationship has been very weak – other things have not been equal.

The historical evidence highlights that 'other things' are often not equal. Figure 28 plots the average annual growth rates in real per capita GDP (in 2010 PPP USD) between 1960 and 2010 against the natural logarithm of per capita GDP in 1960 for all of the countries in the Conference Board Total Economy database (TED) sample for which data are available for the entire 1960 – 2010 period.[10] On average, we find a slightly negative relationship, i.e. over this period, in the sample of countries, those with a higher initial per capita income did tend to grow slightly less fast than countries with lower initial per capita income. However, the relationship is very weak, evidenced both by a shallow slope of the trend line and the fact that the data points are widely distributed around it – the R^2 of a simple linear regression of average per capita growth rates on log GDP per capita in 1960 virtually explains none of the variation in growth rates between countries.[11]

[10] The sample consists of 90 countries.

[11] The same exercise when done on the whole sample of countries in the TED database or when using the Penn tables data yields very similar conclusions.

Figure 28. Absolute convergence in per capita GDP 1960 – 2010

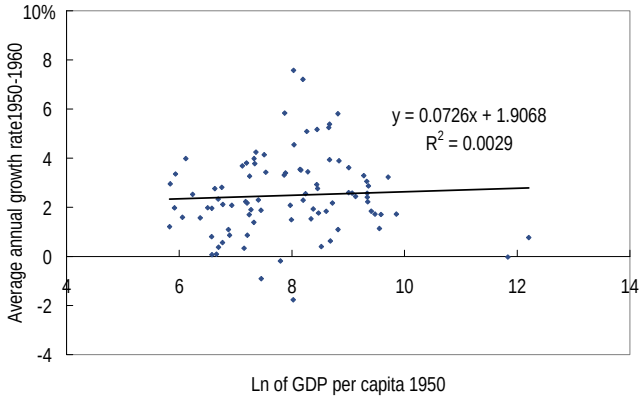


Note: Average annual growth rate is average annual growth rate of 2010 PPP USD GDP per capita. Sample only includes countries for which data was available for the whole period.

Source: Conference Board TED (Jan 2011); Citi Investment Research and Analysis

Figure 29 to Figure 34 present similar scatter plots for 10-year periods after 1950. It turns out that in four of the six sub-periods, average per capita GDP growth has even been *positively* related to initial per income GDP, i.e. it was the richer countries that tended to grow slightly faster than poorer countries. Only in two of the sub-periods, between 1980 and 1990 and between 2000 and 2010, has the relationship between growth and initial income been negative, and only in the latter of the two periods has it been even weakly significant.

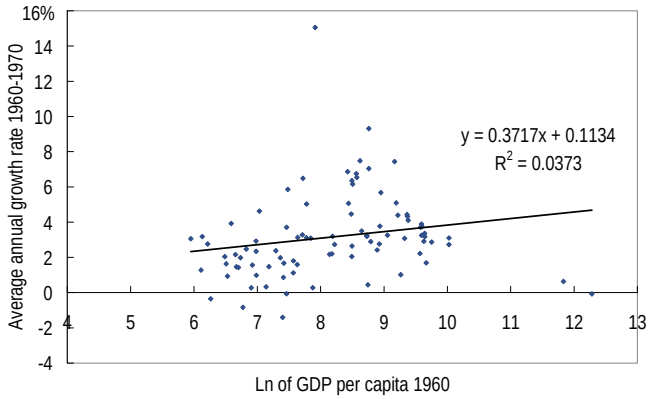
Figure 29. Absolute convergence in per capita GDP 1950 – 1960



Note: Average annual growth rate is average annual growth rate of 2010 PPP USD GDP per capita. Sample only includes countries for which data was available for the whole period.

Source: Conference Board TED (Jan 2011); Citi Investment Research and Analysis

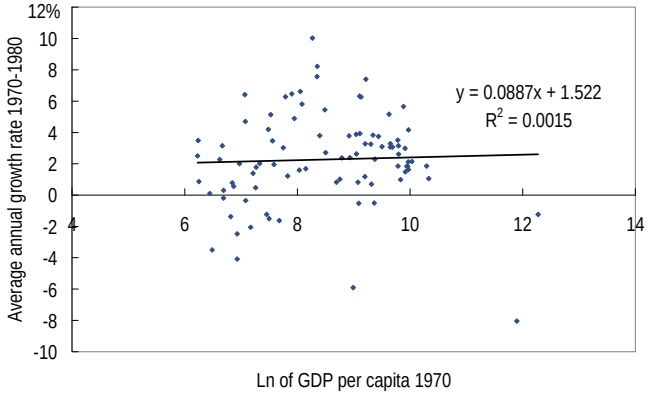
Figure 30. Absolute convergence in per capita GDP 1960 – 1970



Note: Average annual growth rate is average annual growth rate of 2010 PPP USD GDP per capita. Sample only includes countries for which data was available for the whole period.

Source: Conference Board TED (Jan 2011); Citi Investment Research and Analysis

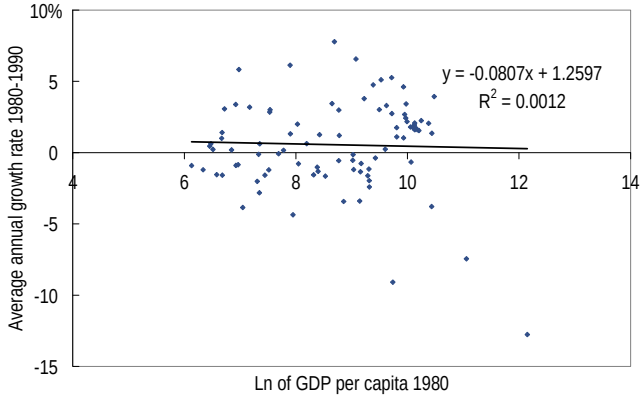
Figure 31. Absolute convergence in per capita GDP 1970 – 1980



Note: Average annual growth rate is average annual growth rate of 2010 PPP USD GDP per capita. Sample only includes countries for which data was available for the whole period.

Source: Conference Board TED (Jan 2011); Citi Investment Research and Analysis

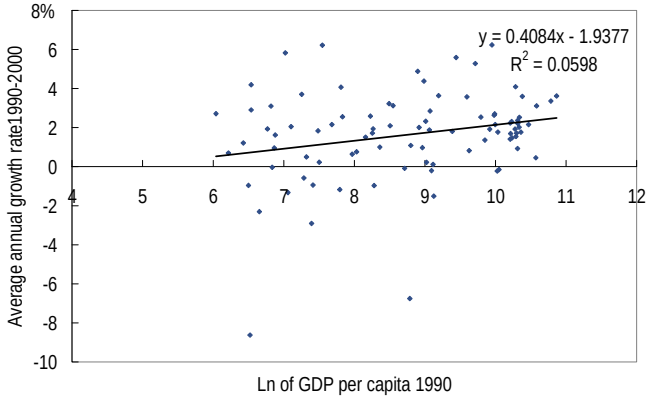
Figure 32. Absolute convergence in per capita GDP 1980 – 1990



Note: Average annual growth rate is average annual growth rate of 2010 PPP USD GDP per capita. Sample only includes countries for which data was available for the whole period.

Source: Conference Board TED (Jan 2011); Citi Investment Research and Analysis

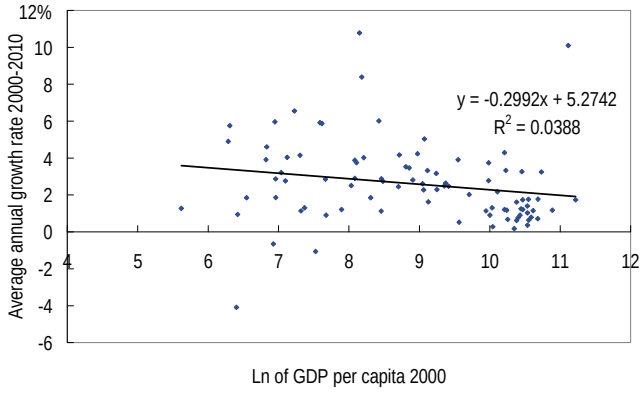
Figure 33. Absolute convergence in per capita GDP 1990 – 2000



Note: Average annual growth rate is average annual growth rate of 2010 PPP USD GDP per capita. Sample only includes countries for which data was available for the whole period.

Source: Conference Board TED (Jan 2011); Citi Investment Research and Analysis

Figure 34. Absolute convergence in per capita GDP 2000 – 2010



Note: Average annual growth rate is average annual growth rate of 2010 PPP USD GDP per capita. Sample only includes countries for which data was available for the whole period.

Source: Conference Board TED (Jan 2011); Citi Investment Research and Analysis

Poor institutions and policies, low human capital, conflict and disease have prevented many poor countries from growing more quickly in the past – there has been little 'absolute convergence'.

Once these factors are accounted for a negative relationship between growth and initial income also shows up in historical data.

By and large, a weak relationship between initial per capita income and subsequent per capita growth rates has also been the conclusion of the voluminous academic literature on 'absolute convergence' (for a summary of the evidence, see e.g. Barro and Sala-i-Martin (2003) and the references therein). Luckily, those efforts did not end with the realisation that initial income cannot or cannot alone explain the varying growth experiences of different countries. Instead, further research efforts yielded many insights about the drivers of growth. First, as noted above, 'other things' are often not equal between richer and poorer countries, and these other things, such as different levels of human capital or institutional quality, can have a systematic impact on growth. In section 7, we will discuss a number of growth drivers in more detail, but here we already note that the stronger negative relationship between initial income and subsequent growth rates that is visible in the recent past can be understood in relation to changes in institutions and policy in a number of poor countries. Many academic studies have in fact documented evidence in favour of 'conditional convergence'. These studies show that, once we control for other determinants of growth, growth rates do exhibit a robust tendency to decline with rising levels of income per capita (see e.g. Barro and Sala-i-Martin (1992)).

Other potential determinants of growth, besides the level of initial income per capita, include other initial conditions, such as the stock of physical and human capital as well as institutional quality, policies, geography, climate and culture. These determinants can vary widely between countries and some of them are likely to be systematically correlated with per capita income, implying that any statistical test of the relationship between growth and per capita income that does not control for these other drivers of growth, such as our simple scatter plots above, will be misleading. For example, many high-income countries possess a comparatively well-educated labour force, and comparatively well-run state institutions, including an independent judiciary that upholds the rule of law. These factors may allow such countries to grow at relatively quick pace, despite the high levels of initial per capita income. By contrast, many of the extremely poor countries of sub-Saharan Africa were held back for many decades by the burden of disease, ineffective or non-existent state institutions, corruption, and conflict. A simple scatter plot of average growth on initial income, or a simple regression of average growth on initial income, would attribute the (negative) effects of conflict and institutions to the initial income levels in those countries, thus giving rise to a spurious positive and/or insignificant coefficient estimate.

Globalisation and market reforms have reached many emerging economies only in the recent past.

Globalisation and the embrace of some form of market economy only reached the poorest countries from about 1980. For India, the former Soviet Union, and the former communist countries of CEE, the Great Convergence only started after 1992, 1991 and 1989 respectively. This would provide one possible explanation why (absolute) convergence would mainly be observed in the very recent period. What is more, catastrophes – natural ones, such as earthquakes, tsunamis and hurricanes, as well as man-made ones, such as conflict or disastrous economic management – have tended to visit poor countries more often than rich countries. A very crude way of accounting for these factors is to weigh the data points in simple regressions of income growth on initial income by population, which indeed results in a (slightly) stronger negative relationship between initial per capita income and average growth rates, as two countries that belatedly but decisively decided to join the world economic community, India and China, are hugely populous and experienced very high growth rates subsequently (Cole and Neumayer (2003)). What is more, 'growth disasters' have tended to occur mainly in the smaller countries.

Figure 35 is another way to document that the historical evidence in favour of income convergence has been mixed, or at least that there has been variation over time in the degree to which (absolute) convergence has been observed. In Figure 35, we count the number of countries in the Conference Board Total Economy Database (TED) that have grown more quickly than the US, in 2010 PPP USD dollars per capita GDP terms, during various 10-year intervals between 1950 and 2010. A large majority of countries grew more strongly than the US between 1950 and 1960, but the fraction fell subsequently. Between 1960 and 1980, only marginally more countries grew quicker than the US, and the share further fell steeply in the 1980s and 1990s, reflecting robust growth in the US, but also hiccups in many other parts of the world, including the 'lost decade' in Latin America. Since 1980, when globalization truly took wings, the percentage of countries growing faster than the US has increased markedly, and was almost 90% between 2000 and 2010.

Figure 35. Per capita growth (% YoY) relative to the US

	Number of countries that grew faster than US	Total Number of Countries	% of Countries that grew faster than US
1950-1960	63	90	71
1960-1970	46	90	52
1970-1980	45	90	51
1980-1990	22	90	25
1990-2000	35	111	32
2000-2010	99	111	90

Note: Growth is measured in terms of 2010 PPP US dollars.

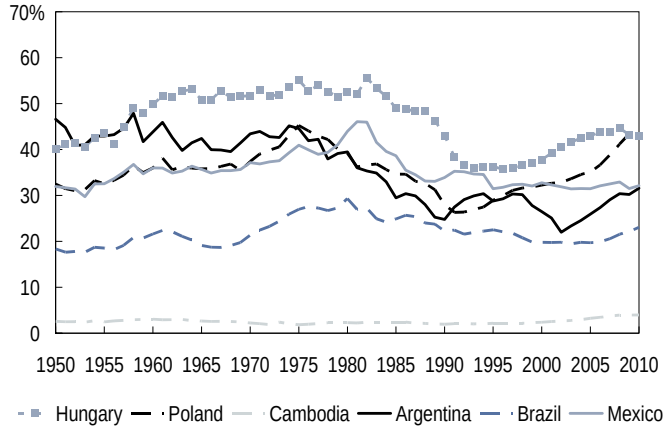
Source: The Conference Board TED (January 2011), Citi Investment Research and Analysis

Convergence is neither automatic, nor inevitable. In history, it has been more the exception than the rule until very recently. Figure 36 presents a number of examples for countries that have not shown any consistent tendency to convergence towards the levels of per capita income observed in the US. A case in point is Argentina, one of the world's most prosperous countries at the turn of the 20th century. In 1950, Argentina's level of GDP per capita was 47% of the US level, but reached a post-war low of only 22% of US GDP per capita in 2002, though it recovered to around 35% of US GDP per capita in 2010.[12]

[12] Since then, GDP per capita has grown strongly again – in fact more strongly than in its neighbour and recent economic powerhouse, Brazil. But here it is important not to confuse growth – the simultaneous expansion of actual output and potential output - with recovery – the closing of the gap between potential output and actual output following an economic downturn.

The high growth rate experienced by Argentina since 2003 – represents in part a recovery from the disastrous final years of the Argentine currency board and the deep recession that led to Argentina's sovereign debt default of 2001. The strength of commodity prices has also contributed to Argentina's better economic performance since 2003. With the output gap in Argentina now closed, with rising inflationary pressures, with a low rate of domestic capital formation and only modest population growth, and without any improvement in economic institutions or policies, Argentina's high growth years are likely to be behind it, although improving terms of trade, courtesy of rising commodity prices, should continue to boost standards of living.

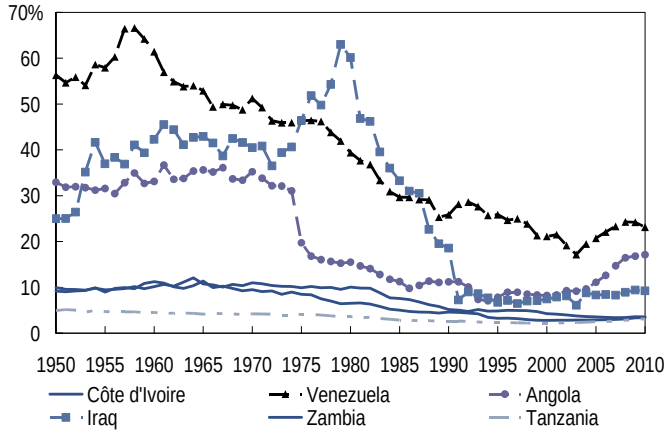
Figure 36. Selected Countries – Convergence in real GDP per capita 1950 – 2010



Note: 2010 PPP EKS GDP per capita

Source: Conference Board TED and Citi Investment Research and Analysis

Figure 37. Selected Countries – Convergence in real GDP per capita 1950 – 2010



Note: 2010 PPP EKS GDP per capita

Source: Conference Board TED and Citi Investment Research and Analysis

There are many examples of countries which have not tended to converge with the frontier over the past few decades – Argentina is one.

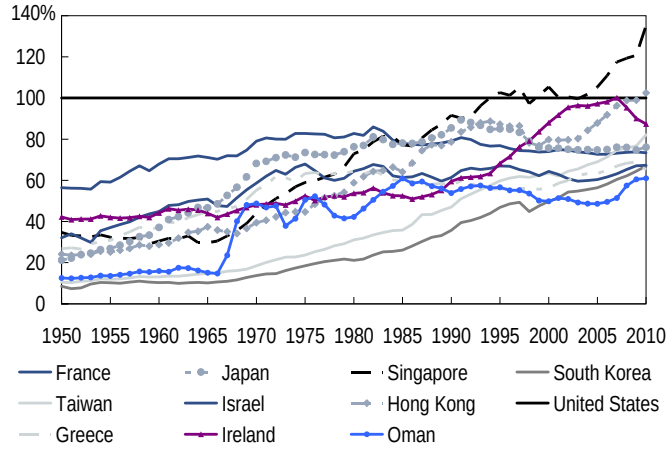
Figure 37 highlights a number of countries which have, if anything, shown a tendency for per capita income levels to diverge from US levels over time. A look at the sample of countries reveals that most of them are conflict-ridden countries and many of them are located in Africa. However, the list also includes Venezuela, which, with per capita income levels of 66% of US levels in 1957, was richer than many Western European nations. However, decades of economic mismanagement has seen relative real GDP per capita fall dramatically.

Western European countries and Japan closed income gap to the US rapidly and substantially – but convergence stopped once they closed in on US per capita income levels.

There have also been success stories. The war-ravaged countries of Western Europe rebuilt rapidly after the end of World War II and substantially reduced the gap in living standards to the US until the 1980s, even though catch-up seems to have stopped – at least temporarily – once per capita income had reached 80% of US levels. Later, the industrial economies of East Asia, first Japan, later South Korea, Hong Kong, Taiwan and Singapore, also closed much of the gap in per capita GDP with the US (in Singapore's case, to negative values) after decades of sustained per capita income growth. For Japan, as for most Western European nations, catch-up ceased and partially reversed once per capita income levels were closing in on those of the US. Singapore, on the other hand, seems to have taken that hurdle rather lightly and its population now enjoys a per capita income that is substantially higher than that of the US – or any other major industralised nation. Incidentally, South Korea and Taiwan have now reached or are close to reaching the income levels relative to the US at which growth slowed markedly for the Western European nations and Japan, and it remains to be seen whether the same fate awaits these two ageing East Asian tigers.

The countries depicted in Figure 38 highlight that rapid catch-up with income levels at the frontier is achievable. But for most of the countries presented there, the 'low hanging fruit' has been harvested by now and future growth rates of income and living standards are likely to be lower than those seen over the past decades.

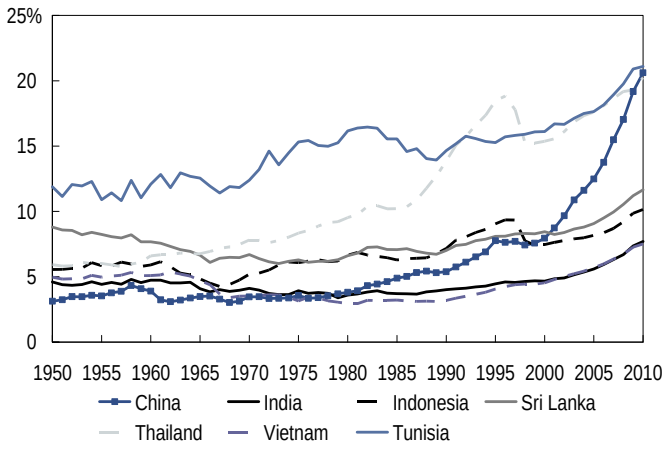
Figure 38. Selected Countries – Convergence in real per capita GDP 1950 – 2010



Note: PPP EKS GDP per capita

Source: Conference Board Total Economy Database and Citi Investment Research and Analysis

Figure 39. Selected Countries – Convergence in real per capita GDP 1950 – 2010



Note: PPP EKS GDP per capita

Source: Conference Board Total Economy Database and Citi Investment Research and Analysis

Despite very high recent growth rates, China and India have decades or generations of catch-up growth to come.

Figure 39 contains the more promising dimension of the convergence evidence: Recently a number of poor economies, mostly in East Asia, but also in the Middle East and elsewhere, have started to grow rapidly and reduce the gap in per capita income and living standards with the industrialised world. China's growth in GDP and GDP per capita over the last two decades has been nothing short of spectacular. As a result, it has overtaken, in per capita income terms, countries such as Indonesia and Sri Lanka, which have themselves enjoyed fairly rapid per capita income growth over the same period. We expect convergence to continue and to be more prevalent than has been the case historically.

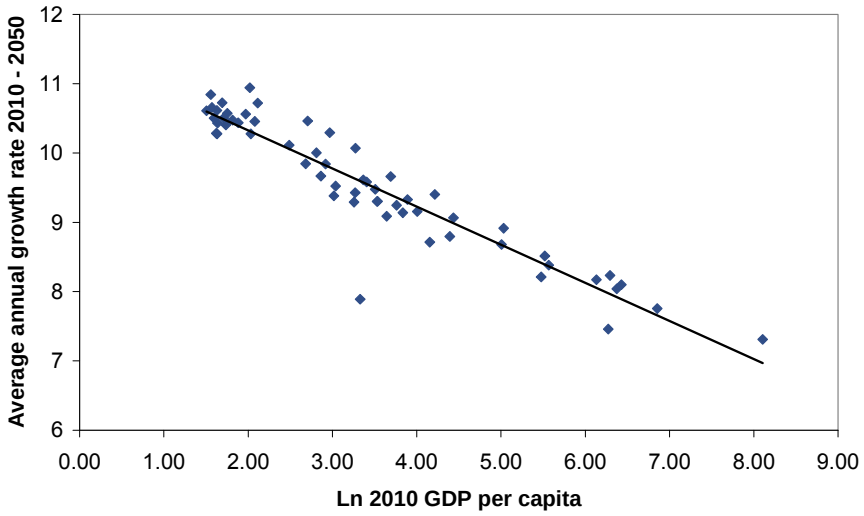
One reason for our belief that more convergence should be expected is already included in Figure 39: Despite the spectacular growth in China since about 1980 and in India since the early 1990s, real convergence of economy-wide productivity and income levels has barely started, with China's real per capita GDP at barely 20% of that of the US and India still well below the 10% mark. There are, given the right institutions and policies, decades of catch-up growth in prospect even for China, and generations of catch-up growth for India. Many other countries in East Asia have also reached but a fraction of US per capita income levels. Some of them, such as Thailand, have seen fairly high per capita growth rates in past few decades already. Others, such as the Philippines, have not. All of them could potentially look forward to decades or generations of fast growth – as could many poor countries in other regions, particularly in Africa.

We expect much more convergence of income levels over the next four decades – yet income levels in the EMs of today should still lag today's industrialised nations in 40 years' time.

Figure 40 plots average annual growth rates in per capita real GDP between 2010 and 2050 against the logarithm of the initial level of per capita GDP in 2010 in the countries in our forecast universe. It is the equivalent of Figure 28, with the historical evidence on per capita GDP growth rates replaced by our forecasts for the period between 2010 and 2050 – note that the main difference between the figures is that in Figure 28, we plot *realizations* of average real per capita GDP growth against the y-axis, while in Figure 40 it is our *forecasts* that are plotted. In our forecast-based Figure 40, the negative relationship between initial (per capita) income and subsequent growth is clearly visible, in contrast to the corresponding historical pictures presented above.

Of course, as noted above, in the presence of other factors correlated with per capita income, these simple scatter plots can be misleading, but if we control for these other factors, the picture would look similar.[13]

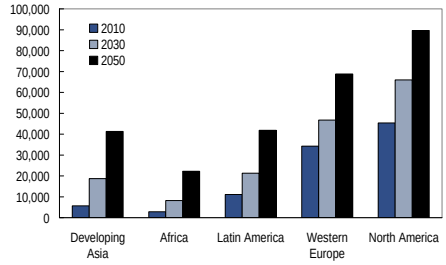
Figure 40. Absolute convergence in per capita GDP 2010 to 2050



Note: GDP per capita is measured at 2010 PPP US dollars.

Source: Citi Investment Research and Analysis

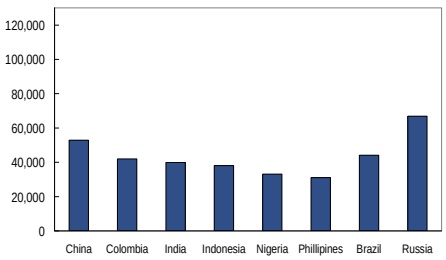
Figure 41. Selected regions – real GDP per capita



Note: GDP per capita measured in 2010 PPP USD.

Source: Citi Investment Research and Analysis

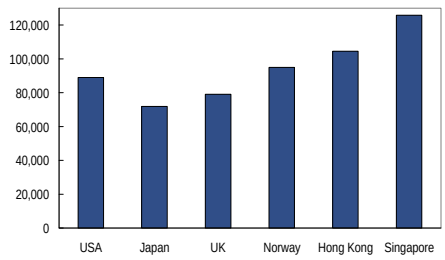
Figure 42. Selected countries – real GDP per capita, 2050



Note: GDP per capita measured in 2010 PPP USD.

Source: Citi Investment Research and Analysis

Figure 43. Selected countries – real GDP per capita, 2050



Note: GDP per capita measured in 2010 PPP USD.

Source: Citi Investment Research and Analysis

Figure 41 presents the evolution of per capita levels of GDP by 2030 and 2050, according to our forecasts. The countries in East Asia and Africa should catch up substantially with the per capita income levels of the industrialised countries, but remain some way away from the richest nations of the world, still predominantly to be found in Western Europe and North America and the city states of East Asia, even in 2050.

[13] We control for other factors in two (equivalent ways). The first is to regress average growth on a number of controls (other growth drivers) in addition to initial (log) income per capita. The sign of the coefficient on initial income in this multiple regression could be interpreted as indicating the direction and quantitative strength of comovement between average growth and initial income (if the regression is otherwise well-specified). An equivalent way would be to regress average growth on all the regressors of the regression just discussed, with the exception of initial per capita income. We could then plot the residuals from that regression against initial per capita income to arrive at a more rigorous version of Figure 40. As noted above, the results are qualitatively similar to the simple scatter plot/regression results discussed above.

China, which we forecast to continue to grow at relatively high rates (if not as high as recently), should still 'only' be at 60% of US levels in terms of GDP per capita – certainly no mean feat, given that its per capita income is only 20% of the level in the US today, and overtaking countries like Thailand, Peru and Egypt in the process.

4. Persistent heterogeneity of methods, processes, institutions and outcomes

Convergence does not imply uniformity of economic performance or methods and modes of production.

Above, we noted that there is evidence for conditional, and for the most recent period, even absolute convergence and catch-up. We also highlighted that we predict convergence to continue and strengthen over the next four decades.

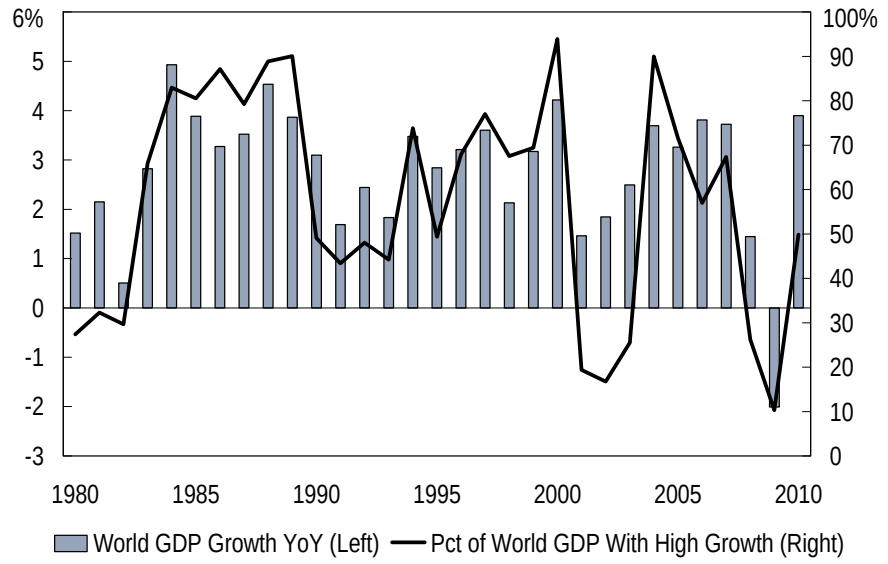
But one thing globalisation has not achieved is establishing uniformity of economic performance, or of methods and modes of production. Some may argue that this is simply a matter of time, but we beg to differ. It is true that ICT has made the global spread of information and knowledge of best-practice technology and skills a relatively low-cost affair. Add to that the mobility of managers, of key workers and of enterprises that can, by opening branches or subsidiaries, transplant many elements of corporate culture and identity, and one might begin to wonder why methods of production, efficiency and productivity levels have not converged everywhere. A key part of the answer is that convergence and catch-up by the late(r) starters in the industrialisation process is not a matter of working one's way to a fixed target.

Economic growth is a process of creative destruction, as Schumpeter (1942) noted. The best-practice targets are moving constantly. Each of the intermediate steps or stages of the process of moving from an economy dominated by agriculture and informal service sectors to a predominantly industrial economy and thence to an economy dominated by formal, market and non-market service sectors, is itself subject to the forces of creative destruction. *Panta rei* – everything moves, and nothing stays the same for any actor in the global economy. New winners and losers in the economic game are born all the time, and picking winners and avoiding losers is not a once-and-for-all act or decision. Change is ongoing in the external environment and the recurrent mutations in the constantly evolving complex dynamic global economic system of which each of us is an active part – reacting, responding, learning, anticipating and pre-empting. Full convergence of performance and outcomes is not to be expected and is indeed not observed.

Growth dispersion across countries was high in 2010 – but there is no marked trend in this dispersion.

The incompleteness in the convergence of economic performance can be observed at all frequencies. As regards global cyclical downturns and recoveries, what stands out about the global recovery that started around the middle of 2009, is how uneven it is. Figure 44 makes this clear. During the past two years of high global GDP growth, the share of global GDP accounted for by countries with high GDP growth was less than 50 percent – much lower than in previous high-growth episodes (1983-1990, 1994-2000 and 2004-2007). An 'eyeball' measure of growth dispersion can be inferred from the vertical difference between the red bars and the blue line.

Figure 44. Growth and Dispersion

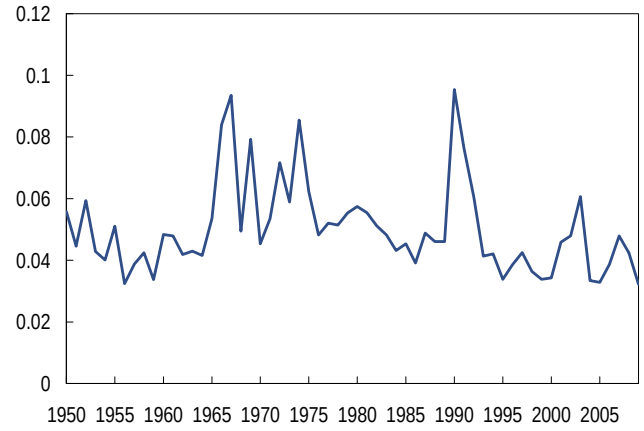


Note: High-growth countries are defined as those with GDP growth above 1981-09 average or above 8% YoY

Source: IMF WEO; Citi Investment Research and Analysis

We find the same pattern when we look at growth and per capita income across the world over longer periods of time, as is clear from Figure 45 and Figure 46. Figure 45 shows the evolution between 1950 and 2009 of the cross-sectional standard deviation of per capita GDP growth rates (in 2010 PPP USD) across a large number of countries from the Conference Board TED. The first thing to note, trivially, is that the cross-sectional variability is not zero, i.e. there is no tendency for the cross-sectional distribution of GDP growth rates to 'collapse' on a narrow range of growth rates. What is more, volatility has not markedly declined from the postwar period though the spikes in variability observed in the '60, 70's and '80s seem to have become smaller.

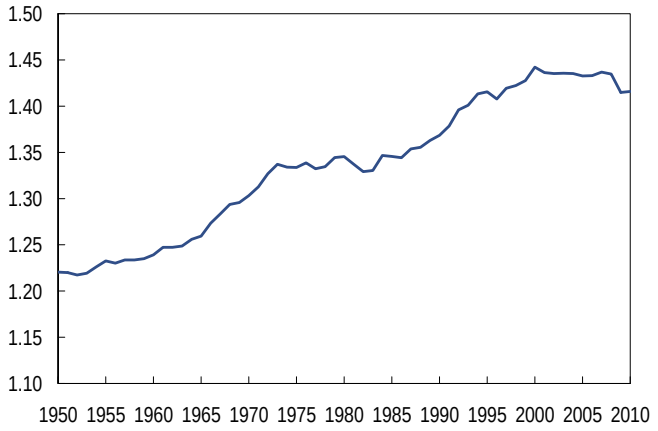
Figure 45. Cross-sectional Volatility of Income Growth



Note: Cross-sectional standard deviation of per capita GDP growth (in 2010 PPP USD). Sample includes all countries for which data is available for the entire period.

Source: Conference Board TED and Citi Investment Research and Analysis

Figure 46. Cross-sectional Volatility of Income



Note: Cross-sectional standard deviation of the natural logarithm of per capita GDP (in 2010 PPP USD). Sample includes all countries for which data is available for the entire period.

Source: Conference Board TED and Citi Investment Research and Analysis

Second, an obvious question is whether the sequence of distributions of decennial GDP growth rates settles down or converges to some constant distribution in the long run. Quah (1996a,b) has argued that, empirically, the long-run cross-sectional distribution not of GDP growth rates but of relative per capita GDP *levels* was not uni-modal (with a single peak) but had 'twin peaks', or two 'convergence clubs', with very different levels of (relative) per capita income. Debate on the modality of the distribution of per capita levels continues – researchers such as Kremer et al (2001) and Azariadis and Stachurski (2004) argue that the long-run distribution would be unimodal, but that income disparities may be very persistent, so that they appear as 'poverty traps'. The presence of resource-based economies, which can see wild fluctuations in GDP and in GDP per capita levels due to volatility in their terms of trade and world commodity prices, also complicates the distributional empirics. But even studies that argue that the distribution is unimodal do not imply that the unimodal distribution has low measures of variation, and speeds of transition to the long-run distribution are estimated to be very low.

Third, a continued wide dispersion of growth rates across countries (as measured by range, variance or some other measure of spread) is consistent with (but does not require) a high degree of persistence over decades in the growth rate of any given country. So, although growth rates are distributed unequally each decade, it could be the case that different countries are found at the lower, upper or middle end of the distribution of growth rates in each decade. To find out whether this actually occurs we have to link each country's position in the growth rate distribution for a particular decade to its positions in the growth rate distributions of earlier and later decades – effectively computing the 'transition matrices' for the whole set of countries' growth rates. Exercises of this nature have been performed, by Quah (1996a,b) and others both for GDP growth rates and for (relative) income or GDP *levels*.

There is considerable evidence that, as postulated by Alexander Gerschenkron (1962), the coexistence of economically and technologically advanced and backward countries creates the potential for spectacular catch-up and real convergence in productivity and real income per head. Countries that start from an initial condition of economic backwardness, with low capital per worker and technology well within the technological frontier may be able to skip several stages in the progression from a mainly agricultural and rural society, with traditional and often informal service sectors, to a modern urban society, with an industrial or post-industrial economic structure and a large, formal service sector. This can be achieved through the transfer and adaptation of state-of-the-art technology, management skills and sometimes even institutions from the advanced countries. Historical illustrations can be found in the unique patterns and paths of industrialization of Meiji Japan after 1868 and of the Soviet Union following the collectivisation of agriculture in the early 1930s. More recent examples include China and India. Other postulates of Gerschenkron - that the less developed an economy was (relative to the frontier economies) when it entered its development and industrialisation phase, the more likely it would be that consumption would be squeezed in favour of saving and investment, that banks would play a greater role in financial intermediation than capital markets and that the state would play a larger and more guiding role in the allocation of investment, also appear to have been borne out by the leading examples of successful late industrialisation, including South Korea, Singapore, China and India.

Even if poor countries grow faster than rich countries, income inequality between countries may not fall – 'beta-convergence' does not imply 'sigma-convergence'.

Figure 46 shows that the cross-sectional variation of per capita GDP *levels* has *risen* slightly, but steadily over time and has fallen only slightly if at all in recent years, despite fast growth in many of the poorer countries. But even spectacular catch-up through higher growth rates in the poorer countries need not lead to a fall in the dispersion of per capita GDP or income levels. In the language of academic economics, 'beta-convergence', the tendency of poorer countries to grow faster, need not imply 'sigma-convergence', i.e. a smaller measure of variation for the distribution of per capita income or GDP levels. To be sure, higher growth by poorer countries would tend to reduce dispersion of per capita income, but this process is offset by new disturbances which tend to increase dispersion. Whether dispersion increases in the aggregate, depends on the (average) size of the growth differential between poor and rich, the initial distribution of per capita income levels, and the disturbances.

5. Why should it be different this time?

Our forecasts imply higher growth and more convergence by poor countries than in the past, for two reasons:

i) the arrival of game-changers: globalisation and economic liberalisation in many EMs, including China

ii) omissions: calamities, busts and 'growth disasters' are hard to predict and are therefore not included in our forecasts – though they will occur.

Our long-term forecasts imply a substantial degree of (absolute) convergence in incomes between countries that are rich today and countries that are poor today. As we discussed above, with the exception of the last decade or so, there is little historical evidence for (absolute) convergence on a sustained and global scale, with the exception of the postwar period and the last decade.

Now, whenever predictions are substantially and qualitatively different from the past, one does well to go back to first principles to establish what exactly has changed to merit such a different outlook. Often, such a different outlook suffers from what Reinhart and Rogoff call the 'this time is different syndrome', a temporary but recurrent delusion that time-honoured laws and regularities no longer hold, which usually ends with an abrupt realization that those same laws and regularities were very much in operation still, typically with severe, if temporary, consequences. But occasionally, there are game changers. The embrace of some form of market economy and the removal of political obstacles to globalization by many former communist and centrally planned countries and by many previously inward-looking, autarkic poor countries kept back by the intrusive overregulation of most economic activity are two such game changers in the 1980s and 1990s. Growth takes off and societies and economies are transformed. Recent examples can be found around the world, from Brazil to Singapore to China and India. Below we will aim to point to a few cases where similar take-offs may be possible, despite the presence today of growth-inhibiting institutions, policies and circumstances.

Forecasts inherently involve forecast errors and misjudgments. Growth, particularly transformational growth, does not tend to be a smooth, consistent phenomenon, but rather one that is characterised by spurts of growth, booms and busts, jolts and occasional crashes. Despite their absence in our projections, we do not rule out the possibility of temporary lulls in growth or even of 'growth disasters'. Three areas in particular stand out that can derail the growth machinery of an economy: conflict, catastrophe (both natural and man-made) and poor policies. Their effects are usually temporary, but with time spans that can stretch to decades, and thus can easily invalidate our predictions. What they also have in common is that their nature and timing is extremely hard if not impossible to predict. We are dealing with uncertainty in its true, Knightian sense: not in the sense of a list of well-defined possible outcomes whose likelihood is unknown, but rather in the sense of a list containing a huge 'anything else that might happen' category, where the nature of the elements contained in this residual category is unknown and indeed unknowable – unknown unknowns.

6. The Shift in the Global Economic Centre of Gravity and its Implications

The 'global economic centre of gravity' has started to shift eastwards and will continue to do so.

Figure 16 to Figure 19 indicate the increasing importance of Asia for the world economy. A graphic, visually intuitive illustration of the shift of the global economy's center of gravity can be found in the work of Professor Danny Quah of the London School of Economics. In a recent paper (Quah 2011), Quah computes the global economy's centre of gravity, i.e. the average location of economic activity across geographies on Planet Earth, and tracks its dynamics over time. The paper finds that in 1980 the global economy's centre of gravity was mid-Atlantic. By 2008, the continuing rise of China and the rest of East Asia implied that the centre of gravity had drifted to a location east of Helsinki and Bucharest. Extrapolating growth in almost 700 locations across Earth, the paper projects the world's economic centre of gravity to locate by 2050 literally between India and China. Observed from Earth's surface, the economic centre of gravity would have shifted by 9300km or 1.5 times the radius of the planet between 1980 and 2050. The result of Quah's (2011) study is shown in Figure 47 below. The movement over time is monotonically from the left to the right.

Figure 47. The world's economic centre of gravity, 1980–2007 (black) and extrapolated 2010-2049 (in red, reduced size, italicized), at 3-year intervals[14]

Source: Quah (2011), Citi Investment Research and Analysis

In a related paper, Quah (2010) investigates empirically the hypothesis that the world's spatial distribution of economic activity is secularly drifting from its 20th-

[14] A dynamic version of Figure 8 (with moving black and red dots) is available at: http://econ.lse.ac.uk/staff/dquah/g/2010.08-wm-cg-gdpp-extrap-animated-DQ.gif

century moorings. In this contribution, he considers a range of indicators, including the shift in the world's economic centre of gravity illustrated in Figure 47 above, *"… but also the dynamics of global poverty; decoupling and the emergence of cross-country trade clusters; and the cross-geography relative contribution to world economic growth"*. For each of these quantitative empirical indicators, Quah's paper establishes a profound ongoing eastwards shift of global economic activity.

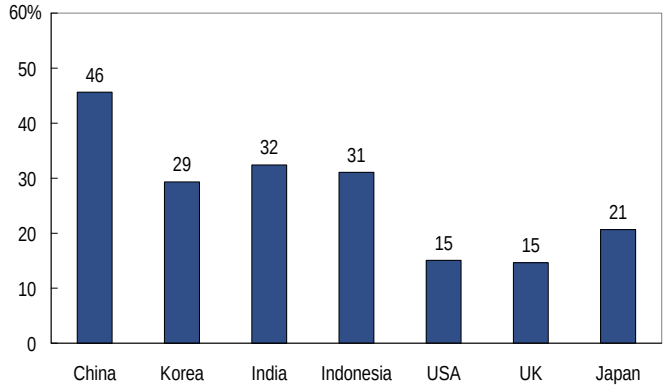
So the world is looking eastwards once again after a hiatus of a few centuries. Be it as a source of cheap production of consumer goods or business services, as a pool of cheap – or relatively cheap, but high-skilled – labour, as a lender of last resort to struggling sovereigns in the advanced economies, as an importer of commodities or machinery, few places in the world are indifferent to the fate of the Asian economies even now. And the importance of China, India, and their neighbours will only grow, so it merits paying some attention to the outlines of the stages of development some of these economies will go through.

6.1. The Rise of Asian Investment

Spectacular catch-up growth in Asia has been accompanied by high investment rates – but investment is still low in per capita terms.

As conjectured by Gerschenkron (1962), a late start and catch-up growth are associated with often spectacularly high investment rates, as is clear from Figure 48, which presents investment rates for a number of Asian and Western economies.

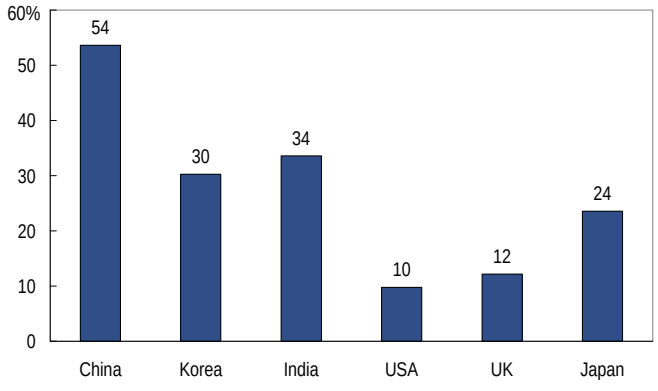
Figure 48. Selected countries – Investment rate (% of GDP) 2009



Note: measured as gross fixed capital formation as % of GDP

Source: World Bank WDI Database; Citi Investment Research and Analysis

Figure 49. Selected countries – Savings rate (% of GDP) 2009

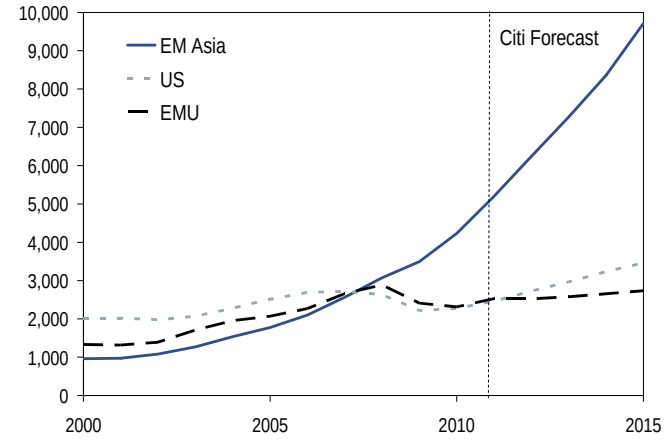


Note: gross savings rate as % of GDP

Source: World Bank WDI Database; Citi Investment Research and Analysis

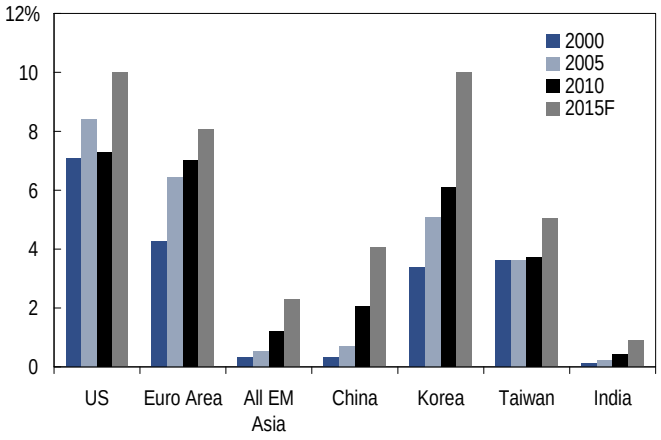
The recent very high investment shares in GDP of China (45 to 50 percent) and India (30 to 35 percent) still amount to fairly low investment per capita (or per member of the labour force), because of the vast population sizes of these nations. This is shown in Figure 50 and Figure 51 which compare total investment spending and investment spending per capita in the EU and EMU with that in the fast growing Asian economies. Even though total investment spending in Asia's fast-growing economies could exceed the total investment spending by the US and the EMU, the low per capita numbers suggest again that the convergence process may have several decades (China) or even several generations (India) to go. As we shall see below, different mature economies – which should have a comparative advantage in capital goods production - take advantage of the export opportunities created by these high investment rates to very different degrees.

Figure 50. Investment Spending, USD bn



Source: Economist Intelligence Unit; Citi Investment Research and Analysis

Figure 51. Investment Spending per capita, USD Thousands



Source: Economist Intelligence Unit; Citi Investment Research and Analysis

6.2. The Rise of Asian Consumption

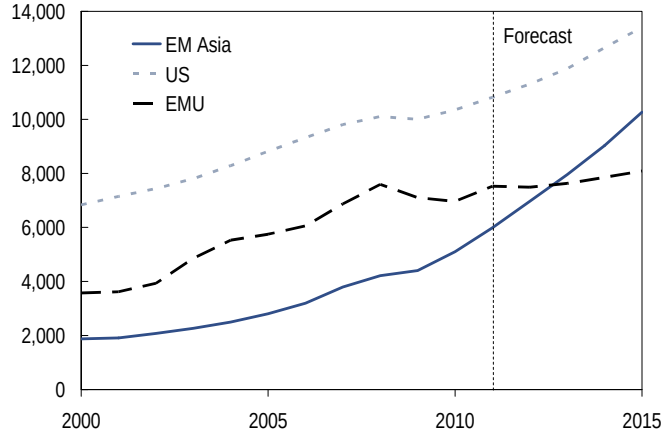
Consumption demand has already risen strongly in Asia and will exceed consumer spending in the Euro Area during the next two years.

Despite the very high investment rates of the fast-growing late starters/converging economies, consumption growth too is already a significant driver of domestic demand in many of these countries. Figure 52 illustrates this point emphatically.

Total consumer spending in the fast-growing Asian economies is likely to exceed total consumer spending in the Euro area during the next two years. It could exceed the total consumer spending in the US within a dozen years.

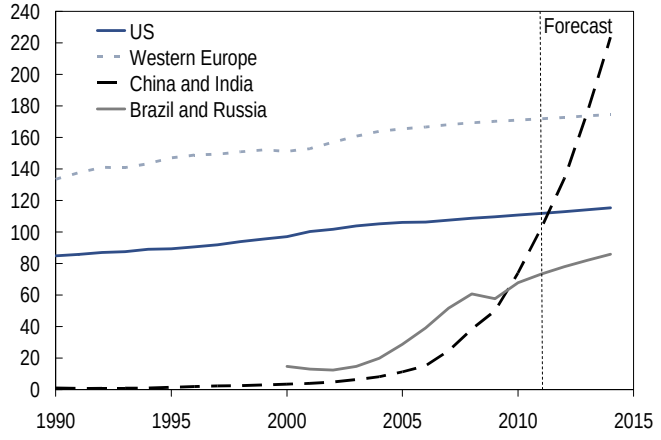
The proximate driver of this consumption boom is the growth of the middle class in fast-growing Asia. The number of households with an annual income of at least $10,000 USD per annum in India and China combined is likely to exceed that in the US from 2011 on and that in all of Western Europe 2 or 3 years later. There are already well over 100 million households with income over $10,000 USD in India and China combined.

Figure 52. Consumer Spending, USD bn



Source: Economist Intelligence Unit; Citi Investment Research and Analysis

Figure 53. Number of Households (Millions) with Annual Income of at least USD 10,000



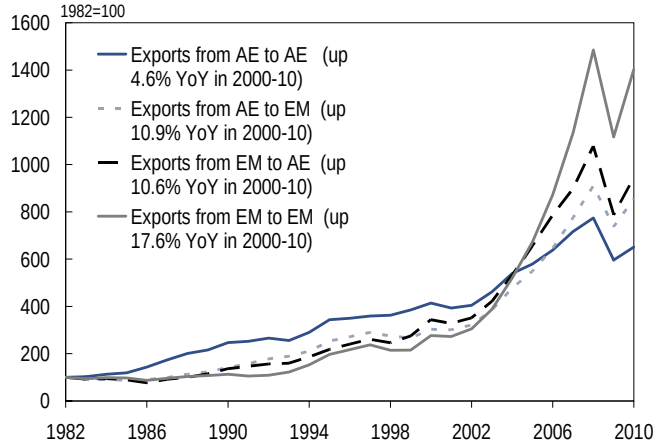
Source: Economist Intelligence Unit; Citi Investment Research and Analysis

6.3. The Rise of EMs and Trade

The rise of EMs, in particular in Asia, has opened up new trade corridors.

The fast-growing converging/catching-up economies are creating new patterns of globalisation. The emergence of new 'trade corridors' among fast-growing converging economies is apparent from Figure 54.

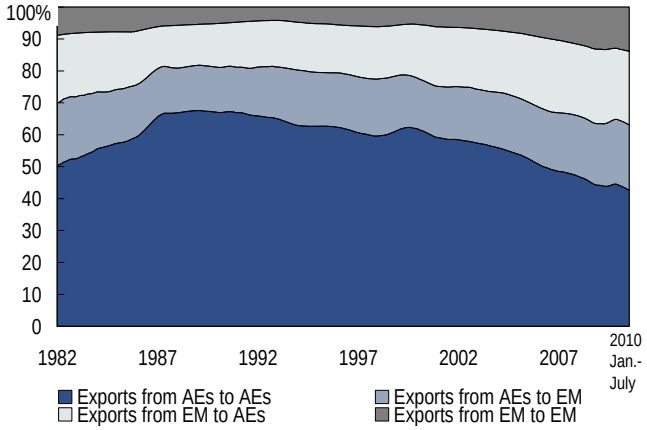
Figure 54. World Trade Levels (1982=100)



Note: AE stands for Advanced economies. EM stands for Emerging markets

Source: IMF; Citi Investment Research and Analysis

Figure 55. Share of World Trade (12-month averages)



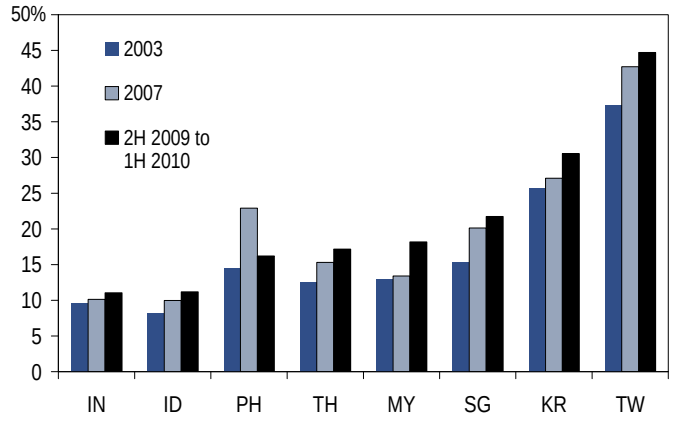
Note: AE stands for Advanced economies. EM stands for Emerging markets

Source: IMF; Citi Investment Research and Analysis

The most rapidly growing cross-border trade is international trade involving Emerging Markets. During the decade 2000-2010, trade among mature economies grew at an annual rate of 4.6 percent, trade between EMs and mature economies grew by 10.8 percent and trade between Emerging Markets by 17.6 percent. Trade between mature economies by 2010 was smaller than that between Emerging Markets.

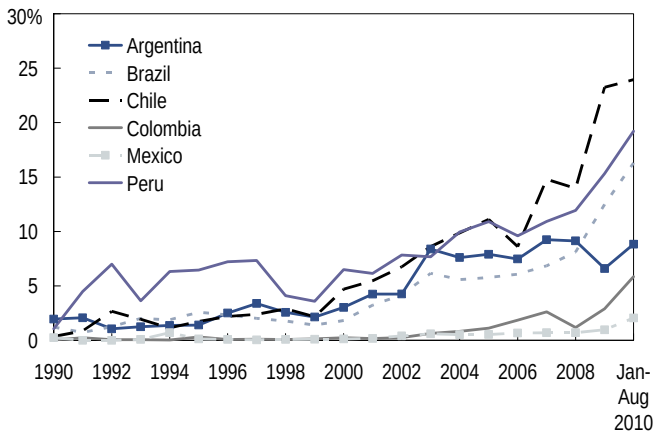
Thus far China has been the main driver of the emergence of the new trade corridors between the Global Growth Generator nations. This is clear from Figure 56. The export-driven nature of China's growth and development strategy of the past 30 years accounts for this. The nature of the new trade corridors is, however, not uniform. Within Asia, there is significant two-way trade between China and its trading partners, accounted for partly by geographically dispersed integrated production networks, but also by China's imports of primary resources (oil, rubber, copper and nickel) from Southeast Asia and its exports of cheap manufactured goods to other Asian countries.

Figure 56. Asia's exports to China, % of total exports



Source: IMF Direction of Trade Database; CEIC Data Company Ltd; Citi Investment Research and Analysis

Figure 57. Latin America's exports to China, % of total exports

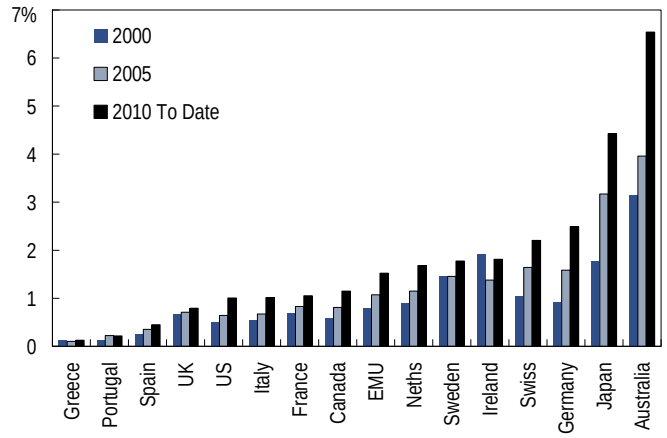


Source: IMF Direction of Trade Database; Haver Analytics; Citi Investment Research and Analysis

Export exposure to EMs and Asia varies widely between the advanced economies.

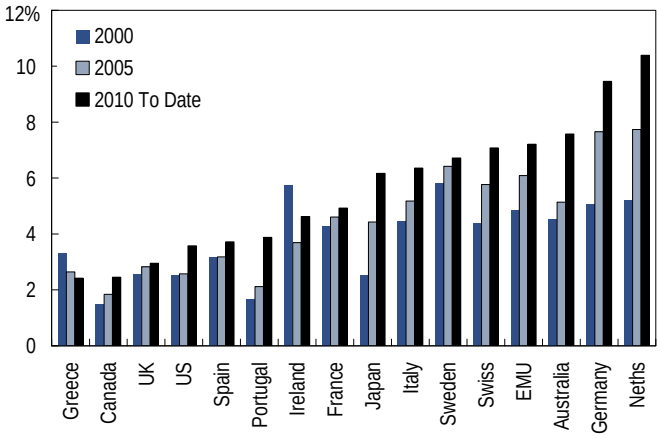
It is clear from Figure 59 that not all mature economies have been equally capable of taking advantage of the opportunities offered by the rapid import growth of the fast-growing converging economies.

Figure 58. Exports to Emerging Asia (% of GDP)



Source: IMF Direction of Trade Database; Citi Investment Research and Analysis

Figure 59. Exports to All Emerging Markets (% of GDP)



Source: IMF Direction of Trade Database; Citi Investment Research and Analysis

As regards the share of exports going to the fast-growing Asian countries, it is instructive that the three worst-performing countries all belong to the Euro Area Periphery (Greece, Portugal and Spain). Of the EA periphery countries, only Ireland stands out as a major exporter to the fast-growing Asian countries. The US, the UK, Italy and France also score badly. Japan does well, partly because of its geographic location, and partly because of its export-oriented manufacturing prowess. Australia benefits because of location and because of its commodity producer status – mostly down to luck rather than its institutions or policies. The Netherlands, Sweden, Ireland, Switzerland and Germany all have above-average and steadily increasing export exposure to the fast-growing converging economies of Asia.

When we consider all Emerging Markets rather than just the Asian ones, a number of European countries score better, especially the Netherlands,

Germany, Switzerland, Sweden and Italy. This is not surprising, as the wider Emerging Markets category includes Central and Eastern Europe and Russia, which offer proximity, as well as Latin America, with which many European countries have historical ties. Even so, Greece, Portugal, Spain and this time Ireland too rank in the lower half of the distribution. Rather surprisingly, both the US and the UK continue to score poorly.

6.4. The Rise of Asia – what will change?

Steady transformation of Asia from export and investment to consumption-driven economies will have profound consequences and should ultimately:

i) raise world prices of consumer goods relative to investment goods

ii) lower commodity prices (or temper their increase).

We do not expect China's growth strategy for the next forty years to be export-driven. Quite the contrary. Rising prosperity will play its part in increasing domestic demand and domestic consumption, in particular. But so will the dramatic population aging that China has already started to experience. With a declining population size projected from 2026 (by the US Census Bureau International Database), China's national saving rate is likely to decline dramatically in the near future, turning the country from a net exporter into a net importer.

The implications will be manifold. As noted above, the balance between consumption and investment in domestic demand should shift towards the former, increasing the demand for consumer goods, including imported ones, and thus raising the prospects of consumer goods and services exporters relative to those of exporters of industrial and other investment goods. This could be rather good news for the US and the UK, for instance.

The composition of output between industry and services will change, with an expected increase in the relative size of the services sector, thus bringing the composition of output closer to that of the western industrial nations. Real wages in China should rise rapidly – faster than the growth of labour productivity - thus raising the share of labour income in GDP. Despite the heady wage increases reported in recent years the share of labour income in GDP in China is still not much above 40%, much below the 60-70% usually observed in the advanced industrial countries. Rapid increases in unit labour costs would put pressure on China's competitiveness in export markets and import-competing industries, helping to improve the lot of other exporters around the globe.

The size of the Chinese economy implies that its structural changes will affect not just local, but world prices. Trends in relative prices may slow down, halt or even reverse as a result. This could, for instance, affect commodity prices (keeping them down), as investment demand tends to be more commodity and energy-intensive than consumption demand, and the relative price of unskilled labour, (raising it) as China reaches the end of its

"unlimited supply of labour" development phase, as defined by Arthur Lewis.

The global repercussions of these developments in China should be partly mitigated, at least for the next decade or two, by the rapid growth and increasing relative importance of countries that are at earlier stages of their convergence process than China. The composition of production and demand in countries like India, Bangladesh, Indonesia, Vietnam and Egypt is likely to be quite commodity-intensive for the foreseeable future. Their demographics are also rather different – with the working age population growing rapidly for decades to come, rather than declining as in China.

7. Growth until 2050 and its key drivers

We forecast regional and world GDP and GDP per capita until 2050 and also produce country-specific forecasts for 58 countries.

There exists a well-established and voluminous academic literature on long-term growth and its drivers based on regression analysis using historical data to try to determine which factors have been associated with high growth in the past. Many potential drivers have been put forward. But at the highest level of aggregation, the taxonomy of potential growth drivers only has three categories: (1) initial conditions and the external environment, (2) institutions and (3) policies. Each of these three categories does, however, have a number of sub-categories. We characterise the most important ones below.

If the growth drivers identified by these factors can be extrapolated into the future, those factors could then be used to forecast future growth. Our starting point for the investigation of countries that could be potential future Global Growth Generators makes use of Citi's position as a global bank, with a physical presence in 109 countries.

Citi's economics team has more than 50 economists based in 19 countries. They cover 60 countries, accounting for over 85% of 2010 world GDP measured in US dollars. We collected long-term growth forecasts from our economists from around the globe, for the countries covered by them. We also asked them to summarise briefly, following a common template – but one permitting a very wide and heterogeneous range of potential future growth drivers - the fundamental determinants of their country forecasts. We then combined our economist's forecasts with historical growth rates and imposed the assumption that in the long-run growth rates should converge to the 'frontier' for per capita income levels at the rates suggested by academic studies.[15]

We therefore do not impose a common view or 'model' of the drivers of economic growth, but instead allow the free but structured expression of the subjective, local knowledge, widely distributed individual insight, expertise and familiarity with a range of data to aggregate into or inform a common view on the likely future global growth generators. This approach may look like creative improvisation, but it can be reconciled with more rigorous classical or Bayesian approaches to data analysis once one ceases to view econometrics as the estimation of constant parameters in a known model (preferably linear) using accurately measured data, and recognises instead that one is really involved in estimating the values of time-varying and uncertain parameters in a model whose specification is known imperfectly, using data that are measured with errors of uncertain size and persistence and that may correspond but vaguely to the economic concepts whose name the data share. Citi's locally based economists can use their locally sourced knowledge to inform forecasts of the medium-term and longer-term future performance of the economies they monitor, study, comment on, and frequently live in.

With these forecasts, and with our economists' lists of country-specific growth drivers, we go back to a classification of common, shared growth drivers or clusters of growth drivers and discuss observable proxies for them.

[15] We set the US to be the country that the other countries' income levels are supposed to converge to in the long run. The assumed rate of convergence is 1.5% p.a., in the middle of the range of between 1% and 2% p.a. suggested by most empirical estimates of the rate of convergence (see e.g. Barro and Sala-i-Martin (2003) for a summary of the evidence).

7.1. Preliminaries

7.1.1. Horizon

Our forecast horizon extends to 2050.

Economists, like anybody else, are not blessed with perfect foresight. Forecasting therefore always involves forecast errors. And the further we look into the future, the larger these forecast errors are likely to be. At the same time, many of the defining features of the development and growth process of countries, such as demographic transitions or transitions from agricultural to industrial societies only play out over long periods of time. Picking a forecast horizon therefore necessarily involves a trade-off. In our exercise, we choose the forecast horizon to end in 2050.

7.1.2. Measures of Income and Income Growth

We focus on GDP and GDP per capita, measured at constant 2010 purchasing power parity adjusted US dollars – we present some forecasts in terms of current nominal USD values in the Appendix.

We present forecasts for Gross Domestic Product (GDP) by country and for GDP per capita. The level of GDP can be seen as a useful measure of the size of an economy. It permits us to answer questions such as 'which country is likely to be the largest economy in the world in 2020, or 2050?'. However, the size of the GDP of a country is naturally heavily affected by the size of its population and therefore not a good measure of living standards. GDP per capita, on the other hand, which is arrived at by dividing the gross domestic product of a country by its population, can be used as a measure of material wellbeing or affluence, even if an imperfect one, in a country.

We use growth in the sense of 'sustained and sustainable growth'. There is a tendency to use the term 'growth' for any increase in output. We prefer to treat and label seasonal, cyclical and other short-run or temporary expansions of output as distinct from secular, underlying or trend growth. Growth of GDP, which includes capital depreciation and resource depletion in the output measure and does not record the depletion of environmental capital, may not be sustainable even if it has been sustained for an extended period of time. Our first point is that any amount of a non-renewable resource like oil that is extracted and stored or consumed above-ground is by definition no longer available below-ground for future use. The net domestic product or national income measures would, ideally, include only the value added in the oil extraction process, not the resource depletion. Second, most production and consumption of goods and services included in the GDP measure involves environmental damage that can be viewed as a form of environment capital depletion or depreciation. Most of these negative externalities are not captured by GDP. The value of these negative externalities should be subtracted from conventional value added measures. We don't have the information to do this, unfortunately, but we will occasionally raise the matter when the issue appears to be especially relevant.

Rapid GDP growth is not sustainable when it severely damages the land, pollutes the atmosphere and poisons fresh water supplies. The damage to the environmental capital stock is likely to be reflected sooner or later even in lower conventionally measured GDP growth. Even before conventionally measured GDP growth is adversely affected by environmental capital depletion, measured GDP can be rising when material well-being is falling; and material well-being can be rising while the quality of life is declining. Sustained and sustainable growth is growth that recognises the importance of 'green' constraints and the intrinsic value of many environmental goods and services that are not counted in the GDP statistics. Countries that achieve GDP growth mainly through resource depletion don't strictly speaking generate growth, but can generate vast profitable and socially valuable investment opportunities. If they do the latter, they could belong to the 3G.

7.1.3. The unit of account

In order to allow the levels of GDP and GDP per capita to be compared across countries, we need to convert them into the same unit of account. We consider two units of account. The first is GDP and GDP per capita converted into current US dollars at market exchange rates. The advantage of current US dollars as a unit of account is that it converts figures from any country into the most common international unit of account – the dollar remains the international currency of choice in trade and finance. But this measure also has two disadvantages. The first is that it is heavily influenced by the nominal exchange rate between the local currency and the US dollar. The high volatility and persistence of nominal exchange rates, both much in excess of what relevant fundamentals would suggest, introduce an element of distortion into any comparisons in a cross-section of countries based on conversions at market exchange rates. Differences between US and non-US inflation rates introduce a further reason for not using changes over time in GDP measured in US dollars at market exchange rates to make inferences about relative changes in 'real' GDP between countries over time. Even converting conventional national real GDP measures using real exchange rates (that is, nominal exchange rates corrected for relative national currency GDP deflators - or even national currency consumer price indices) would not in general allow us to make comparisons of national GDPs over time, measured in units of real purchasing power.

The second measure that we consider addresses these shortcomings, as it measures each nation's real GDP by first converting that nation's nominal GDP into *current* US dollars using a purchasing power parity (PPP) adjusted nominal exchange rate and then deflating this current US dollar, PPP exchange rate-based measure of its GDP by the US GDP deflator. The result is a constant US dollar value of that nation's GDP, based on the PPP exchange rate. PPP-adjusted exchange rates reflect differences in cost of living across countries. Such cost of living comparisons are carried out, inter alia, in the International Comparison Program (ICP) of the World Bank which collects data on the price of a basket of goods and services in many countries every few years, with extrapolations using national price indices used in the interim years. By fixing the base year and expressing all values in terms of 2010 dollars, we also make the resulting numbers readily comparable to current GDP figures. Throughout the main text we focus on this measure and relegate discussion of forecasts in terms of GDP and GDP per capita at market exchange rates to the Appendix. Reassuringly, the pictures that emerge from both sets of forecasts (those based on GDP in current dollars and those at constant PPP adjusted dollars) are in any case very similar.

7.1.4. Country coverage

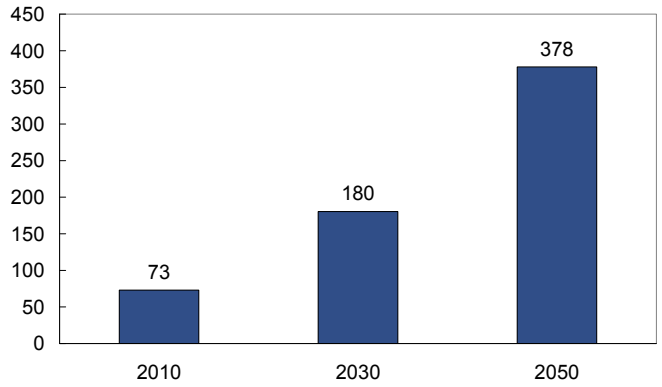
We produce forecasts for 58 countries: Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Dominican Republic, Egypt, El Salvador, Euro Area, France, Germany, Hong Kong, Hungary, India, Indonesia, Iran, Iraq, Israel, Italy, Japan, Kazakhstan, Korea, Malaysia, Mexico, Mongolia, Myanmar, Netherlands, Nigeria, Norway, Pakistan, Panama, Peru, Philippines, Poland, Romania, Russia ,Saudi Arabia, Singapore, Slovakia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, United Kingdom, United States, Venezuela, Vietnam. In addition, we also compute forecasts for the Euro Area. Our sample of countries and the Euro Area accounts for 94% of world GDP in 2010, measured in PPP-adjusted US dollars. On the basis of these country forecasts, we compute regional forecasts for Africa, Australia and New Zealand, Central and Eastern Europe, the Commonwealth of Independent States, Developing Asia, Latin America, the Middle East, North America and Western Europe.

7.2. The Evolution of World, Regional and Country GDP between 2010 and 2050

We forecast world GDP will grow (in real PPP-adjusted terms) from $73trn in 2010 to $180trn in 2030 and $370trn in 2050.

According to our forecasts, world GDP will grow from $73trn in 2010, measured at PPP adjusted 2010 dollars, to $180trn in 2030 and $370trn in 2050. This would correspond to an average real growth rate of 4.6% pa between 2010 and 2030 and 4.2% pa between 2010 and 2050.

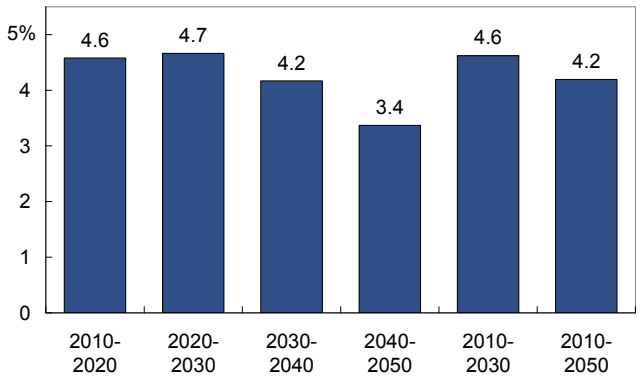
Figure 60. World GDP (2010 USD trn) 2010 – 2050



Note: GDP measured in 2010 PPP USD.

Source: Citi Investment Research and Analysis

Figure 61. Average world GDP growth (% YoY) 2010 – 2050



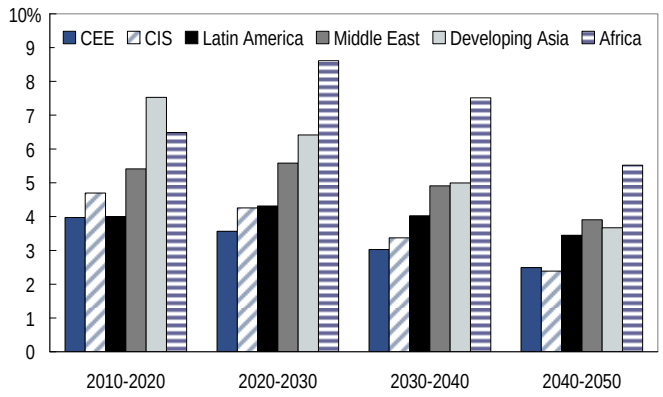
Note: GDP measured in 2010 PPP USD.

Source: Citi Investment Research and Analysis

Growth in Developing Asia and Africa is expected to be fastest throughout.

But growth will be far from uniform (Figure 62 and Figure 63). One region, in particular stands out. We forecast Developing Asia will grow by 7.0% pa between 2010 and 2030 and by 5.6% pa between 2010 and 2050, accounting for 55% and 54% of total world GDP growth over these two (overlapping) periods (Figure 64). Our forecasts also imply strong growth in Africa (7.5% pa between 2010 and 2030, 7.0% pa between 2010 and 2050). Growth in the CIS and Central and Eastern Europe is forecast to be robust, but to slow quite significantly towards the end of our forecast period, mainly due to deteriorating demographics. Latin America (4.2% pa between 2010 and 2030 and 3.7% pa between 2030 and 2050) and the Middle East (at 5.5% pa between 2010 and 2030 and 4.4% pa between 2030 and 2050) are also expected to show significant growth over the next four decades. On the other hand, Western Europe, Japan and North America are only expected to grow modestly, with North America outperforming in the near term due to more favourable demographics, and the three regions together only account for 14% of the increase in world GDP over the next 40 years.

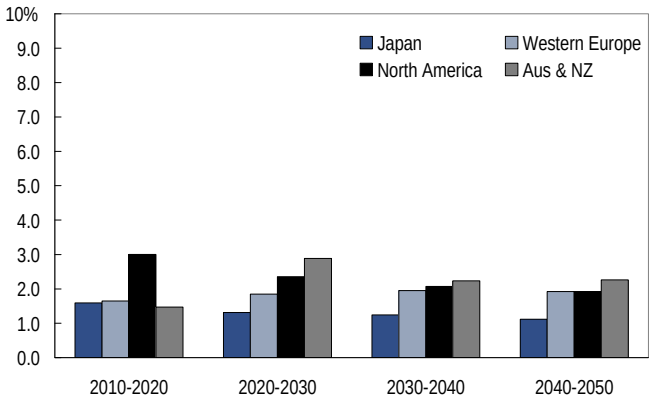
Figure 62. Emerging Economies - Average real GDP growth (% YoY) 2010-2050



Note: GDP measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

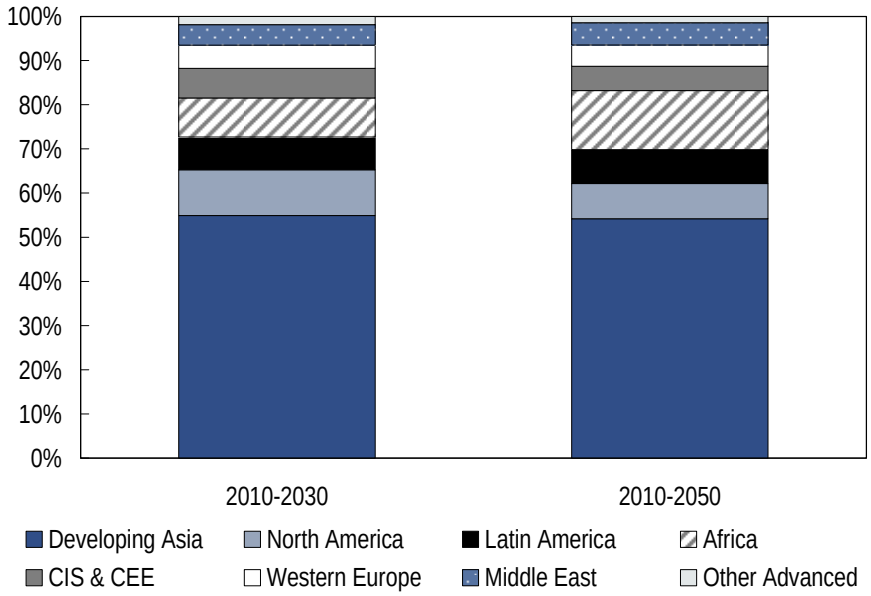
Figure 63. Advanced Economies - Average real GDP growth (% YoY) 2010-2050



Note: GDP measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

Figure 64. Contributions to World GDP growth 2010 – 2050



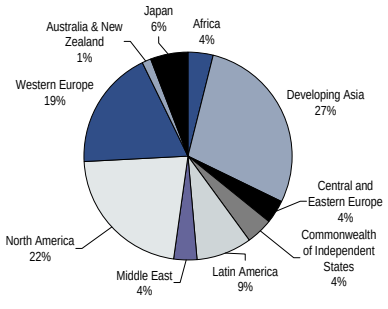
Note: GDP measured in 2010 PPP USD.

Source: Citi Investment Research and Analysis

Share of Developing Asia in World GDP will rise from 27% in 2010 to 49% in 2050.

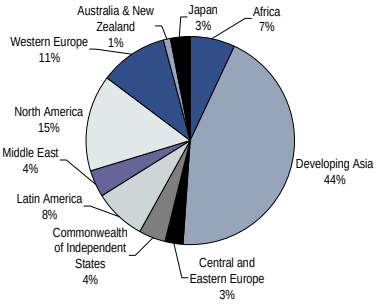
As a result, the composition of world GDP is expected to change substantially. We estimate Western Europe, which accounted for 19% of world GDP in 2010, will only make up 11% of the world economy by 2030 and 7% by 2050. Similarly, we forecast North America's share will fall from 22% in 2010 to 15% in 2030 to just 11% in 2050, while Developing Asia's share will increase from 27% of world GDP in 2010 to 44% in 2030 and 49% in 2050. Meanwhile, we expect Africa's share in the world economy to triple, from just 4% in 2010 to 12% in 2050. The shares of Latin America and the Middle East, on the other hand, are expected to remain relatively unchanged, as growth in those regions is expected to be close to the World average.

Figure 65. Composition of World GDP, 2010



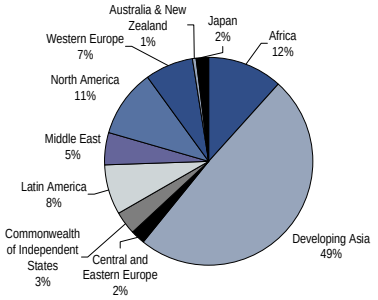
Note: GDP measured in 2010 PPP USD. Source: Citi Investment Research and Analysis

Figure 66. Composition of World GDP, 2030



Note: GDP measured in 2010 PPP USD. Source: Citi Investment Research and Analysis

Figure 67. Composition of World GDP, 2050

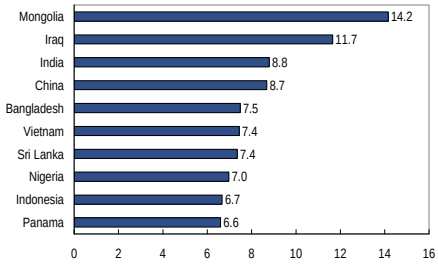


Note: GDP measured in 2010 PPP USD. Source: Citi Investment Research and Analysis

Over the next five years, we expect Mongolia and Iraq to grow at double-digit rates, both driven by resource extraction and the latter by post-war reconstruction and recovery (Figure 68). India and China are expected to grow at very similar – and high – rates. Between 2010 and 2050, Nigeria, India and Iraq are predicted to grow at the highest rates, with Bangladesh and Vietnam not far behind.

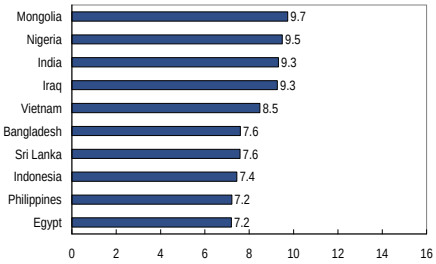
Figure 71 to Figure 73 present the countries for which we predict the lowest growth rates during our forecast interval. The list is heavily dominated by European economies, with Japan the only non-European nation among the 'bottom 10'.

Figure 68. Top 10 countries by GDP growth (% YoY) 2010-2015



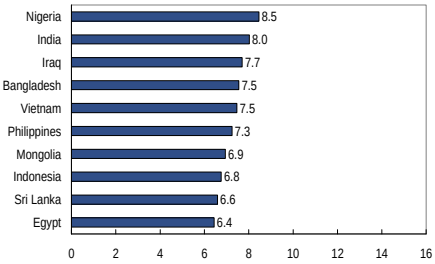
Note: GDP measured in 2010 PPP USD.
Source: Citi Investment Research and Analysis

Figure 69. Top 10 countries by GDP growth (% YoY) 2010-2030



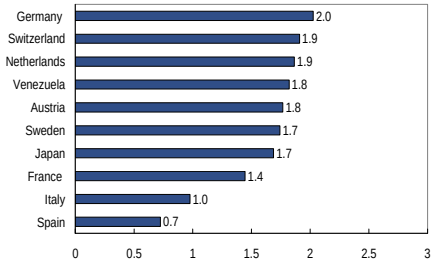
Note: GDP measured in 2010 PPP USD.
Source: Citi Investment Research and Analysis

Figure 70. Top 10 countries by GDP growth (% YoY) 2010-2050



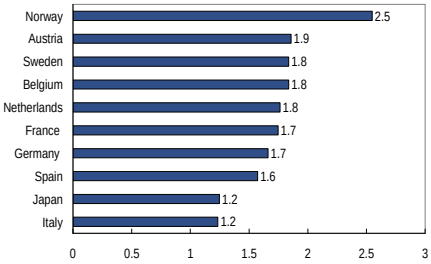
Note: GDP measured in 2010 PPP USD.
Source: Citi Investment Research and Analysis

Figure 71. Bottom 10 countries by GDP growth (% YoY) 2010-2015



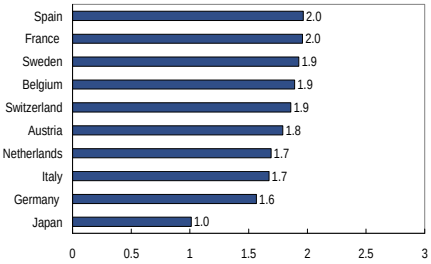
Note: GDP measured in 2010 PPP USD.
Source: Citi Investment Research and Analysis

Figure 72. Bottom 10 countries by GDP growth (% YoY) 2010-2030



Note: GDP measured in 2010 PPP USD.
Source: Citi Investment Research and Analysis

Figure 73. Bottom 10 countries by GDP growth (% YoY) 2010-2050



Note: GDP measured in 2010 PPP USD.
Source: Citi Investment Research and Analysis

The momentous shifts in economic weight and power are also evident in rankings of the largest economies by size of real GDP in 2010 PPP USD (Figure 74). We expect India to overtake Japan to become the third largest economy in the world by 2015, but otherwise forecast little change in the order of the ten largest economies over the next five years. By 2020, China should have just overtaken the US to become the largest economy in the world, while Italy would have dropped out of the top ten, to be followed by France by 2030, the UK by 2040, and Germany by 2050. By 2050, the make-up of the ten largest economies in the world should bear little resemblance to the one in 2010. India is expected to have overtaken China to claim the title spot, while Indonesia, Nigeria, Egypt and Mexico should all have made an entry into the elite club of the ten largest economies of the world.

Figure 74. The Top 10 Largest Economies in the World (in trillion 2010 PPP USD)

Rank	Country	2010	Rank	Country	2015	Rank	Country	2020	Rank	Country	2030	Rank	Country	2040	Rank	Country	2050
1	US	14.12	1	US	16.65	1	China	21.98	1	China	38.49	1	China	58.17	1	India	85.97
2	China	9.98	2	China	15.13	2	US	19.15	2	US	24.62	2	India	48.97	2	China	80.02
3	Japan	4.33	3	India	5.97	3	India	9.34	3	India	23.27	3	US	31.08	3	US	39.07
4	India	3.92	4	Japan	4.71	4	Japan	4.98	4	Japan	5.55	4	Indonesia	8.27	4	Indonesia	13.93
5	Germany	2.91	5	Germany	3.22	5	Germany	3.46	5	Brazil	5.28	5	Brazil	7.96	5	Brazil	11.58
6	Russia	2.20	6	Russia	2.70	6	Brazil	3.36	6	Russia	4.82	6	Russia	6.42	6	Nigeria	9.51
7	Brazil	2.16	7	Brazil	2.70	7	Russia	3.33	7	Indonesia	4.28	7	Japan	6.08	7	Russia	7.77
8	UK	2.16	8	UK	2.48	8	UK	2.83	8	Germany	4.05	8	Nigeria	5.38	8	Mexico	6.57
9	France	2.12	9	France	2.28	9	France	2.48	9	UK	3.67	9	Germany	4.71	9	Japan	6.48
10	Italy	1.75	10	Italy	1.84	10	Korea	2.20	10	Mexico	3.20	10	Mexico	4.67	10	Egypt	6.02

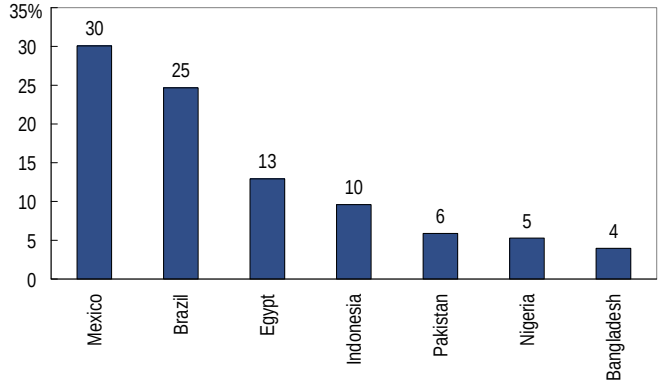
Source: Citi Investment Research and Analysis

Strong growth performance in Developing Asia and Africa is mainly driven by catch-up and high population growth.

Even a cursory look at the countries that rise up the ranks of the largest economies in the world reveals that they have two factors in common. First, they are all poor currently, as is clear from Figure 69, which shows 2010 levels of real GDP per capita as a percentage of real per capita GDP in the US (from now on *real* means measured in 2010 PPP adjusted US dollars). As previously discussed times, poorer countries *should* grow faster, other things being equal. Second, they are young. Working age populations are set to increase over the forecast horizon (in Brazil's case, barely), in some cases still growing in 2050.[16] The size of the population of working age should primarily be seen as a scale variable – more cooks (almost) invariably produce more food. But as the proverb has it, more cooks can occasionally spoil the broth, indicating that the size of the working age population, and in particular, the share of the population of working age in the total population can have substantial (positive or negative) effects on income and production *per capita*, an issue we discuss below.

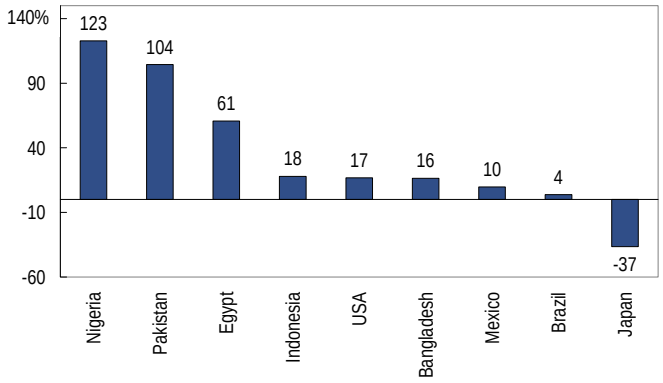
[16] Note that China is not included in the list of countries that rise up the ranks of the largest economies. It was the second largest economy by real GDP at the end of 2010, after the US. Having overtaken the US and been the largest economy in the world, we forecast China to be again the second largest economy in the world, this time after India, in 2050.

Figure 75. Selected countries – real GDP per capita (% of US level) 2010



Note: GDP per capita measured in 2010 PPP USD
Source: Citi Investment Research and Analysis

Figure 76. Selected countries – change in working age population in % and total change in millions 2010-2050



Source: United Nations; Citi Investment Research and Analysis

Size matters. The balance of political and economic power depends on the distribution of political, economic (including financial) and military might. The emergence of China is a clear example, as the size of its population and its landmass have made it a political power to be reckoned with long before it has joined the circle of rich nations. It has also been suggested that size itself may be beneficial to growth, presumably as it allows reaping economies of scale and finer division of labour, though presumably there are also diseconomies of span of control and complexity of networks (see Head (1995), Easterly and Kraay (1999) and Sibert (2011)). A larger market may also increase the incentives to innovate. Today, country size is in many, but not all, cases a poor guide to market size as low technological and man-made barriers to trade have made many markets regional, and some global, in nature.

Market size is also a poor guide to assessing prosperity and living standards, average or median incomes and the resulting potential demand for different types of consumption goods and services. For that, we turn to our forecasts of GDP per capita

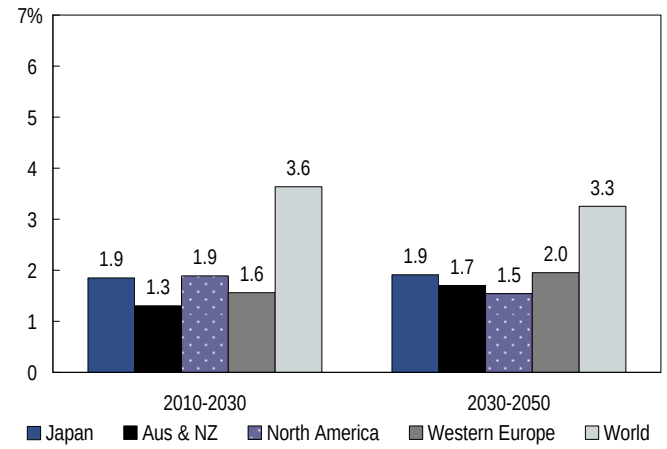
7.3. The Evolution of World, Regional and Country GDP per capita between 2010 and 2050

7.3.1. By Region

Per capita real GDP growth is also expected to be robust until 2050 – with Developing Asia and Africa once again leading.

We expect world real per capita GDP to increase in all regions between 2010 and 2050. According to our forecasts, per capita GDP growth rates will be highest in Developing Asia (6.1% pa between 2010 and 2030 and 4.0% pa between 2030 and 2050) and Africa (5.5% pa between 2010 and 2030 and 5.1% pa between 2030 and 2050). But real per capita income growth is also expected to be high – and close to the World average – in Latin America, the CIS, Central and Eastern Europe and the Middle East. Real per capita GDP growth rates for the industrialised world are expected to be lower, but in line with recent historical experience.

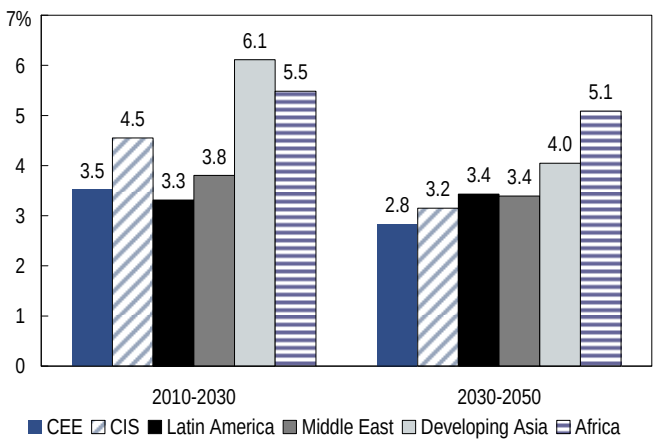
Figure 77. Advanced Economies – Average real GDP per capita growth (% YoY) 2010-2050



Note: GDP per capita measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

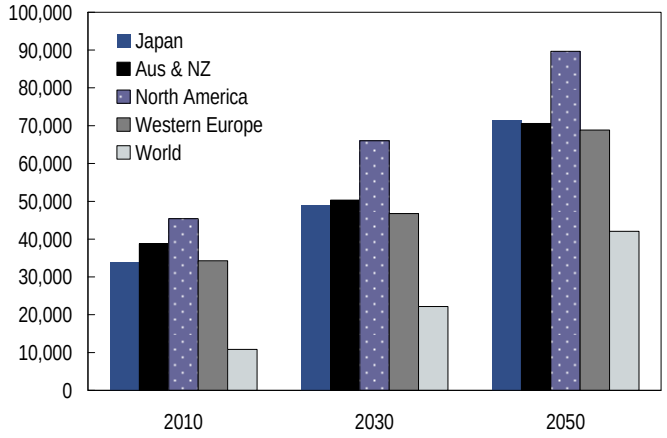
Figure 78. Emerging Economies – Average real GDP per capita growth (% YoY) 2010-2050



Note: GDP per capita measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

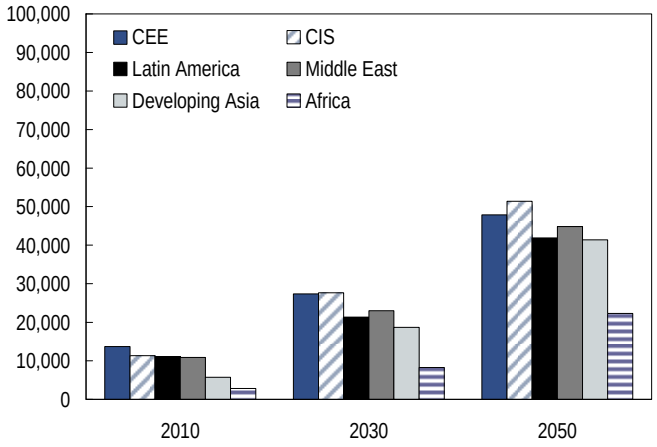
Figure 79. Advanced Economies – real GDP per capita in USD



Note: GDP per capita measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

Figure 80. Emerging Economies – real GDP per capita in USD



Note: GDP per capita measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

Poor nations will catch up substantially – yet Western Europe, North America, Australia and Japan should remain the richest regions.

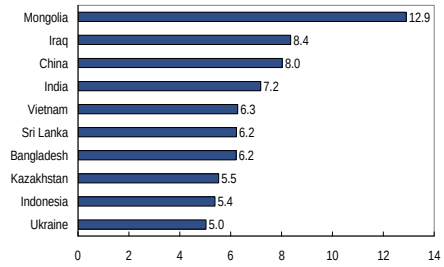
Thus, per capita income in regions which are poorer today is expected to grow faster than in today's richer regions, implying convergence in regional average incomes per capita. Nevertheless, despite decades of convergence, convergence in regional incomes should still be incomplete by 2050. Japan, Western Europe and North America are forecast to remain the most affluent regions in 2030 and 2050 (Figure 79 and Figure 80).

7.3.2. By Country

Nigeria, India and Vietnam are expected to experience the highest real per capita GDP growth rates until 2050.

In terms of average real growth in GDP per capita, we expect Mongolia, Iraq and China to show the best performance over the next five years, with India only slightly behind. When the forecasting horizon is extended to 2030 and 2050, Nigeria, India, Vietnam and Mongolia are expected to grow fastest in our sample, with Bangladesh and Iraq following closely.

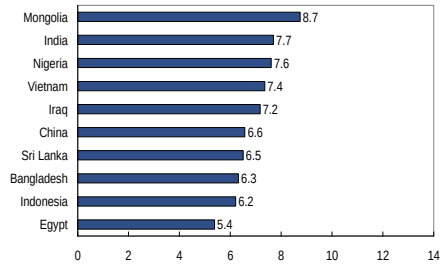
Figure 81. Top 10 countries by GDP per capita growth (% YoY) 2010-2015



Note: Average annual growth rates of GDP per capita (% YoY) measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

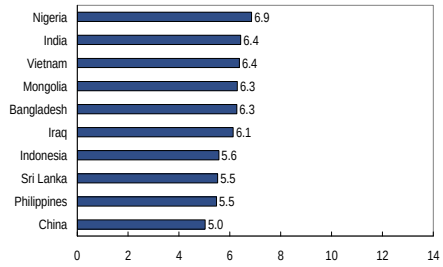
Figure 82. Top 10 countries by GDP per capita growth (% YoY) 2010-2030



Note: Average annual growth rates of GDP per capita (% YoY) measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

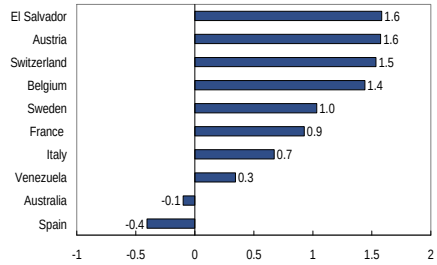
Figure 83. Top 10 countries by GDP per capita growth (% YoY) 2010 – 2050



Note: Average annual growth rates of GDP per capita (% YoY) measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

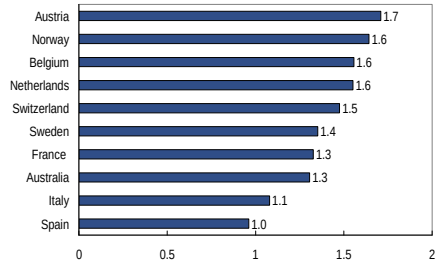
Figure 84. Bottom 10 countries by GDP per capita growth (% YoY) 2010-2015



Note: Average annual growth rates of GDP per capita (% YoY) measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

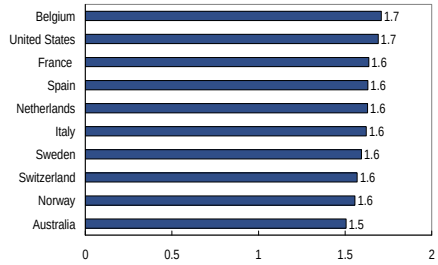
Figure 85. Bottom 10 countries by GDP per capita growth (% YoY) 2010-2030



Note: Average annual growth rates of GDP per capita (% YoY) measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

Figure 86. Bottom 10 countries by GDP per capita growth (% YoY) 2010-2050



Note: Average annual growth rates of GDP per capita (% YoY) measured in 2010 PPP USD

Source: Citi Investment Research and Analysis

Worst performers as regards real per capita GDP growth are advanced countries, particularly in Western Europe.

The slowest growing countries in our sample are dominated by the advanced economies of today, and the European ones in particular. Spain is forecast to experience the smallest growth in per capita income throughout our forecast period, and with negative per capita growth over the next five years. In the near term, we also expect Venezuela and El Salvador to grow slowly, despite their relative low levels of per capita income.

Singapore is the richest country in our sample in 2010 – and 2050.

Measured at 2010 PPP US dollars per capita, Singapore is the most affluent country in our sample today and is expected to remain so for the length of our forecast horizon. Figure 87 to Figure 90 show that we expect many of the top 10 richest countries by GDP per capita to remain in the top 10 in 2030 or even 2050. Singapore, Hong Kong, the US, Switzerland, Taiwan, Canada, and Australia are all expected to remain in the top 10 in 2050. Norway, Australia, and the Netherlands are expected to make way for South Korea, Saudi Arabia and the UK.

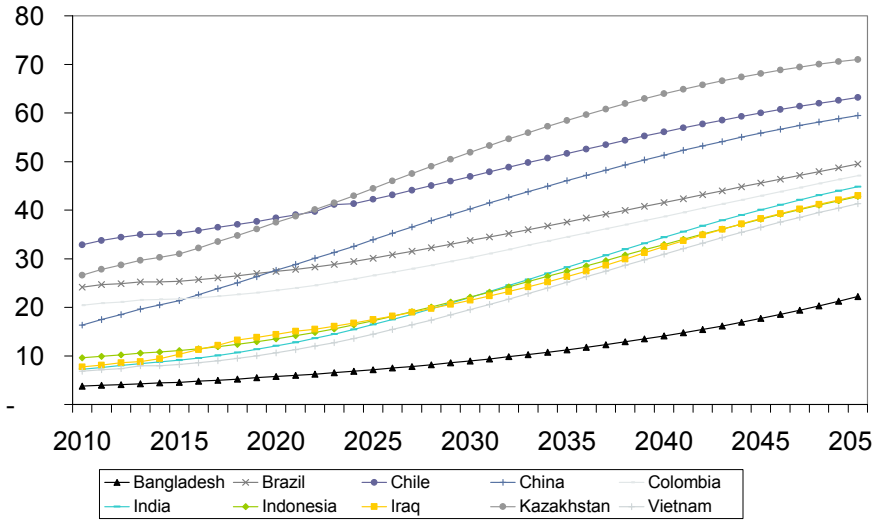
Figure 87. GDP per capita (2010 PPP USD) 2010 – 2050

Rank	Country	2010	Rank	Country	2015	Rank	Country	2020	Rank	Country	2030	Rank	Country	2040	Rank	Country	2050
1	Singapore	56,532	1	Singapore	68,112	1	Singapore	78,858	1	Singapore	99,880	1	Singapore	118,049	1	Singapore	137,710
2	Norway	51,226	2	Hong Kong	53,882	2	Hong Kong	62,233	2	Hong Kong	79,041	2	Hong Kong	96,871	2	Hong Kong	116,639
3	US	45,511	3	US	51,149	3	US	56,227	3	Taiwan	73,219	3	Taiwan	93,382	3	Taiwan	114,093
4	Hong Kong	45,301	4	Norway	48,015	4	Taiwan	53,885	4	US	67,687	4	South Korea	86,109	4	South Korea	107,752
5	Switzerland	42,470	5	Switzerland	45,833	5	Switzerland	49,161	5	Korea	63,923	5	US	82,254	5	US	100,802
6	Netherlands	40,736	6	Netherlands	44,108	6	Canada	47,936	6	Canada	60,465	6	Saudi Arabia	77,018	6	Saudi Arabia	98,311
7	Australia	40,525	7	Taiwan	44,074	7	Netherlands	47,522	7	Switzerland	58,690	7	Canada	76,971	7	Canada	96,375
8	Austria	39,073	8	Canada	43,155	8	Austria	46,071	8	Netherlands	57,185	8	Switzerland	72,620	8	UK	91,130
9	Canada	38,640	9	Austria	42,248	9	Norway	45,949	9	Austria	56,613	9	UK	71,932	9	Switzerland	90,956
10	Sweden	36,438	10	Australia	40,325	10	Korea	44,740	10	UK	55,839	10	Austria	71,431	10	Austria	90,158

Source: Citi Investment Research and Analysis

Although the rich countries of today are expected to be among the rich nations of tomorrow, we still forecast substantial convergence in per capita income (Figure 88). Among the rich nations of today, Hong Kong, Korea and Taiwan are expected to surpass even the US in terms of real income per capita.

Figure 88. Selected Countries – Convergence in Real Per Capita GDP (% of US) 2010 – 2050



Note: GDP measured at 2010 PPP USD.

Source: Citi Investment Research and Analysis

7.4. Making sense of growth

Growth has many fathers – we consider the most important ones here.

In the previous (sub) section, we presented our growth forecasts for GDP and GDP per capita until 2050. At the outset, we noted that our forecasts were informed by the country-specific expertise of our economists around the world and that we did not impose a common model to produce the forecasts. Nevertheless, a number of common drivers can be identified and in this section we discuss the main ones among them in more detail.

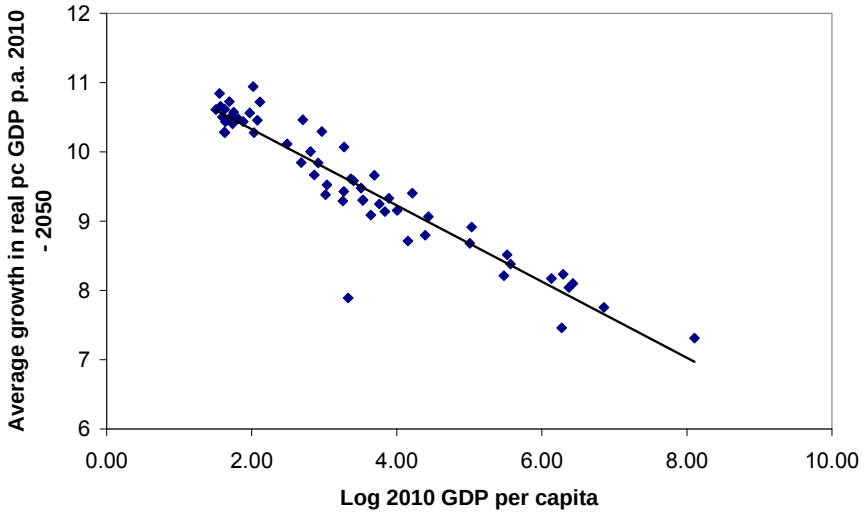
7.4.1. Relative economic backwardness

Relative economic backwardness should make it easier to grow fast – by absorbing lessons learned and importing technologies developed elsewhere.

It is clear that growth of output per capita or productivity in rich, mature economies that operate close to the technological frontier in many of their production sectors is driven by different forces than growth of output per capita or productivity growth in poorer countries that operate well inside even the 'global average practice frontier'. The most spectacular rates of growth of output and productivity have occurred in countries that, starting from a position of technological backwardness and low capital-labour ratios, were able to boost both total factor productivity and labour productivity through the adoption of state-of-the-art technology and management and rapid accumulation of capital.

The effect of low initial income is clearly visible in our forecasts. Figure 40 shows that we predict a strong negative correlation between levels of initial real per capita GDP in 2010 and growth over the next four decades.

Figure 89. Absolute convergence 2010 to 2050



Note: GDP measured in 2010 PPP USD. Source: Citi Investment Research and Analysis

The insight that the easiest way for a country to achieve a high growth rate of output and productivity is to start from a very low level of productivity – low relative to the levels achieved by the country or countries that are at the technology frontier and have accumulated the right quantities and intensities of physical and human capital inputs to make full use of the available stock of productive knowledge (the US today, the UK before 1900) – may not seem particularly startling, until one asks the question as to how this gap between the frontier and a country's actual level of productivity came about in the first place. What combination of exogenous (including external) factors, institutions and policies have prevented the low productivity country from being at the frontier or closer to the frontier over the past years, decades or, in the case of China and India, centuries? Are there feasible and likely changes in institutions, policies or in the external environment that would remove the obstacles to catch-up growth and productivity convergence?

7.4.2. Capital formation and domestic saving: necessary ingredients of rapid convergence and catch-up

High rates of capital formation are usually a necessary ingredient for fast catch-up growth.

High domestic saving rates have in general been necessary for/accompanied by investment-driven catch-up.

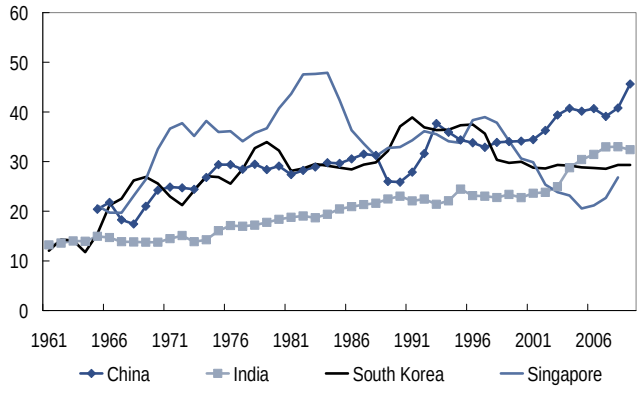
Physical capital endowments, including the stock of infrastructure capital and the stocks of plant and equipment are, like natural resources, potentially subject to the risk of predation, whether through confiscation and expropriation or through high rates of taxation. But physical capital is a key factor of production, because much technical knowledge and know-how is embodied in physical capital equipment.

Conventional 'exogenous' growth theory, in the tradition of Solow (1956, 1957) and Swan (1956), in which factor-augmenting productivity growth or total factor productivity growth is exogenous, and in which labour productivity (at any level given of total factor productivity or labour-augmenting productivity), is increasing in the capital-labour ratio, but at a diminishing rate, implies that, for a given ratio of net investment to GDP, the growth rate of GDP per capita will be higher the lower the initial level of the capital-labour ratio and, therefore, the lower the initial level of labour productivity. Starting from a low initial labour productivity level, the growth rate of output and productivity can, of course, also be raised by increasing the investment share in GDP.

The only policy lever in this conventional growth theory is the investment rate. All other policies and institutions are buried in the assumed relationship between capital intensity and output per worker. Domestic capital formation is financed through domestic savings and net foreign capital inflows – the current account deficit on the balance of payments.

Both domestic capital formation rates and domestic saving rates differ materially between countries at a point in time and for any given country over time. Figure 90 shows that spectacularly high GDP growth rates sustained over a period of a couple of decades have, outside mainly extractive economies, invariably required high rates of capital formation, with fixed investment as a percentage of GDP in the low to mid thirties (India, Korea, Japan, Singapore) or even the forties (China).

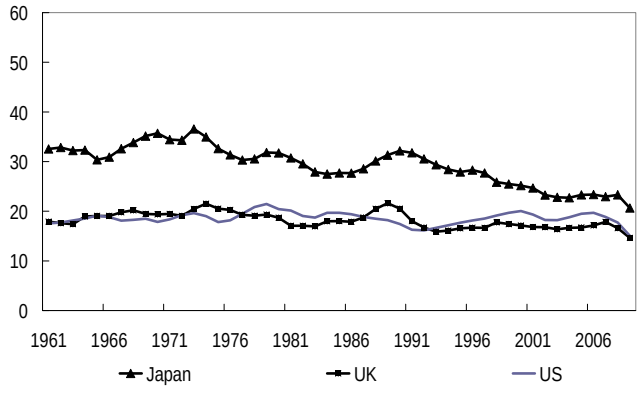
Figure 90. Selected countries – Investment rate (% of GDP) 1961-2009



Note: Gross Fixed Capital Formation (% of GDP)

Source: Citi Investment Research and Analysis

Figure 91. Selected countries – Investment rate (% of GDP) 1961-2009

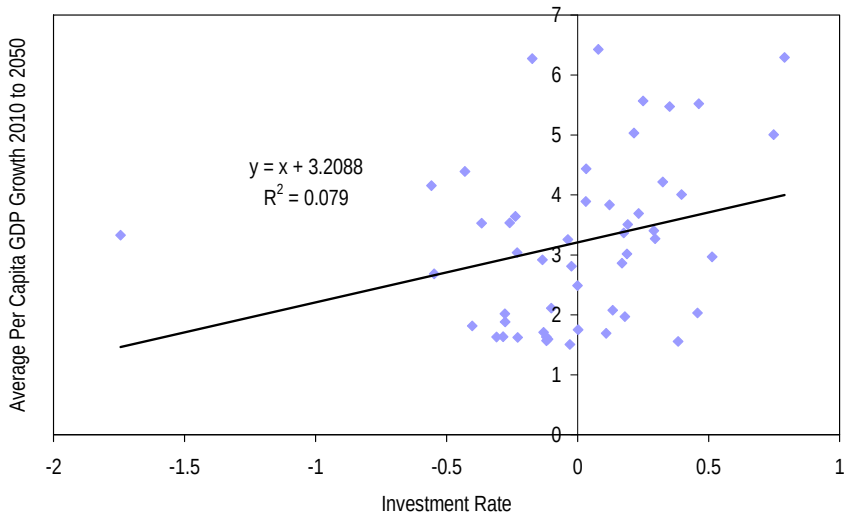


Note: Gross Fixed Capital Formation (% of GDP)

Source: Citi Investment Research and Analysis

Figure 92 shows that the effects of investment also appear in our forecasts. In the figure, we present a scatter plot that accounts for the presence of other growth drivers, of average per capita income growth and the investment rate (the share of gross domestic capital formation in GDP).[17]

Figure 92. Growth and Investment



Note: Average per capita GDP growth is the residual of a regression of average growth rates in real GDP per capita in 2010 PPP USD on identified growth factors other than the investment rate (defined as gross fixed capital formation divided by GDP).

Source: World Bank WDI and Citi Investment Research and Analysis

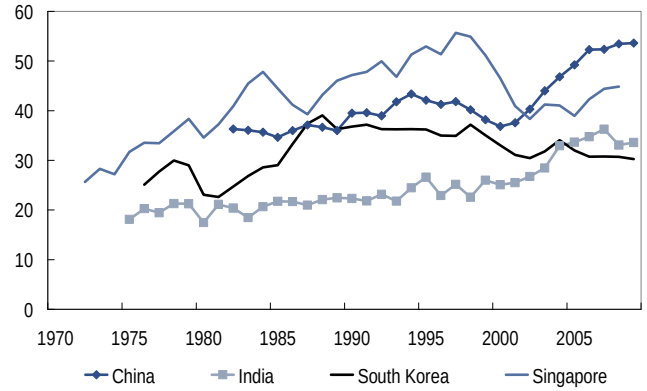
High investment rates are a necessary but not sufficient condition for sustained high economic growth. Investment can be wasted in over-accumulation and misallocation of capital. Indeed, given China's prodigious investment rate and, until very recently, its vast reservoir of low-productivity rural labour willing and able to move into urban industrial employment, it is surprising its GDP growth rate has not been higher. The efficiency of much of its fixed investment must have been low, or in World Bank speak, its ICOR (incremental capital output ratio – the net fixed investment required to achieve a given change in potential output) must have been very high. And low investment rates today may be the result also of high past growth or relatively pessimistic future growth expectations. Fixed investment rates in Japan are now below 25 percent of GDP and appear on their way down to the levels of the US and the UK, both well below 20 percent of GDP (Figure 91).

Figure 93 and Figure 94 present savings rates for the same sample of countries as Figure 90 and Figure 91. From a comparison of both sets of figures, it is apparent that sustained high rates of domestic capital formation have been financed by domestic saving, not by capital inflows/current account deficits. Indeed, the countries with the highest rates of domestic capital formation have tended to have even higher domestic saving rates.

[17] As noted above, if different growth drivers are correlated, a simple scatter plot of the dependent variable (average per capita GDP growth) and any individual regressor (say investment shares) could be misleading, just as the regression coefficient of a simple regression of average per capita GDP growth on the single regressor would yield biased and inconsistent estimates if relevant variables are omitted. The 'correct' scatter plot is arrived at by regressing average per capita GDP growth on all growth drivers, except investment shares, and plotting the residual of that regression against the share of investment. This is how we arrive at Figure 92.

They have exported capital to the rest of the word, in a prima facie refutation of the proposition that less economically developed, labour-rich and capital poor countries should use foreign saving to supplement domestic saving as sources of finance for domestic capital formation. We should, however, note that the current account surpluses (net capital outflows) of many of the high-investment rate countries engaged in catch-up growth co-existed with significant inflows of FDI, which was one of the key mechanisms for importing technology, know-how and other productive skills.

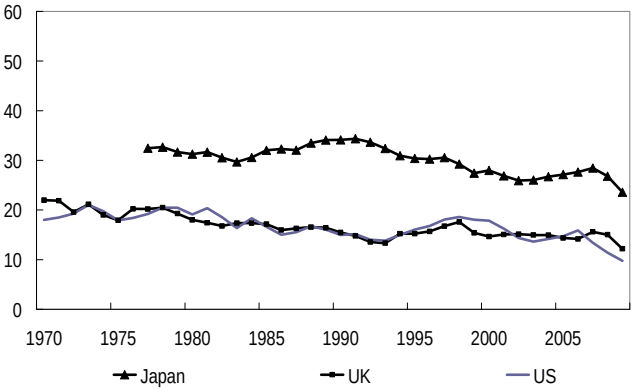
Figure 93. Selected countries – Savings rate (% of GDP) 1970-2009



Note: Gross Savings (% of GDP)

Source: World Bank WDI and Citi Investment Research and Analysis

Figure 94. Selected countries – Savings rate (% of GDP) 1970-2009



Note: Gross Savings (% of GDP)

Source: World Bank WDI and Citi Investment Research and Analysis

7.4.3. Human resources and human capital

Human capital is another key ingredient for generating growth.

Human resources or human capital, including both the physical and mental ability and skillsets of the population are uniquely important for a number of reasons. First, for most people, work is not just a means to an end (income) but also (and up to a point) an end in itself. It could be argued that man as a social being only realizes his full potential – his humanity – through work. In addition, rent extraction from labour is more difficult than rent extraction from natural resources. Forced labour and slavery are the exception rather than the norm today, so we are very unlikely to ever encounter a 'labour curse' to match the well-documented 'natural resource curse'. Countries whose prosperity is based on a skilled and educated labour force are likely to have better long-term prospects than countries whose main source of spending power comes from the extraction of non-renewable resources.

There now exists a range of international surveys that compare economically relevant dimensions of human capital quantity and quality on a systematic basis. One of the best-knows is the OECD's Programme for International Student Assessment or PISA.

The PISA 2009 results show that Korea and Finland topped the rankings in the survey of education performance by country, followed by Hong Kong, Singapore, Canada, New Zealand and Japan. The municipality of Shanghai topped the rankings once cities are included. 65 countries /economies implemented the PISA 2009 survey during 2009. A further 9 implemented the same assessment in 2010, but the results of this will not be available until December 2011.

Figure 95. Top Scorers – Student Performance in Reading, Mathematics and Science

On the overall reading scale	On the mathematics scale	On the science scale
1. Shanghai-China	1. Shanghai-China	1. Shanghai-China
2. Korea	2. Korea	2. Finland
3. Finland	3. Finland	3. Hong Kong-China
4. Hong Kong-China	4. Hong Kong-China	4. Singapore
5. Singapore	5. Singapore	5. Japan
6. Canada	6. Canada	6. Korea
7. New Zealand	7. New Zealand	7. New Zealand
8. Japan	8. Japan	8. Canada
9. Australia	9. Australia	9. Estonia
10. Netherlands	10. Netherlands	10. Australia

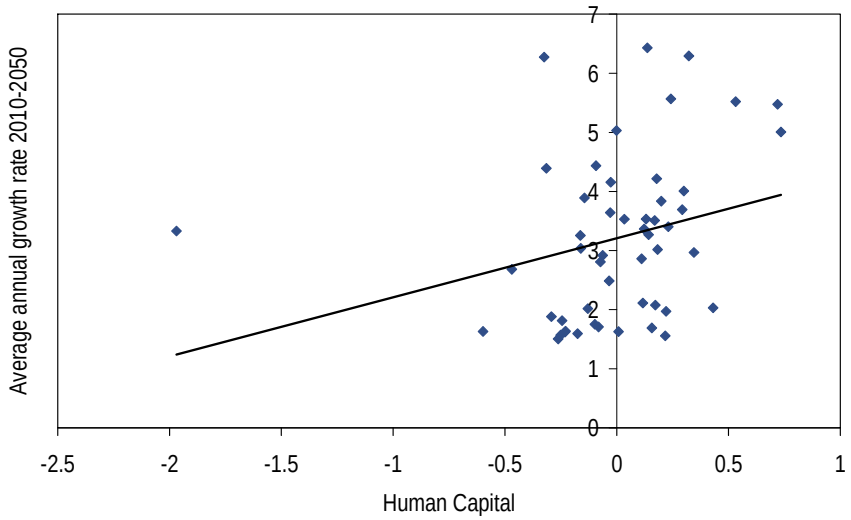
Source: PISA 2009; Citi Investment Research and Analysis

The PISA surveys are especially useful because they attempt to measure a range of cognitive skills. Unfortunately, there have been only four surveys thus far - in 2000, 2003, 2006 and 2009, so meaningful time-series analysis is not yet possible.[18] Educational achievement measures stretching back further in time tend to be restricted to highly imperfect indicators, like enrolment rates by age and gender.

In Figure 96, we plot average per capita GDP growth in our sample against a measure of human capital, based on one such indicator. That indicator is the primary school enrolment rate obtained from the World Bank World Development Indicators and is one of the variables that have previously shown to be significantly correlated with growth in historical data (see e.g. Barro and Sala-i-Martin (2006)). As with saving rates, we do not plot a simple scatter plot of average real per capita GDP growth and human capital. Instead, we control for other growth factors besides human capital. A simple scatter plot of per capita income growth and human capital would yield a flat or negatively sloping trend line, both in historical evidence and in our forecasts, for an intuitive reason: rich countries tend to have higher levels of human capital. Richer countries also tend to experience lower growth rates, conditioning for other drivers of growth besides initial income, and a simple regression of growth rates on human capital would attribute the poor growth performance to high levels of human capital. Figure 96, however, highlights that once we have conditioned on other drivers of growth, including initial levels of per capita income, human capital is positively correlated with average growth rates for our forecasts (this is also true for the historical evidence).

[18] All OECD member countries participated in the first three PISA surveys, along with certain partner countries and economies. In total, 43 countries took part in PISA 2000, 41 in PISA 2003, 58 in PISA 2006 and 74 in PISA 2009.

Figure 96. Growth and Human Capital



Note: Average per capita GDP growth is the residual of a regression of average growth rates in real GDP per capita in 2010 PPP USD on identified growth factors other than our measure of human capital (the gross primary school enrolment rate).

Source: World Bank WDI; Citi Investment Research and Analysis

Besides education, relevant indicators of human capital include health, fertility, and the age distribution of the population.

Besides education, other aspects of human capital may be relevant. The size of the population or of the working age population is first a scale variable – if utilised, a one-off increase in the working age population should imply an increase in economic output, but may or may not have a (positive or negative) effect on growth.

The demographic characteristics (age distribution, gender composition, life expectancies and birth rates) of a nation's population have an important impact on its long-run economic performance, as the key drivers of the population of working age and of the dependency ratio, or the ratio of the economically inactive to the economically active population. The ratio of total to working age population (dependency ratio) should correlate with the tax burden on productive resources, which should deter saving, investment, effort and growth. Demographic factors have a powerful impact on household, private and domestic saving rates.

The 'demographic dividend' can become the 'demographic curse' when large working-age populations cannot find satisfactory employment opportunities.

Finally, demographics matter for voting behaviour and other key dimensions of political participation. It is, for instance, unlikely, that the Tunisian and Egyptian developments of the past two months would have taken place in a country where octogenarians outnumbered 20-year olds.

7.4.4. Institutions and Policies

Policies and institutions matter for growth, including:

- **i) the rule of law, stability and predictability of regulation and taxation**
- **ii) political institutions**
- **iii) social institutions**
- **iv) microeconomic and macroeconomic policies**

Solow-Swan type growth theory does not offer any suggestions as to what institutional and policy reforms could boost growth, other than raising the national saving rate and/or attracting foreign capital to fund a higher rate of domestic capital formation. But the idea that institutions and policies, including the efficiency of financial institutions, the pricing and allocation of capital, the protection of property rights and the rule of law, the regulation of labour and product markets and macroeconomic policy, have a material effect on growth is hardly controversial and has subsequently also been incorporated into theoretical and empirical academic studies for the drivers of economic growth – and found to be important.

7.4.4.1. Economic, financial, and regulatory institutions and business climate

The economic benefits of the rule of law in economic, financial and business affairs and of predictability and stability of regulations and tax rules, as well as the economic damage caused by intrusive, complex and non-transparent rule making, regulation and adjudication of claims and conflicts have been documented by countless surveys, including the EBRD's BEEPS, the World Bank Doing Business Surveys, the World Economic Forum's Competitiveness Reports and many others. It also cannot be a coincidence that the countries scoring high in the global competitiveness reports also tend to come out well in Transparency International's Corruption Perceptions Index.

The quality of financial sector regulation and supervision has potentially important impacts on growth and economic stability both through the prevention and mitigation of financial crises and through its impact on the efficiency of the intermediation process between ultimate savers/sources of funds (at home and abroad) and ultimate investors/users of funds (also at home and abroad). Banks tend to be the dominant intermediary vehicles in emerging market economies, with a limited role for capital markets. This may in part be because the demands played on regulators are more onerous for capital market supervision and regulation than for bank supervision and regulation. A second reason may be that relationship-based intermediation through banks comes more naturally to many emerging market savers and users of external funds than arms-length or transactions-based intermediation through financial markets. The latter requires a degree of trust in the enforcement of the rules of the game (by independent supervisors, regulators and courts) that may not (yet) be present during the earlier stages of financial development. As social capital (trust in the authorities, the courts etc.) accumulates, financial intermediation will accord a greater role to financial markets relative to banking, although banks will remain an important part of the financial landscape.

7.4.4.2. Political institutions

The nature and quality of political institutions can have important consequences for long-term economic performance. Although it is clear from historical experience that political representative democracy in the sense of majoritarian decision making using regular free and fair elections is neither necessary nor sufficient for prosperity and growth, it is also true that most of the world's richest countries are electoral democracies. Other features of what has sometimes been called 'constitutional liberalism', especially the respect for universally acknowledged human rights, the rule of law and secure property rights, backed by an independent legal system and a widely shared perception of legitimacy, have been identified as defining characteristics of economically successful and prosperous societies, although during the early stages of fast accumulation of

capital and high growth, countries have been able to dispense with some of these (see Acemoglu and Robinson (2005) , North (2005) and North, Wallis and Weingast (2009)).

Political unrest and instability are inimical to economic growth. Autocratic regimes without institutionalised succession mechanisms are especially vulnerable to political instability when the incumbent leader reaches an advanced age and there is no successor in sight. North Korea, Tunisia, Zimbabwe, Libya and Egypt are examples of countries where ageing autocrats have tried or continue to try to groom an unqualified or unwilling relative (often a son) or confidant for the succession. Hereditary monarchies where the principle and practice of hereditary succession continue to be widely perceived as legitimate do not necessarily share the succession problems characteristic of personalized autocracies. The same holds for one-party states like China where, at any rate in the post-Mao era, the party is both stronger and longer-lived than any individual occupant of the great offices of state.

Another key determinant of economic performance is the existence of a well-trained, professional career civil service with an ethic of public service and a time horizon that extends beyond the expected life-span of the incumbent government. Technocratic competence is the key differentiating characteristic between technocratic autocracies, like Singapore and China, one the one hand and, on the other hand, autocracies where the state and the state bureaucracy are primarily dedicated to rent extraction in favour of the incumbent government and its supporters in the state bureaucracy (see Acemoglu, Robinson and Verdier (2004)).

An extremely useful data source on political regime characterisations, transitions and fragility is the Polity IV Project and the associated data bases.[19] This project codes the authority characteristics of states in the world system for comparative, quantitative analysis. The dataset covers all major, independent states in the global system (i.e., states with total population of 500,000 or more in the most recent year; currently 163 countries) over the period 1800-2009. One of its interesting outputs is an index of state fragility for 162 countries (in 2009).[20]

Another useful dataset on national political characteristics with potentially important economic implications is the Index of Economic Freedom published by the Heritage Foundation and the Wall Street Journal. Despite the obvious ideological agenda that motivates it, this index, or rather its ten constituent components, Business Freedom, Trade Freedom, Fiscal Freedom, Government Spending, Monetary Freedom, Investment Freedom, Financial Freedom, Property Rights, Freedom from Corruption and Labor Freedom, contain useful information of potential drivers of economic efficiency and growth. This remains true even if one does not agree with the premise of the producers of the index that higher public spending necessary harms freedom, let alone economic efficiency and growth. And if some public spending is efficiency and/or growth-promoting, then so is taxation, because one cannot have the first without a commensurate quantum of the second.

[19] http://www.systemicpeace.org/polity/polity4.htm .

[20] http://www.heritage.org/index/

7.4.4.3. Social institutions

Social capital, defined either as the network of connections between individual entities (persons or legal entities) in a society and other entities within that society or outside it, or as trust between unrelated individuals and/or between the citizen and the state is a key determinant of the quality of a country's economic and political institutions (see Putnam (2006) and Dasgupta (2008)). Trust and networks can facilitate collective action and mitigate the incidence and impact of free riding by beneficiaries of public goods. The development, variety and depth of civil society – the universe of modes of association, organisation and cooperation between the individual and the (nuclear) family on the one hand, and the state on the other hand – is an important determinant of economic efficiency and political stability. Civil society includes religious organisations, trade unions, professional associations, NGOs of every ilk and stripe, voluntary organisations, charitable organisations and many other voluntary and not-for-profit organisations. Just as globalisation has been defined to include the downside of open borders (including more frequent global pandemics, global financial contagion and the destruction of local cultures), civil society could, and perhaps should, be defined comprehensively to include destructive forces such as organised crime and terrorist organisations.

The strength and diversity of civil society affects a nation's ability to respond to adverse shocks and to challenges. Societies in which there is very little social fabric between the individual (or the nuclear family) and the state are apt to be less resilient in the face of unexpected developments and strains than societies with a more developed web of non-state organisations catering for, representing, and expressing, their members interests and opinions.

7.4.4.4 Policies

Policies are vitally important for economic performance at cyclical frequencies, but for secular growth performance, the quality of policy is largely a function of the quality of a nation's economic, political and social institutions. Obviously, macroeconomic stabilisation policy (monetary policy, exchange rate management and fiscal policy) can be mismanaged even by an operationally independent central bank with a clear price stability and financial stability mandate, and by a fiscal authority required to pursue sustainable fiscal-financial policies in a multi-year fiscal framework, supported by a professional, politically disinterested civil service and under the scrutiny of an independent Fiscal Responsibility Board. It just is not very likely.

Quite separate from issues of fiscal-financial sustainability, the level and composition of public spending and the structure of taxation (especially the structure of marginal tax and benefit rates) can be of great significance. It is discouraging that, for a given total fiscal revenue, some of the most advanced economies in the world (the US and the UK) have the most complex and distortionary personal and corporate tax systems (especially if the interaction of tax and benefit schedules on marginal incentives to work, save and invest are considered). The good news for countries at lower current levels of productivity is that it should not be difficult to do better than the leaders with regards to the incentive effects of the tax and benefit systems.

Policies towards capital controls can be used sensibly to discourage excessive, easily reversed, capital inflows, or they can be used to create a framework for domestic financial repression and the stuffing of domestic banks with unwanted domestic government debt at yields below fair-value.

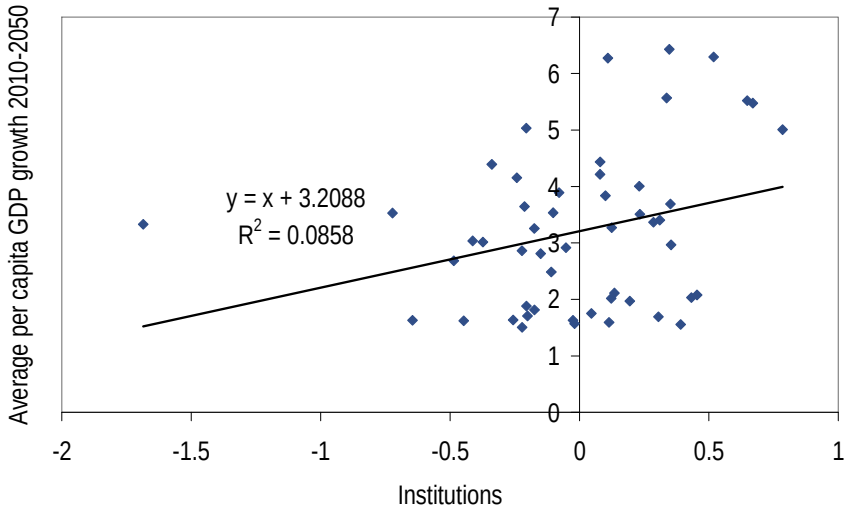
Policies toward intellectual property rights can be predatory or protective of such rights, especially when these rights are owned by foreign parties. National self-interest probably dictates that early in a nation's convergence sequence, when the distance from the technology frontier is vast, a rather cavalier attitude towards intellectual property rights owned by foreign entities makes sense. This is certainly the experience with the fast-converging countries of the post-World War II period. But when a sufficiently high level of domestic economic development has been achieved, domestic R&D results in a growing stock of national patents, and of other national intellectual property rights, including trademarks, copyright and brands. As a result national self-interest dictates a change in official attitudes and policies towards the more effective protection of intellectual property rights generally. Not all nations have made this switch at the right time, often for domestic political reasons.

Our discussion of institutions and policies implies that although a high quality of institutions tends to support faster growth, inefficient institutions and poorly designed policies (including inefficient financial institutions that cause the mis-pricing and misallocation of capital, impaired property rights and rule of law, rigid labour markets and monopolised non-traded sectors) harm growth less when the distance from the efficient frontier is very large.[21] As long as superior technology can be relatively freely 'imported' into a sufficient number of sectors, and as long as labour and capital are in highly elastic supply to these catch-up sectors, even serious microeconomic inefficiencies are dwarfed by the forces of catch-up growth driven by the technology gaps and factor accumulation. Policies and institutions matter a lot more when the distance from the efficient frontier becomes smaller. The quality of institutions and policies may even determine how close to the efficient frontier a nation eventually gets. With relatively inefficient institutions and policies, a follower country may never catch up with the leader. With superior institutions and policies, the follower could overtake the leader and become the new leader, as happened around 1900 with the USA and the UK.

To highlight the role of institutions in our forecasts, we turn to Figure 97. Figure 97 plots the average per capita GDP growth forecasts in our sample against a measure of institutions and policies of a country. This measure was constructed as a simple average of five indicators of institutional and policy quality, namely scores for 'Rule of Law' and 'Government Effectiveness' from the World Bank WDI database, the 'Ease of Doing Business' score from the World Bank's eponymous survey, 'Democracy' from the Polity IV dataset and the 'Global Competitiveness score' from the World Economic Forum. We then regress average per capita real GDP growth rates on all growth drivers, except institutions, in order to account for the effect of other factors on growth. Figure 97 indicates that the quality of institutions is positively related with average per capita GDP growth in our forecasts, as expected.

[21] This is also suggested by academic work by Parente and Prescott (1994, 2002) and by Kehoe and Prescott (2002, 2007) that extends the Solow-Swan framework to include a role for institutions and policies in economic growth.

Figure 97. Growth and Institutions



Note: Average per capita GDP growth is the residual of a regression of average growth rates in real GDP per capita in 2010 PPP USD on identified growth factors other than our measure of human capital (the gross primary school enrolment rate).

Source: World Bank WDI and Doing Business Survey, Polity IV dataset, World Economic Forum, Citi Investment Research and Analysis

Other potential growth drivers include:

i) Openness to trade, capital, migration and FDI

ii) history, geography, and culture

iii) financial endowments

iv) endowment of natural resources

v) the structure of production

7.4.5. Other potential drivers of growth

7.4.5.1. Openness to trade, capital mobility, migration, and FDI

Rapid catch-up requires technology transfer from the leaders to the laggards. This can occur through spontaneous diffusion, including in recent years the intensive use of internet search engines. It is boosted significantly by FDI. This requires not just at least some degree of openness of the financial account of the balance of payments, it also requires further openness: permitting the cross-border transfer of corporate control rights and at least some degree of cross-border mobility of persons - both managers and skilled workers. There is less agreement on whether or under what conditions trade openness promotes growth. Conventional 'Ricardian' trade theory shows that trade promotes economic welfare (given sufficient internal redistribution tools), not that it boosts output (GDP), let alone the growth rate of output. New trade theory emphasizing either conventional increasing returns to scale or the welfare- and productivity-enhancing effects of the greater product or input variety permitted by cross-border trade in the presence of increasing returns does point to sustained or even permanent growth-enhancing effects of greater trade openness (Romer (1986), Rivera-Batiz and Romer (1991), Backus, Kehoe and Kehoe (1992)).

Empirical studies have been inconclusive (Edwards (1998), Frankel and Romer (1999)). A problem in interpreting any empirical correlation between growth and openness is that openness is to a significant degree a political choice variable – it could have been discussed instead under category three of growth drivers: policy. It is therefore endogenous and may respond to some of the unobservable fundamental factors that also drive growth. Again correlation is unlikely to reflect (only) causation.

Regardless of these problems of interpretation, there are some fascinating data bases on different dimensions of globalisation. The KOF index of Globalisation, for instance, attempts to measure three key dimensions of globalisation: economic, social and political. In addition to three indices measuring these dimensions, KOF also constructs an overall index of globalization and five sub-indices referring to (1) actual economic flows (goods, services and capital), (2) economic restrictions (mainly on trade and capital transactions), (3), information flows, (4) personal contact and (5) cultural proximity. Annual data are available for 208 countries over the period 1970 – 2007, which covers the entire period of post-1980 integration of key emerging markets into the global economy.[22]

7.4.5.2. History, geography and culture.

History, geography and culture have also sometimes been proposed (and in some cases tested) as drivers of growth. None of these are choice variables for those currently alive. If you are a land-locked nation, your prosperity is to a large extent dependent on your neighbours. If you are Switzerland, this is not a problem. If you are the Kyrgyz Republic or Chad, it could be a problem. Countries with tropical climates were held back for a long time by infectious diseases affecting humans and cattle. Having a world language as your mother tongue can be a competitive advantage. A country with a large, educated and economically successful diaspora can benefit greatly from this legacy. Remittances, knowledge, expertise and contacts from the diaspora can benefit the mother country greatly. Israel, Armenia, China and India are examples.

History and culture have often been argued to have important influences on attitudes towards risk taking and on the degree of 'impatience' or 'time preference' that is a key determinant of private thrift and savings behaviour. Little solid empirical evidence exists on this matter, however. Some of the early work on cross-country growth regressions argued that such historical 'accidents' as the identity of the former colonial power (mainly British, French, Spanish, Dutch and Portuguese) had discernable effects on the post-independence growth performance of former colonies. Likewise, the nature of the legal system (common law good, statute law bad) has at times been proposed as a possible growth driver. We are not convinced by these studies. When it is not possible to put together a coherent story (or causal mechanism) to explain the statistical correlation, it is generally safe to assume that the correlation is not causal.

7.4.5.3. Endowments of natural resources

Whether renewable or non-renewable, these are pure examples of nature's bounty and should make a nation better off. Because of a number of political economy pathologies, nature's blessing has at times turned into a 'natural resource curse' (see Buiter, Esanov and Raiser (2006) and Robinson, Torvik and Verdier (2006)). Natural resources tend to be sources of 'easy rents' and effort. Intelligence and skills may be diverted towards rent appropriation rather than wealth creation. Notable exceptions are Norway and Botswana. The degree to which such destructive rent-seeking behaviour happens or not is in part a function of culture and institutions. There is a long list of countries that are rich in non-renewable natural resource yet have or have had low growth (especially if measured GDP is corrected for resource depletion), extremely high inequality and rampant corruption. Countries with significant renewable natural resources (agricultural land, cattle, fish and fresh water) tend to be less prone to fall victim of the natural resource curse.

[22] http://globalization.kof.ethz.ch/

Many rapidly growing economies, including China and India continue to charge prices for key resources, including water, electricity and other sources of power that are far below long-run social marginal cost and even far below long-run marginal private cost (excluding environmental externalities) (see OECD (2009) and Easter and Liu (2005), World Bank (2010)). In the case of prices charged to households, there is a second-best argument that, if cash grants to address poverty are not administratively feasible, the subsidization of certain key goods and services consumed by the poor is (constrained) efficient. This argument also supports the use of subsidies on the staple foods consumed by the poor as a poverty relief measure. There is no equity or efficiency-based case, however, to subsidise (charge a price below long-run marginal social cost) the use of water, power and other resources by the industrial and agricultural sectors – by far the largest consumers of power and water.[23] The over-use of both power and water this has encouraged is creating a major potential environmental problem in both India and China. Unless this issue is addressed as a matter of urgency, scarcity of clean, fresh water alone could become a binding constraint on growth in both India and China – and many other countries with large arid regions. Long-run social marginal cost prices of all key resources (or equivalent physical rationing schemes which would, however, be much less efficient in practice) is the only way to prevent further destruction of environmental capital.

7.4.5.4. Financial endowments

The initial financial balance sheets of government, financial sector, corporate sector and household sector can have an important impact on the short-run and medium-term performance of a national economy. A large external debt overhang can, for instance, act as a tax on domestic factor income, which may discourage domestic capital formation, enterprise and effort. It remains an open question whether the initial size and composition of the national financial balance sheet can influence growth significantly over a period of decades. We have not seen any evidence in favour of such a hypothesis.

7.4.5.5. The structure of production

The structure of production (the sectoral and industrial composition of production and employment) is not exogenous but predetermined, that is, given at a point in time, but endogenous in the medium and long run. A key feature of the economy determining both its current level of inefficiency in resource utilisation and it longer-run growth prospects is the size of the informal sector. The size of the informal sector is an increasing function of the burden of formal sector taxation and regulation, and a decreasing function of the capacity of the tax and regulatory authorities to pursue businesses and individuals trying to exist outside the formal sector. The benefits of belonging to the formal sector include access to the legal system (including the courts and other official law enforcement and arbitration agencies), access to formal sector credit sources and eligibility for formal sector benefits such as social security, health and disability. Differences in the susceptibility of economic agents in the formal and informal sectors to predation (extortion, corrupt demands for side-payments, etc.) by the public sector or by private criminals or criminal organisations is another determinant of informality.

[23] Agriculture accounts for 70 percent of all water use globally, up to 95 percent in several developing countries (see UN (2006)).

For obvious reasons, informal sector businesses tend to be small. In manufacturing and even in many modern services, informal sector businesses are of below minimum optimal size. Low productivity tends to be the result. Expansion of the formal economy (sometimes through the formalisation of formerly informal activity, more often through the expansion of new formal sector activities in manufacturing and modern services) therefore permits a potentially major improvement in economic efficiency and productivity, as labour and capital move from the low productivity informal sectors to the high productivity formal modern sectors. Bosworth, Collins and Virmani (2007) and Bosworth and Collins (2008) show the importance of intersectoral reallocation of labour resources as an economy-wide source of productivity growth for India and for India compared to China, respectively.

8. The Global Growth Generators

The Global Growth Generators: Bangladesh, China, Egypt, India, Indonesia, Iraq, Mongolia, Nigeria, Philippines, Sri Lanka, and Vietnam are our 3G countries.

The 3G index combines measures of saving/investment, education, health, institutions, and openness.

In the previous section, we presented our growth forecasts for 2010 to 2050, and discussed the main drivers of growth. In this section, we consider a few countries that stand out in terms of their growth potential over the next four decades. As part of that effort, we construct the 3G Index, which is a weighted average of six growth drivers that we and the literature surveyed in earlier sections consider important. The six components of the index are (1) a measure of domestic saving/ investment, (2) a measure of demographic prospects, (3) a measure of health, (4) a measure of education, (5) a measure of the quality of institutions and policies, and (6) a measure of trade openness.[24] In our view, the countries that are most promising in terms of their growth potential are Bangladesh, China, Egypt, India, Indonesia, Iraq, Mongolia, Nigeria, Philippines, Sri Lanka, and Vietnam.

[24] The saving/investment variable is constructed by taking an unweighted average of 2006 – 2009 averages of gross national savings and gross fixed capital formation, as a percentage of GDP, obtained from the World Bank World Development Indicators (WDI). Demographic prospects are considered in terms of the average annual change in the working age (15 – 64 year) population between 2010 and 2050, obtained from the UN Population Statistics. (Poor) health is measured by the inverse of life expectancy at birth, while education is proxied by the primary school gross enrolment rate, both from the World Bank WDI. Our measure for the quality of institutions is calculated as a simple average of five indicators of institutional and policy quality, namely scores for 'Rule of Law' and 'Government Effectiveness' from the World Bank WDI database, the 'Ease of Doing Business' score from the World Bank's eponymous survey, 'Democracy' from the Polity IV dataset and the 'Global Competitiveness score' by the World Economic Forum. Openness is computed as the sum of exports and imports divided by GDP, controlling for population size and landmass. All variables were normalised to have a zero mean and a standard deviation of one. The final score is arrived at by attributing a weight of 0.5 to the initial income variable, with the remaining weight of one half distributed evenly across the other five indicators.

8.1. The 3G: start poor and young, open up, adopt a market economy, don't be unlucky and don't blow it

Figure 98. 3G countries

Country	2010 GDP per capita	% of US GDP per capita	Average growth 2010 - 2050	3G Index Score
Bangladesh	1735	4	6.3	0.39
China	7430	16	5.0	0.81
Egypt	5878	13	5.0	0.37
India	3298	7	6.4	0.71
Indonesia	4363	10	5.6	0.70
Iraq	3538	8	6.1	0.58
Mongolia	3764	8	6.3	0.63
Nigeria	2335	5	6.9	0.25
Philippines	3684	8	5.5	0.60
Sri Lanka	4988	11	5.5	0.33
Vietnam	3108	7	6.4	0.86

Note: GDP per capita measured at 2010 PPP USD. Average growth is average growth in our forecasts of real GDP per capita measured at 2010 PPP USD. See the main text for a description of the 3G Index.

Source: Citi Investment Research and Analysis

8.1.1. Bangladesh

A low starting point and favourable demographics should make it easy for Bangladesh to grow fast – the main warning is 'don't blow it'.

The main reason behind Bangladesh's high predicted growth rate of real per capita GDP (6.3 percent pa over the period 2010-2050) is that this forecast incorporates some key features/admonitions critical to sustained rapid growth: "start poor, start young, open up, adopt a market economy, don't be unlucky and don't blow it". The last two of these follow almost by default, as predicting bad luck or exogenous disasters is beyond our ken, and there are few countries in our sample for which we would have a major policy disaster as the central projection. As regards per capita income in 2010, Bangladesh ranked 58th, that is last of the countries for which we make forecasts, with per capita income of $1736 dollars (in PPP terms) in 2010, equivalent to just 4% of the level in the US, and even less at market exchange rates. It is also young and expected to remain so, with the working age population increasing from 93mn in 2010 (or 55 percent of the total population) to 136mn in 2050 (59 percent of the population).

Although the country scores poorly on most indices of institutional quality, it has achieved a greater measure of political stability recently. On our 3G Index, Bangladesh scores respectably with a score of 0.39, a score which is dragged down by the poor score for the institutional variables – which, as we noted above, should count relatively less at the current low level of development of Bangladesh.

For Bangladesh to realise its potential, a much greater emphasis on education will be required, as well as a gradual improvement in the quality of its economic institutions and in economic governance. If the predictions of global warming materialise and sea levels rise significantly, Bangladesh will be one of the most affected nations. In the worst case scenario there could be either large-scale population displacement or a need for massive infrastructure investment in sea and flood defences. Both responses would divert scarce resources from growth promoting activities. This would violate the 'don't be unlucky' rule. Other than natural disasters, the main forms of potential bad luck would be a pandemic or an uninvited war, no strangers to the greater region Bangladesh finds itself in, unfortunately.

At the very early stages of convergence, where Bangladesh currently is, remarkable growth can be achieved and sustained for decades despite rather poor institutions and policies. It is, however, possible, to degrade institutions and policies to the point that growth is depressed severely. Despite near unlimited supplies of labour in the economy, the formal labour market can be over-regulated to the point that the formal sector becomes internationally uncompetitive. Informal economic activity which cannot exploit economies of scale and thus is condemned to low productivity will take its place. Political instability can deter investment and depress growth. A bureaucracy that is too far to the kleptocratic end of the 'kleptocratic – technocratic continuum', can paralyse enterprise (see Acemoglu, Robinson and Verdier (2004) and Acemoglu and Robinson (2005)). Unsustainable fiscal deficits will, if they are not corrected, lead to sovereign default or hyperinflation. Institutional weakness and policy errors of this magnitude would violate our 'don't blow it' admonition, but they would not be part of our central scenario for Bangladesh.

8.1.2. China

China is among the 3G – but its highest growth rates are probably behind it.

For China we predict an average growth rate of 5.0 percent pa for real per capita GDP over the period 2010 – 2050, lower than in the recent past, but still highly respectable - even more so after two decades of largely uninterrupted near double-digit increases. China's real per capita GDP ranking in 2010 is 45th, at US$7,430. This is quite far above the poorest countries now, but even more distant still from the rich industrial nations. A lot of convergence therefore remains to be done.

China's demographics are much less favourable than those of the other fast growing nations. Its population is expected to grow from 1,354 million in 2010 to (just) 1,417 million in 2050, after peaking at 1,463 million around 2033. The absolute size of the working age population is expected to peak in the next few years, in part because of the one-child policy. In 2011 the total fertility rate is forecast at just 1.5 and net immigration is projected to be negative but very low for the foreseeable future.

There still are around 350 million Chinese residents of rural areas who could move from low-productivity rural pursuits to higher productivity urban activities, but it is likely that those still in rural areas are less productive (even controlling for age) than those who left for the towns earlier. In addition, the current generation of young Chinese rural workers is unlikely to move to the urban manufacturing sectors on the same terms their parents did. Clearly, the birth rate is likely to recover from the one-child norm. If it did not, China's 1.3 billion population would (absent immigration) halve every generation and be no more than 80 million one hundred years from now, which is clearly counterfactual. But there can be little doubt that China will be old before it is rich.

One of the most astonishing achievements of China has been the effectiveness of its primary and secondary education. The OECD's PISA reports, comparing high school performance for 34 countries as regards literacy, mathematics and other cognitive skills, this year had Shanghai's schools (admittedly not an unbiased sample of China) in first place, with the US and most large advanced European countries bringing up the rear. China should, through the high quality of its human capital, be able to compensate for the imminent decline in the size of the working age population, although this is likely to require a rapid shift out of many of the traditional labour-intensive industries that constituted China's comparative advantage over these past 3 decades.

With China at the end of its 'economic growth with unlimited supplies of labour' phase, and with a likely material reduction in its gross fixed investment rate, the growth rate of its potential output is unlikely to be much above 8 percent per annum now, declining gently but steadily from there on. Our growth numbers for China are still large by the standards of any country during any period except for China in the past decade. They are conditional on marked improvements in economic institutions, governance and policy making and the avoidance of environmental bottlenecks through the appropriate pricing of water, power and other resources.

8.1.3. Egypt

We expect growth of 5.0% pa in Egypt's real GDP per capita over the next forty years – but political changes need to be followed by economic reforms and improvements in education.

For Egypt, we expect a steadily rising growth rate for the next 40 years, averaging 5.0 percent pa between 2010 and 2050. Egypt ranked 48th in 2010 as regards real per capita GDP with US$5,878.

Its population is expected to increase from 84.4 million in 2010 to 129.5 million in 2050 and the population of working age is expected to grow over the same period by 60.8 percent. Provided that productive employment opportunities can be found for the rapidly growing working age population, demographics should be a big plus. But the recent uprisings had at least as much to do with frustration about the lack of employment, underemployment, poor prospects and high income inequality as they had with the desire for more political freedom and proper representation.

The country has long suffered from weak economic institutions and poor policies. The personalized autocracy was supported by a large bureaucracy that was located at the wrong end of the 'kleptocratic – technocratic continuum'. Only during the final years of the Mubarak presidency was there some improvement in the policy environment. A number of economic liberalisation measures were adopted and growth picked up, but not enough to provide the jobs demanded by a growing population of working age. Unemployment, in particular youth unemployment remains very high. Another indicator of underperformance is the fact that Egypt is one of the few countries where urbanisation has stagnated for the past couple of decades around the 44 percent mark. Because of the very fast population growth, this stagnant urbanization rate is quite consistent with the fast growth in the absolute size of the main cities, especially Cairo, and rapid slum formation.

Although the labour force is slightly better educated than that in many other places in Africa, the educational system is not catching up fast enough with the requirements of modern day employers.

It is clear that the challenges faced by Egypt to become a card-carrying member of the 3G club are daunting. The political revolution that swept aside the Mubarak regime in February 2011 gives grounds for hope, but has not by itself solved the challenge of finding employment for the rapidly rising population. In our view, after the political transformation that is to be expected, will be the right time for far-reaching reform in the economic sphere as well. We are therefore optimistic about the prospects for Egypt.

8.1.4. India

Improvements in infrastructure, deregulation and better education could allow India to grow at China-like rates for decades.

We expect India's real per capita GDP to grow at 6.4% pa over the 40-year period between 2010 and 2050 (7.2% pa over the next 10 years and at rates of 7.7% pa between 2020 and 2030 and 5.2% pa between 2030 and 2050). As a result, we expect India to become the largest economy in the world by 2050, overtaking China and the US in the process.

India starts way below the frontier: it ranks 54th in real per capita GDP, at US$3298 in 2010. It truly is an EM as regards the sectoral composition of its production and labour force, which are overwhelmingly rural. Its demographic evolution is at least 35 years behind that of China with a high (but falling) birth rate and a large and growing population of young workers: India's population of working age is expected to grow by 40.7 percent between 2010 and 2050. India's assets are many: It has successfully raised its aggregate savings rate to levels that would allow sustained high levels of domestic capital formation (the domestic saving rate averaged 34.4 percent over 2006-2009 and the gross domestic investment rate 32.4 percent). Its education system, while not without weaknesses, produces a large pool of cheap, internationally competitive, English-speaking graduates, allowing India to build up a comparative advantage in certain sectors, such as IT or business processes.

This 'demographic dividend' can, of course, become an economic curse if the young are not educated and trained properly and if the domestic capital formation rate is not high enough to create an adequate supply of productive jobs. For India to meet that challenge, a number of major changes will have to occur in a relative short period of time. First, India's infrastructure has to be improved across the board. Second, India has to move from a position of educating a limited number of youngsters very well but not the majority (especially females in rural areas and the lower castes almost everywhere) to one of educating all its youth properly. Third, India needs to relax its hostile attitude towards FDI, if it is to reap the benefits of rapid cross-border technology transfer that China has benefited from so greatly. Finally, a further round of serious deregulation of the domestic economy and further trade liberalisation are required. Pricing water, energy and other resources at full marginal social long-run cost, at least for all producers – especially, in the case of water, those in the agricultural sector - or equivalent measures to ration the use of these essential scarce resources will be necessary to avoid an environmental block on economic growth. Given these changes, India's growth rate during the next 20 or 30 years could be as high as those of China this past decade, and these prospects are reflected in India's 3G score of 0.71.

8.1.5. Indonesia

Favourable demographics, abundant resources and low initial income should allow Indonesia to grow at high rates – but more investment and better economic governance are needed.

Indonesia's predicted growth rate of per capita income from 2010 to 2050 is 5.6% pa. It currently ranks 50th in real per capita income, with a 2010 real per capita income level of US$4,362, so there is plenty of potential for catch-up and convergence. Indonesia's large population (233 million in 2010) is predicted to rise to 288 million in 2050. Its population of working age is expected to increase by 17.9 percent over the same period. Thus, demographics are a factor that should be working in Indonesia's favour to achieve China-like growth rates over the next 40 years.

For catch-up growth to get a major boost, Indonesia's rate of capital formation needs to increase. Despite the attractiveness of a large, cheap and growing labour pool, capital formation is not proceeding fast enough to take advantage, and poor infrastructure is acting as a major drag on competitiveness. Indonesia's investment rate averaged 27 percent over the period 2006-2009. To emulate India's, let alone China's past growth rates, this investment rate will probably have to rise to the mid-thirties at least. Questions surrounding land acquisition, corruption and the difficulty of raising financing are hurdles that need to be overcome to raise investment to growth-boosting levels. Because the country is unlikely to manage an increase in the current account deficit of at least 8 percent of GDP, the domestic saving rate will have to rise significantly. This will be a major challenge, but not an impossible one.

Indonesia ranks high on the 3G Index, with a score of 0.72 for the Index excluding government consumption. But Indonesia has a number of hurdles to climb. Public consumption expenditure is relatively high and is unlikely to consist mainly of growth-supporting or poverty-alleviating expenditures, with total public health expenditure under 2 percent of GDP in 2008 and education just 3.5 percent of GDP.[25] Spending on subsidies and administration accounted for almost 40 percent of total expenditures in 2008. Subsidies (mainly for energy) consumed roughly 24 percent of the budget.

Extractive industries have accounted for much of Indonesia's growth in recent years and are likely to remain significant contributors to growth during the coming decades. More investment is needed in these sectors, too. The natural resource curse will be hard to avoid, given the institutional weaknesses of the country. In the near term, the political transition that results from the fact that President Susilo Bambang Yudhoyono cannot run again in the presidential election in 2014 needs to be watched carefully, though Indonesia's recent experience with democracy and political transitions makes us cautiously optimistic. The road to sustained high growth is there, but it is a narrow one.

8.1.6. Iraq

Successive wars have taken a huge human and economic toll in Iraq – but a modicum of political stability should allow rapid catch-up growth.

For Iraq we forecast 6.1 percent real per capita GDP growth from 2010 to 2050. The country starts from 53rd place in the real per capita GDP rankings, with $3,538. The population dynamics are eye-watering. According to the UN Population Statistics, Iraq's population is expected to grow from 31.5 million in 2010 to 64.0 million in 2050. Over that period its population of working age is expected to grow a huge 143.4 percent. This represents both a challenge and an opportunity. Without continued emphasis on education and without radical deregulation of its product markets and labour market, the job growth required to prevent the demographic dividend from turning into a demographic curse may not be forthcoming.

One reason we are optimistic about Iraq's prospects is that its low initial productivity levels are in part the result of a series of wars and civil conflicts over the past 30 years that are unlikely to be repeated during the next 40 years. Compared to where the country would have been under the continuing personalized autocratic rule under Saddam Hussein and the kleptocratic Baathist bureaucracy, but without the external and internal armed conflicts of the past three decades, the 'reconstruction gap' is likely to be significant. Post-war reconstruction can occur very rapidly, as the experience of post-World War II continental Europe makes clear, as long as there is political stability, openness to trade and no acute scarcity of foreign exchange. If an enduring political compromise can establish peace and even a measure of trust between

[25] Source: World Bank.

the Shia, Kurdish and Sunni communities, a reconstruction dividend-cum-peace dividend would reinforce the normal catch-up and convergence dynamics.

If the vast oil and gas resources of the country can be exploited sensibly, resources for infrastructure investment, human capital formation and wider reconstruction efforts ought to be amply available.

8.1.7. Mongolia

For Mongolia, the focus needs to be on avoiding the 'resource curse'.

For Mongolia we project an annual average growth rate of per capita GDP over the period 2010-2050 of 6.3 percent, putting it in 4th place. Its 2010 level of real per capita income is low, at US$3,764, putting it in 51st place. Its population is small, young and growing, from 2.7 million in 2010 to a projected 3.5 million in 2050, and its population of working age is expected to grow by 18.7 percent over the same period.

Mongolia's current saving and investment rates put it right on the track where a 3G country should be. Over the period 2006-2009 it achieved an investment rate of 38.5 percent and a domestic saving rate of 39.1 percent, which is quite remarkable. Favourable demographics, the low starting point for per capita income and the high rates of saving and investment help Mongolia achieve a high 3G index score of 0.63, among the highest in our sample. The country performs weakly on institutions, human capital and life expectancy.

Mongolia's economy is overwhelmingly based on resource extraction. It is therefore a prime candidate for the natural resource curse. Unlike most of the other Central Asian countries, however, Mongolia has thus far avoided the lure of personalized autocracy or strong-man rule and the bureaucracy, although weak, is some distance from the kleptocratic end of the 'kleptocratic-technocratic continuum'. The skill set that has permitted this small country to survive as an independent nation state despite being wedged firmly between two mega-states may also serve it well in the global economy.

8.1.8. Nigeria

A poster child for the resource curse in the past, our view is that 'this time it could be different'.

Nigeria has been a classic example of the natural resource curse at work in the past, but is beginning to show signs of being able to solve the political economy problem of managing the exploitation of natural resource wealth. At 6.9% pa between 2010 and 2050, we expect average real per capita growth in Nigeria to be the highest among the countries in our sample. It is blessed with natural resources, both renewable and non-renewable, even though those blessings have often turned to curses in the past. The policy environment and economic management have improved in recent years. There have been three civilian leaders, and all of the transitions have taken place without major political unrest. On the economic side, oil revenues are managed more prudently, with the existence of the excess crude account and the establishment of a sovereign wealth fund. There has been a movement to liberalise the capital account, although, in the current environment of increased capital controls throughout the emerging world, we cannot fault Nigeria for not being too forceful in this dimension.

A nascent private sector is making strides, creating a number of regional champions, some of which, including banks and airlines, are now expanding into other regions of Africa. The challenging operating environment for private businesses may serve its private sector well in time, as it expands into the near abroad; many countries in Nigeria's vicinity and in the rest of Africa will be beset with similar challenges, while Nigeria's population and large market size may have provided the necessary scale for some firms and sectors to prosper where companies in smaller markets/countries could not. A largely untapped resource

lies in the potential for Nigeria to ramp up agricultural production – all the more promising in an era of structurally high and rising food prices. But to realise this potential, little short of a 'green revolution' would be needed in order to develop seeds, improve irrigation and market access for farmers.

Besides improvements in the policy environment, encouraging developments in private sector activity and the commodities boom, Nigeria's prospects are boosted by our two usual suspects: it is young, and it is poor. Per capita real GDP in 2010 was but 4% of the level in the US. The population stood at 158 million people in 2010 and is expected to rise to 289 million in 2050 by the United Nations.

Nigeria has many challenges to grapple with. It's 3G score is a semi-respectable 0.25, but is much reduced by low levels of human capital. The educational system that had historically been much admired, at least within Africa, has deteriorated substantially, to the extent that investment to improve education at all levels is sorely needed, as are improvements in healthcare. Life expectancy is far too low, and dragged down by a combination of poor nutrition and healthcare, and disease.

The quality of many state institutions remains poor, despite recent improvements, but Nigeria should have plenty of room to grow before these constraints bind. The situation in the Niger delta is still fragile, and may ultimately only be solved by successful development of the area. Resource extraction in the area has had enormous environmental costs, a cost that has been amplified by the actions of local insurgents. Despite the environmental damage, living standards in the Niger delta are still substantially higher than in the largely agricultural north of the country.

So Nigeria will have its hands full to realise its growth potential. In the near term, its challenges pale in the face of the opportunities. If Nigeria's elites do not focus on fighting over the large rents that result from its resource abundance, as regrettably had been the case a number of times in the past, though not so much the very recent past, but instead use the natural resource rents to enhance human capital and infrastructure and to encourage private sector enterprise and employment, the low-hanging fruits of growth are likely to be gathered. In the medium term, the challenges are more formidable. Like most of the rest of Africa, Nigeria lacks a proper middle class and efficient state institutions. But those are problems of middle income countries and for now there is clear daylight between the middle income countries and Nigeria.

8.1.9. Philippines

Investment needs to rise substantially and economic governance needs to improve if the Philippines is to realise its substantial growth potential.

We project 5.5 percent annual per capita GDP growth for the Philippines between 2010 and 2050. At US$3,684 or 8.3% of the US level, the Philippines's level of real GDP per capita puts it in 52nd place in our sample.

Its population is projected to grow from 93.6 million in 2010 to 146.2 million in 2050. Its population of working age is projected to grow by 66.2 percent over that period. Their reported investment rate is low, at 14.5 percent of GDP for the period 2006-2009 almost unbelievably so. Even if the data understate the true investment rate, there can be little doubt that the investment rate will have to be raised substantially if the projected growth rates are to materialize.

The Philippines score quite well on the 3G index, with a value of 0.60. Investment in education and health should help it improve its score and its growth prospects, while institutional quality, which also pulled down its 3G index score, should be raised next.

Unlike Indonesia, which is often mentioned as one of the potential new tiger economies, the Philippines barely get a mention. This seems strange. After all, in terms of governance, institutional quality and human capital there is not much to choose between the two, and unlike Indonesia, the Philippines already manage a respectable growth rate without the access to easy (measured) growth provided by oil, natural gas and other non-renewable resource extraction. With the Philippines safe from the natural resource curse, its prospects for improving institutional capacity would seem to be at least as good as those in Indonesia.

The Philippines also has a widely dispersed 'diaspora' sending home remittances and establishing personal, professional and commercial contacts, links and networks that will benefit the country in the future.

Material governance and institutional reform are necessary for the Philippines to join the Asian Tigers, including a movement of the state bureaucracies into the right direction on the 'kleptocratic – technocratic continuum'. But such reforms have been shown to be feasible in other countries starting from no more favourable conditions. We are hopeful that the Philippines will track our forecast.

8.1.10. Sri Lanka

We expect improvements in governance and openness to follow the end of armed conflict with the Tamil Tigers – and help make Sri Lanka an Asian Tiger.

We expect an annual growth rate of real per capita GDP for Sri Lanka between 2010 and 2050 of 5.5 percent. With a real per capita GDP of US$4,988 in 2010 or 11% of US GDP per capita, Sri Lanka ranks 49th .out of 58 countries in our sample.

Sri Lanka's population is young but not growing fast any longer. From a 20.4 million size in 2010, Sri Lanka's population is projected to peak at 22.2 million in 2035, declining thereafter to 21.7 million in 2050. At 24.7 percent of GDP during the period 2006-2009, its gross investment rate will have to rise to achieve the growth rates we project. So will the domestic saving rate, which averaged 22.1 percent of GDP during 2006-2009.

Our projections assume that there will be improvements in governance and economic openness in the country, which does not score well in these dimensions of the 3G Index – at an overall value of 0.33, Sri Lanka's score in our 3G index is weaker than that of most of the other 3G countries. Sri Lanka's 3G index score and growth prospects would be boosted by an increased public investment in health and education.

One reason for expecting more rapid growth in Sri Lanka over the coming decades is that this country too, is a post-conflict economy. The civil war with the Tamil Tigers has been won by the authorities, and if they succeed in winning the peace as well, there could be a lasting peace dividend.

8.1.11. Vietnam

Excessive regulation and inefficient investment have held back Vietnam, but this could easily be improved to raise Vietnam's growth rate substantially.

Vietnam's expected growth rate of real per capita GDP between 2010 and 2050 is 6.4 percent, according to our projections. This growth is expected to come from a very low base - Vietnam starts from the 55th position in our rankings in the real per capita GDP rankings with a 2010 figure of $3,108. Vietnam's demographics are favourable. Its population is expected to increase from 89 million in 2010 to 112 million in 2050. Its working age population is expected to grow until about 2035, when it is projected to be 17.4 percent larger than in 2010. Its investment rate, at 35 percent of GDP during the years 2006-2009, should be high enough to sustain significant growth, though the poor quality of

its infrastructure and the requirements for further investment in many sectors, including the resource sectors and services, suggest that capital has not been allocated efficiently in the past.

Although Vietnam scores well on the 3G index, with a score of 0.86, its institutional quality is low and its macroeconomic policies, including its exchange rate management, have been erratic at best and poor most of the time. Sizable external imbalances, a rising level of public debt and rather inward-looking, unrepresentative and unresponsive one-party rule impart a certain fragility in Vietnam's outlook. In our view, many of the challenges can be overcome relatively easily. Feasible improvements in institutional quality and in the efficiency of the capital accumulation process should make our projected growth rates achievable.

8.2. What about the other BRICs?

8.2.1. Brazil

Brazil is not 3G – its domestic investment and saving rate are too low, its share of manufacturing is high already and its demographics are fairly neutral.

Brazil, with a 2011 population of 203.4 million, has traditional advanced EM demographics. Its birth rate is falling, but still above the replacement level (the total fertility rate is 2.2 in 2011), and the share of working-age population in total population is high, but even in 1980, the share of its industrial sector in GDP was much higher than that found today in the still overwhelmingly rural (as regards employment) Indian economy and also significantly larger than that of the Chinese economy. Brazil's public spending as a share of GDP is not too far below that of some of the West-European EU member states. It also spends a rather small share of GDP on gross fixed investment (just 17,3 percent of GDP during 2006-2009), as opposed to a gross fixed investment rate of just under 35 percent of GDP for India and between 45 and 50 percent of GDP for China. The extraordinarily high real interest rates faced by those without access to publicly subsidised borrowing rates (the central bank's official policy rate is 11.25 percent with inflation running at an annual rate of less than 6 percent) are symptomatic of an investment-unfriendly loose fiscal-tight monetary policy mix. Brazil's low fixed investment rate is also hostage to the country's low domestic saving rate (17.1 percent of GDP during 2006-2009).

Given Brazil's low investment rate, its ambiguous attitude towards FDI (and the rapid technology transfer it permits), its fairly modestly favourable demographics and the poor educational and training record of much of its population, Brazil's sustainable growth rate of real GDP per capita is estimated by us to be no more than 3.5 percent pa between 2010 and 2050. Its initial level of real per capita GDP, US$10,980 in 2010, puts it in 37th place.

The growth rate of productivity we forecast for Brazil is respectable, but does not amount to a LatAm Tiger rate. Unlike both India and China, Brazil has a significant soft commodity exporting sector and rapidly improving prospects of becoming a significant oil and gas producer and exporter, adding to its ethanol credentials. Brazil may be a 3G country for the future, if we can be reasonably confident that it can raise its domestic capital formation rate, improve the quality of its human resources and eliminate its domestic monopolies, but without these changes it risks becoming an Old BRIC.

8.2.2. Russia

Russia is not 3G – it is a mature industrial country with a vast natural resource endowment, held back by poor demographics and governance and by the 'natural resource curse'.

We predict 3.7 percent real per capita GDP growth pa for Russia between 2010 and 2050. It is ranked 28th in our sample as regards real per capita GDP in 2010, with US$15,701. Russia is expected to have a population of 138.7 in 2011, which is declining at an annual rate of 0.5 percent, due to a combination of a very low birth rate (a total fertility rate of 1.4) and an extremely low male life expectancy (for a country with its per capita income). Except for the low male life expectancy, these are the demographics we expect to find in the advanced economies of western Europe or Japan.

Russia's economy, capital stock and institutions, are unique because it is still lumbered with the legacy of 70 years of central planning and communism. These left it with a capital stock that remains ill-adjusted to the demands of a modern industrial or post-industrial economy and with deep problems of poor economic governance (except for rather well-managed fiscal and monetary policy) and a business climate that deters investment both by residents and foreigners. The result is the anomaly of a capital-scarce country with a low domestic saving rate that exports capital (through persistent current account surpluses) rather than importing it. The country's booming natural resource sector allows it to paper over the large cracks in its economic edifice. It is at risk of becoming a rentier country, not a dynamic modern industrial or service economy, capable of generating sustainable growth through productive investment and human capital formation.

One of the defining characteristics of an emerging market economy (EM) is that it is in the process of emerging from (or has emerged only recently from) a pre-industrial economy/society (dominated by the agricultural and traditional service sectors). It follows that Russia has not been an EM since the collectivisation of agriculture by Stalin in the 1930s. Without major institutional and structural reforms, it is unlikely to belong to what we shall characterise below as the Global Growth Generators – it is unlikely to become, a 3G country.

Nevertheless, alluding to a theme we have touched on several times in this essay: there is many a slip between high GDP growth or per capita GDP growth and high returns to private investment. In Russia since 1992, selective high returns to investment have been obtainable, and with the right kind of country-specific, sector-specific, industry-specific and firm-specific knowledge and expertise, selective high returns to investment will be obtainable in Russia in the future also.

Finally, even when growth is the result of the depletion of non-renewable natural resources, the depleting resource can support consumption for years, decades or generations, if the rents are invested wisely. The process of depleting exhaustible, non-renewable resources can also generate highly profitable investment opportunities. It is not 'growth' in the sense of sustainable growth, and it may not even be income-creating because the GDP measure ignores depreciation of the stock of natural resources, but it can support valuable economic activity and raise standards of living for a considerable period of time.

8.3. Not 3G, but good performers

A dozen countries that are not in the 3G universe but rack up respectable growth rates in our projections are listed in Figure 99. We only discuss three of them in what follows: Thailand, South Korea and Mexico.

Figure 99. Selected Countries – Not 3G, but good performers

Country	2010 GDP per capita	% of US GDP per capita	Average annual growth forecast 2010 - 2050	3G Index Score
Brazil	10980	24	3.5	0.41
Chile	14956	33	3.4	0.22
Colombia	9302	20	3.8	0.41
Kazakhstan	12121	27	4.2	0.24
Korea	29538	65	3.0	-0.29
Mexico	13689	30	3.0	0.27
Peru	9470	21	4.0	0.40
Russia	15701	34	3.7	-0.29
South Africa	10360	23	3.8	-0.05
Thailand	8638	19	4.4	0.33
Turkey	13063	29	3.5	0.05
Ukraine	6606	15	4.4	0.18

Note: GDP per capita measured at 2010 PPP USD. Average growth is average growth in our forecasts of real GDP per capita measured at 2010 PPP USD. See the main text for a description of the 3G Index.

Source: Citi Investment Research and Analysis

Thailand, South Korea, Mexico, Brazil, and a number of other countries are expected to experience robust growth in the next decades, but only major, and unlikely, reforms would make them 3G countries .

We predict an average annual growth rate for real per capita GDP for Thailand over the period 2010-2050 of 4.4 percent pa, putting it just outside the 11 3G countries in terms of real per capita GDP growth rates. The initial real per capita GDP level is $8,638, putting it in 44th place, the highest among the 3G countries, but at under 20% of US per capita GDP still with plenty of scope for catch-up growth.

The population is young but no longer growing fast. Starting from a population size of 68.1 million in 2010, the population is expected to peak in 2039 at 74.0 million and to decline to 73.4 million by 2050. The population of working age peaks between 2020 and 2025.

The 3G index score for Thailand is 0.33, with weak scores for human capital, institutions, life expectancy and demographics, highlight why we would see it as the marginal member of our 3G lot. In Thailand's favour is an investment rate of 26.6 percent of GDP for the years of 2006-2009, all of which was domestically financed, as the domestic savings rate over the same period equaled 30.2 percent.

We decided to exclude Thailand from our list of 3G countries partly because there is a clear discontinuity between its projected growth rate and the next lowest growth rate that was included, which was 5.01 percent for Egypt. Beyond that, there are long-standing unresolved political problems that, unless they are resolved soon and peacefully, reduce the likelihood of even the growth that we are projecting being realised.

South Korea is, demographically and as regards per capita income, a mature economy. Its population, at just under 49 million in 2011, has just about stopped growing – its current population growth rate is 0.2 percent per annum. With a total fertility rate of 1.2, and with what little migration there is mainly in the outward direction, its population is projected to start declining from 2023 on.[26] It has a bit of productivity convergence to look forward to, but its main challenge will be to avoid the economic fate of Japan since the late 1980s rather than to emulate China. A very decent investment rate for its level of income (the 2006 – 2009 average was 29% of GDP, wholly financed by domestic savings), and a generally high quality of domestic institutions lead us to project Korea to continue to be able to grow at very respectable rates – but not at the rates we expect our 3G countries to muster.

One event that could turn this conclusion upside down would be a peaceful re-unification of North Korea with South Korea, in which case the combination of extremely low initial productivity despite a highly skilled and educated labour force in North Korea with South Korea know-how and institutions could produce decades of high growth for both North and South. Note that this is not because of uniquely favourable demographics in North Korea. Its population (24.5 million in 2011) is growing at an annual rate of just 0.5 percent and its total fertility rate in 2011 is just 2.0. It is the extraordinarily low current labour productivity level and, it seems safe to assume, total factor productivity level that create the scope for spectacular catch-up growth once the economic and political regime there changes.

Mexico has at times been seen as a chronic economic underachiever, despite its favourable geography and demographics (a population size of 113.7 million and a total fertility rate of 2.3 in 2011), and despite an impressive series of economic reforms following the economic crisis of 1981-1985. The proximate causes of this disappointing growth are many. They include a low domestic capital formation rate (in the low 20s as a percentage of GDP), including inadequate spending on infrastructure, insufficient public spending on human capital formation, including pre-school, primary and secondary education and public health, intrusive regulation and poor contract enforcement. The financial sector is inefficient and there are pervasive monopolies in key domestic product and service markets (including oil, power, telecoms and internet-related services and transportation). The formal labour market is rigid and has strong unions. There is a large, low-productivity informal sector. The country also has the bad luck of a historical comparative advantage in manufacturing products that compete with China. Finally, we have seen in recent years, in the regions bordering the US, increasing drug-related weakening of the rule of law (see Hanson (2010) and Kehoe and Ruhl (2010)). All these problems are resolvable, however, and Mexico has the potential of being a Latin American success story surpassing even the growth performance of Brazil over the past decade.

The list of countries for which we expect robust per capita growth rates, but that would require major, and currently unlikely, policy changes and institutional reforms to allow them to grow at 3G-like rates goes beyond Thailand, South Korea and Mexico. In our view, that list would include Turkey, Colombia, Peru, Chile, South Africa, Kazakhstan, and Ukraine.

[26] U.S. Census Bureau, International Data Base (IDB)

8.4. Potential 3G?

Countries like Iran or North Korea could join the 3G club, once relatively simple, but fundamental and radical policy and institutional changes occur – but these may well require political transitions/transformations.

Finally, there is a category of countries that, should present economic policies and institutions endure, we see treading water as regards growth and prosperity, but for which there would seem to be a reasonable prospect that the political transformations required to replace dysfunctional policies and institutions with growth-enabling ones will actually occur in the not too distant future. In contrast to the countries discussed in the previous section, the potential 3G countries of this section are prevented from achieving 3G-like growth rates by dysfunctional economic systems whose existence depends on the survival of the dysfunctional political systems ruling these countries. And there are realistic prospects that the expected lifespan of these political regimes may be measured in years rather than decades. This category includes North Korea and Iran. Some might also add Argentina, Venezuela and Myanmar.

9. Some further caveats for research into future Global Growth Generators

9.1. Beware of compound growth rate delusions of order and tranquility

Growth will be volatile in the future, just as it has been in the past. In that respect, don't believe that 'this time it's different'

Growth, even if strong 'on average' in our 3Gs, will never be smooth. First, growth in decentralised market economies has always been cyclical, with alternating phases of overheating and recession, despite occasional proclamations of the end of volatility, or of boom and bust or the arrival of a (quasi-permanent) 'Great Moderation'. It will not be different this time. The faster the growth, the bigger the booms, the more spectacular the bubbles and the more devastating the busts. Examples abound. Booms and bubbles invariable occur where the fundamentals are strong. At some point, lenders and borrowers will succumb to the irrational euphoria that confuses good luck and favourable circumstances not of one's own making with genius or 'alpha'. It therefore seems likely that the next big financial boom, bubble and bust that will rock the global economy will originate in one or more of the most rapidly growing, successful economies we now to admire.

Predicting the nature and timing of bubbles and busts is notoriously difficult. But investors would do well to heed two lessons contained in the book 'This time it's different' by Carmen Reinhart and Ken Rogoff. The first one is that even though the timing of bubble bursts is difficult to predict, busts and crisis episodes do tend to share a number of characteristics. First among them is an excess of leverage and debt in the economy, be it in the private or the public sector. Other signs of euphoria or overheating, such as high levels and/or large increases of asset prices, wage and price inflation and current account deficits can often act as early warning indicators. Other factors, such as the denomination of debt in foreign currency, short maturity of outstanding debt or dependence of the public and/or private sector on revenue from a very small number of sources (as tends to be the case in some commodity-based economies) should also prompt caution.

The second relevant lesson in the book is to be wary of proclamations that 'this time it's different'. There are, occasionally, game-changers and we have written at length about why we believe that *average* growth in many of today's poor countries will be higher than in the past. But in most cases, belief that time-honoured laws and regularities no longer hold usually end with the realisation that those same laws and regularities are very much in operation after all, typically with severe, if temporary, consequences. When it comes to volatility,

structural declines in volatility plausibly have a self-correcting/defeating element: Belief that risk, be it idiosyncratic or systemic or both, has decreased, leads to increases in risk appetite which at least partly cancel out the decline in volatility, if they were ever real in the first place. The same mechanism could be observed when the wearing of seatbelts was made mandatory in a number of countries: driving speeds increased in response, leading, in some cases, to a rise, not fall, in the number of road accidents and fatalities. So investors in China, India, Brazil, Turkey or other fast-growing emerging markets would do well to keep both eyes on the road – and wear a seatbelt.

9.2. What else can go wrong?

Poor macroeconomic and microeconomic policies, conflict and natural disasters can derail growth efforts

Unfortunately, in economics, you can go down before you went up, and busts can come before booms. The experience of many African nations prior to 1990 is sad testimony to this fact. Paraphrasing Tolstoy, countries can become unhappy in their own ways. Among the main culprits are poor macroeconomic and microeconomic policies, conflict, and natural catastrophes.

Procyclical fiscal policy, erratic monetary and exchange rate policies and occasional bouts of overborrowing, preferably in foreign currency, had much to do with Latin America's poor growth performance in the 1990s. Experiments in socialism and communism have by and large failed spectacularly, but their slightly less disruptive cousins, excessive regulation and populism can also do much harm.

Repeated conflict, civil strife and civil wars, have afflicted many of today's poor countries, especially in Africa. Iraq has gone through four wars since 1980 (the Iran/Iraq war, the First and Second Gulf Wars, and the subsequent civil war). Afghanistan has more or less continuously been in a state of war since the Soviet invasion in 1979. Armed conflict imposes large human and economic costs, destroying human, physical, and social capital, and deterring investment.

The outbreak of armed conflict between nations is hard to predict. Domestic political and social instability, however, can be related to a certain number of factors. Among them is the degree of religious, ethnic, political and social fragmentation, the degree of income inequality and the extent of repression. High rates of unemployment, in particular among the young, may fuel discontent and ultimately violence. An endowment of natural resources in many cases has encouraged jockeying for position, fragmentation and adversarial relations between different parts of society.

Above, we noted that geography has been linked to growth by some researchers. Natural disasters tend to visit different parts of the world with different frequencies and severity. GeoHazards International ranked Kathmandu in Nepal as the world's most earthquake prone city, in a 2001 study, followed by Istanbul in Turkey, Delhi in India, Quito in Ecuador, Manila in the Philippines, and Islamabad/Rawalpindi in Pakistan. Climate change will have benign effects on some regions of the world, e.g. raising the potential for agriculture in Russia and Canada, but also likely increasing the incidence of extreme weather events, such as large hurricanes and tsunamis. The incidence of outbreaks of diseases and epidemics is also distributed unequally around the world, and is related to climate, the density of the population (human and animal, in some cases), and standards of hygiene and sanitation. But globalisation and the increased movement of goods and people across borders have increased the ability of germs and germ-carriers to travel, raising the overall burden of disease, but also distributing it potentially more equally.

9.3. Growth and investment returns

It is possible to have high economic growth without high returns to investment, and to have high returns to investment without high growth

High economic growth does not automatically equate to high returns to investment. It is possible to have high growth without high returns to investment and high returns to investment without high growth.

Across the world, the entry into the integrated global economy of China, India and a number of other poor countries with huge, often young populations has raised the share of capital income in GDP to unprecedented levels. The Chinese share of labour income in GDP is only just over 40 percent. In the West this is closer to 60 or 70 percent. This decline in labour's share was transmitted to the rest of the world, including Western Europe and North America, through trade, outsourcing through offshoring, through FDI, through other capital flows and through migration and labour mobility. Even in mature economies, moderate growth may therefore still support high rates of returns to investment.

Other reasons for a discrepancy between GDP growth performance and private investment returns come from a number of wedges between the social return to investment and the private return. In addition to externalities of all kinds, there are the following reasons why social and private investment returns may differ from each other:

i. Political risk (expropriation, administrative expropriation, predation, taxation, risk to repatriation of profits and capital).

ii. (related to (i)) Problems of getting capital *into* a country to take advantage of an extraordinary opportunity, or to take the profits out of the country again, once the capital has been sunk into a project.

iii. Ordinary economic risk. The business cycle affects different sectors and industries differentially; terms of trade shocks and other relative price shocks are endemic; technological change and other handmaidens of creative destruction destroy as well as create profits. After all, no-one invests in GDP producing projects.

What is more, returns to financial investments are determined in part by the behaviour of financial asset markets that are characterised by varying degrees of technical and informational efficiency. In particular, the extent to which financial asset markets are rationally forward-looking, myopically introspective, or driven by herding instincts and bandwagon behaviour varies over time. Financial investment decisions and the returns to financial investment are therefore, to varying degrees, forward-looking variables. Economic growth, although influenced by current and past financial investment decisions, is not forward-looking to anything like the same degree as financial investment. It therefore can behave very differently, and over extended intervals, from the returns to financial investment for that reason alone.

10. Conclusion: Two sets of propositions on how to generate sustained growth

When you are a poor nation with a young population, growing should be easy: 'open up and don't blow it'

The secret of achieving sustained high growth really is no secret at all. The fact that it is no secret does not mean, however, that it is easy to achieve. Something can be perfectly understood yet impossible to achieve.

Growth should be easy for those starting out far behind:

- Start poor – far below the frontier levels of labour productivity and total factor productivity, and with a low stock of capital per worker.
- Have a young population, that is, a large population of working age relative to the economically inactive population.
- Educate your workers and future workers, men and women, to the maximal extent.
- Let your best and brightest be educated abroad. They will come back if you provide a reason for them to come back.
- Create a professional, well-trained career civil service.
- Strive for institutions that support the orderly succession of supreme political power. Avoid personalised autocracies.
- Create a market economy and rely to the fullest possible extent on the profit motive for the provision of private (rival and excludable) goods and services.
- Invite in FDI to the fullest extent. The technology, know-how and expertise it brings in are far more important than the equity funding these are bundled with.
- Invite in foreign businesses, entrepreneurs, managers and workers and open up to the global treasure chest of ideas.
- Make sure you can achieve economies of scale, either by having a large domestic market or by opening up fully to world trade. Global export markets will allow you to exploit any economies of scale for traded goods and services. Competition from foreign imports and FDI will keep domestic producers in both traded and non-traded sectors on their toes.
- Focus limited public spending on infrastructure, health, pre-school, primary and secondary education and vocational training and poverty relief.
- Achieve high domestic investment rates and fund domestic capital formation mainly through domestic saving. Funding domestic capital formation with foreign saving/current account deficits always brings additional risks with it.
- Liberalise the capital account slowly and deliberately, making sure the domestic banking sector and financial system can cope with the stresses and strains brought by financial openness.

When closer to the frontier, the quality of institutions matters more.

For those who have already achieved a fair degree of convergence or are close to or at the frontier, additional growth will be harder to achieve

- Now the quality of institutions and policies becomes increasingly important.
- Give the rule of law a try – put the government under the law and establish an independent judiciary
- Try to achieve an assignment of property rights that is both clear and viewed as legitimate, and enforce property rights impartially.
- Remember that the way to minimise corruption is (a) to limit bureaucratic discretion (the source of corruption rents), (b) to maximise transparency and openness in government and (c) to encourage an open society, through diverse and critical media and a thriving civil society (to maximise the risk of exposure).
- Make sure domestic financial market development and international financial integration do not get ahead of your supervisory and regulatory capacities.
- Try to make sure that domestic savers have choices other than bank deposits and residential real estate. Consider the early liberalisation of portfolio investment abroad for this reason.
- Encourage competition. Avoid man-made obstacles to entry and exit in labour markets and product markets, wherever possible. Avoid unnatural monopolies.
- Regulate natural monopolies through transparent, accountable mechanisms.

Policymakers in many developing nations have started to heed those lessons – we are therefore optimistic about the world's growth prospects.

The good news is that many of the lessons above are now heeded by policymakers in a larger part of the world. As a result, we are fairly optimistic about the growth prospects of the world economy, expecting it to grow at average rates that were more common in the 1950s and 1960s when developing countries grew strongly and many advanced economies recovered from the second World War and (re)industrialised. Our forecast of 4.6% pa between 2010 and 2030 and 3.8% pa between 2030 and 2050, taking the world economy from a size of 72 trillion 2010 PPP US dollars to 180 trillion 2010 PPP US dollars in 2030 and 380 trillion in 2050 is, we believe, eminently achievable.

The most promising countries are composed of the young and the poor - Nigeria, India, Vietnam, Mongolia, Bangladesh, Iraq, Indonesia, Sri Lanka, the Philippines, China and Egypt are our '3G countries'.

Nigeria, India, Vietnam, Mongolia, Bangladesh, Iraq, Indonesia, Sri Lanka, the Philippines, China and Egypt have the most promising growth prospects, in our view. Growth will therefore mainly be driven by countries that fall under the aegis of the first set of recommendations above – poor countries with young populations. Some of them (Nigeria, Mongolia, Iraq and Indonesia) are lucky too, in principle, by being blessed with large natural resource endowments. We noted, however, that the natural resource blessing has often turned out to be a mixed one in the past, and has on occasion turned into a curse. Iraq is recovering from numerous wars. All but China have favourable demographics. All are poor today and should have decades or even generations of catch-up growth ahead of them.

A number of countries, including Mexico, Brazil and Turkey, would need to implement major adjustments, including raising domestic saving and investment rates substantially, to join the list of 3G countries. Other countries, including Iran and North Korea, could find it easier, once they achieve the political transitions or transformations required to release their economies (and societies) from their decades-long straitjackets.

Growth will not be smooth. Boom and bust cycles have been a constant companion of growth and development in virtually all economies. It will not be different this time, so beware of any proclamations of an end of volatility and the 'next sure thing'. Prospects for many poor nations today are more promising than probably at any time in human history and we expect many countries to grow fast and catch up substantially, but 'growth disasters' induced by poor policies, internal conflict or bad luck are sadly not unlikely.

Growth generators need not be countries, but include regions, cities, asset classes, commodities, products and activities – we intend to investigate all of them.

Countries are not the only, and may not be the best lens through which to examine growth opportunities.

Regions could be important growth generators. Areas such as the Aachen-Liege-Maastricht region straddling the borders of Belgium, Germany and the Netherlands, or the US-Mexican border region, are regions that cross national boundaries, yet form an integrated economic ecosystem. Urbanisation has long been recognized as one of the channels through which countries develop, and the world's 20 or 50 largest cities would be an auspicious universe to focus on in the search for global growth generators.

Global growth generators could be asset classes, or commodities – some of which may not yet be traded on financial markets, or much across borders at all. Water may be an example – we expect to see it develop first as a globally traded commodity (like oil and LPG) and eventually as an asset class. Finally, products, processes or activities can and should also be examined as part of the quest to identify global growth generators. Demographic change, including the rapid ageing of populations in many advanced and some emerging economies, and climate change are examples of fundamental processes that will shape and condition research and investigations across a vast range of areas and subjects. We intend to contribute to these in the future.

11. References

Acemoglu, Daron and James A. Robinson (2005). Economic Origins of Dictatorship and Democracy. Cambridge University Press

Acemoglu, Daron, James A. Robinson and Thierry Verdier (2004), "Alfred Marshall Lecture—Kleptocracy and Divide-and-rule: A Model of Personal Rule", Journal of the European Economic Association 2, no. 2-3 (April-May, pp. 162-92.

Azariadis, Costas andJohn Stachurski (2003), "A Forward Projection of the Cross-Country Income Distribution," KIER Working Papers 570, Kyoto University, Institute of Economic Research.

Barro, Robert J & Sala-i-Martin, Xavier, 1992. "Convergence," Journal of Political Economy, University of Chicago Press, vol. 100(2), pages 223-51, April.

Barro, Robert J. and Xavier Sala-i-Martin, 2003, Economic Growth, 2nd Edition, McGraw-Hill.

Backus, David K., Patrick J. Kehoe and Timothy J. Kehoe (1992), In Search of Scale Effects in Trade and Growth", *Journal of Economic Theory*, 58(2), pp. 377-409.
Bosworth, Barry and Susan M. Collins (2008), "Accounting for Growth: Comparing China and India, *Journal of Economic Perspectives*—Volume 22, Number 1—Winter 2008—Pages 45–66

Bosworth, Barry, Susan M. Collins and Arvind Virmani (2007), "Sources of Growth in the Indian Economy", India Policy Forum, 3, pp. 1-50.

Brinkhoff, Thomas. *The Principal Agglomerations of the World.* October 2009.

http://www.citypopulation.de.

Buiter, Willem H., Akram Esanov and Martin Raiser (2006), "Nature's blessing or nature's curse: the political economy of transition in resource-based economies", with Akram Esanov and Martin Raiser, in Richard M Auty and Indra de Soysa eds. *Energy, Wealth and Governance in the Caucasus and Central Asia; Lessons not learned.* Routledge, London and New York, pp. 39-56.

Cole, Matthew A. and Eric Neumayer, 2003. "The pitfalls of convergence analysis: is the income gap really widening?," *Applied Economics Letters*, Taylor and Francis Journals, vol. 10(6), pages 355-357, April.

Dasgupta, Partha (2008), 'Social Capital', in Steven N. Durlauf and and Lawrence E. Blume eds. *The New Palgrave Dictionary of Economics*, Second Edition,

Easter, William K. and Yang Liu (2005). "Cost Recovery and Water Pricing for Irrigation and Drainage Projects", Agriculture and Rural Development Discussion Paper 26, 2005, p. 15-19.

Easterly, William and Aart Kraay (1999), "Small States, Small Problems?", Policy Research Paper 2139, The World Bank.

Edwards, Sebastian (1998), "Openness, Productivity and Growth: What Do We Really Know?", *Economic Journal*, 108(447), pp. 383-98.

Conference Board (2010) http://www.conference-board.org/data/economydatabase/

Frankel, Jeffrey A. and David Romer (1999), "Does Trade Cause Growth?", *American Economic Review*, 89(3), pp. 379-99.

Gerschenkron, Alexander (1962), *Economic backwardness in historical perspective, a book of essays*, Cambridge, Massachusetts: Belknap Press of Harvard University Press.

Goldman Sachs Global Economics Group. (2007), "*BRICs and Beyond".* London: Goldman Sachs, 2007.

Hanson, Gordon H. (2010), "Why Isn't Mexico Rich", *Journal of Economic Literature*, December 2010, Volume XLVIII, Number 4, pp. 987-1004.

Head, Allen C. (1995), "Country Size, Aggregate Fluctuations, and International Risk Sharing", Canadian Journal of Economics, 28, pp. 1096-119.

Kehoe, Timothy J. and Edward C. Prescott (2002), "Great Depressions of the Twentieth Century, Review of Economic Dynamics, 5(1), pp. 1-18.

Kehoe, Timothy J. and Edward C. Prescott eds. (2007), *Great Depressions of the Twentieth Century.* Minneapolis, Federal Reserve Bank of Minneapolis

Kehoe, Timothy J. and Kim J. Ruhl (2010), "Why Have Economic Reforms in Mexico Not Generated Growth", *Journal of Economic Literature*, December 2010, Volume XLVIII, Number 4, pp. 1005-1027

Kremer, Michael & Onatski, Alexei & Stock, James, 2001. "Searching for prosperity," Carnegie-Rochester Conference Series on Public Policy, Elsevier, vol. 55(1), pages 275-303, December.

North, Douglas (2005), *Understanding the Process of Economic Change*, Princeton University Press, 2005.

North, Douglas, John Joseph Wallis and Barry R. Weingast (2009)m *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History*, Cambridge University Press, 2009

OECD (2009), *Managing Water for All: An OECD Perspective on Pricing and Financing,* Paris**.**

Parente, Stephen L. and Edward C. Prescott (1994), "Barriers to Technology Adoption and Development", *Journal of Political Economy*, 102(2), pp. 289-321.

Parente, Stephen L. and Edward C. Prescott (2002), *Barriers to Riches*, Cambridge and London, MIT Press

Putnam, Robert D. (2006). *E Pluribus Unim: Diversity and Community in the Twenty-First Century,* Nordic Political Science Association

Quah, Danny (1996a), "Empirics for economic growth and convergence," *European Economic Review*, June.

Quah, Danny (1996b), "Twin peaks: Growth and convergence in models of distribution dynamics," *Economic Journal*, July.

Quah, Danny (2010), “The Shifting Distribution of Global Economic Activity”, Mimeo, Department of Economics, LSE, May 2010, http://econ.lse.ac.uk/staff/dquah/p/2010.05-Shifting_Distribution_GEA-DQ.pdf

Quah, Danny (2011), “"The global economy's shifting centre of gravity," Global Policy, vol. 2. issue 1, January, pp. 3-9”.

http://www.globalpolicyjournal.com/articles/world-economy-trade-and-finance/global-economy%E2%80%99s-shifting-centre-gravity

Rivera-Batiz, Luis A. and Paul M. Romer (1991), “Economic Integration and Endogenous Growth”, *Quarterly Journal of Economics*, 106(2), pp. 531-555.

Robinson, James A., Ragnar Torvik and Thierry Verdier (2006), “Political foundations of the resource curse”, *Journal of Development Economics* 79 pp. 447-68.

Romer, Paul M. (1986), “Increasing Returns and Long-run Growth”, *Journal of Political Economy*, 94(5), pp. 1002-1037.

Schumpeter, Joseph Alois (1942), *Capitalism, Socialism and Democracy*, George Allen & Unwin (Publishers) Ltd.

Solow, Robert M. (1956). "A Contribution to the Theory of Economic Growth". *Quarterly Journal of Economics* (The MIT Press) 70 (1): pp. 65–94.

Solow, Robert M. (1957), “Technical Change and the Aggregate Production Function”, *Review of Economics and Statistics*, 39(3), pp. 312-20.

Swan, T. W. (956), “Economic Growth and Capital Accumulation”, *Economic Record* 32, 334-361.

Summers-Heston data set (September 2006), http://www.bris.ac.uk/Depts/Economics/Growth/summers.htm

http://pwt.econ.upenn.edu/php_site/pwt_index.php

UN (2007), *Coping with water scarcity: challenge of the twenty - first century,* UN Water Da7 2007, March 22. http://www.fao.org/nr/water/docs/escarcity.pdf

World Bank (2010), *World development report 2010: development and climate change, Washington DC.*

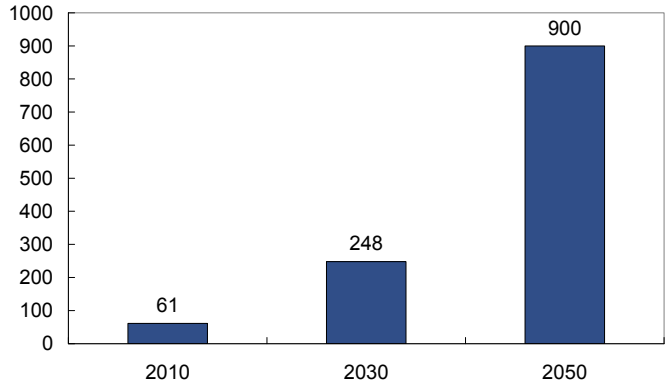
World Economic Forum (2011), Trailblazers, Shapers and Innovators; Models of Success from the Community of Global Growth Companies, http://www3.weforum.org/docs/WEF_GGC_MembersProfiles_2010.pdf

12. Appendix

Here, we present a few forecasts measured in current US dollars at market exchange rates. As noted in the main text, our forecasts are qualitatively very similar, whether we consider them in terms of constant US dollars converted at PPP-adjusted exchange rates or in terms of current US dollars converted at market exchange rates. Quantitatively, there are two differences, however. First, the share of poorer countries in world GDP is higher under the PPP-adjusted measure. This is because poorer countries tend to have lower price levels (when expressed in a common currency). Because the poorer countries tend to grow faster, the growth rate of world *real* GDP, when non-US national nominal GDPs are converted into current US dollars using PPP exchange rates and then converted into constant 2010 US dollars using the US price deflator, will tend to be higher than the growth rate of world *real* GDP when non-US national nominal GDPs are converted into current US dollars using market exchange rates and then converted into constant 2010 US dollars using the US price deflator.

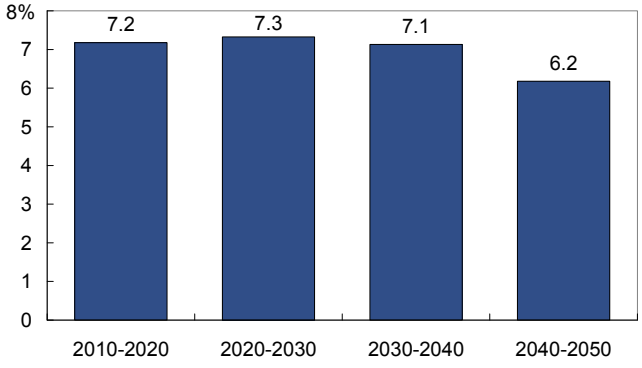
Second, we are considering world *nominal* GDP at market exchange rates, which amounts to adding the US rate of price inflation to the growth rate of world real GDP at market exchange rates. We forecast US inflation to be moderately positive – around 2.0 percent p.a. - for our forecast horizon. The second effect dominates the first effect under our numerical assumptions, so the growth rate of world nominal GDP is higher under the measure of GDP converted into current US dollars at market exchange rates than it is for world real GDP when the national measure of GDP is converted into current US dollars using PPP exchange rates.

Figure 100. World Nominal GDP (trillion current USD)



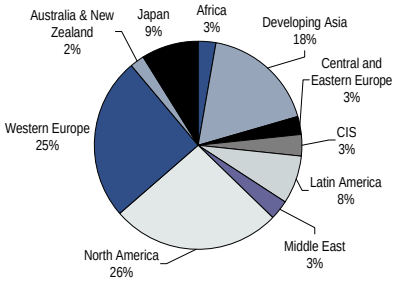
Note: GDP is measured in trillion current USD converted at market exchange rates.
Source: Citi Investment Research and Analysis

Figure 101. Average World Nominal GDP growth (%YoY) 2010-2050



Note: GDP is measured in current USD converted at market exchange rates
Source: Citi Investment Research and Analysis

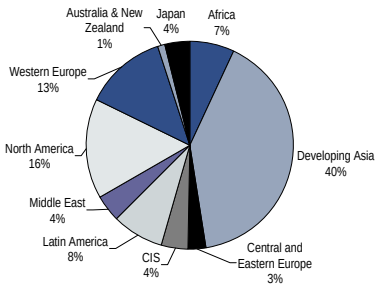
Figure 102. Composition of World Nominal GDP, 2010



Note: GDP is measured in current USD converted at market exchange rates. CIS- Commonwealth of Independent States

Source: Citi Investment Research and Analysis

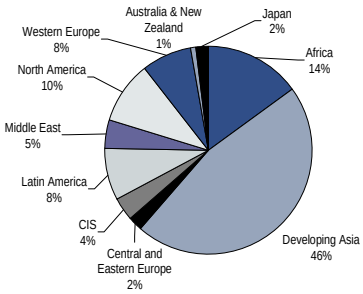
Figure 103. Composition of World Nominal GDP, 2030



Note: GDP is measured in current USD converted at market exchange rates. CIS- Commonwealth of Independent States

Source: Citi Investment Research and Analysis

Figure 104. Composition of World Nominal GDP, 2050



Note: GDP is measured in current USD converted at market exchange rates. CIS- Commonwealth of Independent States

Source: Citi Investment Research and Analysis

Figure 105. The Top 10 Largest Economies in the World (in billion current USD)

Rank	Country	2010	Rank	Country	2015	Rank	Country	2020	Rank	Country	2030	Rank	Country	2040	Rank	Country	2050
1	US	14,612	1	US	18,247	1	China	23,178	1	China	57,138	1	China	115,671	1	China	205,321
2	China	5,860	2	China	13,118	2	US	23,007	2	US	35,739	2	India	75,996	2	India	180,490
3	Japan	5,465	3	Japan	5,876	3	Japan	6,786	3	India	24,824	3	US	54,822	3	US	83,805
4	Germany	3,292	4	Germany	3,886	4	India	6,453	4	Japan	9,213	4	Indonesia	20,140	4	Indonesia	45,901
5	France	2,602	5	India	3,358	5	Germany	4,557	5	Brazil	8,780	5	Brazil	17,501	5	Nigeria	42,437
6	UK	2,259	6	France	3,047	6	Brazil	4,256	6	Russia	7,380	6	Nigeria	17,347	6	Brazil	33,199
7	Italy	2,044	7	Brazil	3,026	7	Russia	3,806	7	Indonesia	7,299	7	Russia	12,885	7	Russia	19,697
8	Brazil	1,989	8	UK	2,885	8	UK	3,637	8	Germany	6,466	8	Japan	12,452	8	Japan	16,394
9	India	1,596	9	Russia	2,668	9	France	3,573	9	UK	5,819	9	Germany	9,267	9	Philippines	14,738
10	Canada	1,572	10	Italy	2,414	10	Canada	2,741	10	France	5,236	10	UK	9,135	10	UK	13,846

Note: GDP is measured in billion current USD converted at market exchange rates

Source: Citi Investment Research and Analysis

Figure 106. Nominal GDP per capita (current USD) 2010-2050

Rank	Country	2010	Rank	Country	2015	Rank	Country	2020	Rank	Country	2030	Rank	Country	2040	Rank	Country	2050
1	Norway	78,102	1	Norway	86,102	1	Norway	101,748	1	Singapore	155,232	1	Singapore	214,757	1	Singapore	288,204
2	Switzerland	68,787	2	Singapore	77,863	2	Singapore	100,770	2	Norway	143,511	2	Norway	202,492	2	Norway	283,023
3	Australia	57,649	3	Switzerland	74,425	3	Switzerland	86,422	3	Switzerland	120,664	3	Switzerland	173,423	3	Switzerland	250,925
4	Sweden	48,032	4	Sweden	61,499	4	Canada	73,517	4	Canada	110,918	4	Canada	166,403	4	Canada	241,630
5	Netherlands	47,256	5	Canada	60,293	5	Sweden	71,143	5	Australia	100,995	5	Sweden	145,793	5	Sweden	217,626
6	US	47,100	6	Australia	58,264	6	Netherlands	67,529	6	Sweden	99,764	6	Korea	145,321	6	Australia	212,434
7	Canada	46,144	7	Netherlands	57,802	7	US	67,393	7	US	95,686	7	Australia	144,941	7	Korea	212,408
8	Singapore	44,801	8	US	56,051	8	Australia	66,726	8	Netherlands	95,233	8	Netherlands	137,728	8	Netherlands	200,443
9	Austria	43,670	9	Belgium	49,295	9	Austria	58,019	9	Korea	88,959	9	US	135,144	9	UK	191,336
10	Belgium	43,123	10	Austria	48,836	10	Belgium	57,551	10	Hong Kong	86,967	10	UK	130,062	10	US	190,895

Note: GDP is measured in current USD converted at market exchange rates

Source: Citi Investment Research and Analysis

Notes

Notes

Appendix A-1

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