

The world in 2050

Quantifying the shift in the global economy

With the rapid growth of the emerging markets, the global economy is experiencing a seismic shift. In this piece, we argue that this shift is set to continue. By 2050, the collective size of the economies we currently deem 'emerging' will have increased five-fold and will be larger than the developed world. And 19 of the 30 largest economies will be from the emerging world. At the same time, there will be a marked decline in the economic might – and potentially the political clout – of many small population, ageing, rich economies in Europe.

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Disclosures and Disclaimer This report must be read with the disclosures and analyst certifications in the Disclosure appendix, and with the Disclaimer, which forms part of it.

The world in 2050

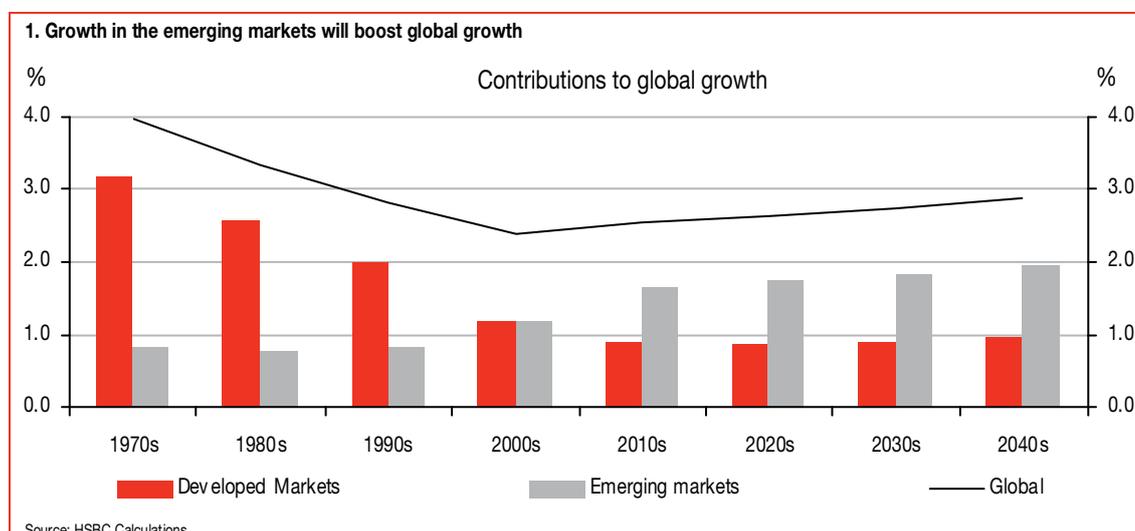
- ▶ 19 of the 30 largest economies will be emerging economies
- ▶ The emerging economies will collectively be bigger than the developed economies
- ▶ Global growth will accelerate thanks to the contribution from the emerging economies

With the rapid growth of the emerging markets, the global economy is experiencing a seismic shift. But why is this change occurring? Will it continue? And how will the world look if it does? The answers to these questions are important for investors' decisions today.

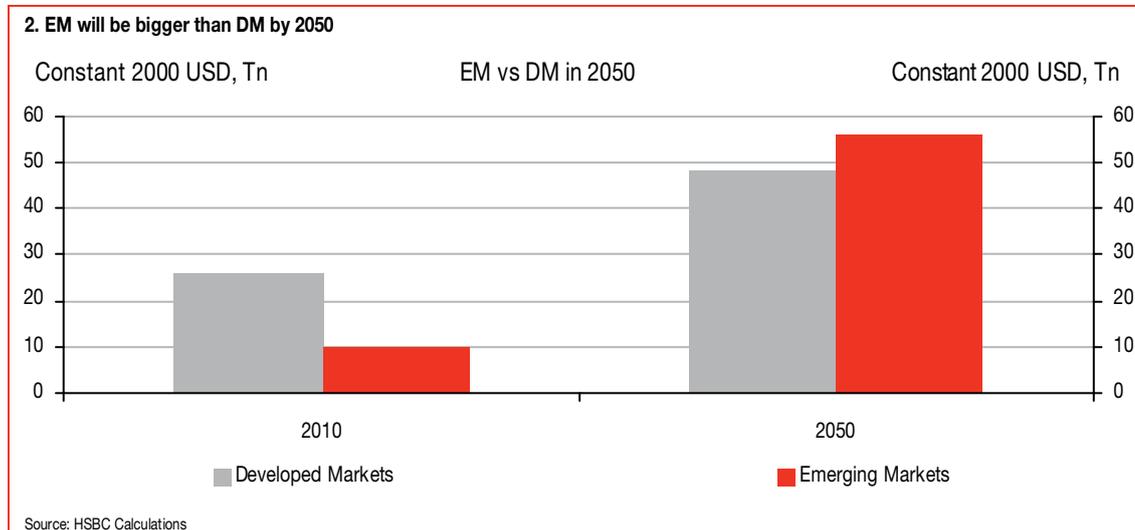
In this piece, we provide a framework for thinking about these issues. Based on our analysis of the Top 30 economies ranked by size of GDP in 2050, our conclusions are as follows:

- ▶ World output will treble, as growth accelerates on the back of the emerging economies. On average, annual world growth is projected to be accelerate towards 3% compared with growth of just over 2% in the 2000s (Chart 1). Emerging-world growth will contribute twice as much as the developed world to global growth over this period.
- ▶ By 2050, the emerging world will have increased five-fold and will be larger than the developed world (Chart 2).
- ▶ 19 of the top 30 economies by GDP will be countries that we currently describe as 'emerging' (Table 3).
- ▶ China and India will be the largest and third-largest economies in the world, respectively.
- ▶ Substantial progress up the global league table will be made by a host of other emerging economies – most notably, Mexico, Turkey, Indonesia, Egypt, Malaysia, Thailand, Colombia and Venezuela.
- ▶ These projections combine prospects for per capita GDP and the demographic outlook. Income per capita should grow in all the countries that we consider. But demographic patterns vary significantly across the world and have a major influence on growth prospects.
- ▶ The US and UK, with better demographic outlooks, are relatively successful at maintaining their positions.
- ▶ But the small-population, ageing, rich economies in Europe are the big losers. Switzerland and the Netherlands slip down the grid significantly, and Sweden, Belgium, Austria, Norway and Denmark drop out of our Top 30 altogether.

- ▶ This may have implications for the ability of these economies to influence the global policy agenda. Already Europe has been forced to concede two seats on the IMF's executive board in order to make way for some emerging economies. This adds a whole new dimension to the current Eurozone crisis, and provides a significant incentive to euro-area countries to work through their current difficulties and remain a union.
- ▶ Demographic change is even more dramatic outside of Europe. The working population will rise by 73% in Saudi Arabia and fall by 37% in Japan. That is reflected in these countries' differing fortunes in our top 30 table (Chart 4).
- ▶ By 2050, the seismic shift in the global economy will have only just begun. Despite a seven-fold increase (Chart 5), income per capita in China will still be only 32% of that in the US and scope for further growth will be substantial. This 'base effect' must be considered when comparing current growth in the emerging world with that of the developed world.
- ▶ Energy availability need not hinder this path of global development so long as there is major investment in efficiency and low-carbon alternatives. Meeting food demand may prove more of a challenge, but improvements in yield and diet could fill the gap. In the final section, we discuss our preliminary thoughts on this topic.



Visual Summary

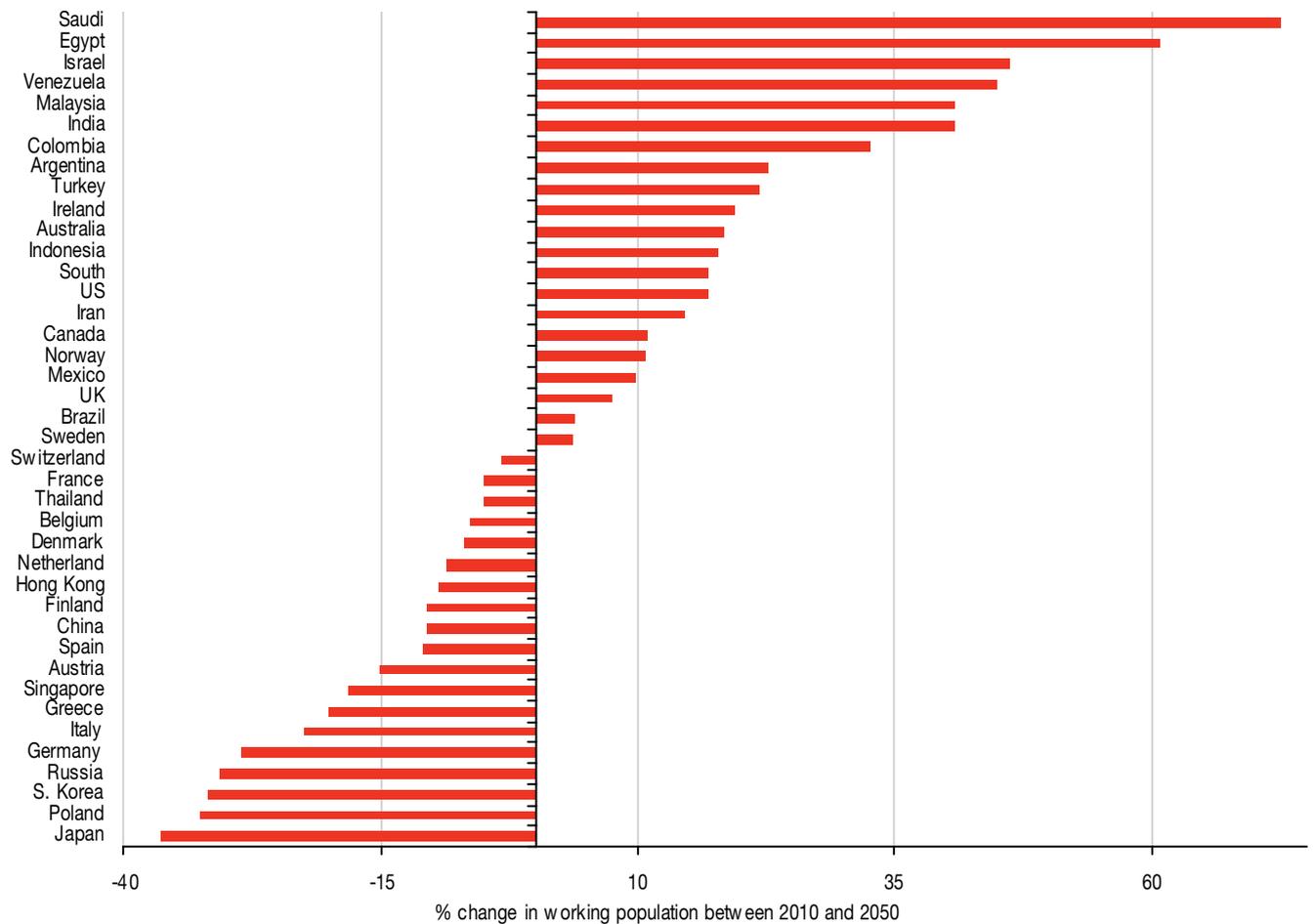


3. The top 30 in 2050

Order in 2050 by size		Size of economy in 2050 (Bn, Constant 2000 USD)	Rank change between now and 2050	Income per capita (Constant 2000 USD)		Population (Mn)
				2050	2010	
1	China	24617	2	17372	2396	1417
2	US	22270	-1	55134	36354	404
3	India	8165	5	5060	790	1614
4	Japan	6429	-2	63244	39435	102
5	Germany	3714	-1	52683	25083	71
6	UK	3576	-1	49412	27646	72
7	Brazil	2960	2	13547	4711	219
8	Mexico	2810	5	21793	6217	129
9	France	2750	-3	40643	23881	68
10	Canada	2287	0	51485	26335	44
11	Italy	2194	-4	38445	18703	57
12	Turkey	2149	6	22063	5088	97
13	S. Korea	2056	-2	46657	16463	44
14	Spain	1954	-2	38111	15699	51
15	Russia	1878	2	16174	2934	116
16	Indonesia	1502	5	5215	1178	288
17	Australia	1480	-3	51523	26244	29
18	Argentina	1477	-2	29001	10517	51
19	Egypt	1165	16	8996	3002	130
20	Malaysia	1160	17	29247	5224	40
21	Saudi Arabia	1128	2	25845	9833	44
22	Thailand	856	7	11674	2744	73
23	Netherlands	798	-8	45839	26376	17
24	Poland	786	0	24547	6563	32
25	Iran	732	9	7547	2138	97
26	Colombia	725	13	11530	3052	63
27	Switzerland	711	-7	83559	38739	9
28	Hong Kong	657	-3	76153	35203	9
29	Venezuela	558	7	13268	5438	42
30	South Africa	529	-2	9308	3710	57

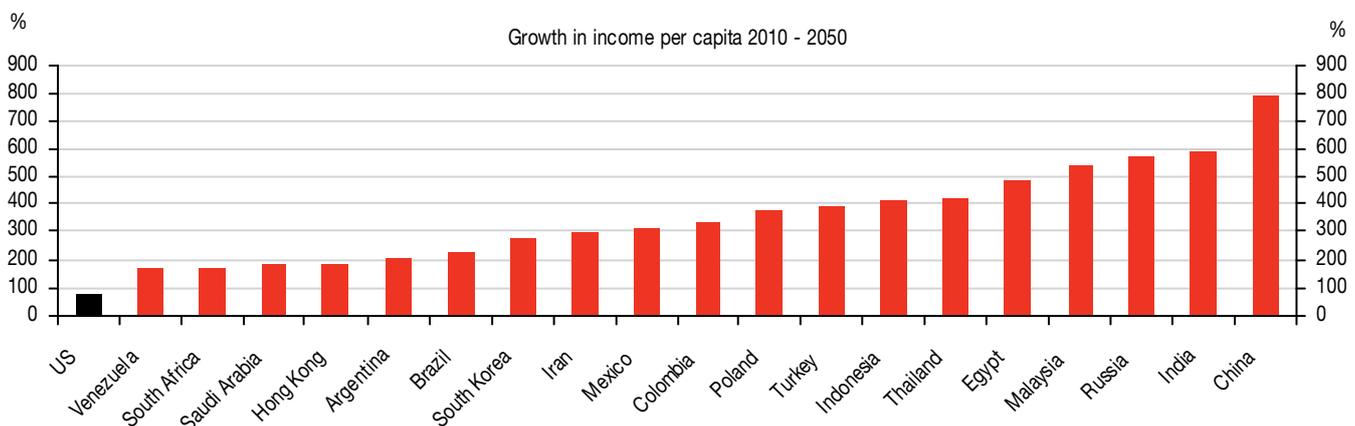
Source: HSBC Calculations

4. The outlook for working population is vastly different across economies



Source: UN projections, HSBC calculations

5. The rise in income per capita in the emerging world will dwarf that of the US in the coming years



Source: HSBC Calculations

Why do economies grow?

- ▶ The emerging markets are at a very early stage of development
- ▶ Global growth will now be powered by the emerging economies

What spurs growth?

We are moving into a world where global growth will be powered by emerging economies, rather than held back by them. The question is why so many of the emerging markets are now managing to ‘catch up’ having failed so miserably to

improve living standards through much of the 20th century (Table 6).

As we look into the future, we need to work out how much of this is due to improvements in the foundations of economic growth, to establish whether the recent growth spurt can be sustained.

6. What is driving these growth spurts

Annual average growth in GDP per capita	1913-50	1950-73	1973-98
World	0.9	2.9	1.3
United States	1.6	2.5	2.0
Western Europe	0.8	4.1	1.8
Japan	0.9	8.1	2.3
Total Asia ex Japan	0.0	2.9	3.5
China	-0.6	2.9	5.4
Hong Kong	n/a	5.2	4.3
Malaysia	1.5	2.2	4.2
Singapore	1.5	4.4	5.5
South Korea	-0.4	5.8	6.0
Taiwan	0.6	6.7	5.3
Thailand	-0.1	3.7	4.9
India	-0.2	1.4	2.9
Indonesia	-0.2	2.6	2.9
Latin America	1.4	2.5	1.0
Argentina	0.7	2.1	0.6
Brazil	2.0	3.7	1.4
Chile	1.0	1.3	2.6
Colombia	1.5	2.1	1.7
Mexico	0.9	3.2	1.3
Peru	2.1	2.5	-0.3
Uruguay	0.9	0.3	2.1
Venezuela	5.3	1.6	-0.7
Eastern Europe	0.9	3.8	0.4
Former USSR	1.8	3.4	-1.8
Africa	1.0	2.1	0.0
Egypt	-0.1	1.5	3.0
South Africa	1.3	2.2	-0.3
Morocco	1.6	0.7	1.9
Ghana	1.1	1.0	-0.5

Source: Maddison, The World Economy, OECD Development Centre Studies

To get to projections for total GDP, we start by modelling income per capita and then incorporate the demographic outlook.

Our estimations of per capita income are based heavily on the work of Harvard's Robert Barro¹. The keys determinants of economic development are split into three groups (full details can be found in Appendix 1):

- 1 **Economic governance:** the degree of monetary stability, political rights and the level of democracy, the rule of law, the size of government (with large government restricting activity).
- 2 **Human capital:** the level of education, health of the population and fertility rate.
- 3 **The starting level of income per capita.**

Before we go into these variables in more detail, it's worth pointing out that we don't include variables such as savings or investment rates. The reason is that these should be endogenous to the system. We are looking to identify the exogenous, structural factors that would mean people *want* to invest. This should provide us with a more rigorous framework for considering how economies have changed and whether growth can be sustained. In our view, this is a key reason why our study differs from some previous studies which try to extrapolate how the inputs will grow, often using current investment rates. These will tend to overstate growth.

Economic governance

The first set of variables are rule of law, monetary stability, democracy and government interference, proxied by government spending. All try to capture sound economic governance.

This is clearly one area where there has been significant change in the past couple of decades and which plays a major role in the recent progress from a number of these emerging economies.

Most obviously there have been some significant regime changes around the world. Communism in large swathes of the world, including the Soviet Union and Mao's China, effectively divided the economic world and closed these systems off to both trade and the technological progress in the West. How can you 'copy and paste' the technologies of the world's best economic performers if you can't see what they are doing?

These command economies often failed to allocate their domestic resources efficiently, suffering from low productivity and a lack of technological advance.

As a result, through the 1950s, '60s and early '70s, given income per capita was coming from such a low base, we should have seen income per capita growth far outstrip that of Western Europe or the US. Russia's performance in the '50s and '60s was reasonable but wasn't sustained (Table 6). Of course, the threat of war also played a key role in how resources were allocated. In the 1970s, military and space spending consumed 15% of GDP in the Soviet Union, three times that in the US and five times that in Europe.

These 'iron curtains' have now been drawn back, opening these economies up to trade, and the technology available in developed nations.

India's relative underperformance over the same period also stemmed from significant government control and an inability to efficiently allocate

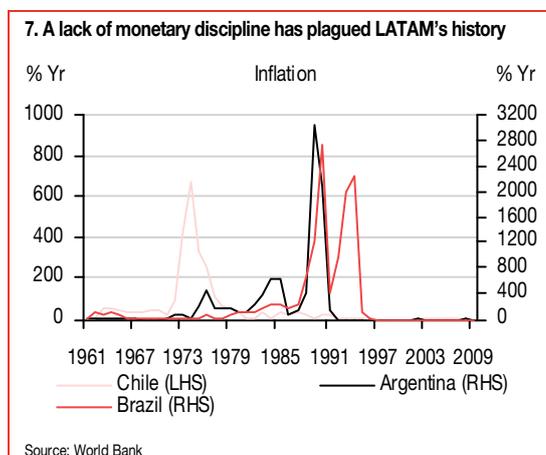
¹ *Determinants of Economic Growth: A cross-country empirical study*, Robert J Barro

resources, partly by shielding domestic business from foreign competition following Indian independence. Through much of the '70s and '80s, the government dominated industrial activity by controlling both the licensing to trade or import and the loanable funds available for such activity (and this allocation was often riddled with corruption). Time and again, this led to production shortages and balance of payments crises. In the early 1990s, India made significant strides in correcting at least some of these supply-side issues. Industrial licensing was largely removed and import restrictions were pared back on capital and industrial inputs. While there are still certain problems in government administration, the Indian economy has again been opened up to the demand and technological know-how of the more developed economies.

Latin America, by contrast, had made itself considerably more open to the competition, trade and capital offered by the global economy but found itself plagued through the 1970s and '80s by a lack of monetary control, giving rise to frequent inflationary outbursts and debt crises (Chart 7). An improvement in governance has played a key role in turning economic fortunes in parts of LATAM. This had led to other supply-side improvements that tend to follow a period of low and stable inflation.

Behind all these individual country stories between the '70s and '90s, there was a major rethink of how best to run economies to aid economic development. The traditional thinking had been that state control and economic planning, public investment and protection from the volatility of the world market was the best recipe for promoting economic development. Self-sufficiency was the goal, so foreign trade was seen as a hindrance and therefore a tax opportunity.

From the late 1970s, a stream of work from the NBER, World Bank and IMF started to challenge this form of governance. They began advocating market-friendly and open-border policies to promote economic development. This work culminated in the publication of what was termed by some as the 'Miracle Book' by the World Bank in 1993².



² *The East Asian Miracle: economic growth and public policy*, World Bank, Oxford University Press, 1993

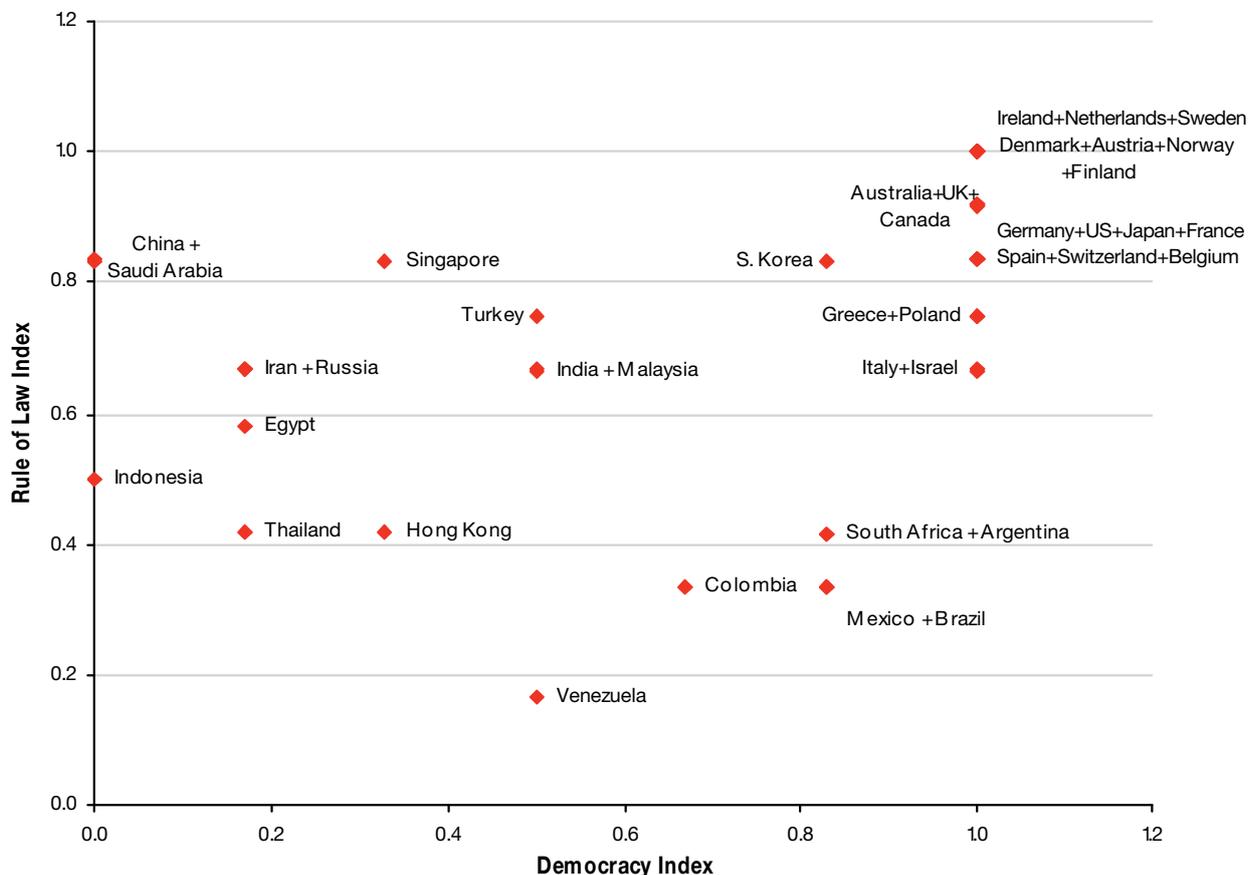
How does democracy fit into the story of success through liberalisation? It is generally assumed that democratic systems will be most successful in achieving growth because the population will want the highest standard of living possible and so will vote for governments offering policies most capable of delivering growth. It's certainly true that the most democratic systems have delivered the best investment prospects as characterised by the rule of law index (Chart 8).

But there are authoritarian regimes that have still delivered a good 'rule of law', China and Singapore being the clearest examples. And in parts of Latin America, democracy has done little to raise their score for rule of law.

Barro's work actually showed that too much democracy wasn't necessarily a good thing for economic growth (of course it may be the best model for social development). He found that at very high levels of democracy, income redistribution becomes a dominant force, which serves to restrain entrepreneurial endeavours. And democracy places a disproportionate weight on winning current votes, potentially at the expense of future votes, and therefore can hinder the investment required for long-term development.

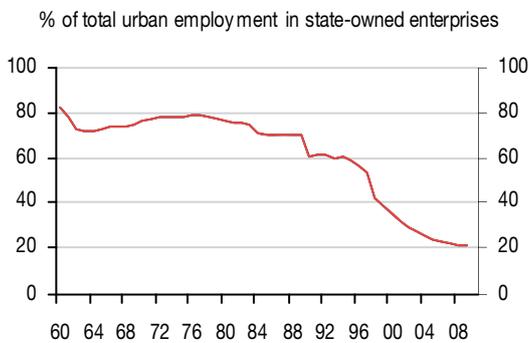
Overall, authoritarian regimes can deliver economic success if the system manages to set in place the incentives that a market-based system naturally delivers, namely competition and a motivation to drive efficiency.

8. Some authoritarian regimes have been more successful at delivering good investment conditions than more liberal systems



Source: Political Risk Services International Country Risk Guide & Freedom House political rights index

9. China's state-owned enterprises are in decline



Source: CEIC

There are a number of examples of how this has been achieved in China (for further details see *Inside the growth engine* (Zhang Zhiming, December 8, 2010). De-centralising and privatising production to the regional level and running down the old state-owned industry model (Chart 9) has led to 'industry rivalry' between the regions delivering competition and incentives for the state governments.

Another example in China is the 'household responsibility system' whereby land was leased to rural households with *set* taxes and rents. Households had every incentive to improve productivity because they then reaped the rewards.

And China has clearly opened itself up to foreign direct investment and global trade, and in 2001 joined the World Trade Organisation. Such engagement with the developed world allows it to mimic and develop the technologies of the West.

There are still challenges to overcome which have the potential to raise China's growth rate further. In particular, fuzziness of certain ownership arrangements, especially in the regional enterprise sector, and a lack of legal infrastructure will all constrain China's potential. Moreover, the state-controlled banking system is the only official game in town for borrowers and savers. Liberalisation of the financial sector will better align borrowers and savers and should lead to a more efficient allocation of capital.

But it's worth remembering that during the 1970s Japan was criticised using many of the arguments that now face China. The Japanese catch-up effort was bolstered significantly by government policy. Large corporate groups (keiretsu) and banks had close ties, and the Ministry of Trade and industry provided administered guidance to firms and banks which influenced what were deemed 'key industries'. Indeed, the criticisms were such a hindrance to Japan's global economic reputation that it made a significant donation to the World Bank for it to complete the 'Miracle Book' to examine the issue.

Human capital

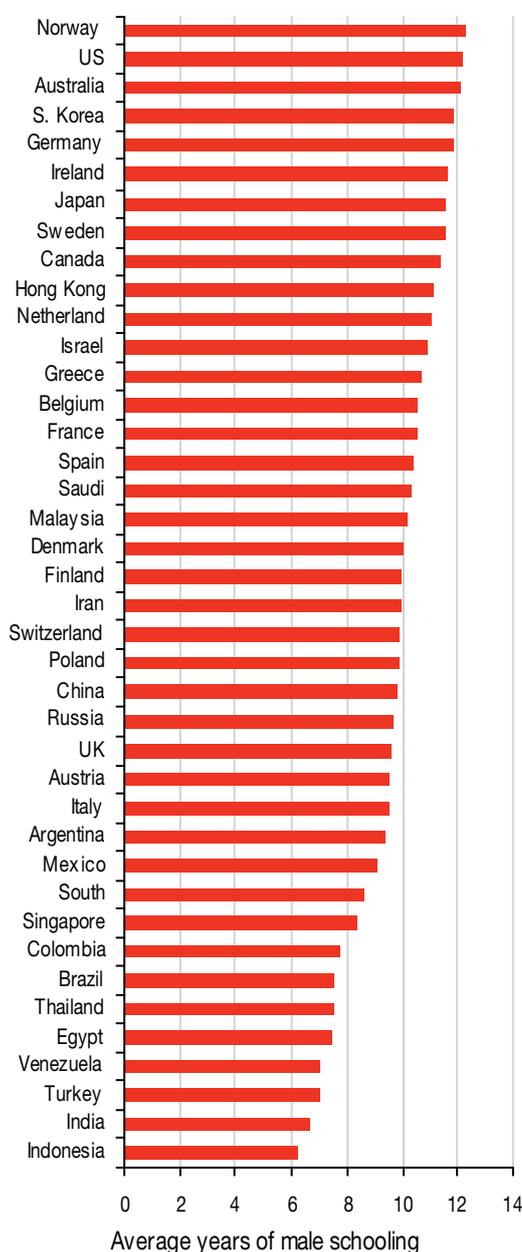
The next set of variables in the model focus on the productivity of the worker – the level of education being the most significant (Chart 10). It's all very well having the latest technology, but if a workforce hasn't been sufficiently trained it won't be able to use it. And once 'copy and paste' growth is complete, it seems likely the most educated workforce will be the one able to innovate and drive technological progress.

Another important determinant of the productivity of the workforce is health, which Barro proxies with life expectancy. If you expect to live, and therefore work, for a long time, it will be worth while investing years getting yourself educated. Of course, on the other end of the spectrum, a population that lives a long time but spends a large period of time in retirement could place a burden on the working population. But we should capture this in our model due to the high levels of government spending required to support an ageing population. Growth will therefore be constrained in countries with a high dependency ratio.

Barro also takes into account the level of fertility. A higher fertility rate means investment goods are spread more thinly, and with more productive capacity devoted to child rearing, it reduces output per capita. Of course, when we consider total growth, high-fertility economies will get a boost for this reason.

The role of mortality, fertility and life expectancy is explored in some detail in the chapter entitled 'Running out of workers' in Stephen King's book *Losing Control* (Yale University Press, 2010).

10. The more educated a nation, the more likely an economy will be able to catch up and innovate



Source: Barro-Lee

The starting level of income per capita

The model then includes the current level of GDP on the basis that *if a country has the right economic infrastructure*, growth in low-income economies will be amplified in the short run as additional investment produces high returns. These fade when the law of diminishing returns kicks in.

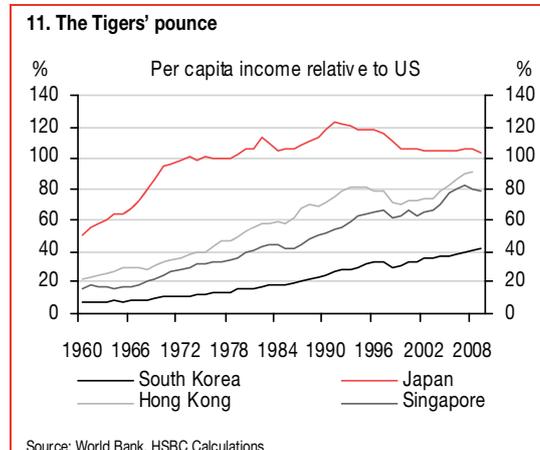
To illustrate this ‘law’, take the example of a roadsweeper. With no equipment at all, it takes this roadsweeper a long time to clear one street by collecting the litter by hand. Now supply him with a broom, and he will be able to clean many more streets than before. His productivity – output per worker – in this case measured in clean streets, will have risen dramatically.

Now supply him with two brooms and there is a possibility he can clean streets a little faster, but the gain in productivity is unlikely to be anywhere near as great as that seen with the first broom.

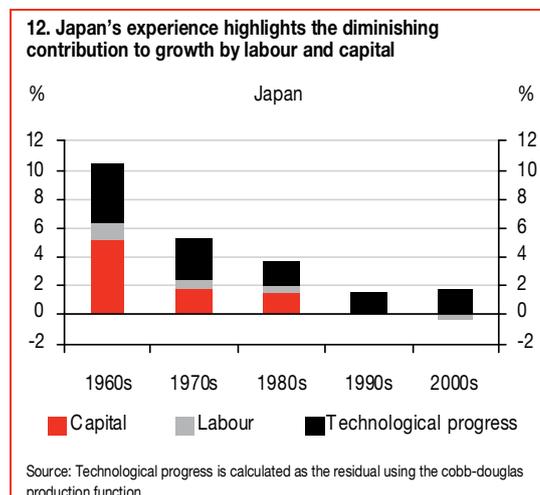
This is what we know as the law of diminishing marginal returns. Incremental capital additions generate smaller output gains as the level of the capital stock increases and at some point further investment is pointless. There is no point having three brooms when you only have two arms.

Because of diminishing returns one can’t simply extrapolate current growth or investment rates.

Just consider the mistakes made with forecasts for Japan in the early 1960s. An explosion in investment fuelled extremely high rates of growth and income per capita rose from just 50% of the level seen in the US in 1960 to being equal to the levels of income by the early 1970s (Chart 11).

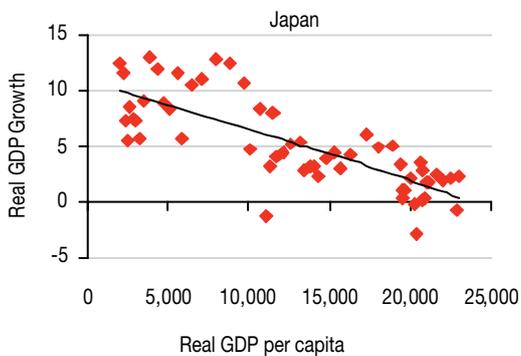


But extrapolating the rates of growth in investment spending into the future, as many did, suggested that Japanese income per capita would continually outpace that of the US. This wasn’t the case; investment spending slowed and any growth that has been achieved over the last two decades has only been achieved by technological progress (Chart 12).



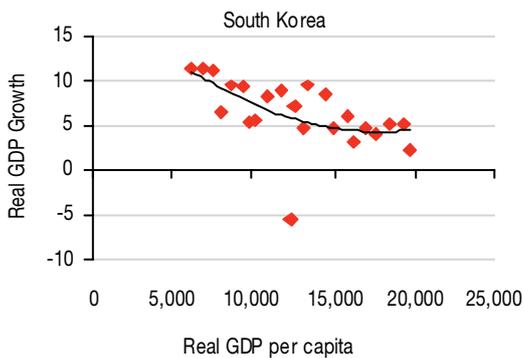
The same is true of the growth seen in some of the other Asian tigers – as income per capita rose, growth has slowed (Charts 13-15).

13. Growth rates slow as economies develop as seen in Japan...



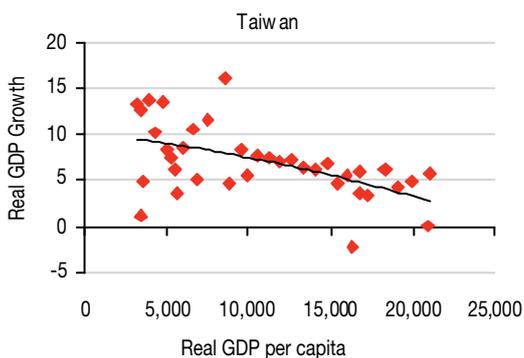
Source: World Bank, HSBC Calculations

14. ...South Korea...



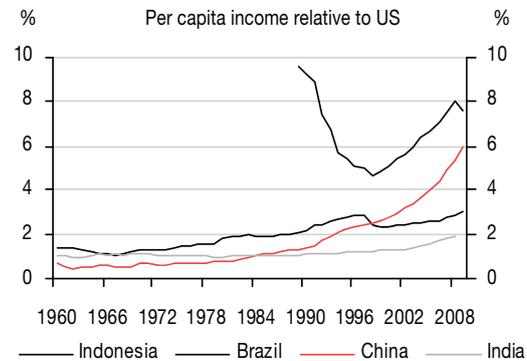
Source: World Bank, HSBC Calculations

15. ...and Taiwan



Source: World Bank, HSBC Calculations

16. A whole new bunch of economies are improving their relative standard of living

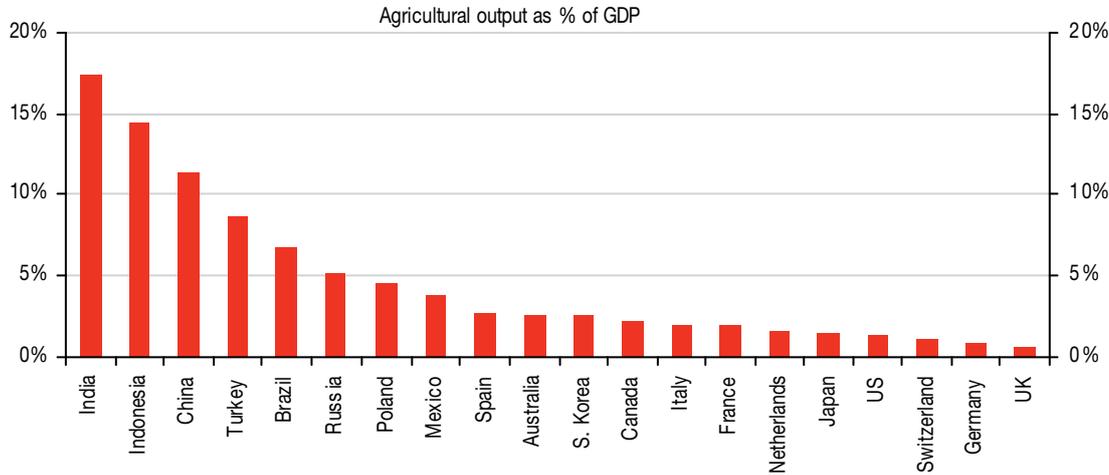


Source: World Bank and HSBC calculations

Of course, many of the new economies are so far from reaching developed status that these constraints will not kick in for some time. Just look at the axis on Chart 16. Despite rapid growth, income per capita in China, in constant dollar terms, is currently just 6% of that seen in the US. In India, income per capita is just 2% of that in the US.

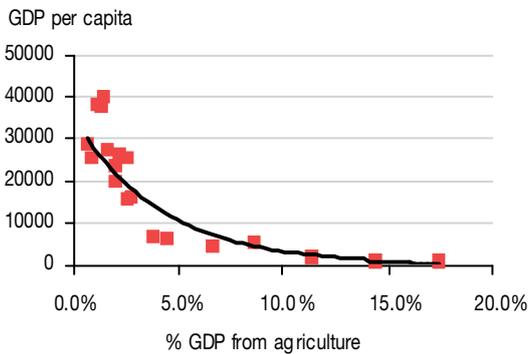
The fact that these economies have a long way to go in their development is also clear when we look at the sectoral breakdown. As economies develop, they become more efficient at producing basic goods. So once you've got a tractor it's much easier to produce the food you need and you can concentrate your resources in producing other goods and services. This is what we tend to call moving up the value-added chain (Chart 18).

17. The fastest growing economies are still very early in their stage of development



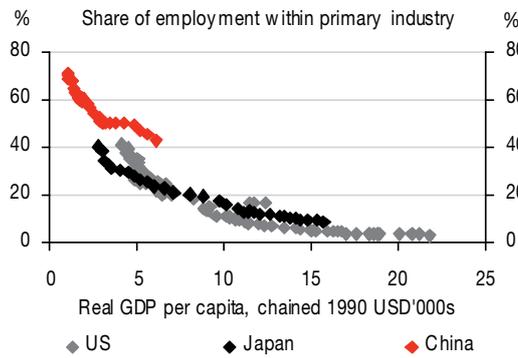
Source: World Bank, HSBC

18. The more capital you acquire the less you need to devote to agricultural production



Source: World Bank, HSBC

19. 40% of China's workforce is still working in primary industry



Source: IMF and HSBC calculations

As such, the expansion into other industries means that in the G7 on average, agricultural production is now less than 3% of all goods produced.

In China, 12% of output is still agricultural production (Chart 17) but perhaps more strikingly, it requires 40% of its working population to deliver this (Chart 19). This highlights how the automation of food production and the ability of workers to move towards other forms of production – the ‘urbanisation’ of the workforce – still has a long way to go.

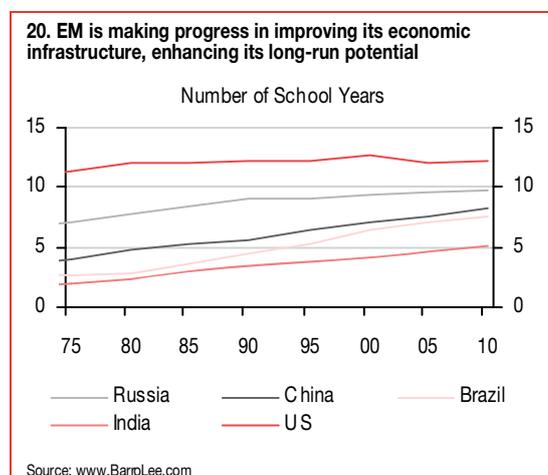
The employment statistics are less reliable for other economies. But given around 18% of output in India is still agricultural, a similar story will hold. There are still a lot more resources to be put towards more productive use (Chart 17).

The model economy

To test the reliability of the model, we started by taking the economic infrastructure in 2000 and creating projections for 2000-2010 and were satisfied with the results. Further details of the model and all the results are discussed in Appendix 1.

To simplify the analysis, we are working in constant 2000 US dollar terms. Further appreciation of emerging-market currencies against the dollar will extend the conclusions of this report. We consider the top 40 so that we can see who is coming up the chart to enter the top 30, but it is perfectly feasible that some economies outside of the top 40 might demonstrate such impressive growth that they leapfrog many places to reach the Top 30. Our economics team in Asia believe the Philippines may be one such example. We had to draw the line somewhere, but this is an important caveat to our final list.

To get to our base case projections, we considered two scenarios. The first assumes that the 'economic infrastructure' is fixed at that evident today. But to constrain these economies to not making any improvements would be unfair. For example, there is a clear trend that education standards are improving (Chart 20).



So we then consider a second scenario, in which we assume that over the next 40 years, all economies reach the 'optimal' economic infrastructure. This is the highest possible level of achievement from any of the countries in our sample. For example, everyone brings education standards up to that of the best in class (Norway), everyone improves rule of law to the highest possible score of 1, etc.

The results of these two scenarios are shown in the appendix. Our base case scenario sits between these two options. Essentially, each country gets half way there in improving its imperfections. There are many reasons that such a rosy outlook will not pan out, which we discuss in the final section, but for now we assume government will continue to progress rather than regress in their economic policies.

And of course the economic infrastructure could develop even more quickly than forecast. Turkey is one example. Following the worst financial crisis in Turkey's history in 2001, the ruling administration embarked on an impressive political, constitutional and economic reform agenda, which was eventually rewarded with the formal launch of accession negotiations with the European Union in 2006. We expect this improving domestic political stability to be acknowledged by an "investment grade" status for Turkey in 2011. For this reason, we have raised Turkey's democracy rating to equal that of Malaysia (an index level of 0.5).

21. Defining the 'economic infrastructure'

	Income per capita (Constant 2000 USD)	Average years of male schooling	Life expectancy	Fertility	Rule of Law	Government consumption (% GDP)	Democracy Index	Inflation Rate (%)
Australia	26243 (16)	12.1 (3)	81 (6)	1.9 (16)	0.92 (8)	16.9 (22)	1.0 (1)	2.83 (19)
Austria	26455 (13)	9.53 (27)	80 (12)	1.4 (34)	1.0 (1)	18.2 (17)	1.0 (1)	1.96 (32)
Belgium	24758 (18)	10.5 (14)	80 (15)	1.8 (23)	0.83 (11)	23.1 (6)	1.0 (1)	2.08 (30)
Canada	26335 (15)	11.3 (9)	80 (10)	1.6 (28)	0.91 (10)	19.3 (13)	1.0 (1)	1.60 (36)
Denmark	31418 (9)	10.0 (19)	78 (21)	1.8 (20)	1.0 (1)	26.5 (1)	1.0 (1)	2.14 (28)
Finland	27150 (12)	9.97 (20)	79 (20)	1.8 (22)	1.0 (1)	22.3 (7)	1.0 (1)	2.19 (26)
France	23881 (19)	10.5 (15)	81 (5)	1.9 (15)	0.83 (11)	23.1 (5)	1.0 (1)	1.46 (38)
Germany	25082 (17)	11.8 (5)	80 (16)	1.3 (36)	0.83 (11)	18.0 (18)	1.0 (1)	1.74 (35)
Greece	14382 (23)	10.6 (13)	79 (17)	1.5 (22)	0.75 (22)	17.0 (20)	1.0 (1)	2.75 (20)
Ireland	27964 (10)	11.6 (6)	78 (22)	2.1 (13)	1.0 (1)	15.9 (25)	1.0 (1)	1.48 (37)
Italy	18702 (20)	9.50 (28)	81 (4)	1.4 (33)	0.66 (29)	20.2 (9)	1.0 (1)	1.98 (31)
Japan	39434 (3)	11.5 (7)	82 (1)	1.3 (37)	0.83 (11)	17.9 (19)	1.0 (1)	0.02 (40)
Netherlands	26375 (14)	11.0 (12)	80 (14)	1.7 (26)	1.0 (1)	25.0 (3)	1.0 (1)	1.76 (34)
Norway	40933 (2)	12.2 (1)	80 (12)	1.9 (17)	1.0 (1)	19.2 (14)	1.0 (1)	2.22 (25)
Spain	15698 (22)	10.3 (16)	81 (8)	1.4 (32)	0.83 (11)	19.2 (15)	1.0 (1)	2.15 (27)
Sweden	31777 (8)	11.5 (8)	81 (7)	1.9 (19)	1.0 (1)	25.9 (2)	1.0 (1)	1.79 (33)
Switzerland	38738 (4)	9.87 (22)	82 (3)	1.4 (31)	0.83 (11)	10.5 (37)	1.0 (1)	0.89 (39)
UK	27646 (11)	9.59 (26)	79 (18)	1.9 (18)	0.92 (8)	21.7 (8)	1.0 (1)	2.57 (22)
US	36354 (6)	12.2 (2)	78 (22)	2.1 (13)	0.83 (11)	15.8 (26)	1.0 (1)	2.11 (29)
Developed	27860	10.86	80	1.7	0.9	19.8	1.0	1.9
Egypt	3002. (34)	8.76 (31)	70 (36)	2.8 (3)	0.58 (31)	20.0* (36)	0.17 (34)	13 (3)
Iran	2138 (38)	9.92 (21)	71 (34)	1.8 (25)	0.67 (25)	11.1 (35)	0.17 (34)	18.7 (2)
Israel	37005 (5)	11.3 (10)	81 (9)	2.9 (2)	0.67 (25)	24.2 (4)	1.0 (1)	3.23 (17)
Poland	6562. (26)	9.87 (23)	75 (24)	1.3 (35)	0.75 (22)	19.4 (12)	1.0 (1)	3.55 (14)
Russia	2934 (35)	9.68 (25)	67 (38)	1.4 (30)	0.67 (25)	16.9 (21)	0.17 (34)	11.5 (4)
Saudi Arabia	9832 (25)	10.3 (17)	73 (29)	3.1 (1)	0.83 (11)	19.6 (10)	0 (38)	6.36 (10)
South Africa	3710 (31)	8.55 (32)	51 (40)	2.5 (7)	0.41 (35)	19.1 (16)	0.83 (22)	8.58 (5)
Turkey	5087 (29)	7.01 (38)	71 (33)	2.1 (12)	0.75 (22)	12.8 (30)	0.5 (31)	8.48 (7)
CEEMEA	8784	9.43	70	2.3	0.7	16.8	0.5	9.2
China	2396 (37)	9.80 (24)	73 (28)	1.7 (27)	0.83 (19)	12.9 (29)	0 (38)	3.30 (16)
Hong Kong	35202 (7)	11.0 (11)	82 (1)	1.0 (40)	0.42 (33)	8.32 (40)	0.33 (31)	2.27 (24)
India	790 (40)	6.65 (39)	63 (39)	2.7 (4)	0.67 (25)	11.7 (33)	0.5 (28)	8.53 (6)
Indonesia	1178 (39)	6.24 (40)	70 (35)	2.1 (11)	0.5 (32)	8.41 (39)	0 (38)	7.00 (9)
Malaysia	5223 (28)	10.1 (18)	74 (25)	2.5 (5)	0.66 (29)	12.2 (32)	0.5 (28)	2.68 (21)
S. Korea	16462 (21)	11.8 (4)	79 (19)	1.1 (39)	0.83 (19)	15.2 (27)	0.83 (22)	3.34 (15)
Singapore	45957 (1)	9.1 (30)	80 (11)	1.2 (38)	0.83 (19)	10.0 (38)	0.33 (31)	3 (18)
Thailand	2743 (36)	7.49 (36)	68 (37)	1.8 (24)	0.42 (33)	12.4 (31)	0.17 (34)	2.28 (23)
Asia	13744	9.05	74	1.8	0.6	11.4	0.3	4.1
Argentina	10516 (24)	9.34 (29)	73 (26)	2.2 (10)	0.41 (35)	13.4 (28)	0.83 (22)	7.89 (8)
Brazil	4710 (30)	7.63 (35)	72 (32)	1.8 (21)	0.33 (37)	19.4 (11)	0.83 (22)	4.72 (13)
Colombia	3051 (32)	7.69 (33)	72 (30)	2.4 (8)	0.33 (37)	16.3 (23)	0.67 (26)	5.58 (11)
Colombia	3051 (32)	7.69 (33)	72 (30)	2.4 (8)	0.33 (37)	16.3 (23)	0.67 (26)	5.58 (11)
Venezuela	5437 (27)	7.02 (37)	73 (27)	2.5 (6)	0.16 (40)	11.5 (34)	0.5 (28)	26.2 (1)
LATAM	5354	7.88	73	2.3	0.3	15.4	0.7	10.0
Overall	18002	9.79	76.1	1.9	0.7	16.9	0.7	4.9

Note: *We were unable to reconcile the World Bank data on Egyptian government consumption and thus replaced it with the national source. **We have altered the level of democracy based on our judgment about recent improvements (see text). The 2009 Gastil estimate is 0.33. Source: See table below.

Data description

Variable	Description	Source
Average years of male schooling	The average number of years spent in education by males in 2010	www.barrolee.com
Life expectancy	The life expectancy of total population in 2008; natural log taken.	World Bank
Fertility	The number of births per woman in 2008; natural log taken	World Bank
Rule of law	An index between 0 and 1 which measures the attractiveness of the investment climate based on the level of law enforcement, contract sanctity and property rights. Data for 2009	Political Risk Services International Country Risk Guide
Government consumption	Percentage of GDP accounted for by government consumption in 2008.	World Bank
Democracy index	An indicator of political rights, originally compiled by Gastil from 1972-1994. It measures the right of all adults to vote and compete for public office and to have a decisive vote on public policies. Measured between 0 and 1, where 1 represents a full democracy.	Freedom House political rights index
Inflation rate	CPI Inflation (% year); average 2004-2007.	World Bank

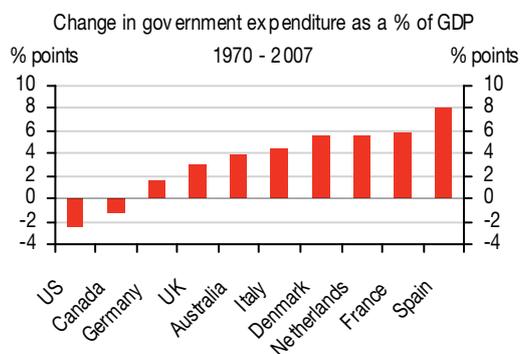
Source: HSBC

Table 23 using, the inputs in Table 21, show the model's base scenario projections for per capita growth.

There is a relatively narrow range for income per capita growth in the **developed world**, which range from 0.5% in Sweden and Norway (although not capturing natural resources, Norway's full potential may be underestimated) to 2.6% in Switzerland.

The differences can largely be accounted for by variations in schooling and size of government, which acts as a drag on real activity. If a country is already rich for its given infrastructure (such as the US), this will constrain further growth. So growth in per capita income in the US is lower than other developed-world economies. The model is essentially saying that its education and other infrastructure variables barely justify the level of income per capita, so future growth is constrained.

22. Western government's have become bloated in recent decades



Source: World Bank, HSBC calculations

But on our assumptions, it is not just the developing world that is sorting its policy imperfections. The developed world also improves its economic foundations in part by reversing some of the rise in government spending seen over the previous four decades in many of the Western economies (Chart 22), although we accept that ageing populations will make this a challenge. This explains why growth in the developed world accelerates through the forecast horizon.

23. The model's per capita growth projections

	Average annual per capita growth in 2000USD			
	2010-20	2020-30	2030-40	2040-50
US	0.6%	1.1%	1.5%	1.8%
Japan	1.3%	1.6%	1.9%	2.0%
China	6.5%	5.7%	5.1%	4.6%
Germany	2.1%	2.2%	2.3%	2.4%
UK	1.4%	1.6%	1.8%	2.0%
France	1.2%	1.5%	1.8%	2.1%
Italy	1.6%	2.4%	2.5%	2.7%
India	4.0%	4.5%	4.8%	5.1%
Brazil	2.2%	2.7%	3.1%	3.5%
Canada	1.9%	2.1%	2.2%	2.3%
S. Korea	3.7%	3.4%	3.1%	3.0%
Spain	2.4%	3.1%	3.0%	2.9%
Mexico	2.1%	3.9%	3.7%	3.6%
Australia	1.8%	2.0%	2.1%	2.2%
Netherlands	1.3%	1.6%	1.9%	2.1%
Argentina	2.4%	2.6%	2.7%	2.8%
Russia	5.1%	4.8%	4.6%	4.4%
Turkey	4.0%	3.9%	3.8%	3.7%
Sweden	0.5%	1.1%	1.6%	1.9%
Switzerland	2.6%	2.4%	2.2%	2.1%
Indonesia	3.0%	3.7%	4.2%	4.7%
Belgium	1.2%	1.5%	1.9%	2.1%
Saudi Arabia	2.0%	2.2%	2.4%	2.6%
Poland	4.0%	3.9%	3.8%	3.7%
Hong Kong	3.0%	2.7%	2.6%	2.5%
Austria	2.7%	2.6%	2.5%	2.4%
Norway	0.5%	1.1%	1.5%	1.7%
South Africa	1.1%	1.9%	2.6%	3.3%
Thailand	3.7%	4.0%	4.1%	4.2%
Denmark	0.6%	1.1%	1.5%	1.8%
Israel	-1.3%	0.3%	1.0%	1.6%
Singapore	3.6%	3.2%	2.7%	2.3%
Greece	3.1%	3.0%	2.9%	2.9%
Iran	3.5%	3.5%	3.5%	3.5%
Egypt	2.8%	4.0%	4.2%	4.3%
Venezuela	1.4%	2.0%	2.5%	3.0%
Malaysia	5.4%	4.6%	4.1%	3.6%
Finland	1.6%	1.8%	1.9%	2.1%
Colombia	3.0%	3.3%	3.6%	3.8%
Ireland	1.9%	2.0%	2.0%	2.1%

Source: Barro and HSBC

Non-Japan Asia produces a diversified crop. We split these into three broad groups, the 'good infrastructure poor', the 'good infrastructure rich' and the 'poor infrastructure poor'. The 'good infrastructure poor' group contains China and Malaysia. These economies all have good foundations in that the education levels are reasonably high, they have a good rule of law and monetary stability and relatively low fertility rates. These economies are therefore expected to converge relatively quickly.

The 'good infrastructure rich' includes Hong Kong and Singapore and to a lesser extent South

Korea. These economies already have high income per capita relative to the rest of the region. However, these economies score highly from having a small government and a combination of low democracy but strong rule of law.

The 'poor infrastructure poor' include India, Indonesia and Thailand. These economies currently have low levels of education and score less highly for rule of law and monetary stability. However, school levels are improving and we account for further improvement over our forecast horizon. Therefore while these countries start off with less impressive growth rates, their growth rates accelerate through the forecast horizon.

As a group, **LATAM** fails to achieve the income per capita growth rates seen by the star performers in Asia. In general, the education rates are lower across the region and a low score for rule of law plays a significant role in restraining growth. The rule of law index averages just 0.4 on average in the region which is half that of the star performers in Asia. This reduces the annual per capita growth rate by 1%. The region also still suffers from a lack of monetary stability, although there are significant differences across LATAM.

Brazil's relatively low growth rate is the one that most stands out, relative to expectations, and certainly relevant to recent growth rates. In this model, the low level of schooling acts as a major constraint. Of course, what the model is not capturing is the natural resources that Brazil has and how, enhanced by its trade links with China, this has spurred growth. The model is quite possibly understating Brazil's growth potential.

On the model, Mexico would have the strongest growth rate in the LATAM region as it has relatively high levels of schooling, and low government interference. It suffers on rule of law, but no more than Brazil. However, at present at least, the North American Free Trade Agreement

has seen the majority of Mexican exports travel to the US. As such, Mexican growth is extremely well correlated with US growth and per capita income has failed to grow at the pace the model would have forecast. Therefore for the first 10 years we have restricted Mexican per capita growth to be between that delivered by the model and that which we expect for the US. The per capita growth projections in LATAM also suffer due to high rates of fertility. Of course, when we start to look at total growth rates, LATAM will get a significant boost for this very reason.

CEEMEA is already a very diverse region. Israel's income per capita is already above that of the US and this year it joined the OECD.

Outside of Israel, Russia has a good level of schooling and low fertility which offsets the relatively low score for rule of law and democracy. Poland scores much more highly on all counts. Turkey and Egypt lag in terms of infrastructure with reasonably low levels of education. South Africa's outlook is constrained by the extremely low life expectancy related to the AIDS pandemic. At just 51 years, this knocks 1.5% points off the growth projections, relative to Turkey. One hopes that a solution to this disease is found over our time horizon, which should then serve to boost South Africa's growth rate significantly.

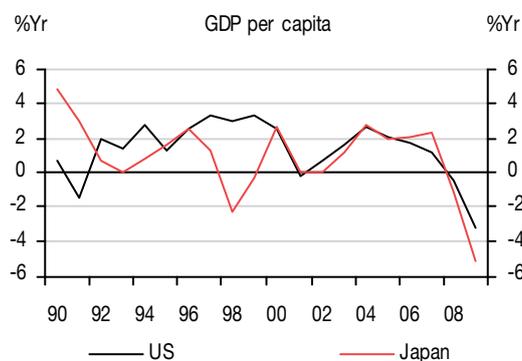
In the context of the model, with a good level of education, Iran would produce good growth rates. However, the backcasting exercise shows that Iran has failed to achieve this. Poor relations with the rest of the world and the trade and capital sanctions likely play a key role here. This just shows how the model cannot capture all of the issues, and Iran is the one country where we haven't taken the model's forecast but have replaced it with the past growth rate.

Demographic challenges

- ▶ Differences in the demographics alone could explain as much as 2.5% points in GDP growth differentials in the coming decades

So far, we have established how the economic conditions will affect how much an individual will be able to produce. But this is only part of the story. The number of people being put to work will vary substantially across economies in the coming years.

24. The performance of Japan in the 'lost decades' doesn't look as bad when demographic trends are accounted for



Source: World Bank and HSBC calculations

Demographics matter but are often ignored. People often put the stagnation of Japan relative to other developed nations down to the deleveraging after the asset bubbles of the late 1980s. While this has undoubtedly played a role, the demographic shift that has taken place explains at least some of this relative performance (Chart 24).

Table 25 highlights how each country's working population is expected to grow on average in each decade. These projections are taken from the UN.

25. Demographic challenges will be a significant drag on growth in some areas

	Average Yearly Working Population Growth %			
	2010-20	2020-30	2030-40	2040-50
US	0.5%	0.3%	0.4%	0.3%
Japan	-0.9%	-0.7%	-1.4%	-1.2%
China	0.2%	-0.1%	-0.7%	-0.5%
Germany	-0.4%	-1.1%	-1.0%	-0.7%
UK	0.2%	0.1%	0.2%	0.3%
France	-0.1%	-0.1%	-0.2%	0.0%
Italy	-0.2%	-0.6%	-1.1%	-0.6%
India	1.7%	1.2%	0.7%	0.1%
Brazil	1.1%	0.2%	-0.2%	-0.7%
Canada	0.4%	0.0%	0.4%	0.3%
S. Korea	0.0%	-1.0%	-1.3%	-1.3%
Spain	0.4%	-0.1%	-0.7%	-0.7%
Mexico	1.2%	0.5%	-0.3%	-0.5%
Australia	0.6%	0.4%	0.4%	0.4%
Netherlands	-0.2%	-0.5%	-0.4%	0.1%
Argentina	1.0%	0.8%	0.4%	-0.1%
Russia	-0.9%	-0.8%	-0.6%	-1.1%
Turkey	1.4%	0.7%	0.2%	-0.2%
Sweden	-0.1%	0.1%	0.1%	0.2%
Switzerland	0.0%	-0.3%	-0.2%	0.2%
Indonesia	1.3%	0.6%	0.0%	-0.2%
Belgium	-0.1%	-0.3%	-0.2%	0.0%
Saudi Arabia	2.6%	1.7%	1.1%	0.6%
Poland	-0.8%	-0.7%	-0.7%	-1.5%
Hong Kong	0.2%	-0.6%	-0.2%	-0.3%
Austria	0.0%	-0.6%	-0.6%	-0.3%
Norway	0.4%	0.2%	0.1%	0.3%
South Africa	0.4%	0.5%	0.4%	0.2%
Thailand	0.3%	-0.2%	-0.3%	-0.3%
Denmark	-0.2%	-0.3%	-0.4%	0.2%
Israel	1.4%	1.2%	0.8%	0.5%
Singapore	0.2%	-1.1%	-0.7%	-0.3%
Greece	-0.2%	-0.4%	-0.8%	-0.8%
Iran	1.0%	0.9%	0.3%	-0.7%
Egypt	1.9%	1.6%	1.1%	0.5%
Venezuela	1.7%	1.2%	0.8%	0.3%
Malaysia	1.7%	1.1%	0.7%	0.2%
Finland	-0.5%	-0.3%	0.0%	-0.2%
Colombia	1.5%	0.9%	0.5%	0.2%
Ireland	0.9%	0.9%	0.2%	-0.1%

Source: UN and HSBC Calculations

In the coming decade, average GDP growth should be 1.5% points higher in the US than in Japan based on the demographics alone. India's GDP growth should be more than 2.5% points higher than Japan's for this reason.

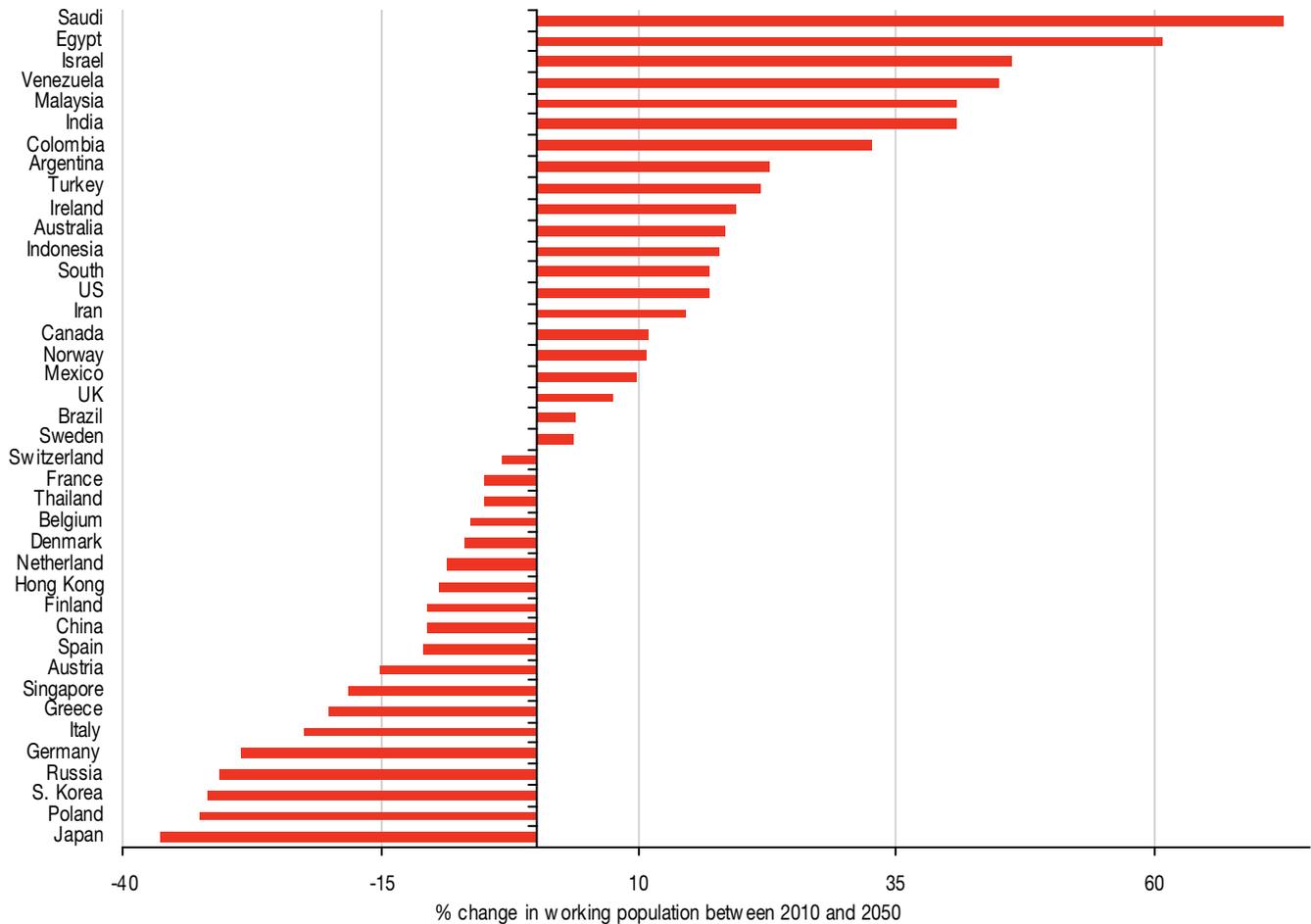
Perhaps the most striking way to see what's going on is to look at the total change over the whole 40-year period (Chart 26).

Japan's workforce will shrink by a whopping 37%. South Korea's demographic outlook isn't a lot better, falling by 32%. Singapore, China and South Korea will also see more than double-digit declines in total working population.

The outlook for working population in parts of Europe is similarly challenging, particularly in Russia, Poland and Germany.

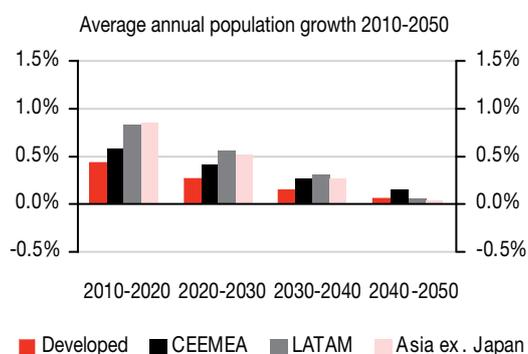
On the other side of the spectrum, Saudi Arabia, with the highest fertility rate, gets a significant boost to growth with the working population expected to grow by more than 70%. Egypt isn't far behind. Certain parts of Asia – Malaysia, India, and Indonesia – will all see strong growth in their workforce.

26. The outlook for working population is vastly different across economies



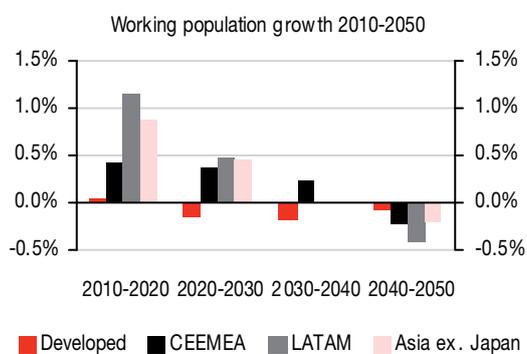
Source: UN projections, HSBC calculations

27. Total population growth declines over time...



Source: UN projections, simple averages of countries in our Top 30 in each region

28...but the downturn is even more stark in working population



Source: UN projections, simple averages of countries in our Top 30 in each region

Looking at this on a regional basis, it's clear that while population growth is set to slow significantly across the world (Chart 27), the slowdown in working population is even greater (Chart 28). But there is a large dispersion by region. The working population in the developed world will only grow for one more decade and barely at that. CEEMEA, despite being dragged down by Russia and Poland, has a better outlook than the developed world but well below that of the other emerging regions.

By far the best region, in terms of available workers, is LATAM due to the rate of fertility which is still reasonably high, averaging 2.1 births per woman.

Of course these working age projections are subject to a considerable degree of uncertainty. The most morbid is disease, which could raise the mortality rate. By contrast, medical breakthroughs could lower the mortality rate.

Immigration flows are another feature which can throw these projections heavily off course.

A perhaps more predictable deviation from these projections would be retirement ages. These are already rising in Western economies as people are living longer and funding public pensions proves too much of a burden on fiscal positions.

There could also be government incentives to try and raise the fertility rate. Russia has recently announced a scheme whereby couples producing three children or more are entitled to a certain amount of land. This again highlights the uncertainty around forecasting this far in to the future.

Charts showing the demographic profile by country can be found in Appendix 2.

Putting everything together

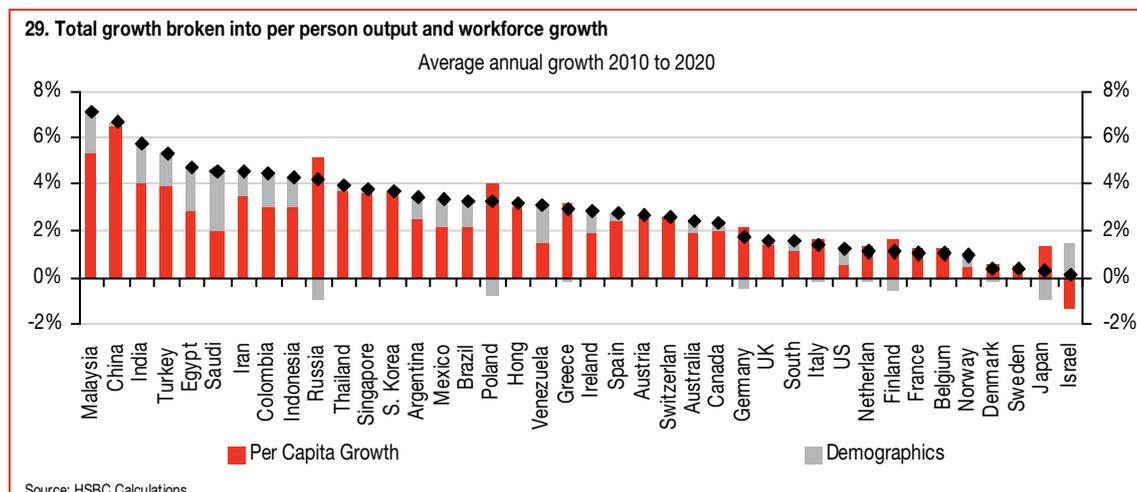
- ▶ Asia will continue demonstrating extremely strong growth rates and those with large populations will overtake Western powerhouses
- ▶ Latin America will feature more heavily in the global league tables
- ▶ The league table losers – the small European countries – may struggle to maintain their influence in global policy forums

Adding our outlook for income per capita to the demographic projections, we get to total growth rates found in Table 30. For the first 10 years, the breakdown into per capita and workforce growth is shown in Chart 29.

It will come as no surprise to see that China is near the top of the growth table. But as income per capita rises and the one-child policy leads to a demographic headwind, India's growth rate soon overtakes that of China beyond 2030.

But there are other bright stars in **Asia**. Malaysia, Thailand and Indonesia all demonstrate rapid rates of growth and as their education and policy systems develop, these are likely to be sustained over our forecast horizon.

In **CEEMEA**, Russia is projected to continue its rapid expansion, but it scores fewer points for monetary stability and has a less-supportive demographic outlook than some of its Asian rivals, which limits its relative performance. Of course, with the model not accounting for an



economy's natural resources, movements in the oil price could play a key role in sending these Russian projections off track. In the CEEMEA region, Turkey and Egypt each look set for a better run.

Latin America, helped by an encouraging demographic outlook also produces good growth rates. **Colombia** looks set to deliver the fastest growth rates in the LATAM region, although by not accounting for Brazil's natural resources, we may be underestimating the potential pace of growth in Brazil.

As we step back and think about what is happening, in essence there have been structural improvements in the economic governance of these economies. Assuming governments continue to improve on recent advances, income per capita will continue to catch up with the levels seen in the Western world. This is making them more attractive investment destinations and such investment is lifting income per capita. And if you're already large by population, you will become large in economic size.

30. The model's total GDP projections

	2010-20	2020-30	2030-40	2040-50
US	1.1%	1.4%	1.9%	2.1%
Japan	0.4%	0.9%	0.5%	0.8%
China	6.7%	5.5%	4.4%	4.1%
Germany	1.7%	1.1%	1.4%	1.7%
UK	1.6%	1.7%	1.9%	2.2%
France	1.1%	1.4%	1.6%	2.1%
Italy	1.4%	1.9%	1.5%	2.1%
India	5.7%	5.6%	5.5%	5.2%
Brazil	3.3%	2.9%	2.9%	2.8%
Canada	2.3%	2.1%	2.6%	2.5%
S. Korea	3.7%	2.3%	1.8%	1.7%
Spain	2.8%	2.9%	2.3%	2.2%
Mexico	3.3%	4.4%	3.5%	3.1%
Australia	2.4%	2.3%	2.5%	2.6%
Netherlands	1.1%	1.2%	1.5%	2.2%
Argentina	3.4%	3.3%	3.1%	2.7%
Russia	4.2%	4.0%	4.0%	3.3%
Turkey	5.3%	4.7%	4.0%	3.5%
Sweden	0.4%	1.3%	1.7%	2.1%
Switzerland	2.6%	2.0%	2.0%	2.3%
Indonesia	4.3%	4.3%	4.3%	4.5%
Belgium	1.0%	1.2%	1.7%	2.1%
Saudi Arabia	4.5%	3.9%	3.5%	3.2%
Poland	3.3%	3.2%	3.1%	2.1%
Hong Kong	3.2%	2.1%	2.4%	2.2%
Austria	2.7%	1.9%	1.9%	2.1%
Norway	0.9%	1.3%	1.5%	2.1%
South Africa	1.5%	2.4%	3.1%	3.5%
Thailand	4.0%	3.8%	3.8%	4.0%
Denmark	0.5%	0.8%	1.1%	2.0%
Israel	0.1%	1.6%	1.8%	2.1%
Singapore	3.7%	2.1%	2.0%	2.1%
Greece	2.9%	2.6%	2.2%	2.1%
Iran	4.5%	4.4%	3.8%	2.8%
Egypt	4.7%	5.6%	5.2%	4.8%
Venezuela	3.1%	3.2%	3.3%	3.3%
Malaysia	7.1%	5.7%	4.7%	3.8%
Finland	1.1%	1.4%	1.9%	1.9%
Colombia	4.5%	4.2%	4.1%	4.0%
Ireland	2.8%	2.8%	2.2%	1.9%

Source: Barro and HSBC

Taking a look at the global leaderboard in 2050 and compare that to how it stands today (Table 31 - order in 1970 included for illustration), the US may then find its ego somewhat bruised by falling off the top spot but it will, of course, remain a dominant force at international policy meetings.

By contrast, the small by population and well-developed economies in **Europe** will find themselves slipping rapidly down the league table, or disappearing from the Top 30 altogether. Indeed, by our calculations, Sweden, Austria, Norway and Denmark all find themselves falling out of the list by 2050. As we've already mentioned, income per capita is still rising, so in some ways this doesn't matter. However, these countries may find themselves having less of a say in the global policy arena. As competition hots up for the world's scarce resources, this may become an issue.

31. The potential reshuffle between now and 2050 is no different from that seen in the last forty years

Order in 1970	Order in 2010	Order in 2050
1 US	1 US	1 China
2 Japan	2 Japan	2 US
3 Germany	3 China	3 India
4 UK	4 Germany	4 Japan
5 France	5 UK	5 UK
6 Italy	6 France	6 Germany
7 Canada	7 Italy	7 Brazil
8 Spain	8 India	8 Mexico
9 Brazil	9 Brazil	9 France
10 Mexico	10 Canada	10 Canada
11 Netherlands	11 S. Korea	11 Turkey
12 Australia	12 Spain	12 Italy
13 Switzerland	13 Mexico	13 S. Korea
14 Argentina	14 Australia	14 Spain
15 Sweden	15 Netherlands	15 Russia
16 India	16 Argentina	16 Indonesia
17 Belgium	17 Russia	17 Argentina
18 China	18 Turkey	18 Australia
19 Austria	19 Sweden	19 Egypt
20 Denmark	20 Switzerland	20 Malaysia
21 Turkey	21 Indonesia	21 Saudi Arabia
22 South Africa	22 Belgium	22 Thailand
23 Venezuela	23 Saudi Arabia	23 Netherlands
24 S. Korea	24 Poland	24 Poland
25 Greece	25 Hong Kong	25 Colombia
26 Norway	26 Austria	26 Switzerland
27 Finland	27 Norway	27 Iran
28 Saudi Arabia	28 South Africa	28 Hong Kong
29 Iran	29 Thailand	29 Venezuela
30 Portugal	30 Denmark	30 South Africa

Source: World Bank and HSBC calculations

Over the limit?

- ▶ Energy availability need not hinder this path of global development ...
- ▶ ...so long as there is major investment in efficiency and low-carbon alternatives
- ▶ Meeting food demand may prove more of a challenge, but improvements in yield and diet could fill the gap

Over the limit?

The scale of economic expansion forecast in this report over the next four decades raises inevitable questions about environmental feasibility: Put simply, does the planet have enough capacity to sustain this tripling in economic output by 2050?

The answer is a cautious yes: The world economy can triple its income, but only if levels of resource productivity are improved many times over.

More than two planets

Global prosperity depends on an array of ecosystem services, notably the provision of natural resource inputs (such as food, fuel and materials), as well the regulation of natural processes (e.g. water filtration, crop pollination and climate stability). Most of these services are under-priced in today's global economy – with the inevitable result that many natural assets are becoming over-exploited. Not only are many externalities – such as carbon costs – poorly priced, but additional agricultural, energy and water subsidies encourage further depletion: fossil fuels alone received USD557bn in government support in 2008.

As a result of these market and policy failures, the global economy's 'ecological footprint' has doubled since 1966. By 2007, humanity was using the equivalent of 1.5 planets each year to support its consumption levels, according to the environmental group, WWF.

Essentially, the global economy has entered a period of ecological deficit – depleting natural assets faster than these can be replenished. And this is at a time when more than 1 billion people are still under-nourished, lack access to electricity as well as modern sanitation. By 2030, the footprint is projected to have deepened to two planets' worth of resources each year and to 2.8 planets in 2050. Clearly, it is possible to deplete natural assets for a time – but continuing resource overshoot runs the risk of localised and, increasingly, global constraints on economic activity. Looking ahead to 2050, the major challenges for growth flow from climate change, as well as land and water availability for food production.

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Running out of inputs?

Much of the discussion about ecological capacity has been cast in the language of ‘running out’ of key inputs, notably energy and metals.

In the case of metals, core commodities such as aluminium, iron and even copper are widely available, and easily recyclable. Even rare earths are not so rare. Total global production in 2009 of 14 key ‘rare earth’ materials amounted to 127,520 tonnes. Yet, according to a recent report by the US Department of Energy, global reserves stand at some 99 million tonnes. The issue, however, is that current production is highly concentrated, with 95% of output accounted for by just one country, China.

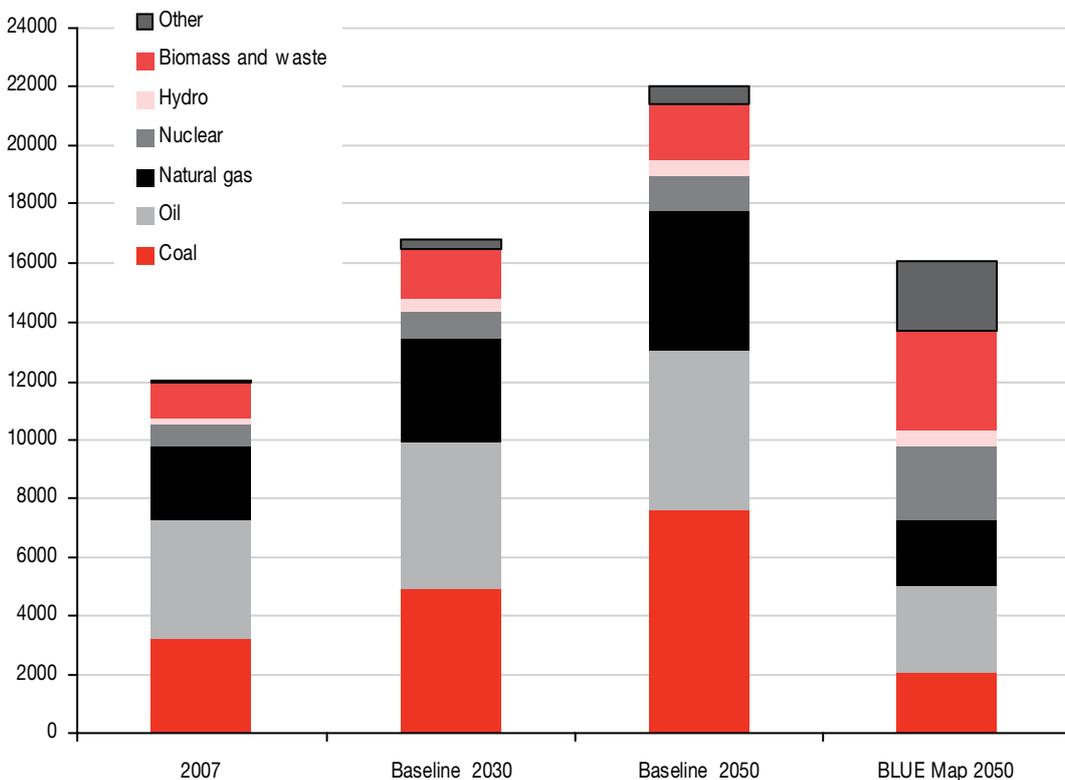
Energy availability is somewhat more complicated. The era of cheap and easily accessible oil supplies is clearly over, with some

pointing to the risk of ‘peak oil’ disrupting economic stability. A report on energy security from the Lloyds insurance market concludes, for example, that “we are heading for a global oil supply crunch and price spike”. Reserves of coal and gas are more plentiful, however. And supplies of renewable energy are for all intents and purposes unlimited (and to date, untapped), at over 3,000 times larger than current energy needs.

The International Energy Agency’s (IEA) latest Energy Technology Perspectives report shows in its BLUE Map scenario that it is possible to raise energy production by 2050 while simultaneously reducing coal, oil and gas consumption below current levels (Chart 32).

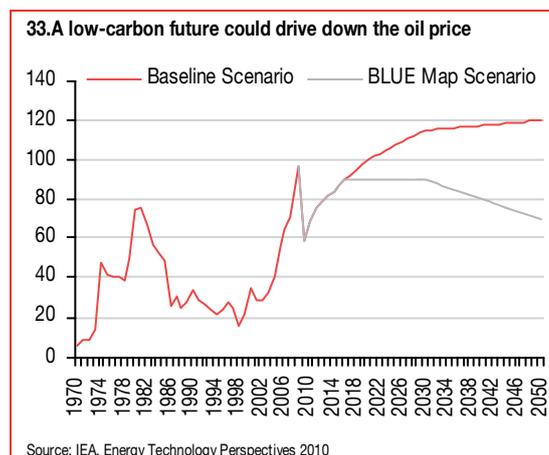
Indeed, for an additional upfront cost of USD46trn in energy efficiency, renewables, nuclear and ‘clean coal’, fuel savings amounting

32. A low-carbon future in 2050 will use less energy than ‘business as usual’ in 2030: world primary energy supply by fuel (BoE)



Source: IEA, Energy Technology Perspectives 2010

to USD112trn could be generated by 2050. One consequence would be a significant reduction in the projected cost of oil (Chart 33).



Breaking the link

The fundamental issue for energy therefore is not so much its availability to meet global needs, but the cost, either in terms of emissions or the investment required today to deliver alternative energy sources. In terms of the climate change impact of greenhouse gas (GHGs) emissions, fossil fuels account for around 60% of the global total. To have a reasonable chance of holding long-term global warming to around 2 degrees Celsius, GHGs will need to be cut by half by 2050 – at a time when the global economy is more than tripling.

Greenhouse gas emissions are the largest and fastest-growing component of the global economy's 'ecological footprint' – and according to a report for the PRI investor alliance, these emissions generated an external damage costs of USD4.5trn in 2008, some 7.5% of global GDP; this external cost is projected to rise to over 12% of global GDP by 2050.

Breaking the historic link between economic growth and carbon emissions will certainly be hard. But it is both technologically feasible and economically attractive.

Feeding the world

The growing sense of confidence that a practical pathway exists to a clean-energy economy by 2050 is not yet in place for food and water. The Food and Agriculture Organisation projects that a 70% increase in food production will be needed by 2050. But growth in yields has been falling from 3.2% a year in 1960 to 1.5% in 2000. In addition, the scope for increasing the area under cultivation is limited by the need to halt the decline in soil and water resources, the loss of species as well as the erosion of ecosystem quality that is proceeding on the back of rising food consumption. In 1995, about 1.8 billion people were living in areas experiencing severe water stress; by 2025, about two-thirds of the world's population – about 5.5 billion people – are expected to live in areas facing moderate to severe water stress.

Climate change will further compound the issue. Although governments agreed in Cancun in December 2010 to try to hold the increase in average global temperatures below 2°C this century, current commitments remain insufficient. As a result, the world could well warm by 2°C by 2050, and in some projections by as early as 2024 (see *Too Close for Comfort*, December 2009). This would have severe implications for agricultural yields, as well as water availability, with greater incidence of extreme events such as droughts and floods.

Yet the potential for meeting nutritional needs and sustaining resources in a world of 9 billion people with much higher incomes clearly exists. With investment, yields can be improved, crops can be adapted to a changing climate, and post-harvest losses can be cut. And the need to slow and reverse the negative health impacts of over-consumption offers another way of matching resources with rising incomes and human well-being. Approximately 1.5bn adults were

overweight in 2005, with 400 million obese. By 2015, the World Health Organisation projects that this could rise 2.3 billion and 700 million respectively. In the UK, a quarter of adults are already obese, a figure that is projected to grow to 60% of men and 50% of women in 2050.

The Mother of Opportunity

While Keynes and Friedman are currently battling it out in the economic conundrum of how to generate growth, the contest of the coming decades will be between Malthus' economics of scarcity and Stern's³ economics of green growth. There are real limits to the continued expansion of the global economy's 'ecological footprint' – and if these are not confronted then economic output and human well-being will become increasingly constrained. But growth can also be delivered by investing in the markets, technologies, knowledge and business models that improve resource productivity and sustain natural assets.

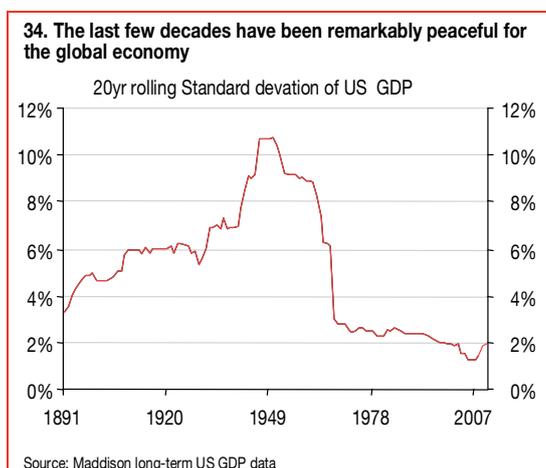
On the road to 2050, we expect what are currently 'off balance sheet' costs – whether in terms of carbon emissions or biodiversity loss – to be brought more formally into economic decision-making. This will reward the corporations and countries that make resource productivity a key element of long-term strategy. Even with the current modest targets, we expect the low-carbon economy to grow by 10% CAGR over the next decade to reach over 2% of global GDP (see *Sizing the climate economy*, September 2009).

We believe that there will be a deepening of deployment and innovation in the decades thereafter, with the 'climate economy' potentially playing an equivalent role to the 'knowledge economy' in the past century. It will be growth, but not as we know it.

³ Lord Stern is author of *The Economics of Climate Change*.

What might go wrong?

- ▶ Our projections are based on policymakers making ‘good’ decisions
- ▶ The most pressing risk is that open borders, which have played such a key role in development, are closed



In a nutshell, our projections are based on a rather rosy backdrop – everything is going right, governments and policymakers are doing the right thing. Of course, there are a number of reasons things might not play out in the way we have assumed. We should remind ourselves that up until the recent turmoil we had seen a remarkably calm period for the global economy as a whole (Chart 34).

Border barriers and war

The biggest danger is that the open borders that have delivered so much prosperity are closed. It's hard to see how such a wave of protectionism could benefit any individual economy, and certainly not the system as a whole. But politicians' motivation tends to be about getting through the next election, rather than long-term growth. As such, bad politics is a key risk to these

projections. And, of course, trade wars can be followed by real wars. We probably don't need to go any further in highlighting how this would disrupt our projections.

Cyclical interruptions

Our model is a structural model of potential supply and therefore ignores cyclical factors and whether there are ebbs and flows in demand.

Natural disasters

Natural disasters can send economies seriously off course as their development seeks to replace what was lost rather than make any further leap forward.

Factors the model isn't picking up

No model can perfectly capture all the idiosyncratic factors that will constrain or boost an economy's development. One of the most significant variables we are not capturing is the natural resources with which an economy is endowed and how this drives its relative terms of trade and its bargaining power in the global economy. There are also important trade linkages that we are not capturing. Brazil has developed close trade ties with the emerging markets, which appears to have accelerated its development.

Supply-side setbacks

The supply-side advances in both the developed and emerging markets, which have managed to deliver growth without inflation, could go into reverse. The prospect of China's labour force becoming more militant is at the forefront of a number of investors' minds. And in the western world, faced with an ongoing squeeze in real income, further cuts to public pension provision and increases in retirement ages, one can't rule out a re-emergence of labour unionisation.

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Appendix 1

Barro's growth model

A1. The model

Variable	Coefficients
Log GDP	-0.018
Male schooling	0.002
Log GDP * schooling	-0.004
Log life expectancy	0.044
Log fertility	-0.016
Government consumption ratio	-0.136
Rule of law index	0.029
Democracy index	0.090
Democracy index squared	-0.088
Inflation rate	-0.043

Source: Barro with HSBC adjustment to schooling

To test whether the model was too simplistic we used the data on the economic infrastructure for our forty countries in 2000 and predicted the average per capita income over the past ten years.

We made two amendments to Barro's original model. First, we lowered slightly the convergence rate, in line with more recent literature (See OECD 2001).

Second, it appeared that the original model was overstating the impact of education. In Barro's original model, an extra year of schooling served to raise GDP growth by 1.2% points. Those with very high levels of education, such as Germany, were forecast to grow much more quickly than they achieved. And countries such as India with very low levels of education were barely forecast to grow at all. However, recalibrating the model to lower the impact of education produced remarkably accurate forecasts for such a simple model. The main areas of failure are in Asia, where the region in the early part of the 2000-2010 period was still recovering from the Asian crisis.

A2. Testing the model by forecasting growth from 2000-09

	Model Forecast	Actual growth rate	Forecast error
China	6.7%	9.6%	2.9%
India	4.6%	5.5%	0.9%
Russia	5.5%	5.2%	-0.3%
US	0.7%	0.8%	0.2%
UK	1.5%	1.2%	-0.3%
Brazil	2.2%	2.1%	-0.1%
Japan	0.9%	0.8%	-0.1%
Germany	1.4%	0.8%	-0.6%
France	0.8%	0.8%	-0.1%
Italy	2.0%	0.0%	-2.1%
Spain	3.1%	1.2%	-1.9%
Canada	1.7%	1.3%	-0.4%
Mexico	3.7%	0.8%	-2.9%
Australia	1.7%	1.7%	0.0%
S. Korea	3.8%	3.9%	0.1%
Netherlands	1.2%	1.1%	-0.1%
Turkey	1.6%	2.4%	0.8%
Poland	5.2%	4.1%	-1.1%
Indonesia	1.9%	3.8%	1.9%
Belgium	1.1%	1.0%	-0.1%
Switzerland	2.2%	1.4%	-0.8%
Sweden	0.5%	1.4%	0.9%
Thailand	5.1%	3.1%	-2.0%
Argentina	3.3%	2.6%	-0.7%
Greece	3.0%	3.0%	0.0%
Malaysia	6.3%	2.8%	-3.4%
Ireland	1.8%	2.2%	0.4%
Finland	1.7%	1.8%	0.1%
South Africa	2.0%	2.2%	0.2%
Denmark	0.4%	0.5%	0.1%
Austria	2.3%	1.3%	-1.1%
Norway	0.0%	1.2%	1.2%
Saudi Arabia	2.4%	1.0%	-1.4%
Hong Kong	5.1%	4.3%	-0.8%
Colombia	2.2%	2.4%	0.2%
Venezuela	1.4%	2.1%	0.7%
Iran	5.6%	3.6%	-2.1%
Israel	-0.4%	1.5%	1.9%
Singapore	5.5%	3.2%	-2.3%
Egypt	5.4%	2.9%	-2.5%

Source: Barro and HSBC calculations

Creating the base scenario forecasts

A3. Model's projections assuming the 'economic infrastructure' doesn't improve

	2010-20	2020-30	2030-40	2040-50
US	0.5%	0.5%	0.6%	0.6%
Japan	1.2%	1.2%	1.0%	0.9%
China	6.6%	5.2%	4.2%	3.5%
Germany	2.1%	1.8%	1.5%	1.3%
UK	1.3%	1.1%	0.9%	0.7%
France	1.2%	1.0%	0.8%	0.7%
Italy	2.1%	1.7%	1.4%	1.2%
India	4.1%	3.4%	3.0%	2.6%
Brazil	2.3%	1.7%	1.4%	1.1%
Canada	1.9%	1.6%	1.3%	1.1%
S. Korea	3.9%	2.9%	2.4%	1.9%
Spain	2.9%	2.5%	2.0%	1.7%
Mexico	3.6%	3.0%	2.5%	2.1%
Australia	1.9%	1.5%	1.3%	1.1%
Netherlands	1.2%	1.1%	0.9%	0.8%
Argentina	2.5%	1.9%	1.6%	1.3%
Russia	5.1%	4.3%	3.5%	2.9%
Turkey	4.0%	3.4%	2.9%	2.5%
Sweden	0.5%	0.5%	0.5%	0.5%
Switzerland	2.6%	2.1%	1.7%	1.4%
Indonesia	3.1%	2.6%	2.1%	1.8%
Belgium	1.1%	1.0%	0.8%	0.7%
Saudi Arabia	1.9%	1.5%	1.2%	1.0%
Poland	4.1%	3.3%	2.7%	2.2%
Hong Kong	3.0%	2.4%	1.9%	1.6%
Austria	2.7%	2.2%	1.8%	1.5%
Norway	0.4%	0.5%	0.6%	0.6%
South Africa	1.1%	0.8%	0.6%	0.4%
Thailand	3.8%	3.1%	2.7%	2.2%
Denmark	0.6%	0.5%	0.4%	0.4%
Israel	-0.1%	0.9%	0.8%	0.7%
Singapore	4.2%	3.5%	3.0%	2.5%
Greece	3.0%	2.6%	2.1%	1.7%
Iran	6.2%	5.1%	4.2%	3.4%
Egypt	3.5%	4.3%	3.8%	3.2%
Venezuela	1.4%	1.0%	0.7%	0.5%
Malaysia	5.4%	4.3%	3.5%	2.9%
Finland	1.5%	1.3%	1.1%	0.9%
Colombia	3.0%	2.5%	2.0%	1.7%
Ireland	1.6%	1.5%	1.3%	1.1%

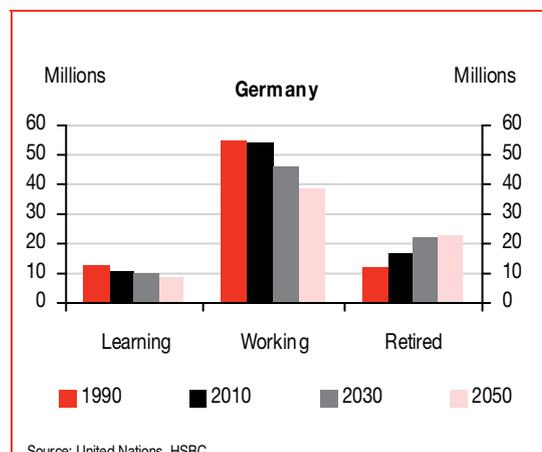
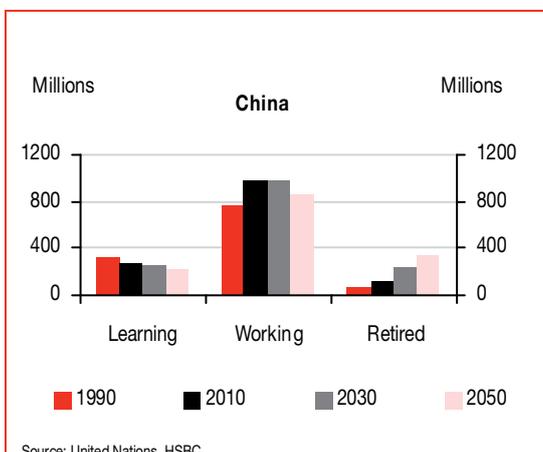
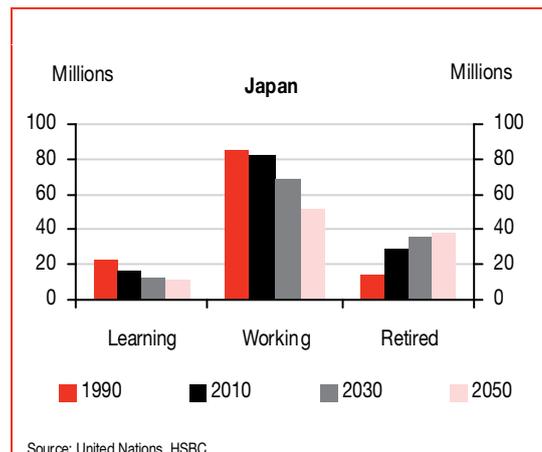
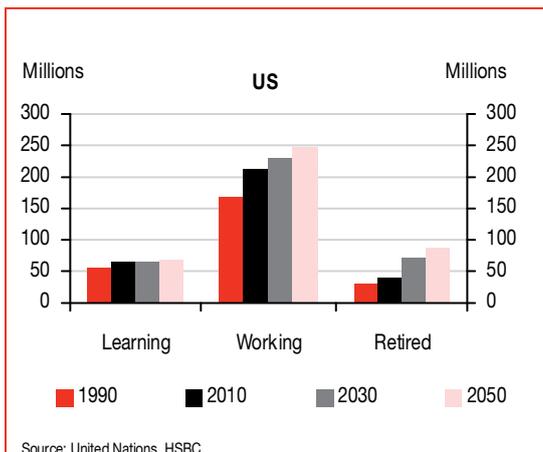
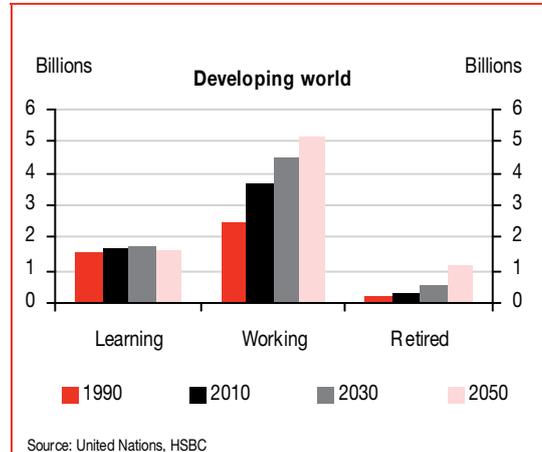
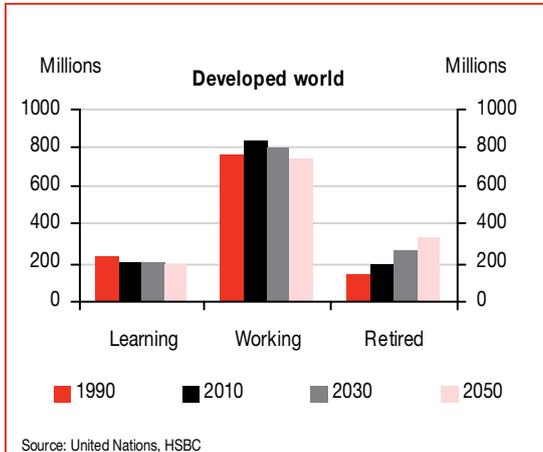
Source: HSBC Calculations

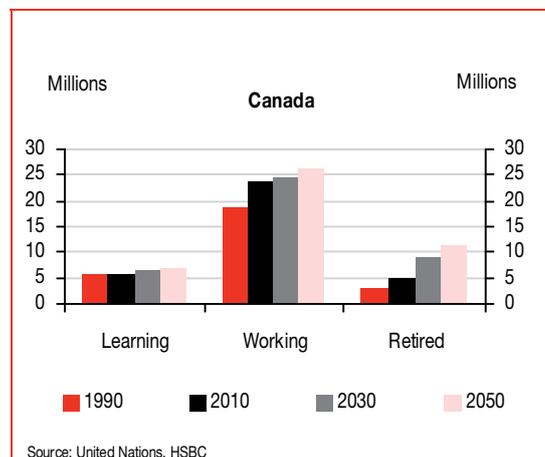
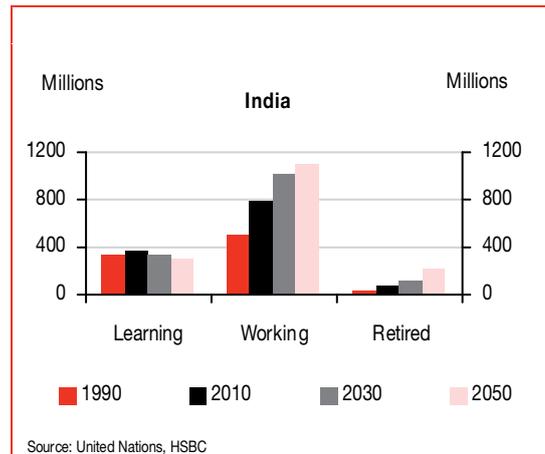
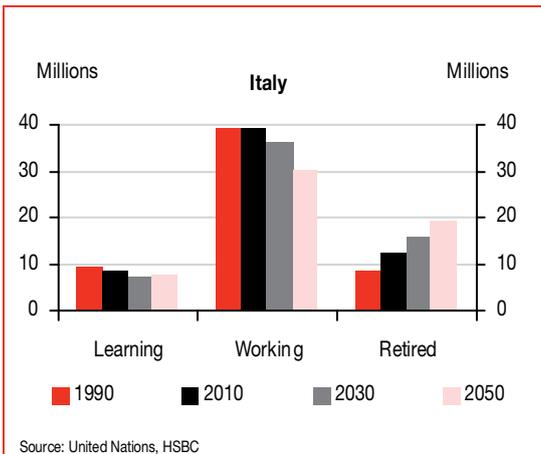
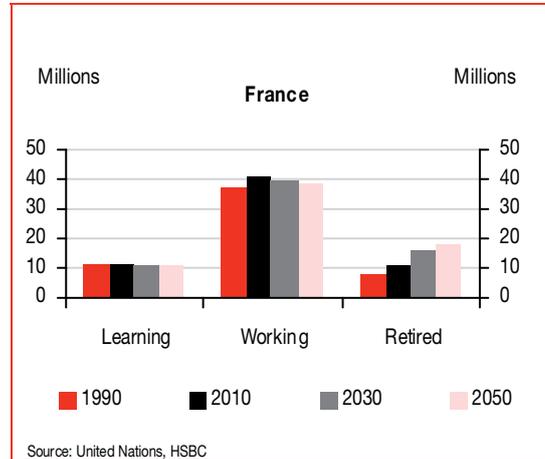
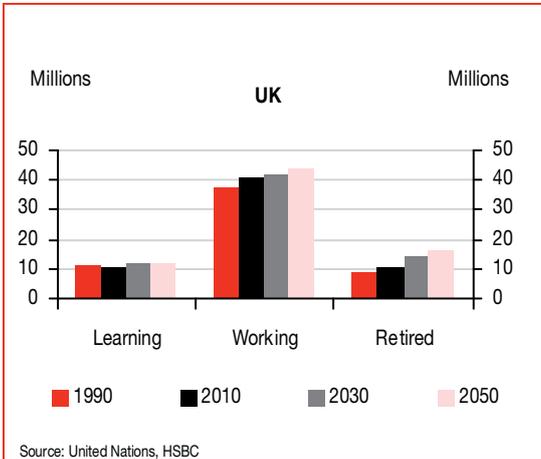
A4. Model's projections assuming the 'economic infrastructure' improve to the highest possible level

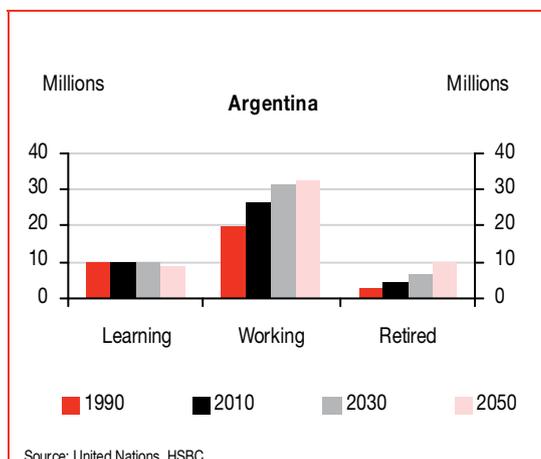
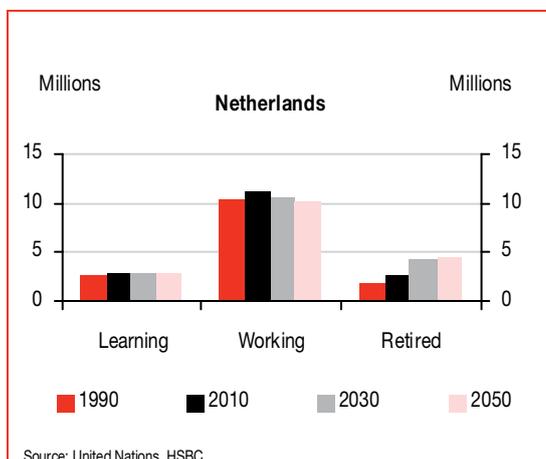
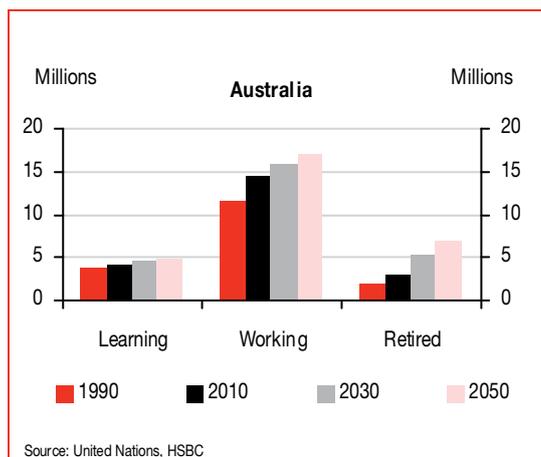
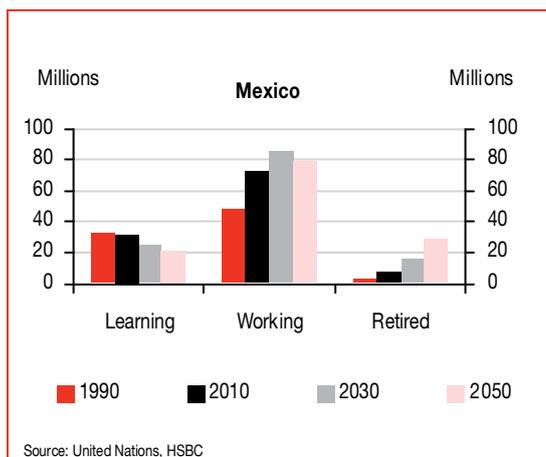
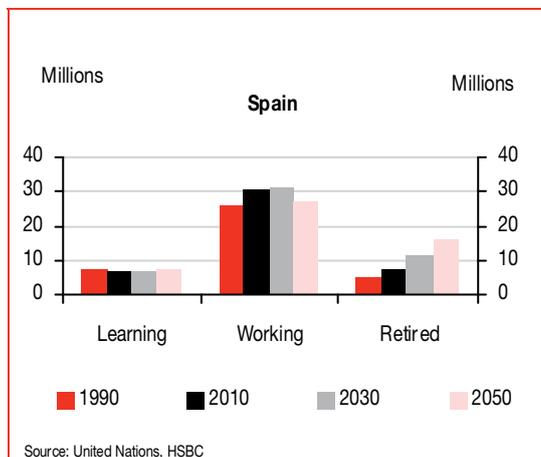
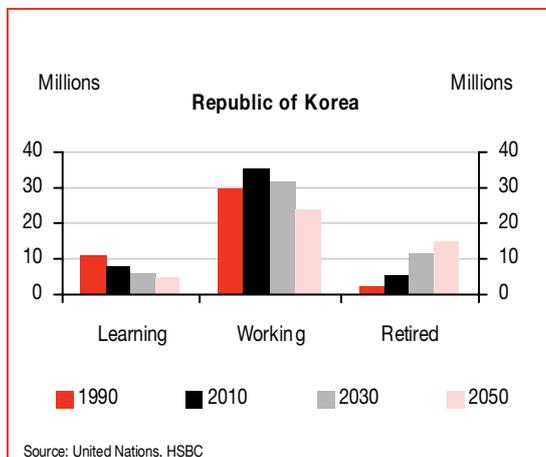
	2010-20	2020-30	2030-40	2040-50
US	0.5%	1.6%	2.3%	2.8%
Japan	1.2%	2.1%	2.7%	3.2%
China	6.6%	6.0%	5.8%	5.6%
Germany	2.1%	2.8%	3.2%	3.6%
UK	1.3%	2.1%	2.7%	3.2%
France	1.2%	2.1%	2.8%	3.4%
Italy	2.1%	2.9%	3.5%	4.0%
India	4.1%	5.4%	6.5%	7.3%
Brazil	2.3%	3.5%	4.7%	5.7%
Canada	1.9%	2.5%	3.0%	3.4%
S. Korea	3.9%	3.7%	3.9%	4.0%
Spain	2.9%	3.4%	3.7%	4.0%
Mexico	3.6%	4.1%	4.4%	4.7%
Australia	1.9%	2.3%	2.8%	3.1%
Netherlands	1.2%	2.2%	2.9%	3.4%
Argentina	2.5%	3.1%	3.6%	4.2%
Russia	5.1%	5.5%	5.7%	6.0%
Turkey	4.0%	4.4%	4.7%	4.9%
Sweden	0.5%	1.7%	2.6%	3.2%
Switzerland	2.6%	2.6%	2.7%	2.7%
Indonesia	3.1%	4.7%	6.2%	7.3%
Belgium	1.1%	2.1%	2.9%	3.5%
Saudi Arabia	1.9%	2.6%	3.3%	3.9%
Poland	4.1%	4.4%	4.8%	5.1%
Hong Kong	3.0%	3.0%	3.1%	3.2%
Austria	2.7%	3.0%	3.2%	3.3%
Norway	0.4%	1.5%	2.3%	2.8%
South Africa	1.1%	2.9%	4.5%	5.9%
Thailand	3.8%	4.7%	5.5%	6.1%
Denmark	0.6%	1.7%	2.6%	3.3%
Israel	-0.1%	1.3%	2.4%	3.3%
Singapore	4.2%	3.4%	3.0%	2.6%
Greece	3.0%	3.5%	3.8%	4.1%
Iran	6.2%	6.0%	5.9%	5.8%
Egypt	3.5%	4.5%	5.3%	6.1%
Venezuela	1.4%	2.8%	4.1%	5.3%
Malaysia	5.4%	4.8%	4.5%	4.2%
Finland	1.5%	2.3%	2.8%	3.3%
Colombia	3.0%	4.1%	5.0%	5.7%
Ireland	1.6%	2.3%	2.7%	2.9%

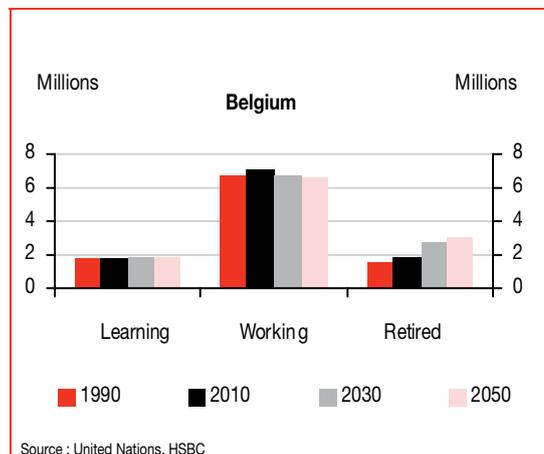
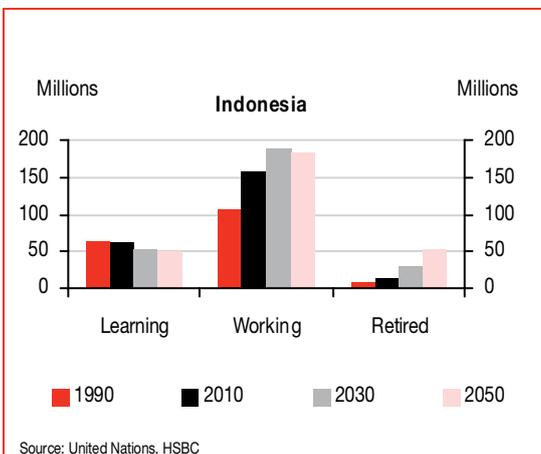
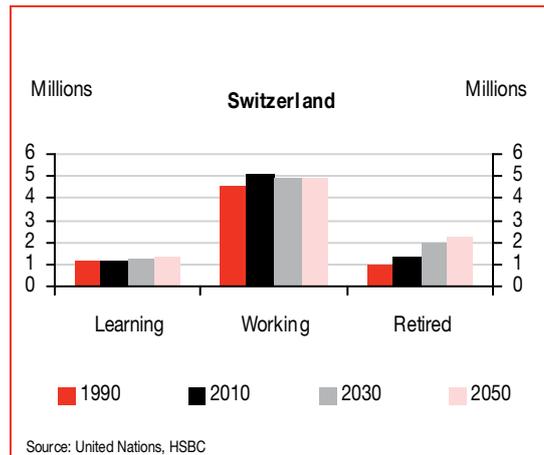
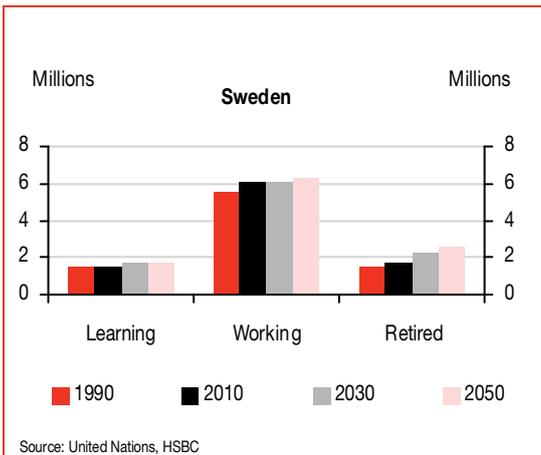
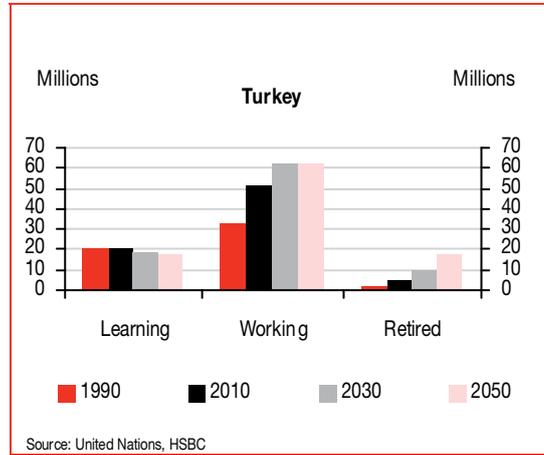
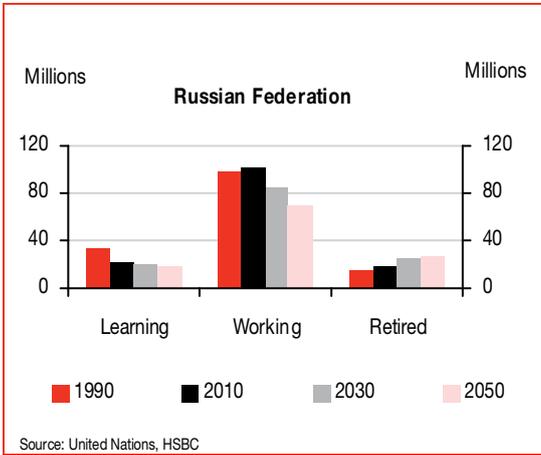
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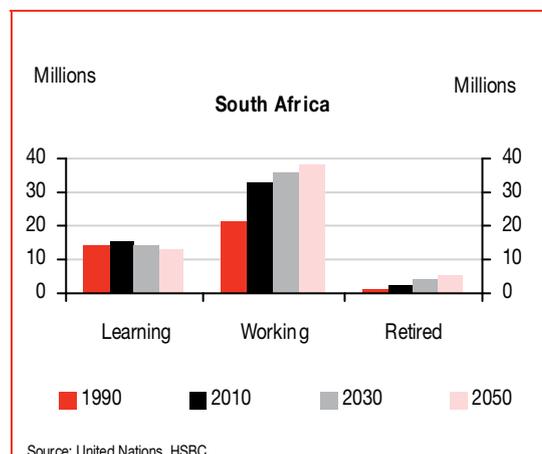
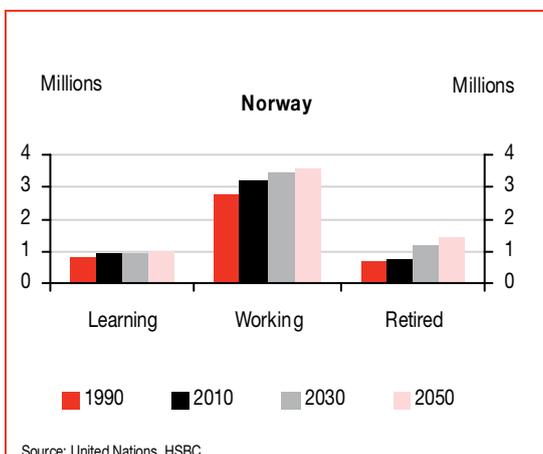
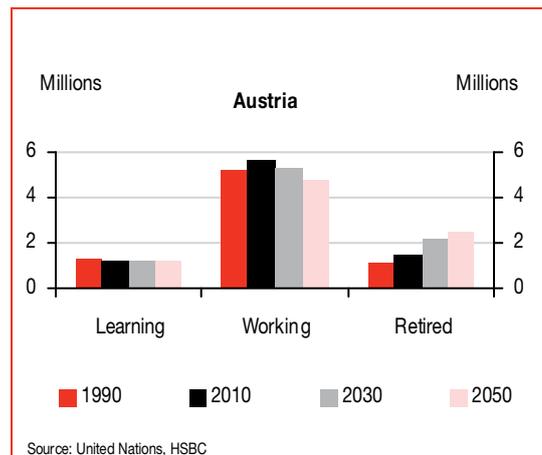
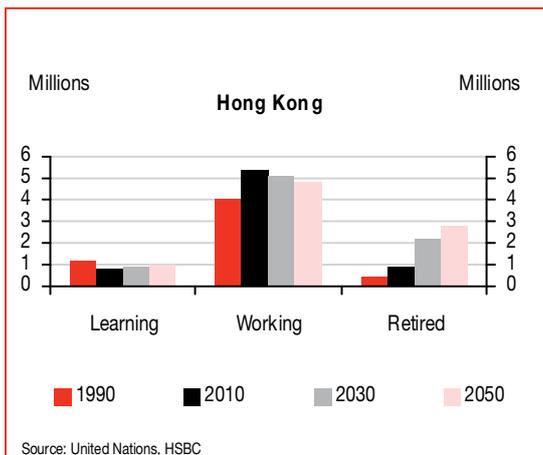
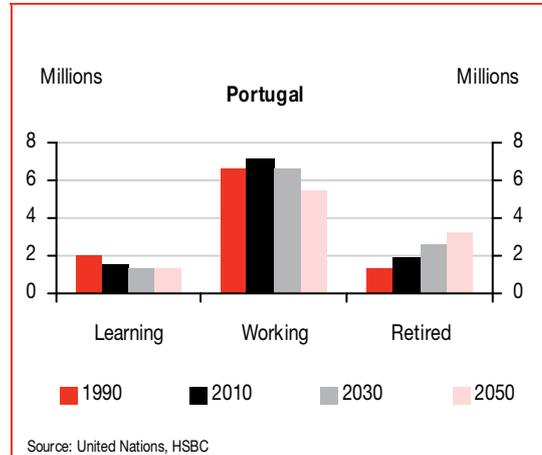
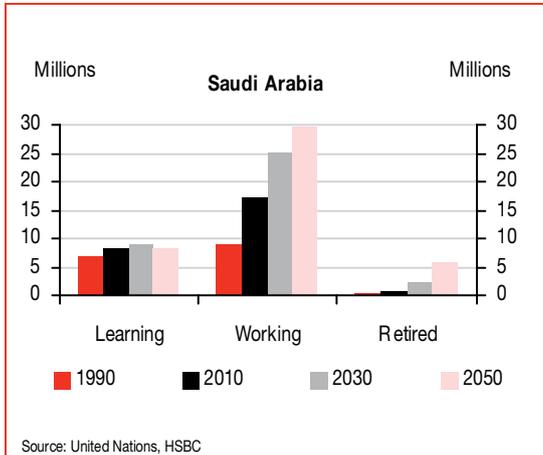
Appendix 2: Population demographic changes to 2050.

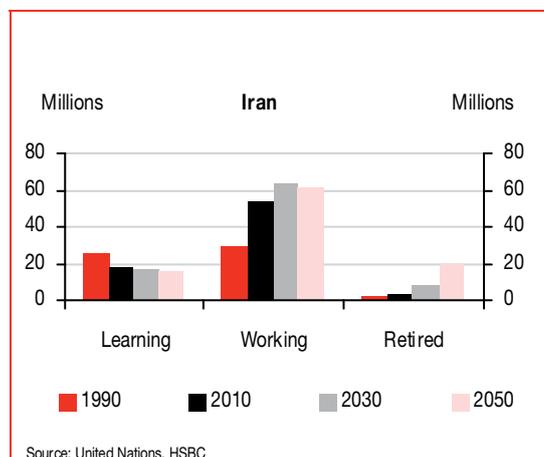
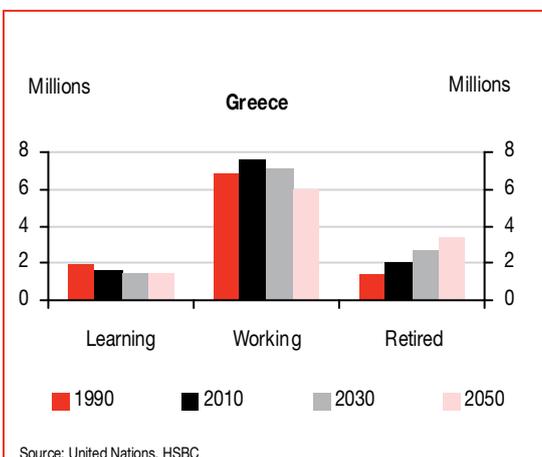
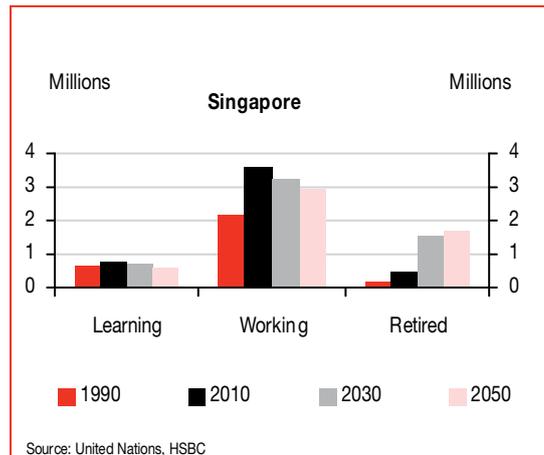
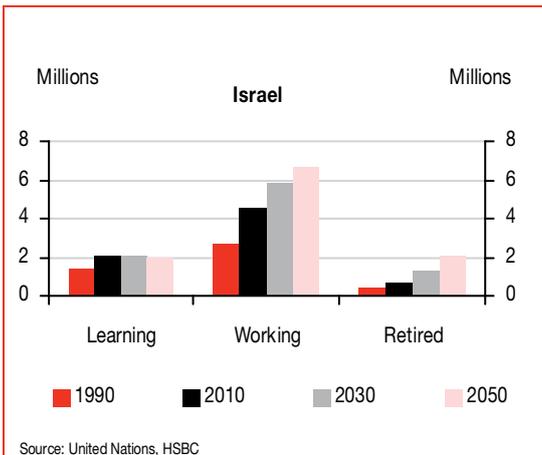
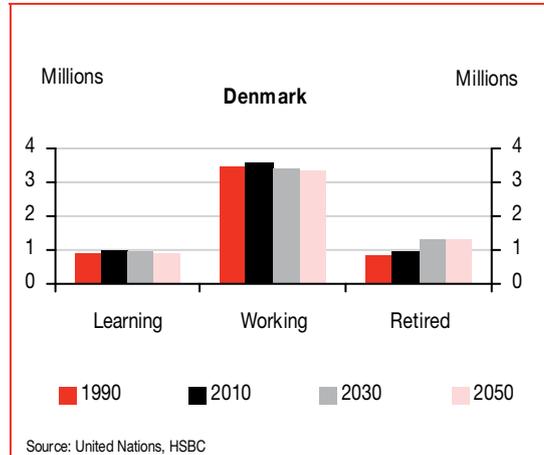
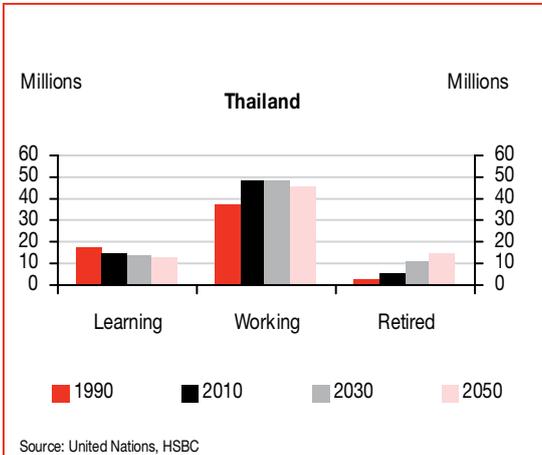


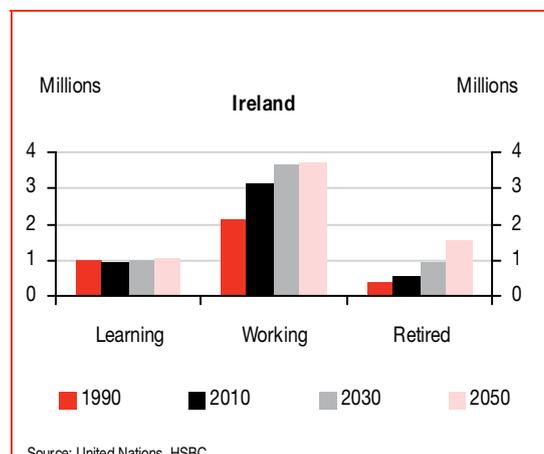
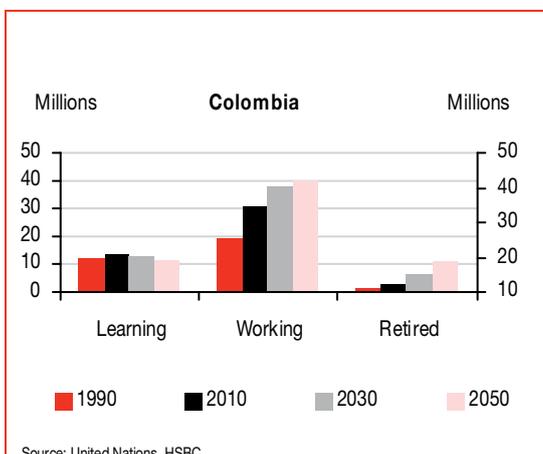
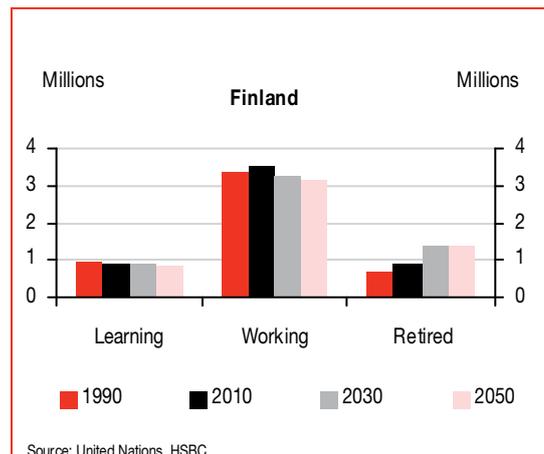
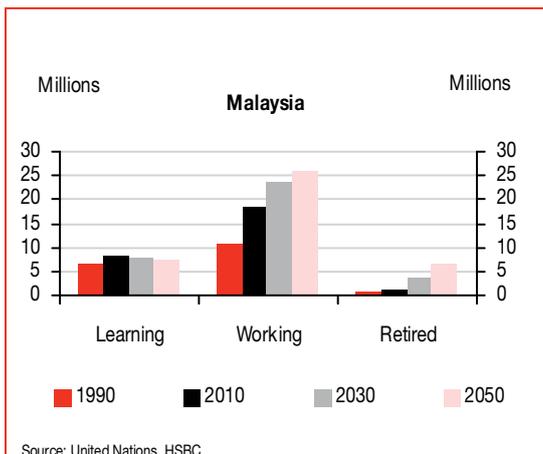
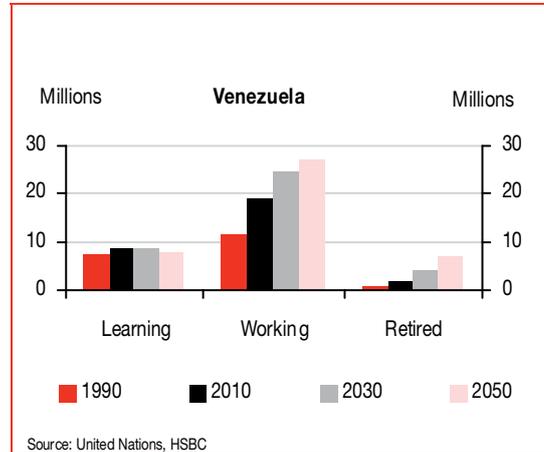
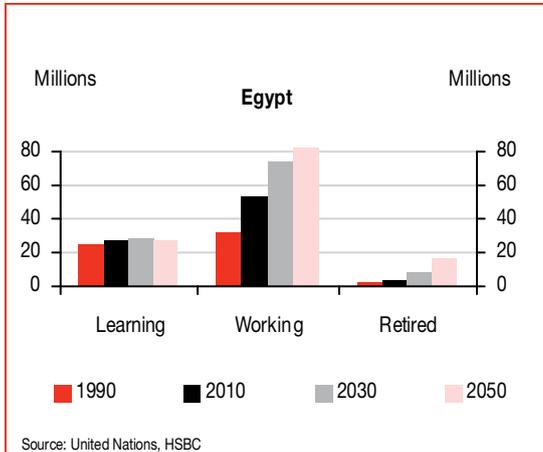












Notes

Disclosure appendix

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