Global Built Asset Wealth Index 2013

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1 | Introduction

Welcome to the first EC Harris Global Built Asset Wealth Index. The principle behind this report is simple - how does the money spent on developing a country's built environment impact its social and economic success?

Economic measures such as human factors (population growth, unemployment or education), and financial indicators (GDP, interest rates or inflation) are some of the traditional methods used to define a country's performance, however, these metrics tell only one side of the story.

GDP, for example, quantifies national income rather than national wealth, in much the same way that a household's income is only one indicator of its overall wealth which might include property and other belongings.

In a world where the balance of economic power is shifting, we see countries in the East with large cash reserves investing in their built environment at an unprecedented rate, whereas countries in the West have an aging built environment, but little cash to replace it.

Governments all around the world recognise the value the built environment provides, from the positive economic impact of a new house, road or power station to the platform for economic growth that effective transportation links or quality office space provide.

So how do you define this built wealth and what factors can be used?

One way of doing this is through quantifying the accumulated wealth of a country's built environment, or its 'built assets'. This built asset wealth takes into account the value of all the public and private property and infrastructure in a country - so all of its residential and commercial office space, its transport infrastructure such as roads and rail, airports, plus power plants, water networks and so on.

By quantifying the value of built assets, not only do we gain a vital perspective on the competitive advantage of economies, but also gain insights into how effective investments in built assets have been.

EC Harris, which is an ARCADIS company, helps public and private sector clients the world over make the best use of the money they spend on their built assets, so it was felt that quantifying this global built asset wealth would provide some fascinating insights.

Together with the Centre for Economic and Business Research, we have compiled this ground breaking research report to answer the following questions:

- **Where is the world's built asset wealth?**
- **How much built asset wealth is there per person?**
- **Which countries are investing the most in their built assets?**
- **Which countries are emerging as major players?**

Through compiling this data we will be able to identify trends that will help us to provide insights into how countries are planning, creating, operating and redefining their built assets, which are relevant to clients across all sectors and geographies.

Matt Bennion
Global Director, Buildings
ARCADIS

Total built asset wealth within the 30 countries is estimated at

US$193 trillion

in 2012

By 2022 **China** is projected to haveaccumulated

US$75.7 trillion

in built assets

The UK's built asset wealth of US$88,000 per person is

29% lower

than that of other developed nations

Singapore has

US$156,000

in built assets for every citizen

2 | Executive summary

The Global Built Asset Wealth Index demonstrates the distribution of the world's wealth in terms of the physical assets which contribute to a nation's productivity. The index illustrates the accumulation of buildings, infrastructure and machinery and equipment to unveil the economic divergence between 30 countries that represent 82 per cent of global GDP. It also highlights how these disparities are predicted to evolve in future. Produced by EC Harris and informed by research conducted by the Centre for Economics and Business Research (Cebr), this first edition of the Global Built Asset Wealth Index finds that:

- Total built asset wealth within the 30 countries is estimated at US$193 trillion in 2012 - this is equivalent to almost three times the US$68 trillion GDP of the same countries in 2012. By 2022, built asset wealth is forecast to increase by 35 per cent in real terms to reach US$261 trillion.
- In 2012, the USA was the wealthiest nation in terms of built assets, with total wealth estimated at US$39.7 trillion. This is forecast to increase to US$47.2 trillion by 2022 - a rise of 19 per cent.
- China is rapidly gaining on the USA and could become the owner of the world's biggest built wealth as early as 2014. For instance, by 2022 China is projected to have accumulated US$75.7 trillion in built assets.
- In Europe, built asset growth is expected to be subdued at around 2.7 per cent over the next decade. In some struggling Eurozone economies, investment is forecast to fall short of asset depreciation, leading to a fall in the built asset stock.
- Despite rapid growth in emerging markets, built asset wealth per person still falls well short of that in developed economies. By 2022 China's built asset wealth per person will still be 61 per cent lower than that of the USA.
- Singapore has US$156,000 in built assets for every citizen, making Singaporeans the wealthiest built asset citizens of all the 30 nations studied.
- The UK's built asset wealth of US$88,000 per person is 29 per cent lower than that of other developed nations. This substantial gap suggests that the UK has significantly underinvested in built assets over many years.
- The fastest growth over the next decade is expected in the Middle East and Africa and in Asian economies, as built assets are forecast to rise by 63 per cent in both regions. This rapid expansion, combined with slower growth in the developed economies of North America and Europe, will allow these regions to continue to close the built asset wealth gap.

Emerging countries are spending **1.6 times** as much of their output on investment in an effort to catch up economically

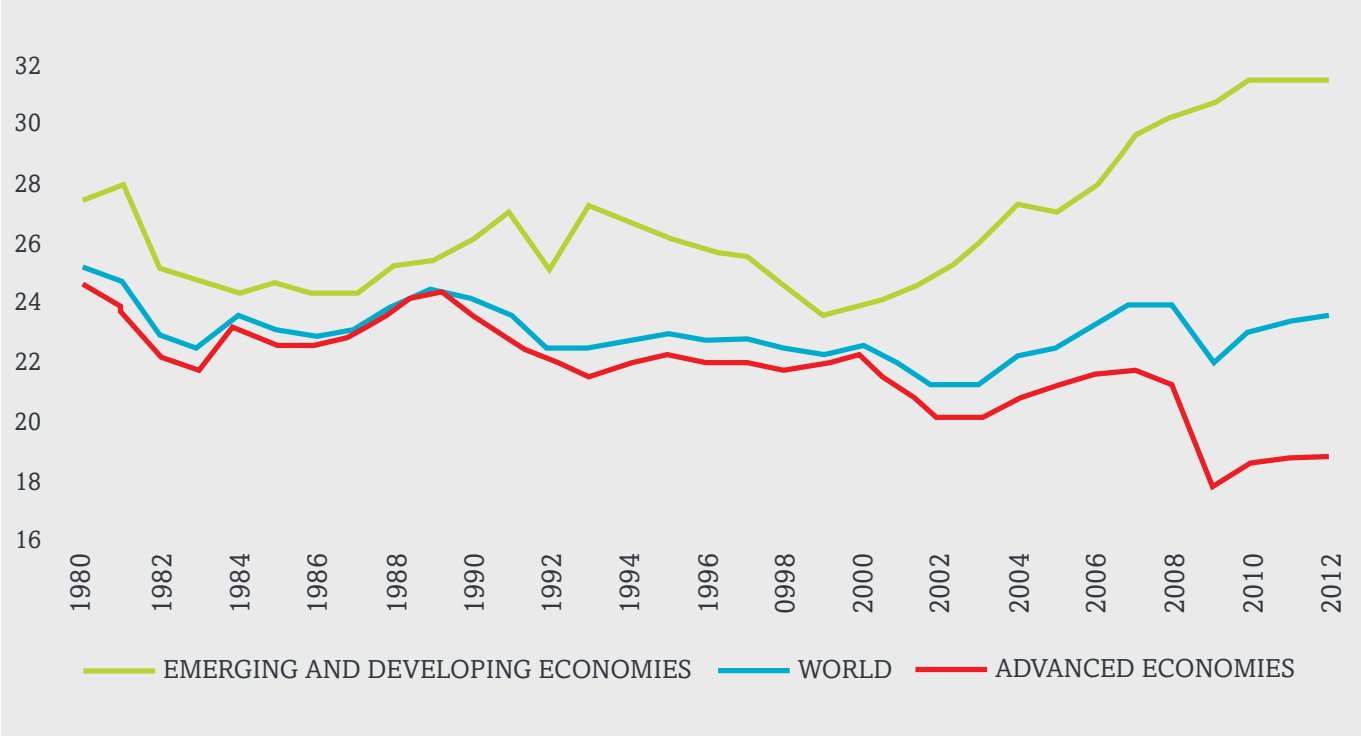
3 | Current state of the world economy

Since the financial crisis, growth in the global economy has remained slow by historical standards. Muted business prospects amid a reduction of debt in both the public and private sectors of industrialised nations have resulted in cash hoarding by large firms rather than spending on new productive capacity. At the same time, the need to consolidate government finances after the extensive and expensive interventions during the financial crisis means that publicly funded investment has been under pressure, especially in the Eurozone.

Despite this gloomy message, global growth is projected to remain steady, supported in no small part by the stabilising contribution of investment. Investment is a crucial component of economic activity and the accumulation of capital has allowed people to achieve unprecedented standards of living. Cross-border investment flows into low income countries are gradually bringing economic parity. Extensive government and private investment in infrastructure in emerging markets is another factor supporting local industries and creating a pro-growth environment.

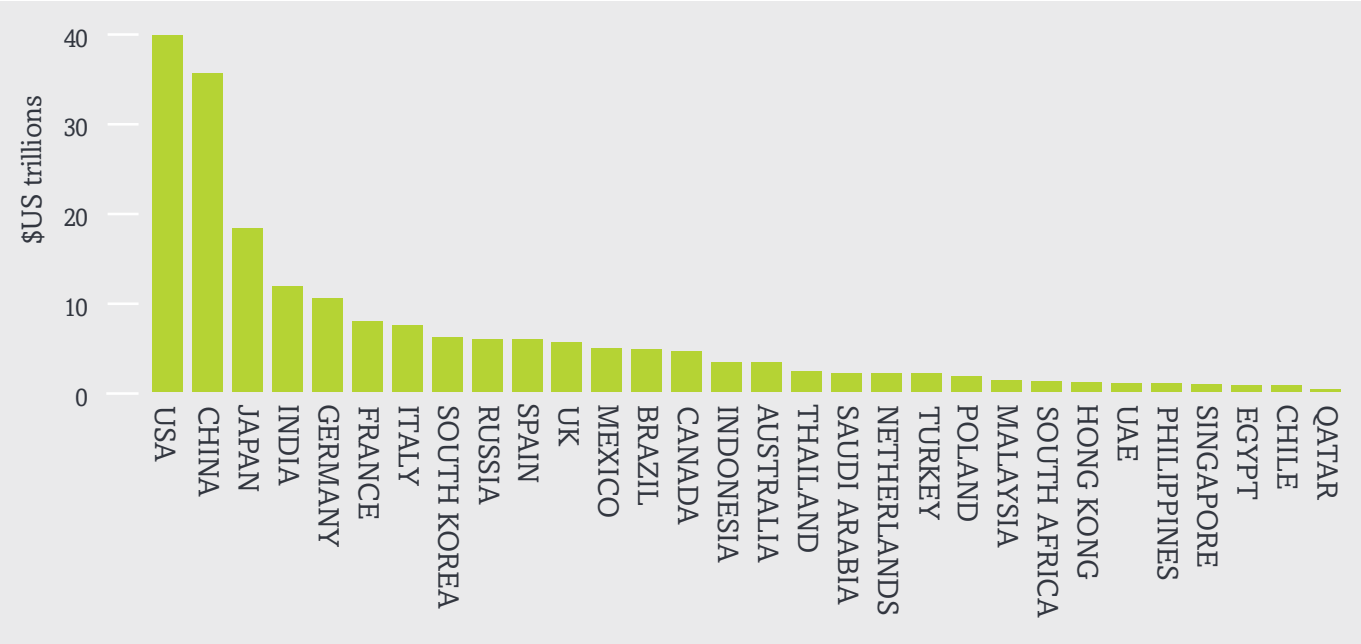
Clear evidence that the era of Western economic dominance is ending comes from an international comparison of investment. Although emerging markets have traditionally invested more over the past few decades, the gap in comparison with advanced economies has always been moderate. That changed in the 2000s when emerging market investment surged, led by the emergence of China as an economic superpower. **Figure 1** illustrates the divergence, with emerging countries spending 1.6 times as much of their output on investment in an effort to catch up economically. For these countries, investment in tangible assets such as housing and infrastructure is crucial. This report explores trends and comparisons in such built asset investment.

Figure 1 - Investment as a share of GDP



Source: International Monetary Fund

Figure 2 - Stock of built assets by country in 2012 (US$ trillions)



Source: Cebr analysis

4 | The Global Built Asset Wealth Index

The total stock of built assets provides an indication of the wealth which a country has accumulated and, therefore, the resources which it can draw upon for generating economic growth and ultimately to provide an income for its population. Built assets can be thought of as all tangible fixed capital investment, including infrastructure investment, residential and non-residential construction, as well as investments in plant and machinery and improvements in 'natural assets', such as land reclamation. As a result, this stock is an important indicator of the productive potential of an economy and offers valuable insights into the economic disparities which exist across nations. This section provides a country-level overview for key economies to show where the world's built asset stock is concentrated and illustrates the differences in built asset wealth per person.

4.1 | Global built asset wealth ranking

Across the 30 countries included within our analysis, total built asset wealth is estimated at US$193 trillion in 2012 - almost three times the US$68 trillion produced in GDP by these countries in the same year. There is significant variation in the stocks of built assets across the world, as demonstrated in **Figure 2**, which illustrates the stock of built assets in 2012 by county. With an estimated built asset wealth of US$39.7 trillion the USA has the largest stock of built assets in 2012, followed closely by China with an estimated stock of US$35.4 trillion. Taken together, the USA and China account for 38.9 per cent of total estimated built asset wealth in 2012 in our 30 country sample.

Qatar
is estimated to have accumulated built asset wealth of
US**$0.3 trillion**
in 2012

At the other end of the scale, Qatar is estimated to have accumulated built asset wealth of US$0.3 trillion, the lowest total of all the countries under analysis. Despite having a reputation for heavy investment in construction, the relative size of the Qatari economy means that, on the global stage at least, the total value of Qatar's built assets are relatively low.

Larger built asset stocks are found in a mixture of established developed economies, such as Japan and Germany, and in populous emerging countries, such as India and Indonesia. On the one hand, historically higher economic growth in developed countries facilitates relatively higher levels of investment, while fast population growth in developing economies is likely to drive demand for built assets.

Countries with higher levels of built assets should be well-placed to generate greater levels of economic output and therefore greater levels of income, reflecting the distribution of global economic power. This is demonstrated in **Figure 3**, which shows the relationship between built assets and GDP.

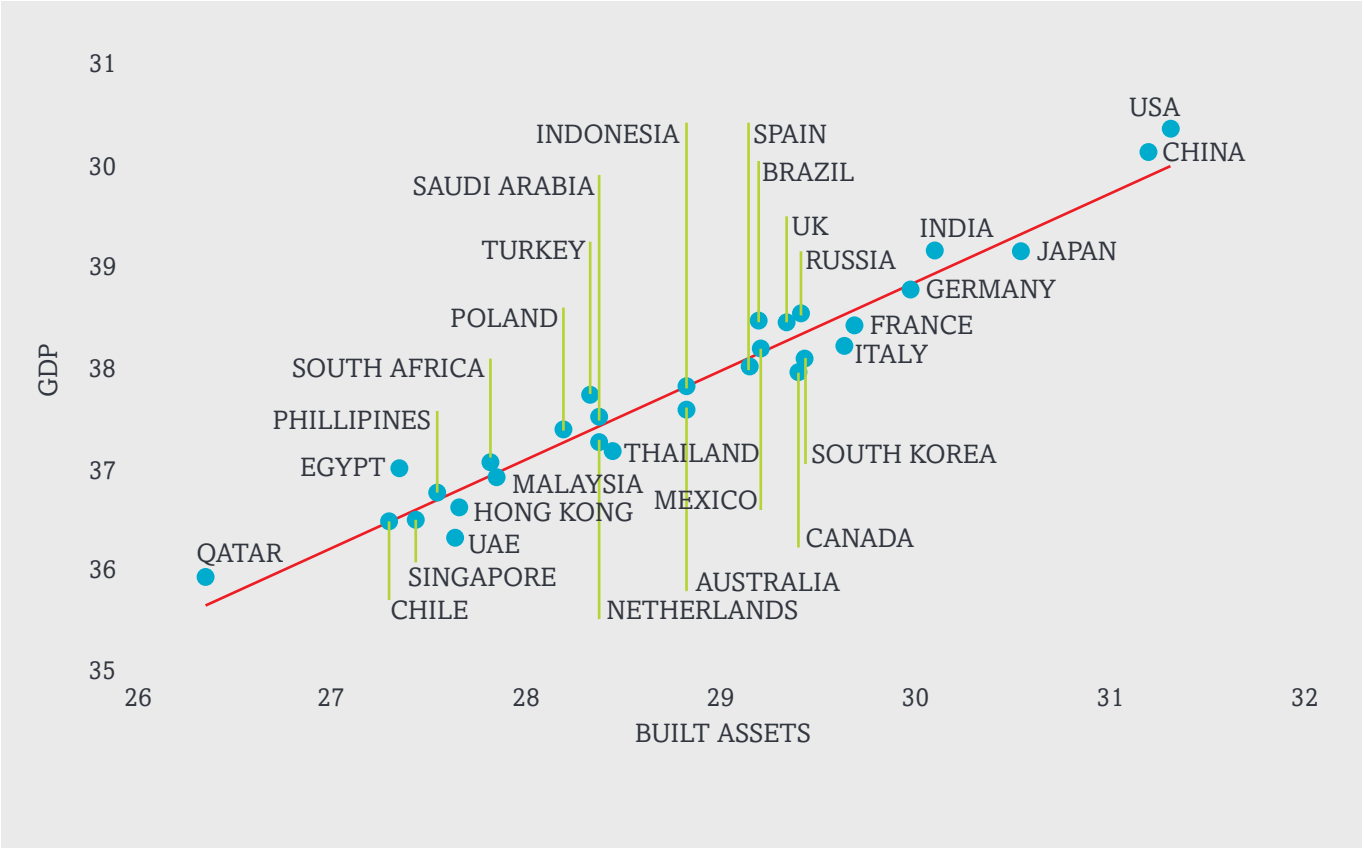
Using a logarithmic scale to allow for comparison between countries with disparate built asset stock, the diagram clearly shows a strong relationship between built asset wealth and GDP.

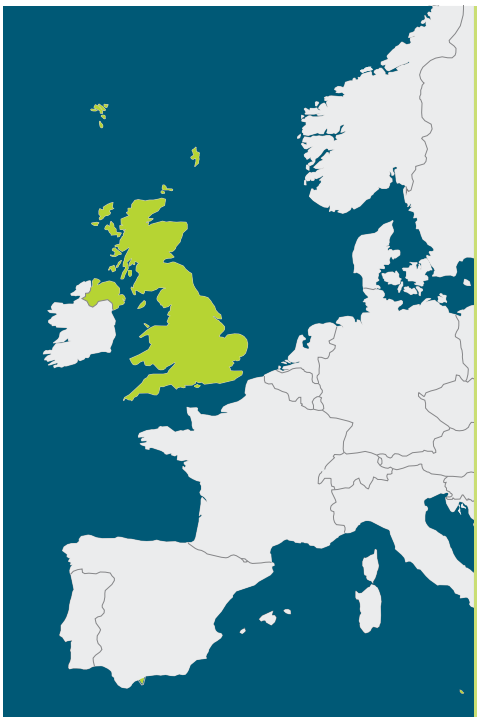
Interestingly, the comparison between China and the general relationship found between built assets and GDP across our sample (the black line on the chart) suggests that the Chinese economy is expanding its investment largely in line with what could reasonably be expected given the size of its GDP. Indeed, China is generating a higher level of GDP for its level of built assets than the international average. In 2012 China's built asset stock is estimated to be 286 per cent of its GDP, compared to the international average of 284 per cent. This would indicate that arguments suggesting China is over investing may be misplaced, at least for now. However, if investment continues to expand at a high rate, as we expect it to, overinvestment becomes a growing concern.

A country appearing above the general trend line, such as the UK, may indicate that the country is utilising its built assets more effectively to generate higher than average levels of output, but conversely may point towards a degree of underinvestment in built assets, such as infrastructure, given the size of the economy. In the former case, the windfall from higher gains can be used to reinvest in the productive capacity of the economy, while in the latter, it will be critical to spur built asset investment before this becomes a constraint on growth. Industrial structure may also play a role here; an economy more dependent on services stands to gain more from investment in intangible assets and may therefore invest proportionately less in built assets compared to a more manufacturing intensive economy.

For countries that sit below the line, including UAE and Singapore, and in Europe; France, Italy, Spain and the Netherlands, this comparison poses the awkward question: are assets being used effectively, and potentially, is there over capacity in the economy? For global hubs like the UAE and Hong Kong, the reality is likely to be that the price of entry to their market is a super-concentrated asset base. For more mature economies, the concern will be that they have excess built asset capacity, and that the costs of operating, maintaining and reinvesting in these assets over time will continue to be a drag on countries with limited capacity to invest. In extreme cases, an over-generous built asset portfolio could turn out be a liability rather than a source of advantage. In the next section, the perspective changes as we investigate built asset wealth per capita.

Figure 3 - GDP and built asset relationship, 2012 US$ (logarithmic scale)





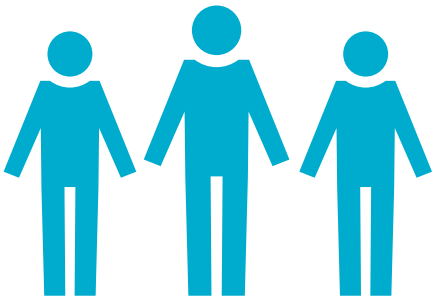
COUNTRY SPOTLIGHT: United Kingdom

The UK position in the index illustrates many of challenges and opportunities associated with asset investment in the new normal of low growth, financial deleveraging and economic restructuring. Cuts in public and private investment that followed the 2008 crash are, in sectors such as power generation, constraining the UK's ability to remedy decades of under-investment.

However the UK punches above its weight in generating GDP from its asset base, so the picture is by no means uniformly downbeat.

One of the characteristics of the UK asset base has been the degree of long term private sector participation in utilities and public service provision. Another has been the UK's shift from a manufacturing to a globalised service economy. Regulated investment in utilities has resulted in an efficient allocation of capital, whilst the UK's enthusiastic adoption of the online world - from FX trading to internet shopping is reducing the UK's need for physical assets to generate wealth.

The UK does have infrastructure shortfalls - airports, roads and energy all need massive investment. However, the reality is that the UK's asset base is being used more intensively and more cost effectively than in peer countries. In asset rich, cash poor nations like the UK, the effectiveness of built asset utilisation will be a key to future competitive advantage.



Singapore
has estimated built assets of
US$156,000
per person in 2012

4.2 | Wealth per person

The previous section highlighted the varying magnitudes of built asset wealth across countries, but the degree to which this affects the living standards of individuals depends to a large extent on how the size of this wealth compares to the size of the population. While higher levels of built assets should enable the generation of higher levels of GDP and income, a larger population will require more built assets to maintain the same wealth per person. **Figure 4** illustrates total built asset wealth per person across the same sample of 30 countries.

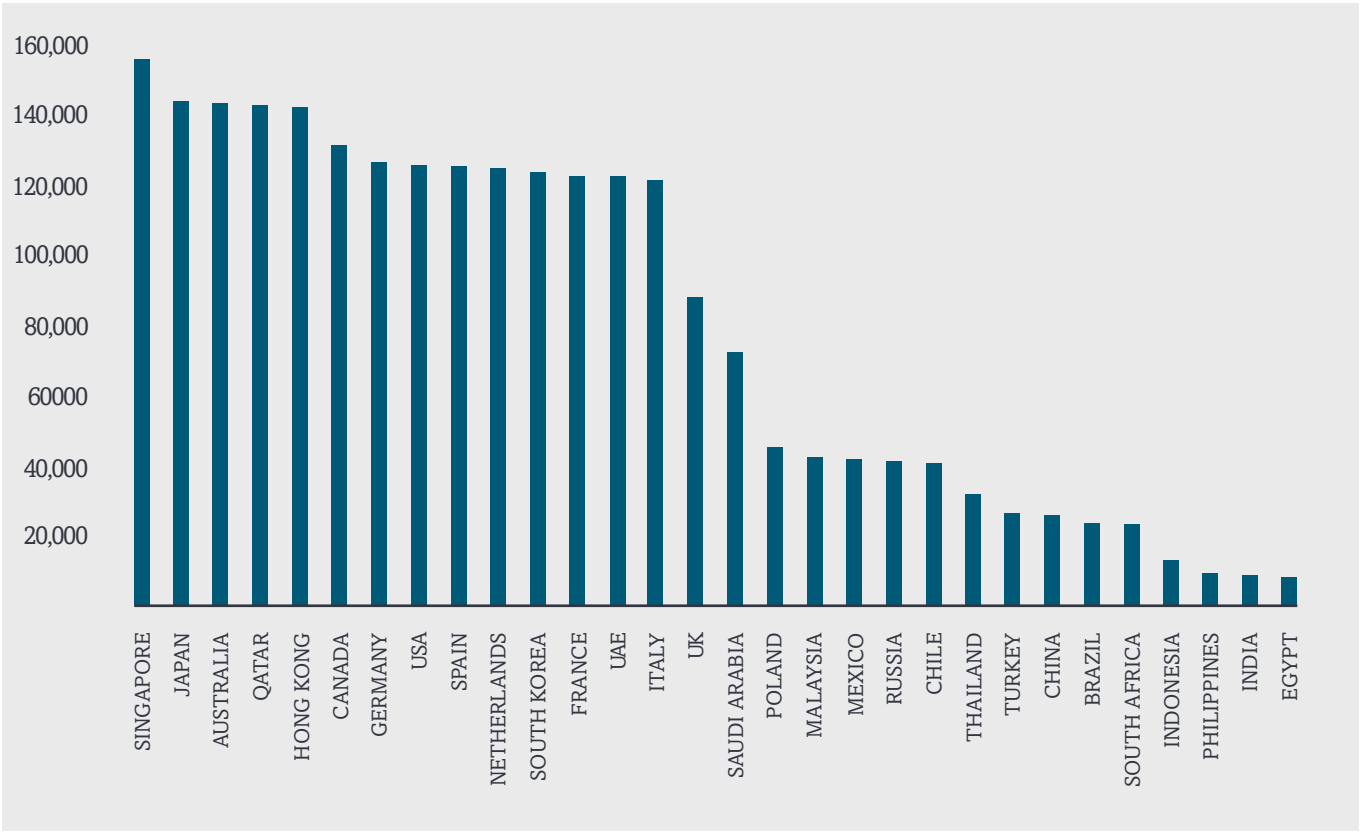
Singapore has by far the wealthiest population in terms of built assets, estimated at US$156,000 per person in 2012. Qatar had US$143,000 in built assets for every member of its population in 2012, placing Qataris among the wealthiest by built assets per capita. Due to their small GDP size, both Qatar and Singapore were estimated to have some of the lowest total built asset wealth in 2012 within our sample, but have accumulated vast built asset wealth for their population size.

There is a clear divide between emerging and developed economies. India and China have less than US$40,000 worth of built assets per person, while developed economies have higher levels of built asset wealth, averaging US$125,000 per person. On this evidence, the UK appears to lag behind its peers in terms of built asset investment, with wealth per person of US$88,000, some 29.2 per cent below the average level of developed economies. The size of the gap cannot be explained by population density which suggests that the UK's investment in key areas such as infrastructure, housing, commercial property, machinery and equipment is lagging behind that of its peers.

Accounting for the size of the populations in emerging economies such as China and India highlights just how far these economies have to go before they reach the prosperity of developed economies. China's built asset wealth per person of US$26,000 is only slightly higher than a fifth of the US$126,000 estimated in the United States. The speed at which the process of 'catch up' is likely to occur is highlighted in the next section, which also looks at the recent growth in built asset wealth.

"Both Qatar and Singapore were estimated to have some of the lowest total built asset wealth in 2012 within our sample, but have accumulated vast built asset wealth for their population size."

Figure 4 - Built assets per person by country in 2012, (US$)



Source: Cebr analysis

COUNTRY SPOTLIGHT: SINGAPORE

Singapore has the highest built asset wealth per capita in the world, worth US$156,000 per individual. The continued development of its built environment is critical to Singapore's economy as it seeks to maintain its leading position on the global stage.

At the heart of Singapore's vision is the need to make sure that it has the right civil and social infrastructure to attract and retain business and highly skilled workers. As an island nation with limited land and natural resources, the built environment that it does have must be used to attract 'people resources' to maintain long-term prosperity.

Built assets such as global transport links, quality office space and excellent living environments are all enablers for Singapore to be one of the most attractive destinations to do business in Asia.

Singapore is continuing to invest in its built environment and has committed to a multi-billion dollar investment in new infrastructure over the next decade. Strategic initiatives include the construction of two further underground lines and four extensions to existing lines, the relocation of the container port away from the Central Business District to free up prime waterfront and the creation of Regional Centres - decentralised commercial hubs on the North, East and West strategic corridors to sustain Singapore's growth.

4.3 Changes over the past year

The growth rates in the stock of built assets can offer some insights into how built asset wealth is likely to change over the medium term. **Figure 5** presents the percentage changes in the built asset stock per person between 2011 and 2012.

The highest growth rates by far are estimated for Qatar and China, where the stock of built assets per person increased by 8.4 per cent and 8.2 per cent respectively. In Qatar this was made possible by double digit growth in the underlying built assets stock of 12.4 per cent in 2012, whereas China's marginal population growth meant that an 8.7 per cent growth in the overall built asset stock translated into almost the same rate of growth in per person terms. In ten of the economies under study, the stock of built assets per person is estimated to have fallen in 2012 compared to a year earlier, with the most severe decline of -2.1 per cent occurring in Japan. As well as investing in replacing deteriorating assets, it is also crucial for countries to invest in maintaining their existing assets to ensure they continue to generate income. In countries experiencing negative built asset growth, the investment in new assets and the expenditure on the maintenance of existing assets has not been sufficient to offset the estimated depreciation of their built asset stock. In these cases the potential for built assets to contribute to the productive capacity of the economy and generate income for the population is therefore estimated to be declining.

Notably, Mexico and the Philippines were the only non-developed economies to have experienced significant declines in their built asset wealth per person over 2012. On the whole, emerging economies appear to be catching up to the built asset wealth of more developed economies. The four economies experiencing the highest growth in per capita wealth are all emerging economies, with China and Qatar leading growth by some distance.

COUNTRY SPOTLIGHT: QATAR

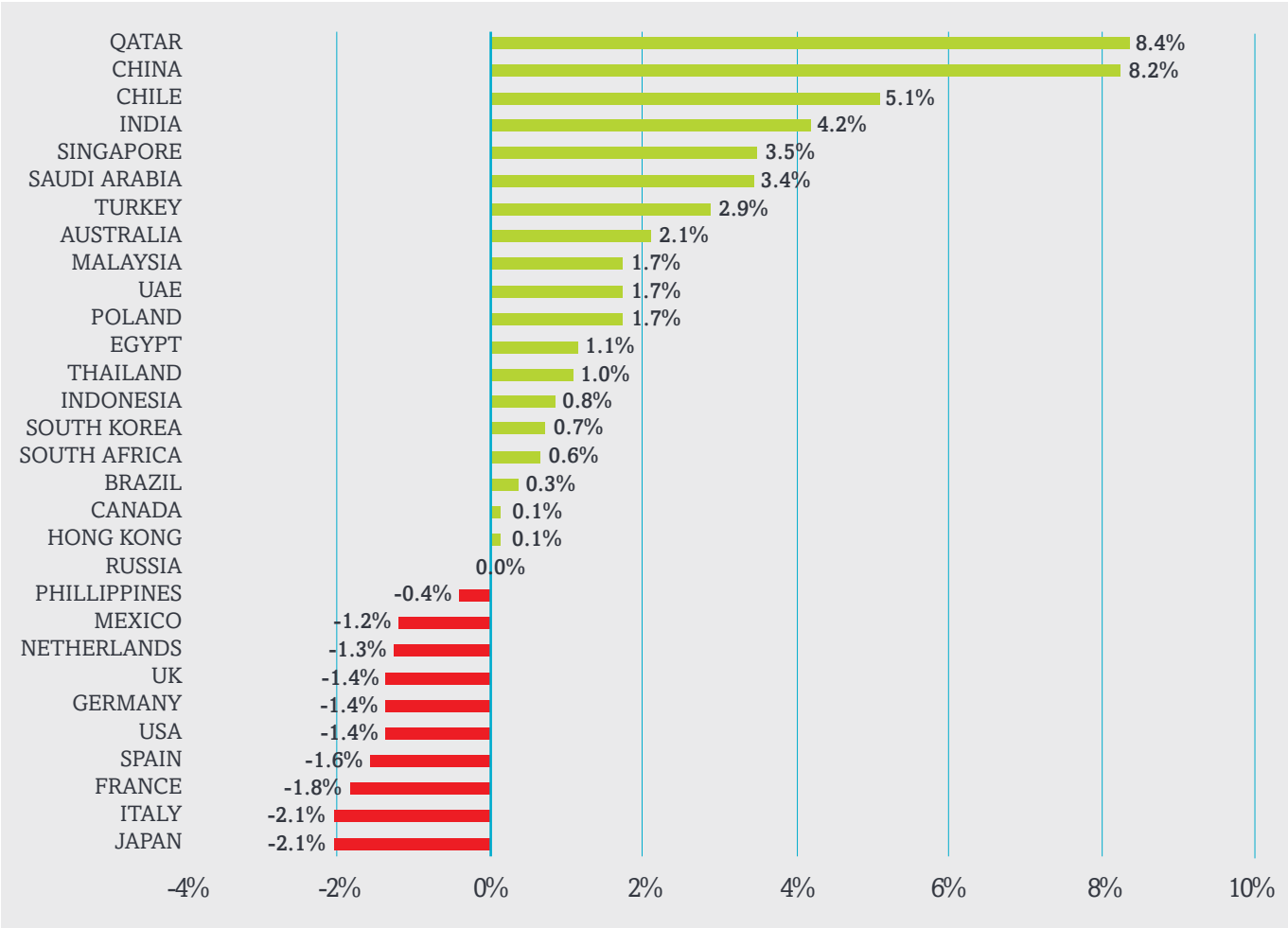
Qatar is set to experience an explosion of construction activity over the next decade. With the FIFA World Cup™ in 2022, as well as the National Vision to be delivered in 2030, the Qatari government is investing heavily in capital projects and infrastructure.

By 2021, the value of the construction industry is forecast to almost double to US$15 billion per annum in real terms (Source: BMI). Growth in output on this scale is unprecedented in Qatar. One of the implications of this boom is the cost of construction potentially going up due to the impact it will have on a combination of factors such as workload, capacity, labour, plant and materials costs.

A recent EC Harris report (Avoiding the Inflation Bubble: Qatar Construction Inflation Forecast 2013) predicted that, unless urgent steps are taken to build industry capacity, construction inflation could peak at 18% per annum over the next decade, potentially adding billions of dollars to the cost of building Qatar's future.

In Qatar, as in other Middle Eastern nations, we are seeing additional investment in the built environment as a social as well as economic enabler. Where some countries have neglected the development of social infrastructure such as social housing, education and hospitals, Qatar is committed to developing this sector to ensure its development as a nation is sustainable for the long term future benefit of its population.

Figure 5 - Built assets per person, annual percentage change 2012



Source: Cebr analysis

"The highest growth rates by far are estimated for Qatar and China, where the stock of built assets per person increased by 8.4 per cent and 8.2 per cent respectively."

5) Building the future: asset wealth over the coming decade

The changes highlighted in the previous section provide some insight into the areas of the globe experiencing the most substantial increases in built asset wealth. This section takes a longer term view to examine how the rapid expansions of emerging economies, combined with weaker growth in developed nations, will affect the distribution of global built asset wealth over the coming decade.

5.1) A decade ahead, China will comfortably surpass the United States

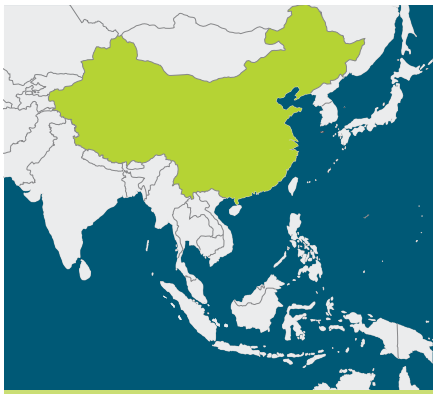
The rapid expansion in emerging markets highlighted in the previous sections is a key driver of the shifts shown in **Table 1** on the next page. China's total stock of built assets is expected to comfortably surpass the USA by 2022 - built asset investment in China is projected to grow at an average rate of 6.1 per cent, causing the size of the built asset stock to more than double from US$35.5 trillion in 2012 to an estimated US$75.7 trillion in 2022. Remarkably, by 2022, China's total built asset wealth is forecast to be greater than that of the USA and India combined.

Built asset investment growth in the USA is expected to rise steadily over the coming decade, averaging around 6.5%, but a couple of factors will contribute to the world's largest economy being overtaken by China in built asset terms. Firstly, the rapid growth of the Chinese economy, combined with the high investment share of GDP - investment accounted for almost half of GDP in 2012 - means that each year China's built asset investment as a proportion of the existing stock of built assets is much higher than that of the USA. Sustaining this over a long period of time will allow China to exceed the level of built asset accumulation in the USA.

Secondly, the higher technological intensity of the US economy means that more investment is channelled into non-built asset investments, such as computer software and forms of intellectual property. Including these 'intangible' investments would delay the moment at which China catches up with the USA.

Elsewhere, sluggish investment growth in Japan is expected to lead to a decline in the total built asset stock in 2022 compared to 2012, with the volume of built assets falling by 6.8 per cent, or US$1.3 trillion. Over the next few years, built asset investment is expected to fall short of the level required to offset the depreciation of the existing asset stock, before positive growth returns in the outer years of the forecast. In part this reflects the fact that Japan invests proportionately more than many other nations in intangible assets such as computer software. Therefore, while our estimates show that the built asset stock in Japan is falling over the forecast horizon, other forms of capital investment may be increasing. The decline of built assets in Japan should allow India move up the table to hold the third largest stock of built assets in the world by 2022, estimated at US$20.17 trillion, representing an overall increase of 71.4 per cent from 2012.

Brazil, Singapore and the United Arab Emirates are expected to be the highest climbers over the coming decade, each rising two places up the global rankings. Steady investment growth in Brazil is expected to be enough to allow it to outpace both steadily growing Mexico and struggling Spain - Spanish built assets are projected to fall by 7 per cent over the coming decade, as investment flounders in the Eurozone's fourth largest economy.



COUNTRY SPOTLIGHT: CHINA

China's built asset wealth is set to more than double over the next ten years, representing a phenomenal level of construction activity.

The sheer rapidity of this development, funded almost entirely by the Government, has the potential to lead to problems with the sustainability of its future built environment. There is a danger that building assets too quickly and in the wrong place could lead to more examples of the 'ghost shopping malls' and empty residential estates that have arisen across the country when a 'build it and they will come' mentality was prevalent. China is also facing a rising problem with the deterioration of its assets that, in many cases, were only built over the past decade, but should have had a much longer lifecycle.

Sustainable value, demand and materials are key to China's future development.

In Singapore and the UAE, where citizens already enjoy some of the highest levels of built asset wealth per person, built asset growth is expected to average 6 per cent and 7 per cent respectively over the coming years. Since both countries are already estimated to have higher levels of built asset wealth compared to their respective GDP levels (**see Figure 3**), it will be critical that built asset expansion is carefully managed to maximise the economic benefits of this increased productive capacity.

Table 1 - Built asset wealth in 2012 and 2022, (US$ 2012 trillions)

Rank 2012	Rank 2022	Country	2012	2022	Change from 2012
1	2	USA	39.73	47.28	-1
2	1	China	35.45	75.70	1
3	4	Japan	18.27	17.02	-1
4	3	India	11.77	20.17	1
5	5	Germany	10.39	10.32	0
6	6	France	7.80	7.50	0
7	8	Italy	7.42	7.06	-1
8	7	South Korea	6.03	7.15	1
9	9	Russia	5.90	6.38	0
10	12	Spain	5.85	5.44	-2
11	10	UK	5.54	6.24	1
12	14	Mexico	4.87	5.17	-2
13	11	Brazil	4.79	5.73	2
14	13	Canada	4.55	5.41	1
15	16	Indonesia	3.30	4.32	-1
16	15	Australia	3.28	4.59	1
17	18	Thailand	2.24	2.91	-1
18	17	Saudi Arabia	2.09	3.86	1
19	21	Netherlands	2.09	2.09	-2
20	19	Turkey	2.01	2.78	1
21	20	Poland	1.74	2.26	1
22	22	Malaysia	1.24	1.81	0
23	24	South Africa	1.20	1.38	-1
24	27	Hong Kong	1.03	1.19	-3
25	23	UAE	1.00	1.69	2
26	26	Philippines	0.91	1.23	0
27	25	Singapore	0.82	1.31	2
28	29	Egypt	0.76	0.96	-1
29	28	Chile	0.71	1.16	1
30	30	Qatar	0.28	0.78	0

Source: Cebr analysis

"Brazil, Singapore and the United Arab Emirates are expected to be the highest climbers over the coming decade."

COUNTRY SPOTLIGHT: KINGDOM OF SAUDI ARABIA (KSA)

KSA is the largest economy in the Middle East with a growth in GDP of 5% in 2012. Although the growth is still dominated by the production and export of oil, the Government is investing in the six economic cities spread throughout the country to develop and increase manufacturing and heavy industry. To support the growth of these economic centres, investment is being made in infrastructure, in particular a heavy rail network linking the East and West coasts and implementation of major public transport systems in Jeddah and Riyadh.

The creation of built assets in residential, healthcare, leisure and education sectors are also growing to meet the demands of an increasing population and consumer led society.

KSA has a finite oil resource so there are also opportunities for the growth of built assets in the fields of renewable energies and environmental programmes. Both these markets are in their infancy compared to Western economies. There is also a push to expand natural gas production, mining and the development of deep sea oil reserves from the Red Sea.

"In the Middle East and Africa, the stock of built assets in Egypt, Qatar, Saudi Arabia, South Africa and the United Arab Emirates is expected to increase by 63 per cent to US$8.7 trillion in 2022, just outpacing growth in the Asian economies."

5.2 Regional developments and implications for the global economy

Over the next ten years, divergent trends across regions will sustain an on-going structural shift in the distribution of built asset wealth across the globe. This may have far reaching consequences for the balance of both economic and political power as emerging economies gradually bridge the gap in accumulated wealth compared with their more developed counterparts.

Figure 6 illustrates the magnitude of this shift, showing the size of built asset growth by region.

The Asian countries in our sample had the largest stock of built assets in 2012, estimated at US$84 trillion. By 2022, this is forecast to increase to US$137.4 trillion - a rise of 62.9 per cent. Similarly, North America is expected to perform strongly - by 2022 built assets are forecast to increase by 19 per cent, rising to US$52.7 trillion. Growth in North America is therefore forecast to outpace that in the Latin American countries examined, where strong growth of 16.3 per cent is expected over the coming decade, with combined built asset wealth in Brazil, Chile and Mexico reaching US$12.1 trillion in 2022.

It is in the Middle East and Africa, however, where the most significant growth is expected. Taken together, the stock of built assets in Egypt, Qatar, Saudi Arabia, South Africa and the United Arab Emirates is expected to increase by 63 per cent to US$8.7 trillion in 2022, just outpacing growth in the Asian economies.

By contrast, the built asset stock of European countries within our sample is forecast to increase from US$48.7 trillion in 2012 to US$50.1 trillion in 2022, representing growth of just 2.7 per cent. It is clear that growth in Europe is expected to be dwarfed by that elsewhere. This will have implications beyond the next 10 years; investment in built assets now lays the foundations for future GDP expansion and therefore impacts upon the potential for further investment in the years ahead. Of course there is causation in both directions, but this evidence suggests that European economies are likely to be outpaced by emerging economies - as well as the more developed economies of North America - for many years to come.

The Asian countries in our sample had **the largest** stock of built assets in 2012, estimated at **US$84 trillion**

For the purposes of estimating regional aggregates, regions are comprised of:

Asia: Australia, China, Hong Kong, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea and Thailand.

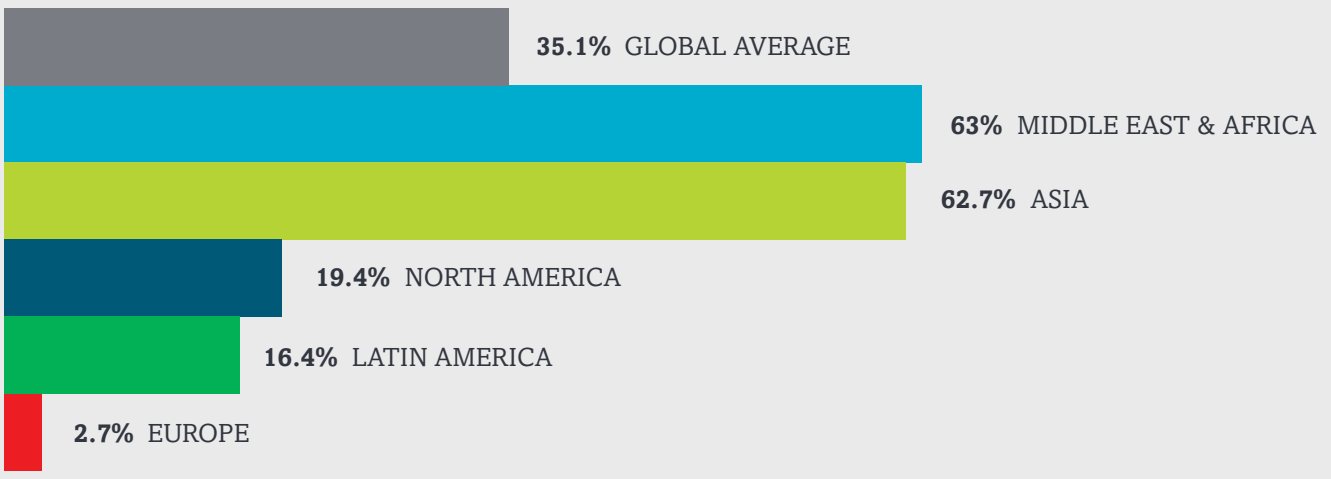
Europe: France, Germany, Italy, Netherlands, Poland, Russia, Spain, Turkey and the UK.

Latin America: Brazil, Chile and Mexico.

Middle East and Africa: Egypt, Qatar, Saudi Arabia, South Africa and the United Arab Emirates.

North America: Canada and the United States of America.

Figure 6 - Built asset wealth, forecast percentage growth between 2012 and 2022



Source: Cebr analysis

Asset Rich or Poor?

From Figure 6 we can identify a clear differentiation between countries - asset poor, cash rich; cash poor, asset rich and asset poor, cash poor.

Cash rich, asset poor

Countries such as Saudi Arabia, Qatar and Chile. In these countries built assets are being developed as an enabler for new and growing economies to develop, often on the back of resource derived wealth. The focus in these markets is on the planning and creation of assets that have a real impact and will be sustainable for the long term.

With much GDP being derived from natural resources such as oil, gas or minerals, these nations have to invest rapidly to diversify their economies.

These types of countries have historically been viewed as emerging markets, but from a built asset perspective should be viewed as 'seed nations', rapidly investing in the foundations for their future social and economic growth through developing their built environment.

Asset rich, cash poor

Countries including the UK, Germany and USA. Countries with a well-developed built environment and diversified economic base, creaking under the weight of age, population growth and, in many cases, the changing needs in use of its built environment, for example from manufacturing to service based industries.

These countries need to continue to invest in new and existing built assets to improve mobility, productivity and standard of living, but do not have the available finance to do so. The focus is, therefore, on attracting new modes of finance, extending the life of existing assets and redefining built asset use through regeneration.

Asset poor, cash poor

Countries like India, Malaysia, Philippines and Egypt. These countries face huge challenges as a result of rapid population growth, urbanisation and economic transformation. Built assets need to be developed to address big challenges around the basic need for social infrastructure as well as productive capital. Part of the focus in these markets is in the planning and creation of basic assets which meet rapidly increasing social need.

These countries may find themselves between a rock and a hard place. They must invest to meet basic social need, mitigating potential causes of inequality and social unrest. However, being cash poor, they also need to raise capital from private sector providers, who need stability and security and who also expect high returns on investment. A country's ability to secure capital investment on a huge scale will be a key to future sustainable growth and competitive advantage.

"North America is set to remain the wealthiest region by far, with built asset wealth forecast to reach US$139,000 per person in 2022."

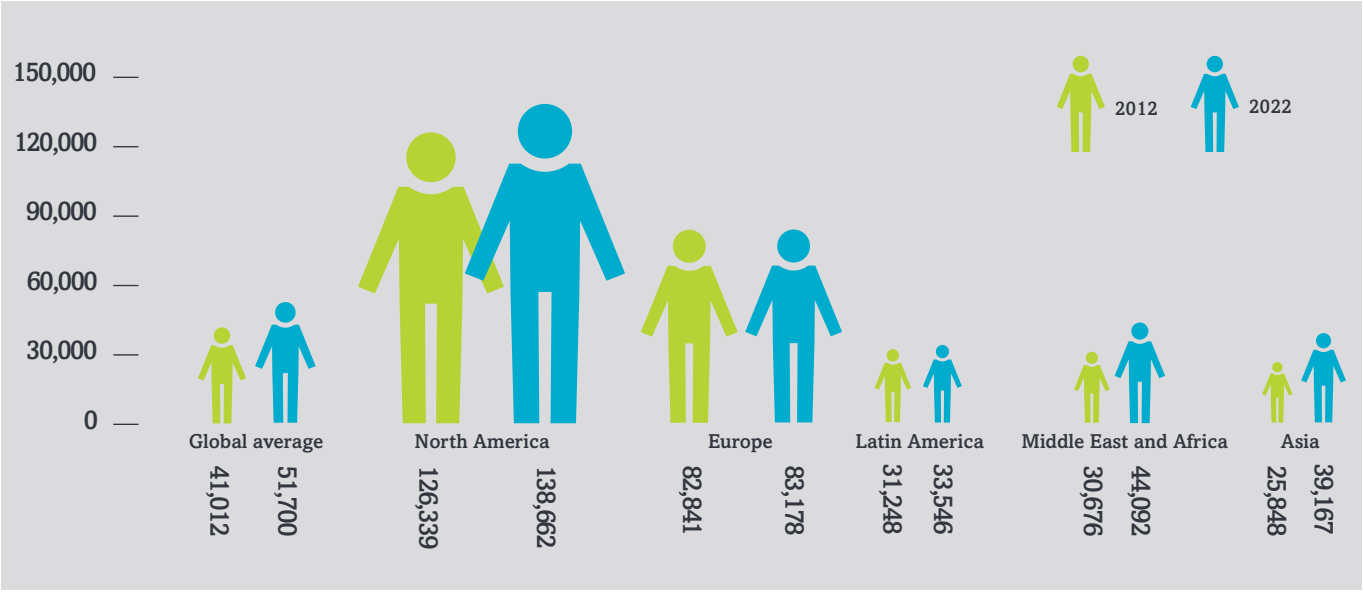
Despite the different growth trajectories identified on the previous page, it is likely to be a long time before high growth regions such as Asia and Latin America experience the same levels of built asset wealth as their European or North American counterparts. This is illustrated by the regional built asset stock per person presented in **Figure 7**.

An increase in the stock of built assets per person is forecast in all regions. North America is set to remain the wealthiest region by far, with built asset wealth forecast to reach US$139,000 per person in 2022, representing a 10.1 per cent increase from 2012 levels. European countries are expected to realise much lower growth in per capita terms - less than 1.0 per cent over the next decade - as a result of declines in some countries. This would take Europe's built assets per person to US$83,000.

Asia, the Middle East and Africa and Latin America are expected to see built asset wealth per person increase by 51.3 per cent, 43.7 per cent and 7.4 per cent respectively by 2022. This robust growth will still leave the average built asset wealth per person in these regions at least US$41,000 lower than that of Europe and over US$87,000 below North American levels. Based on this evidence, it would appear that emerging economies have some ground to cover to reach comparable standards of accumulated wealth in built assets.

Asia is expected to see built asset wealth per person increase by **51.3%** by 2022

Figure 7 - Built asset wealth per person, 2012 and 2022 (US$ 2012)



Source: Cebr analysis

6 | Learnings across the whole built asset lifecycle

This report illustrates that different countries are at varying points in the planning, development and operation of their built assets.

For emerging economies, the creation of assets is the core focus as they seek to develop their economy for future economic growth. In the asset rich, cash poor West, the funding of new assets and the maintenance and redefinition of existing assets are the burning priorities.

At EC Harris we refer to these different stages as the 'asset lifecycle', which can be broken down into four stages as shown in **Figure 8** below.

Figure 8: The built asset lifecycle

Based on the trends in this report, we can explore some of considerations for investors, developers, owners and occupiers across the whole lifecycle of the built asset.

1. PLANNING ASSETS

- Link to strategic vision/ masterplan
- Assess the scope and scale
- Certainty and attractiveness to investors
- Consider alternative financing/ ownership models
- Assess sustainability of value and use.

2. CREATING ASSETS

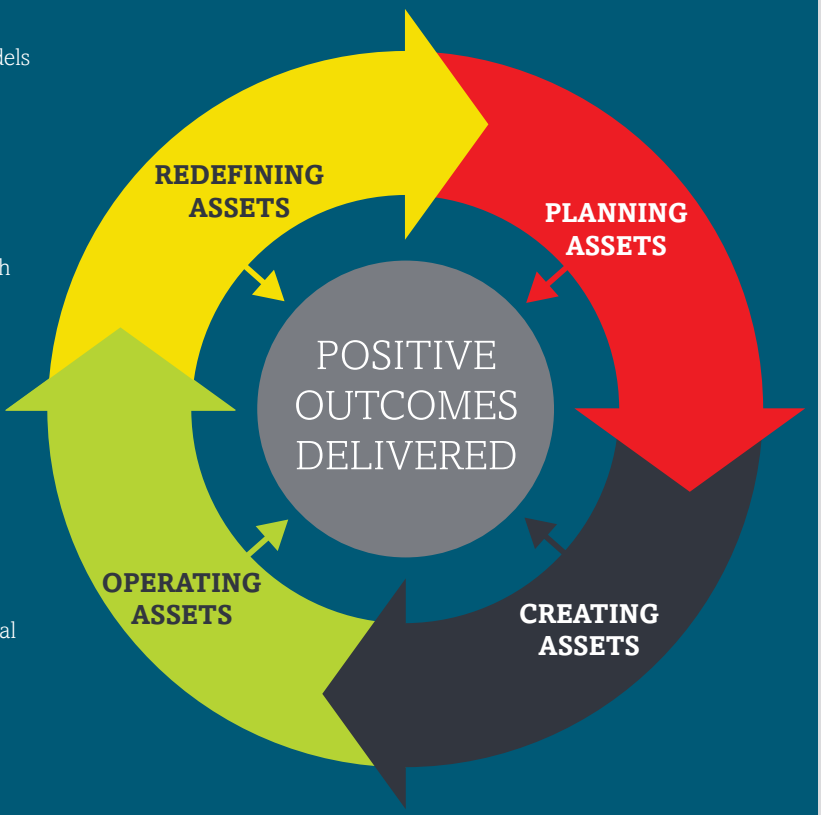
- Define end/ business outcome
- Manage risks of time and cost overruns through supply chain
- Consider whole lifecycle cost
- Asset information capture from delivery.

3. OPERATING ASSETS

- Enabler of competitive advantage
- Drive social and community benefits
- Consider financial constraints and implications
- Understand connected social and environmental regulations.

4. REDEFINING ASSETS

- Vision for regeneration
- Assess extent of environmental liability from prior use
- Remediate with end use in mind
- Assess economic benefits vs cost of clear up.



7 | Conclusion

This report has captured a world view of built asset wealth which provides a clearer understanding of:

- Where the world's built asset wealth lies
- How much built asset wealth there is per person
- Which countries are investing the most in their built assets over the next 10 years
- Which countries are emerging as major players.

Our ability to compare a country's asset base enables us to start to consider some key questions concerning the creation, use and redefinition of the built asset base.

These include:

- What role does built asset creation have in meeting basic human need in the world's fastest growing economies?
- Is there an over-supply of assets in the developed world - could rationalisation increase competitiveness?
- How should the big built asset wealth creators prioritise their investments as they catch up with the developed economies? Could technological leap-frogging reduce a dependence on physical assets?
- How can developed economies make best use of their existing asset base to develop new sources of competitive advantage?
- Will the race to create built asset advantage lead to further challenges around finance and social and environmental impact?

Later this year, EC Harris and Cebr will publish a second Built Asset Index looking at the wider performance issues associated with the built asset wealth that is captured here. This 'Global Built Asset Performance Index' will seek to show which nations are creating the most value from their built asset wealth.

For further information, or to register for a copy of future built asset reports, please email: builtassetindex@echarris.com

About EC Harris

EC Harris is a leading global built asset consultancy. As an ARCADIS company, we have access to approximately 22,000 professionals worldwide operating in over 70 countries, 300 offices and generating in excess of €2.5 billion in revenue. Working across a wide range of market sectors, we help our clients make the most from the money they spend on their built assets. For more information visit **echarris.com**

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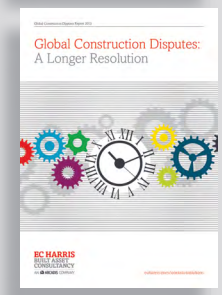
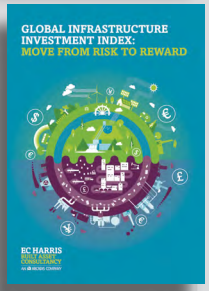
9 | Other reports of interest

Avoiding the Inflation Bubble: Qatar Construction Inflation Forecast

International Construction Costs: A Changing World Economy



Global Construction Disputes: A Longer Resolution



Global Infrastructure Investment Index: Move From Risk to Reward

The London Prime Residential Development Pipeline 2012: A Continued Magnet for Global Investment

Appendix A: Research methodology

Defining built assets

For the purposes of this research 'built assets' are defined as including all tangible fixed capital investment counted in the national accounting framework used by national statistical offices. This includes infrastructure investment, residential and non-residential construction, as well as investments in plant and machinery and improvements in 'natural assets' such as land reclamation. The definition excludes all intangible investments, such as expenditure on software and data, as well as investment in mineral exploration, the vast majority of military expenditure and forms of intellectual property.

Calculating the stock of built assets

The built asset stock was estimated via three principle stages;

1) Establish the composition of fixed capital formation for each country

Fixed capital formation was broken down according to; a) residential and non-residential construction (including infrastructure); b) machinery and equipment. Where this data was not available, estimates for the composition of fixed capital were compiled based on economic relationships derived from similar countries within our sample.

2) Formulate depreciation schedules for each component of fixed capital formation

These were drawn from international best practice, including the Bureau of Economic Analysis, the Organisation for Economic Cooperation and Development and the World Bank. Following this guidance, an average service life for each of the components of fixed capital formation (residential and non-residential construction and machinery and equipment) was established.

3) Forecasting the stock of built assets

Having established estimates for the initial stock of built assets in each of the 30 countries within our sample, forecasting the change in these stocks requires, for each country, an assessment investment growth in constant purchasing power parity adjusted to US dollars, the composition of investment, the depreciation of the existing stock and the rate of population growth.

Cebr relied upon internal forecasts for GDP growth for those countries where detailed forecasts are produced, and made use of IMF forecasts for the investment share of GDP for countries for which Cebr does not produce such detailed forecasts. To forecast the composition of investment, or fixed capital formation, Cebr established econometric relationships in each of the countries within our sample to estimate its evolution over the forecast horizon.

Appendix B: Data sources

National sources

Australian Bureau of Statistics - http://www.abs.gov.au/

Brazilian Institute of Geography and Statistics - http://www.ibge.gov.br/english/

Statistics Canada - http://www.statcan.gc.ca/start-debut-eng.html

National Bureau of Statistics China - http://www.stats.gov.cn/english/

French National Institute of Statistics and Economic Studies - http://www.insee.fr/en/

German Federal statistics office - https://www.destatis.de/EN/Homepage.html

Hong Kong Census and Statistics Department - http://www.censtatd.gov.hk/

Indian Ministry of Statistics - http://mospi.nic.in/

Italian National Institute of Statistics - http://en.istat.it/

Japanese Ministry of Internal Affairs and Communications - http://www.soumu.go.jp/english/

Malaysian Department of Statistics - http://www.statistics.gov.my/main/main.php

Mexican National Institute of Statistics and Geography - http://www.inegi.org.mx/

Statistics Netherlands - http://www.cbs.nl/en-GB/menu/home/default.htm

Russian Federal State Statistics Reserve - http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/en/main/

Saudi Arabian Central Department of Statistics and Information - http://www.cdsi.gov.sa/english/

Department of Statistics Singapore - http://www.singstat.gov.sg/

Statistics Korea - http://kostat.go.kr/portal/english/index.action

Spanish National Institute of Statistics - http://www.ine.es/en/

Turkish Statistical Institute - http://www.turkstat.gov.tr/Start.do

UK Office for National Statistics - http://www.statistics.gov.uk/hub/index.html

US Bureau of Economic Analysis - http://www.bea.gov/

International sources

International Monetary Fund, World Economic Outlook, April 2013. Accessed via Macrobond.

Penn World Table, Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 7.1, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, Nov 2012. Accessed via Macrobond.

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