Research by

OXFORD ECONOMICS

Capital project and infrastructure spending

Outlook to 2025 research findings

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Contents

1 Research findings

1.1 Introduction

The research analyzes capital projects and infrastructure spending across 49 of the world's largest economies with varying Gross National Products across six continents. It estimates the scale of current infrastructure investment and assesses the prospects for future investment from now to 2025. Our findings show the shift in economic weight from West to East as well as the real possibility that many advanced Western European economies may fall behind their competitors in this key sphere.

1.2 Definition of infrastructure

Our definition of infrastructure is wide-ranging, taking in a number of broad sectoral groupings and economic activities. We cover the sectors traditionally classified as infrastructure such as transportation and utilities, but also look at a number of the key manufacturing and primary activities that enable transportation and utilities sectors to develop and operate.

For example, without a supply of basic metals, it is difficult to develop and improve rail networks; similarly, without the capacity to refine hydrocarbons, road, air and sea transportation will have to bear the high cost of imported fuels. In this respect, a number of manufacturing sectors are also a key part of a country's infrastructure. We also look at sectors that supply households with essential human services such

Figure 1.1: Five key infrastructure sectors

1. Extraction

- Oil and gas
- Other extraction (coal, metals, minerals)

2. Utilities

- Power generation
- Electricity T&D
- Gas
- Water
- Telecoms

3. Manufacturing

- Petroleum refining
- Chemical
- Heavy metals

4. Transport

- Rail
- Roads
- Airports
- Ports

5. Social

- Hospitals
- Schools

as education and health, or social infrastructure.

To measure infrastructure investment in our dataset, Oxford Economics estimated Gross Fixed Capital Formation (GFCF) in each of our sectors. This concept is consistent with standard National Accounting methodology adopted by most statistical agencies around the world, and measures the value of work done in any given year in developing assets used by different sectors. For example, GFCF in the petrochemicals industry would measure the investment in building a new factory and filling it with all the necessary machinery and equipment to start producing. If the factory took five years to build and fit out, with an equal amount of spending in each year of the project, then the GFCF measure of investment would record a fifth of the total project amount per year over this period.

This is different from the other principal approach to measuring investment in infrastructure, i.e., measuring the volume of deals agreed in any given year. Using the deals-agreement method in the example above, the investment would be recorded in the year the agreement to build the factory was signed, regardless of when (or indeed, even if) the factory was actually built.

Conceptually, these two approaches should be equal over the long run, assuming no projects were abandoned after being recorded. However, there will clearly be differences in the pattern of investment as recorded in the data. The case of an individual project has already been discussed, but the differences are also noticeable in aggregate. For example, deals typically pick up during periods of economic recovery, but dry up during recessions, which means the deals data can be highly cyclical. And even as deals pick up quickly during economic recoveries, the process of getting real boots on the ground and work started may still lag behind. By contrast, GFCF numbers are not subject to the same uncertainty and volatility as deals data; therefore, it is a better choice for analyzing our dataset.

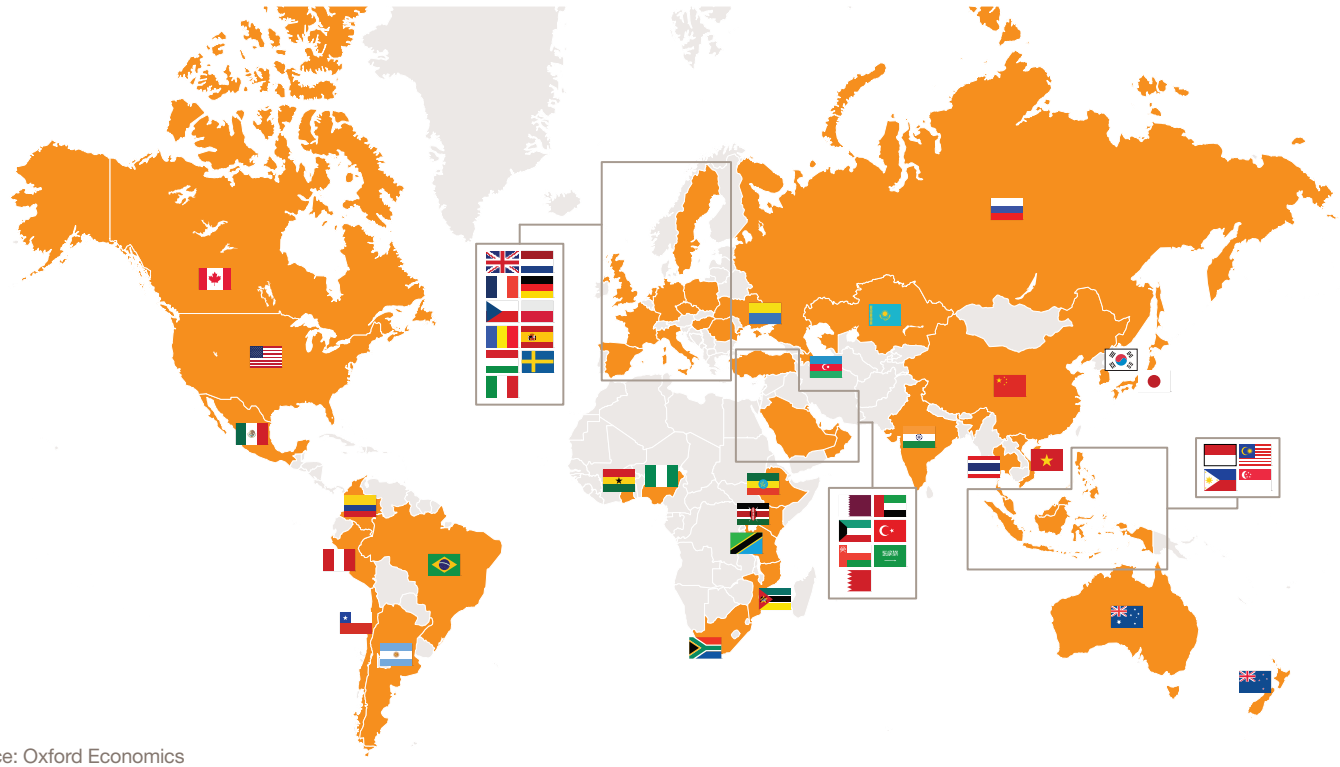
For simplicity, we present all numbers in our dataset in current nominal price in US dollars.

1.3 Geographical coverage

The dataset incorporates 49 of the world's largest and fastest growing economies. Ideally, of course, any assessment of the global infrastructure spending would attempt to incorporate all of the world's 200+ countries. However, our sample covers around 91% of total world fixed investment spending (in 2012) and we are confident that our estimates are a good proxy for the total infrastructure market.

Map 1.1: Country coverage

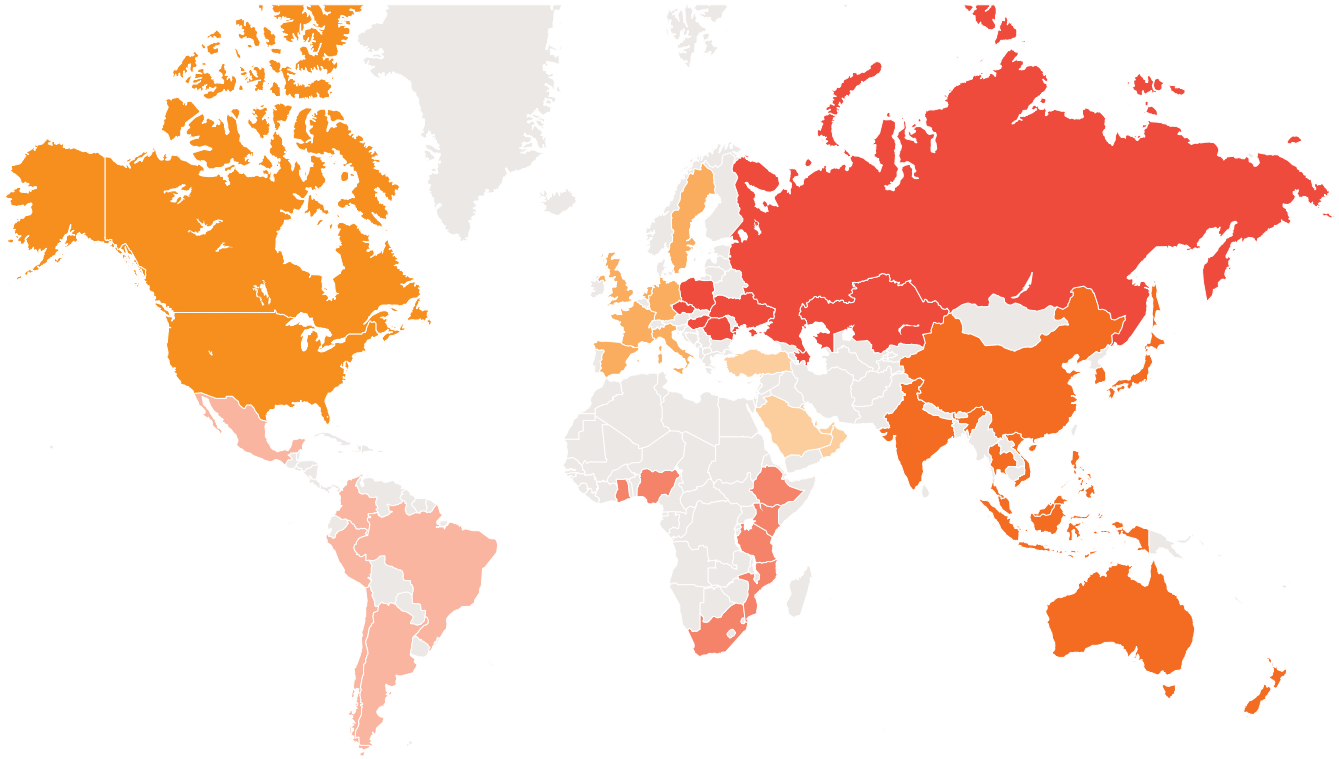
49 countries accounting for 90% of world GDP and 91% of world fixed investment



Source: Oxford Economics

Map 1.2: Regional groupings

Western Europe, North America, Latin America, Asia-Pacific, Middle East, Sub-Saharan Africa, Former Soviet Union/Central and Eastern Europe



Source: Oxford Economics

Our country coverage is set out in Map 1.1 and Map 1.2.[1]

1.4 Data resources and methodology

The starting point wherever possible is official statistics published by official statistical agencies (including national statistical bodies, and supra-national organizations such as Eurostat and the OECD) on GFCF by industry. This is relevant for a number of our infrastructure sectors, which directly match with typical industrial classifications, in particular the extractive and manufacturing sectors. The World Bank's dataset on investment in telecommunications is also used heavily throughout the dataset.

In some areas, official statistics are available for broad groupings of infrastructure, but not the component parts. This is often the case in utilities, which are typically reported as a group in official GFCF statistics, but not always individually (gas supply, electricity generation, electricity transmission and distribution, telecommunications, and water). Where this is the case, we have used a variety of approaches depending on data availability. In some cases industry trade bodies or regulators hold data on investment spending, collated across all major firms in the sub-sector. Elsewhere, we have examined annual reports from large firms in the sector to splice together at least a short time series, which can then be extrapolated using the relationship with the sector's economic output for which data is readily available.

In the case of the transportation sector, particular care is needed in using official statistics since data referring to "road transportation" will typically refer to the operation of road transportation services. As such, investment by this sector is the purchase of new vehicles for passenger or freight transport, and not the construction of new roads. Our data for investment in the transportation sectors are, therefore, typically taken from government fiscal accounts (recording capital spending on road or rail construction), or from regulatory bodies such as national port or aviation authorities. In the cases where there is a single owner/operator of airports, such as Infraero in Brazil,

it is possible to use annual financial reports to estimate capital formation.

Spending on health and education infrastructure is available in standard national accounts for a number of countries, with data covering both private and public providers. However, in developing and emerging economies this is less often the case. In these instances Oxford Economics used datasets from the World Health Organization and UNESCO to estimate capital spending.

Using this range of datasets, as well as Oxford Economics data on output in each sector across the sample, capital spending is calculated to output ratios for each type of infrastructure. These ratios are then used to fill in the cases where the above approaches have not yielded suitable data on capital spending in a given sector/country combination. For example, data availability in Africa is the poorest in our dataset, with South Africa, Nigeria, Kenya, and Ghana having better data for fixed capital formation than Ethiopia, Mozambique, and Tanzania. Using the ratio of capital to output and output data (which is more readily available) allows us to estimate GFCF in the countries where data availability is weakest.

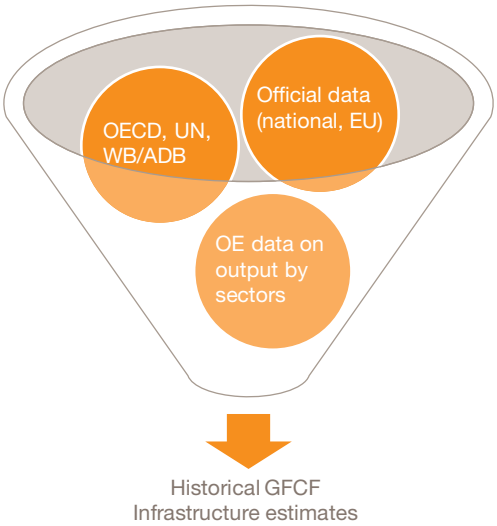
Having developed the historical dataset back to 1995 or wherever the data allow, we began forecasting infrastructure spending in each sector/country.

Wherever possible, Oxford Economics used forecasts from its existing Global Macroeconomic Model (GEM), used in government, finance and the wider business community worldwide. GEM forecasts for output in different sectors (formulated by Oxford Economics in-house country specialists) are the key drivers for infrastructure GFCF in our forecasts. In countries not covered at the sectoral level in the GEM (mainly those in Africa, select Former Soviet Union countries, and smaller Middle East economies), Oxford derived bespoke forecasts for sectoral output using historical data from government sources, and our own "high level" output forecasts. This approach is generally most useful when forecasting directly market-facing sectors, such as the extractive industries, utilities and manufacturing.

However, it is not possible to do this type of forecast in the case of sectors where the firms producing output are not those whose investment we seek to measure, e.g., investment by road transportation firms will be driven by demand in the transportation services sector, but road transport firms invest in vehicles, not roads. As such, forecasts in the transportation sectors are generated using the relationship between transportation investment and wider government investment, and whole-economy business investment (since a growing economy is likely to support the expansion of air and port facilities by either public or private bodies).

In the case of social infrastructure (health and education spending), we have analyzed the relationship between investment in these sectors, wider government investment, and the demographic structure of the population. Investment in education as a proportion of total government investment is found to be positively correlated with the proportion of younger people in total population, while health investment displays a similar relationship with the proportion of people aged 65+. Since demographic projections are widely available, this yields a good basis for forecasting forward infrastructure spending in these areas.

Figure 1.2: Data sources for infrastructure estimates



Source: Oxford Economics

2 The global infrastructure market

Key findings in our report

- *Global infrastructure spending fell by around $200bn in 2009, but has otherwise grown steadily over the past decade, reaching $4trn in 2012.*
- *An ever-increasing share of global infrastructure spending has been undertaken in emerging markets—in particular in Emerging Asia—which now accounts for nearly half of total spending, up from over 10% in 2006. This shift in spending from West to East is also reflected in the types of infrastructure being built, with the demand for commodities boosting extractive sectors in particular.*
- *Looking ahead, several factors are expected to determine how the global infrastructure market will evolve over the coming decade: high public debt burdens are expected to undermine public investment in some advanced economies; demographic factors will likely spur education investment in some countries and health in others; and natural resource endowments are expected to determine where extraction takes place. Also, the emergence into middle income is forecasted to produce millions of new car owners in Asia.*
- *As the world economies recover from the global uncertainty caused by the Eurozone debt crisis, the global infrastructure market is forecasted to grow by around 7–8% a year into the medium term and ease to around 6.5% after that.*
- *But the recovery will likely be uneven, with infrastructure spending in Western Europe struggling to reach pre-crisis levels until at least 2018. Emerging markets, unburdened by austerity or ailing banks, are expected to see much faster growth in infrastructure spending. We estimate that Emerging Asia will account for almost half of all global infrastructure spending by 2025*

2.1 Infrastructure spending since the global crisis

In this first section of our report we look at the impact the global economic crisis has had on infrastructure investment around different sectors and regions as well as the state of global infrastructure investment spending in 2013.

As a result of the damage done to the global banking system and government accounts, as well as the changing demand for different types of goods and services, the great recession of 2008-09 has dramatically shifted the pattern of infrastructure spending. We are seeing investment funds shift from the West to the East, from sectors serving households to those supporting early-stage economic growth, and from sectors that rely on public investment or bank-lending to those supported by retained profits or rising commodity prices.

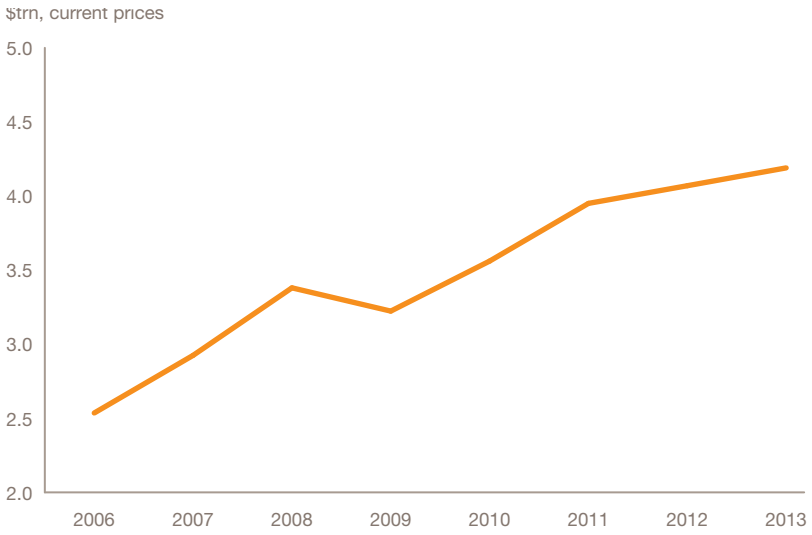
Overall, we estimate global infrastructure spending shrank by around $200bn in 2009, after having maintained steady growth for a few years. It rebounded again in 2010, driven partly by government stimulus spending infrastructure (see Figure 2.1)

But the rate of growth has not been the same for all regions. In particular, the Eurozone crisis hit infrastructure spending directly in Europe, as well as indirectly those firms in other regions that serve European consumers and governments. This has left the composition of infrastructure spending looking markedly different across continents compared to just a few years ago.

As Figure 2.2 shows, emerging markets now account for just short of half of all infrastructure spending, an increase of

Figure 2.1: Global infrastructure spending

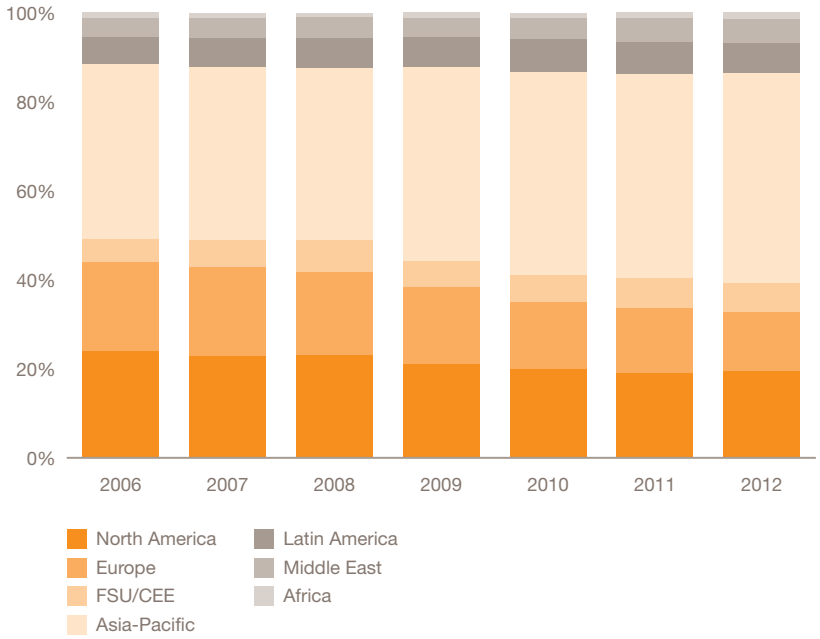
Estimated at $4trn in 2012



Source: Oxford Economics

Figure 2.2: Proportion of infrastructure spending by region

Emerging markets account for approximately half of global spending



Source: Oxford Economics

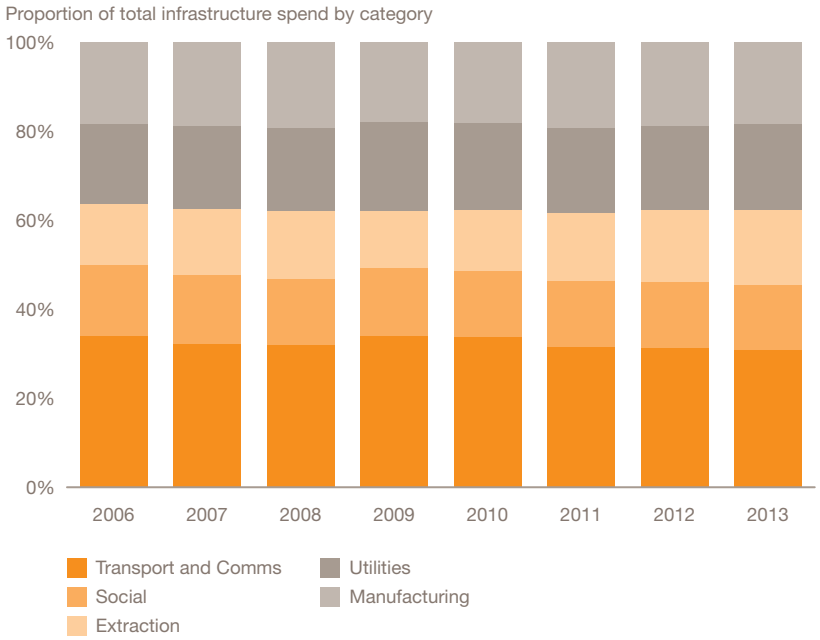
over 10% relative to 2006. Advanced economies' share of total spending has fallen correspondingly, from 62% to 50%. In this current state of affairs, Emerging Asia (in particular China) has seen the greatest proportionate growth—from 23% to 30%—while Western Europe's share has fallen from 20% to just 12%.

The sectoral breakdown of infrastructure spending (see Figure 2.3) shows much less change than the geographic split. Extraction has increased its share of total spending from 14% to 17%, with most of this growth coming from non-oil/gas extraction. Transportation and communications infrastructure spending fell from 34% of total to 31%. The manufacturing and utilities sectors, at the aggregate level, have stayed broadly stable, while social infrastructure edged down from 16% of total to 15%, mostly due to slower growth in education investment than other types of infrastructure.

The shifting of economic power from the West to the East has also meant that infrastructure has grown to take an increased share of global fixed investment (see Figure 2.4). This is because countries like China, India and other emerging markets invest a greater proportion of their resources in developing physical infrastructure such as power supply and transportation links, as opposed to advanced economies where these assets are already well established. As a result, the share of global investment going to infrastructure has grown steadily.

Figure 2.3: Proportion of infrastructure spending by sector

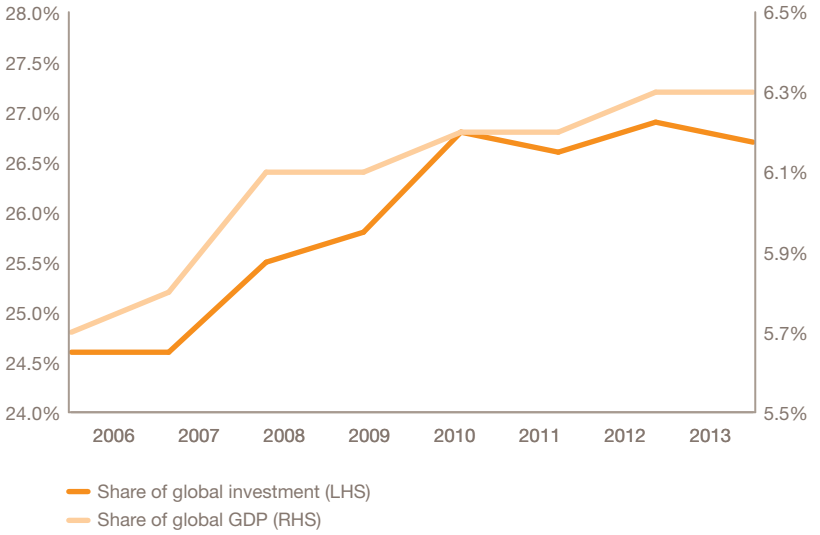
Gradual shift toward extractive investment in recent years



Source: Oxford Economics

Figure 2.4: Infrastructure's importance in the global economy

Infrastructure accounts for a greater share of world output and investment due to emerging market growth



Source: Oxford Economics

2.2 *Drivers of future infrastructure spending*

The analysis suggests that the different sectors of infrastructure spending are driven by separate variables.

One of the key drivers of infrastructure investment is the availability of funding. In many sectors like social services and transportation, infrastructure development is mostly funded and implemented by governments, so government finances are quite clearly a key determinant of prospects.

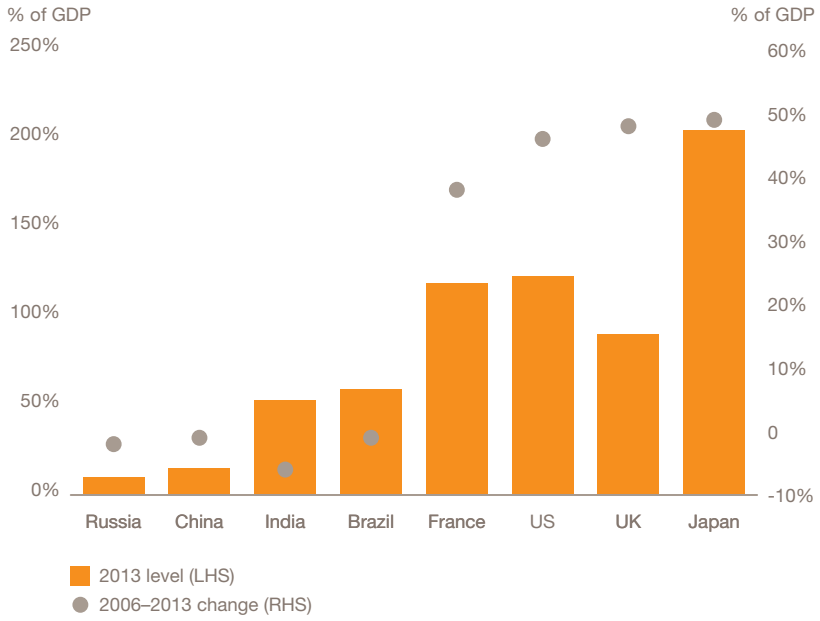
This is particularly relevant in the context of the advanced economies, especially Europe, where government debt burdens have risen to dangerous levels, reducing resources for future public investment. By contrast, in the emerging economies, debt burdens have stayed far more stable over the past few years, leaving considerably more room for future government investment. This is illustrated in Figure 2.5, which plots government debt-to-GDP ratios in 2013 and the change since 2006.

That said, emerging economy governments by and large have much higher borrowing costs than advanced economies (see Figure 2.6) due to generally poorer credit histories and less certainty about future economic stability. So, if infrastructure projects were to be funded directly by government borrowing, they would have to meet a higher expected economic return to justify government investment, even though in theory the government has greater fiscal freedom to do so.[2]

In addition, governments have a range of options for how to fund and implement transportation and social infrastructure projects, with Public-Private Partnerships (PPP) and other

Figure 2.5: Debt to GDP ratio in 2013, change vs. 2006, selected economies

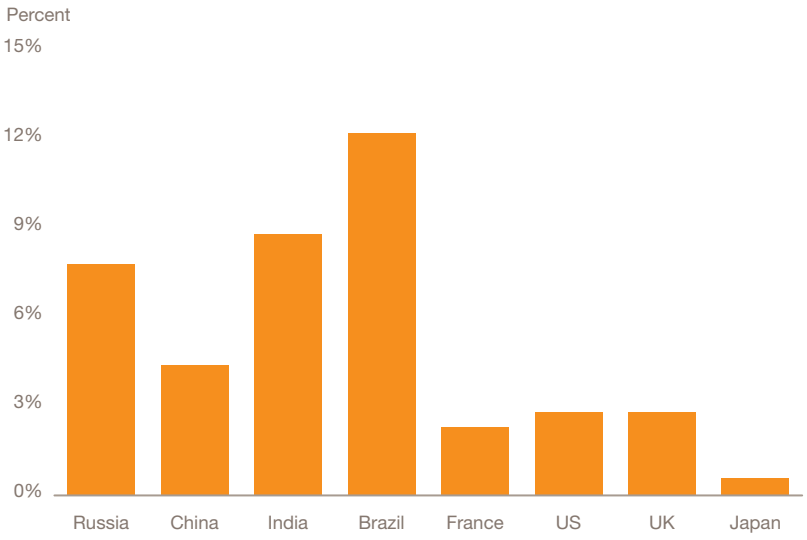
Emerging markets not as constrained by fiscal burdens as high-income economies



Source: Oxford Economics

Figure 2.6: Interest rate on 10-year government bonds, 2013Q4

Emerging market governments face higher borrowing costs



Source: Oxford Economics

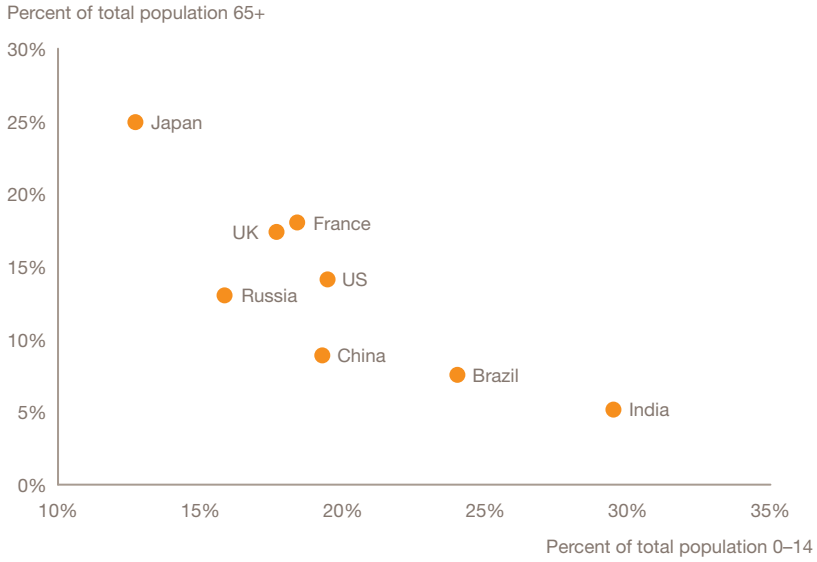
financing arrangements becoming more common in European economies in particular. Nevertheless, since such arrangements add to governments' future liabilities, they are hardly zero-cost options, despite not adding to headline government debt today. Leveraging more private financing into infrastructure spending would no doubt boost overall investment in certain sectors. But since the success of these arrangements depends on the particular circumstances in each economy—and, in the case of some countries, on substantial legal and regulatory improvements—we do not explicitly quantify the role of PPP in this dataset.

Demographics characteristics will also play a key role in determining the type of infrastructure built (see Figure 2.7). For example, a country with a large or growing school-age population will need to devote more of its available resources to building schools, while those with a larger old-age cohort will need to devote more towards healthcare facilities.

Economic wealth will also have an impact on the type of infrastructure required. For example, as income per capita rises, households are more likely to acquire cars. This relationship is illustrated in Figure 2.8 where, across our sample of 49 countries (except Qatar and Singapore), each $1,000 increase in GDP per head results in an extra 15 cars per 1000 persons. Therefore, we expect spending on road infrastructure to grow in line with car ownership and income per head. Growth in car ownership would also imply an increased demand for the three manufacturing sectors in our dataset, namely, fuel refining, chemicals, and basic metals—all of which are central to car production.

Figure 2.7: Demographic structure 2013, selected economies

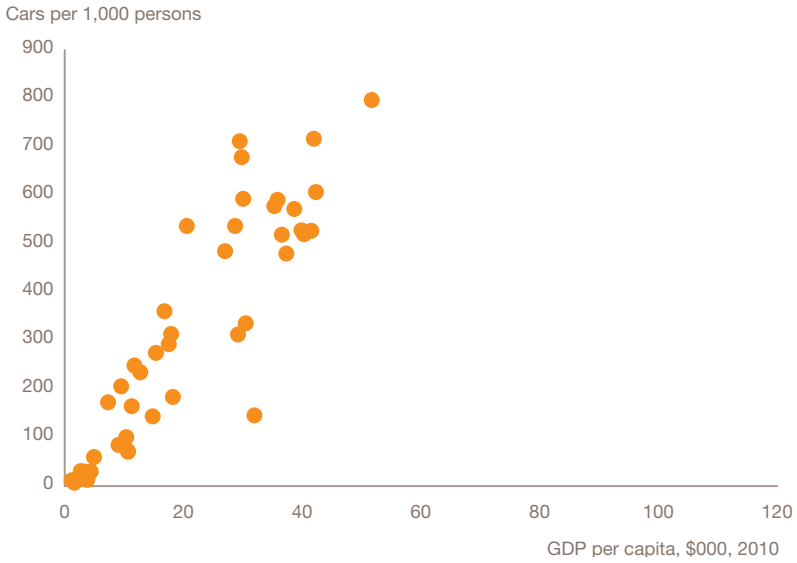
Aging populations more prevalent in higher-income economies



Source: Oxford Economics

Figure 2.8: Car ownership and GDP per capita

Economic growth will drive demand in car ownership and road space



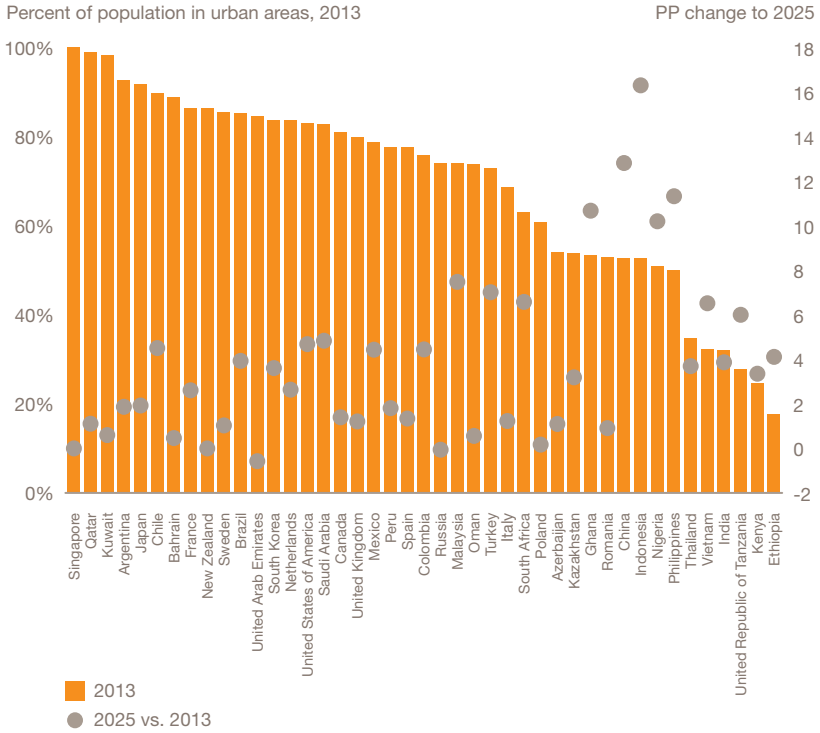
Source: Oxford Economics

Also, as countries become wealthier—in particular as they move from low-income status (broadly, GDP per capita of less than $4,000 a year) to middle income status (between $4,000 and $12,000)—they tend to urbanize. This can be seen in the development of leading emerging markets in Latin America and Asia, as shown in Figure 2.9. In the coming decade this process will continue in a number of economies, with the biggest shift to urbanized populations expected to occur in China, the Philippines, Indonesia, Ghana and Nigeria. In each of these five countries, we expect a shift from rural to urban population of 10% or more.

As countries urbanize, access to basic utilities services increases. This is shown in Figures 2.10 and 2.11, where access to water supply and electricity becomes almost universal when 80% or so of the population live in urban areas.

Figure 2.9: Urbanization across our sample

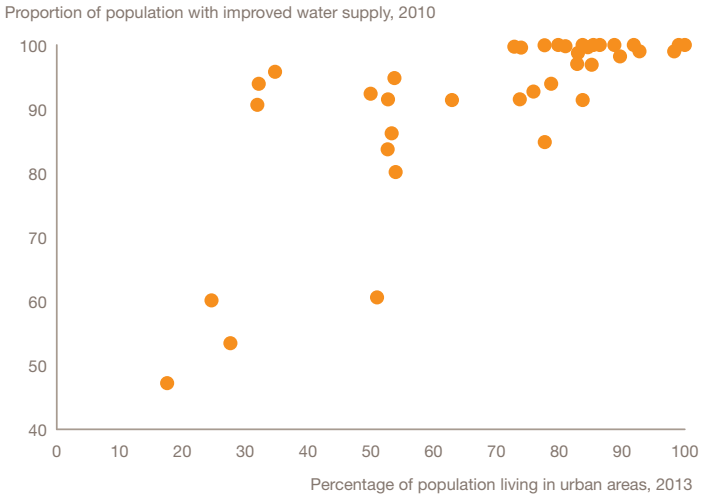
Urbanization on the upswing in emerging markets



Source: Oxford Economics

Figure 2.10: Urbanization and access to water supply

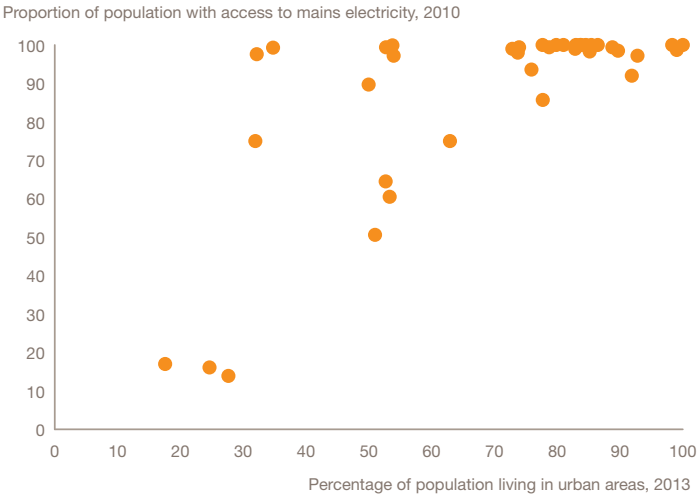
… will fuel investment in water-related infrastructure



Source: Oxford Economics

Figure 2.11: Urbanization and access to electricity supply

… will fuel investment in the grid



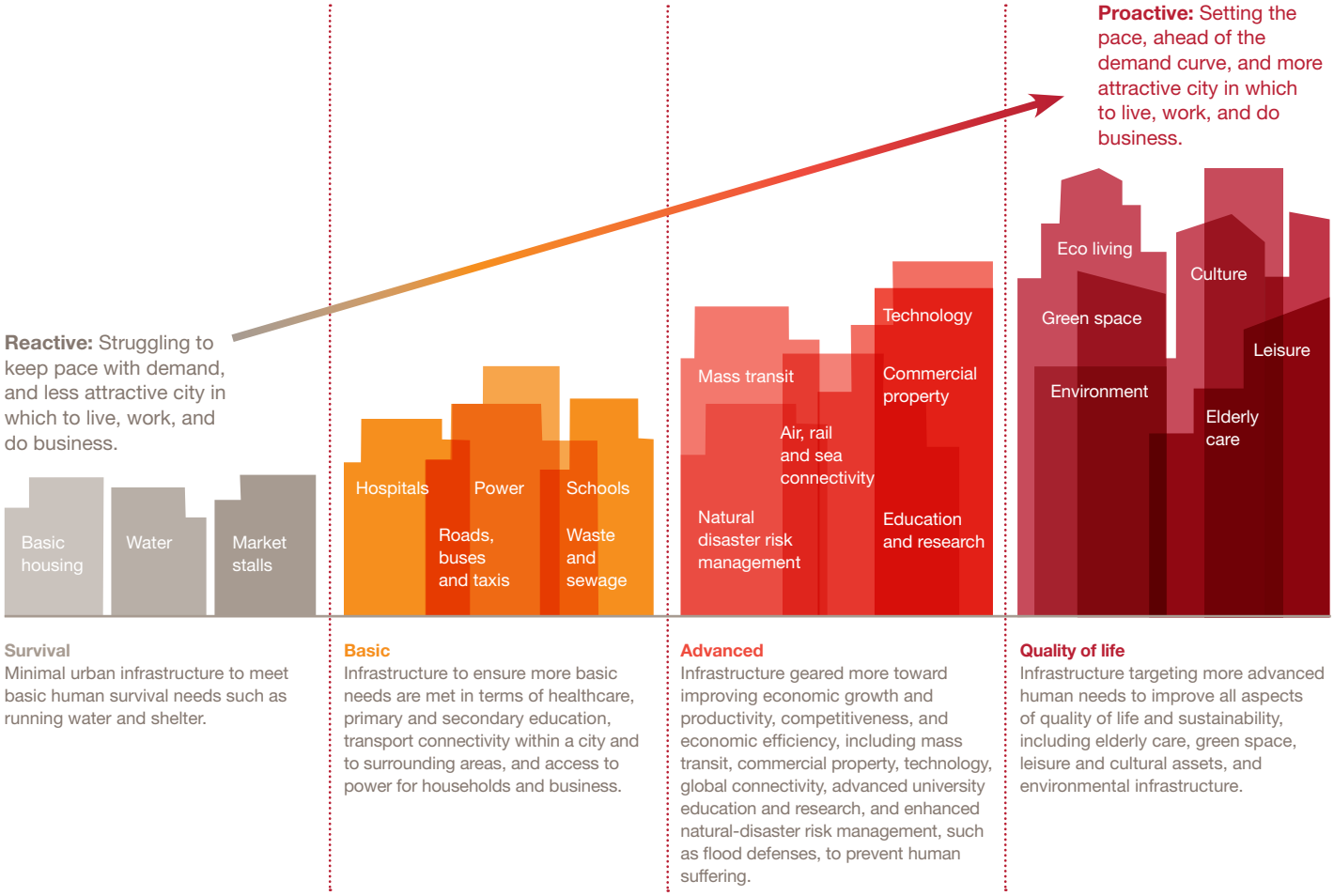
Source: Oxford Economics

We do not examine causality in detail here but two factors seem likely to be at work. First, increased urbanization—and by extension, higher population density—lowers the cost of supplying utilities to each household. This is because it's cheaper to build a water main into a block of apartments than it is to build it into 30 separate dwellings. Second, since people tend to migrate from the countryside to cities in search of higher wages, new urban dwellers are better able to afford not only the utility supply itself, but also goods (e.g., domestic appliances) whose functionality depends on a reliable water supply. It comes as no surprise then that we might expect noticeable growth in utilities investment in countries that are rapidly urbanizing.

As economies develop from low to middle to upper income, the types of infrastructure investment demanded in their cities also evolve. At the very lowest income levels, increased population density means the need for better provision of amenities essential to human subsistence such as shelter and water supply. As income increases, investment can be directed into basic, but non life-critical services like utilities, health, and education. At higher income levels increased investment is made into sectors that make the city a more productive place to do business such as sophisticated transportation and communications infrastructure.[3] The city's infrastructure life cycle is set out in Figure 2.12.

Figure 2.12: A city's infrastructure life cycle

Four-stage urban infrastructure evolution
Where are the Cities of Opportunity positioned today in the evolution of urban infrastructure and what will future infrastructure demands be?



Source: PwC, *Cities of Opportunity: Building the Future*, November 2013

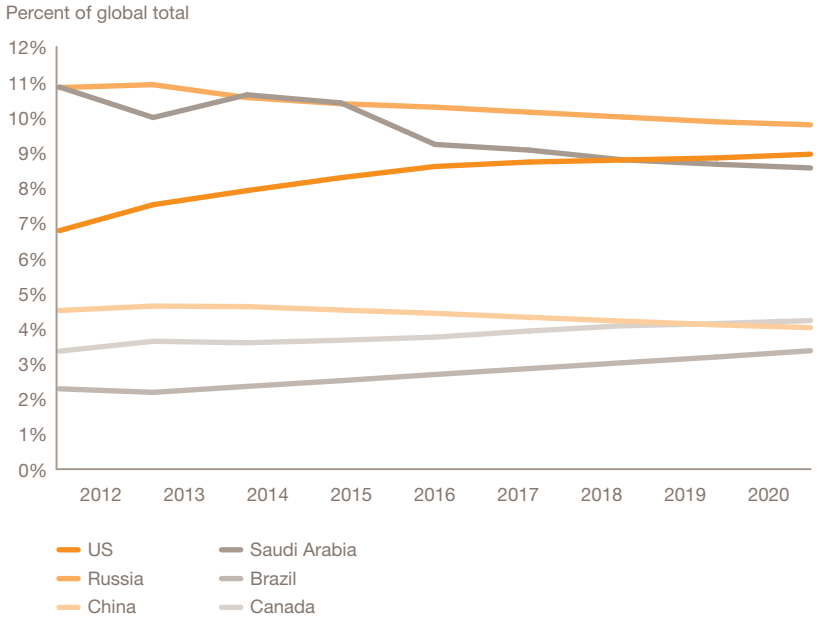
Endowments of natural resources, and policy frameworks around exploiting them, are also expected to play a key role in determining the pattern of infrastructure spending. Figure 2.13 shows Oxford Economics' forecasts for the shares of global oil production across some of the world's major oil producers. We expect the US, Canada, and Brazil, buoyed by discovery of new reserves and an openness towards private and foreign investors, to increase their share of global oil output over the coming decade, while the shares of Saudi Arabia and Russia decline. But in order for this shift to become reality, increased spending on extraction in North America and Brazil will be necessary.

2.3 *Infrastructure investment in the coming decade*

We estimate a global economic recovery to generate more infrastructure spending in the next few years, with growth rebounding from the low single digits in 2012-13 to 6% in 2014 and 7.5% by 2016. As the recovery levels off in the latter half of this decade, we expect the pace of growth to ease slightly, but global infrastructure spending is still expected to grow by over 6.5% a year into the medium term. Overall, we expect the global market to be worth over $9trn a year by 2025, up from $4 trn in 2012 (see Figure 2.14).

Figure 2.13: Share of global oil production

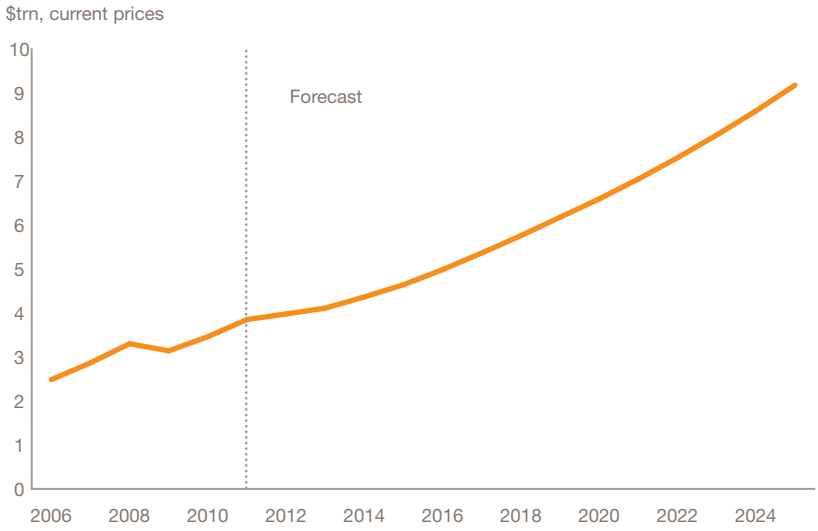
Unconventional sources will shift balance of production back to the West



Source: Oxford Economics

Figure 2.14: Global infrastructure spending

Global infrastructure market to exceed $9trn by 2025

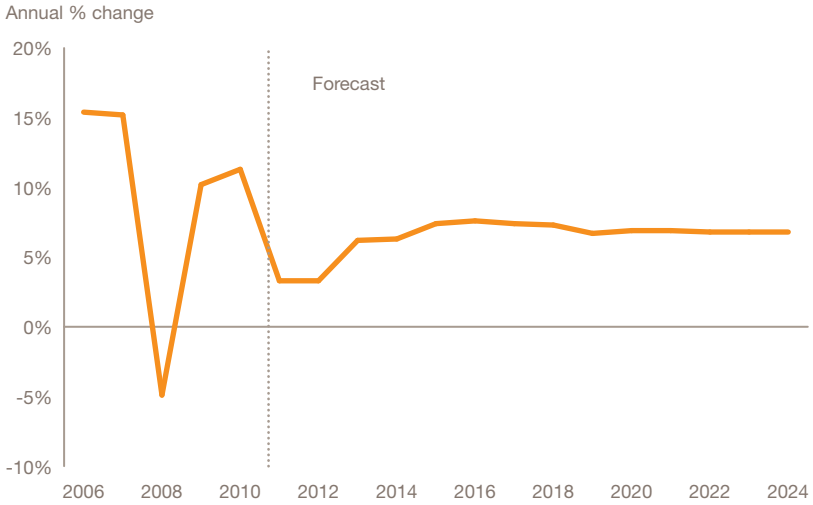


Source: Oxford Economics

Since advanced economies' recovery lags behind the emerging markets, and European governments in particular struggle to keep public debt burdens down, the broad geographical and regional trends identified in section 2.1 are likely to persist—and even accelerate modestly—into the medium term (see Figure 2.15). Emerging Asia's share of global infrastructure spending is set to rise from 30% in 2012 to 40% in 2018, and 48% by 2025, while Western Europe falls from 12% to almost 10%, and Advanced Asia from 17% to 10.5% (see Figure 2.16).

Figure 2.15: Growth in global infrastructure spending

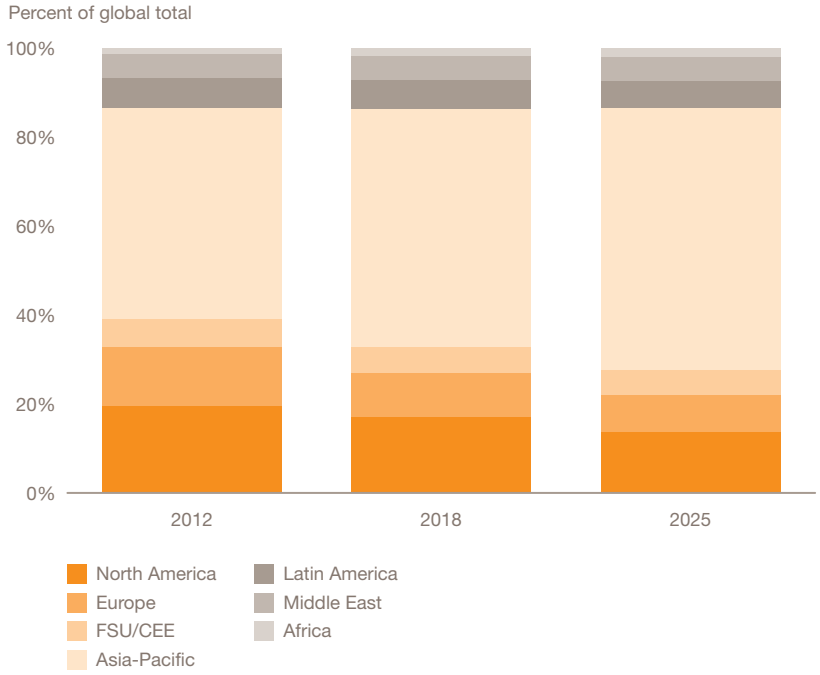
Long-term growth will average 6.5% per year



Source: Oxford Economics

Figure 2.16:

Market will continue to shift eastward



Source: Oxford Economics

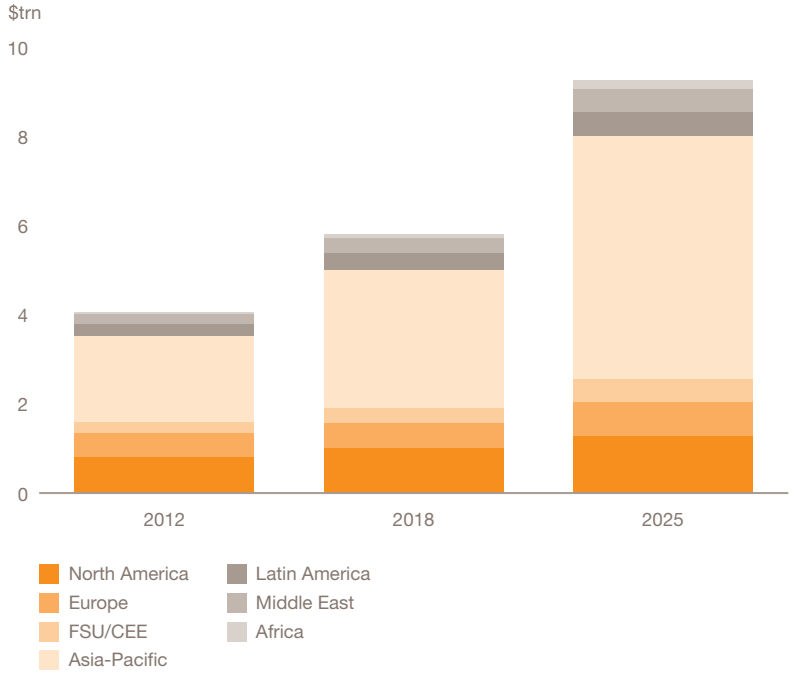
The volume of infrastructure spending will rise in all regions, even in those countries that are losing share of the global total. Nevertheless, the impact of austerity and slow recovery in Western Europe over the coming few years are clear: total infrastructure spending will edge up gradually in the near future, reaching only $594bn by 2018 (see Figure 2.17), which is around the same nominal spending as in 2007.

The growing importance of emerging markets in infrastructure spending is also reflected in the composition of global spending through our forecast. Manufacturing sectors essential to supporting wider economic development (basic metals, fuel refining, and chemicals) are expected to grow to just less than a quarter of total infrastructure spending by 2025. Sectors that typically contribute a greater share to infrastructure spending in advanced economies—e.g, social infrastructure—are likely to dip as a proportion of global spending in the coming few years as austerity curtails government spending in these areas (see Figure 2.18).

Further out though, social services's share of global infrastructure should rebound, as both advanced and emerging economy governments increase their investment. By contrast, the importance of the extractive sector should ease as growth in global commodity demand evens out (with falling demand in advanced economies offsetting rising demand in the emerging markets).

Figure 2.17: Regional infrastructure spending

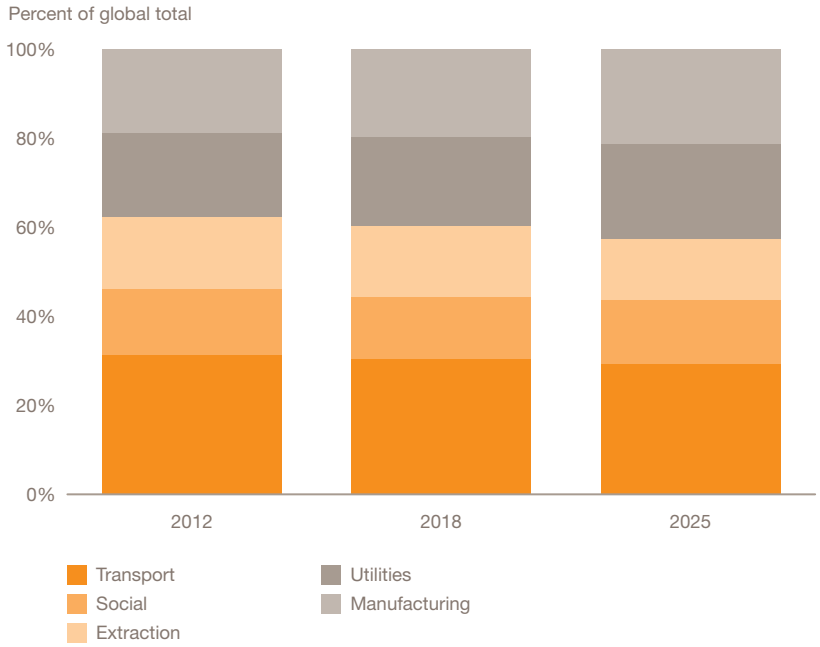
Even in regions with slower growth, infrastructure spending will grow almost 50% by 2025



Source: Oxford Economics

Figure 2.18: Infrastructure spending by sector

Manufacturing and utilities investment key to emerging market growth



Source: Oxford Economics

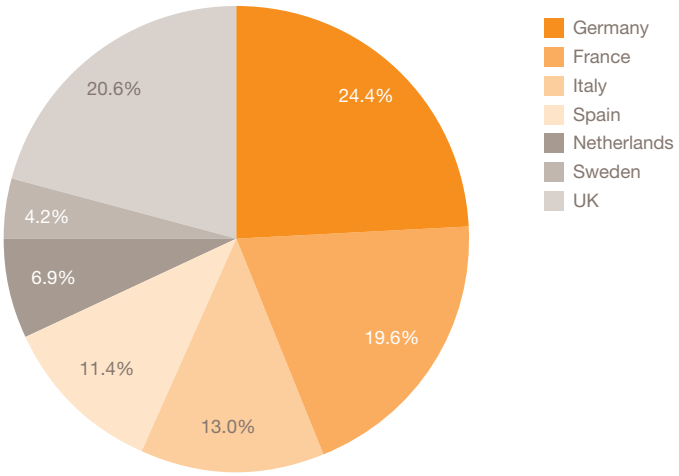
3 Western Europe

Our Western Europe sample comprises the leading Eurozone economies (Germany, France, Italy, Spain and the Netherlands), as well as Scandinavia's largest economy (Sweden), and the largest non-Eurozone economy in the EU (the UK). As Figure 3.1 shows, the three largest economies (Germany, France and the UK) account for almost two thirds of total infrastructure investment across this sample in 2013, with Germany alone generating around a quarter of total infrastructure spending in Western Europe. The next largest economy on the continent, Italy, lags well behind in its infrastructure development. (Italy's economy is only 20% smaller than France in GDP terms, but infrastructure spending is around a third less.) Spain's infrastructure market in 2013 is broadly in line with its share of GDP among our Western Europe grouping, while the Netherlands and Sweden account for a larger portion of infrastructure spending than their shares of GDP would imply.

Figure 3.1: Composition of Western European infrastructure market, 2013

Germany, France, and the UK dominate European infrastructure spending

Percent of regional spending



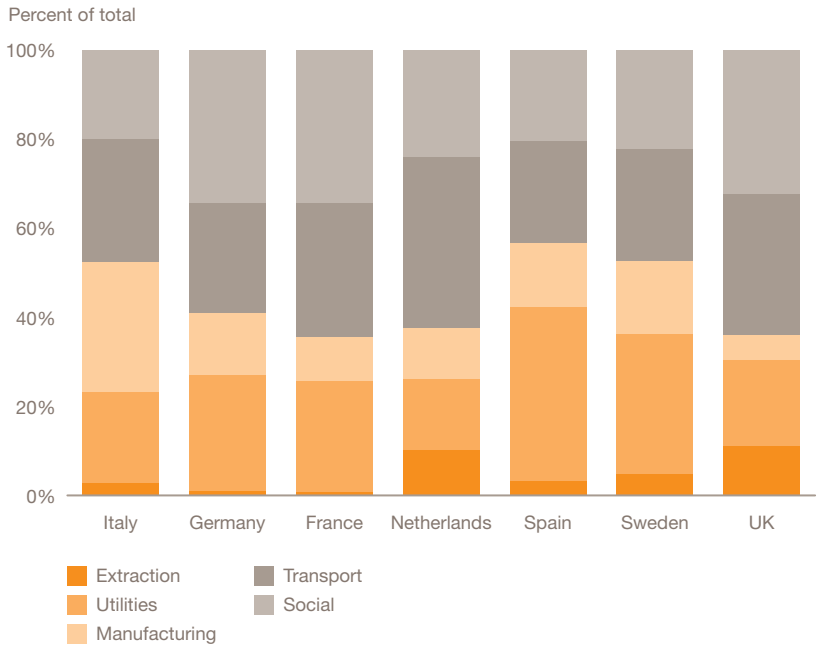
Source: Oxford Economics

As Figure 3.2 shows, a large chunk of infrastructure spending across the sample set of Western European countries is delivered in the social sector, between 20% and 35% of the total. (This is in line with advanced economies in the world and higher than emerging markets, which average 10-20%). But there is quite a substantial difference in the importance of utilities investment though, with Spain leading the pack with close to 40% spending in 2013 by our estimates. In the Netherlands and the UK, extraction investment contributes around 10% of total. Heavy manufacturing has all but disappeared as a priority for infrastructure spending in the UK, but remains substantially more important in Italy (which produces around twice as much steel per year as in the UK). The Netherlands invests a greater proportion in transportation infrastructure than any other European economy, with a particular emphasis on seaports and airports, supporting its role as a key trading hub.

Looking forward, the impact of the global and European financial crises of the past few years is set to weigh upon infrastructure investment (see Figure 3.3). In Spain and the UK, debt-to-GDP ratios have risen by 40-50%. France's debt burden has risen by almost as much, while the Netherlands has seen debt increase from less than 60% of GDP to almost 80%. Only in Germany and Sweden is public debt still reasonably well-contained.

Figure 3.2: Infrastructure spending by type, 2013

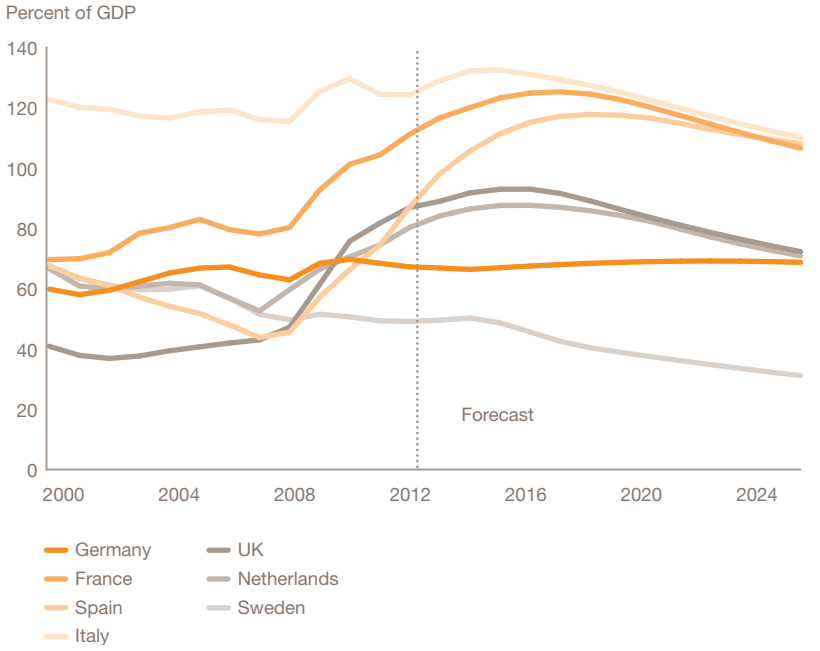
Big differences in the composition of spending across economies



Source: Oxford Economics

Figure 3.3: Western Europe government debt burdens

Heavy government debt burdens across Europe over the next decade



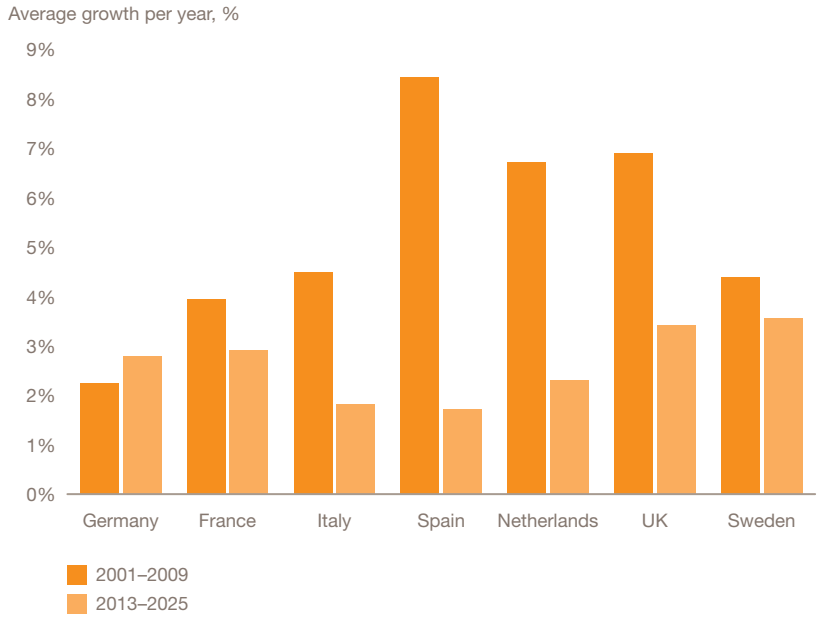
Source: Oxford Economics

As a result, we expect government spending and investment to grow at a much slower rate over our forecast horizon than had been the case in the run up to the global economic crisis (see Figure 3.4). In Spain, public spending grew on average at 8% a year from 2001 to 2009; this will likely slow to short of 2% on average in the coming decade. The rate of public spending growth will likely also shrink by half in the UK, Italy, and the Netherlands. Only in Germany, where public spending barely grew as fast as prices in the decade before the global downturn, is government spending set to gather pace.

In general, in most European economies (and world economies at large), the government has a role in financing and directing transportation investment. As such, transportation spending in particular will likely be hit by a period of austerity. As Figure 3.5 illustrates, we estimate two more years of falling spending on transportation infrastructure. From 2008 to 2015, at the regional level, transportation spending in nominal dollar terms is forecasted to have fallen by just over 30%. We expect only a gradual recovery in transportation investment later in the decade as governments continue to focus on rebalancing the public finances.

Figure 3.4: Government spending before and after the Eurozone crisis

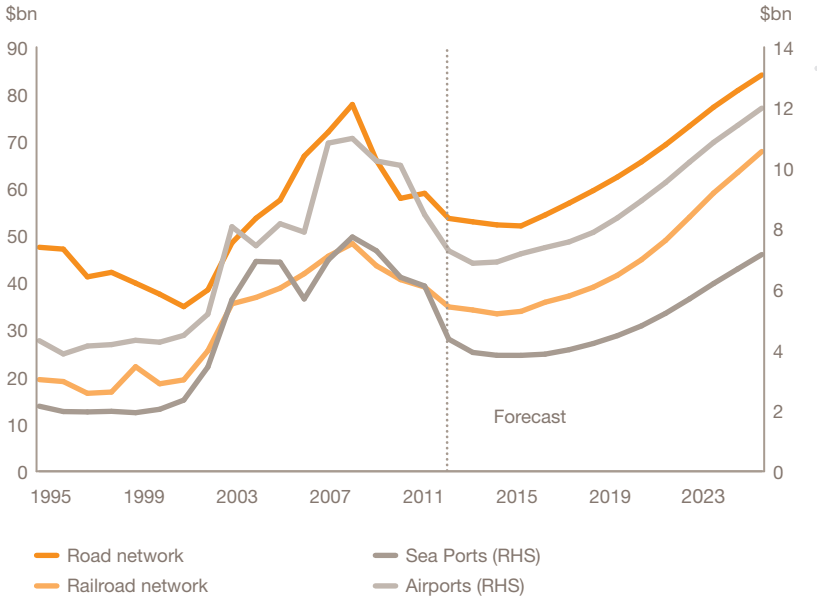
A spell of relative austerity ahead



Source: Oxford Economics

Figure 3.5: Total transport spending by type

Transportation spending will decrease by just over 30% between 2008 and 2015, then pick up again



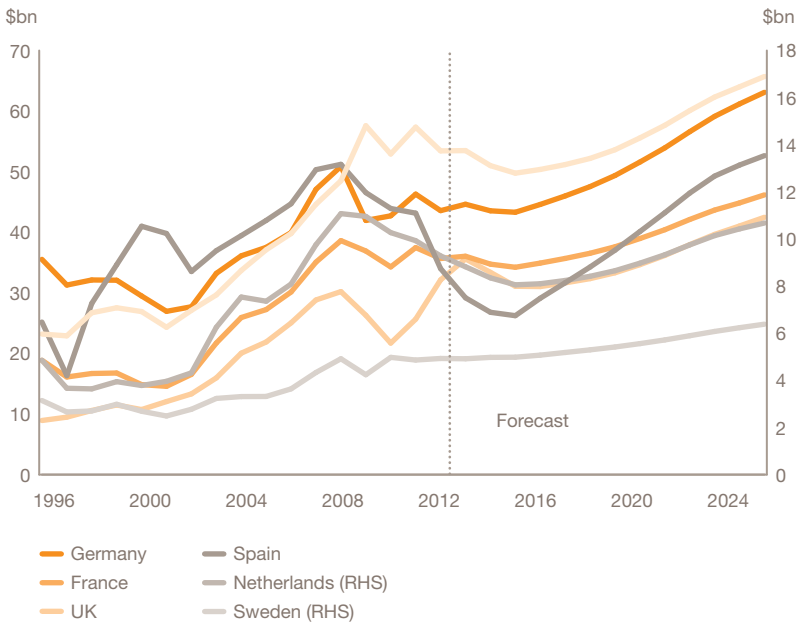
Source: Oxford Economics

Austerity will likely also affect social infrastructure investment (see Figure 3.6). In Spain, capital spending in education and health is forecasted to be cut in half by 2015 compared to 2008, and reduced by 25% in the Netherlands. In Germany, France and Italy, a prolonged period of stagnation is in store. In low-debt Sweden though, relatively steady growth is set to continue.

Europe's populations are (along with Japan's) among the oldest in the world, and the proportion of citizens aged 65 or over is expected to rise further over the coming decade. As Figure 3.7 shows, we estimate a quarter of German and Italian residents, and over a fifth in all our other Western European economies, will be 65 or older by 2025. As a result, an increased share of social infrastructure spending is likely to be diverted towards healthcare. This proportion has already reached close to 80% in Italy and Germany is expected to follow suit in the coming decade (see Figure 3.8).

Figure 3.6: Social infrastructure spending by country

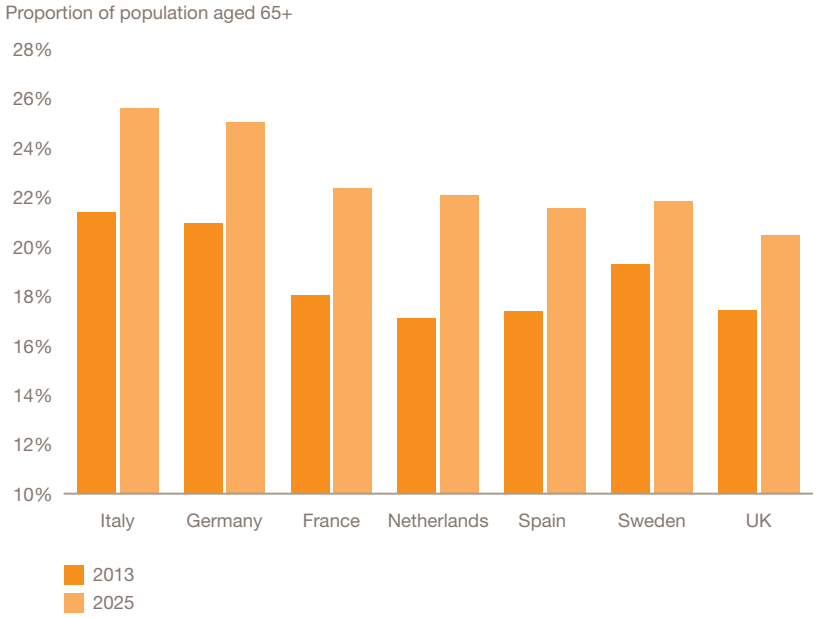
Austerity drives deep cuts in social infrastructure



Source: Oxford Economics

Figure 3.7: Population aging in Western Europe

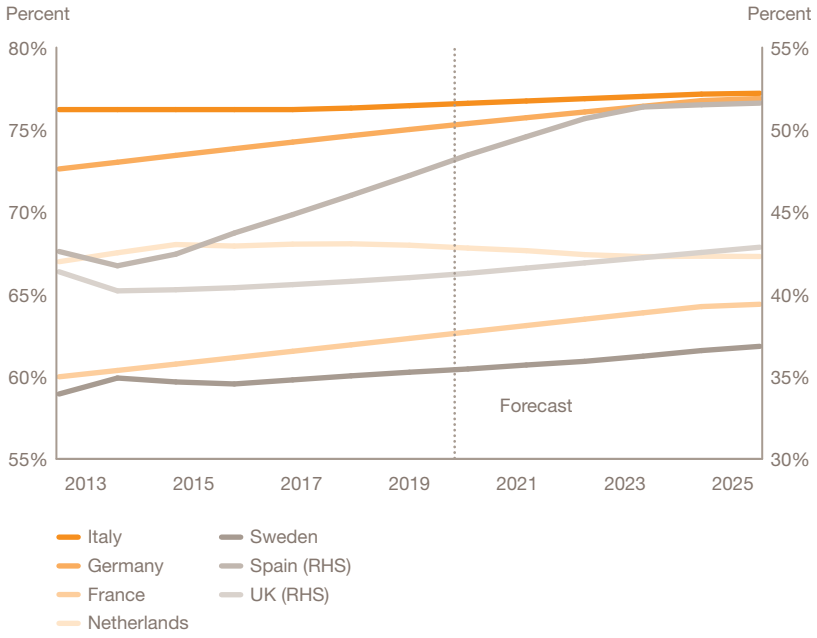
Rapidly greying population drives social infrastructure spending



Source: Oxford Economics

Figure 3.8: Proportion of social infrastructure spending on health

Despite austerity, health-related spending will be a priority



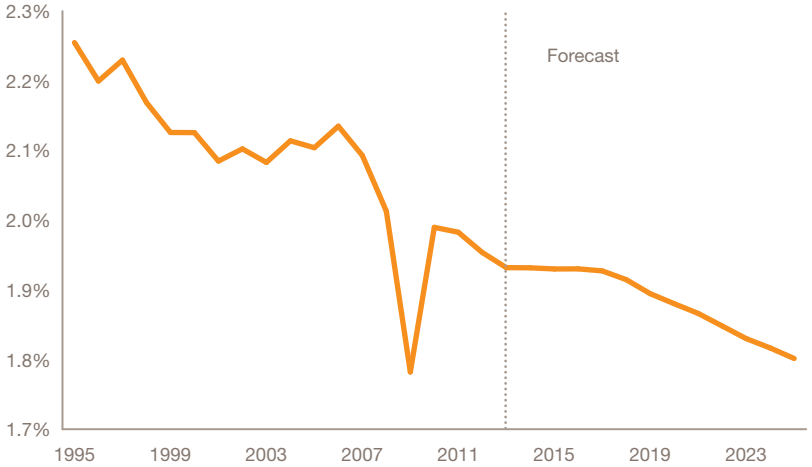
Source: Oxford Economics

Meanwhile, the deindustrialization of Europe's economy is expected to undermine the need to invest in heavy manufacturing sectors. The proportion of total European economic output produced in the metals, chemicals, and fuel refining sectors has fallen gradually over the long run, but the collapse of the global economy in 2009 hit the sector especially hard. Despite intense government pressure in a number of European economies to prevent closure of steel plants and other heavy industrial units, it seems inevitable that cost advantages in emerging markets, as well as better proximity to other manufacturing sectors using fuels, chemicals, and metals, will continue to undermine the case for investment in these sectors in Europe (see Figure 3.9).

Figure 3.9: Share of heavy manufacturing in Western European economy

Deep declines in manufacturing

Percent of nominal GVA accounted for by fuel, chemicals and metals manufacturing



Source: Oxford Economics

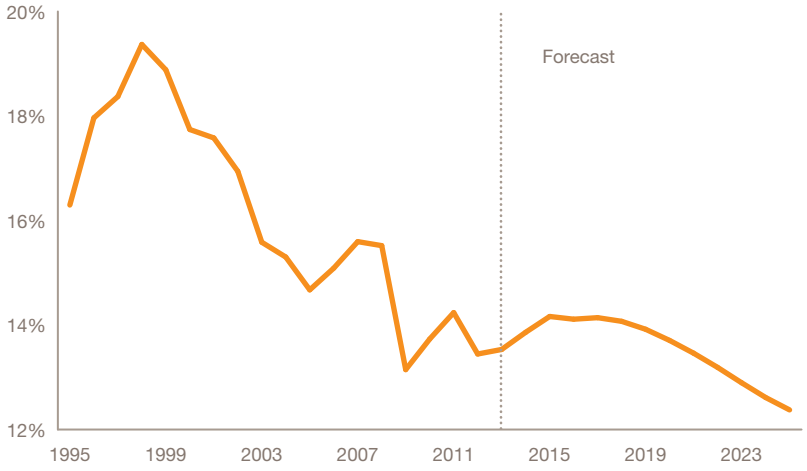
As such, we expect heavy manufacturing capital expenditure to grow by around 1-2% a year over the medium to long term. As Figure 3.10 shows, heavy manufacturing as a share of total infrastructure investment will be approaching 10% by the end of our forecast period, down from over 18% during the late 1990s.

We also expect investment in the utilities sector to be more robust over the coming decade since it is less reliant on government finances and, unlike relatively mobile manufacturing investment, is tied directly to the countries where the sector's output is consumed (see Figure 3.11). After a couple of more years of stagnation, we expect investment in the power supply, gas distribution, telecommunications, and water supply sectors to rebound.

Figure 3.10: Share of heavy manufacturing in Western European infrastructure investment

Decline in manufacturing will drive corresponding declines in metals, fuels, and chemicals investment

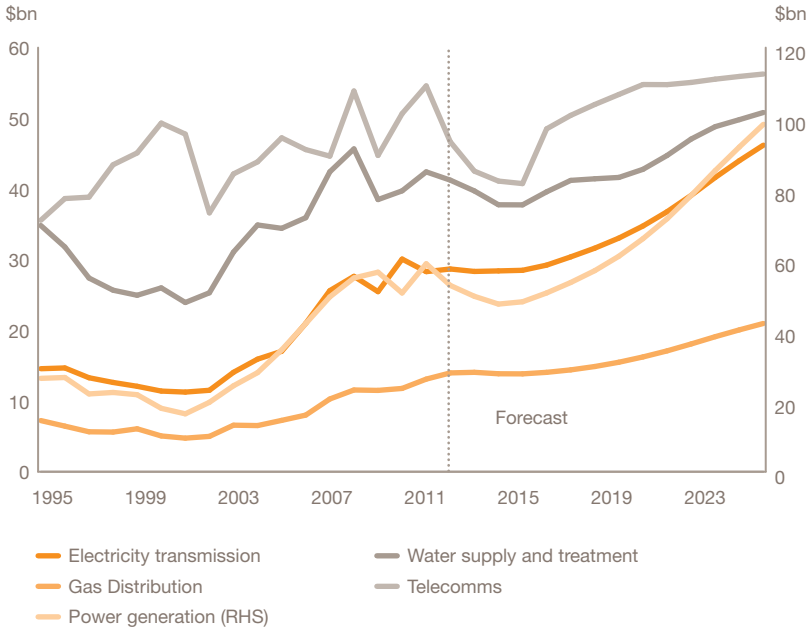
Percent of total infrastructure investment being made in metals, fuels and chemical sectors



Source: Oxford Economics

Figure 3.11: Utilities investment in Western Europe

Robust utilities investment ahead

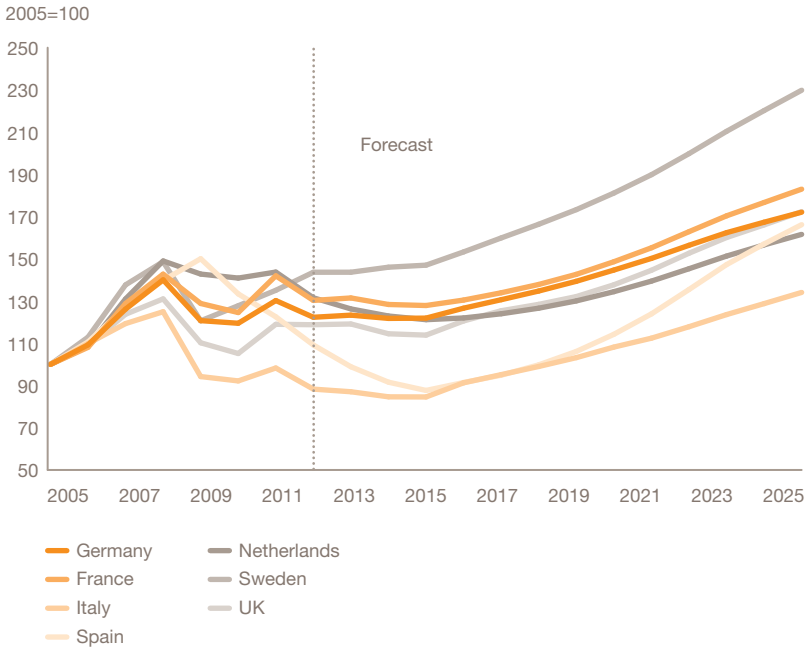


Source: Oxford Economics

Overall, Europe is set for a couple of more years of falling infrastructure spending, followed by only the most gradual of recoveries. But some countries are set to perform better than others, as Figure 3.12 shows. Sweden, being relatively unscathed by the Eurozone crisis and with limited fiscal consolidation to undertake, is expected to increase its investment in infrastructure relatively quickly from 2014 onwards. By contrast, "core" Eurozone economies such as Germany, France and the Netherlands, as well as non-Eurozone UK, will likely take longer to recover, partly due to debt burdens, but also because their reliance on trade with other Eurozone countries undermines investor confidence. In the countries most badly affected by the debt crisis, it is expected that infrastructure spending will still be below 2008 levels (in nominal dollar terms) well into the next decade. All in all, we expect Western Europe's share of global infrastructure investment to erode over the coming decade.

Figure 3.12: Infrastructure investment by country

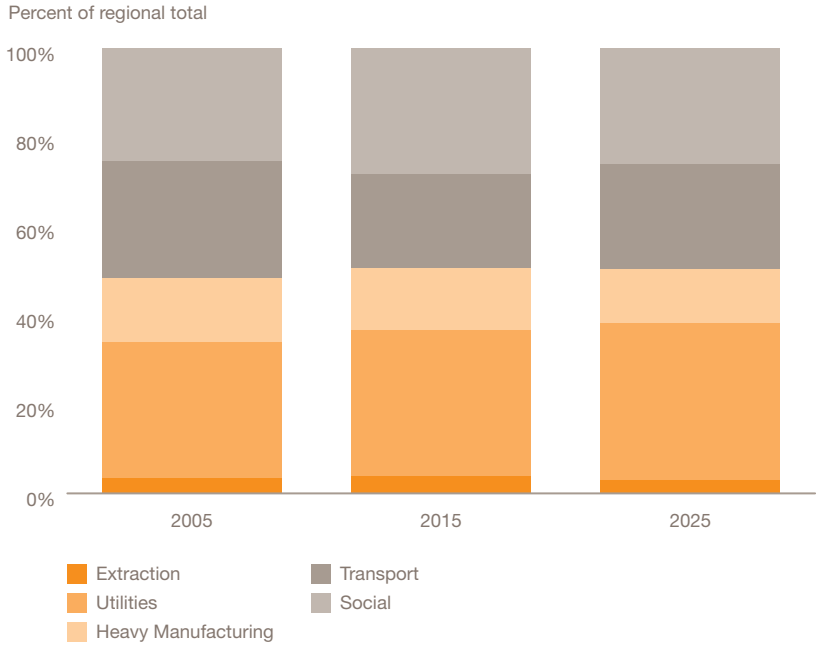
Italy and Spain to see deepest cuts to infrastructure spending, but faster recovery in Spain permits some "catch-up"



Source: Oxford Economics

Figure 3.13: Composition of infrastructure investment in Western Europe

Utilities and transport infrastructure set to lead a gradual recovery

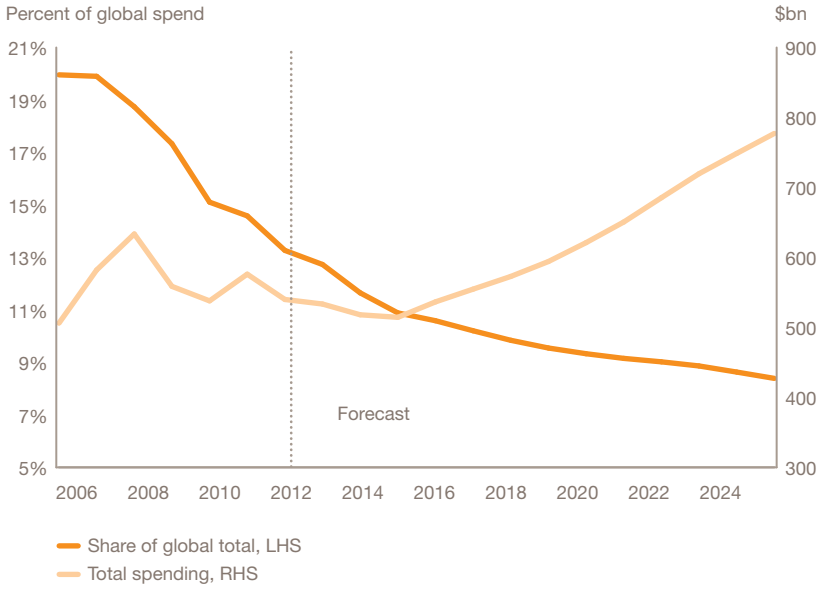


Source: Oxford Economics

As Figure 3.14 shows in nominal terms, the market is expected to reach pre-crisis levels towards the end of this decade, growing by around 4% a year after that. But with a number of other parts of the world growing at twice this rate, Western Europe is forecasted to generate less than 10% of the global spending by 2025, compared to twice as much only a few years ago.

Figure 3.14: Western Europe in the global context

At a long-run growth rate of 4% a year, Western Europe will account for a falling proportion of global infrastructure spending



Source: Oxford Economics

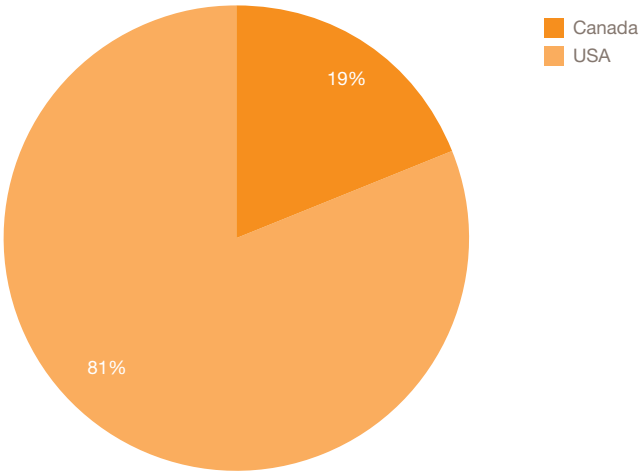
4 North America

As might be expected, infrastructure spending on the North American continent is dominated by the US, which we estimate to account for 81% of infrastructure investment in 2013 (see Figure 4.1). But this is somewhat less than the US's share of North American GDP (over 90%).

Figure 4.1: Composition of the North American infrastructure market, 2013

The US accounts for more than 80% of North American infrastructure market

Percent of regional infrastructure spending



Source: Oxford Economics

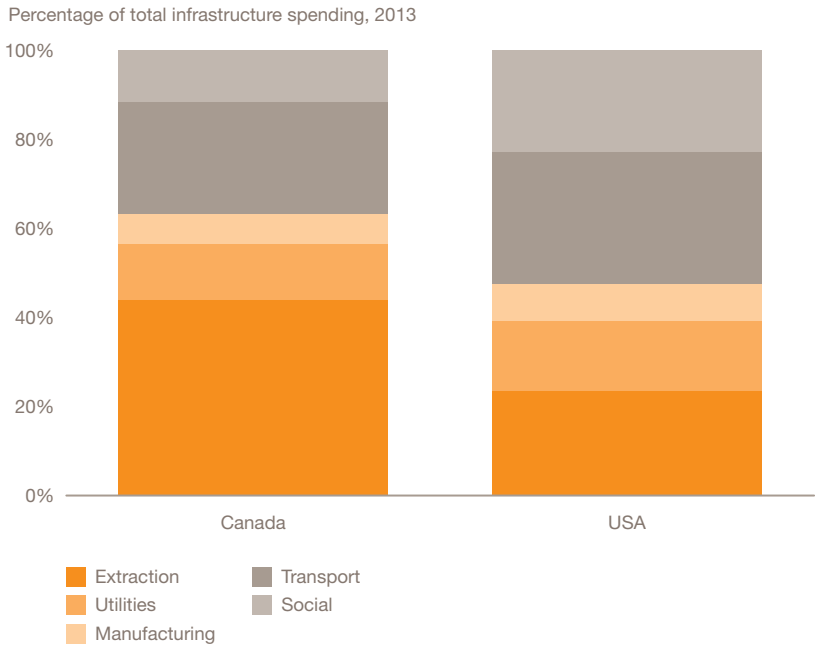
Figure 4.2 breaks down the North American infrastructure spending by type. For example, the bulk of Canada's share of infrastructure spending goes to extractive sectors, where Canada accounts for a third of total spending in the North America region. By contrast, the US invests a much greater proportion of total infrastructure spending than Canada in social infrastructure. In fact, despite not having universal healthcare coverage, the US actually spends more of its GDP on health services than any other country in the world, according to the World Health Organization. Also, as home to almost half of the world's top 100 universities (according to the Times Higher Education supplement rankings), education infrastructure spending is substantial—accounting for 0.65% of GDP in 2013 versus 0.45% in Western Europe.

These differences aside, the composition of infrastructure spending in the two North American countries is broadly similar, particularly in the utilities, manufacturing, and transportation sectors.

But the global economic crisis has had a markedly different impact on government finances in the two economies, as Figure 4.3 illustrates. In the US, where the financial sector was especially badly hit, government debt has swelled to over 120% of GDP (compared to 83% in 2008). In Canada, by contrast, government debt stands at just over 80%. The US also has a worse short term fiscal position, with a deficit close to 7% of GDP in 2013, compared to just over 2% in Canada (see Figure 4.4).

Figure 4.2: Infrastructure spending by type, 2013—North America

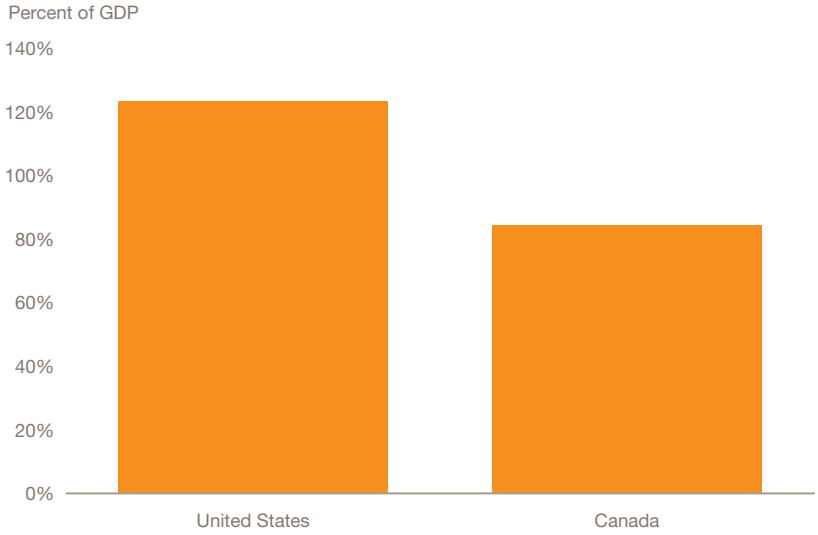
Composition of spending broadly similar in US and Canada



Source: Oxford Economics

Figure 4.3: Government debt in the North America, 2013

Canada less fiscally constrained over the long term

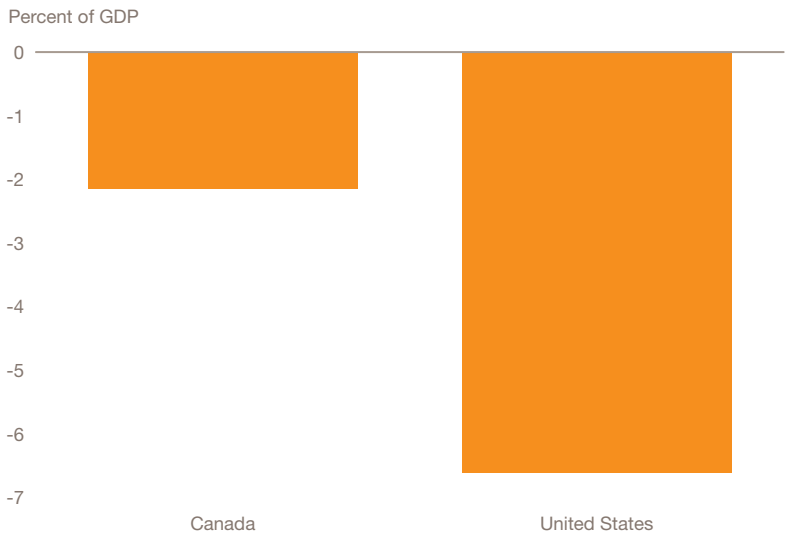


Source: Oxford Economics

Having said that, a couple of underlying fiscal trends do work in the US's favor. For example, the US has slightly more favorable demographics than Canada, possibly due to a larger proportion of Hispanic residents, among whom birth rates per 1000 of population are around a third higher than among the white or Asian populations. As such, aging will take a lower toll on US fiscal revenues (in terms of lower labor taxes and higher retirement payments) than in Canada (see Figure 4.5).

Figure 4.4: Government deficits in North America, 2013

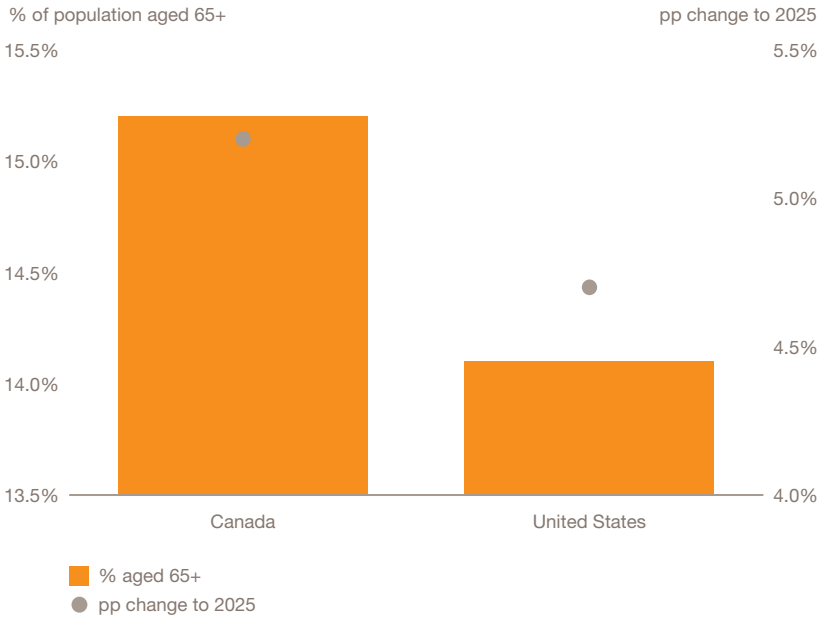
Canada also less fiscally constrained in the short term



Source: Oxford Economics

Figure 4.5: Aging population in North America

Not as much change as in Europe or the Former Soviet Union



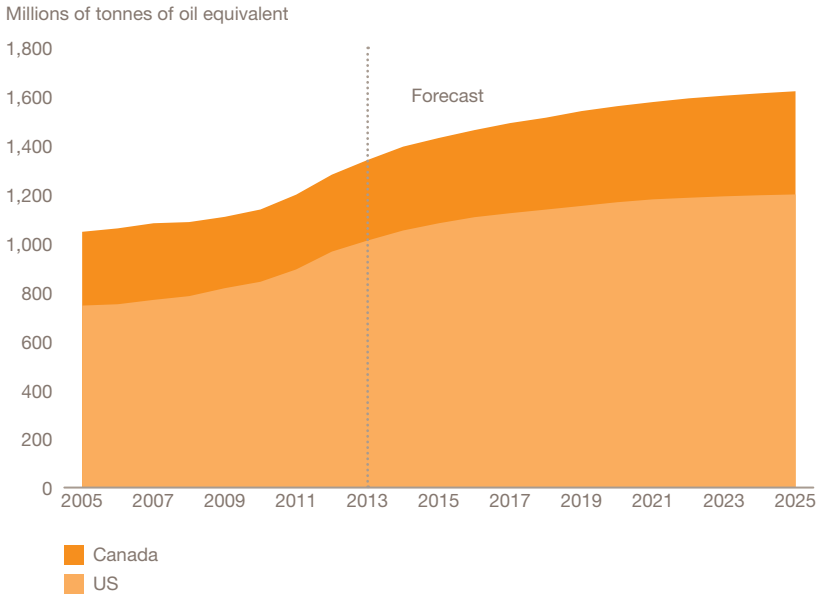
Source: Oxford Economics

We also expect the exploitation of shale gas to give a substantial boost to both activity/employment and tax revenues generated in the extractive sector. Total US output of oil and gas is expected to rise almost 25% between 2011 and 2016, compared to just 16% in Canada. Over the longer term, growth in the sector is likely to converge between the two countries, but in the coming few years, the US is expected to generate greater revenue growth in the sector than its neighbor (see Figure 4.6).

Nevertheless, these modest advantages are not enough to offset the initial starting point of higher debt and deficits in the US. In the coming decade, Canada is expected to be able to deploy substantially greater fiscal resources for infrastructure development than the US. As Figure 4.7 shows, we expect (in nominal terms) t government investment in Canada to rise by an average of 4.5% a year over the coming decade, compared to just over 3% a year in the US.

Figure 4.6: Energy production in North America

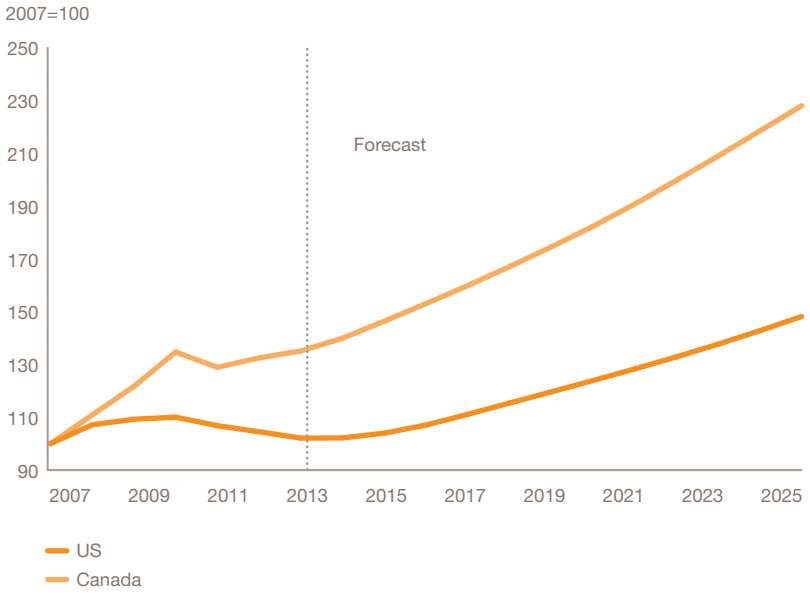
Rapid growth in oil and gas output projected



Source: Oxford Economics

Figure 4.7: Nominal government investment in North America

Canadian government has more fiscal firepower over the coming decade



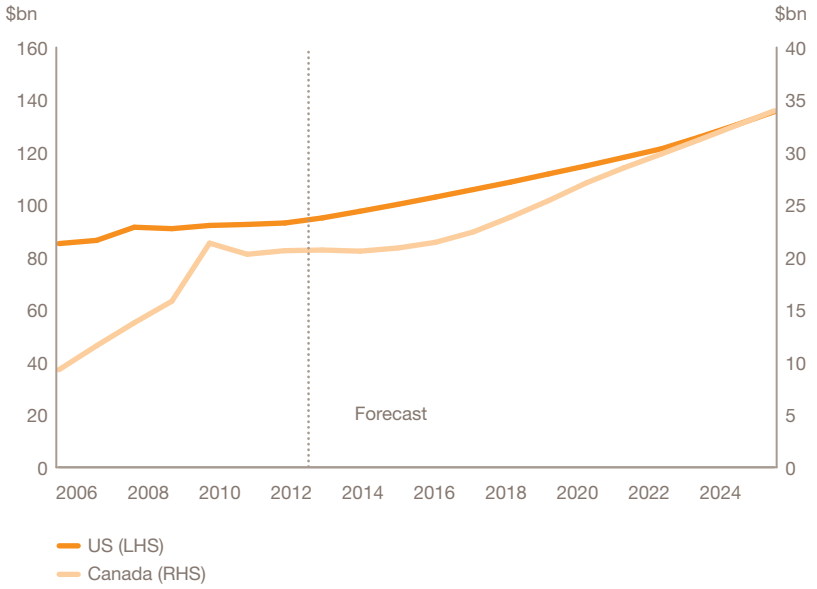
Source: Oxford Economics

This will also mean faster growth in the areas of infrastructure most dependent on fiscal support. In Canada, investment in road and rail infrastructure has been stagnant since 2010, and this seems set to continue for a couple of years. However, from 2015 or so onwards spending in these areas is forecasted to pick up to growth rates more in line with the pre-crisis period, i.e., around 5% a year. In the US, we expect road and rail investment to grow by around 3% a year into the longer term (see Figure 4.8).

As noted earlier, we expect substantial growth in extractive output in North America over the coming decade. In the US, we expect shale oil and gas reserves to be exploited more ambitiously than in most other parts of the world, raising the US's share of total world oil and gas extraction from 15.5% in 2011 to a peak of just short of 17% by 2017. As Figure 4.9 shows, this will require capital spending of around $150bn a year over the near term, rising to $200bn by 2025. Canada's annual spending in oil and gas extraction is forecasted to reach around $75bn by 2025, with its share of total world oil and gas output edging down from 7.5% to 7%. We also expect investment in non-oil and gas extraction to grow to around $30bn in Canada by 2025 and almost $20bn in the US.

Figure 4.8: Spending on road and rail infrastructure, North America

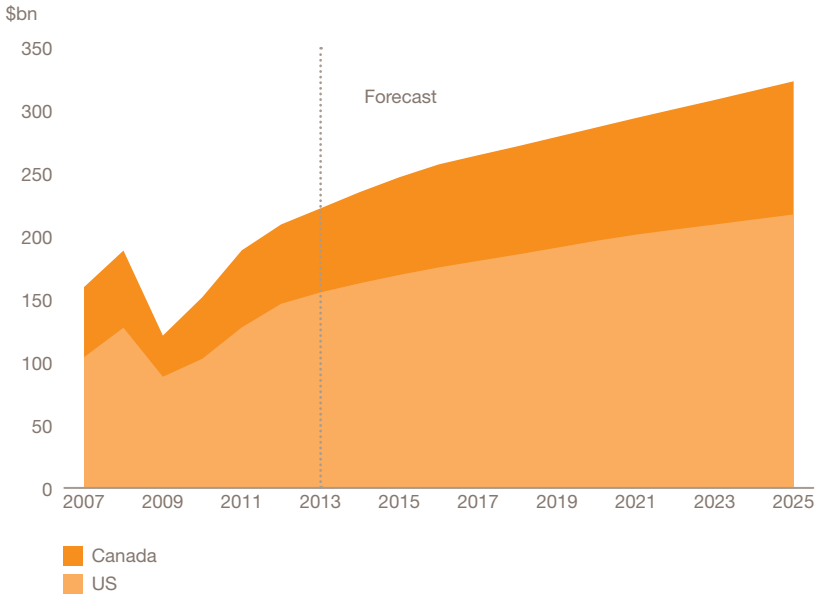
Faster transportation spending ahead



Source: Oxford Economics

Figure 4.9: Spending on extractive investment, North America

Extraction investment to top $300bn by 2025 as US increases share of world output



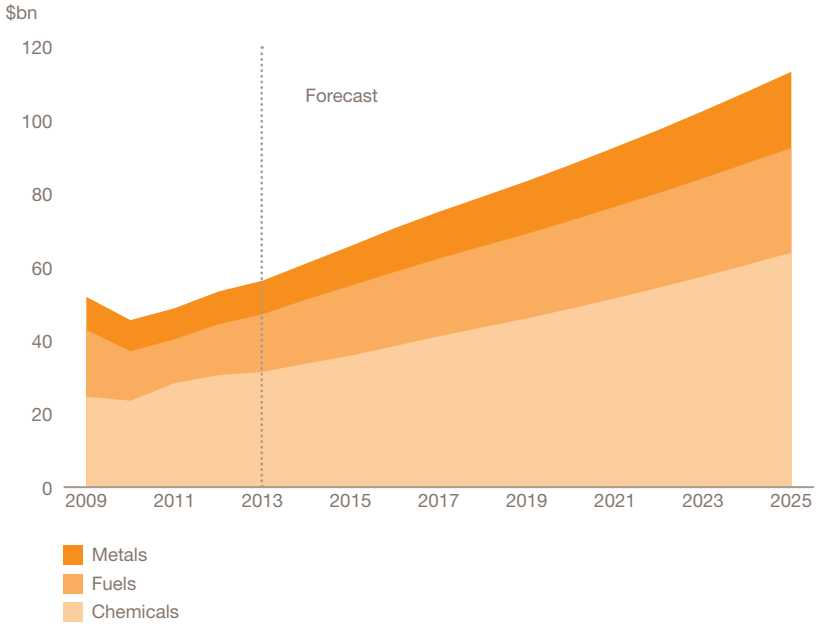
Source: Oxford Economics

Unlike Western Europe, we expect North America's share of total economic output generated in the heavy industrial sectors to stay broadly stable. Two factors would seem to be key in facilitating this: first, lower energy prices in North America are likely to enable energy intensive sectors to compete better with emerging markets than their European counterparts. Second, geographical factors also seem likely to play a role. With global transportation costs rising, the US and Canada will likely be able to fend off competition from lower cost competitors that are located far away, as opposed to Western European manufacturers who have to compete with their Former Soviet Union/ Central and Eastern European (FSU/ CEE) neighbors. We estimate that US investment in these sectors will top $100bn by 2023 (see Figure 4.10), with investment in Canada reaching $16bn by this point, up from $56bn and $10bn respectively in 2013.

Overall, we expect North America's infrastructure market to grow to $1.2trn a year by 2025 (see Figure 4.11). Relative to GDP, infrastructure is expected to stay largely stable. But as emerging economies increase spending faster than the 4% per year or so, we expect North America will lose share over the coming decade. We anticipate, however, that North America will lose share more slowly than the other principal high-income region, i.e., Western Europe, thanks to slightly less onerous fiscal constraints and greater opportunities in the extractive sector.

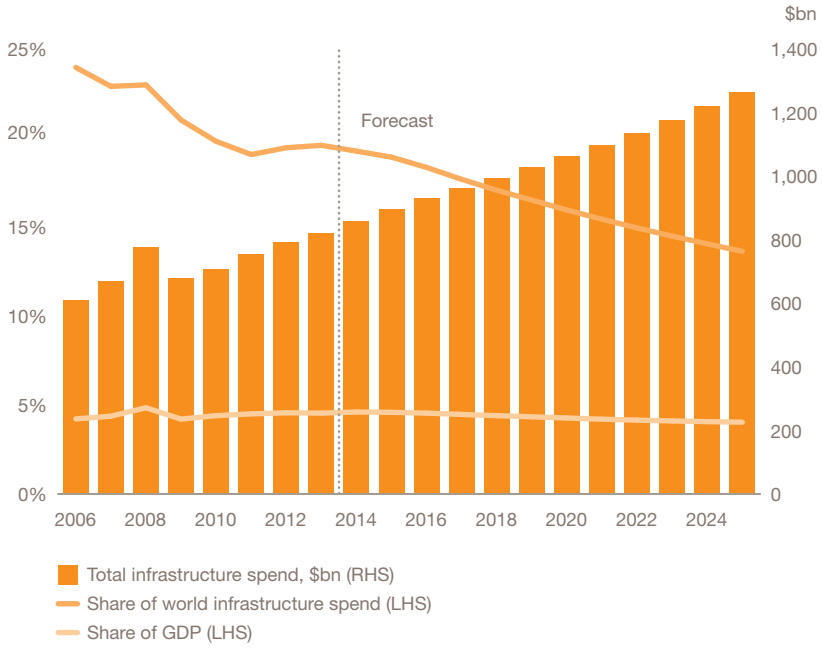
Figure 4.10: Manufacturing infrastructure investment, US

Downstream sectors profit from lower energy costs



Source: Oxford Economics

Figure 4.11: Total infrastructure investment in North America



Source: Oxford Economics

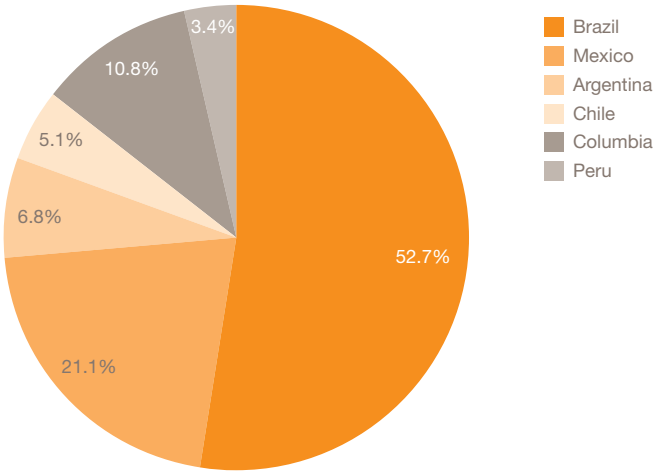
5 Latin America

Our dataset covers six countries in Latin America (see Figure 5.1), accounting for just short of 90% of GDP generated in the region. But within this set, the regional economic heavyweights dominate—with Brazil accounting for around half of all infrastructure spending in 2012 and Mexico accounting for a further 21%.

Figure 5.1: Composition of Latin America infrastructure market

Brazil dominates the Latin American infrastructure market

Percent of regional spending, 2012

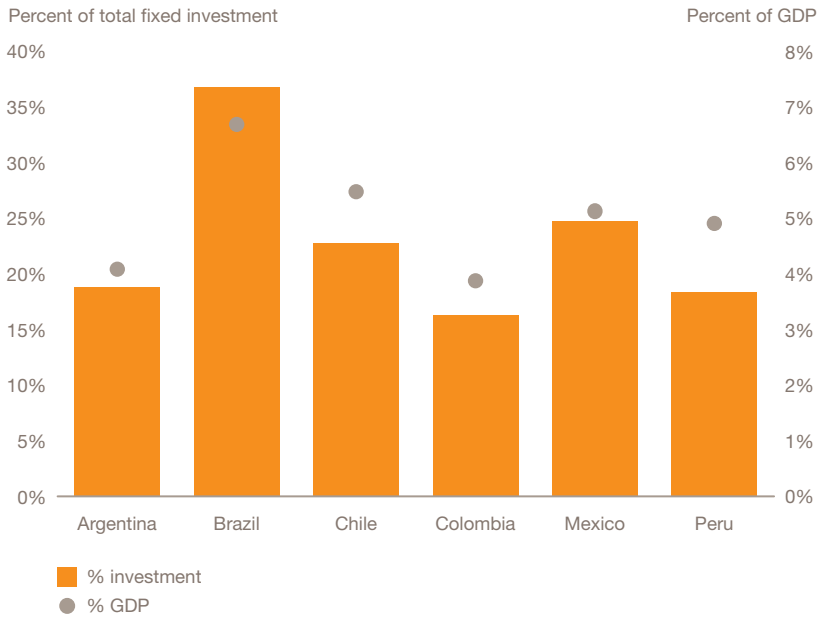


Source: Oxford Economics

Countries in the region invest proportionately less than the global norm in infrastructure development—only Brazil invested more than 6.3% of GDP (the average across our dataset) in infrastructure in 2012 (see Figure 5.2).

Having said that, infrastructure's contribution to overall investment growth in the region varies markedly—from 20% or less in Argentina and Peru to 37% in Brazil. The composition of infrastructure spending by sector across the region also varies quite substantially, as Figure 5.3 illustrates. The extractive sector generates over 20% of total infrastructure investment in four of our Latin American economies (compared to a global average of 16%). Transportation investment, in particular, has dominated Colombia's infrastructure spending in recent years, thanks to major investment in roads (around $10bn) and seaports (around $6bn), making the sector's share of infrastructure twice as great as most of the country's peer group.

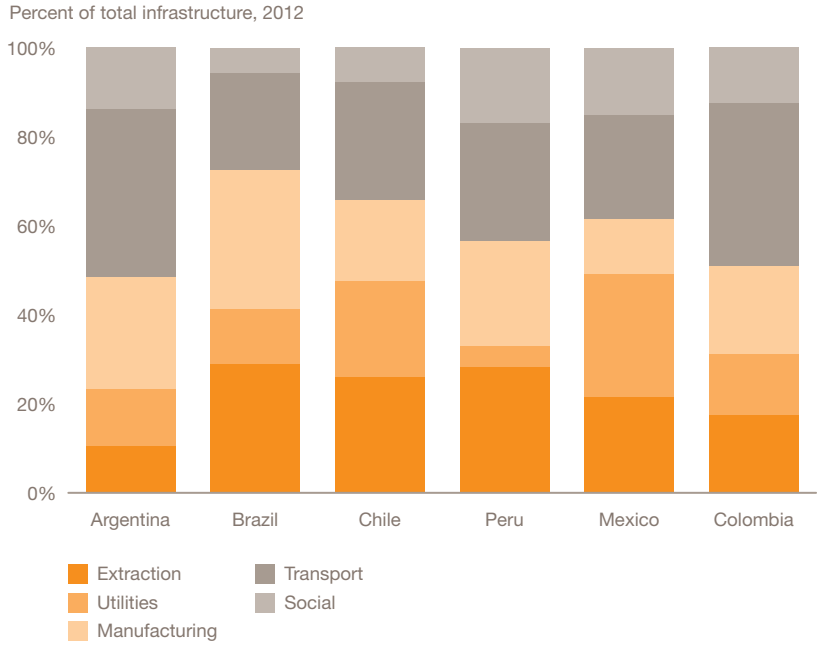
Figure 5.2: Infrastructure's impact on national economies, 2012



Source: Oxford Economics

Figure 5.3: Infrastructure spending by type

Wide divergences in infrastructure priorities across the region



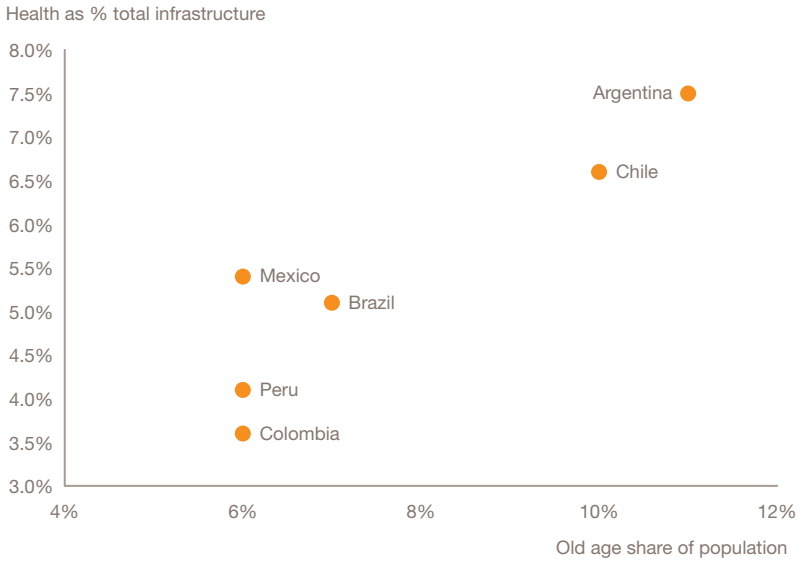
Source: Oxford Economics

There are also substantial variations in the share of investment going into social infrastructure. That said, there is a particularly strong correlation between the demographic structure of different Latin American populations and the share of infrastructure investment made in healthcare facilities (see Figure 5.4).

We expect populations across the continent to age over the coming decade (see Figure 5.5) and, as a result, the share of investment made into healthcare facilities is forecasted to increase from 58% in 2008 to 59% in 2015, rising further to 61% by 2022 (see Figure 5.6).

Figure 5.4: Health spending and old-age population, 2012

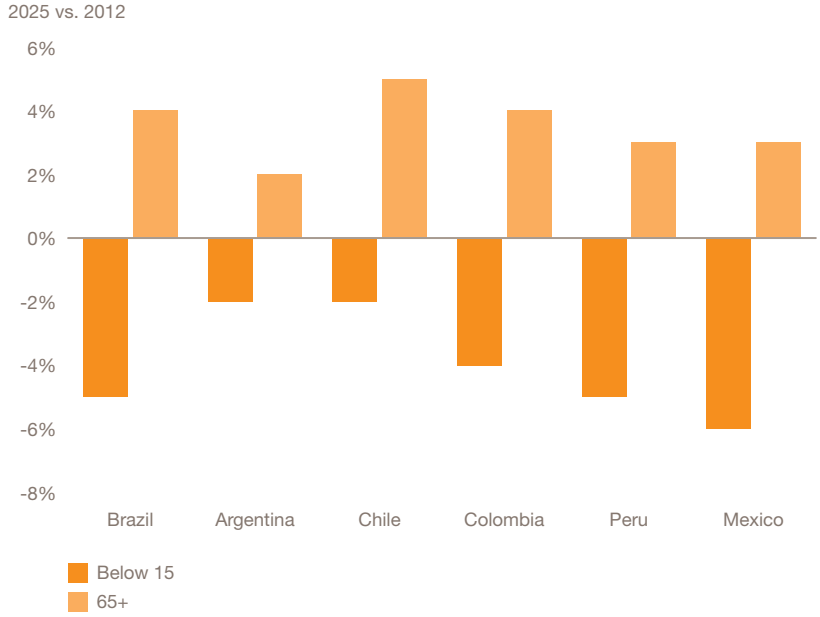
Clear correlation between aging populations and health spending



Source: Oxford Economics

Figure 5.5: Demographic change in Latin America

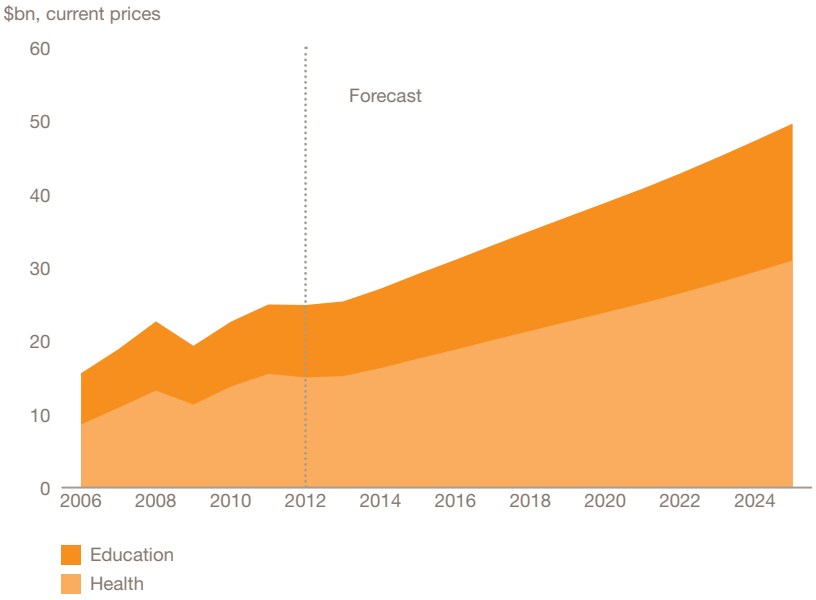
Different rates of aging across the region



Source: Oxford Economics

Figure 5.6: Social infrastructure spending in Latin America

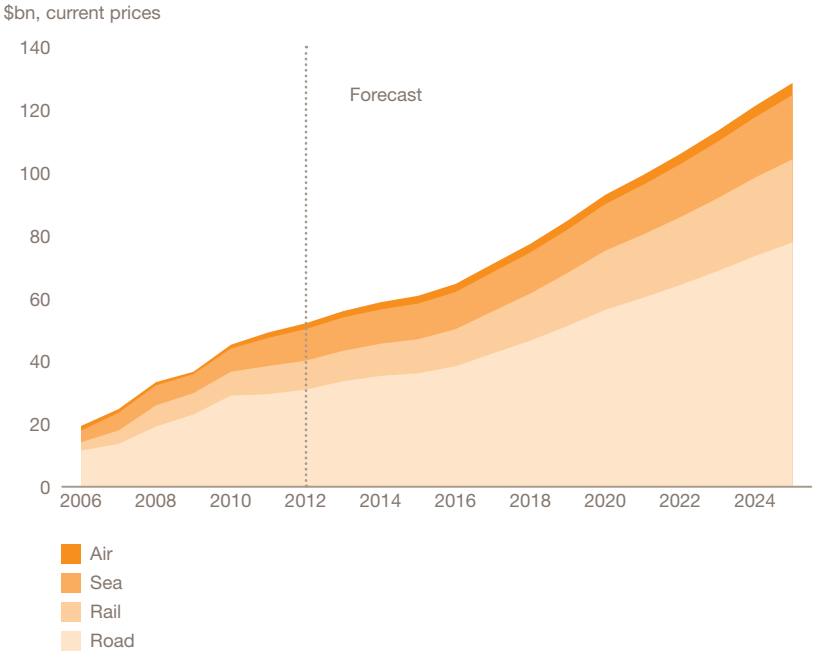
Overall, health spending on the upswing as populations age



Source: Oxford Economics

Figure 5.7: Transport infrastructure spending in Latin America

Car ownership drives increase in road investment



Source: Oxford Economics

As demonstrated earlier in Figure 2.8, there is a clear relationship between car ownership rates and GDP per capita. We expect GDP per capita in constant price terms to increase by 25% in Argentina, 40% in Brazil, and 50% in Chile between now and 2025. In light of this growing prosperity, we expect car ownership to continue to rise on the continent, driving sustained increases in road investment, with an average growth rate of over 7% a year over the forecast horizon.

Increased prosperity will likely also generate demand for other forms of transportation: airport investment is set to grow in our forecast by an average of 6%—i.e., just short of $4bn—year on year until 2025, while seaport investment is estimated to grow by 5% a year as a result of both increased consumer demand for imports and commodity exports. Overall, we expect roads spending to increasingly dominate the transportation infrastructure spending in Latin America over the coming decade (see Figure 5.7).

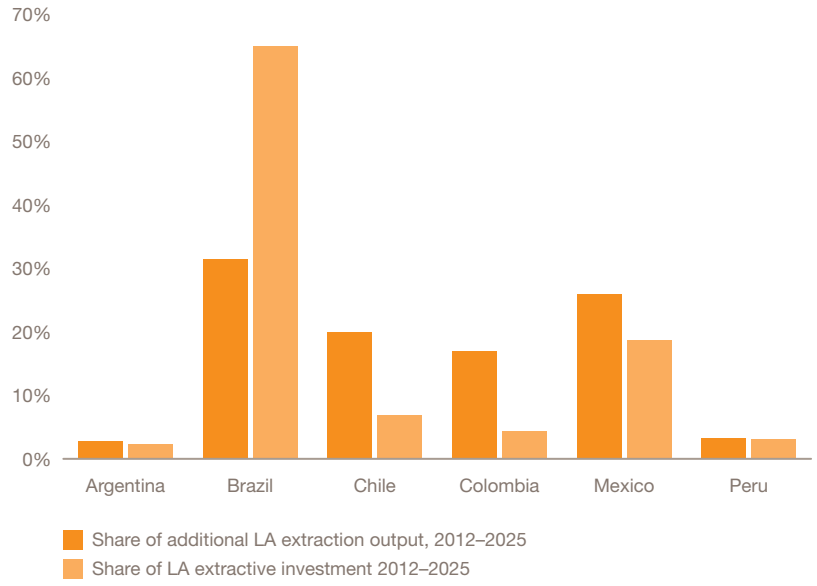
We also expect to see substantial investment in extraction in Latin America over the coming decade. In Figure 5.8, we show different Latin American countries' share of 1) additional extraction output over the 2012-2025 period, and 2) total extraction investment over this period. Furthermore, Brazil is forecasted to gain around 30% of the additional output in extraction as the "pre-salt" oil fields are developed.

But recovery costs for this oil, which lies deep under the seabed, are much higher than for oil produced using conventional wells in the Gulf of Mexico or in Colombia. As a result, we estimate just over $400bn investment in fixed capital in the oil and gas sector between 2013 and 2025.

Overall, we expect investment in extraction to triple in Latin America over the coming decade, reaching over $140bn by 2025 (see Figure 5.9). As a result of the investment in Brazil's oil sector, the share of global investment in oil and gas taking place in Latin America is forecasted to increase from 10% in 2012 to 11.4% in 2025.

Figure 5.8: Shares of extraction output and investment in Latin America

Brazil's pre-salt fields dominate oil investment

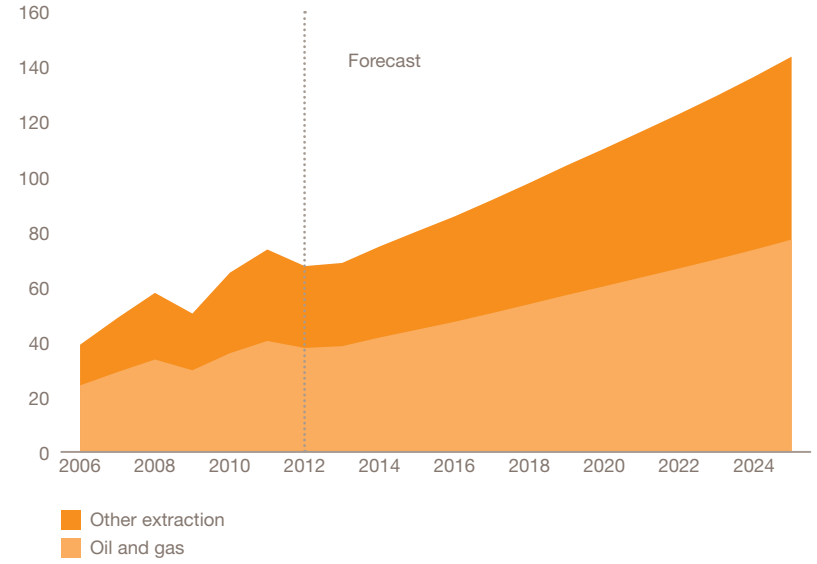


Source: Oxford Economics

Figure 5.9: Extraction investment in Latin America

Extraction grows at close to 7% annually over the long term

$bn, current prices

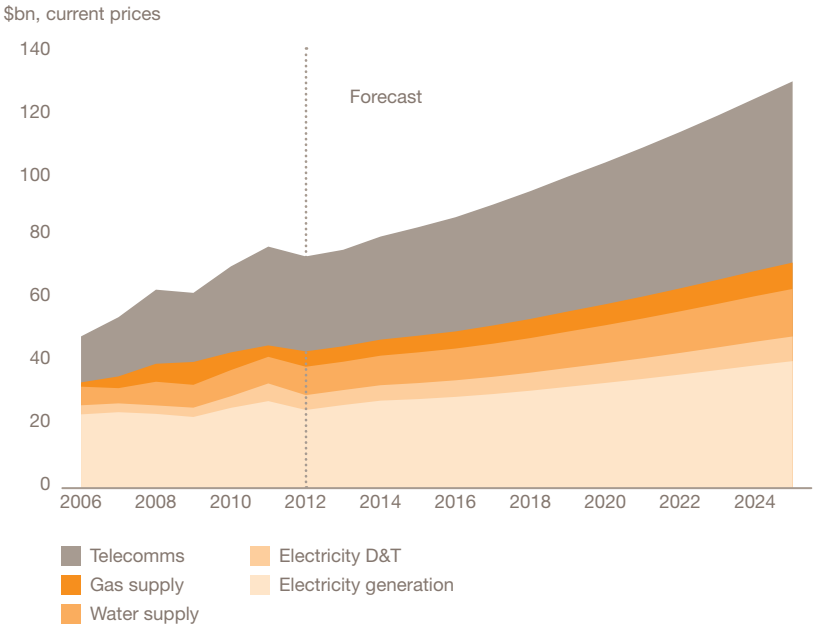


Source: Oxford Economics

In line with most other middle-income regions, utilities investment in Latin America is likely to grow more slowly over the coming decade than other forms of infrastructure. We expect annual investment in power generation to grow from just over $25bn a year to $40bn by 2025, or just over 3% a year. Investment in the utility supply network (the distribution of electricity, gas and water) will grow slightly faster, at 4-4.5% a year (see Figure 5.10).

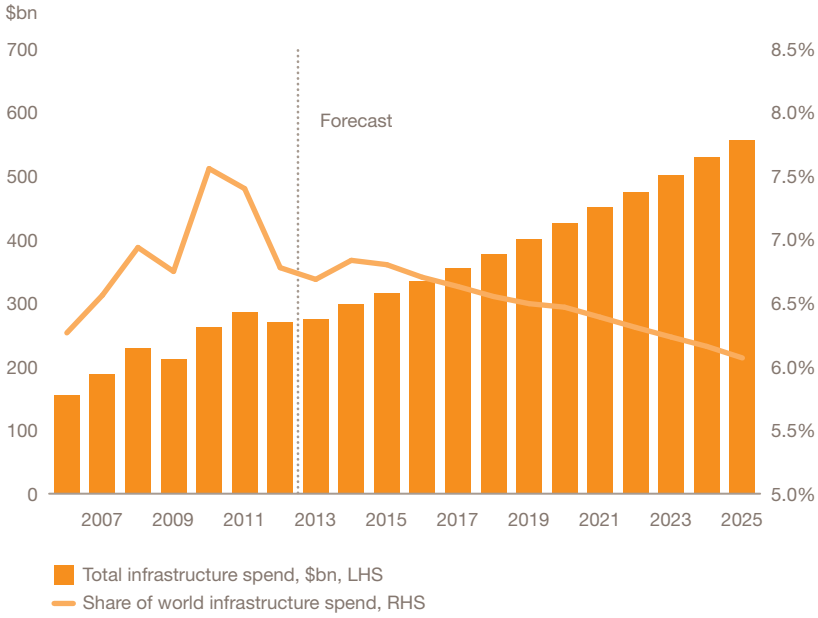
Figure 5.10: Utilities infrastructure spending in Latin America

Utilities lag the rest of infrastructure spending



Source: Oxford Economics

Figure 5.11: Total infrastructure spending, and share of world total

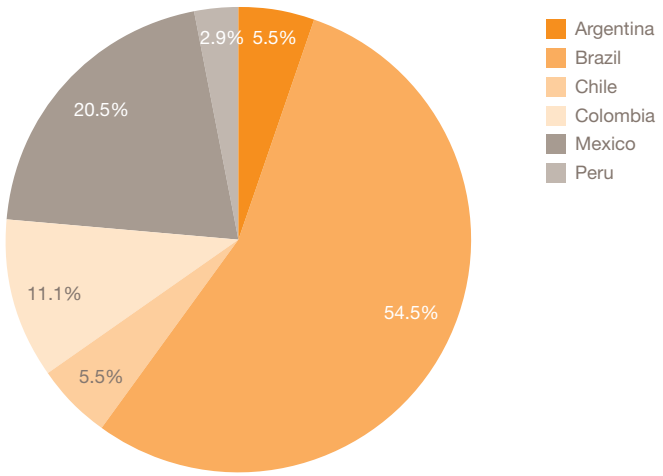


Source: Oxford Economics

Overall, we expect the Latin American infrastructure market to grow to around $557bn a year by 2025 even as its share of global spending steadily decreases. However, within the Latin America region, Brazil, Chile, and Colombia are expected to increase their share of regional spending over the next decade (see Figure 5.12).

Figure 5.12: Shares of infrastructure investment, 2025

Percent of regional total spending, 2025



Source: Oxford Economics

6 Asia-Pacific

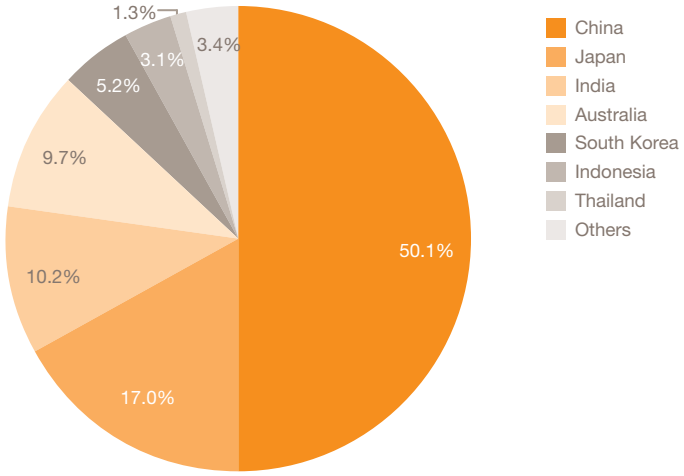
The Asia-Pacific region is the largest and the most diverse of all the regions we analyze in this report. Our sub-sample of the region's economies incorporates high-income countries like Japan, middle income emerging markets like Indonesia, and low-income countries like India and Vietnam. Some of the countries have booming extractive sectors such as Australia, while others are intensive importers of a range of commodities such as China. To simplify our analysis, we have at times separated the region into "advanced" Asia-Pac (i.e., Australia, Japan, New Zealand, Singapore, and South Korea) and "emerging" Asia-Pac (i.e., China, India, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam.)

Taking the region as a whole though, China accounts for just over 50% of the Asia-Pacific infrastructure market—about three times as much as any other country in the region. Japan's share is 17%, while India and Australia—two very different economies—generate around 10% of the regional spending each (see Figure 6.1).

Figure 6.1: Composition of Asia-Pacific infrastructure market, 2013

China dominates regional infrastructure spending

Percent of regional infrastructure spend

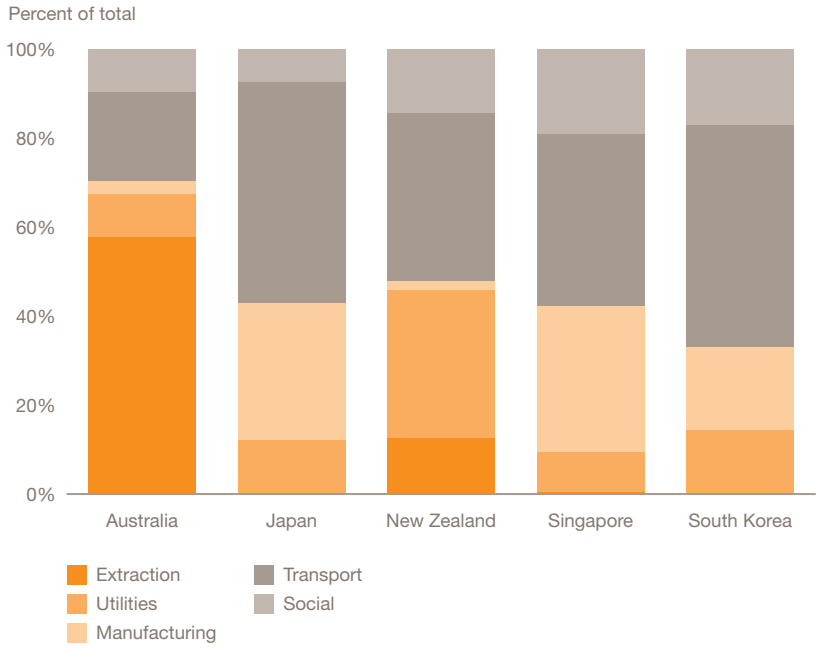


Source: Oxford Economics

As Figure 6.2 shows, in "advanced" Asian economies—with the exception of Australia, where over half of investment is in the extractive sectors—social and transportation spending tend to account for over half of infrastructure investment. In Japan, a further 30% of infrastructure investment is made in heavy manufacturing industries, providing raw materials to a wider national manufacturing sector that produces over 10% of the world's manufacturing output. But in New Zealand, investment in heavy manufacturing is negligible—an unsurprising fact given the tiny domestic market and lack of available supplies from Australia.

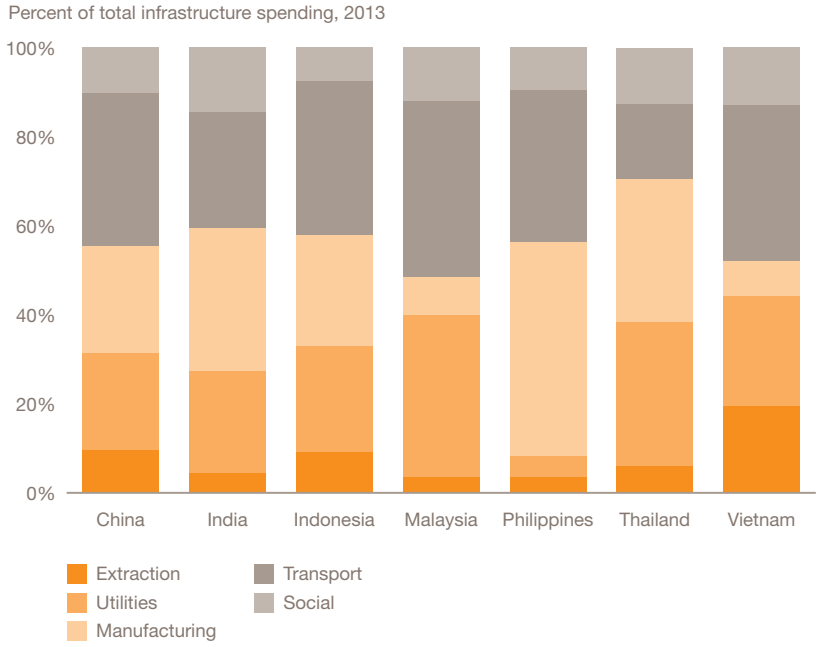
By contrast, in Emerging Asia, social and transportation investment contributes a much lower share of total infrastructure spending, around 30-40% on average. At the same time, aided by high demands for local construction and lower wage-costs, heavy infrastructure sectors like manufacturing contribute between 30-50% of total infrastructure spending (see Figure 6.3).

Figure 6 .2: Infrastructure spending by type, 2013—"Advanced" Asia-Pac



Source: Oxford Economics

Figure 6.3: Infrastructure spending by type, 2013—"Emerging" Asia-Pac

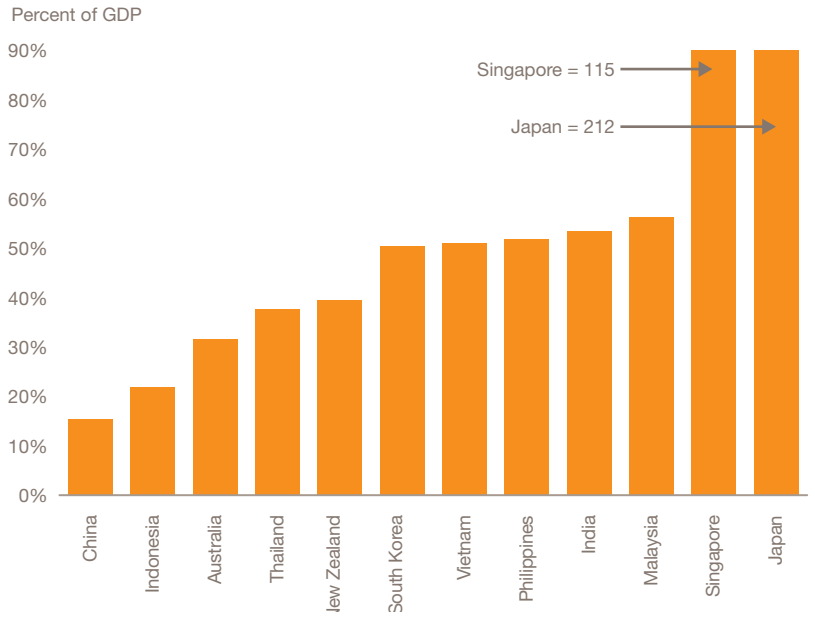


Source: Oxford Economics

By and large, Asian economies enjoy relatively favorable fiscal positions (see Figures 6.4 and 6.5). For most economies in the region, public finances remain relatively supportive of infrastructure investment despite a temporary shift into fiscal deficit due to a weak global economy. In the case of Singapore, it is also important to note that the superficially high gross debt is counterbalanced by a very substantial sovereign wealth fund.

The one exception to this regional fiscal strength is Japan, where public debt is the highest in the developed world relative to GDP and is expected to place severe pressure on government investment going forward.

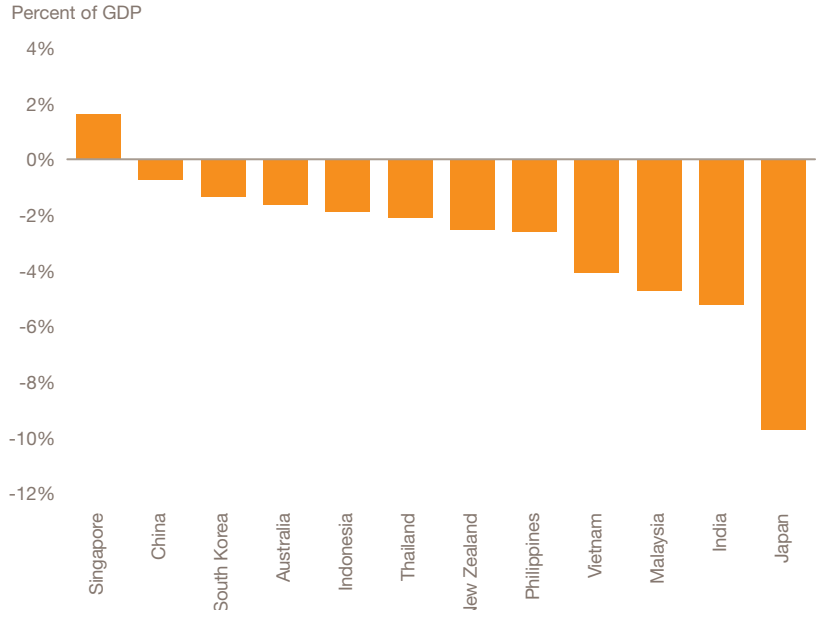
Figure 6.4: Government debt in Asia-Pacific, 2013



Source: Oxford Economics

Figure 6.5: Government deficits in Asia-Pacific, 2013

A weak global environment leads to deficits



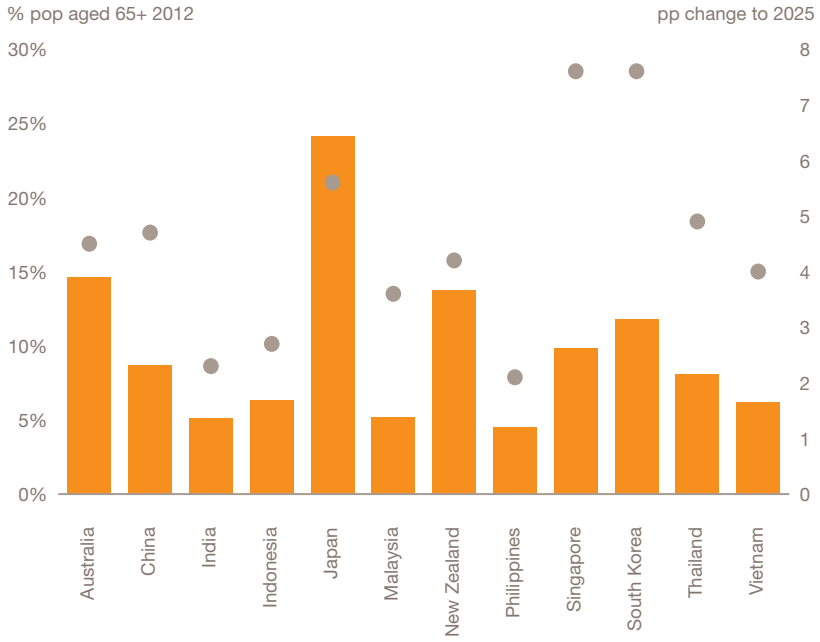
Source: Oxford Economics

Like a number of European economies, Japan's population has aged markedly over recent decades, and this is set to continue in the coming decade. However, as Figure 6.6 shows, other Asian economies are about to follow suit, with South Korea and Singapore set to see the fastest "greying" of the population. By 2025, one in five South Koreans will be aged 65 or over, compared to one in ten now.

India, Indonesia and the Philippines are likely to see less marked shifts in population structures, But even in the "youngest" economies, demographic trends are likely to push government resources towards health investment. As a result, the proportion of social investment being made in healthcare facilities will likely increase over the coming decade (see Figure 6.7).

Figure 6.6: Old-age populations in Asia-Pacific

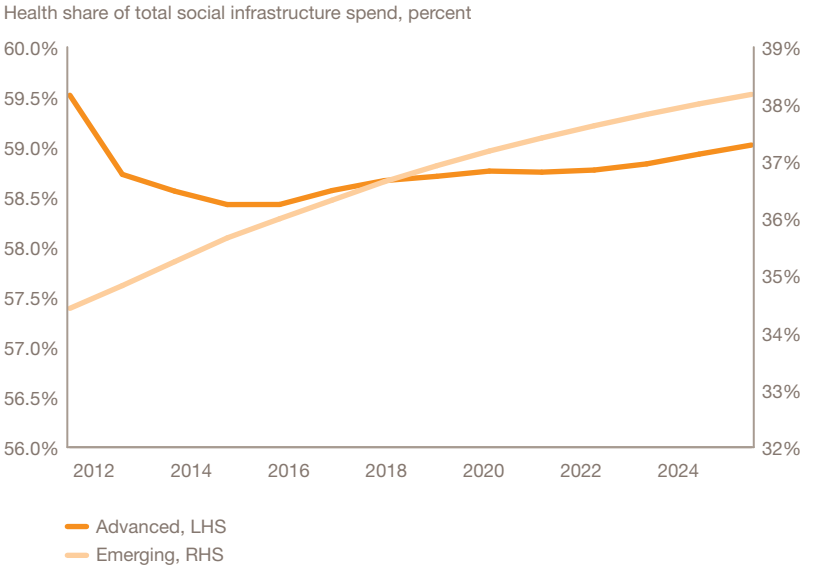
Japan's population is oldest but others are also aging



Source: Oxford Economics

Figure 6.7: Health spending in Asia-Pacific

Resources will shift toward health spending in both advanced and emerging Asia-Pacific



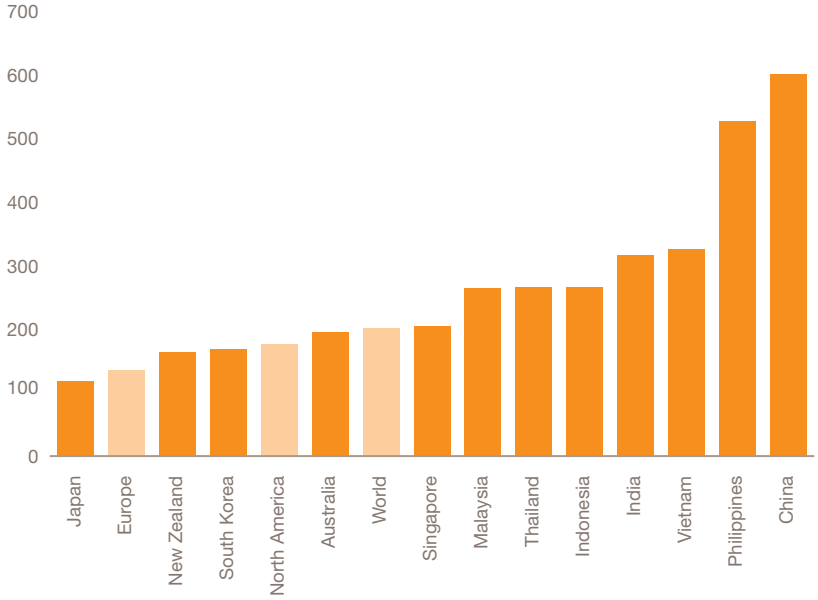
Source: Oxford Economics

At the same time, a boom in car ownership in emerging markets is set to generate ever-greater demand for road investment. Figure 6.8 shows spending on vehicles in constant prices in 2025 relative to 2010. It is estimated that, by the middle of the next decade, car sales by value will have grown by 500% in China, 400% in the Philippines, and 200% or so in six other economies, including India. Road investment is expected to grow proportionately. But in advanced Asia-Pac economies—and in particular Japan, where car sales will probably stay flat over the coming decade—the demand for new road infrastructure is expected to be far more muted (see Figure 6.9).

Figure 6.8: Spending on vehicles, 2025 vs 2010

Car sales booming in emerging Asia

Spending on cars in 2025, constant prices, 2010=100

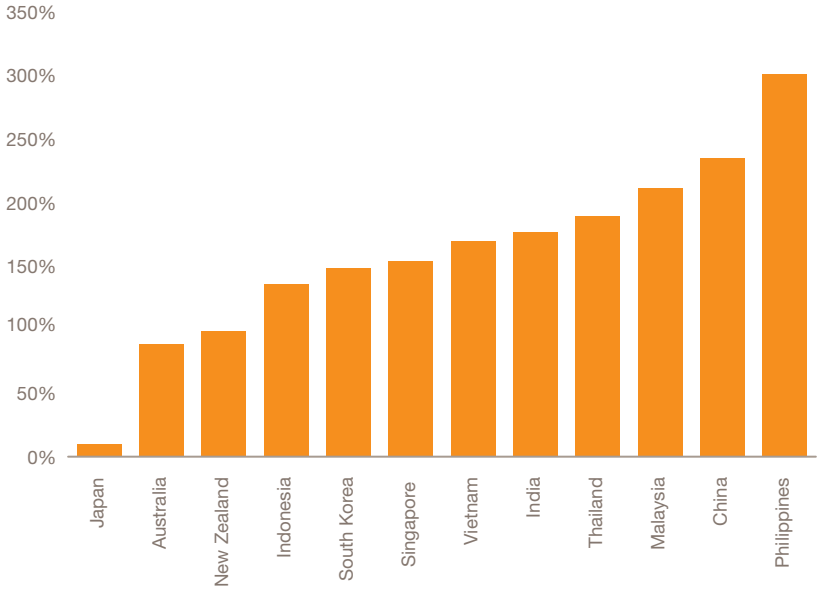


Source: Oxford Economics

Figure 6.9: Road investment spending, 2025 vs 2010

Booming car sales drive increase in highway investment

Percentage growth in annual $ road investment, 2025 versus 2010



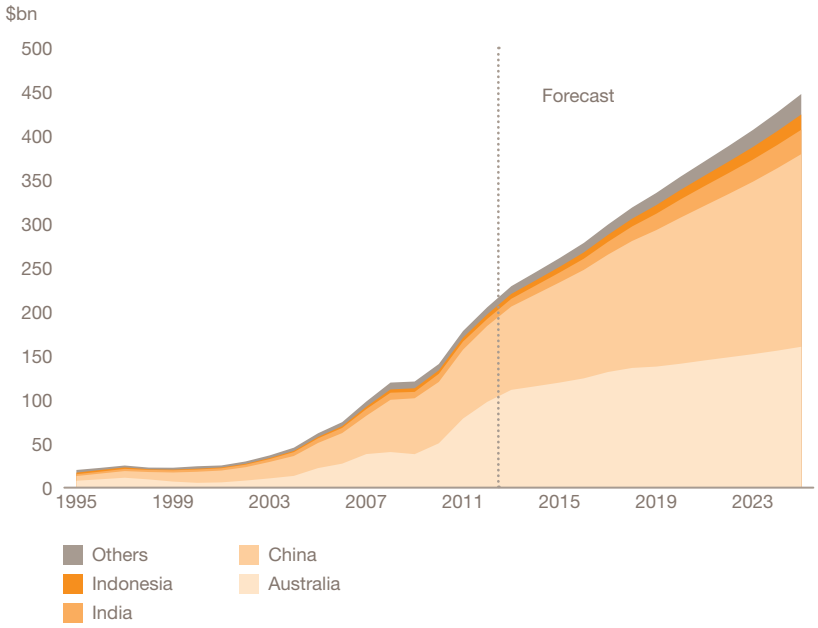
Source: Oxford Economics

Extractive investment in Asia-Pacific is dominated by two regional giants: Australia and China. Looking ahead, we expect Chinese industrial and consumer demand to spur equal investment in both economies' extractive sectors—primarily non-oil/gas extractions in China as well as oil and gas and other extractions in Australia. (see Figure 6.10).

By contrast, in downstream sectors using commodities, we expect investment to be focused on those emerging economies demanding metals, chemicals and fuels (see Figure 6.11).

Figure 6.10: Extractive investment in Asia-Pacific

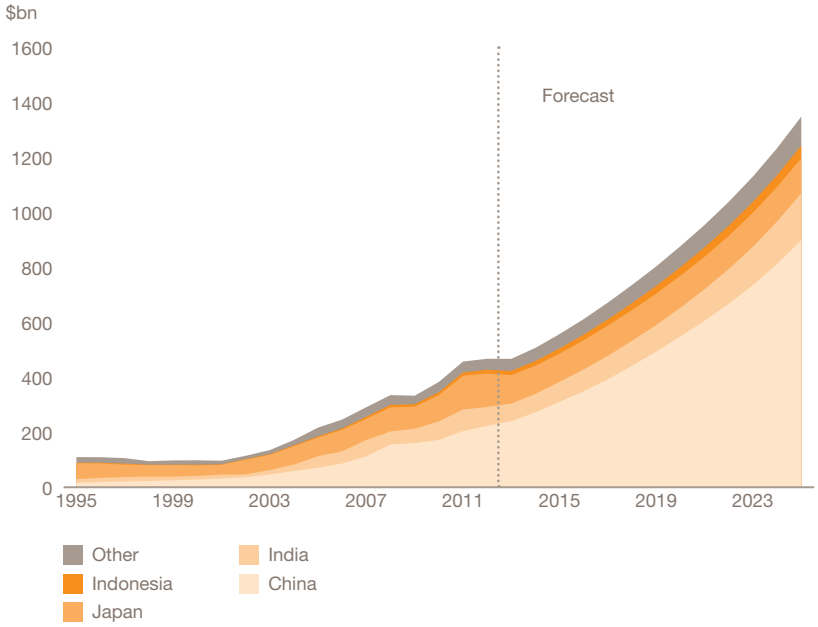
Australia and China dominate extraction spending



Source: Oxford Economics

Figure 6.11: Investment in metals, chemicals and fuels in Asia-Pacific

Investment in downstream sectors focused in largest economies

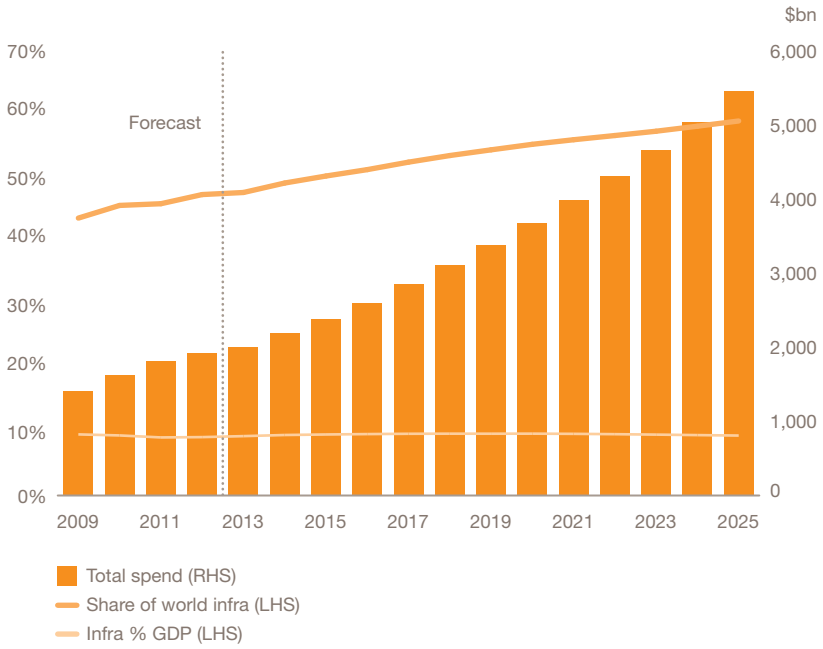


Source: Oxford Economics

Overall, as Figure 6.12 shows, the infrastructure market in Asia-Pacific is forecasted to grow by around 7-8% a year over the coming decade, approaching $5.3trn by 2025—almost 60% of the world total. This, in large part, reflects growth in China's capital spending from 22% of the world total in 2012 to 36.4% by 2025. India's share of global spending is also expected to grow from 5% to 8% over the same period (see Figure 6.13).

Figure 6.12: Total investment in infrastructure in Asia-Pacific

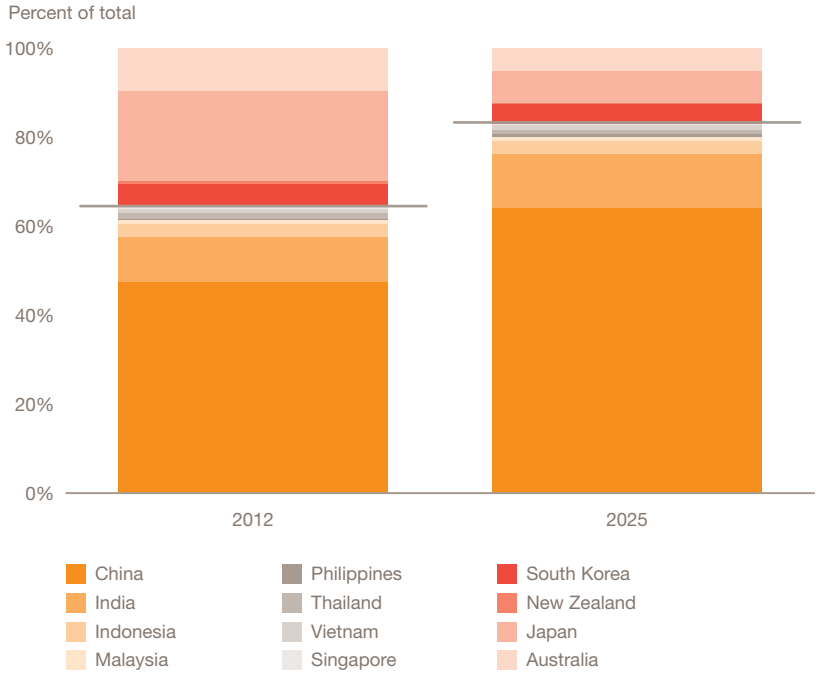
Asia's share of world infrastructure spending to rise to almost 60% by 2025



Source: Oxford Economics

Figure 6.13: Emerging and developed economies' share, 2012 vs. 2025

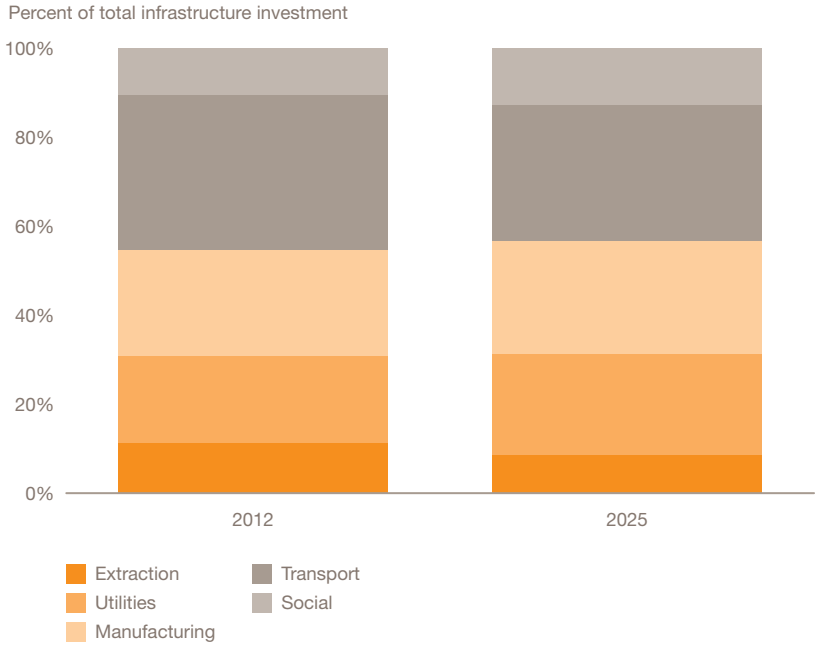
Emerging economies drive future investment



Source: Oxford Economics

Figure 6.14: Sectoral composition of Asia-Pac infrastructure 2012 vs. 2025

Manufacturing and social investment key drivers of growth



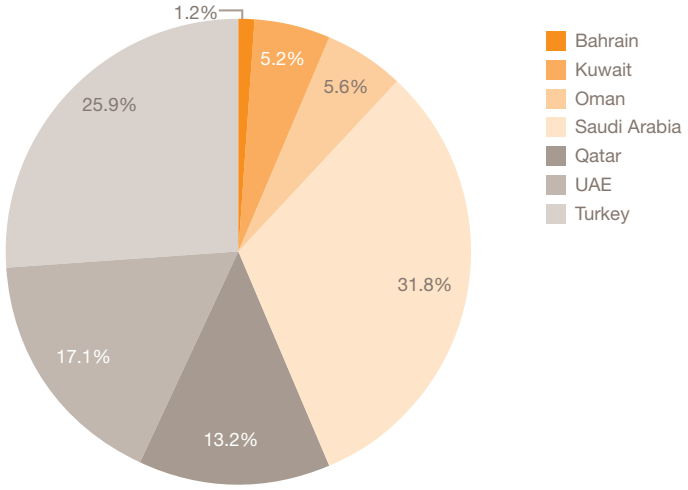
Source: Oxford Economics

7 Middle East

The Middle Eastern region is unlike most of our other regional groupings in that it doesn't have one major player that dominates infrastructure spending (as is the case in Latin America, FSU/CEE, North America, and Asia-Pacific). Turkey[4] and Saudi Arabia generate around a quarter to a third of annual spending each, while the UAE and Qatar also have infrastructure markets worth over 10% of the regional total (see Figure 7.1).

Figure 7.1: Composition of Middle East infrastructure market

Percent of regional infrastructure spend



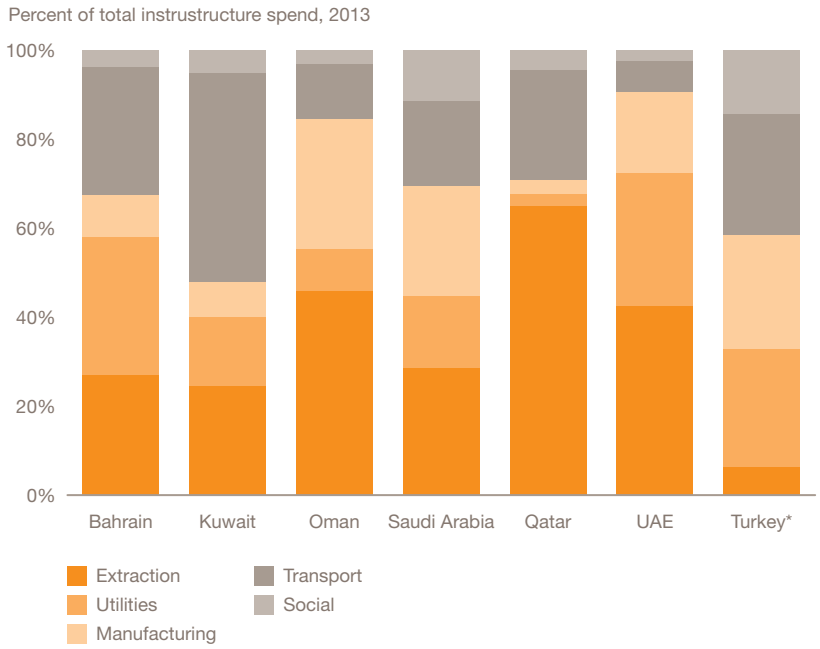
Source: Oxford Economics

As expected, extraction accounts for a substantial portion of infrastructure spending in most Middle Eastern economies—over half of all spending in Qatar, and a quarter to a half in other countries (with the exception of Turkey). Figure 7.3 shows that, in 2013, $74bn was spent in developing extractive infrastructure in the region, i.e., well over a quarter of the total ($245bn). In order to generate more employment on the back of natural resources, some of the Middle Eastern economies have also made sizable investments in downstream sectors, in particular fuels and chemicals processing. We estimate, in 2013, around $20bn was invested in these sectors in Saudi Arabia and just short of $3bn in Oman (see Figure 7.2).

The importance of extractive industries in infrastructure investment is set to continue over the coming decade, as Figure 7.3 shows. In order to exploit the world's third largest gas reserves (greater than Saudi Arabia, the US and Venezuela combined), we expect annual investment in extraction in Qatar to rise from just over $20bn in 2012 to $64bn by 2025. The pace of investment spending in Saudi Arabia and UAE is expected to be only slightly more restrained.

Figure 7.2: Infrastructure spending by type, 2013—Middle East

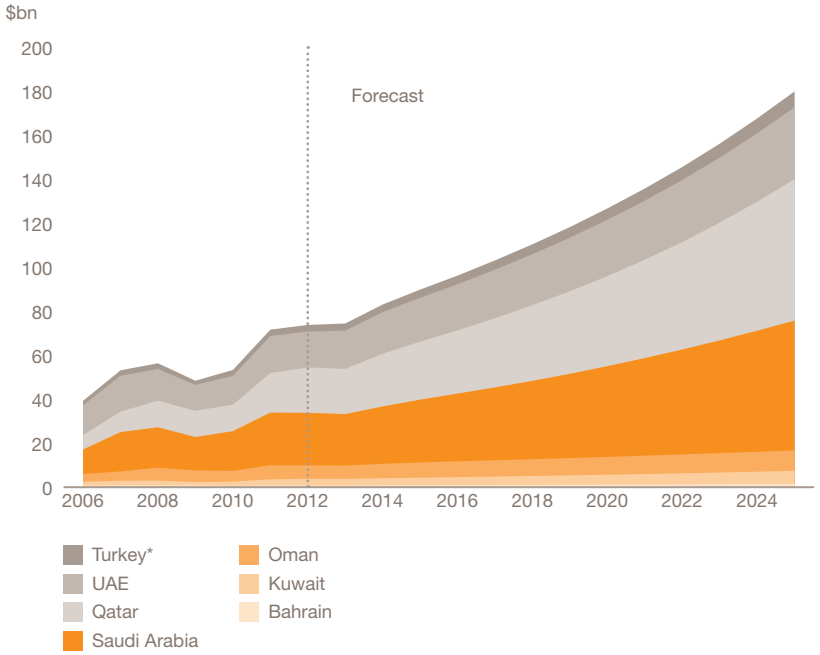
Extraction and (to a lesser extent) downstream sectors will be key targets for investment across the region



Source: Oxford Economics

Figure 7.3: Extraction investment in the Middle East region, 2006–2025

UAE, Saudi and Qatar will continue to dominate extraction investment



Source: Oxford Economics

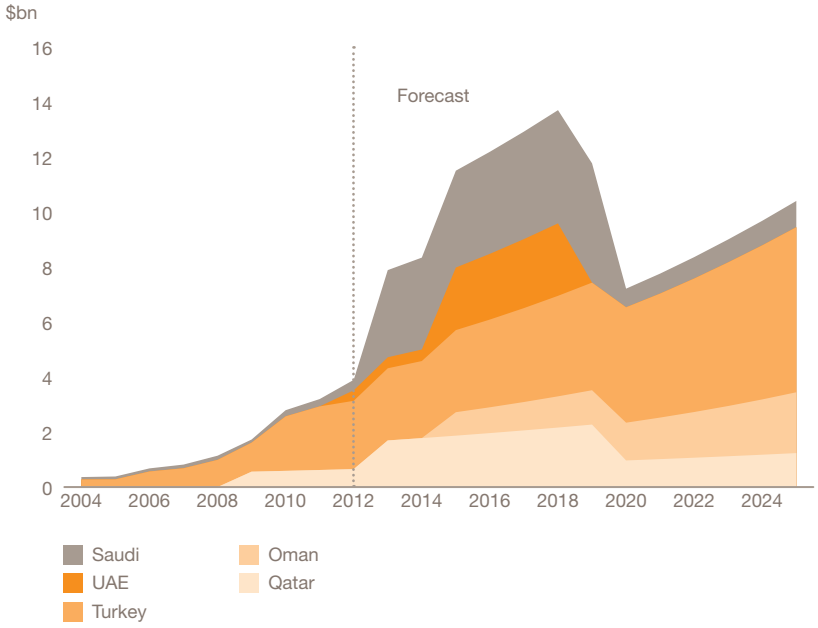
The Middle East region is different from our other regions in that it incorporates a number of extremely high-income micro states/city economies, with substantial government-led investment plans that are many orders of magnitude in excess of historical spending.

Elsewhere in our project we have not sought to use a "bottom up" approach of amalgamating individual areas of spending as this would be neither robust nor feasible; instead we have forecasted infrastructure spending based on its historical drivers and our assessment of these drivers going forward. But, in the case of the Middle East, a purely historical analysis would miss the many government-led "megaprojects", which are particularly notable in transportation development in the region. As such a "bottom up" approach to our Middle East forecast is unavoidable.

For example, in Saudi Arabia, the government announced in 2013 the development of a metro system for Riyadh, which is projected to cost over $22bn to develop and is scheduled to start operation by 2019.[5] This is unprecedented in terms of rail investment spending, which, according to the Saudi Ministry of Finance, averaged around $100m a year from 2002 to 2010. The spending forecast for these rail investments is illustrated in Figure 7.4.

Figure 7.4: Investment in rail infrastructure, 2004–2025

Uneven rail investment dominated by one-off big ticket projects



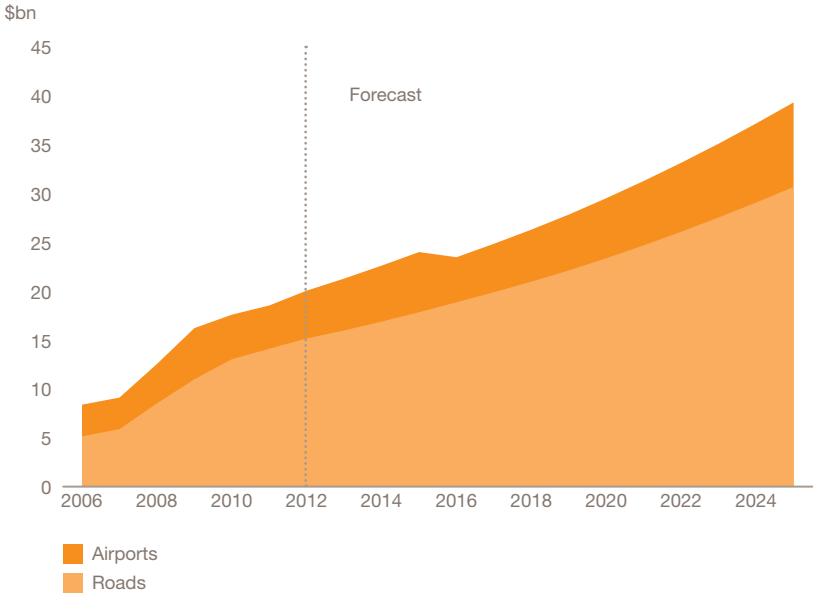
Source: Oxford Economics

Likewise, airport spending in a number of smaller economies has tended to be quite uneven, so we have used an element of bottom-up estimation for some of the region's smallest economies in the Middle Eastern region. For the larger economies though, such as Turkey and Saudi Arabia, airport investment has been much smoother due to good relationships between airport investment and wider economic variables. Given these two different economic scenarios, we expect a burst of spending through 2015, when Qatar's new airport will become operational, followed by a dip in airport investment before finally growing in line again with underlying long-run trends.

Like other high-growth economies, we expect Middle Eastern economies to witness substantial increases in the rate of car ownership. Spending on vehicles in Turkey (in constant prices) is expected to double over the coming decade, with even faster growth in Saudi Arabia and other Gulf economies. In turn, this will generate demand for investment in roads, which we expect to grow to nearly $30bn at the regional level by 2025 (see Figure 7.5).

Figure 7.5: Investment in roads and airports, 2006–2025

Road and airport investment set to double by 2025



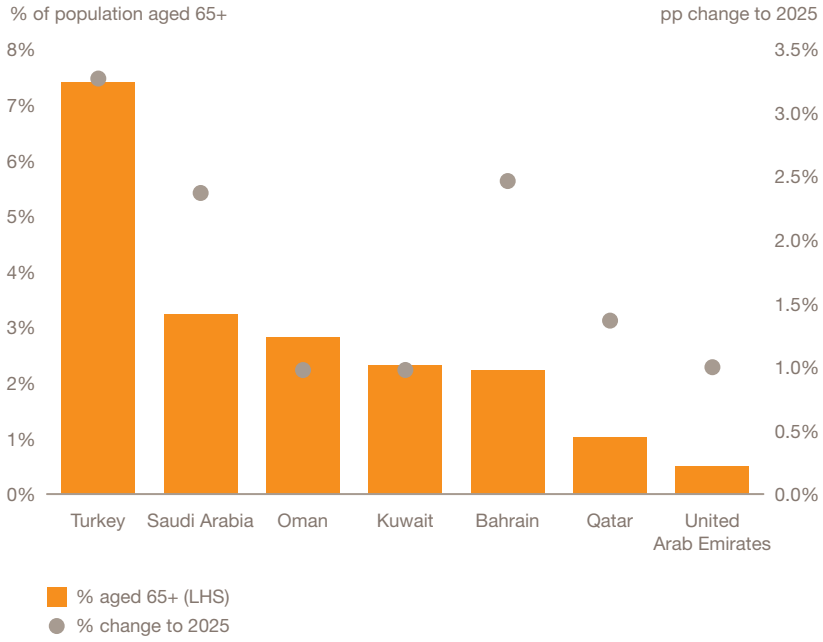
Source: Oxford Economics

The Middle East also has highly favorable demographics, with very low proportions of older residents, and minimal population aging expected over the next decade (see Figure 7.6). The region has substantially higher birth rates than economies with similar levels of per capita wealth. For example, in both Oman and the Czech Republic, GDP per capita is estimated at around $26,000 a year. But, according to OECD statistics, 31 births were registered in 2011 for every 1000 Oman residents, while only 11 births were registered per 1000 residents in the Czech Republic. This is likely due to a couple of reasons: First, cultural norms in the Middle East prohibit women from working in favor of childbearing and rearing. Second, there are major differences in the equality of income distribution between the Middle East region and other high-income economies (or, in other words, GDP per capita is a much better gauge of "average" household income in Europe than it is in the Middle East). All of this means that the Middle East will likely have a more substantial younger population to contribute to the economy than the Czech Republic in the coming years.

Yet, at the same time, the higher percentage of newborns and school-age cohorts in the Middle East also means a greater ongoing need to invest in education across the region. As Figure 7.7 shows, the proportion of social infrastructure spending dedicated to education will remain well above 70% until the end of our forecast period, compared to 60% in Asia-Pacific and North America, 55% in FSU/CEE, and just over a third in Europe.

Figure 7.6: Population structure in Middle Eastern countries, 2013

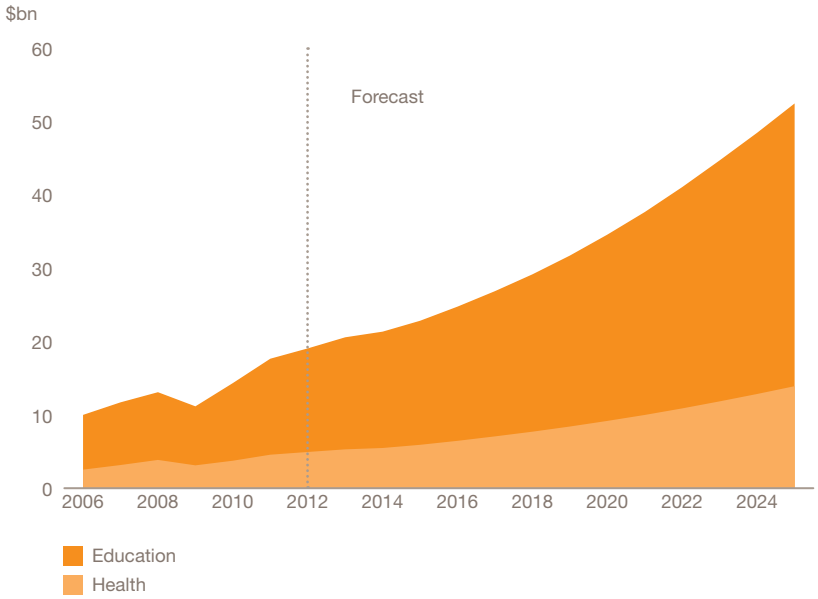
Minimal aging expected over the next decade



Source: Oxford Economics

Figure 7.7: Middle East investment in social infrastructure, 2006–2025

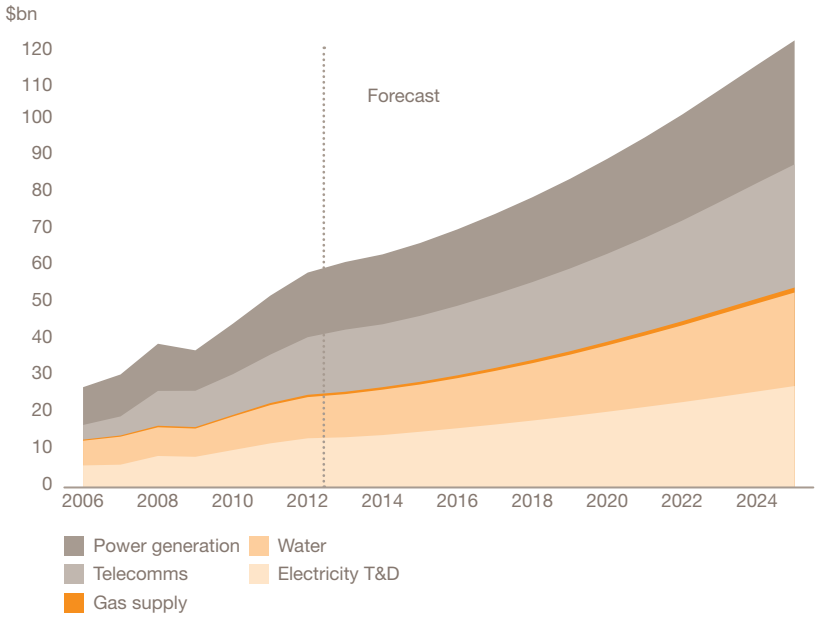
Young populations drive spending on social infrastructure



Source: Oxford Economics

Improving power and water supply will also be a priority for the Middle East. Most of the region's high-income economies already enjoy high-quality utility supply. But there are a couple of factors that will drive substantial growth in the future: 1) the relatively rapid population growth, where each country's population (except Turkey's) is expected to grow by at least 20% by 2025, and 2) aspirations to broaden the sectoral makeup of these economies and, in particular, to provide more manufacturing sector jobs for residents. Given these reasons, we expect investment in power generation to almost double by 2025 to $33bn a year across the region, with a comparable rate of growth in power distribution and water supply (see Figure 7.8).

Figure 7.8: Middle East investment in utilities

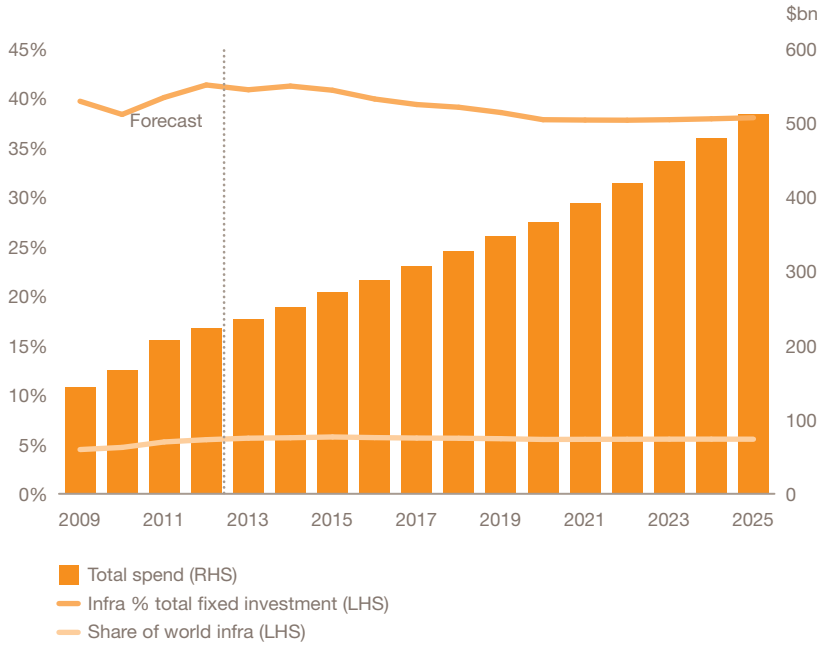


Source: Oxford Economics

Overall, we expect the Middle East's total infrastructure spending to rise from $207bn in 2011 to $510bn in 2025 (see Figure 7.9), a pace of growth broadly in line with the global market. The region's share of total global spending is forecasted to remain relatively steady at around 5% (compared to 3.5% of world economic output in 2025). We expect extraction infrastructure to grow as a share of total capital spending, alongside social infrastructure (see Figure 7.10).

Figure 7.9: Total infrastructure investment in the Middle East

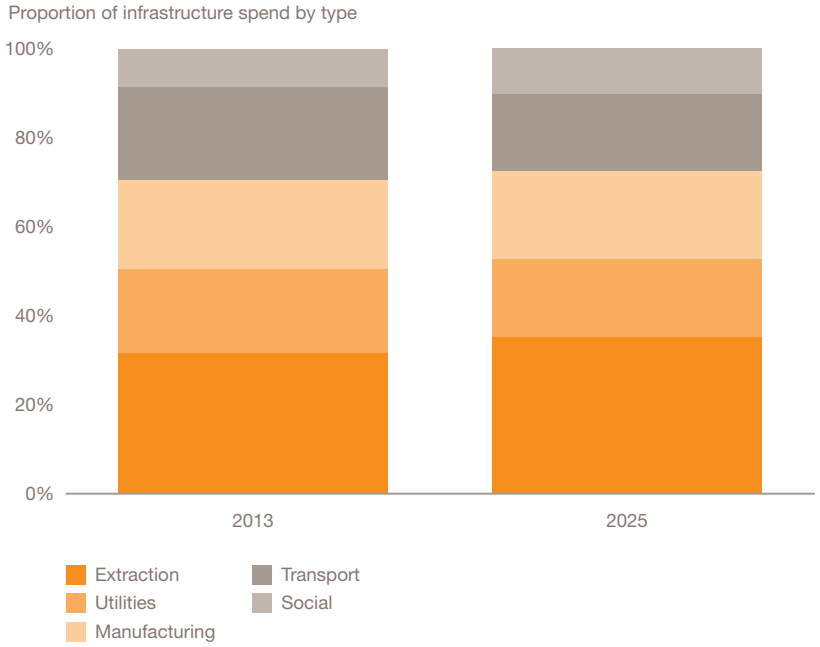
Infrastructure spending reaches $510bn by 2025



Source: Oxford Economics

Figure 7.10: Total infrastructure investment in the Middle East, 2013 vs. 2025

Extraction and social infrastructure sectors to increase their share of the region's total spending



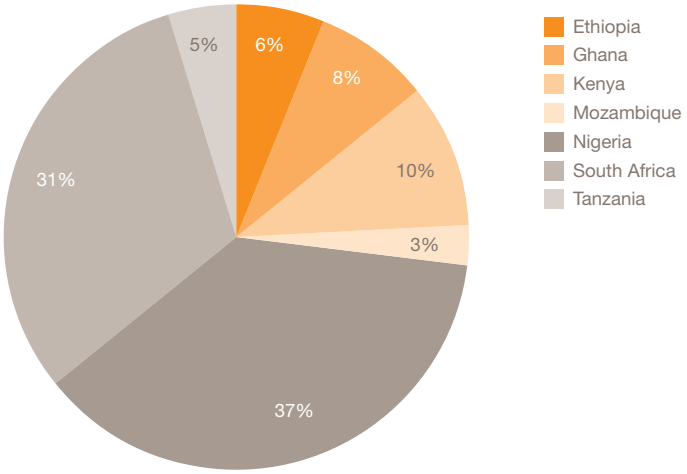
Source: Oxford Economics

8 Sub-Saharan Africa

The Sub-Saharan Africa's (SSA) infrastructure market is dominated by two major regional economies—South Africa and Nigeria. As Figure 8.1 shows, these two account for over two-thirds of infrastructure investment in the seven countries in our sample (which themselves account for around three quarters of economic output across the region's 48 countries).

Figure 8.1: Composition of SSA infrastructure market, 2013

Percent of regional infrastructure spend

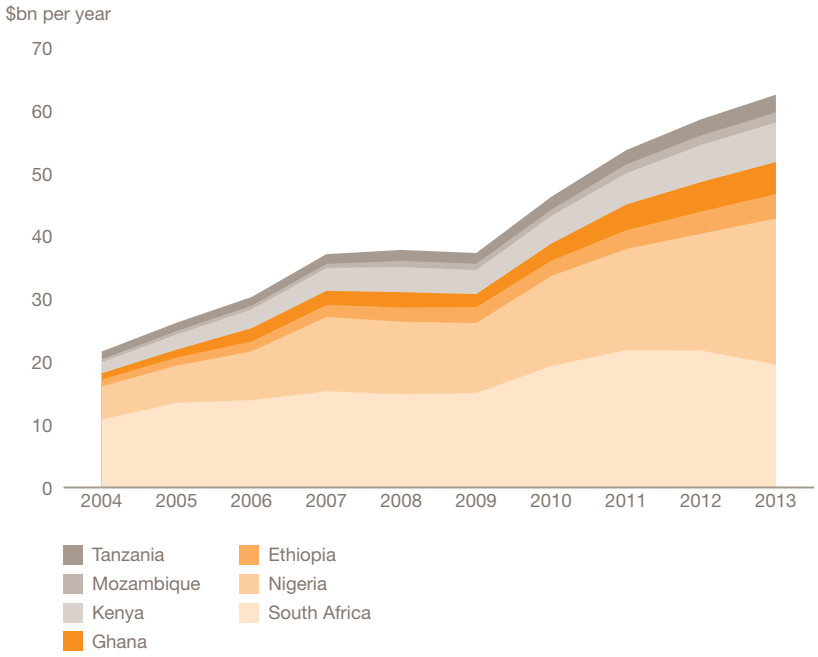


Source: Oxford Economics

Despite broadly similar growth paths over the past decade, Nigeria, aided by better fiscal position, fast urbanization, and oil revenues, is expected to outperform South Africa over the coming decade; meanwhile, growth prospects in other countries like Ethiopia, Ghana, Kenya, Mozambique, and Tanzania also look bright (see Figure 8.2).

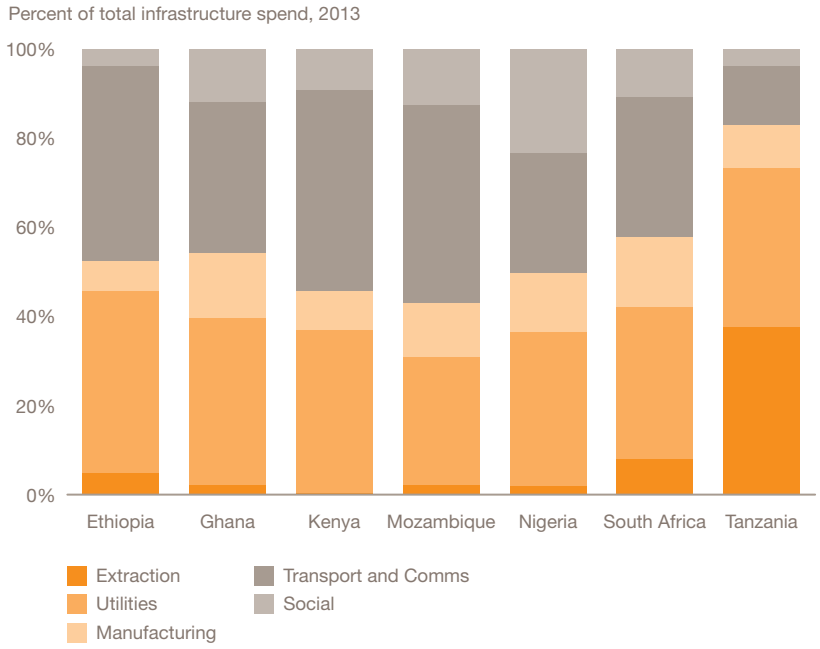
A number of similarities exist between the infrastructure markets in our SSA region, as Figure 8.3 illustrates. Transportation and communication account for a large portion of investment in most countries; only in Tanzania was the estimated share of total infrastructure spending in these sectors in 2013 below 30%. Heavy manufacturing is relatively scarce in most African economies and this is reflected in our estimates for the share of infrastructure investment in chemicals, fuel refining, and metal production, which is uniformly 10% or less, compared to an average of 23% in Latin America and 24% in Asia-Pacific. As for social investment, only Nigeria directs much more than 10% of total spending towards social infrastructure, perhaps reflecting limited budgetary resources in other African countries.

Figure 8.2: Growth in SSA infrastructure spending, 2004–2013



Source: Oxford Economics

Figure 8.3: Infrastructure spending by type, 2013—SSA



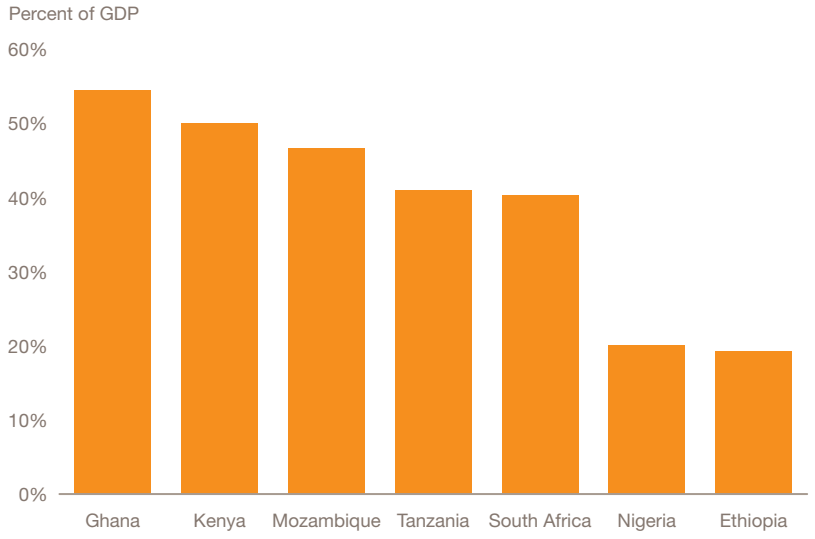
Source: Oxford Economics

Debt burdens are lower as a proportion of GDP in most African economies than in "advanced" economies or even middle-income countries. This would seem to imply that governments have more room to support social and transportation investment. But with a lower tax-take relative to GDP (generally 15-20% across Africa, compared to 25% in Argentina, 35% in Brazil, and even higher in Europe), as well as a poorer credit history than richer countries, financial market perceptions of sustainable debt loads in African economies tend to be much lower. When combined with sizable fiscal deficits, this undermines government resources for investment in many countries in the SSA region (see Figures 8.4 and 8.5).

Having said that, growth prospects in most of the region's economies look bright. The region was less affected by the global economic crisis than any other part of the global economy. This is partly because the continent's integration into international manufacturing supply chains is still in its infancy (and therefore the collapse in manufacturing output in 2008-09 had less of an impact than on, say, East Asia), and partly because capital inflows were relatively low prior to the crisis (and therefore the global credit crunch had less severe impact than on countries like Spain or Greece.) As a result of a less severe downturn, unemployment rates have risen less in Africa than elsewhere and banks have suffered fewer bad debts.

Figure 8.4: Government debt in SSA, 2013

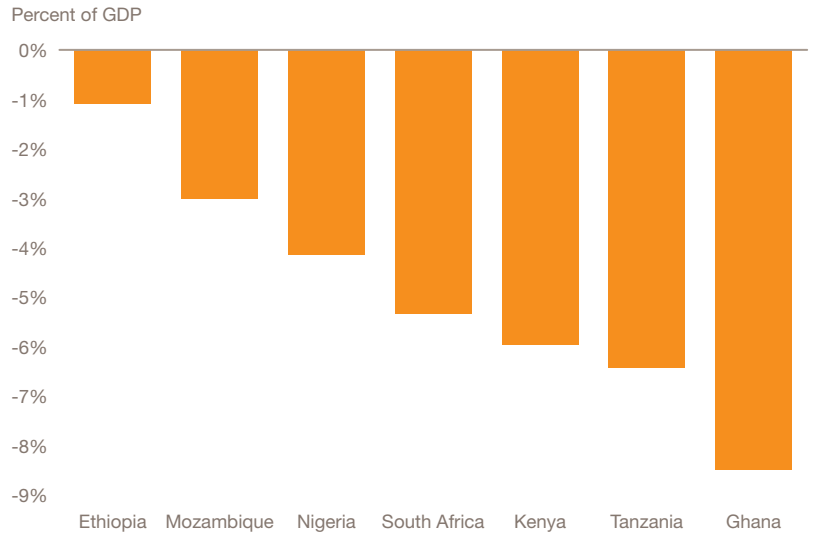
Only Nigeria and Ethiopia have some room to accrue debt



Source: Oxford Economics

Figure 8.5: Government deficits in SSA, 2013

Deficits are an issue in many countries



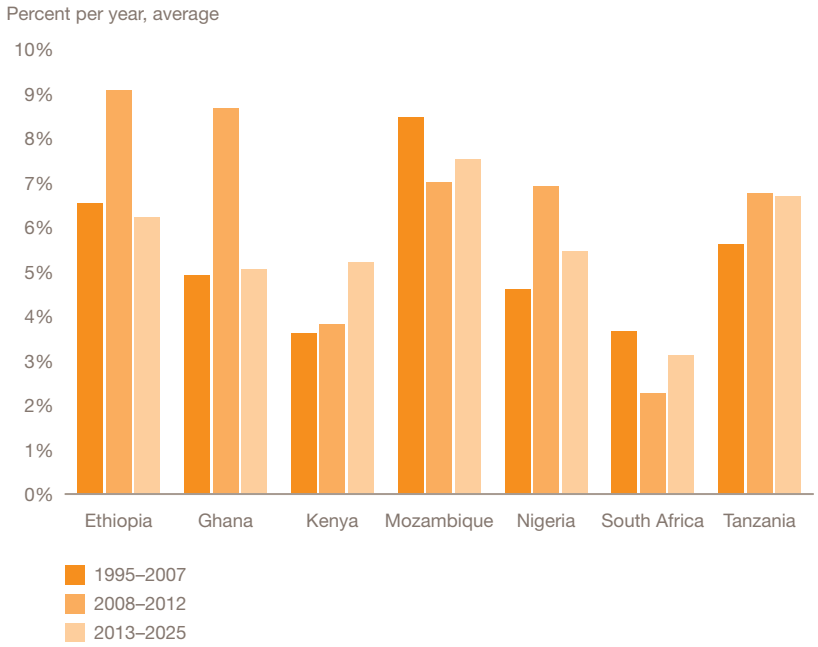
Source: Oxford Economics

The policy environment for growth has also been improving across the continent. The World Bank's Doing Business 2014 report rated Ghana as one of the top ten improvers in the world for getting access to credit; Ethiopia was among the top ten that did most to ease cross-border trade; and Mozambique ranked among the top ten that did most to simplify the path to business formation. With supportive demographics, average growth rates in most of the region's economies are likely to top 5% over the coming decade (see Figure 8.6), driving demand for investment in a range of infrastructure sectors.

As Sub-Saharan economies continue to develop, a substantial increase in investment into basic manufacturing sectors—the building blocks for industrialization, growth of manufacturing sectors, and the raw materials for wider residential, commercial and infrastructure development—seems inevitable. Data on current activity and investment in these sectors is limited, but, as Figure 8.7 shows, we estimate the chemicals, metals, and fuels sectors will grow from an annual total spending across our seven economies of around $6bn in 2012 to $16bn by 2025, with almost half of it invested in the chemicals sector.

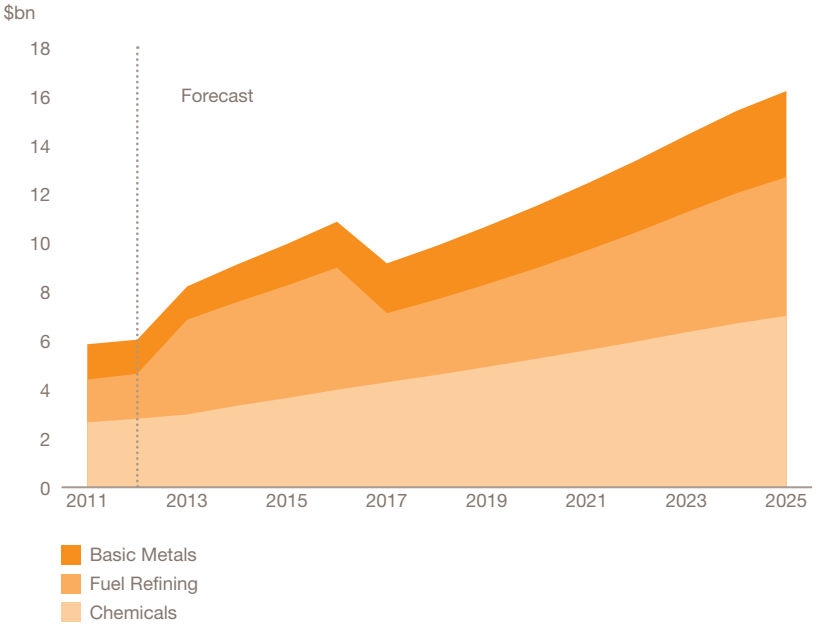
Figure 8.6: Average GDP growth in Sub-Saharan Africa, percent per year

SSA set for robust growth in coming decade after weathering global financial crisis better than several other regions



Source: Oxford Economics

Figure 8.7: Manufacturing infrastructure investment in Sub-Saharan Africa



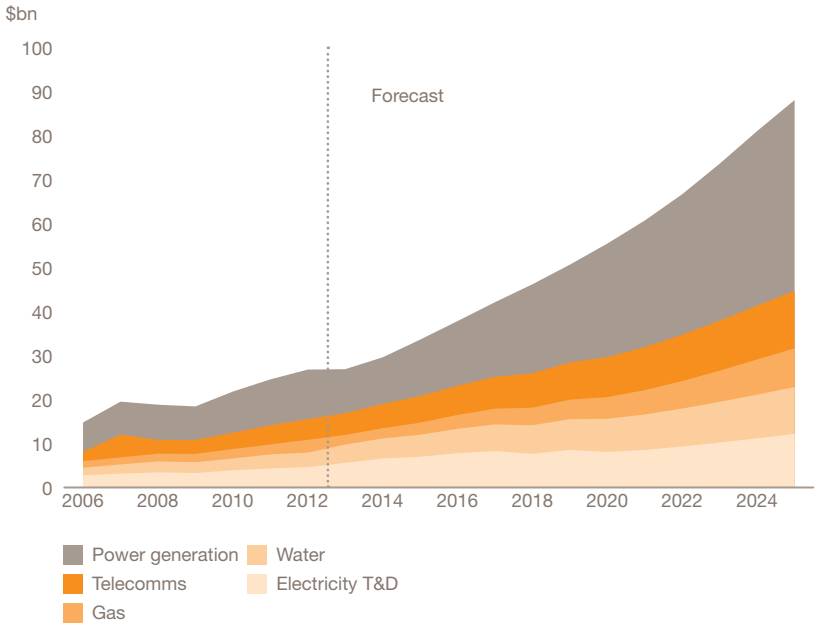
Source: Oxford Economics

Besides developing a manufacturing sector, Africa will need to continue to grow investment in the utilities sector over the coming decade (see Figure 8.8). The main priorities in our sample will likely be to boost electricity production and improve distribution, which together account for around 60% of total spending in 2012 and are forecasted to grow in dollar terms from around $15bn in 2012 to $55bn by 2025.

It is true that substantial improvements have been made in extending access to water and sanitation over the past couple of decades. In Ethiopia, e.g., where access to these services is weakest in our sample, the proportion of urban residents with access to an improved water source has risen from 79% in 1990 to 97% in 2010, and in rural areas from just 5% to 34%. This has demanded a substantial investment in the sector, averaging an estimated $400m a year over the past decade. Nevertheless, with only 44% of all Ethiopians currently enjoying access to an improved water source—compared to 47% of Mozambicans and 53% of Tanzanians—there is still a need for ongoing investment into the sector. We expect around $10bn a year across our seven countries by 2025, up from $3.3bn in 2012.

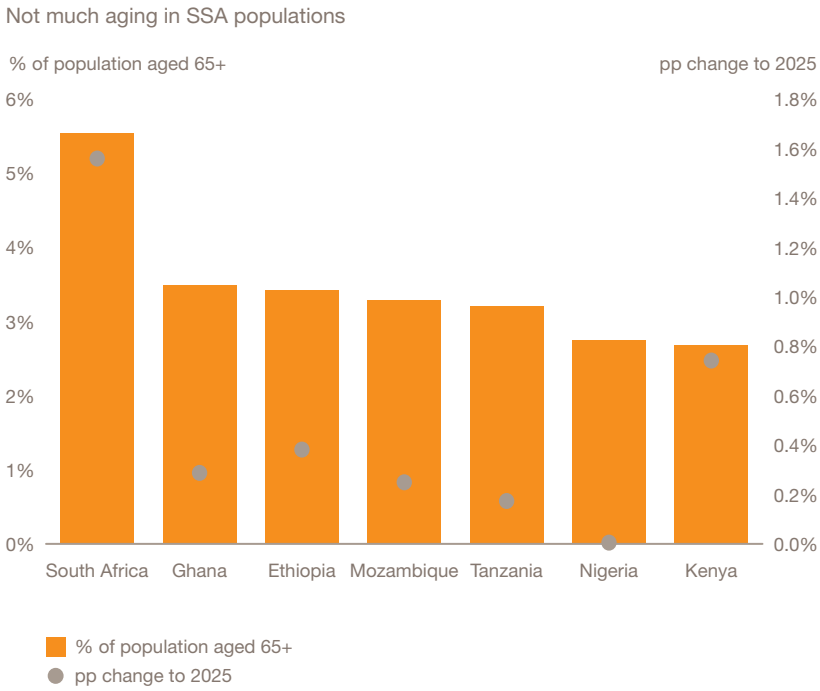
As noted earlier, the region's demographics stand out when compared with most other parts of the world. Only 3% or so of the population is aged 65+ in most Sub-Saharan countries and minimal change is expected over the coming decade (see Figure 8.9).

Figure 8.8: Utilities investment in Sub-Saharan Africa



Source: Oxford Economics

Figure 8.9: Old-age populations in SSA, 2013

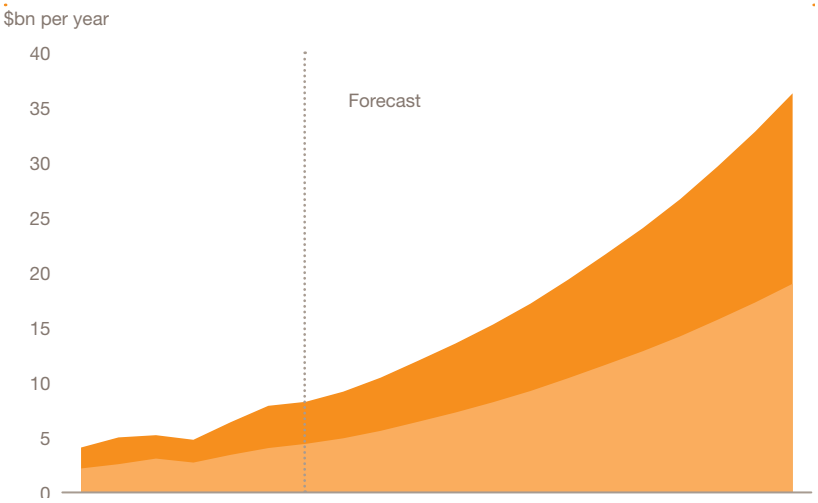


Source: Oxford Economics

Of course, Africa faces a number of particularly pronounced challenges to public health, not least of which is the prevalence of HIV/AIDS. Nevertheless, with the school age population continuing to grow, we expect the split between health and education spending to be broadly maintained between now and 2025 (see Figure 8.10).

Figure 8.10: SSA social infrastructure spending

Robust investment in both health and education

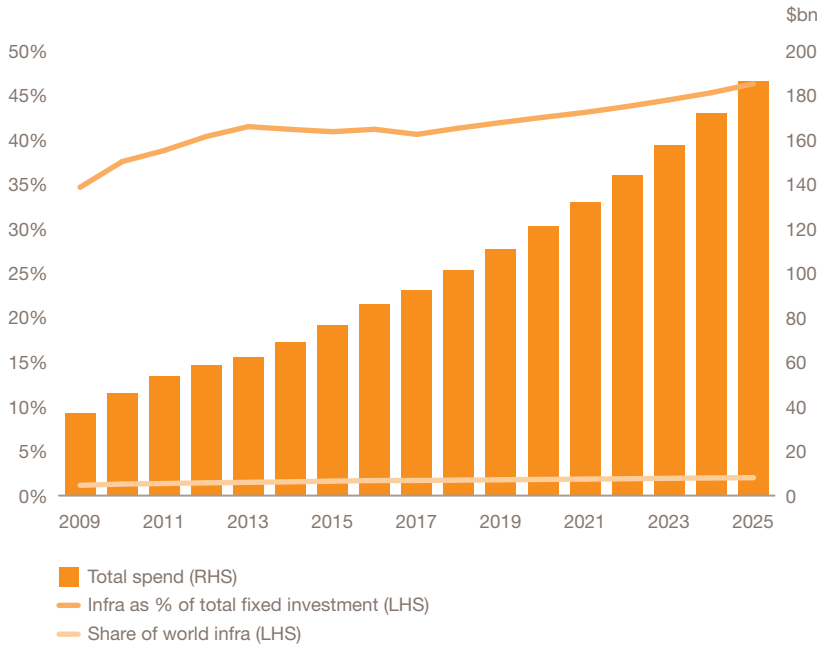


Source: Oxford Economics

Overall, we expect infrastructure investment in Sub-Saharan Africa to grow on average by 10% a year over the coming decade, roughly in line with the global market. As a result, SSA's share of the world infrastructure market will be broadly stable, at around 2%, while the total volume of spending will top $180bn by 2025 (see Figure 8.11). Specifically, as Figure 8.12 shows, we expect Nigeria to substantially increase its share of SSA infrastructure investment. Aided by better government finances and the fastest rate of urbanization in Africa, Nigeria's share is forecasted to rise from 35% to 42%. This will principally be at the expense of the region's other main economy, South Africa, where public finances are in worse shape and urbanization is more advanced (although by no means complete).

Figure 8.11: Total investment in infrastructure in Sub-Saharan Africa

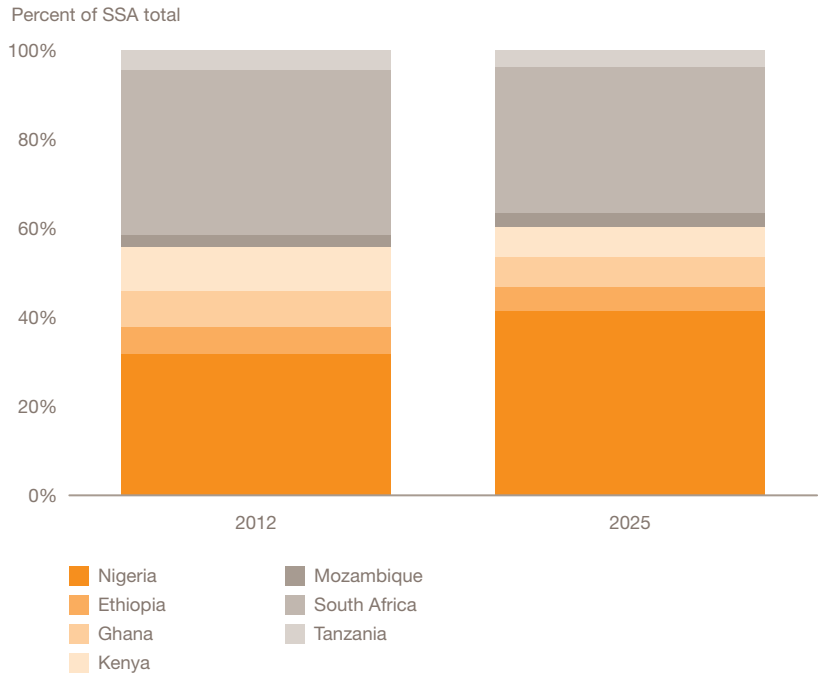
Infrastructure market to reach $200bn a year by 2025



Source: Oxford Economics

Figure 8.12: Composition of infrastructure spending in Sub-Saharan Africa, 2012 vs. 2025

Nigeria to become a powerhouse



Source: Oxford Economics

9 Former Soviet Union/Central and Eastern Europe

The FSU/CEE region is, along with Asia-Pacific, one of the most diverse in our sample: it includes FSU countries that participate as producers in the FSU's oil and commodity trade as well as CEE countries that are well integrated into the Western European economy and benefit from EU membership. Our sample includes the four largest economies in Central and Eastern Europe, which are now EU members, as well as the four largest economies in the Former Soviet Union. Together, these eight economies account for over 86% of total economic output across the region's 29 countries (15 in FSU including the Baltics, and 14 in CEE). Russia alone accounts for over half of the region's economic output ($2.03trn out of $3.45trn across our sample and $3.98trn across the whole region, in nominal dollar terms in 2012).

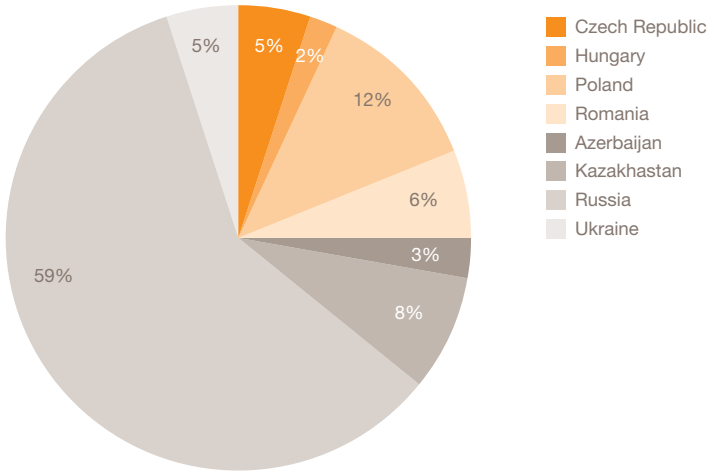
The diversity of this region has a particular impact on the quality of data available across economies. Since the Czech Republic, Hungary, Poland and Romania are members of the EU, we are able to access data for these economies from Eurostat. Further, since some economies in the region are members of the OECD and its Executive Agencies, we are able to tap into these data resources as well. In other countries though, particularly where official statistics agencies offer less comprehensive information, more estimation has been necessary.

As Figure 9.1 shows, we estimate that just over half of the FSU/CEE infrastructure spending in 2013 was undertaken in Russia, roughly in line with its share of regional GDP (59% in 2013). Poland accounted for 12% of the total, with Kazakhstan, Ukraine, Romania, and the Czech Republic each generating 5-8%.

Figure 9.1: Composition of FSU/CEE Infrastructure market, 2013

Russia currently dominates

Percent of regional infrastructure spend



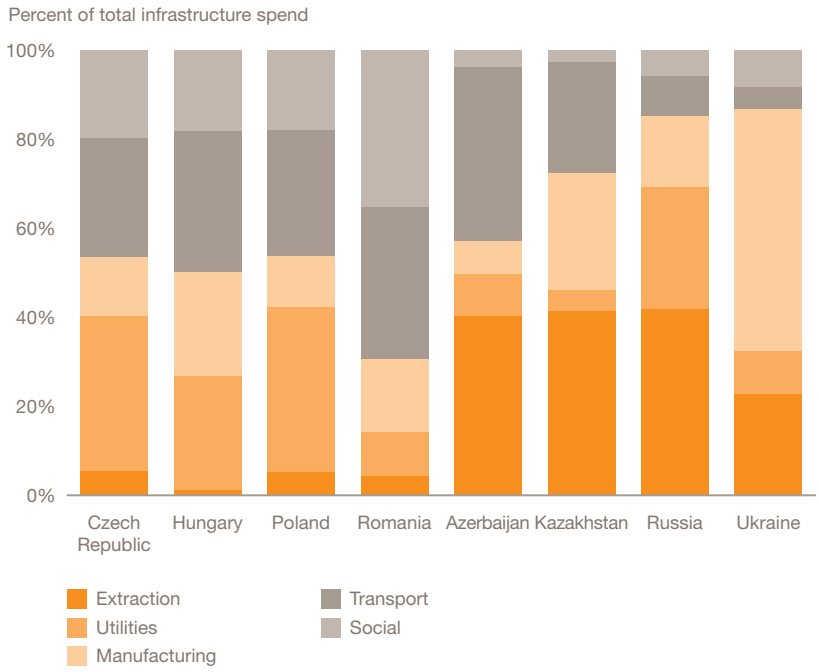
Source: Oxford Economics

As Figure 9.2 shows, half of the countries in our FSU/CEE region have sizeable extractive sectors (10–20% of all infrastructure spending), specifically the four in the Former Soviet Union. By contrast, the economies further west tend to have a much higher degree of investment in transportation spending. This might be, in large part, due to the availability of EU structural funding, although we do not consider this in detail here. Heavy manufacturing still plays a major role in many of the region's economies, with almost half of all infrastructure spending in Ukraine and a third in Kazakhstan delivered in the chemicals, fuels, and metals sectors.

With the exception of Ukraine, government finances in the FSU are in much better shape than in CEE economies, partly due to oil and gas endowments and the associated tax revenues (see Figure 9.3). Deficits also tend to be slightly higher in CEE economies, although the differences here are fairly marginal. Also, governments' short-term finances are on the whole much healthier in CEE than in Western Europe or Advanced Asia. Ukraine stands out as the most immediately fiscally constrained economy, with a deficit of 6% of GDP (see Figure 9.4).

Figure 9.2: Infrastructure spending by type in FSU/CEE, 2013

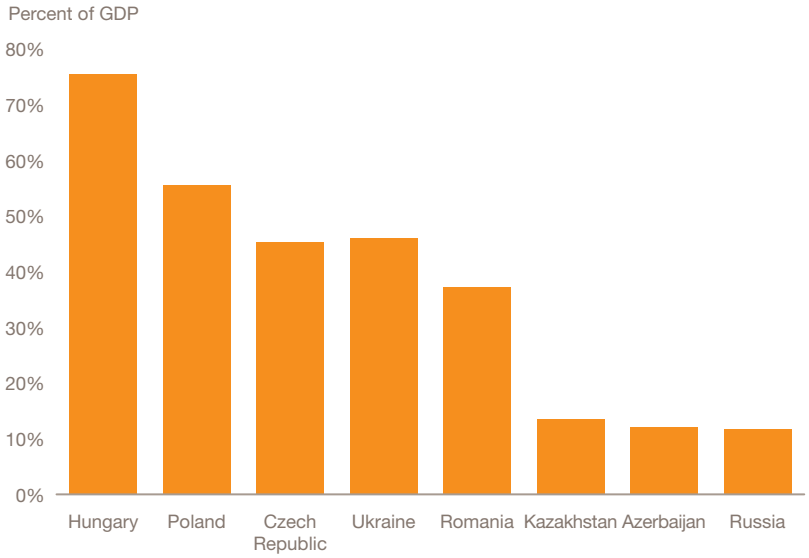
FSU strong in extraction and manufacturing; CEE in transportation sectors



Source: Oxford Economics

Figure 9.3: Government debt in FSU/CEE, 2013

Debt burdens less serious in FSU than CEE

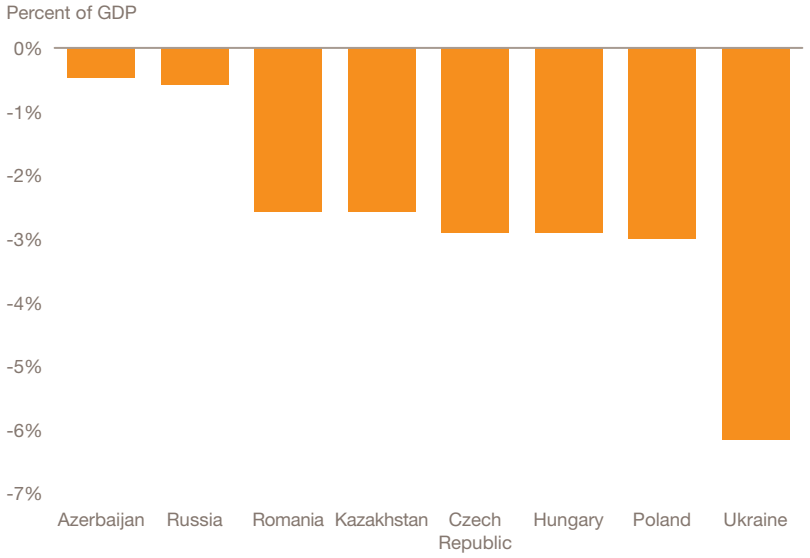


Source: Oxford Economics

In turn, this means greater fiscal freedom for governments in the FSU to support infrastructure investment over the coming decade. As Figure 9.5 shows, we expect government spending in Azerbaijan and Kazakhstan to grow by 7% a year or more in nominal dollar terms, compared to around 4% a year in CEE countries. We expect spending in Ukraine to grow relatively quickly in the second half of this decade, but this reflects, in part, a rebound following a long period of spending restraint under an IMF economic agreement.

Figure 9.4: Government deficits in FSU/CEE, 2013

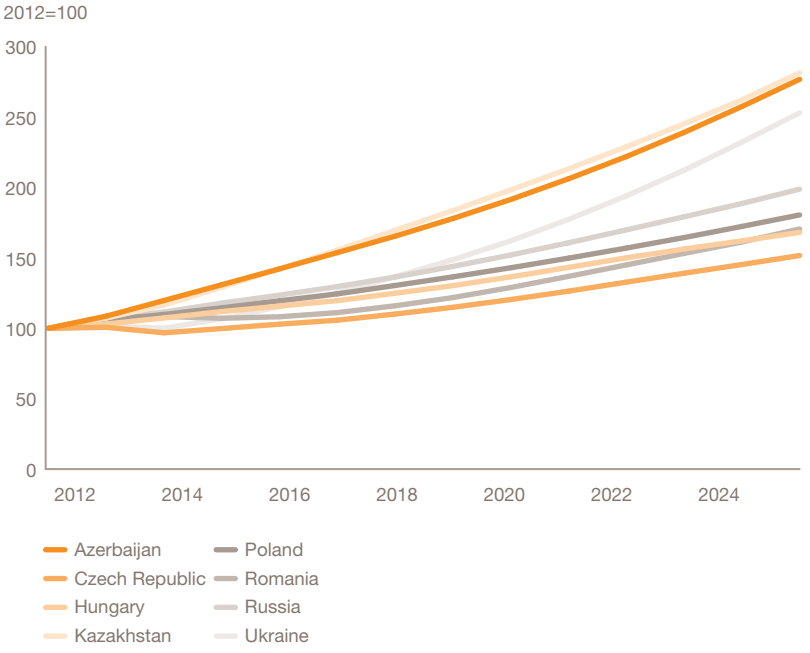
Ukraine faces substantial near-term fiscal challenges



Source: Oxford Economics

Figure 9.5: Government spending in FSU/CEE, US$ current prices

Resources for government investment not as constrained in FSU



Source: Oxford Economics

With the exception of Azerbaijan and Kazakhstan, the FSU/CEE region faces less drastic demographic challenges than Western Europe, but population-aging will still be a concern for governments across the region. By 2025, as Figure 9.6 illustrates, we expect a fifth of the population in the Czech Republic, Hungary, Poland, and Romania to be aged 65 or above, with Ukraine and Russia close behind. As in other economies, we expect this to affect the type of social spending undertaken by governments, with a familiar shift toward prioritizing health spending—from 52% of total social infrastructure spending to 54% at the regional level (see Figure 9.7).

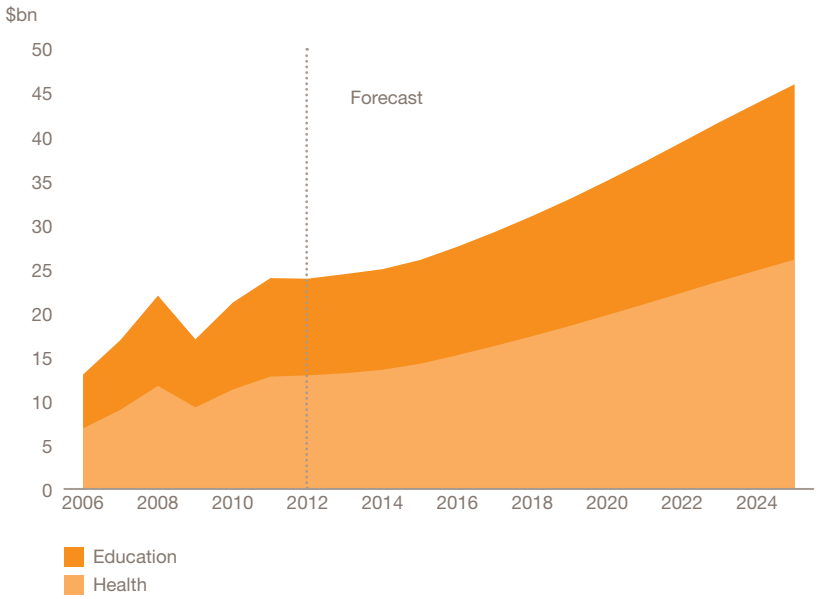
Figure 9.6: Old-age populations in FSU/CEE, 2013

Aging population on the rise but slightly less so than in Western Europe

Source: Oxford Economics

Figure 9.7: Health and Education spending in FSU/CEE

Aging population drives resources into health infrastructure



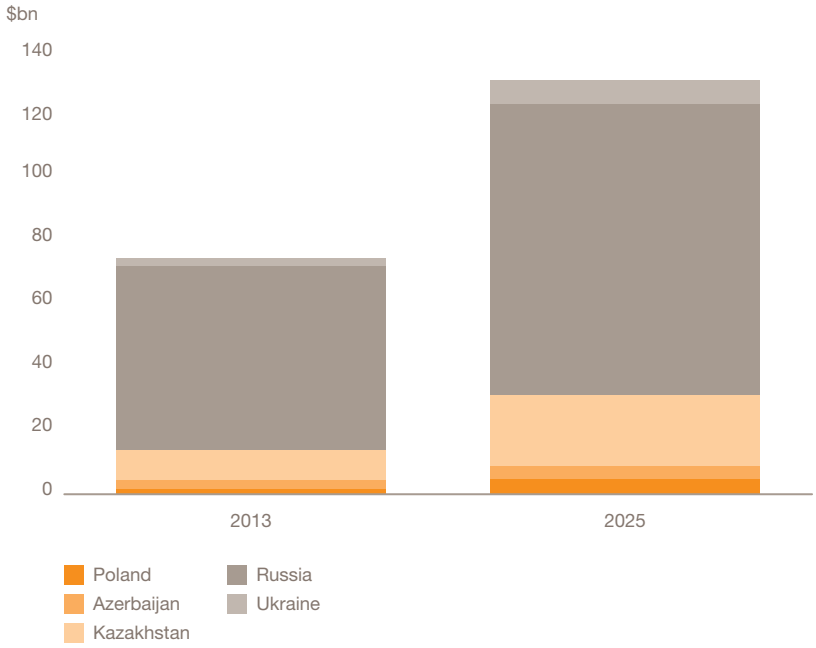
Source: Oxford Economics

Extractive investment will continue to be a key driver of infrastructure spending in the region, albeit almost exclusively in the FSU countries (see Figure 9.8). Only a negligible level of investment—below $1bn a year—is likely to persist in the Czech Republic, Hungary and Romania. With the world's tenth largest coal reserves, we expect Poland's extractive sectors to boost investment by around 9% a year over the coming decade, reaching $4.5bn by 2025. Of far greater significance is the growth we anticipate in Russia and Kazakhstan's extractive sectors, reaching $90bn and $22bn a year respectively by 2025.

Heavy manufacturing is expected to continue to play a key role in many of our FSU/CEE economies (see Figure 9.9). Our industry forecasts indicate basic metals production in Russia will contribute a steadily increasing share of total manufacturing activity over the coming decade, with output rising from $88bn in 2013 to $192bn by 2025. Chemicals and fuels refining will also grow in importance, drawing on the investment made upstream in extractive sectors. In non extraction-led economies though—principally those further West, where average incomes are higher and these sectors are less competitive—heavy manufacturing investment will grow less rapidly than other infrastructure sectors.

Figure 9.8: Investment in extraction in FSU/CEE

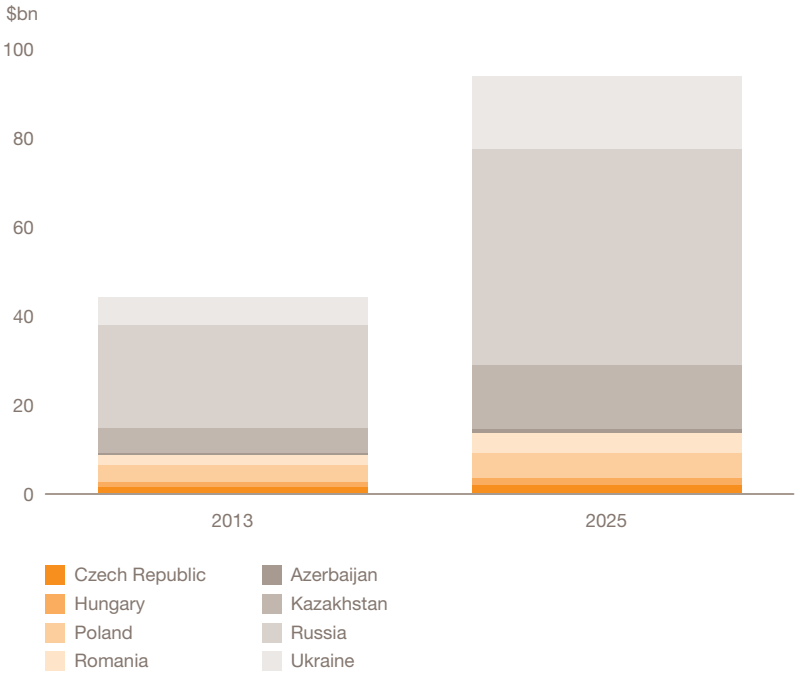
Extraction will continue to demand substantial investment



Source: Oxford Economics

Figure 9.9: Investment in manufacturing in FSU/CEE

Downstream sectors across the region double investment from 2013 to 2025



Source: Oxford Economics

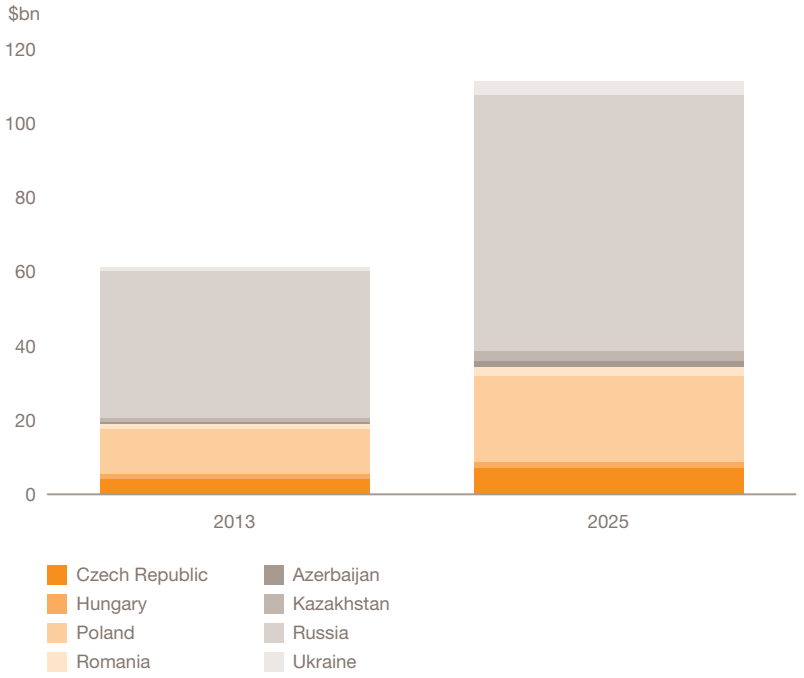
Finally, we expect utilities investment to be a key driver of infrastructure spending over the long run. This is partly due to energy-hungry sectors such as basic manufacturing. But, more importantly, there is a need in many countries to improve reliability and quality of supply after decades of historical underinvestment due to the fiscal constraints of Communism and the difficulties of transitioning into a market economy.

This program of reinvestment is already well underway in some countries (e.g., we estimate investment in water supply and sanitation in Russia has risen from $3bn per year in 2005 to just over $9bn by 2013), but has remained stalled in others (e.g., in Ukraine, where water infrastructure spending has been broadly unchanged since 2004). Looking ahead, the capacity to invest depends in large part on government financing and the wider rate of growth across the economy (see Figure 9.10). For example, we expect annual utilities investment in Ukraine to still be under 1.3% of GDP by 2025, well below less fiscally-constrained economies such as Poland (2%) and Russia (1.6%).

Overall, we estimate infrastructure spending in the FSU/CEE region to reach around $508bn by 2025 (see Figure 9.11), in large part due to the growth of extractive investment. But infrastructure as a share of total investment is expected to edge down through the forecast period as non-infrastructure investment like residential and commercial property, as well as service sector activities, becomes increasingly important. At around 5% a year, growth in infrastructure spending in the FSU/CEE is somewhat slower than in most other regions. As a result, the share of global infrastructure spending being undertaken in the FSU/CEE region is forecasted to fall from around 7% to 6% over the long run.

Figure 9.10: Investment in utilities in FSU/CEE, 2013 vs. 2025

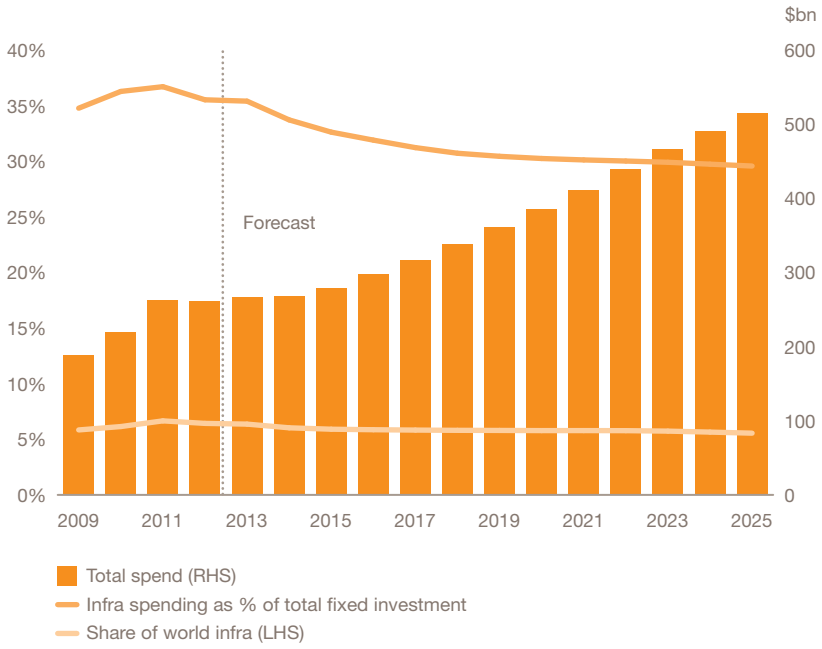
Utilities investment rebounds in certain economies



Source: Oxford Economics

Figure 9.11: Total investment in infrastructure in FSU/CEE

FSU/CEE infrastructure market to reach around $508bn by 2025



Source: Oxford Economics

Endnotes

1. Our coverage is as follows: Canada, US, Argentina, Brazil, Chile, Colombia, Mexico, Peru, France, Germany, Italy, Netherlands, Spain, Sweden, UK, Turkey, Azerbaijan, Bulgaria, the Czech Republic, Hungary, Kazakhstan, Poland, Russia, Ukraine, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE, Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Tanzania, South Africa, Australia, China, India, Indonesia, Japan, Malaysia, New Zealand, the Philippines, Singapore, South Korea, Thailand, Vietnam.
2. Those emerging market governments with large cash and forex reserves or substantial revenue streams from state owned enterprises may not need to borrow to invest. In such cases, the cost of borrowing in the market might not be the criteria upon which potential government investments are judged.
3. More discussion of a city's infrastructure life cycle can be found in *Cities of Opportunity – Building the Future*, published by PWC and available at http://www.pwc.com/gx/en/capital-projects-infrastructure/publications/assets/pwc-cities-of-opportunity-building-the-future.pdf
4. Unlike most of the other economies in our Middle East region, Turkey is not an oil exporter; instead, it has a large and diverse manufacturing sector. As such, it may be more appropriate to group Turkey in an alternative grouping. However, Turkey is geographically, culturally, and demographically more similar to the Middle East region than either the FSU/CEE or Western Europe regions (the only two other obvious regional groups where we might include Turkey).
5. 5. Deena Kamel Yousef, Deema Almashabi and Alaa Shahine, "Saudi Spends $22 Billion on Riyadh Metro Line Construction," *Bloomberg News,* July 29, 2013.

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To have a deeper conversation about this subject, please contact:

Richard Abadie
Global leader
Capital projects & infrastructure
Tel: +44(0) 20 7213 3225
richard.abadie@uk.pwc.com

Neil Broadhead
EMEA
Capital projects & infrastructure
Tel: +44 (0) 20 7804 4423
neil.broadhead@uk.pwc.com

Mark Rathbone
Asia-Pacific
Capital projects & infrastructure
Tel: +65 6236 4190
mark.rathbone@sg.pwc.com

Peter Raymond
North and South America
Capital projects & infrastructure
Tel: +1 703 918 1580
peter.d.raymond@us.pwc.com

Methodology note: In developing this analysis, Oxford Economics used data sets to provide consistent, reliable, and repeatable measures of projected capital project and infrastructure spending globally as well as by country. Historical spending data is drawn from government and multinational organization statistical sources. Projections are based on proprietary economic models developed by Oxford Economics at the country and sector levels. The analysis, completed over the second half of 2013 and early 2014, incorporates all available information at that time. For more information on the methodological basis for these projections, please see page 6.