

# China's commodity demand

## Turbulence ahead

- The next five years will bring huge changes in China's commodity demand as the transition to a less investment driven, more consumer led economy – one that is not as competitive in global manufacturing, but less polluting – gathers pace.
- The consensus view is that this will lead to a slowing of demand for almost all commodities, but we still see plenty of scope for China to create shocks and surprises in international markets.
- Our new framework for assessing commodity demand in developing countries, the Flight Path Analysis for Commodities (FPAC), enables us to assess how China's changing growth profile will affect domestic demand for different commodities, but also *the impact of these changes on international markets, via changes in China's share of global demand*.
- China's impact on global energy markets will be transformed as its oil and coal consumption growth slows fast. Investment in renewables is likely to surge and China is likely to become much more important in global gas markets.
- In contrast, its influence in global industrial metals markets will greatly diminish as domestic growth rates slow sharply and China's global market share falls back. Unless other developing countries take up the slack, global metals demand growth rates over the next five years will be much slower as a result.
- China's share of the global gold market is likely to rise sharply as it is one of the few countries where demand is likely to continue expanding over the next five years. By 2020 it could be consuming almost half the world's gold output.
- Coffee demand is set to soar over the next five years. However, maturing diets mean slower growth of meat, corn and soybean demand.

### Commodities Research

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### Economics Research

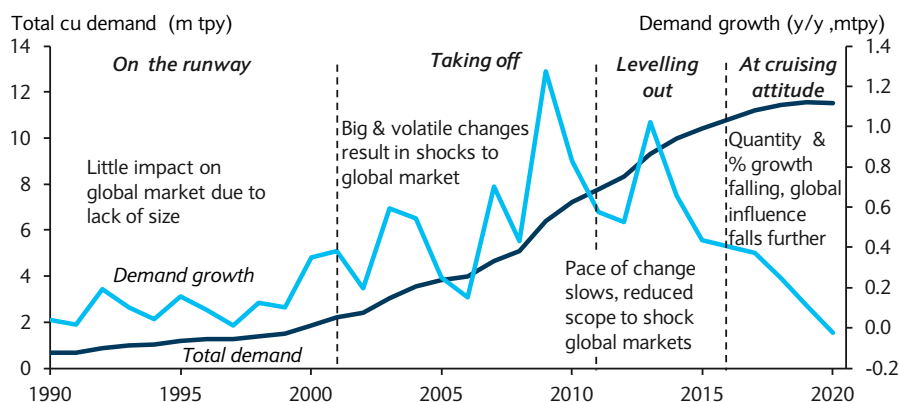
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FIGURE 1  
Copper's flight path in China



Source: Woodmac, Barclays Research

## OVERVIEW

## China's changing 'flight path' for commodities

China's economy is slowing and becoming less dependent on infrastructure building, manufacturing exports and construction, and more driven by consumer spending. The consensus view is that the country's growth is becoming much less commodity intensive and its demand for commodities is slowing fast.

In fact the truth is much more nuanced. Since 2008, as Chinese GDP growth has slowed from average levels of over 10% to less than 8%, demand growth for different commodities has varied widely. For some, growth has contracted fast and intensity of use is clearly in structural decline. That is the case for energy commodities like coal, refined oil products including diesel and residual fuel oil and some staple foodstuffs like rice and wheat. On the other hand, there are plenty of examples of commodities that are still experiencing rapid increases in intensity of use and where local demand growth is accelerating fast. Coffee demand has been growing at roughly four times the rate of the Chinese economy over the past five years, demand for gold and natural gas has grown at twice the rate and even industrial metals like steel and copper have seen their intensity of use per unit of GDP continue to expand, albeit much less rapidly than in the past.

One of the most important drivers of the period of rapid price appreciation that characterised much of the previous decade in commodity markets was the huge increase in demand for commodities like copper, soybeans and gold. That process drove China from being a relatively minor influence to the dominant consumer in these markets in a very short space of time, often accompanied by a huge increase in import demand and an enormous boost to international prices.

So in this report we are interested not just in assessing the domestic commodity winners and losers from China's changing growth profile, but also *the impact of changes in future demand growth on international markets, via changes in China's share of global demand*. Are there new commodity sectors where China is poised to expand rapidly and shock global markets? In which markets is China's impact now stabilising following the volatile growth of the past decade? And are there any commodities that could see an outright contraction in Chinese demand and a diminishing of its dominant role in global markets in the future?

FIGURE 2

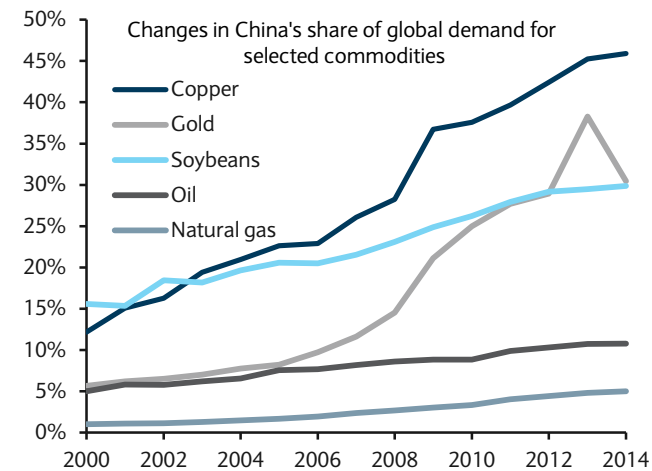
China's economy is characterised by huge deviation in rates of usage intensity for different commodities



Source: Wood Mackenzie, USDA, BP, WGC, Thompson Reuters, Barclays Research

FIGURE 3

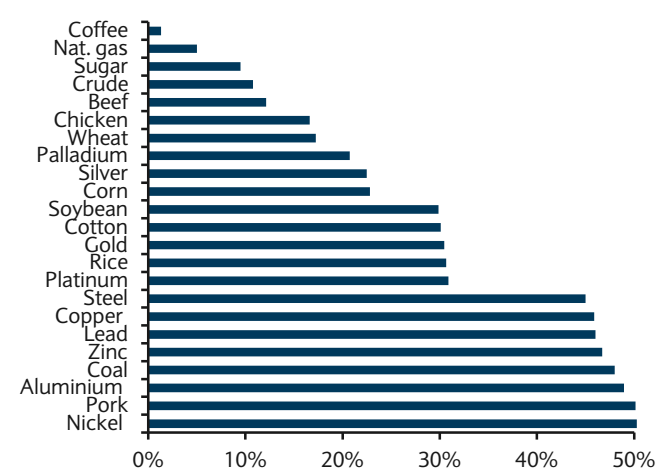
China's share of global demand for many important commodities has soared in the past decade



Source: USDA, BP, Woodmac, WGC, CRU, Barclays Research

FIGURE 4

Though its overall share in different markets is still highly diverse



Source: USDA, BP, Woodmac, WGC, CRU, Barclays Research

To do this we have developed a new framework we call the Flight Path Analysis for Commodities (FPAC). This takes into account a number of factors including which stage of the developmental “S” curve each commodity is at, where it is moving to on that curve over the next five years, as well as its current and future share of global demand and how fast that is changing.

By combining these measures we can group different commodities into those that are “on the runway” (ie, about to start on a phase of rapid domestic growth though not yet with a big enough global demand share to influence international markets very much); “taking off” (fast growing commodities where China’s global share is significant and rising quickly and with the potential to create demand shocks in international markets); “levelling out” (markets where China has a dominant share of global demand, but growth in domestic demand is slowing down); “at cruising altitude” (domestic demand growth stabilising at very high levels of global market share) and finally a small group of commodities that are “in descent” (demand growth is already falling, or will soon, and global market share is shrinking).

There is a more detailed explanation of our FPAC framework in the Appendix to this report.

### Key findings: Taking off, at cruising speed or in descent?

The next five years will bring big changes in the main factors that have been driving China’s commodity demand growth for most of this century so far, as the transition to a less investment driven, more consumer led economy, less competitive in global manufacturing, but also less polluting, gathers pace. Not only will GDP slow from 7.8% over the past four years, to just 6.2% over the next five; average rates of fixed asset investment and industrial production growth will fall by a third, while growth in manufacturing exports will fall 40%. Meanwhile, living standards will continue to rise (reaching the equivalent of \$20k/capita by 2020) and sales of autos and consumer durables will soar.

Here we summarise the impact these changes will have on different commodity sectors and individual markets. A detailed breakdown of the forecasts is shown in Figure 4.

**The biggest losers in this process are likely to be the industrial metals.** The era of double-digit growth in metals demand is now over, as China’s maturing economy re-orientes investment away from metals-intensive industries and fixed-asset growth towards the service sector and domestic consumption. We expect metals consumption growth rates to slow very sharply over the next five years. China will remain the world’s dominant consumer

in industrial metals markets, but its global market share is likely to fall as demand growth rates in other developing countries accelerate. As this process plays out China will become a less dominant factor driving metals market balances and international market prices than has been the case over the past decade.

**Patterns of energy demand are likely to be transformed by three key trends: cleaner energy, greater electrification and a reduction in energy intensity of the economy as a whole.** Energy demand in China is undergoing a rapid slowdown and at just 3% pa average growth to 2020 will be only half that of the previous five years. Coal will be the big loser, its demand growth falling by more than half to an average of just 2% pa as it loses share in electricity generation to nuclear, gas and renewables. These alternative energy sources will see their combined share of total Chinese energy consumption double to 15% while the share of coal falls from 65% to 60%. By 2020 China could account for almost 40% of total global energy generation from renewables. It is also set to become a much more important player in global gas markets, its share of global gas demand doubling to 10% over the next five years.

**Oil demand growth is set to continue slowing as growth rates for diesel, petrochemicals and residual fuel oil contract. The effect of this on crude oil demand is partially offset by faster growth in refined products like gasoline and jet fuel.** We forecast that by 2020 China's oil demand will have risen to almost 11.9m b/d from last year's 9.9m b/d, a much slower rate of growth than the 2.5m b/d gain made over the past five years as average percentage growth rates fall from 5% to 3% pa. The slower growth means that China's share of global oil demand is now close to peaking and will rise by only another 1% to 12% by 2020.

**In precious metals the key theme is that of a stabilisation in demand growth at relatively high rates. China's influence on global precious metals will increase because demand elsewhere will be rising much less quickly.** Gold is the best example of this. Although in tonnage terms its gold demand over the next five years is unlikely to grow much faster than it did over the past five (when its total demand rose by around 500t), China's share of global fabrication demand will rise substantially to 46% from its current 30%. However, we do not expect this trend to be hugely positive for prices in its own right, as this growth will be taking place in a market where demand growth in many other regions is flat to down.

**In agriculture the key factor driving future growth is that China's food consumption has already passed its most intense growth period.** On a per capita basis, both quantity and quality of food consumption have reached similar levels to those in more developed East Asian countries. Without significant population growth, demand for staple grains in China is likely to stop rising altogether over the next five years. Demand for protein is likely to see relatively slow growth as well, which will mean a marked slowdown in demand growth for animal feed derived from corn and soybeans. Instead some of the soft commodities are likely to be the biggest beneficiaries of rising living standards, urbanisation and changing tastes, with coffee leading the way.

#### *Flight paths of different commodities*

**On the runway: coffee and natural gas.** China's consumption of coffee is poised for take-off and so is its natural gas demand. If they grow as fast as we expect, then by 2020 China's consumption is likely to be close to the critical mass required to start moving international markets and have a significant impact on prices.

**Taking off: gasoline, jet fuel and palladium.** A doubling in the number of cars on China's roads over the next five years will underpin a huge 50% acceleration in the rate of gasoline demand growth from an average of around 900k b/d over the past five years to an average of around 1.3m bpd each year to 2020. By then total Chinese gasoline demand will reach

3.7m b/d (still a long way short of the US total of almost 9m b/d, because it will take much longer for China's total fleet of cars to catch up with the US). We also expect continued very strong growth in demand for air travel which will keep jet fuel demand expanding by an average rate of 10% pa over the next five years.

Demand for palladium in autocatalysts will benefit not only from the expansion in auto sales, but also from tightening emissions standards. Although work is being done in China to encourage the development of alternative fuel vehicles as a way of combating pollution, we do not expect it to have much impact on the production of conventional vehicles over the next five years.

**Levelling out: gold, animal feed and steel.** China's gold demand has been hugely volatile recently expanding by 41% in 2013 as prices fell, then contracting by 28% in 2014 as interest waned. We expect percentage growth rates to slow sharply over the forecast period, but for tonnage growth to average just over 500tpy, the same as the average of the past five years as China gradually moves toward similar per capita consumption levels as its Asian neighbours, but is unlikely to exceed them.

The industrialisation of animal husbandry is an important policy goal and will be a key trend supporting demand for feedstuff over our forecast period. This means that unlike in some other agricultural commodity markets where demand is slowing much faster, growth in demand for corn and soy will remain strong enough for China's global market share to continue expanding gradually, albeit much less quickly than in the past five years.

In steel, rapid growth in the auto sector is set to partially offset a structural decline in infrastructure spending and construction activity. However, steel demand growth rates are slowing fast and over the next five years China is expected to add a only 180m tonnes to its steel demand compared with an extra 290m tonnes over the past five years.

**At cruising altitude: copper, diesel, coal, pork and beef.** Lower fixed asset investment and construction activity will drive a slowdown to more sustainable growth rates for base metals and some refined oil products like diesel. Maturing dietary patterns and low population growth will also lead to a sharp slowing in meat consumption growth rates. Commodities in this category are likely to see their growth rates falling to levels in line with current global averages so China's share of total global demand will stabilise at around current levels.

**In descent: cotton, residual fuel oil and tin.** Loss of market share in low-cost garment manufacture will hasten what is already an outright decline in cotton consumption. China's focus on cleaner energy and energy efficiency will drive consumption of heavy fuel oil lower. Meanwhile we also expect tin to start an absolute decline during our forecast period, as its use in soldering and electronics is being phased out due to new environmental regulations.

FIGURE 5

## The outlook for China's commodities demand by Flight Path stage

Commodity & flight		Global demand share		Total Volume Growth			% Growth Rates	
path stage	Units	2014	2020	2008-2014	2014-2020	Change	CAGR 2008-14	CAGR 2014-20
On the runway		Small/growing very fast		Very high CAGRs & rapid volume growth from low base				
Coffee	Th Bags	1%	4%	1470	5285	259%	28%	25%
Nuclear	mb/d oe	6%	11%	0.29	1.08	271%	12%	19%
Gas	mb/d oe	5%	9%	1.71	2.98	74%	14%	12%
Taking off		Medium/growing fast		High CAGRs & rapid volume growth from a bigger base				
Renewables	mb/d oe	16%	40%	0.95	1.39	46%	56%	15%
Jet	kb/d	N/A	N/A	220	372	69%	10%	10%
Gasoline	kb/d	N/A	N/A	883	1311	48%	8%	8%
Palladium	Th Oz	21%	25%	732	767	5%	7%	5%
Silver	MT	22%	29%	1710	1794	5%	6%	5%
Sugar	Th MT	9%	10%	1828	2494	36%	2%	2%
Levelling out		Large/growing less quickly		Very large base level of demand, but growth rates slowing				
Gold	MT	30%	46%	523	522	0%	14%	7%
Nickel	Th MT	51%	65%	678	514	-24%	22%	7%
Soymeal	Th MT	29%	34%	24913	17399	-30%	10%	5%
Soybean	Th MT	30%	34%	34211	24600	-28%	9%	4%
Soyoil	Th MT	31%	34%	4928	3956	-20%	7%	4%
Steel	Th MT	44%	45%	291439	183273	-37%	9%	4%
Corn	Th MT	23%	26%	68121	53623	-21%	6%	4%
All Primary energy	mb/d oe	22%	24%	17	13	-24%	6%	3%
Crude	kb/d	11%	12%	2511	1942	-23%	5%	3%
Platinum	Th Oz	31%	35%	1196	482	-60%	11%	3%
Chicken	Th MT	17%	17%	2033	1823	-10%	3%	2%
At cruising altitude		Large/stable		Demand stabilising, big declines in volume growth				
Lead	Th MT	46%	45%	2307	1039	-55%	10%	3%
Aluminium	Th MT	49%	44%	13545	4086	-70%	13%	2%
Copper	Th MT	46%	45%	4885	1548	-68%	12%	2%
Zinc	Th MT	47%	42%	2695	984	-63%	9%	2%
Coal	mb/d oe	46%	49%	9	5	-46%	5%	2%
Pork	Th MT	50%	52%	8413	5701	-32%	3%	2%
Beef	Th MT	12%	13%	929	681	-27%	2%	2%
Diesel	kb/d	N/A	N/A	633	257	-59%	3%	1%
Hydro	mb/d oe	27%	25%	2	0	-88%	10%	1%
Wheat	Th MT	17%	17%	17113	3408	-80%	3%	0%
Rice	Th MT	31%	29%	14299	2176	-85%	2%	0%
Petchem	kb/d	N/A	N/A	683	34	-95%	5%	0%
In descent		Large/declining		Demand contracting in absolute terms				
Resid	kb/d	N/A	N/A	93	-31	-133%	2%	-1%
Tin	Th MT	N/A	N/A	16	-21	-236%	2%	-3%
Cotton	Th Bales	30%	18%	-8973	-10383	16%	-4%	-6%

Source: USDA, BP, Woodmac, WGC, CRU, NBS, Barclays Research

## Revisiting our 2012 report – The Dragon's appetite did change

The last time we thoroughly examined the outlook for China's commodity demand was in 2012 (see *China's commodity intensity: The Dragon's appetite is changing*, 25 April 2012). We concluded back then that China's economic slowdown and rebalancing would lead to slower demand growth for almost all commodities over the medium term.

FIGURE 6

## Comparison of 2012 forecast with actual outcome

Annual average growth rate				
	2007-11	2011-15 F	2011-14 Act	Difference
Rapid gainers (intensity of use rising and quantities expanding rapidly)				
Renewables	66.1%	34.2%	27.3%	-6.9%
Coffee	21.7%	38.5%	26.8%	-11.7%
Nuclear	10.2%	34.6%	15.4%	-19.2%
Hydro	14.3%	11.8%	15.1%	3.2%
Nickel	22.6%	13.1%	14.3%	1.2%
Gas	19.9%	16.5%	10.5%	-6.0%
Gasoline	7.5%	12.6%	10.5%	-2.2%
Aluminium	17.9%	13.7%	10.3%	-3.4%
Gold	16.9%	14.5%	2.7%	-11.8%
Diesel	7.6%	8.0%	0.5%	-7.5%
Average	20.5%	19.8%	13.3%	-6.4%
Steady gainers (intensity of use falling modestly but quantities still increasing)				
Lead	14.0%	9.3%	7.2%	-2.1%
Palladium	5.5%	6.7%	5.0%	-1.7%
Silver	10.3%	9.1%	4.9%	-4.2%
Crude	7.0%	5.8%	4.0%	-1.7%
Beef	-0.5%	1.1%	2.8%	1.7%
Coal	7.2%	7.0%	2.6%	-4.4%
Cotton	-1.7%	0.2%	-3.9%	-4.0%
Average	6.0%	5.6%	3.2%	-2.4%
Losers (intensity of use falling and quantities declining)				
Platinum	10.3%	4.4%	9.6%	5.1%
Copper	14.6%	7.3%	8.7%	1.4%
Jet	9.2%	6.1%	8.7%	2.6%
Zinc	10.7%	5.8%	7.3%	1.5%
Soyoil	6.2%	4.5%	6.2%	1.7%
Soybean	9.0%	5.0%	5.8%	0.9%
Corn	5.7%	3.8%	5.6%	1.7%
Steel	14.4%	7.6%	4.8%	-2.8%
Petchem	9.4%	5.8%	2.9%	-2.9%
Average	9.9%	5.6%	6.6%	1.0%
Big losers (intensity of use and quantities both falling fast)				
Soymeal	11.1%	5.0%	6.1%	1.1%
Resid	-5.6%	-2.3%	5.1%	7.4%
Sugar	4.2%	2.0%	4.8%	2.8%
Pork	1.8%	1.1%	2.5%	1.5%
Broiler Meat	4.7%	3.1%	2.4%	-0.6%
Rice	1.7%	0.5%	1.8%	1.3%
Wheat	2.2%	1.2%	0.0%	-1.2%
Average	2.9%	1.5%	3.3%	1.7%

Source: USDA, BP, Woodmac, WGC, CRU, NBS, Barclays Research

Above is a summary table of our 2012 forecast and actual results till 2014. They are grouped according to the definitions provided in our 2012 report.

## Forecast mostly played out, with a few surprises

Looking back at these forecasts, our view that China's commodity intensity would decline, except in the case of new energy and a few industrial metals, has played out. However, there were a few surprises.

### Precious metals and agriculture: consumers evolve

The usage intensity of precious metals (gold and platinum) and agricultural commodities are closely associated with income levels.



In 2012 we argued that China's food consumption would slow down, due to the already high quantity and quality of food consumption. Indeed agriculture commodities turned out to be at the bottom of the growth table, especially staple grains, as consumers started to substitute them with meats and fruits. Feed commodities such as soybeans and corn had better performance due to the industrialisation of meat production. Coffee was on top of the growth table, as expected. China started to move into an income level that supported a jump in coffee consumption, albeit from a very low base. One negative surprise was cotton. Cotton consumption dropped quicker than we expected. This is due to a rapid decline in cost competitiveness on the clothing export industry, similar to the experiences of Japan and Korea.

For precious metals, China's demand growth also became more gradual with maturing consumer demand. Gold and silver demand grew slower than expected; however, there was significant volatility in yearly consumption between 2013 and 2014 due to investment demand associated with significant price moves. Platinum demand surprised to the upside, partially due to the higher popularity of platinum jewellery compared with gold. Palladium demand came out within our expectation, closely linked to auto penetration and stricter pollution standards.

### **Industrial metals and energy: finer, cleaner**

For energy and industrial metals, the rate of GDP growth was not the only driver of usage. The structure of GDP growth also matters. In addition, government policies play an important role.

In 2012 we expected a slowdown in the growth rate of all industrial metals. This forecast was based on the fact that China had progressed quickly in an industrialisation catch-up, while the acceleration after 2008 was likely driven by the government's CNY4trn fiscal stimulus package. This forecast largely played out. However, there are more surprises to our forecast for energy, including the rapid slowdown in China's energy demand and the change in the country's fuel mix. China's energy demand growth rose to 10% pa from 2001 to 2005. The surge surprised the government which had planned for less than 3% annual energy demand growth. It also raised market expectations on China's future energy demand. Growth has since been slowing, and the speed of the slowdown in the past two years surprised many, including us. Energy intensity declined through both the rapid growth years (10% pa 2003-11) and slowdowns (7.7% pa in 2011-13).

The fuel mix has also changed surprisingly quickly with oil and coal demand growth rates slowing more than expected. The slower oil growth is largely associated with weakening diesel demand, which accounts for 35% of China's total oil consumption. The slowdown in coal demand growth has also been dramatic, due to both efficiency improvements and fuel substitution.

Meanwhile, power generation by cleaner fuels, including gas, renewables, nuclear and hydro, has risen dramatically. Renewable power generation has seen a rapid take-off this decade. Economies of scale and cost reductions have encouraged the installation of more wind turbines and solar panels. Gas demand has grown strongly, though by less than expected due to supply constraints and reforms that have raised domestic natural gas prices. Nuclear and hydro electricity generation has increased significantly, though again by less than we expected, reflecting the lumpiness in project developments. The fast growth of natural gas, nuclear and renewables raised their usage intensity relative to GDP, despite the overall decline in energy intensity, while that of hydropower has remained relatively flat.



## ECONOMICS

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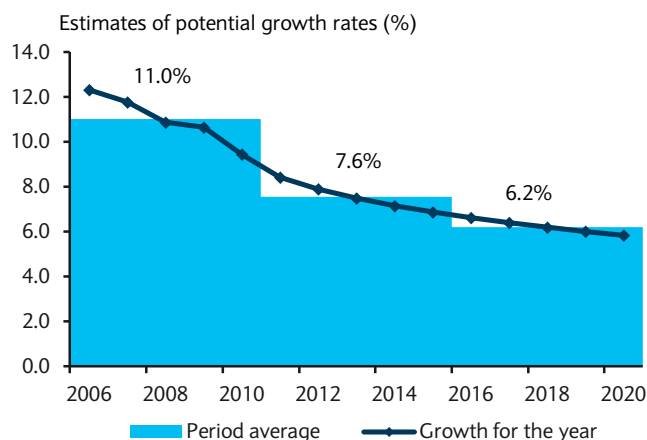
## Changing economic drivers of future commodity demand

After more than three decades of rapid economic growth, China has significantly narrowed its gaps in infrastructure, living space and living standards with medium-income emerging economies and has got most mileage out of its investment led industrial expansion. We think several trends are likely to characterise China's economic development in the next five years.

### Key assumptions of our demand forecast

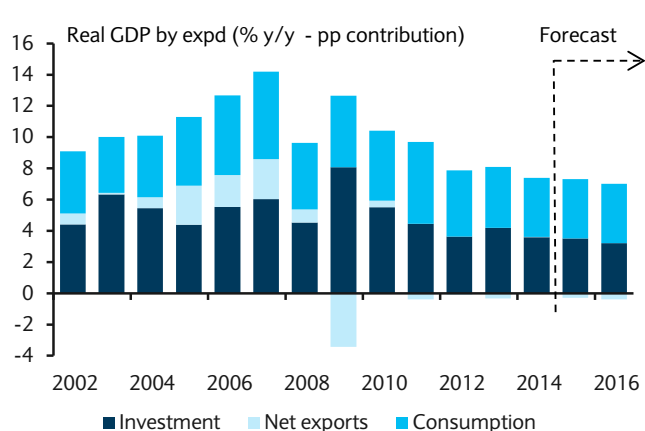
- Average GDP growth to slow from 7.8% pa 2011-15 to 6.2% pa on average for 2016-20 and c.6% by 2020.
- Income per capita on a PPP basis to rise from US\$11,868 in 2013 to US\$13,993 by 2015. By 2020, income per capita PPP is forecast to be around US\$20,000.
- FAI to slow from annual y/y growth rate of 15.7% in 2014-15 to c.10% by 2020.
- China's power industry investment to total RMB6.1trn in 2011-15, up 88.3% compared to the past five years, including a power generation investment of RMB3.2trn and a power grid investment of RMB2.9trn. Investment to continue in 2016-20 to facilitate the expansion of long-distance transmission networks necessary to "transport by wire" remote coal, hydro, wind and solar resources to urban load centres.
- Industrial production to slow from an average of 10.6 % pa in 2011-15 to c.7% by 2020.
- Auto sales to increase from an annual average of 20.8mn units annually in 2011-15 to c.35mn units per year by 2020.
- The urbanisation ratio to reach 60% by 2020 from the current 54%.
- Floor space of new buildings to increase from an annual average of 1.3bn sq m in 2007-11 to 1.9bn sq m in 2011-15.
- Manufacturing export growth to slow from an annual average of 10% pa in 2011-15 (6.0% in 2014) to 6% pa by 2020.

FIGURE 7  
China's potential growth is set to decline



Source: CEIC, Cai Fang et al (2013), Barclays Research

FIGURE 8  
The past decade saw a visible shift in the growth driver



Source: Haver, Barclays Research

### Economic growth slows further as per capita income rises

We think the rate of potential economic growth in China, currently at around 7%, will continue to slow towards 5-6% by the end of this decade, we predict. The three contributing factors to production and GDP growth – employment, capital stock accumulation and total factor productivity growth – will slow further, reflecting the demographic change brought about by a slow-down in the working-age population, decelerating investment growth to more sustainable levels, and moderate productivity growth as the economy moves from a manufacturing-based to a serviced-based economy. The Development Research Center of the State Council forecasts China's potential growth slowing to 6.4% in 2015-2019. Another leading think-tank, the Chinese Academy of Social Science (CASS, Cai Fang *et al* (2013))<sup>1</sup>, forecasts average potential GDP growth of 6.2% in 2016-2020.

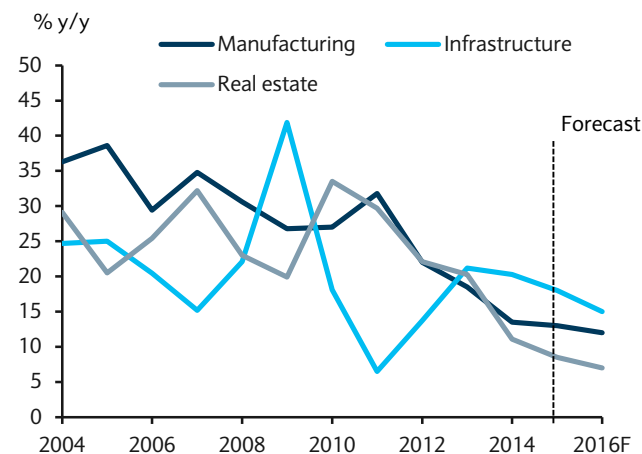
In a transformation of its growth model, the Chinese government appears to have accepted the idea that tolerating lower growth is necessary. It has refrained from big stimulus programmes despite a continued growth slowdown since 2011, and has only boosted infrastructure investment sporadically to ease downward pressures. The central bank has maintained a relatively hawkish bias over 2011-14, in our view, with the aim of adjusting the economic structure and to deleverage the economy in the medium term.<sup>2</sup> As a result, real GDP growth fell below the government's 7.5% target in 2014, the first time in a decade.

Moreover, since 2014 the Xi-Li government has even been promoting the concept of “new normal” – a shift “from high-speed growth to a medium-to-high one” and “from quantity and speed to quality and efficiency”. It has repeatedly said in the past year that the Chinese economy faces many deep-seated problems. It described the current stage as a “triple-transition period” characterised by “a shift to lower economic growth”, “painful structural adjustment” and the “digestion of the earlier large stimulus policy”. We think such rhetoric is meant to manage local government, market and public expectations in preparation for more difficult economic adjustments ahead.

Meanwhile, China's income per capita will continue to rise with the economy. Growth in household income should also benefit from the gradual shift in government policy, emphasising that the goal of economic growth is to lift people's living standards, rather than saving and investing more. Official data show that household real disposable income

FIGURE 9

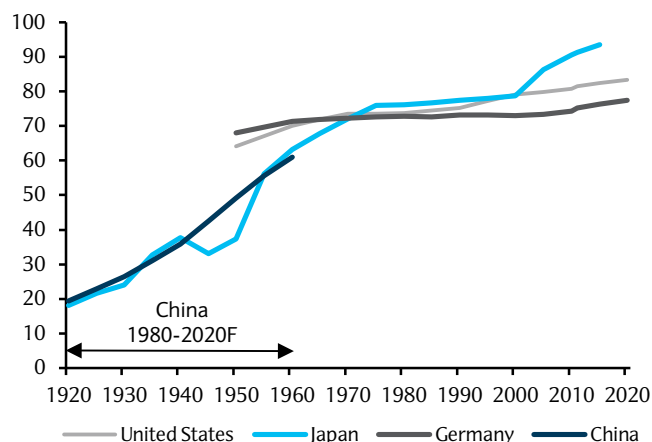
Fixed asset investment will slow further



Source: CEIC, Barclays Research

FIGURE 10

Urbanisation still has a long way to go



Source: United Nation, Barclays Research

<sup>1</sup> Cai Fang and Lu Yang, Population Change and Resulting Slowdown in Potential GDP Growth in China, *China & World Economy*, Vol. 21, No. 2, 2013

<sup>2</sup> See *China: Deflation risks fuel reluctant easing*, 10 Feb 2015

grew by 8% in 2014, exceeding GDP growth for a second year. It also outpaced growth in fiscal revenue and corporate profits.

### **Economy rebalances away from export and investment**

China's transition away from an export- and investment-led economy is gradually taking place. Export growth fell from the pre-crisis level of around 26% in 2007 to 6% in 2014 on slowing external demand and reduced export competitiveness. Fixed asset investment growth fell to around 15% in 2014 from the peak of 30% in 2009, when China implemented large investment stimulus in response to the global financial crisis. Consequently, GDP growth has fallen by half from the peak of 14.2% in 2007 to 7.4% in 2014, the lowest in two decades. With significant overcapacity in many sectors, we think investment will continue to play a diminishing role in the next 5-6 years. Nevertheless, China's urbanisation will continue to generate demand for infrastructure development, and infrastructure investment remains a focus area of the government's long-term development planning, as well as short-term demand management. China's capital stock on public infrastructure in per capita terms is only 38% that of Western Europe and 23% that of North America. And its rate of urbanisation is more than 20ppt lower than developed countries. This means there remains significant room to increase public goods and services as well as building and upgrading infrastructure. To some extent, this will serve to offset decelerating private investment.

### **Consumption rises supported by higher income and urbanisation**

Consumption growth has been more stable, and we think rising consumption is a long-term secular trend supported by economic fundamentals and government policies. The contribution of consumption to GDP has been low in China, a consequence of the country's export and investment-oriented growth model. The trend has reversed with a modest pickup since 2011, according to official statistics. For the first time in eight years (Figure 10), total consumption to GDP has risen above 50%; in 2014 it contributed 51.2% to real GDP growth. Household income, the dominant driver of consumption, has grown rapidly. Developments in other key determinants of consumption<sup>3</sup>, including appreciation in the real effective exchange rates, the rising share of service sector employment, an increasing old age-dependency ratio, financial sector development, and rising real interest rates, have contributed to the resilient consumption growth in recent years. Looking ahead, we expect robust wage growth, given a slowdown in the number of new entrants to the labour market<sup>4</sup>. China's population aging is an irreversible trend that is becoming widespread. Structural reforms, including improving income distribution, continued financial liberalisation, and deregulation of the service sectors, all support a positive picture for consumption growth.

The growing number of urbanites with higher-than-average incomes will lead to increased consumption of goods, services and energy, the basics of modern life. One should expect healthy growth in demand for automobiles, appliances, electronics and home furnishings. Currently, car ownership in China averages 89 units per 1,000 people. The consensus is that the number will continue to grow to somewhere between 300 and 400 at least over the next 20 years, although it will probably never reach the US level of 800 units (Figure 12).

### **Exports are likely to upgrade as growth slows**

While export growth is slowing, the upgrade of the export sector from labour-intensive consumer merchandise to energy and metal intensive machinery and equipment seems to be on the rise. Chinese trade data already show early signs of this change. The trend

<sup>3</sup> Kai Guo and Papa N'Diaye, 2010, "Determinants of China's private consumption: An international perspective", IMF Working Paper WP/10/93, Washington DC.

<sup>4</sup> China: The consequences of demographic change, April 2012

may accelerate in the future on three grounds: economy of scale and competitive advantage in manufacturing; rising outward foreign direct investment and EPC contracts; and the government's support of exporting heavy industrial products to alleviate domestic overcapacity (see *China: New Silk Road, new opportunity*, 14 November 2014). If it materialises, this may help offset some of the declining demand for industrial metals and energy.

### Property market is experiencing a correction in the short run

We expect the correction in the housing market, ongoing since 2014, to continue into 2015-16, with property investment slowing towards 5-8% from 11% in 2014 and 26% in 2009-13. While demand in the 'first-tier' cities will remain robust, significant inventories in the 'lower-tier' cities will weigh on prices and investment. According to SouFun, inventory levels in the first-tier cities of Beijing, Shanghai, Shenzhen and Guangzhou had fallen to the equivalent of 12.5 months in December 2014. For lower-tier cities, the ratios are much higher, ranging from 22 months in Tier-2 cities and close to 50 months in Tier-3 and Tier 4 cities as of November.

Where the housing market is headed post 2016 remains uncertain. At present, the official data from National Bureau of Statistics put China's per capita urban floor space at about 33 sq m already on a par with more advanced countries in Western Europe and Korea. However, researchers at the Chinese Academy of Social Sciences (CASS) claim this statistic is based on a biased survey sample.<sup>5</sup> Using CASS's methodology, we calculate that the per capita urban floor space is actually c.23 sq m, or three quarters the Korean level (Figure 13). Also, by China's reckoning the average age of housing stock is only 30 years due to the poor quality of construction. This suggests that there is still some room for housing development post 2016, though the growth will be slow and mostly in first- and second-tier cities.

### Heavy industrialisation wanes as the service sector rises

China's heavy industrialisation was surprisingly intense because of the unique factors associated with Chinese economic reform. As large swathes of investment, infrastructure build-out and housing construction have passed their prime, heavy industrialisation is also on the wane and faster than many economists expect. Industry (45.0%) was surpassed by services (45.5%) as the largest contributor to GDP for the first time in 2012, and the sector

FIGURE 11  
Consumption share in GDP likely bottomed

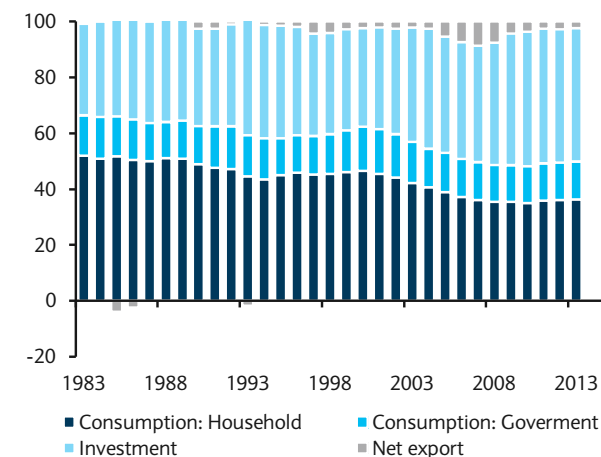
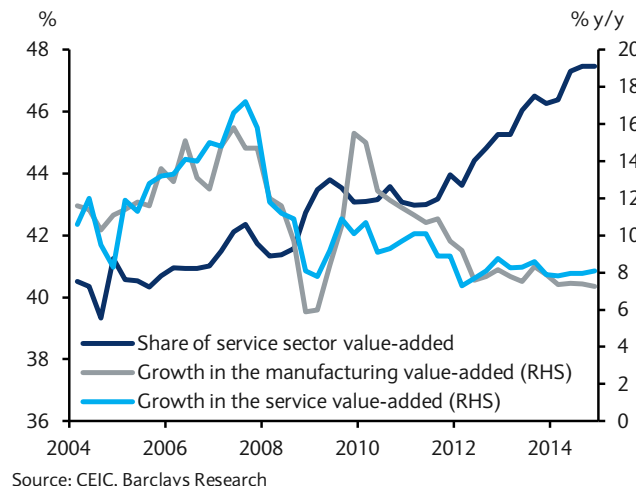


FIGURE 12  
Service sector value-added in GDP has been rising



<sup>5</sup> Yanqun Zhang, 2015, "Estimation on the relative bubble of housing price and per capita housing area in 24 big and medium cities of China", *Western Forum*, Vol. 25, No. 1, pp. 60-65.

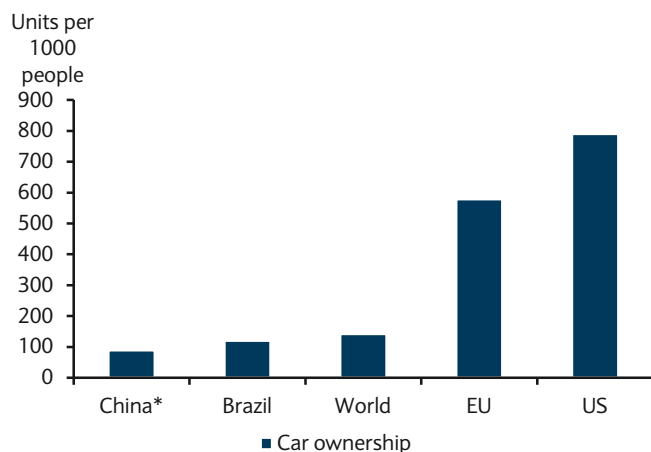
has since increased to 48.2%, with industry shrinking to 42.6%. The decline of industry to GDP is expected to continue in the next five years.

### Environmental concerns shape policies

China's rapid economic growth has been accompanied by environmental degradation. Energy and environmental policies have been in place since the 1990s to encourage energy conservation, coal diversification and environmental friendly development. The effort has led to the reduction of energy intensity by 19% in 2005-2010, and an additional 16% reduction is expected by 2015. The policy has also been a significant factor behind the increase in natural gas and non-fossil fuels. Nevertheless, economic growth has assumed more importance and environmental pollution has continued to worsen.

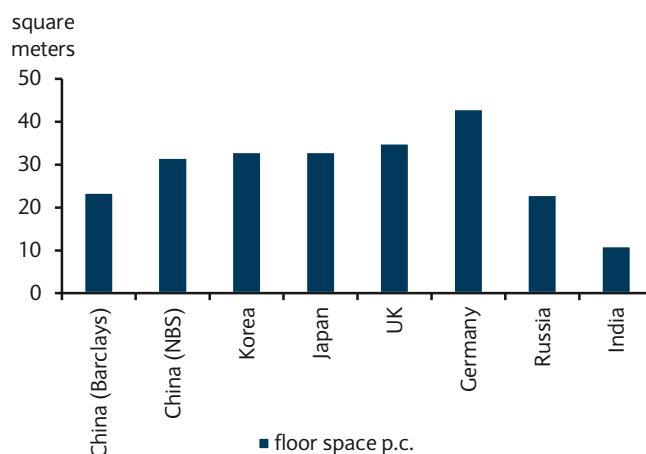
After years of rapid economic growth at the expense of the environment, we think China has in fact reached an inflection point. Consumers have increasingly cried for better air quality since 2011 when Gary Lock, the US ambassador to Beijing, made aware the harmful air pollutant (PM2.5) people inhale everyday by publishing the daily PM2.5 number from air quality readings surrounding the US embassy in Beijing. Consumer preference will drive policies in the coming years to make environmental protection a binding constraint on economic growth.

FIGURE 13  
Gap to bridge in automobiles



Source: NBS, Barclays Research

FIGURE 14  
Room for housing growth



Source: NBS, Barclays Research

## PRECIOUS METALS

Our underlying economics assumptions paint a healthy picture for precious metals consumption. Although y/y percentage growth rates are likely to slow, volume growth for 2014-2020 would be similar to that for 2008-2014 due to a higher base. As a result, we expect China to play an even bigger role in the global market for precious metals in the coming years. In addition to macro economic factors, precious metals consumption is also exposed to policy changes. A possible upside surprise for gold would be if the central bank openly reported additional purchases, while a downside surprise would be if the financial markets were opened up, driving demand for alternative assets.

FIGURE 15

History and forecasts of China consumption average annual growth rate and volume

Commodity	Unit	Average Growth Rate		Average Growth Amount	
		2008-14	2014-20	2008-14	2014-20
Gold	MT	14.0%	7.5%	87	87
Palladium	1000 Oz	7.0%	5.2%	122	128
Silver	MT	6.0%	4.6%	285	299
Platinum	1000 Oz	10.8%	2.9%	199	80

Source: CRU, VM Group, Johnson Matthey, Barclays Research

### Gold – not losing its shine yet

Gold demand in China has come under much scrutiny recently, given its extraordinary rise and the record it set in 2013, making up over a quarter of global gold consumption. Fabrication demand plus physical gold bar investment rose by 41% y/y to over 1,300 tonnes in 2013. Given that the increase was driven by the sharp decline in prices rather than a change in underlying dynamics, demand moderated in 2014, but was modestly firmer than in 2012.

While China's demand statistics are not fully reported, a market that appeared to be severely undersupplied by domestic mine output and scrap supply appears to be drawing in excess metal. China's reported supply data underscore a country-level deficit and its need to import gold just to be able to meet its jewellery demand. But implied trade shipments and data from the Shanghai Gold Exchange suggest inflows into the country far exceed reported demand materialising from fabrication (including jewellery, electronics, dentistry, official coins and other industrial) as well as physical bar investment. The World Gold Council (WGC) in its report last year, *Understanding China's gold market*, estimated 50% of supply came from net imports through Hong Kong and mainland China over the five years spanning 2009-2013. Demand from the jewellery sector, industrial consumption and physical investment (bar and coin) was just under 4.5kt over the same period and the WGC estimates just over 1kt of additional demand not captured under fabrication or investment demand stemmed from stocks held by jewellery fabricators (75-125 tonnes), those on banks' balance sheets (400-600 tonnes) and purchases by the central bank potentially in excess of 500 tonnes, ie, 20% of demand has not been captured over the past five years in the reported data.

Given the nature and lack availability of data driving metal held by the jewellery, banking and official sectors, here we focus on the fabrication and investment demand which is linked to our macroeconomic assumptions.

A number of factors gold consumption has benefited from – in jewellery and investment form – will remain intact, in our view. For the purpose of our analysis we assume the financial market in China remains relatively closed, limiting the options of alternative

investment and savings products open to the domestic market. Gold benefitted from the market being opened up to private investment in 2004, and China continues to support development of its gold market promoting personal consumption of the metal, a trend we assume will continue. First and foremost we assume real income will continue to rise, and gold's appeal as a hedge against inflation and lower interest rates will persist. The rate of urbanisation is set to continue at a similar pace to the past few years, leading to a larger population with greater spending power and rising household disposable income. This is supported by the government's pro-gold stance and the shift from an investment led economy to greater growth in private consumption. We assume the savings rates which reached over 42% in 2010 continue to ease, albeit modestly, with gold being one of the beneficiaries.

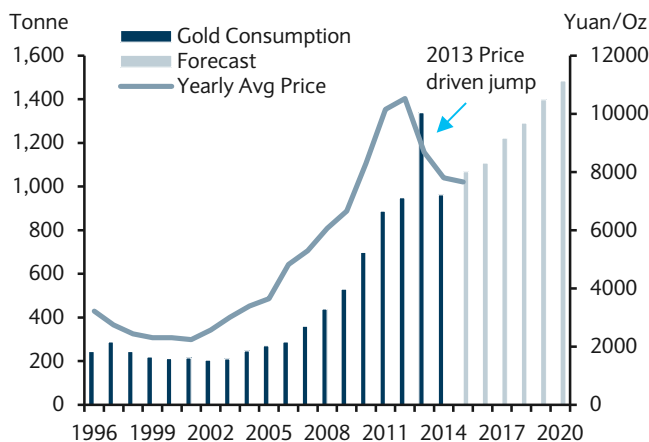
Gold buying in China has proved to be price sensitive, as 2013 underscored, although we believe price risks are skewed to the downside in 2015 in light of a potential rate hike in the US. We believe longer term, this year and next are likely to offer sound buying opportunities with prices approaching their nadir. It is not our base case that we will see triple-digit gold prices, but in turn we are not likely to see a repeat of 2013's buying frenzy. Instead we believe prices are likely to trend higher, and firmer prices are likely to moderate the tonnage consumed but the value of purchases is likely to rise. This leads to demand recovering to the 2013 peak within our forecast period, topping 2013 and surpassing the current peak by some 150 tonnes by 2020. We expect gold demand to grow by 7% on average over the next five years compared to 12% on average in the past five years and 25% in the five-year period before that.

Similarly to India, the Chinese market has revealed its preference for physical gold consumption as opposed to paper-backed product following the subdued offtake of the gold ETFs. In turn the bulk of demand is likely to remain in jewellery form. A moderation in income per capita growth means the incremental demand is likely to stem from how successful the government is in steering the economy to consumption led growth and whether alternative products are launched. Another risk is that, despite higher disposable income, savings rates stagnate or rise amid higher interest rates while inflation and inflation expectations are tamed. It is also worth noting the corruption clampdown is also likely to have dampened demand in 2014, the effects of which are likely to be felt going forward.

Aside from jewellery, silver industrial demand in China has slowed. This is largely a result of the slowdown in shipments of photovoltaic cells (PV) partly due to the slowdown in

FIGURE 16

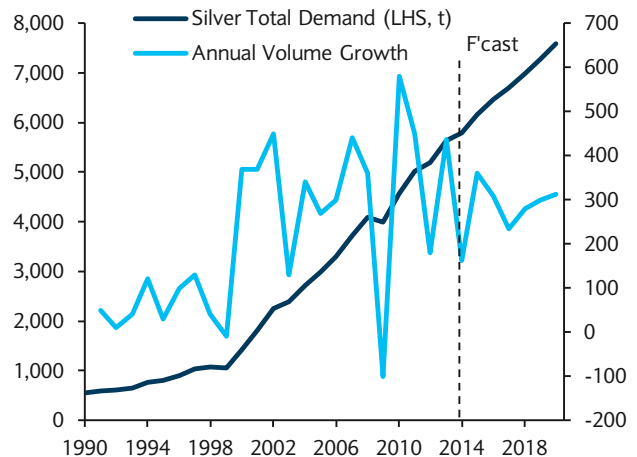
**Gold consumptions set to continue, driven by rising income; however, prices may add volatility in demand as in 2013**



Source: Bloomberg, Barclays Research

FIGURE 17

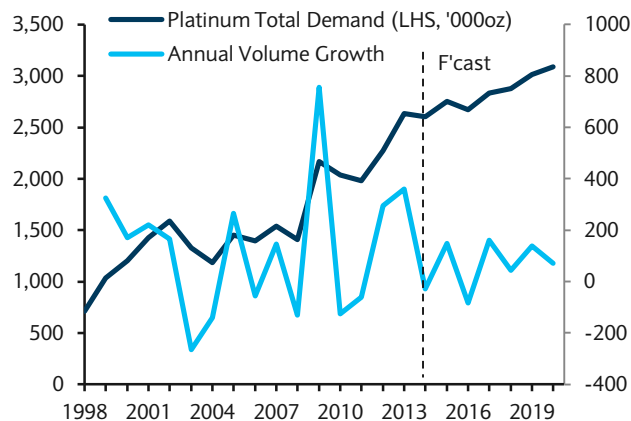
**Silver will keep growing, although at lower speed**



Source: Barclays Research

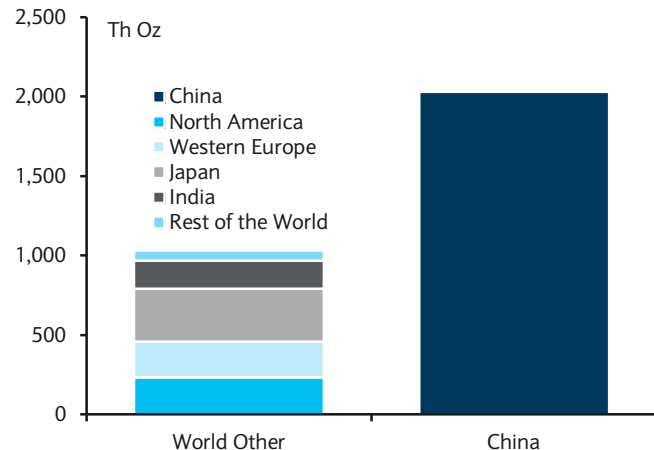


FIGURE 18

**Platinum consumption growth set to slow**

Source: Barclays Research

FIGURE 19

**China already dominating platinum jewellery demand**

Source: WPIIC, Barclays Research

European consumption. Given we forecast IP to slow from 10.6% to around 7% by 2020, and higher silver prices in the past five years have triggered a round of thrifting and substitution, industrial consumption of silver is set to slow, but still grow y/y.

On the upside, there are a number of factors that could drive gold consumption beyond our forecast, such as unannounced purchases by the central bank. Amid the gold traffic moving from west to east, China could establish itself successfully as the central trading hub in the east, leading to additional flows of metal in terms of exchange warehouse stocks, investment products, and as a physical hub. We forecast China's consumption per capita to continue to grow, but while 2013 will have prematurely boosted this measure, consumption per capita was relatively flat compared to 2012 and below India and most of its neighbours. It is worth noting that if China establishes itself as a trading hub it could rival warehouse stock measures seen in Hong Kong and Singapore.

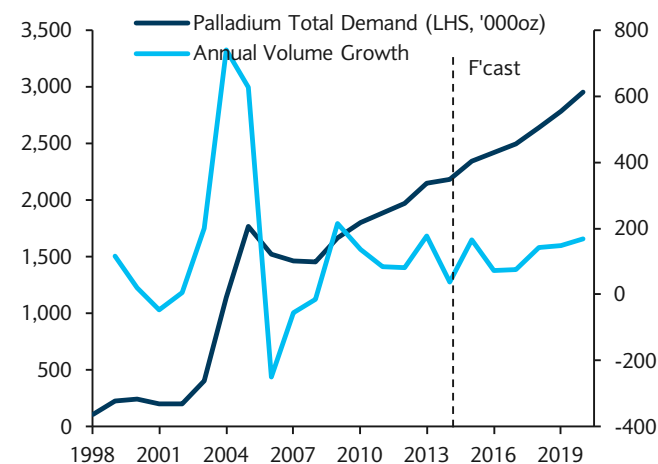
WGC noted that in value terms the Chinese consumer preferred gold jewellery, although by weight there is greater expenditure on silver. China's silver and platinum jewellery consumption is likely to benefit from similar trends in gold, but gold has a dual appeal and is also regarded as an investment. China's younger generation covets platinum jewellery over gold, suggesting there is healthy growth potential, but at the same time additional sensitivity on price. Fabricators have stocked up on platinum when its price has traded at a discount to gold and they have been able to market it at a smaller premium to gold pieces. China is the world's largest market for platinum representing almost a third of global consumption and net jewellery consumption makes up almost 60% of its consumption. Similar to gold, it is likely that platinum's softening in demand in 2014 was in part linked to the price volatility as well as the anti-corruption clampdown seeing a decline in luxury goods. Furthermore, it is likely that lower platinum prices mean that the market has restocked significantly as trade data imply, in turn leading to unsold inventory. We expect platinum fabrication demand to grow by 3% on average over the next five years compared to growth of 7% over the past five years.

## PGM – focus on auto consumption

China has overtaken the US as the largest auto market and like the US it is predominantly a gasoline market; however, vehicle size is much smaller and perhaps more importantly palladium loadings are much lighter. China lags behind in terms of emission standards and less stringent standards nationwide but the government is clamping down. While vehicle

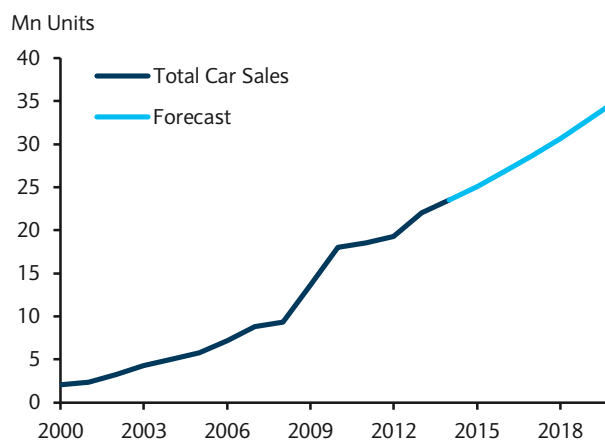
sales have grown by 6.9% on average over the past four years, auto-catalyst palladium consumption has risen by 12% on average. We expect palladium loadings to continue to rise, driven by China's desire to improve air quality by 2017 and its pact to limit green house gas emissions by 2030. There is a risk that car sales could be curbed, but in order to improve air quality older cars will need to be replaced. We estimate palladium recovered from scrapped auto-catalysts could exceed 100koz by 2020 but incremental palladium demand will average around 100koz per annum. China is a gasoline biased market and is forecast to remain so, but it has rolled out China V standards (the equivalent of Euro V standards) in Shanghai and Beijing for diesel vehicles, in turn supporting an increase in average platinum loadings. China VI standards are due to be implemented before 2020. Concerns over pollution raise the question whether alternative fuel vehicles will take off in China. Our auto analysts note that China is yet to introduce an official fuel cell vehicle in its domestic market, but companies have made initially investments with production slated in 3-5 years. Central and local government subsidies are available for pure electric passenger vehicles and plug-in hybrids.

FIGURE 20

**Palladium consumption set to maintain momentum**

Source: Barclays Research

FIGURE 21

**As total car sales are expected to keep growing**

Source: Barclays Research

## INDUSTRIAL METALS

The era of double-digit metals growth is now over, as China's maturing economy re-orientes investment away from metal-intensive industries and fixed-asset growth to the service sector and domestic consumption. Nonetheless, within the 2014-2020 forecast period, we expect metal consumption to continue to grow, although at a much slower pace. The slowdown will not affect all metals equally as some metals are more oriented to consumer products. We anticipate lead and copper to show the most resilience to the slowdown, with aluminium and nickel the most affected.

FIGURE 22

History and forecasts of China consumption average annual growth rate and volume

Commodity	Unit	Average Growth Rate		Average Growth Amount	
		2008-14	2014-20	2008-14	2014-20
Nickel	1000 MT	21.8%	7.3%	113	86
Steel	1000 MT	8.7%	3.8%	48573	30545
Lead	1000 MT	9.8%	3.0%	384	173
Aluminium	1000 MT	13.0%	2.5%	2258	681
Copper	1000 MT	11.8%	2.4%	814	258
Zinc	1000 MT	9.4%	2.4%	449	164
Tin	1000 MT	2.0%	-2.7%	3	-4

Note: Adjustments to the modeled results have been made for aluminum, copper, and steel demand to account for changes in automotive parts sourcing. Explanations are presented in the following section. Source: Woodmac, CRU, Barclays Research

### At a crossroads

The story of China's dramatic economic rise is first and foremost a story about a rapacious hunger for metals. China, in one generation, built a modern system of infrastructure and engaged in a vast and aggressive plan of industrialisation, requiring massive amounts of base and bulk metals. Both the size and speed of China's growth in metals consumption upended what was once a static market, as producers scrambled to find new sources of raw materials and ores to supply the awakening dragon. Consider the fact that in 1995, China accounted for a mere 9% of global metals consumption. In a space of 10 years, as both China's relative share and the absolute size of the global metals market grew, China climbed to account for a quarter of all metals consumption. Over the past decade, this dominance has accelerated. China now accounts for nearly 50% of global metal consumption, consuming around 54% of global copper production, just over 50% of global aluminium production, and nearly 50% of the world's steel market.

However, all good things must come to an end, and we can confidently predict that the era of China's double-digit growth in metals consumption is now over. As the Chinese economy shifts in focus away from fixed-asset growth and towards domestic consumption, we expect growth in metals demand to begin to level off by 2020. That said, China will still require in absolute terms massive quantities of metals to fuel its domestically oriented economy.

In a new era of a more slowly growing Chinese economy, it is not the case that each particular metal will be affected in the same way. Some metals, such as lead, may prove resilient due to their usage in consumption oriented sectors. To assess the changes to the outlook for individual metals, we have constructed a forecasting model that incorporates the data and insights of our China economics team with our past research in the metals sector. We modelled China's metal consumption as a function of the outlook for fixed-asset

investment, floor space of new buildings started, and passenger car sales. We expect slowing growth in fixed-asset investment (to the order of 10% by 2020) and floor space of new buildings started. In contrast, passenger car sales and car sales overall are expected to continue to display strong growth, with the Chinese automotive sector expected to total some 220mn vehicles by 2020.

Average consumption totals for all of our metals, except tin, are expected to be higher over the 2015-2020 period. Yet this fact does not tell the whole story, as by 2020 we expect demand growth for every metal to be in the single digits, except tin which is expected to post continued declines. We make three adjustments to our initial modelled results in aluminium, copper, and steel to account for fundamental changes in the automobile industry. By 2020, consumption growth in tonnage terms begins to approach a plateau for most metals. In other words, while China's consumption of metals will be higher over 2015-2020, this period is nearing the peak for China's metal demand.

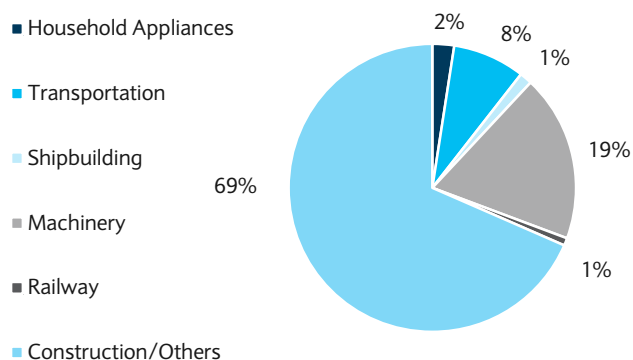
### Steel

China's rapid industrialisation required dramatically large quantities of steel consumption. To this end, the country majorly invested in expanding steel capacity and production with the result that by the close of 2014, China accounted for just under 50% of global steel production. Despite massive domestic demand, China still has enough capacity to export globally. Initially, this steel production was used to build China's new cities, factories, and infrastructure, with total construction accounting for 69% of downstream steel usage in 2013. As the Chinese economy matures and re-orientes its growth, we expect the importance of the construction industry to decline as consumer oriented sectors like transportation pick up the slack.

For this reason, a slowing Chinese economy will not necessarily translate into a decline in net primary steel consumption. We expect China's domestic automobile sector to post strong growth on the back of rising domestic demand, supplementing declining steel demand from the infrastructure and construction sectors. Moreover, China has the potential to expand market share in direct steel exports or leverage its dominance by expanding steel-intensive product exports such as ships. The transportation and shipbuilding sectors have a combined market share of 9% of Chinese steel consumption, suggesting that there is potential room for both absolute and relative growth.

We forecast that Chinese steel consumption will grow by 4% over the 2015-2020 period. Note that this is a revision downwards from our initial model results of 5% average growth.

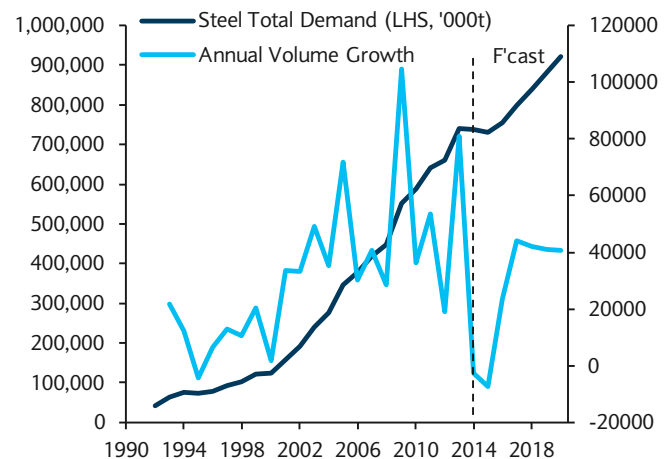
FIGURE 23  
China's downstream steel demand by sector, 2013



Source: Bloomberg, Barclays Research

19 March 2015

FIGURE 24  
A growing automobile sector makes up for slowing construction and fixed-asset sector growth



Source: CISA, Barclays Research

The reason for this negative revision is that we believe lightweight materials, such as aluminium and carbon fibre, will constitute an increasing share of automobile body weight. This growth will come at the expense of traditional steel components. Thus, while we predict rising steel consumption stemming from growing automobile production, we do account for the fact that as a relative share of vehicle inputs, steel is declining.

### Aluminium

Aluminium has widespread uses throughout the economy and is equally important to both the industrial and consumer sectors. On the industrial side, aluminium is heavily used in electrical power transmission, machinery and equipment, and construction. Housing, in particular, makes heavy use of the lightweight material as a substitute for steel and wood in doors, windows and siding. On the consumer side, aluminium is used in a variety of retail products, including cans, packaging, air conditioners, furniture and vehicles.

China's economy remains very aluminium intensive relative to its peers and is expected to remain so for the foreseeable future. We expect Chinese aluminium consumption to remain high but like steel shifting to different downstream usages. As aluminium consumption in infrastructure and housing construction slows, the downstream mix should shift towards consumer oriented goods such as soft drink cans and household appliances.

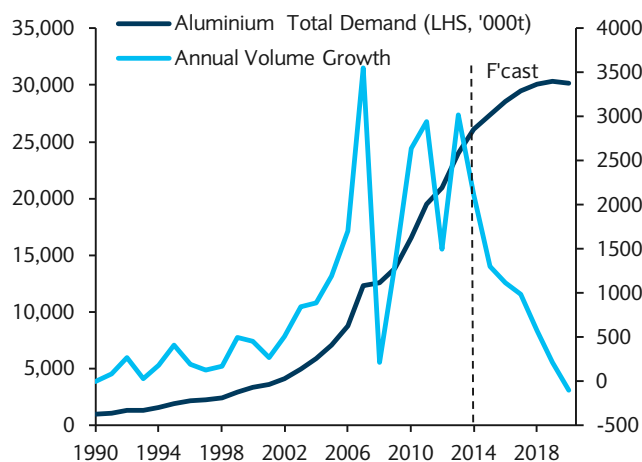
In addition, there is major transformation underway in the automotive industry, which is positive for aluminium consumption and has led us to revise our initial modelled results upwards. We expect the automotive sector in China and the world to use more aluminium in the production of passenger and commercial vehicles. Previously, welding issues prevented a successful combination of a steel frame with aluminium components. However, regulatory pressures for lighter and more fuel-efficient cars have driven automakers and aluminium producers to invest in newer adhesive technology. As a result, over the past five years considerable progress has been made in aluminium-intensive vehicle production. As this trend continues, the aluminium component of car production should continue to rise, further supplementing declining demand from building usage.

### Copper

Copper's widespread uses make it a fundamental metal in industrialisation. Like aluminium, it is used in both the consumer and industrial sectors of the economy. China's principal usage of copper has taken two forms: investment in power transmission capacity and real estate

FIGURE 25

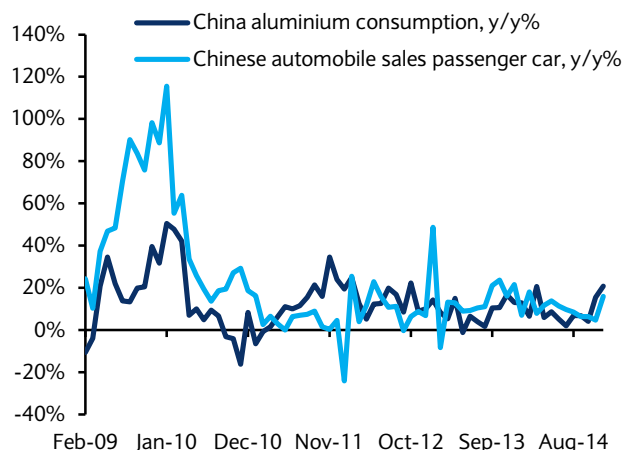
China's aluminum consumption is set to peak...



Source: Barclays Research

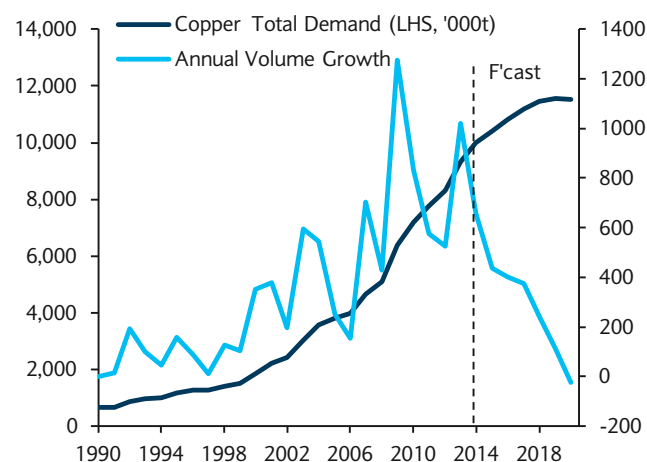
FIGURE 26

... but a shift to lightweight materials in vehicle production could provide upside potential



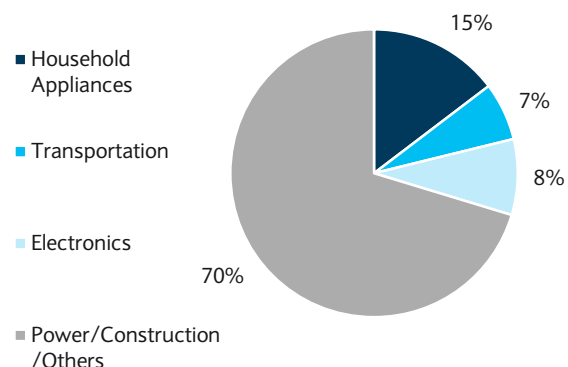
Source: National Bureau of Statistics of China, Barclays Research

FIGURE 27

**Copper consumption is set to slow**

Source: Wood Mackenzie, Barclays Research

FIGURE 28

**China's downstream copper demand by sector, 2013**

Source: Bloomberg, Barclays Research

construction. Copper has the highest level of conductivity out of the base metals and is used extensively in power transmission, particularly in smart grids and other technology-intensive power transmission systems. Copper is also extensively used in infrastructure and housing investment in the form of pipe, electrical wire and building materials (decorative roofs, for example).

In our last report, the outlook for copper was bullish as China's announced investments in its state electrical grid, including the investment of Rmb500bn in 2012, would require large amounts of copper. Now, however, the low-hanging fruit of infrastructure development has been picked and thus we expect a slowdown in the growth of copper consumption. Despite newer announcements of increased grid capacity spending and smarter grid investment, China's electricity consumption growth has slowed, raising the question of whether more capacity is really required. Moreover, our anticipated slowdown in the housing sector will weigh heavily on copper consumption.

Weighing against these headwinds is copper's relatively low intensity of use in the Chinese economy. Copper is intensely used in household appliances, vehicles and electronics. As China moves towards increased domestic consumption, we expect these types of goods to benefit from rising pressures to spend. A wealthier, consumer oriented China is a China that will buy more televisions, cars, kitchen appliances, computers and cell phones, all of which require copper.

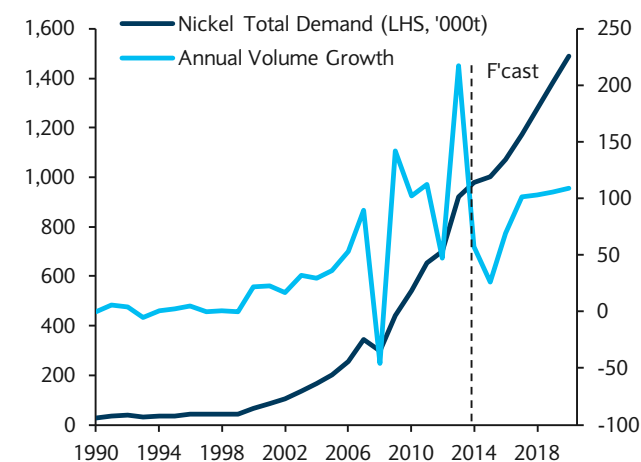
Weighing these two factors, we adjust copper consumption growth upwards to average 3.25% over the 2015-2020 outlook. This translates into 12mn tonnes of copper consumed in 2020, some 2.1mn tonnes higher than 2014 levels.

**Nickel**

China's appetite for nickel is driven by stainless steel production. According to industry estimates, around 83% of nickel consumed in China for 2014 was used in stainless steel production. Therefore, an understanding of the future of stainless steel consumption in China is a requirement to understanding the future nickel market. As a high-value, premium product, stainless steel consumption should grow in both absolute and relative terms. Even if Chinese steel production were to peak, we are still bullish on stainless steel, and thus nickel, consumption.

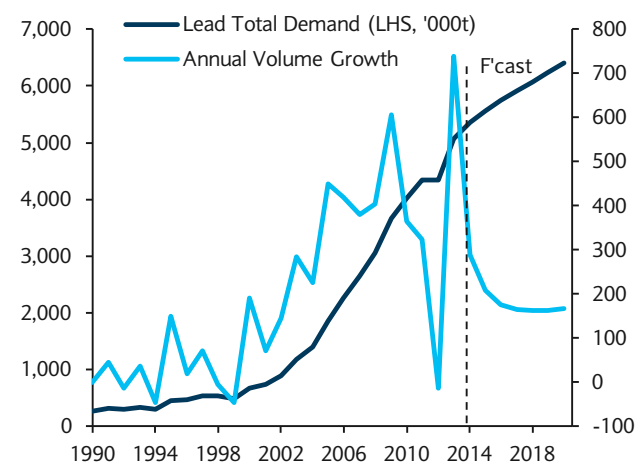
The reason for this is stainless steel's corrosion-resistant properties and usage in consumer products, such as dentistry, cookware and appliances. Assuming a consumer oriented

FIGURE 29

**Nickel consumption continues to rise**

Source: Barclays Research

FIGURE 30

**Lead benefits from a growing automobile sector**

Source: Barclays Research

economy and a relatively declining industrial sector, we still expect stainless steel production to grow in market share, which will support nickel demand. Our view is supported by a review of the Chinese steel sector and investment. Several new stainless steel projects are expected to come online in 2017-2018, boosting nickel demand. We expect nickel consumption to grow 7.3% annually from 2014 to 2020. This is higher than the forecasted growth rate of steel at 3.8%, reflecting the view that stainless steel will gain market share within the steel complex and bring China's nickel consumption relative to steel production more in line with US and European countries.

**Lead**

Despite a recent temporary downturn in consumption, Chinese lead consumption is expected to rise over the forecast period. Lead has a variety of uses throughout the economy and is used in both high- and low-end manufacturing. Lead bricks, for example, are used in radiation shielding, while lead alloys are used to protect against machine wear and tear.

Lead is also heavily used in car batteries. Rising electric car sales and production are the main drivers behind our forecast for Chinese lead consumption to grow at 3% per year over 2014-2020. We believe that the Chinese economy will use less lead in areas such as construction and infrastructure development. This declining usage will be supplemented by lead's role in car batteries, which will be needed to grow China's car fleet. Of all the metals, lead experiences the weakest slowdown in demand growth. In other words, lead proves the most resilient to the slowdown in the Chinese economy. Lead grew at an averaged yearly rate of 8% over 2010-2014, and we expect that rate to moderate to 4% over 2015-2020. By 2020, the Chinese economy will consume around 6,800 kt of lead, from 5,360 kt in 2014.

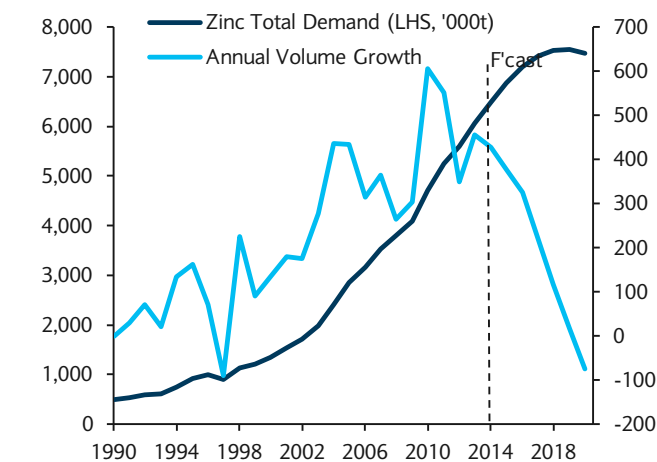
**Zinc**

Zinc's primary usage in the industrial economy is via galvanised steel. Galvanised steel is heavily employed in infrastructure and building construction. With China's fixed asset demand and new residential floor space under construction both slowing, we expect zinc consumption to approach peak absolute consumption levels. Despite demand growing by 10% over the last five years, growth over the 2015-2020 period is expected to average 4%. This number seems less extreme in context, given that zinc consumption growth totalled 7% in 2014. Nonetheless, we stress the point that an era of slower zinc growth



FIGURE 31

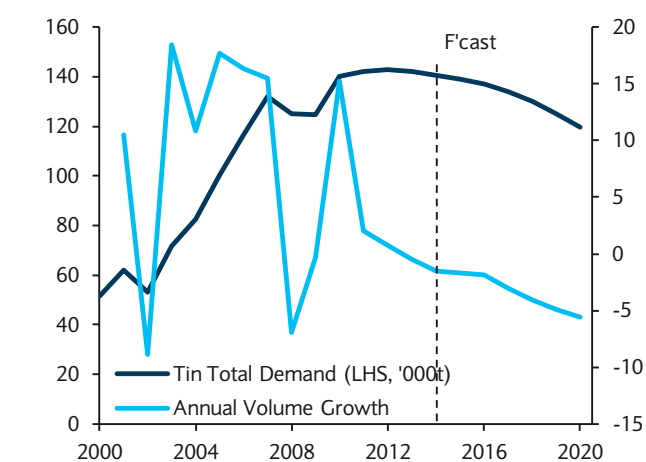
**Zinc consumption will level off as the construction sector slows**



Source: Barclays Research

FIGURE 32

**Tin consumption has peaked over the last five years and is expected to continue to modestly decline**



Source: Barclays Research

rates will still translate into a large increase in total amount consumed. We expect China to consume 8,168 kt of zinc in 2020, a 26% increase from the 6,490 kt consumed in 2014.

### Tin

Tin's importance as an industrial metal declined over the 20<sup>th</sup> century, as cheaper and better alternatives were developed. China is the world's largest producer of tin and uses the material to solder pipes and electronic materials, though even this usage has declined as a result of new environmental regulations. Tin is also used in canning and food preservation, as well as the chemical industry. We expect tin usage to continue to decline in line with historical trends.

## ENERGY

Our underlying economic and policy assumptions imply a continued slowdown in energy demand and a fall in energy intensity. However, we expect further electrification of the Chinese economy, coupled with a policy focus on shifting the electricity generation mix towards cleaner sources, including nuclear, natural gas and renewables. As a result, we expect strong growth in these clean energy sectors despite the drop in primary energy intensity. In addition, the higher income is likely to benefit consumer transportation related energy commodities such as jet fuel and gasoline.

FIGURE 33

History and forecasts of China consumption average annual growth rate and volume

Commodity	Unit	Average Growth Rate		Average Growth Amount	
		2008-14	2014-20	2008-14	2014-20
Nuclear	mb/d oe	11.7%	18.7%	0.05	0.18
Renewables	mb/d oe	55.6%	15.4%	0.16	0.23
Gas	mb/d oe	13.8%	11.6%	0.29	0.50
Jet	kb/d	10.3%	9.8%	37	62
Gasoline	kb/d	8.1%	7.6%	147	218
All primary energy	mb/d oe	5.9%	3.4%	2.77	2.09
Crude	kb/d	5.0%	3.0%	419	324
Coal	mb/d oe	4.7%	2.1%	1.50	0.81
Diesel	kb/d	3.4%	1.2%	105	43
Hydro	mb/d oe	10.5%	0.9%	0.36	0.05
Petchem	kb/d	4.6%	0.2%	114	6
Resid	kb/d	2.2%	-0.7%	15	-5

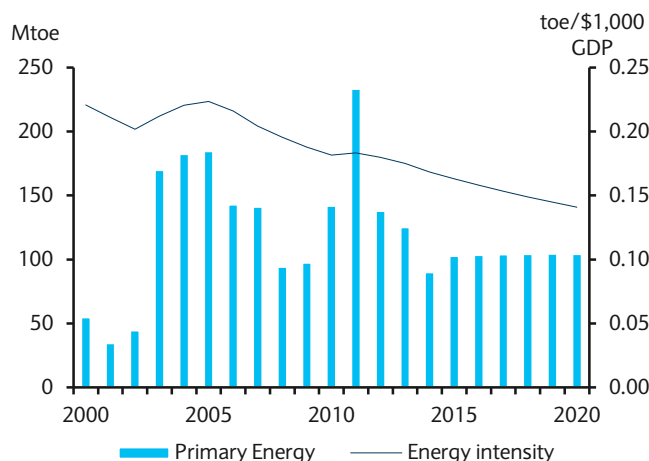
Source: BP, NBS, Barclays Research

## Primary energy demand

China has been trying to set total energy consumption caps in recent years as a means of controlling consumption. An official cap of 3360mtoe (4.8bn tons of standard coal) total

FIGURE 34

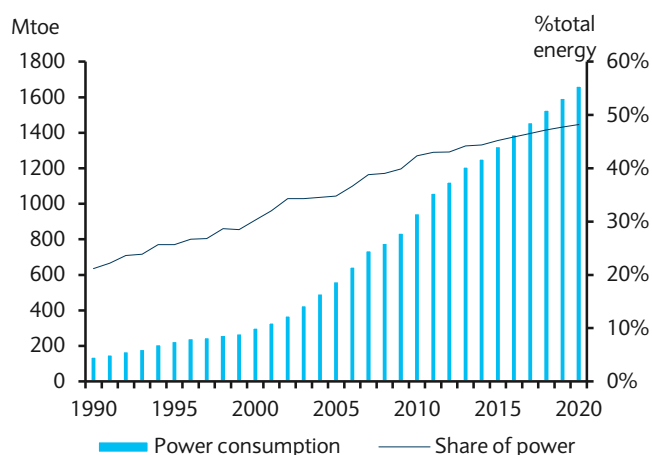
Intensity of primary energy set to decline...



Source: BP, Barclays Research

FIGURE 35

... with electricity taking a growing share of energy consumption



Source: BP, Barclays Research

energy consumption is set for 2020 in the “Energy development strategy action plan 2014-2020” published in November 2014. The cap implies that the government expects energy demand to grow by about 3% pa in 2014-2020 on the basis of estimated 2014 demand. It is likely that the cap or a slightly adjusted number will be adopted by the 13th FYP (2016-2020) to be released sometime next year.

We project China's energy demand to grow by 22.1% (3.4% pa) in 2014-20 based on our assessment of the country's economic dynamics, a step down from 41.3% (5.9% pa) in the past few years. Total energy demand increases by 624mtoe to reach 3453mtoe. Our projection takes into account the surprisingly fast slowdown in energy demand in the last few years. The key factor is the efficiency improvement of coal use in heavy industrial production. According to NBS, coal demand growth fell more rapidly in 2012-13 (3.3% pa) – from the average of 6.1% in the five years to 2011 – than the slowdown of the output growth of major coal users including thermal power generation (5% from 10%), cement (7% from 11%) and steel (7% from 10%) between the same periods.

The projected energy demand growth trails the average GDP growth (6.5% pa) during the forecast period. Total energy intensity continues to decline as a result. Energy consumption per US\$1,000 drops from 0.17toe now to 0.14toe by 2020. This represents a 16% total reduction, on par with the official reduction target for 2010-15.

## Electrification and power generating fuels

China's level of electrification rises with economic growth, as is consistent with the general development experience. Electricity demand grows by 4.8% pa in 2014-2020, faster than the 3.4% pa growth in total energy demand. The per capita electricity consumption rises from 4.0MWh to 5.1MWh by 2020, about half the current weighted average of electricity consumption of Japan, Korea and Taiwan.

Electricity is the sector where competition and fuel substitution happens because almost all fuels can be used in electricity transformation. Non-fossil fuels are likely to see very rapid expansion. The government's “Energy development strategy action plan 2014-2020” envisions an aggressive expansion of non-fossil fuel capacity for the planned period.

FIGURE 36

### Changes in China's electricity generation capacity mix

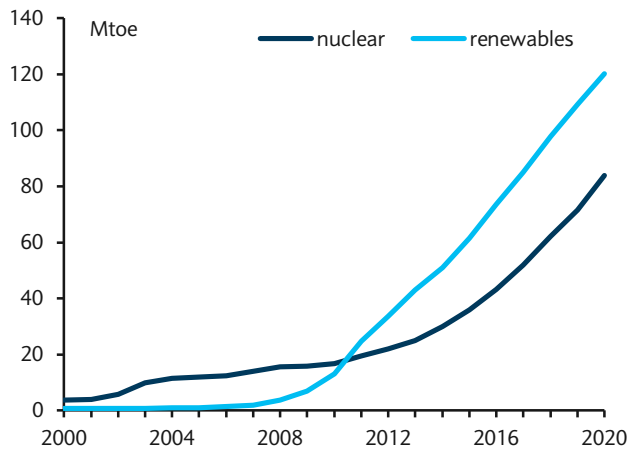
	Power generation capacity (GW)			
	2014	2020	Capacity Change	Increase
Nuclear	20	58	38	194%
Wind	96	200	104	109%
Solar	27	100	73	277%
Hydro	302	350	48	16%
Coal	825	953	127	15%
Natural gas	56	100	44	80%
Other	35	54	19	53%
Total	1360	1815	455	33%

Note: Nuclear, wind, solar and hydro are taken from the government's action plan. Coal, natural gas and others were derived from an industry body report. Source: China Electricity Council, NDRC

The predominant driver of such expansion is the concern about global warming and local pollution that raises policy supports. Other drivers range from technological development and rising engineering capability in nuclear power, continued cost declines in wind and solar power generation and power grid development. Nevertheless, the action plan also faces several challenges including engineering and safety issues with nuclear power, social and

FIGURE 37

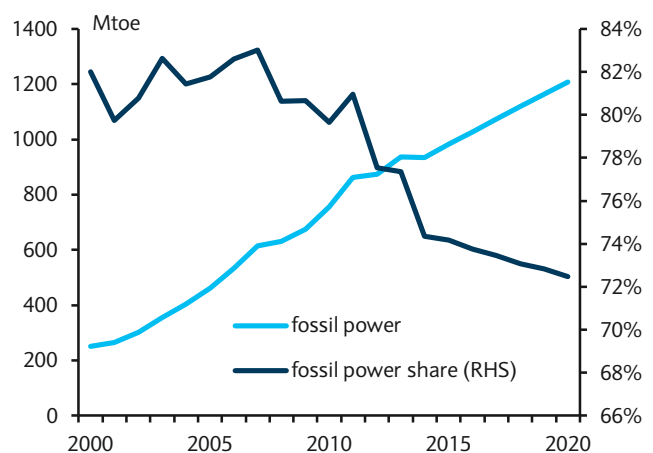
**Continued strong growth in nuclear and renewable energy supply**



Source: BP, Barclays Research

FIGURE 38

**Fossil power generation still growing, but its share in total power generation mix is set to decline**



Source: BP, Barclays Research

ecological issues with hydropower, as well as subsidies and grid access issues with renewable power.

All things considered, we project that nuclear will grow the fastest among non-fossil power generation (179%, 0.18mb/doe), followed by renewable energy (136%, 0.23mb/doe). Hydropower increases by 5.6% (0.05mb/doe).

The plan, as well as the policy, is to seek to promote moderate natural gas power generation, preferably in densely populated urban areas and distributed power generation. The government is making a great effort to control the growth of coal-fired power generation and reduce its share of total power generation. Nevertheless, coal remains the staple fuel in power generation, although its share is falling from the current 75% of the total.

### Oil and refined products

We project that China's oil demand increases by 20% (1.9Mb/d) in 2014-20, compared to 34% (2.5Mb/d) growth in 2008-14. The predominant use of oil is for transportation and industry. It has already been replaced in power generation by other fuels because of its cost.

China's economic structural change suggests that the key drivers of the country's oil demand in the coming years will be rising private mobility and motorisation demand which pushes up gasoline and jet fuel consumption. Our assumption of 6-7% growth in annual automobile sales and expansion of air travel for business and leisure provides solid support to the continued healthy growth of gasoline (56%, 1.3Mb/d) and jet fuel (76%, 0.4Mb/d) demand. Their combined share of total oil demand rises from 25% to 32% between now and 2020.

For diesel, we project a considerable slowdown of demand growth because of the waning of heavy industrialisation and the significant correction in the housing market and associated road freight transportation. Railway electrification, government promotion of natural gas penetration into transportation for the sake of oil security have negative impacts on diesel demand. We expect diesel demand to grow by 7.4% (0.3Mb/d), down from 28% (6.3Mb/d) in 2008-2014. Its share in total oil consumption thus declines from 35% now to 31% by 2020.

China's economic restructure and rebalance inevitably has a negative impact on the country's petrochemicals industry, the fastest growing so far in the world. All big drivers of petrochemical demand from exports of petrochemical-intensive goods to house building

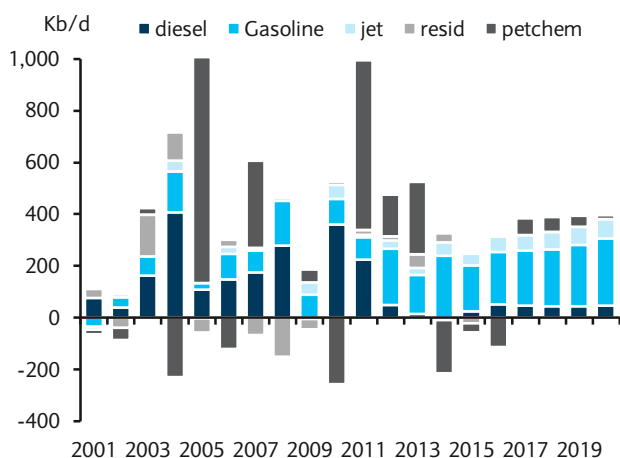
lose steam. Domestic consumer demand and automobile production will likely become important sources of demand. We expect petrochemical demand to moderate to 1.2% (0.3Kb/d) in 2014-20 from 31% (683Kb/d) in 2008-14.

### Coal and natural gas

Outside power generation, coal and gas compete against each other in industrial, service and household applications. Natural gas, with increasing supply availability and policy support, is apparently winning over cheap but dirty coal which is already affected by the slowdown of large industrial uses in steel and cement production. Resource tax and environmental charges meanwhile reduce coal's cost advantage. Adding in power generation discussed earlier, we project total natural gas demand to increase 94% (148Mtoe) in the next six years, while coal grows by 13% (241Mtoe). In comparison, coal demand growth in the previous six years was 32% (447Mtoe). The government policy to emphasise natural gas is a big driver behind the robust gas demand, but is also a risk if it slips.

FIGURE 39

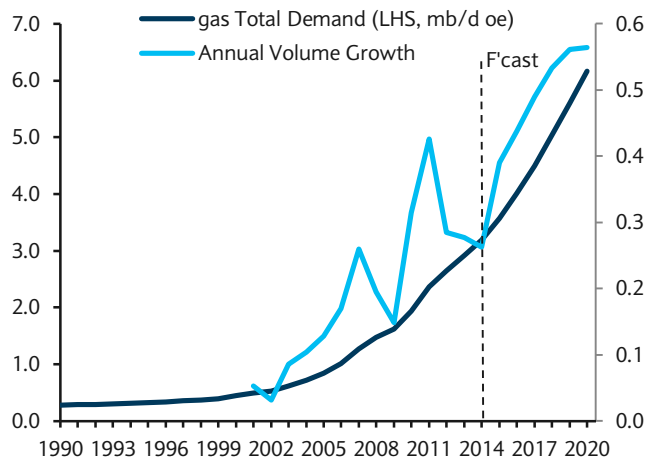
#### Gasoline drives the demand growth in oil products



Source: Barclays Research

FIGURE 40

#### Natural Gas consumption set to continue its strong growth



Source: BP, Barclays Research

## AGRICULTURE: FOOD VERSUS FEED

China's food consumption appears to have passed its most intense growth period. Both quantity and quality of food consumption have reached similar levels as seen in developed East Asian countries. For staple grains and meat, consumption is mainly driven by GDP per capita. We expect their intensity to GDP growth to continue to drop as the income effect on food diminishes as the economy grows richer. For agriculture commodities that are used for animal feed, however, the industrialisation of meat production is an additional driver. We believe their intensity of GDP growth is likely to drop as well, albeit at a potentially lower speed.

FIGURE 41

History and forecasts of China consumption average annual growth rate and volume

Commodity	Unit	Average Growth Rate		Average Growth Amount	
		2008-14	2014-20	2008-14	2014-20
Coffee	1000 60 KG Bag	28.3%	24.9%	245	881
Soymeal	1000 MT	10.2%	4.6%	4152	2900
Soybean	1000 MT	8.9%	4.3%	5702	4100
Soyoil	1000 MT	7.2%	4.1%	821	659
Corn	1000 MT	6.3%	3.7%	11354	8937
Sugar	1000 MT	2.0%	2.4%	305	416
Broiler Meat	1000 MT CWE	2.7%	2.1%	339	304
Pork	1000 MT CWE	2.8%	1.7%	1402	950
Beef	1000 MT CWE	2.4%	1.6%	155	114
Wheat	1000 MT	2.5%	0.5%	2852	568
Rice	1000 MT	1.7%	0.2%	2383	363
Cotton	1000 480 lb. Bales	-3.9%	-5.9%	-1496	-1730

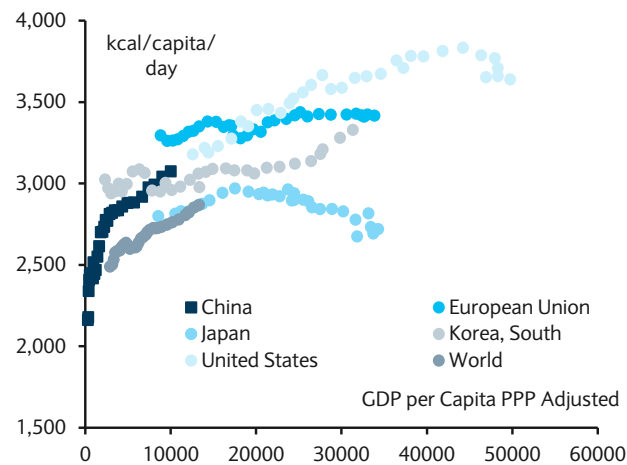
Source: USDA, Barclays Research

### Food consumption already at high level; income effect fades

China's food consumption is high both in quantity and quality. On a per capita basis, in 2011, China had a calorie intake of 3074kal/day, based on latest FAO data. This is higher than that of Japan at 2719kal/day and not far behind Korea at 3329kal/day. There are two further takeaways: first, China now has above \$10,000 GDP per capita on a PPP-adjusted basis, which is important because calorie intake growth slows significantly after that mark; second, China's quality of diet is high. Based on 2011 FAO data, 22.5% of total Chinese calorie intake came from animal products. This is higher than both Japan and Korea. EU and US consumers still consume more animal products; however, dietary preference plays a bigger role in explaining western and eastern food consumption differences.

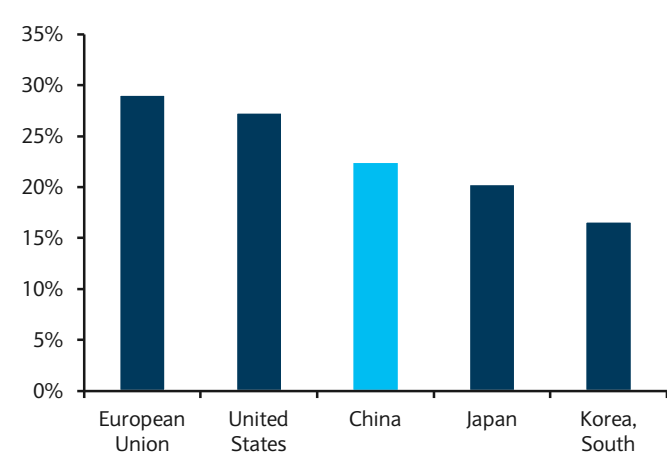
For staple grains such as rice and wheat, China's per capital consumption level is on a par with Japan and Korea. An important point to note is that for both Japan and Korea, when they reached the current income level of China, their wheat consumption level flattened while their rice consumption per capita dropped when income levels rose further. The reason for this shift is that consumers substitute staple grains with higher quality food such as meat, fish and fruit when their income rises. China appears to have reached the saturation point for staple grains. Indeed, from 2008 to 2014, the average annual consumption growth rate has slowed to 1.7% for rice while wheat only managed 2.5%. We expect future consumption for wheat and rice to mostly depend on population changes, with a drop in rice consumption on per capita level even being possible. In terms of national

FIGURE 42

**China past most intense income-driven food growth**

Source: FAO, IMF, Barclays Research

FIGURE 43

**China already has high % calories from animal products**

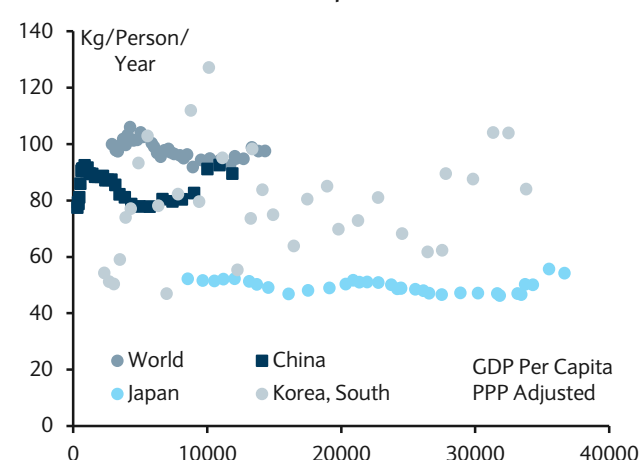
Source: FAO, Barclays Research

total consumption, we expect total wheat and rice consumption to grow by only 0.5% and 0.2% annually from 2014 to 2020.

China's meat consumption is also highly developed. Per capita total consumption of pork, beef and chicken is very similar to that of Japan and Korea despite much lower income levels. One reason for this "leapfrog" in meat consumption is that meat is much cheaper in China than its developed neighbours. When we compared pork prices on online grocery shops, we found pork costs are currently almost twice as high in Japan than in China. Local prices differences, due to regulation and tax, make meat similarly affordable cross Japan, Korea and China – for example, one kg of pork leg costs less than 2% of monthly income, despite Japan having more than five times the per capita GDP of China.

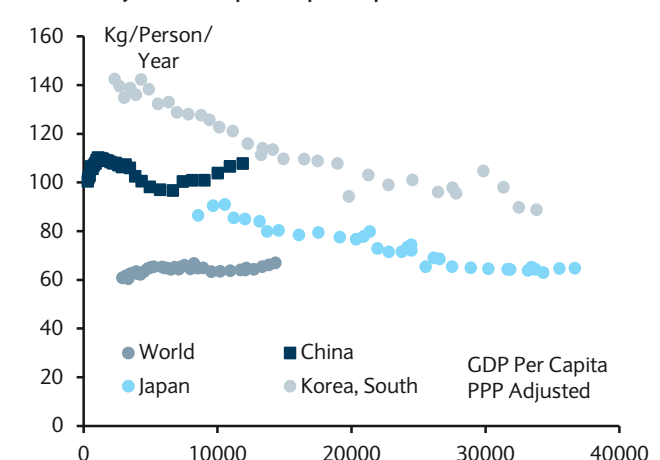
Looking at different types of meat, a more diverse picture emerges. China already has one of the highest pork per capita consumption levels in the world. Further growth would likely be limited even if China becomes a high-income country. For beef and chicken, however, China per capita consumption is still low. Nutrition concerns also play a role in meat consumption. In a recent survey by Nielson, 81% of Chinese consumers surveyed said they would read nutrition content labels before purchase. The increasing health awareness may

FIGURE 44

**Wheat has reached saturation point...**

Source: World Bank, USDA, Barclays Research

FIGURE 45

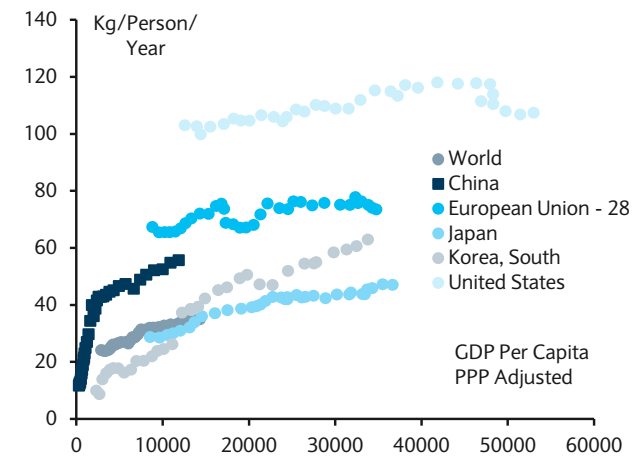
**... rice may even drop on a per capita basis**

Source: World Bank, USDA, Barclays Research



FIGURE 46

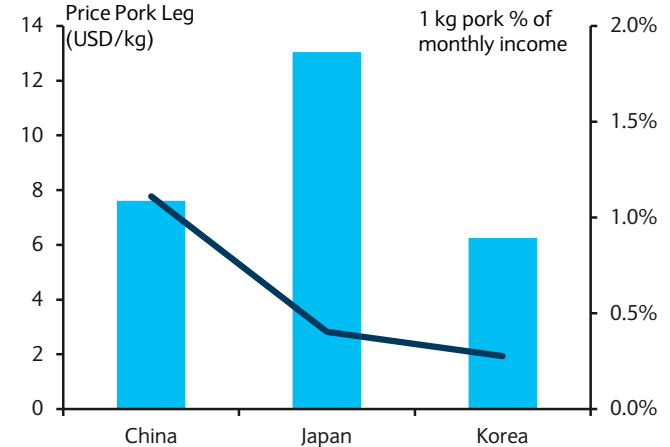
Total meat consumption “leapfrogs” Asian neighbors...



Source: World Bank, USDA, Barclays Research

FIGURE 47

... partially due to lower price



Source: Yihaodian, lotte, Seiyu, ILO, Barclays Research

direct any further consumption towards poultry and fish, which has higher protein and less fat. Thus we expect poultry to be the fastest growing meat consumed over the next six years, averaging 2.1%. Pork consumption is likely to grow at 1.7%, slower than 2.8% achieved between 2008 and 2014. Interestingly, beef consumption growth has been sluggish compared with Korea and Japan at similar income levels. This could be due to the fact that, traditionally, beef has not been widely used as a cooking meat and consumers have yet to adapt. We expect beef consumption to grow only 1.6% for next five years, the slowest of the three main types of meats.

## Industrialisation as additional driver for feed commodities

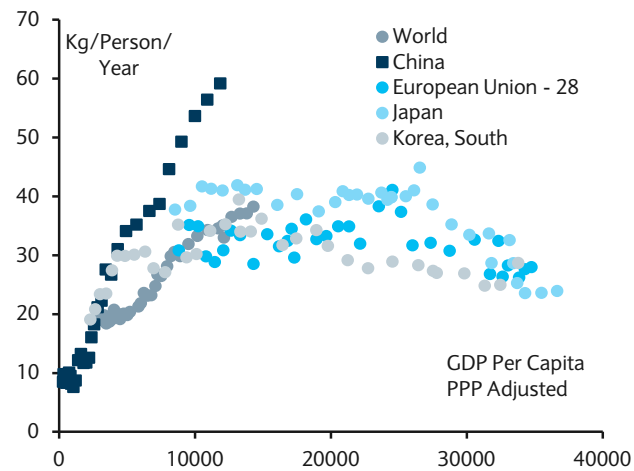
China is the dominant player in the global soybean market and has the potential to become an important swing factor in the corn market. One puzzling fact is that China's per capita soybean consumption is now more than twice that of Japan, Korea and the EU. Our 2011 estimate of corn usage intensity turned out to be too low as well.

We believe the difference in meat supply between China and other east Asian countries explains the divergence in feed grains consumption. Japan imports 50% of its pork and 39% of chicken. Korea imports 30% and 16% for pork and chicken, respectively. However, for China, it imports less than 2% of both meats. Due to the sheer size of China's total consumption (total pork consumption is 35 times that of Korea, 23 times of Japan and five times that of US), it is unlikely that imports will ever play as big a role for meat supply as for its east Asian neighbours. More domestic meat production means more consumption of feed commodities, even if the per capita meat consumption is at a similar level.

China's meat sector is going through a process of industrialisation. Meat production is moving from backyard farming into concentrated industrial animal farms. As industrial meat production relies more on feed grains such as corn and soybeans, this process can act as an additional driver of demand for these commodities. The government has highlighted the increase in scale and industrialisation of meat production as a target in its 12<sup>th</sup> five-year plan. In the No.1 policy document published this February, the government again targeted food safety and standardisation of production. From the consumers' perspective, concerns on food safety have made branded meat from big producers more popular.

FIGURE 48

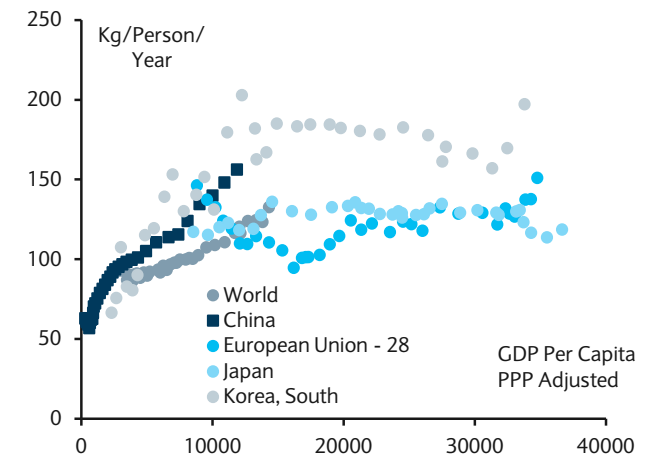
**China consumes significantly more soybean than other countries...**



Source: USDA, World Bank, Barclays Research

FIGURE 49

**... corn is catching up quickly as well**

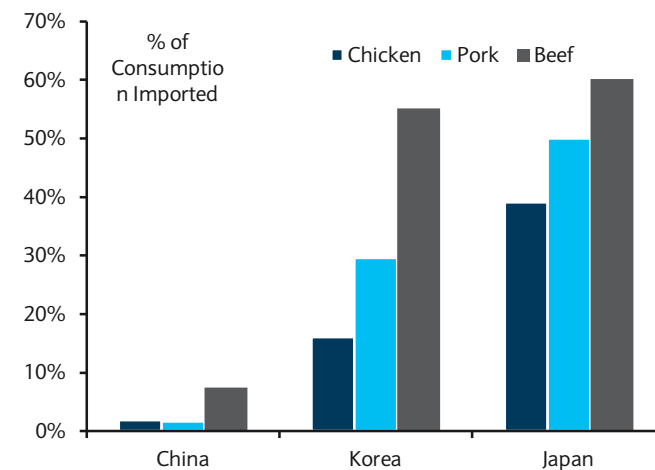


Source: USDA, World Bank, Barclays Research

We expect the industrialisation process to continue, as compared with Japan and Korea, the corn and soybean meal use related to domestic meat production is still low. Therefore, although the intensity of feed commodities use is likely to fall as well, this additional factor means that the decline is likely to be gradual and at a lower speed compared with other agriculture commodities. We expect soybean consumption to grow at 4.3% between 2014 and 2020, primarily driven by an increase in soybean meal consumption. Corn is expected to grow at 3.7% – the additional feed-driven demand makes its consumption likely to grow much quicker than that of wheat.

FIGURE 50

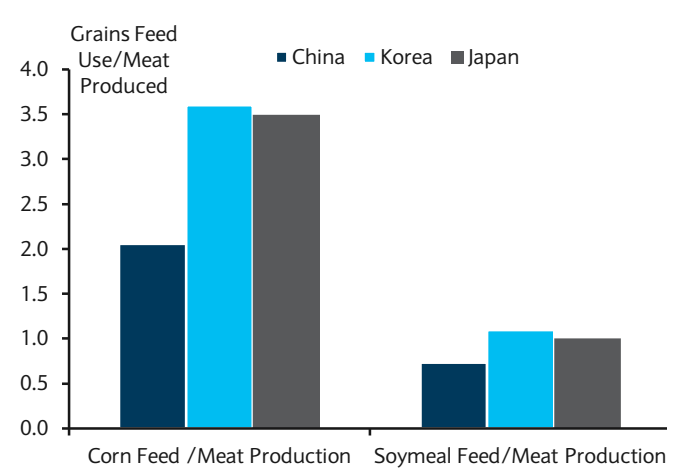
**China domestic production is much more important**



Source: USDA, Barclays Research

FIGURE 51

**Still room for feed use to grow in animal farming**



Source: USDA, Barclays Research

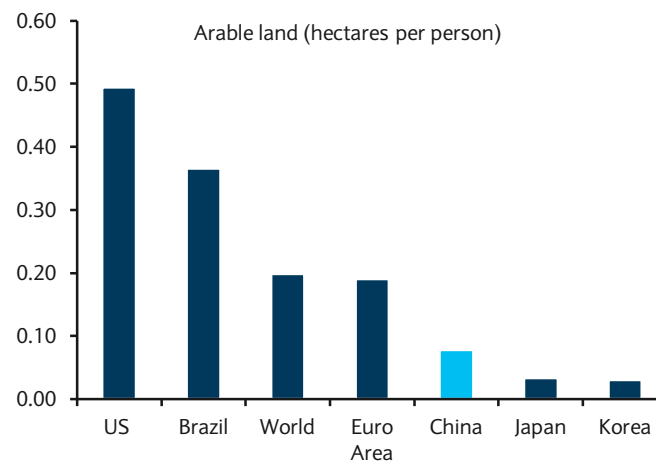
## Import potential: not every commodity made equal

In addition to the divergence of potential consumption, feed and food commodities also face different outlooks in terms of import potential. This is due to the government's efforts to prioritise China's limited crop land resources for the use of staples grains.

Although China's stock of arable land is higher than its east Asian peers, its per capita figure is only half of the world's average and 20% of that of the US. The Chinese government has set a policy priority to maintain food self-sufficiency; however, the constraints imposed by land endowment are a challenge. So far, government policy has been focused on controls on the import of staple grains, while for feed commodities, especially oilseeds, the policy is more relaxed. Since China's accession into the WTO, the government has scrapped the quota for soybean imports and the tariff has been lowered to 3%. However, for wheat, rice and corn, China still maintains a tariff rate quota system. The quota is only around 5% of annual consumption and any imports outside the quota face a 65% tariff.

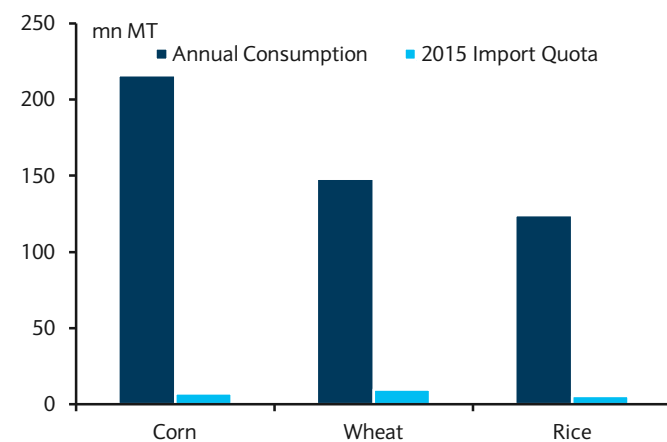
In the recent 12<sup>th</sup> Peoples' Congress, the Chinese Deputy Minister of agriculture again stressed the need to maintain self-sufficiency for staple grains. He also pointed out that more than 70% of agriculture imports are soybeans and most other imports are for industrial use. This highlights the clear distinction between the government's treatment of the import of staple grains and oilseeds.

FIGURE 52

**China arable land endowment is limited**

Source: World Bank, Barclays Research

FIGURE 53

**Staple grains import quota very small versus consumption**

Source: NDRC, USDA, Barclays Research

## Soft commodities: at a crossroads

There is interesting divergence in soft commodities. Coffee consumption has grown rapidly since 2011 and is expected to maintain its momentum. Cotton, on the other hand, has seen a drop in per capita consumption since 2010. We believe China is at a crossroads in terms of income levels for soft commodities: while it has grown too affluent to maintain its competitiveness in clothing manufacturing, it has yet to reach the income level for large-scale coffee consumption.

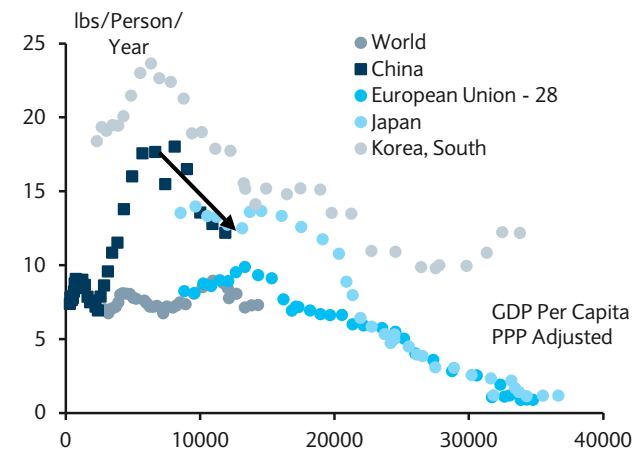
China's cotton consumption per capita has been dropping since it peaked in 2010. We believe the loss of competitiveness in the export sector due to higher income levels is the main driver of this shift. As shown in the BCG manufacturing cost index, China's cost level for the manufacturing sectors increased from 2004 to 2014 against all major emerging market exporters and is now notably higher than that of southeast Asia, India and Mexico. Accordingly, China has been losing market share in the cloth export market. Compared with other east Asian countries, which also used to depend heavily on the export sector, it is a common pattern whereby cotton consumption per capita starts to drop after GDP per capita reaches past \$5,000. We expect Chinese cotton consumption to continue declining between 2015 and 2020 and we forecast it to be the only agriculture

commodities in our complex to decline in absolute consumption volume terms over this period, at more than 1mn MT per year.

On the other hand, coffee per capita consumption has nearly doubled since 2011, although it is still at an extremely low level: per capita consumption is 2% of that in Japan and 3% of that in Korea. For East Asian countries and regions, including Japan, Korea and Taiwan, both the income level and urbanisation rate impact the consumption of coffee. Historically, coffee consumption took off in East Asia when urbanisation rates reached 70% and GDP per capita rose beyond \$15,000, as coffee consumption is difficult to penetrate into rural areas in countries with a tea-drinking tradition. With China expected to continue to grow affluent and more urbanised, we believe that coffee consumption will continue to grow rapidly in the next five years. Anecdotal evidence suggests that the coffee industry shares this growth outlook, with Starbucks targeting a doubling in stores in China to 3,000 by 2019. We expect coffee consumption to grow by around 24.9% per year between 2014 and 2020, similar to the growth rate from 2008 to 2014. However, since the base has increased significantly in the past six years, in absolute terms the growth in consumption between 2014 and 2020 is likely to be more than three times that seen between 2008 and 2014, on our calculations.

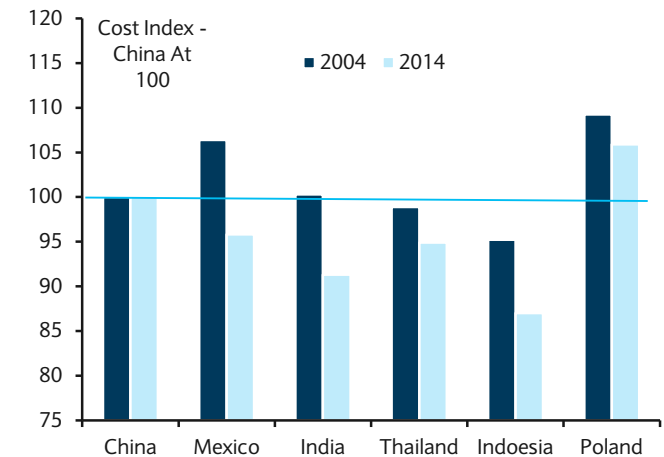
Sugar consumption per capita has been flat since 2008. It is likely to be driven primarily by population growth. The Chinese diet has less of a focus on dessert, where increasing awareness of nutrition has also contributed to the limited growth of sugar consumption. We expect sugar consumption to grow at 2.4% over the next six years, similar to the growth rate achieved between 2008 and 2014.

FIGURE 54  
Chinese cotton per capita consumption is dropping



Source: USDA, World Bank, Barclays Research

FIGURE 55  
As export sector is losing cost advantage



Source: BCG, Barclays Research

## FLIGHT PATH ANALYSIS FOR COMMODITY (FPAC) – A NEW FRAMEWORK FOR COMMODITIES DEMAND

We propose a new framework to think about country-specific commodities demand and its impact on global market. We use the flight path of an airplane as an analogy, trying to capture the difference in growth rate, change in growth rate, volume growth and impact on global market at different development or flight stages. We believe this framework can help identify the potential for rapid moves, up or down, in a country's demand for a specific commodity and the impact this is likely to have on international markets.

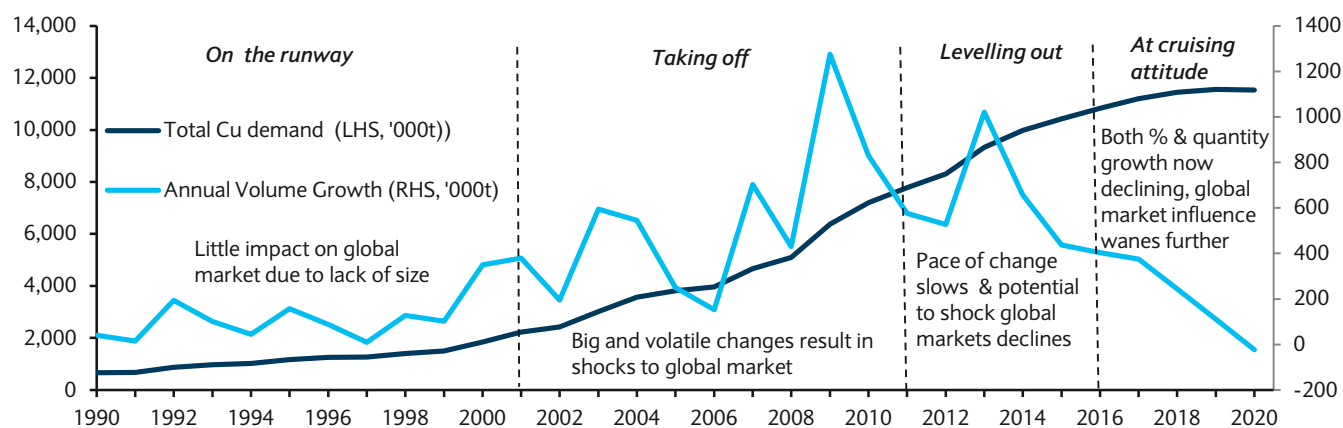
Development history has shown that when countries grow richer, their commodities consumption rises at an increasing rate before stabilising into a low-growth but high-level stage. This pattern has been known as the S-curve. At different parts of the S-curve, both first and second derivatives of growth change, namely the growth rate and the changes in growth rate. However, for the world commodities market, it is the volume demand shock which has the ultimate impact. We find it useful to divide a country's development in commodities demand into five life-cycle stages. Each stage has a distinctive character in terms of growth prospect and will have a very different impact on global balance and prices. We call this life-cycle the flight path, and the five stages are: On the runway; Taking off; Levelling out; At cruising attitude; and In descent. Below we use China's copper demand as an illustration of this flight path and highlight characters for each stage.

### On the runway

This is the first stage of the commodities demand stage. At this stage, the country starts to move into income level which supports consumption of a certain commodity. The key feature of this stage is the very small base consumption level. Annual growth rates can be very high and volatile, with a possible doubling of consumption in a short period of time. However, as the base is very small, the total volume growth is also small and has only a limited impact on the global balance. However, the country and commodity in question should be on the market radar: demand is ready to take off, and in the medium to long term this country can become very important once it moves into the next stage.

FIGURE 56

The commodity flight path for copper in China



Source: Woodmac, Barclays Research

### **Taking off**

This is the second stage of the life cycle and the most important stage in terms of impact on the global market. At this stage, the growth rate is still high, although the percentage rate is likely to be slower than the first stage and in decline. Crucially, the base consumption level of the country is already significant, thus high yearly growth means very high-volume changes in demand for the global balance. In addition, although the percentage growth rate is declining, the absolute volume growth year-on-year (y/y) is still increasing due to a large base. A country at this stage can create a demand shock and have a significant impact on prices, especially if supply is slow to react.

### **Levelling out**

At this stage, the commodities demand is near maturity; however, it is still growing. The total consumption volume is high, but the growth rate has declined further from the second stage. A key feature of this stage is that the total volume growth is declining, so y/y increases in consumption will become smaller and smaller. The country's positive influences on the global market are waning. This is especially relevant if there is lagged supply response for the last stage of the cycle, which means new supply capacity coming online when demand growth is tailing off.

### **At cruising attitude**

At this stage, the country's demand for the commodities in question has matured. The total consumption volume is much higher than at the start of the development stage; however, the y/y change in demand is small. A paradox emerges: although the country consumes a lot of a certain commodity, with fewer surprises, it tends to fade into the background. However, this is no time to loosen that seat belt: due to the large size of the country's consumption, any turbulence will have a large impact on world markets and prices. The demand shock from ethanol in the US for corn since the early 2000s is a valid example.

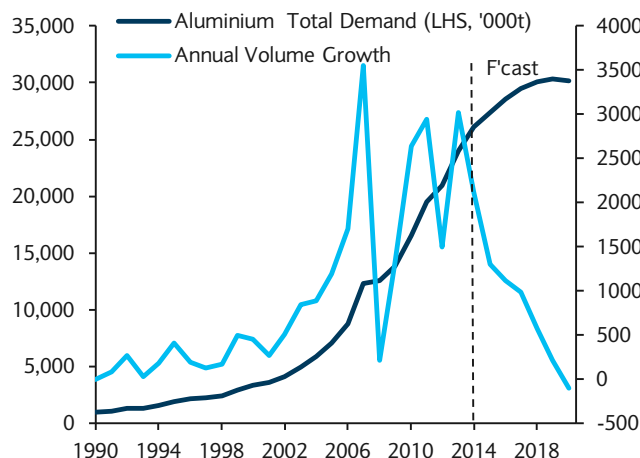
### **In descent**

This stage will be relevant for some but not all commodities. When the income level of the country continues to grow after the maturing stage, the consumption of some commodities starts to drop off. Three effects are possible drivers: loss of cost competitiveness and a shrinking of the export sector; consumers substituting out inferior commodities with high-quality ones; and the shift of GDP growth driver from investment to consumption.

*In the following pages, we list China's demand history and forecasts for energy, base metals, precious metals and agriculture commodities. The charts show at which stage each commodity is at in the Flight Path.*

FIGURE 57

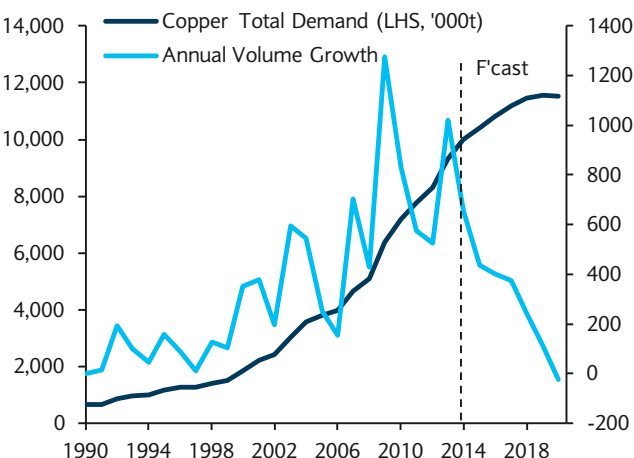
**Aluminum**



Source: Woodmac, Barclays Research

FIGURE 58

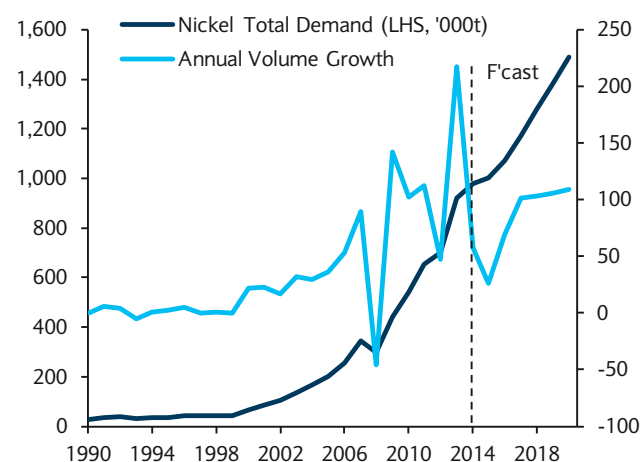
**Copper**



Source: Woodmac, Barclays Research

FIGURE 59

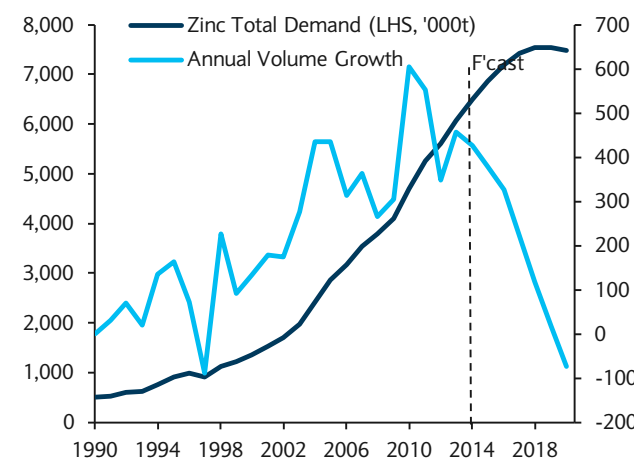
**Nickel**



Source: Woodmac, Barclays Research

FIGURE 60

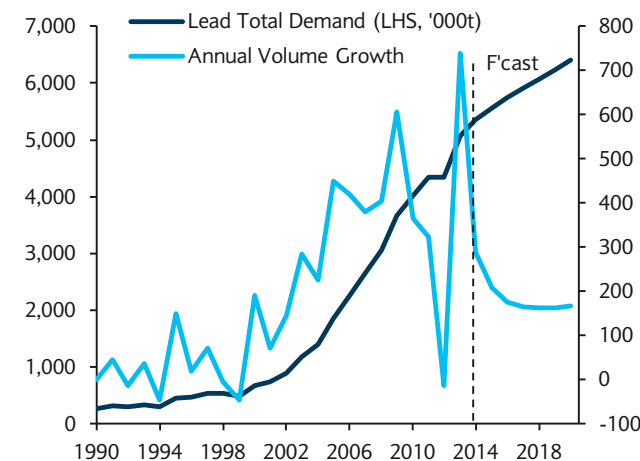
**Zinc**



Source: Woodmac, Barclays Research

FIGURE 61

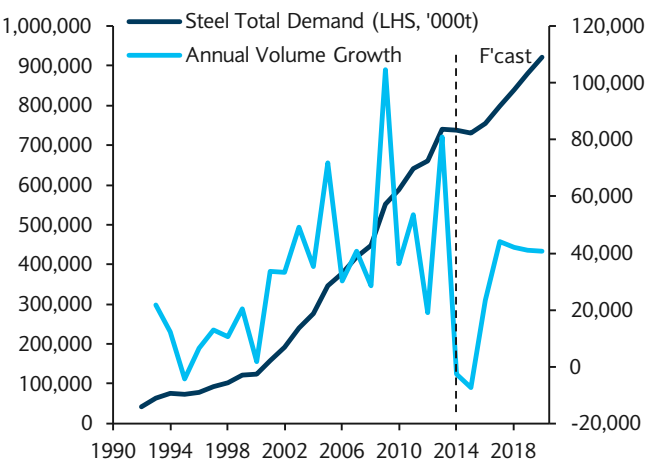
**Lead**



Source: Woodmac, Barclays Research

FIGURE 62

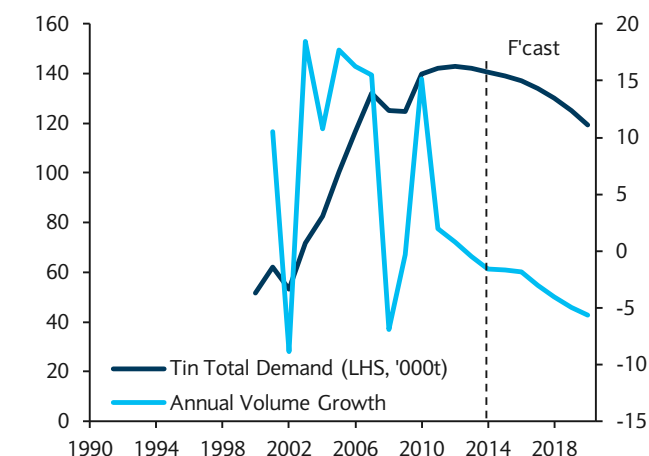
**Steel**



Source: Woodmac, Barclays Research

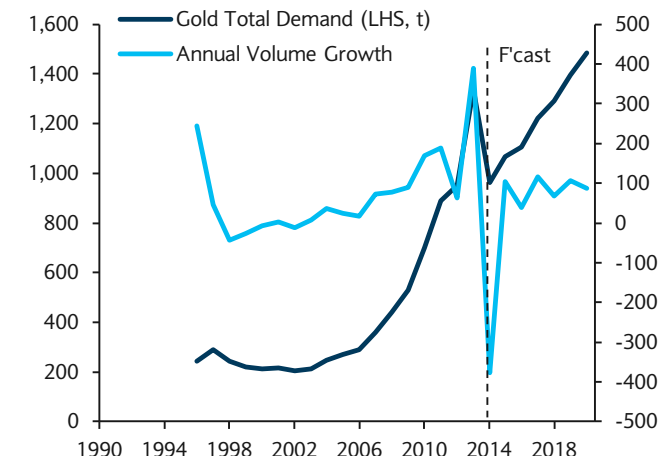


FIGURE 63

**Tin**


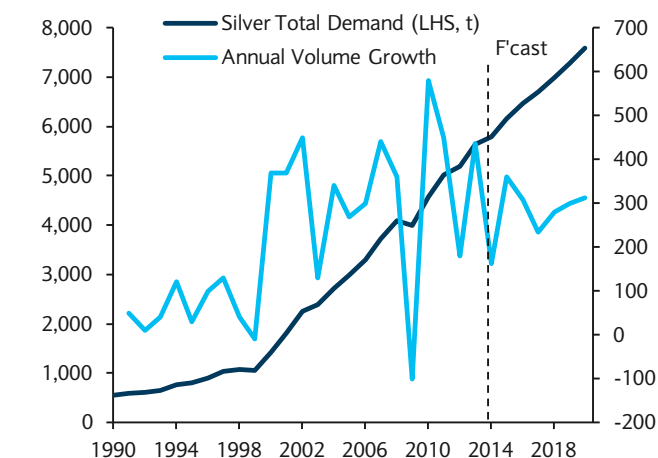
Source: Woodmac, Barclays Research

FIGURE 64

**Gold**


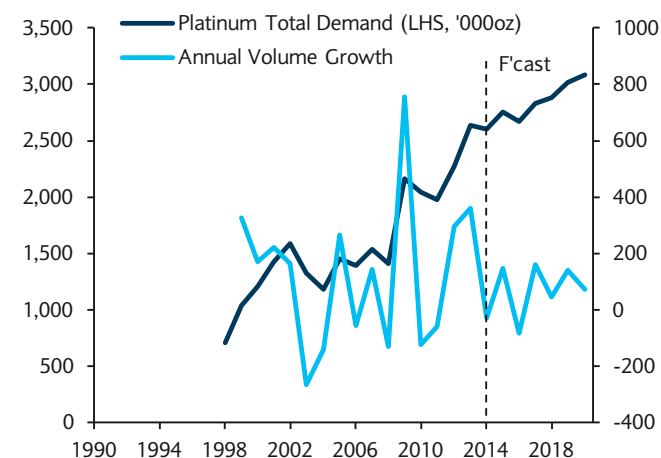
Source: WGC, Barclays Research

FIGURE 65

**Silver**


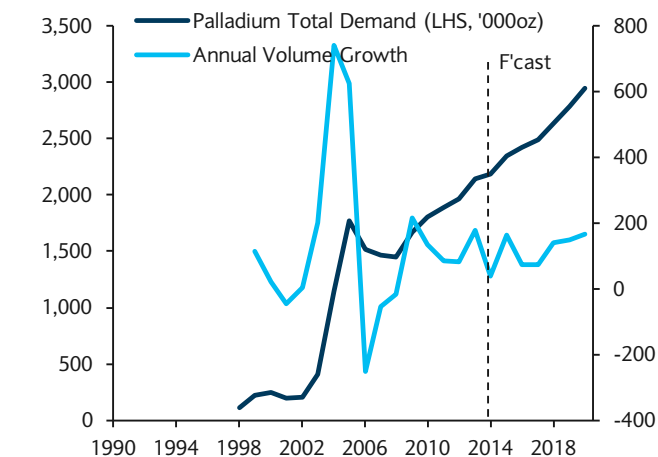
Source: CRU, Barclays Research

FIGURE 66

**Platinum**


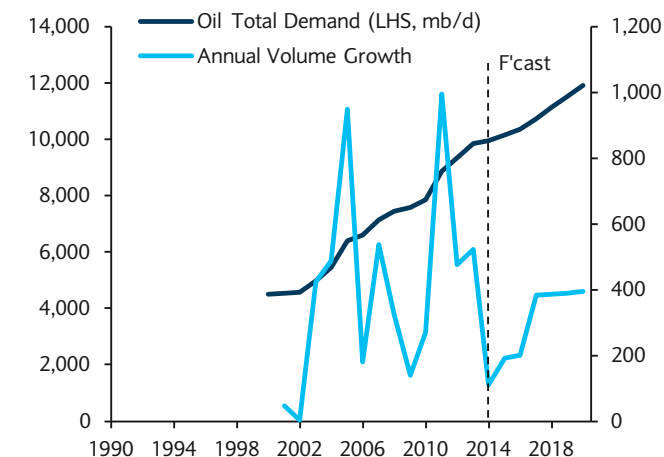
Source: CRU, Barclays Research

FIGURE 67

**Palladium**


Source: CRU, Barclays Research

FIGURE 68

**Crude oil**


Source: BP, NBS, Barclays Research

FIGURE 69

### Gasoline

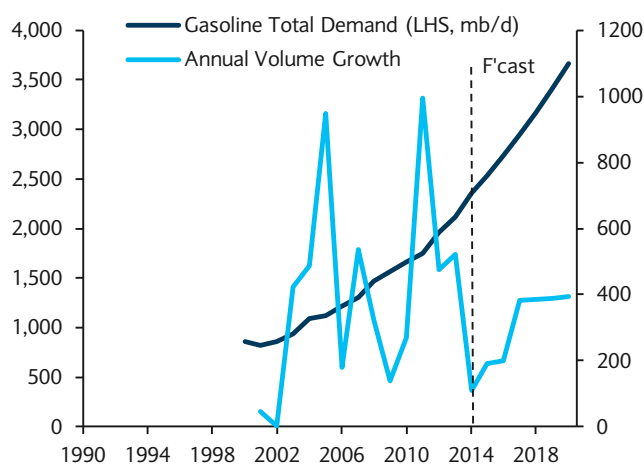
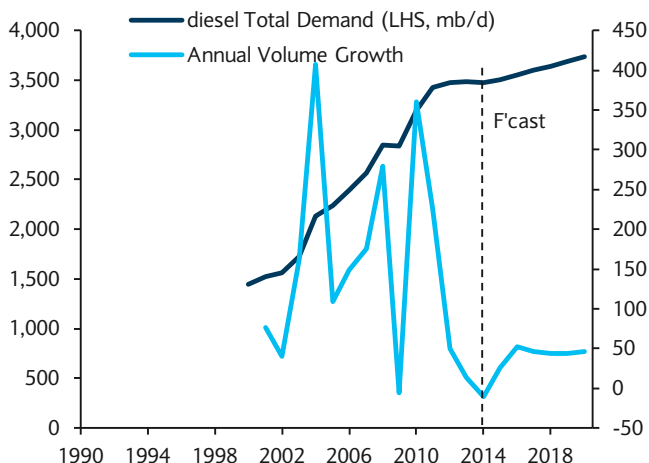


FIGURE 70

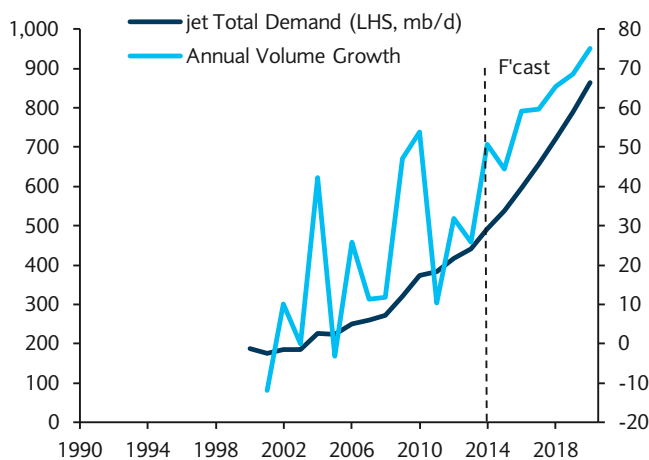
### Diesel



Source: BP, NBS, Barclays Research

FIGURE 71

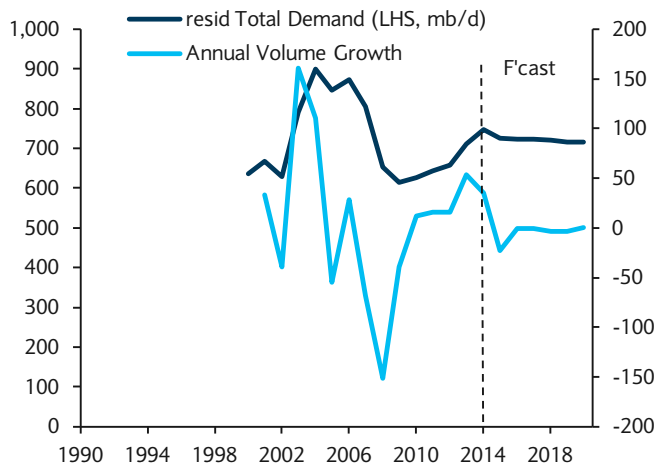
### Jet Fuel



Source: BP, NBS, Barclays Research

FIGURE 72

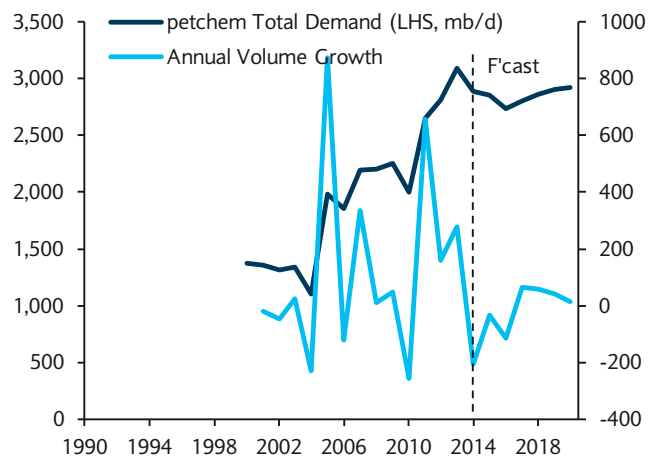
### Residual fuel



Source: BP, Barclays Research

FIGURE 73

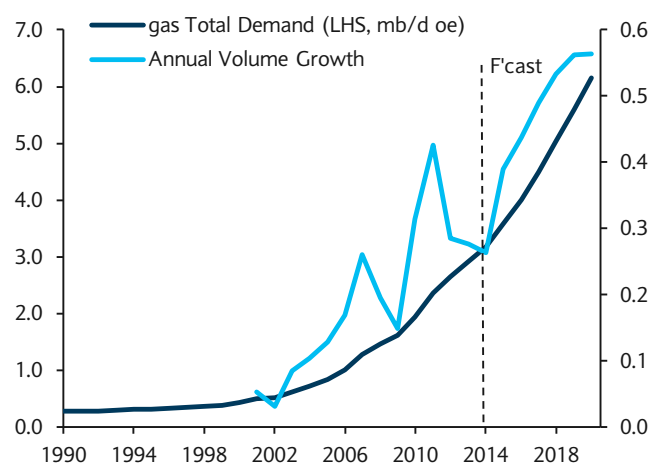
### Petrochem



Source: BP, Barclays Research

FIGURE 74

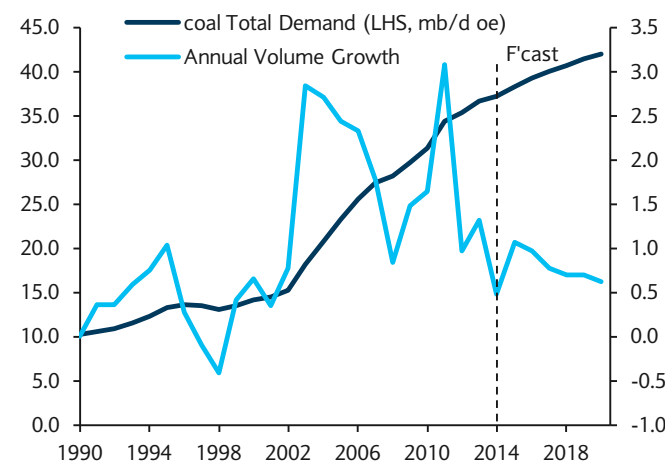
### Natural gas



Source: BP, Barclays Research

FIGURE 75

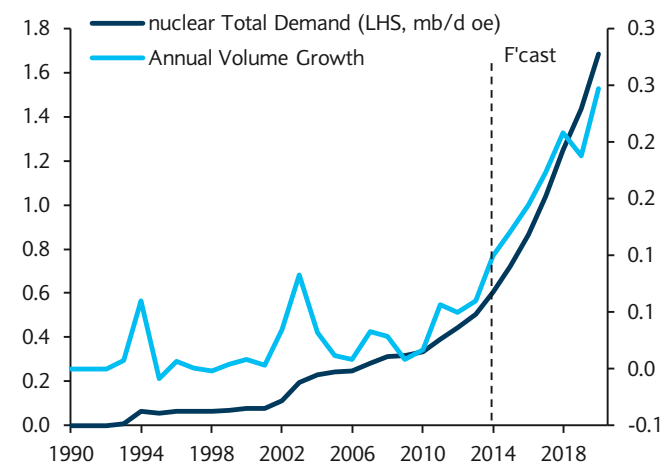
### Coal



Source: BP, NBS, Barclays Research

FIGURE 76

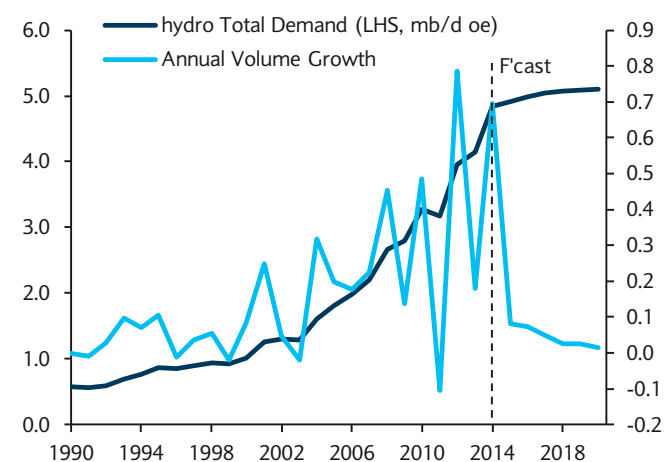
### Nuclear



Source: BP, Barclays Research

FIGURE 77

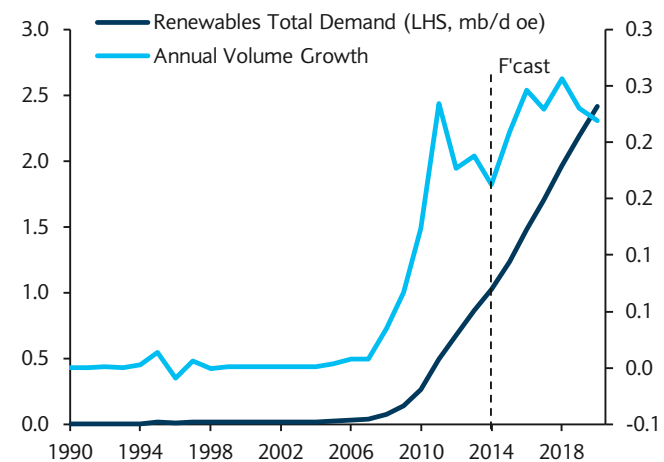
### Hydro



Source: BP, Barclays Research

FIGURE 78

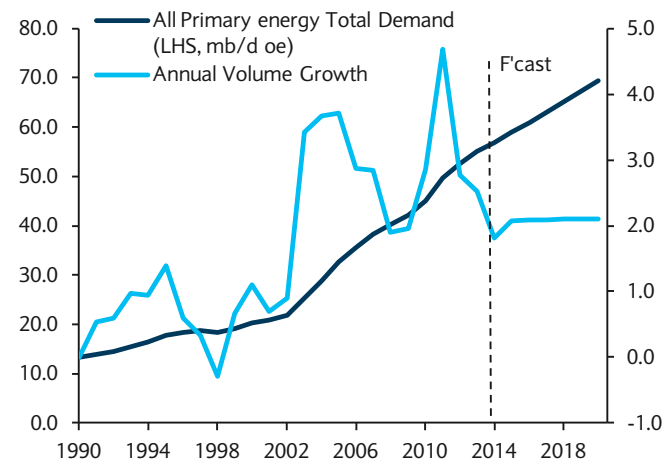
### Renewables



Source: BP, Barclays Research

FIGURE 79

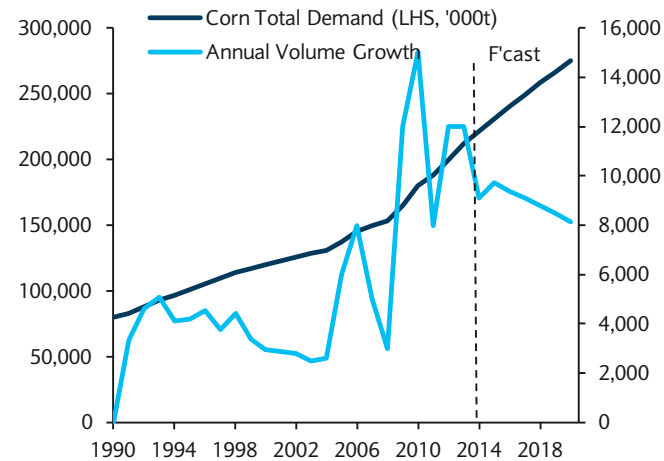
### All primary energy



Source: BP, Barclays Research

FIGURE 80

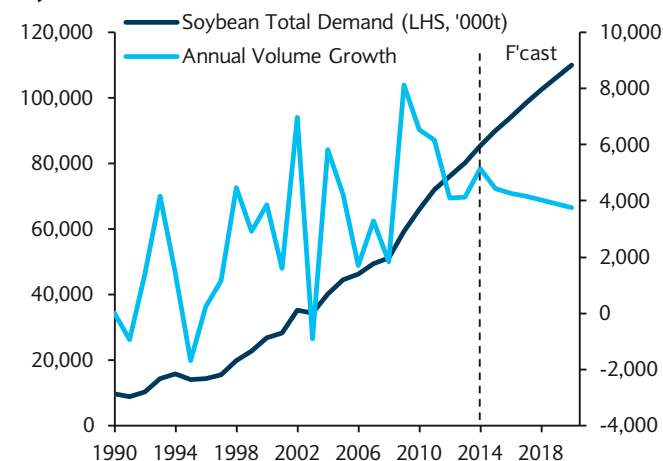
### Corn



Source: USDA, Barclays Research

FIGURE 81

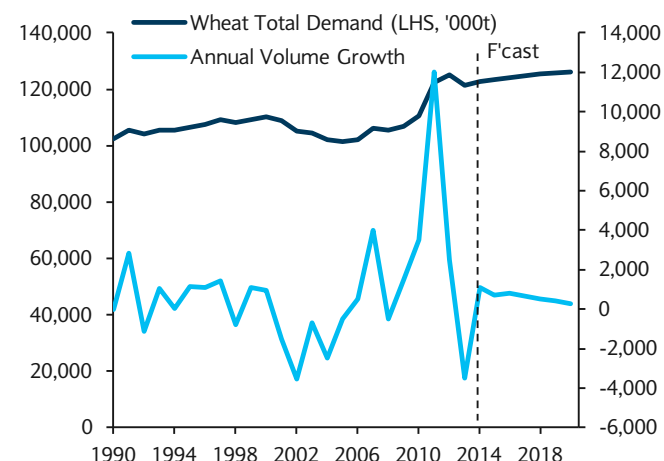
**Soybean**



Source: USDA, Barclays Research

FIGURE 82

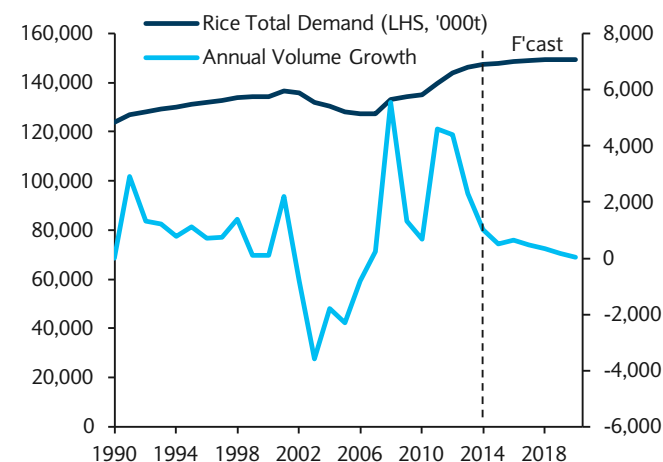
**Wheat**



Source: USDA, Barclays Research

FIGURE 83

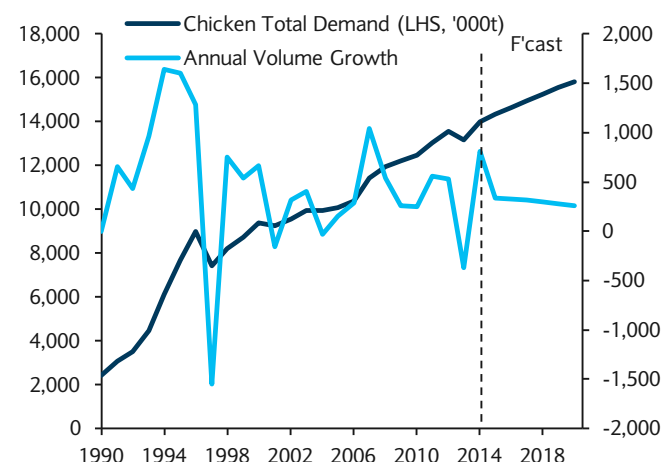
**Rice**



Source: USDA, Barclays Research

FIGURE 84

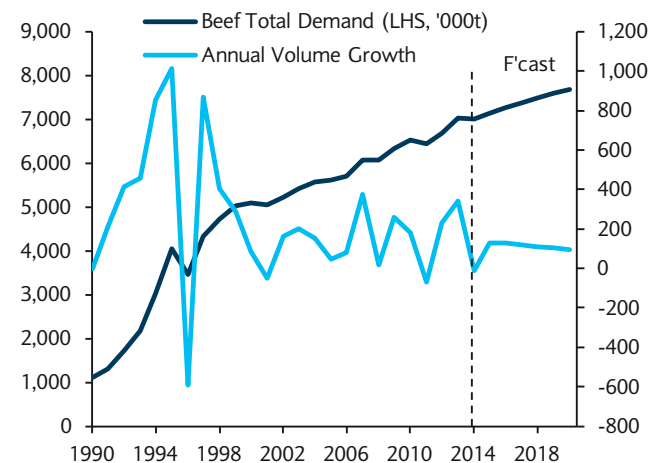
**Chicken**



Source: USDA, Barclays Research

FIGURE 85

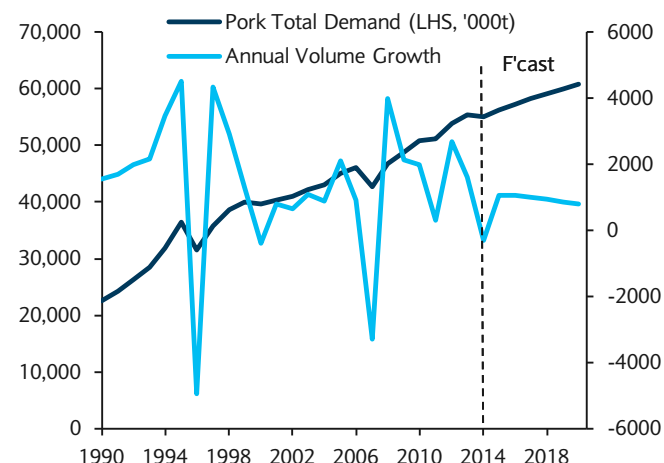
**Beef**



Source: USDA, Barclays Research

FIGURE 86

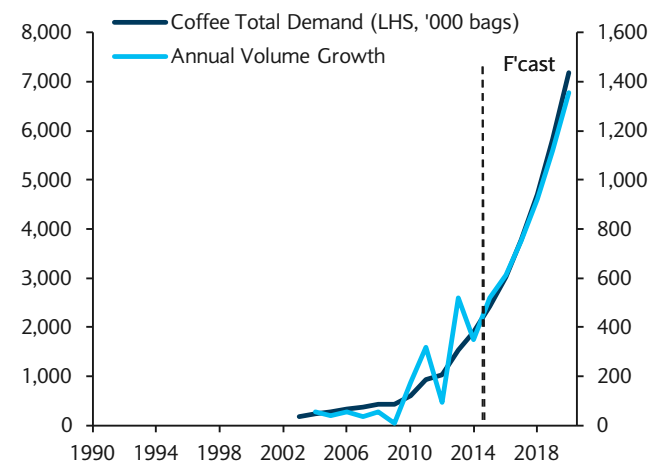
**Pork**



Source: USDA, Barclays Research

FIGURE 87

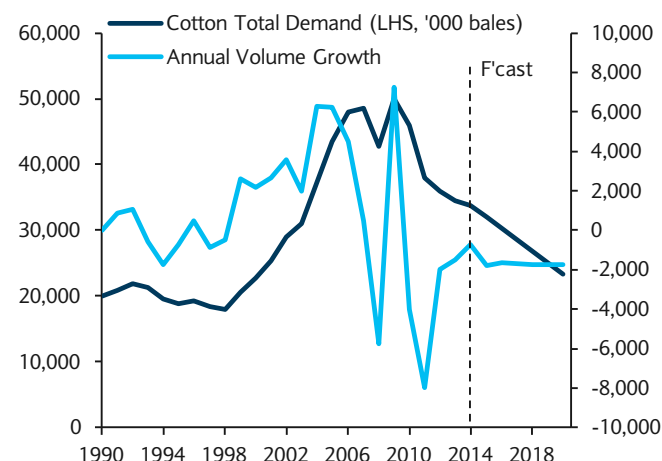
### Coffee



Source: USDA, Barclays Research

FIGURE 88

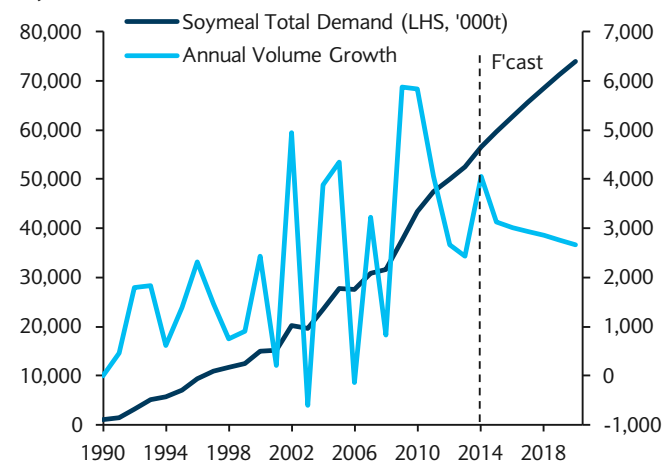
### Cotton



Source: USDA, Barclays Research

FIGURE 89

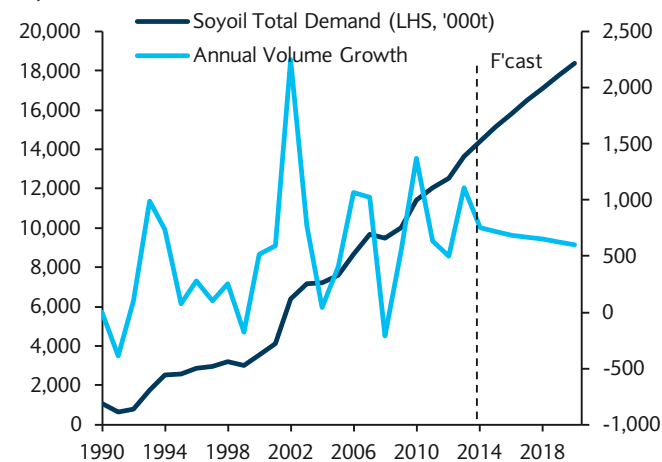
### Soybean meal



Source: USDA, Barclays Research

FIGURE 90

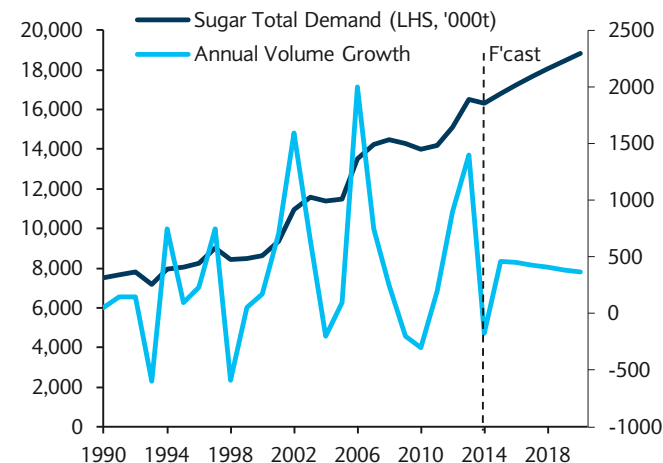
### Soybean oil



Source: USDA, Barclays Research

FIGURE 91

### Sugar



Source: USDA, Barclays Research

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