Global Steel

Global steel primer: a starter kit for steel investors

Industry Overview

Bank of America Merrill Lynch

Equity | 17 July 2019

Steel dwarfs other metal markets. Industry deep dive.

Steel is the largest commodity market after oil. We estimate an annual market size of $1.15 trillion (2018A). It dwarfs all other commodity markets; copper is the third largest with an estimated market size of $152bn. We publish an update to our Global Steel Primer reviewing the key drivers and characteristics of the global steel industry. We highlight key issues including the importance of property to steel demand in China, China supply-side reform, global trade protection in steel, the rising cost of CO2 and implications for European steel and our Steelmageddon™ thesis for the US market. We also discuss key technical aspects including steel production processes and products.

China: demand peak pushed out (again), supply reform

China remains a key driver of global steel trends producing and consuming roughly 50% of global steel annually. We have forecasted China at "peak" steel demand for a number of years, yet steel demand continues to surprise to the upside. China steel production YTD is up 9%, surprising positively as Chinese policy makers have responded to weaker export demand, due to global trade tensions, with domestic property and infrastructure stimulus. We model steel production up 3% in 2019 vs. our previous estimate for a small decline. We do expect China steel demand to peak in 2019 yet expect utilisation rates to remain >85% even as demand falls. China's continued focus to act rationally when it comes to steel supply, plus the growing theme of industry consolidation in that market, should help underpin global steel spreads.

Headwinds for US and Europe: Steelmageddon ™, Carbon

For many years, China trends have almost entirely determined global steel prices and producer profitability. China still matters, but we do see some new regional factors emerging, which we think will have a meaningful impact on steel company performance. In Europe, EU ETS reform means rising carbon emissions costs. Producers will have to invest to eliminate CO2 emissions or, under current regulation, could "pay away" more than 80% of EBITDA to carbon costs in the long-term. Salvation could be in the form of a "green import tax". In the US, Steelmageddon™ means new capacity can herald a period of weak prices. We see risk that high cost mills in the US go out of business reshaping the footprint of the industry.

Structural vs. cyclical considerations

The steel industry outlook is finely balanced, in our view. Structural tailwinds for the sector include supply cuts and market consolidation, offset by structural headwinds of peak steel consumption in China and no growth in other key steel consuming regions. Cyclically, China steel demand should correct in 2H although relief could be seen for steel producer margins from lower iron ore on supply restarts. Trade tensions and import barriers remain a risk for steel demand.

Global
Steels

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Refer to important disclosures on page 111 to 113.

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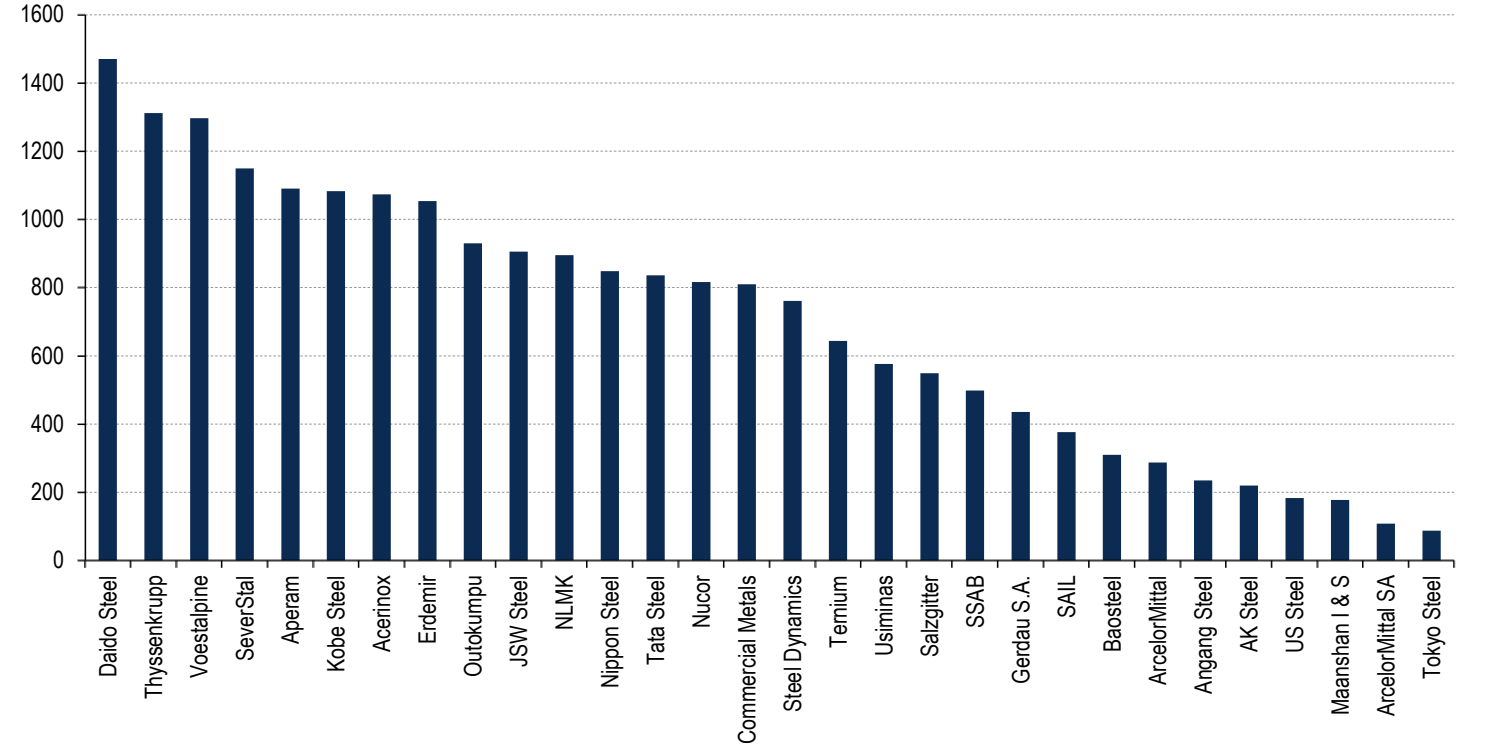
Global steel coverage and key metrics

Table 1: Global steel coverage and EV/t of capacity

Company	BofA ML Ticker	Mkt cap US$mn	EV US$mn	Capacity 2018, mn t	EV/t of capacity($) 2018
China					**242**
Baosteel	BAOSF	20,380	28,361	91.5*	310
Angang Steel	ANGGF	3,947	6,011	25.4	237
Maanshan I & S	MAANF	2,916	3,892	21.7	179
Europe carbon steel					**799**
ArcelorMittal	AMSYF	16,807	33,125	115.7	286
Thyssenkrupp	TYEKF	8,170	19,785	15.0	1,319
Salzgitter	SZGPF	1,330	4,090	7.3	560
Voestalpine	VLPNF	5,108	11,027	8.3	1,325
SSAB	SSAAF	3,318	4,687	9.3	506
Europe stainless steel					**1,043**
Aperam	XASPF	2,172	2,397	2.2	1,100
Acerinox	ANIOF	2,438	3,076	2.8	1,081
Outokumpu	OUTFF	1,298	3,052	3.2	948
North America					**549**
AK Steel	AKS	660	3,108	14.2	219
Commercial Metals	CMC	2,078	3,448	4.3	802
Nucor	NUE	16,640	20,682	25.7	804
Steel Dynamics	STLD	6,562	8,235	11.1	742
US Steel	X	2,351	5,787	32.2	180
Reliance Steel	RS	6,141	8,522		n/a
South America					**552**
Gerdau S.A.	GGB	1,836	10,850	24.5	443
Usiminas	USSPF	823	5,473	9.5	576
Ternium	TX	4,333	6,690	10.5	637
Russia					**1,047**
NLMK	XKOVF	14,707	15,599	17.1	914
SeverStal	SVJTY	13,756	14,997	12.7	1,181
Japan					**878**
Nippon Steel	NISTF	15,947	41,946	49.7	844
Daido Steel	DADSF	1,599	3,230	2.2	1,468
Kobe Steel	KBSTF	2,340	8,867	8.2	1,078
Tokyo Steel	TOKSF	1,187	657	7.5	88
Hitachi Metals	HMTLF	4,710	6,924		n/a
Yamato Kogyo	YMTKF	1,926	1,053		n/a
SMM	STMNF	8,273	12,636		n/a
ROW					
Erdemir	ERELF	4,407	4,231	4.0	1,058
ArcelorMittal SA	ARCXF	235	661	6.1	109
India					**693**
JSW Steel	XWWDF	8,985	15,861	18.0	881
Tata Steel	XTLLF	8,118	22,285	27.0	825
SAIL	SLAUF	2,759	8,779	23.5	374
WORLD AVERAGE					**702**

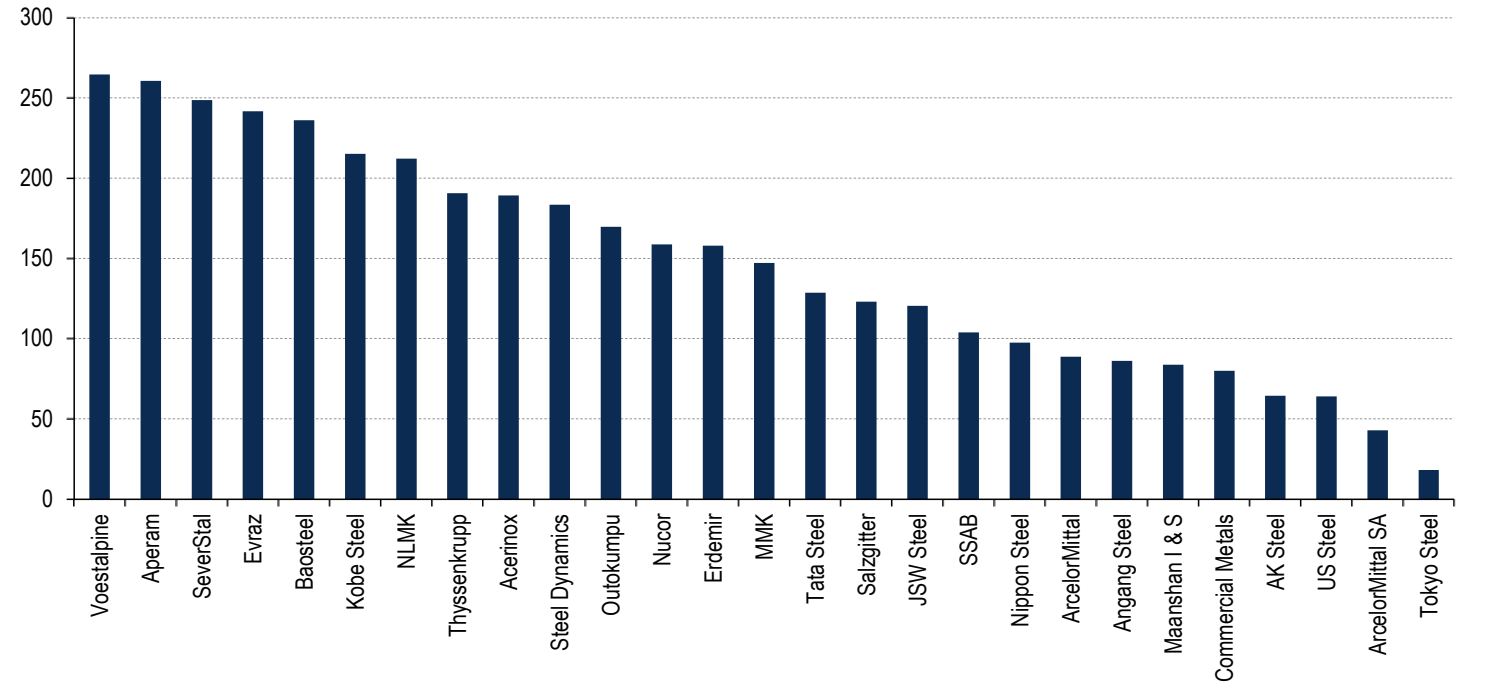
Source: BofA Merrill Lynch Global Research, Company data, CRU. Note (*): Baosteel's capacity takes into account Wuhan Iron and Steel's capacity following its acquisition.

Chart 1: EV/t, $



Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 2: EBITDA/t, 2018A, $



Source: BofA Merrill Lynch Global Research estimates

Steel: how it is made

There are 2 primary routes for producing steel:

- Blast oxygen furnace (BOF) – often referred to as an "integrated" steel production process, and
- Electric Arc Furnace (EAF)

Globally c.70% of steel is produced in BOF and c.30% in EAF.

Blast oxygen furnace production process

Producing steel via a BOF is a 2 step process. A blast furnace is used to reduce iron ore using coal to pig iron. Pig iron is then converted to steel in a BOF.

Blast Furnace (BF): From raw material to pig iron

A blast furnace is a large structure lined with refractory bricks. It is used in integrated steel making where coke and iron ore react together under a hot flow of air to form liquid hot metal, called pig iron ore. BF steel production is a continuous process – i.e. the blast furnace is "topped up" with raw material once liquid metal has been tapped from the process. This differs from EAF which is generally a batch process.

The two main raw material inputs into the blast furnace production process are iron ore and coking coal. Iron ore, coking coal, and limestone are added into the top of the blast furnace while heated air is blown into the bottom of the furnace to drive the combustion process. The combustion of iron ore with other materials in the blast furnace produces molten pig iron. Limestone is added to the blast furnace to capture impurities and create a waste slag.

The liquid iron falls to the bottom of the furnace while impurities float to the top and bind with the limestone. The molten pig iron is then tapped into ladles to be moved to the next step of the process – the basic oxygen furnace (BOF). By itself, pig iron has limited use, and is generally regarded as an intermediate product between raw iron ore and crude steel.

Basic Oxygen converter (BOF): From pig iron to crude steel

Pig iron is moved from the blast furnace to an oxygen converter known as a basic oxygen furnace (BOF). Molten iron from a blast furnace is "charged" (poured from a ladle) into the BOF, and a water-cooled lance is lowered into the vessel. Small quantities of scrap can also be added to the BOF. Scrap is added to control the final metallurgy of the end product and heat.

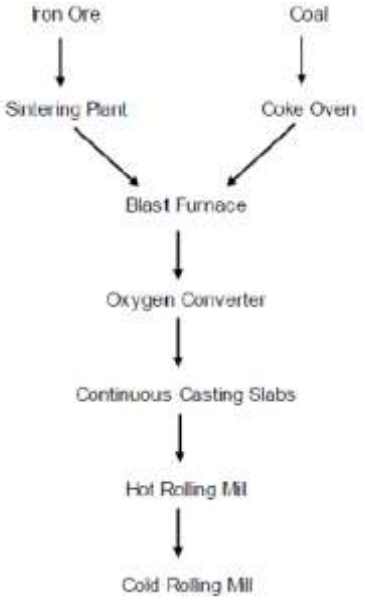
As liquid iron and additional scrap steel are charged into the basic oxygen furnace, oxygen is blown through the lance at high pressure reacting chemically with carbon to burn off impurities. The result is molten steel, which is now ready to be poured into a ladle for casting. Before casting, a variety of different alloys can be combined with the steel to modify the strength, formability, or durability.

Raw materials in the integrated production process

- Iron ore: Almost all iron ore produced globally is used as feedstock in the integrated steel production process, while a small portion is used in the manufacture of cement, pigments, agricultural products or specialty chemicals. Roughly 1.5t of iron ore is required to make 1t of steel.
- Coking/metallurgical coal: Coke (produced from coking coal) is added to the blast furnace and is the reducing agent (removing oxygen and impurities). Coke is also the heat source in the integrated production process. Roughly 0.5-0.6t of coking coal is required to make 1t of steel.

- Limestone: Iron ore naturally contains impurities that need to be removed during the steel production process. Limestone chemically reacts with impurities to form a slag. The slag forms a layer on top of the molten iron and can be skimmed off. Approximately 500 pounds of limestone is consumed to produce 1t of steel.
- Scrap: Scrap is added to the BOF in different quantities (generally 0.1-0.2 to per tonne of liquid metal). Scrap is added to manage the metallurgy of the end product.
- Oxygen: To drive the combustion process 3,000–4,000 pounds of compressed air is injected into the BOF to react with the steel raw materials.

Exhibit 1: Integrated production process



Source: BofA Merrill Lynch Global Research

EAF production process

Electric Arc Furnace (EAF) steel producers (also known as "mini-mills") use steel scrap rather than iron ore as the main raw material input to produce steel, and require a smaller initial investment versus the more capital-intensive blast furnace process. In general (but not always), EAF's tend to produce lower quality steel in terms of finish which are more often used in construction/infrastructure end markets. In other words, EAF steel producers tend to dominate long product steel production.

EAF: From scrap to steel

In the mini mill process, an electric current passes through graphite electrodes to form an arc, and the heat generated by this arc melts the scrap metal. EAF mills are more widely used in well industrialised regions, such as the US, where there is a large quantity of scrap steel available. We outline the process in more detail.

Furnace charging

The first step is to prepare a quantity of steel scrap for melting. There are many different grades and qualities of scrap. Generally, scrap can be categorized as "home scrap" or "purchased scrap." Home scrap is generated at the mill, and is re-melted and used again at the same plant. Purchased scrap is classified as either "industrial" or "obsolete." Industrial scrap is "clean" scrap and a by-product of the manufacturing process. The automotive industry is one of the largest sources of scrap. Obsolete scrap is lower grade and comes from junkyards and building demolitions. Prior to melting, the scrap mix must be adjusted based on the type of steel to be produced. The prepared scrap is then transferred into the EAF for melting.

Melting

Electricity is introduced into the charge mix via graphite electrodes. The amount of electricity is carefully regulated to insure a uniform and safe melting of the scrap. Once the metal is completely melted, and "flat bath" conditions are reached, temperature measurements and samples are taken. The analysis of the bath chemistry helps determine the amount of oxygen necessary during refining.

Deslagging

Deslagging involves the removal of impurities from the furnace. The furnace is tilted backwards and slag tapped. The deslagging process needs to be carefully executed at the right temperature to avoid slag components from integrating back into the molten steel.

Tapping

Once the desired steel composition and temperature is achieved, the tap-hole is opened and molten steel is poured into a ladle for transfer to a ladle furnace. During the tapping process, de-oxidizers such as aluminium or silicon are commonly added to lower the oxygen content of the steel. The molten steel is moved to a ladle furnace where other alloys are added and the chemical composition is adjusted prior to casting/rolling.

Raw material recipe

Table 2: Raw material recipe

	Blast furnace	EAF
Iron ore	1.5 t	0 t
Coking coal	0.5 t	0 t
Scrap	0.1 - 0.2 t	1.1 - 1.2 t
Fluxes (limestone)	0.2-0.25 t	0.03 t
Oxygen	196m³	15m³

Source: BofA Merrill Lynch Global Research estimates, Steelonthenet.com

Alloying elements

Table 3: Alloying elements

Element	Characteristics
Chromium	Increases hardenability and resistance to corrosion. Used commonly in the production of stainless steel.
Lead	Offers greater machinability
Manganese	Prevent brittleness, increases hardness
Molybdenum	Enhances strength
Nickel	Toughens steel, corrosion resistance. Used commonly in the production of stainless steel.
Silicon	Increases strength, increases magnetic properties
Sulphur	Enhances machining properties
Vanadium	Increased hardness and strength of steel – usually added in long product production
Niobium	Increases hardenability and resistance to corrosion

Source: BofA Merrill Lynch Global Research

Steel making images

Exhibit 2: Raw materials stock yard at integrated steel mill

Source: ArcelorMittal

Exhibit 3: Coke push from coking plant at integrated blast furnace steel mill

Source: BofA Merrill Lynch Global Research – picture taken on company site trip

Exhibit 4: Blast furnace

Source: BofA Merrill Lynch Global Research – picture taken on company site trip

Exhibit 5: Continuous slab casting at integrated blast furnace mill

Source: BofA Merrill Lynch Global Research – picture taken on company site trip

Exhibit 6: Ladles filled with liquid metal, EAF batch processing

Source: BofA Merrill Lynch Global Research– picture taken on company site trip

Exhibit 7: Hot rolling line

Source: BofA Merrill Lynch Global Research– picture taken on company site trip

Exhibit 8: Hot strip mill

Source: ArcelorMittal

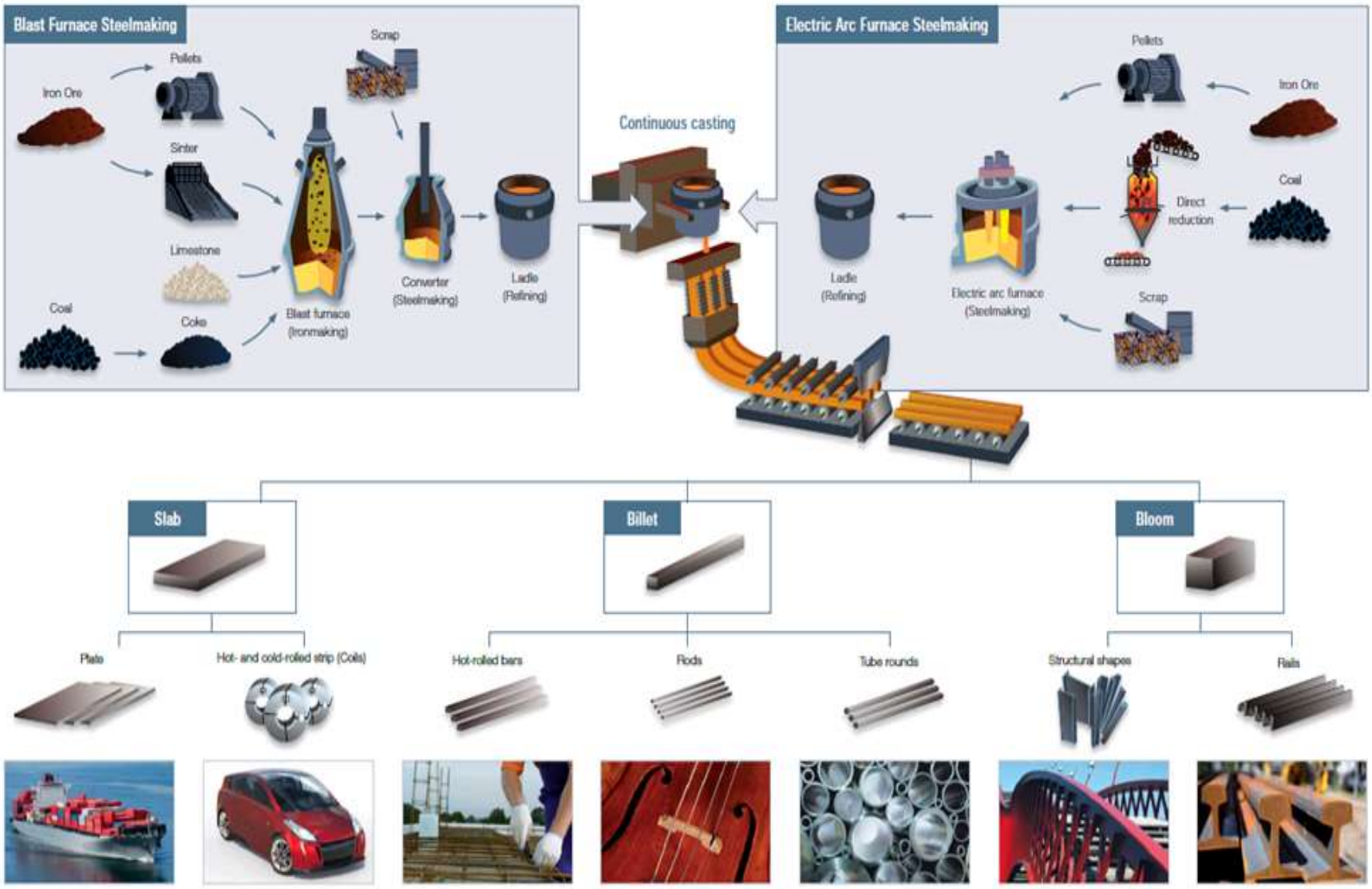
Exhibit 9: **Cold rolled coil at the "front" of the galvanising line.**

Source: ArcelorMittal

Exhibit 10: Cold rolling line

Source: BofA Merrill Lynch Global Research – picture taken on company site trip

Exhibit 11: Steel production process



Source: World Steel, BofA Merrill Lynch Global Research

Why build EAF or BF/BOF?

- Access to raw material: The BF/BOF process uses iron ore as its main source of raw material in the production of steel whilst EAF uses scrap. In the North American market, roughly 60% of steelmaking capacity is EAF based. EAF capacity is reliant on scrap supply which is only really available in large quantities developed economies where a "scrap inventory" has been established.

- Scale advantages: Blast furnaces tend to be larger in size than EAFs (3- 10Mt annual capacity for a BF vs. 1-1.5Mt for an EAF at most). Mills tend to have operating cost advantages over smaller mills. However, the capital cost to build a BF steel mill tends to be higher on a per tonne basis than EAF mills.

- Product quality and type: With EAF technology the metallurgy and quality of the end product is largely defined by the quality of the scrap input. What you put in is what you get out. With BF production, a steel producer can have more control of the end product quality as you are starting from "scratch". EAF steel mills hence tend to dominate in the production of more "commodity" grades – i.e. long product / rebar.

Table 4: Pros and cons of EAF production process

Pros	Cons
Flexibility: Manufacturing activities can be started and stopped at will without exposing the mill to excessive costs associated with the shutdown or start-up process, allowing production to quickly react to changing market conditions.	EAF is reliant on cheap scrap supply, this is usually only available in developed economies, as such the installed base of steel and the life cycle of steel does not support a wide spread EAF-based production.
Energy efficiency. Can use 100% scrap metal feedstock which greatly reduces the energy required to make steel vs. the BF production process.	End product quality is dependent on scrap input quality. Hence producing higher quality sheet products can be limited by scrap supply. In general, higher quality steel products (autos/aviation application) are produced via the blast furnace route.
Many companies schedule their operations to take advantage of cheaper off peak electricity rates.	

Source: BofA Merrill Lynch Global Research

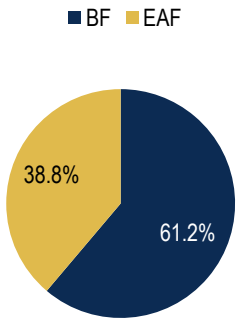
Table 5: Pros and cons of BOF production process

Pros	Cons
More control over the quality of the steel output.	Capital cost to build a BF steel mill tends to be higher on a per tonne basis than EAF mill.
Cheaper than EAF if a large blast furnace runs at a high utilisation rate	Inflexible production schedule as the mills cannot be started and stopped at will without exposing the mill to excessive costs associated with the shutdown or start-up process vs. EAF production process. Has to be kept at high capacity utilisation rates throughout manufacturing process

Source: BofA Merrill Lynch Global Research

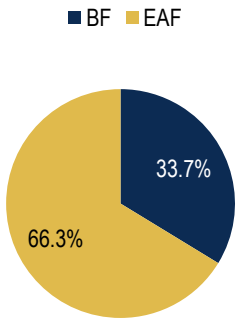
Regional capacity breakdown – BF vs. EAF

Chart 3: EU steel production by type, 2018



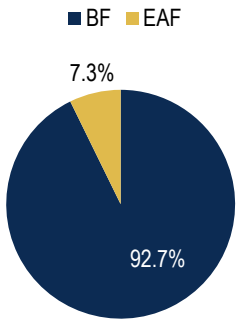
Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 4: NAFTA steel production by type, 2018



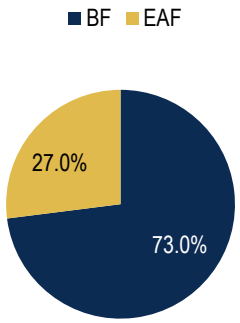
Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 5: China steel production by type, 2018



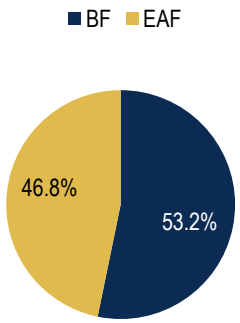
Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 6: World steel production by type, 2018



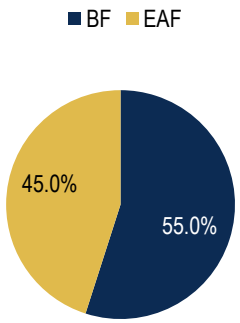
Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 7: World ex-China steel production by type, 2018



Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 8: World ex-EU NAFTA and China steel production by type, 2018



Source: BofA Merrill Lynch Global Research estimates, CRU

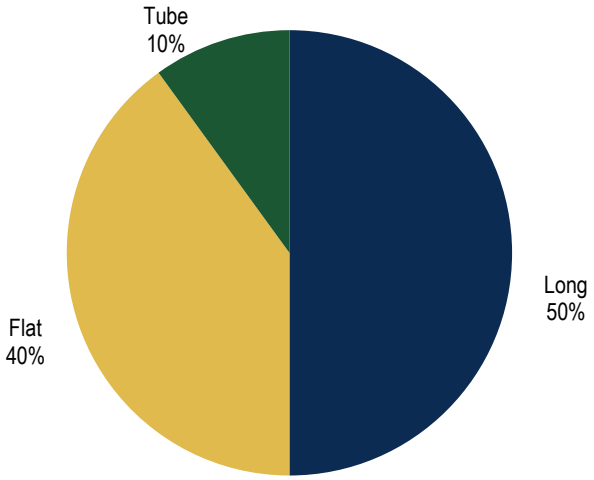
Steel products: flats vs. longs

Carbon steel represents c. 95% of all steel products manufactured globally. The remaining 5% is comprise of stainless steel (includes nickel and chrome as alloys) and Engineering Steels (SBQ – special bar quality steel, also a carbon steel but which is produced using alloy agents which ensure a defect-free surface necessary for safety critical components used in key components that are in motion. Uses include gears, axles, suspension, drive trains in autos, oil drilling, aerospace).

There are two broad carbon steel product types: Flat steel products and long steel products. Flat and long steel products are produced to a variety of qualities depending on their application.

- Flat steel overview: Flat steel is used in the manufacture of cars, white or yellow goods and tubular products (with tubular products flat steel sheets are welded together to make tubes). Flat steel is sold as coil (flat sheets of steel "rolled up") or plate. Tube products are often classified within flat products (most often produced from sheet welded into tubes).
- Long steel overview: Long steel products include rods, bars (used in construction) and rail products (use in infrastructure).

Chart 9: Global steel consumption by product shape, 2016



Source: World Steel Association and Metals Consulting International

Table 6: Summary of steel product terms

Flat		Long	
Slab	The primary product of continuous casting	Rebar	Reinforcing bar
HRC	Hot rolled coil	Wire Rod	Rolled alloy or non-alloy steel product
CRC	Cold rolled coil	M. Bar	Merchant bar
HDG	Hot Dipped Galvanized steel		
AHSS	Advanced High Strength Steel		
Plate	Produced from slab. Main difference to coil is the thickness of the end product		

Source: BofA Merrill Lynch Global Research

Flat products

Flat products fall into 2 broad product types: 1) plate and 2) coil/sheet. Product prices increases along with the quality of the end product. Flat products are mainly produced by the BF/BOF, or integrated, production process.

- Slab: The primary product of continuous casting. Slabs are usually rectangular, 250mm thick, 5-12m long and 1-1.5m wide. Slab is not a finished product – i.e. cannot be used by a consumer. It must be processed into coil or plate before it can be used by an end consumer.

- Hot rolled coil: Hot rolled coil (HRC) is the most "commodity grade" sheet product. HRC is produced by re-rolling slab at high temperature and high speed in a strip mill. Steel thickness is less than 0.5 inches. HRC is a finished product produced at the first stage of processing. Subsequent processing produces higher quality products (in terms of finish, thinness). "Upgraded" / further processed products include, among others, cold rolled coil (CRC) and hot dipped galvanised (HDG) steel.

- Cold rolled coil: to produce CRC, HRC is re-rolled to further reduce its thickness. The steel is then heat treated (annealed) and strain-hardened to achieve the desired mechanical properties (strength, malleability). Surface finishes and textures can be added at this stage. CRC can be tailored in order to meet specific customer requirements (e.g. ultra-thin products for the beverage industry).

- Coated steel: Both HRC and CRC can be coated to improve anti corrosiveness and increase the life of the steel. A common type of coated steel is hot dipped galvanised (HDG) steel. HDG is coated in zinc and is often used in automotive applications. Coating with paint is also an option when producing coated products.

- Plate: Plate is also produced from slab. The main difference to coil is the thickness of the end product. Plate can also be put through a number of production processes in order to produce a higher quality product (based on strength, thickness and finish).

- Advanced High Strength Steel (AHSS): Has both high strength and good formability, as a result of the metals' unique microstructures.

Uses of flat steel

Automotive

Auto frames, suspension arms and wheels are all produced from hot rolled coil. The body of the car is produced for HDG steel.

General industrial applications

Industrial applications e.g. coated steel for household appliances, packaging and engineering.

Yellow goods / heavy equipment

Plate is often used to produce yellow goods.

Long products

Outside of China, long products are mainly produced by the Electric Arc Furnace production process. Products manufactured under this process include:

- Long-heavy products: Beams, sections, sheet piles, special sections, rails and merchant bars.

- Long light products: Concrete reinforcing bars and wire rods. Common rebar is a steel bar or mesh of steel wires used as a tension device in reinforced concrete.

- Drawn products: Steel wire (used for reinforcing tyres and cladding), sawing wire, drawn in low carbon steel (clear wire, annealed wire, galvanised wire, wire mesh and concrete fibres) and hard steel (pre-stressed wire).

Uses of long products

Construction

The end uses of long-carbon steel are construction (rebar) and infrastructure (rails and track shows for railways). These end markets account for c.90% of demand.

Automotive

Additional end markets include automotive (steel cord used to reinforce tyres).

Steel product images

Exhibit 12: Steel sheet products

Source: Company reports

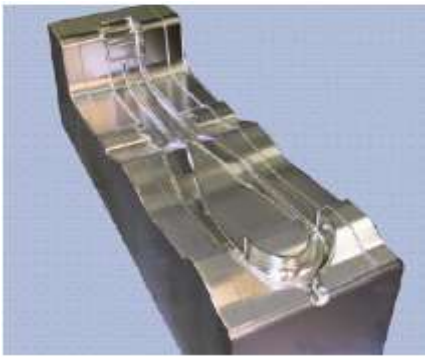
Exhibit 13: Electrical steel applications for electric vehicles

Source: Company reports

Exhibit 14: Steel sections

Source: The constructor

Exhibit 15: Tool steel for blanks



Source: Company reports

Exhibit 16: Valves

Source: Company reports

Exhibit 17: Rebar

Source: ArcelorMittal

Units of measurement

Steel prices and raw materials can be quoted in metric tonnes, short tonnes or long tonnes.

- Metric ton: 1000kg, 2205lbs. Used to quote steel prices in most regions (other than in the US) and raw material prices except scrap, are quoted in metric tonnes.
- Short ton: 2000lbs. US steel prices are quoted in short tonnes.
- Long ton: 2400lbs. US scrap prices are quoted in long tonnes.

Relative pricing of steel products

There is not one homogeneous steel product. Steel differs from LME traded products (like copper, zinc etc.) in that there are thousands of different steel grades depending on the demands of their customers and end users. Products can differ in thickness,

hardness, malleability, finish. Product specification can be determined at 2 steps of the production process: 1) liquid metal phase – alloys are added to give steel different qualities or 2) the finishing phase – steel can be cut, rolled or treated a variety of ways.

Producers can often attract a premium over HRC or rebar (commodity grade flat and long steels) when producing an "upgraded product". Pricing for premium products tends to move in line with commodity grade steel.

Table 7: Types of flat products

Type of steel	Relative pricing
HRC	The most "commodity grade" sheet produced and therefore the cheapest of the flat steels.
CRC	HRC is re-rolled to further reduce its thickness to produce CRC and is therefore priced at a premium to HRC.
HDG	Dipping of prepared steel into a bath of pure molten zinc metal to form an amalgam of zinc and iron ore. Priced at a premium vs. HRC and CRC.
Plate	Plate produced from slab can be put through a number of processes to produce a higher quality product. As such it has usually been priced at a premium vs. HRC and CRC.

Source: BofA Merrill Lynch Global Research

Table 8: Type of long products

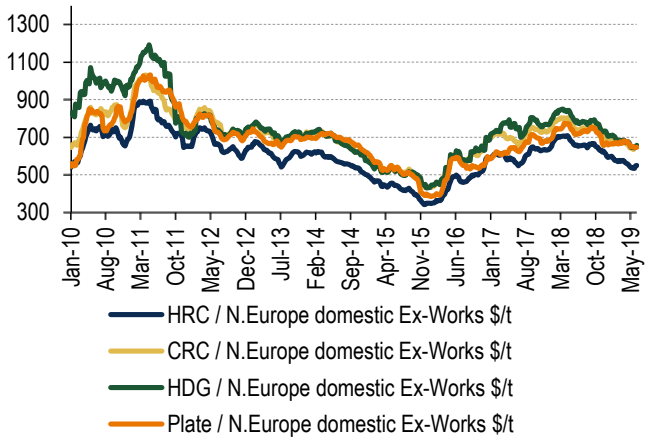
Type of steel	Relative pricing
Rebar	Steel bar or mesh of steel wires used as a tension device in reinforced concrete and the cheapest of the long steels
Wire Rod	Metal rod used in wiredrawing. Priced at a premium vs. Rebar
M. Bar	Finished steel product commonly in flat, square, round or hexagonal shapes. Priced at a premium vs. wire rod.

Source: BofA Merrill Lynch Global Research

As the charts below highlight, there can be some difference in product pricing in different regions and across different products. However, pricing for steel products do tend to "move together" with trade flows arbitraging pricing differences in different regions over time.

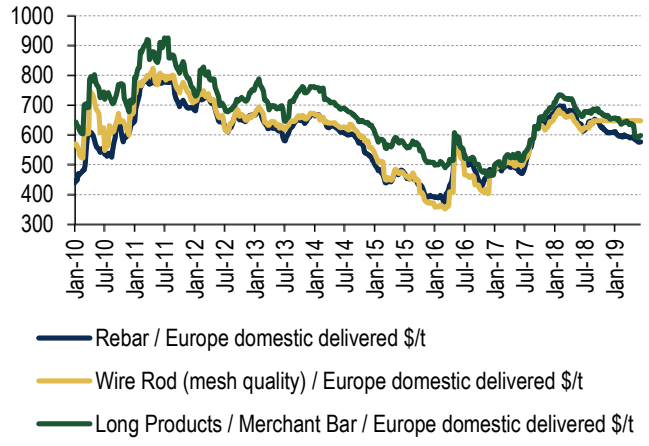
Product pricing – different products and different regions

Chart 10: European Flat products pricing $/t



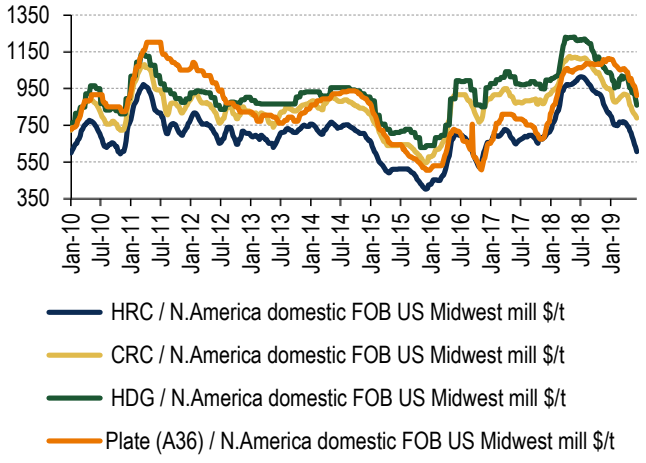
Source: BofA Merrill Lynch Global Research, Steel Business Briefing

Chart 11: European Long products pricing $/t



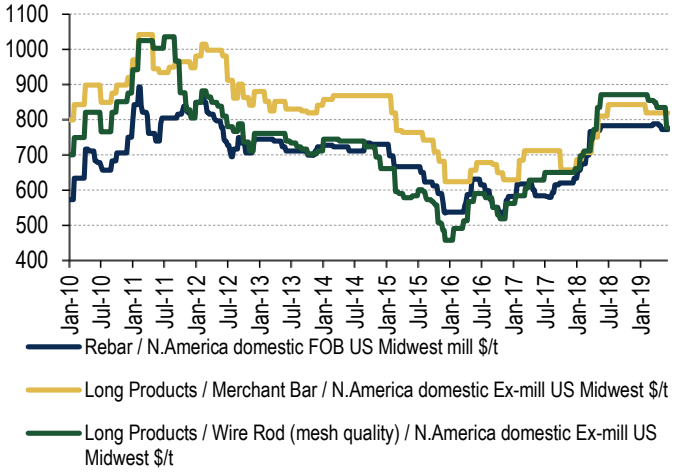
Source: BofA Merrill Lynch Global Research, Steel Business Briefing

Chart 12: N. America Flat product pricing $/t



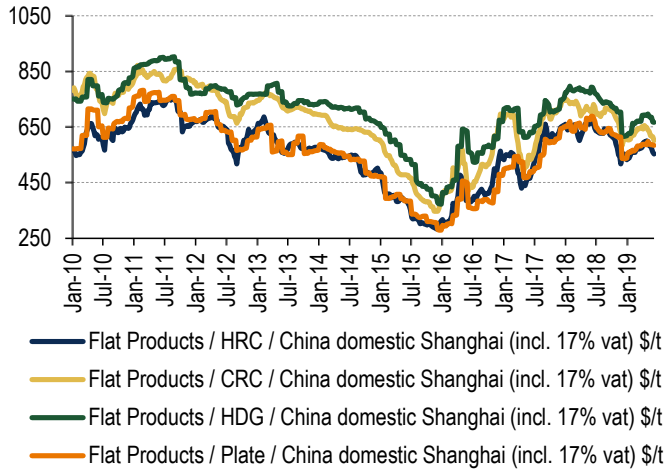
Source: BofA Merrill Lynch Global Research, Steel Business Briefing

Chart 13: N. America US Long product pricing $/t



Source: BofA Merrill Lynch Global Research, Steel Business Briefing

Chart 14: China Flat product pricing $/t



Source: BofA Merrill Lynch Global Research, Steel Business Briefing

Chart 15: China Long product pricing $/t

Source: BofA Merrill Lynch Global Research, Steel Business Briefing

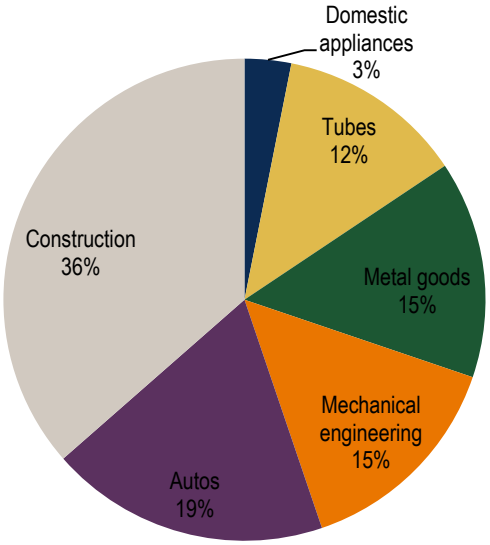
Steel demand and its key drivers

- China is c.50% of global steel demand
- GDP trends dictate YoY changes in global steel demand, with some regional differences observed. Chinese steel demand is more geared into construction (property : infrastructure around 3:2), US/Europe demand is more diversified with autos and machinery applications driving steel demand, as much as construction.
- China's steel consumption/capita has peaked in our view.
- The decline in per capita steel consumption in China will be very gradual.
- Steel demand in developed economies is no longer growing; it has plateaued. We think China annual steel demand has also close to a peak and forecast a slow decline.
- We consider new potential regions of demand for steel, particularly "One Belt, One Road". We suspected that the impact from OBOR on the steel sector is unlikely to be meaningful as funding faces bottlenecks and execution outside China remains challenging.

End demand drivers for steel by region

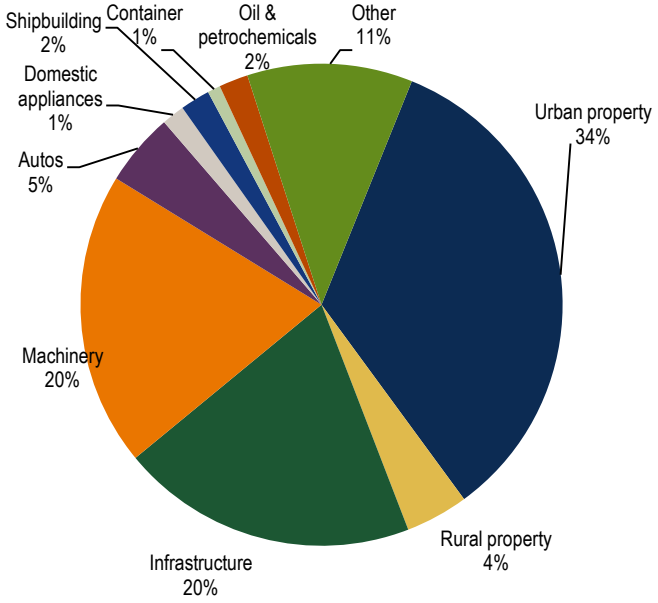
Global steel demand is linked to broad trends in global GDP however regional differences in end demand drivers are observed. We highlight key end markets for carbon steel in China, Europe, the US and the OECD countries. Chinese demand is strongly geared to construction trends (c. 54% of demand driven by property and infrastructure spending). In comparison, automotive and engineering applications are a larger driver of demand in Europe and the US.

Chart 16: Europe end market demand, 2018



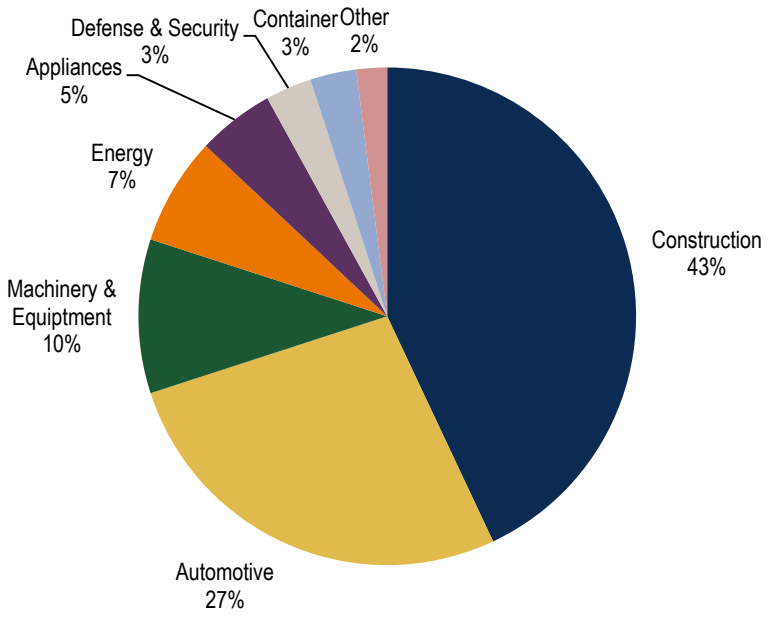
Source: BofA Merrill Lynch Global Research estimates, World Steel, CRU, Steel Business Briefing

Chart 17: China end market demand 2018



Source: BofA Merrill Lynch Global Research estimates, World Steel, CRU, Steel Business Briefing

Chart 18: US end market demand 2017

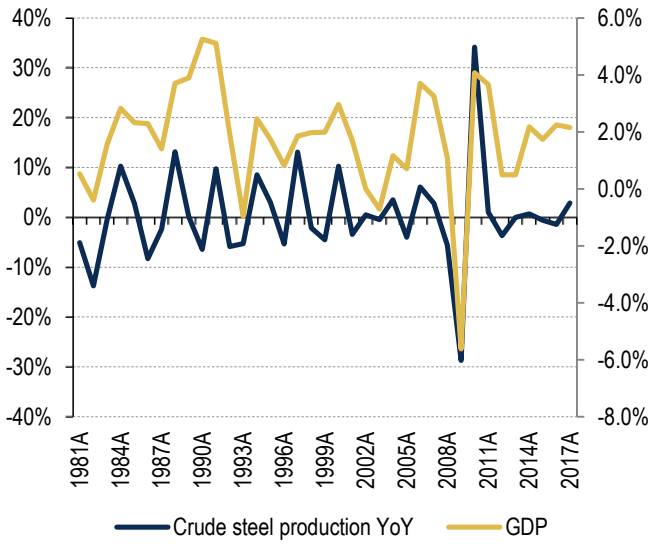


Source: AISI

Steel demand vs. GDP trends

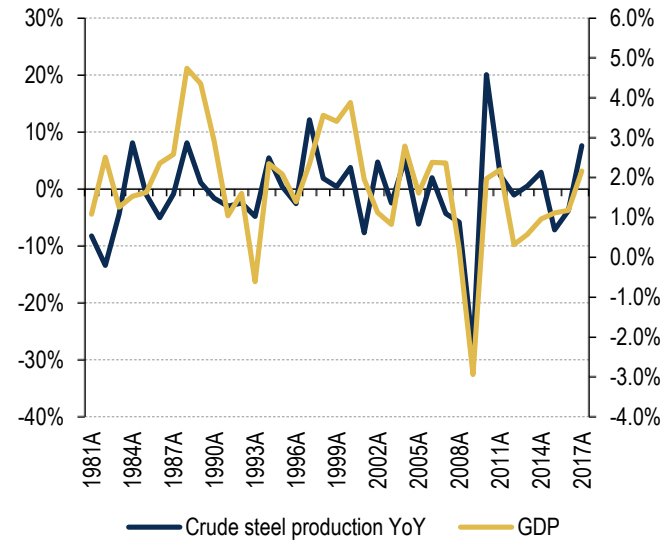
In developed markets there is a close link between GDP trends and steel demand. Running a correlation between GDP and annual YoY change in steel demand in Germany, France, Japan and the US returns an R square of between 0.53 and 0.63.

Chart 19: Germany - Steel demand YoY vs. GDP



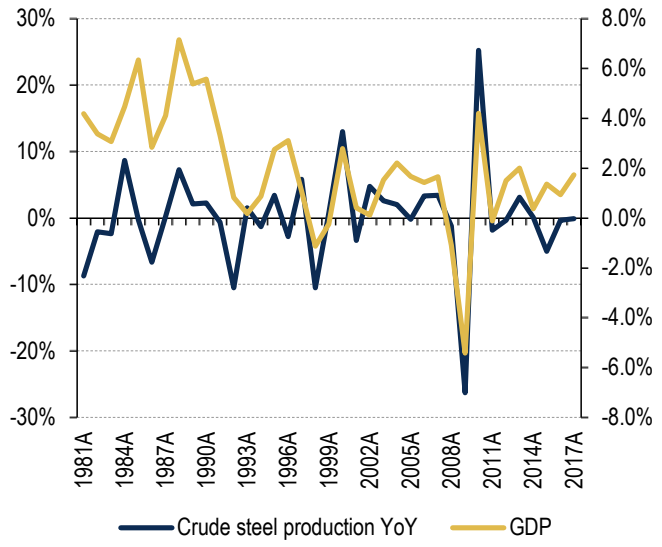
Source: WSA, BofA Merrill Lynch Global Research estimates, World Bank

Chart 20: France - Steel demand YoY vs. GDP



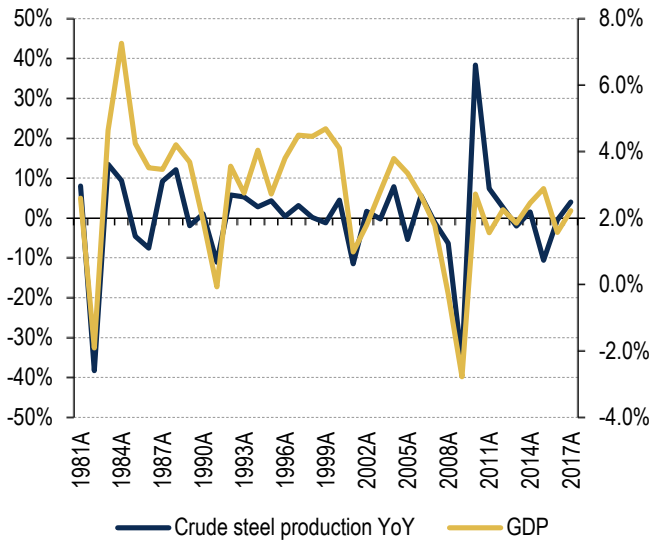
Source: WSA, BofA Merrill Lynch Global Research estimates, World Bank

Chart 21: Japan - Steel demand YoY vs. GDP



Source: WSA, BofA Merrill Lynch Global Research estimates, World Bank

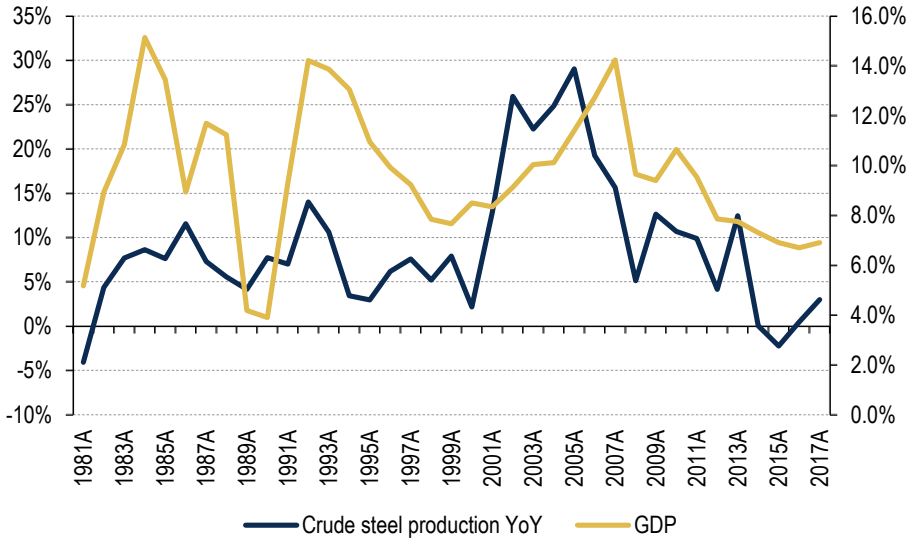
Chart 22: US - Steel demand YoY vs. GDP



Source: WSA, BofA Merrill Lynch Global Research estimates, World Bank

When we turn to China we note a weaker link between GDP trends and steel demand (R squared of only 0.36 over the analysis period). Steel demand growth has decelerated more rapidly vs. GDP in the past 10 years. Steel demand ramped up more aggressively than GDP in the 1990's/2000's hence positioning demand for a faster "normalization" to long-term growth levels.

Chart 23: China - Steel demand YoY vs. GDP



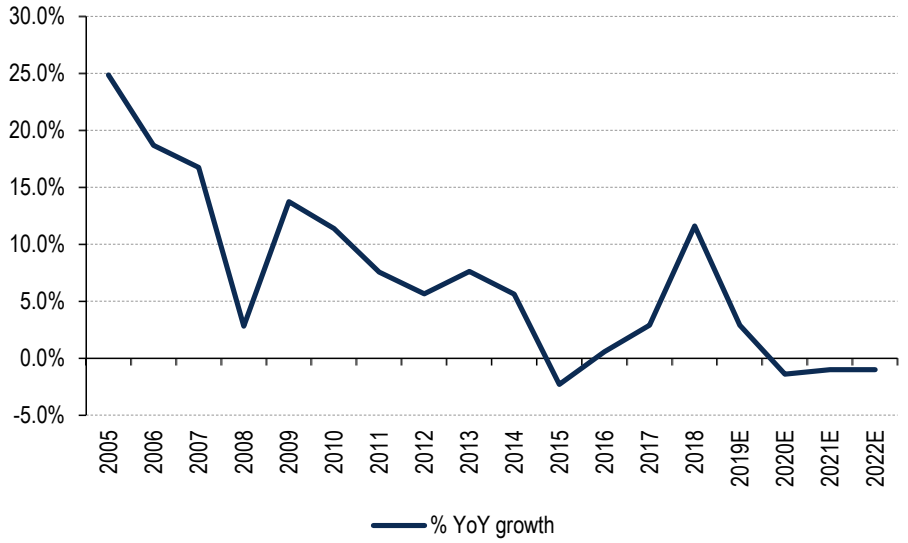
Source: WSA, BofA Merrill Lynch Global Research estimates, World Bank

China vs. US consumption trends

China consumes roughly 50% of all crude steel produced globally. As such we think it is important to examine Chinese commodity consumption trends in greater detail. China's demand growth for "early development" materials e.g. steelmaking raw materials is tapering off post a period of exceptional growth. Looking to 'late development commodities' China has a much smaller share of the market e.g. Diamonds where China made up c.10% of demand.

Chart 24: China steel demand growth

Production and demand normalizing after a period of super normal growth. Pre 2018, illegal production is not reported.



Source: BofA Merrill Lynch Global Research estimates

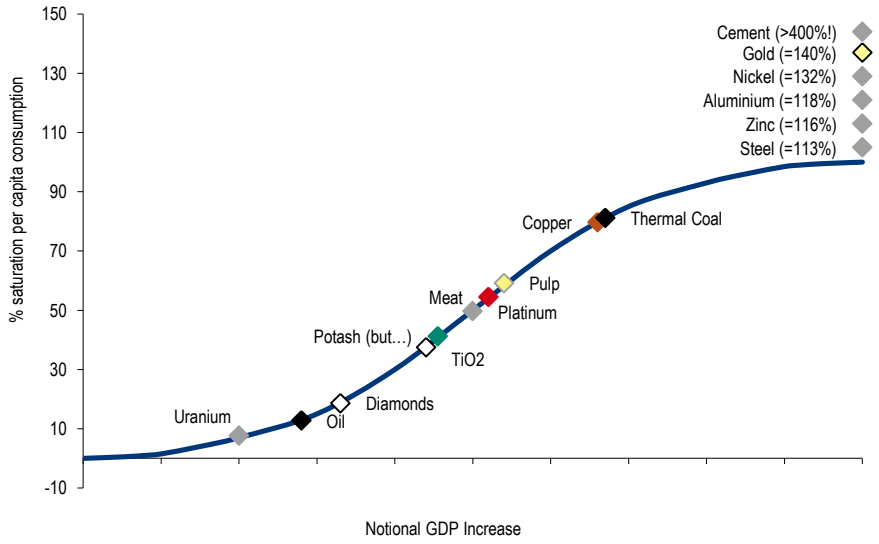
How much does China consume, per capita vs. a developed market?

In the analysis below, we look at China's per capita consumption of various basic materials relative to the US at its steady state, pre-deindustrialization levels of consumption ("% Saturation"). We can see clearly that China already consumes quite high levels of steel and cement on a per capita basis relative to western world peaks, less for copper and aluminium with the most potential upside in platinum, oil, pulp and diamonds.

Steel now more cyclical than structural?

As far as the equity implications here, we think that steel demand is more of a "cyclical" trade now (i.e. will depend on the degree to which China stimulates capital formation) whereas the other commodities will be more long term – structural trades where China is coming to the steep part of the "S Curve".

Chart 25: **"S" curve of consumption intensity, China vs. US**

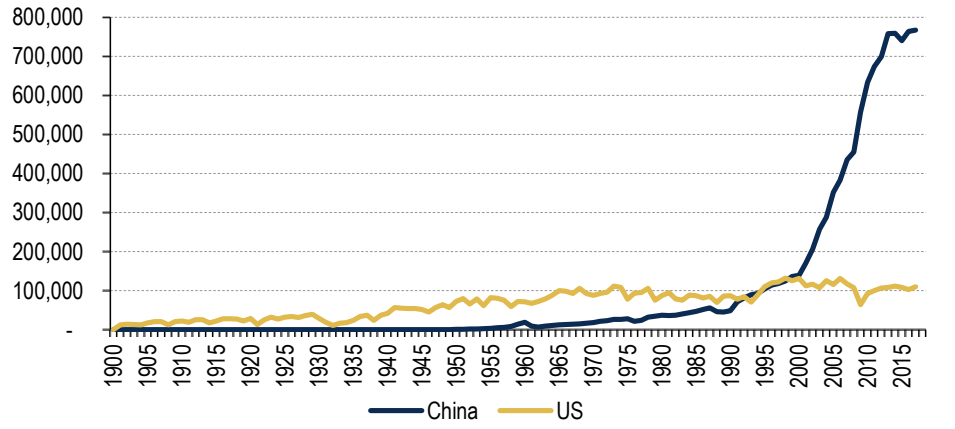


Source: BofA Merrill Lynch Global Research estimates

However, China's installed base of steel is relatively low

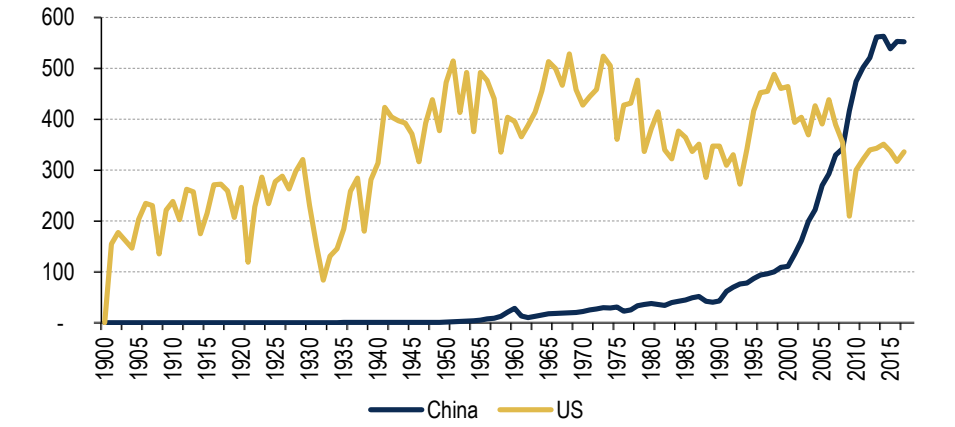
While China's per capita consumption of some early development basic materials is very high relative to developed world levels, we note that this has not been the case for very long. If, rather than looking at annual consumption, we look at cumulative "investment" in metals, we observe quite a different picture. In the chart below we can see that China's gross steel consumption was well below the US for most of the 20th century.

Chart 26: US and China consumption of steel (kt)



Source: BofA Merrill Lynch Global Research estimates

Chart 27: US and China per capita consumption of steel kg/capita



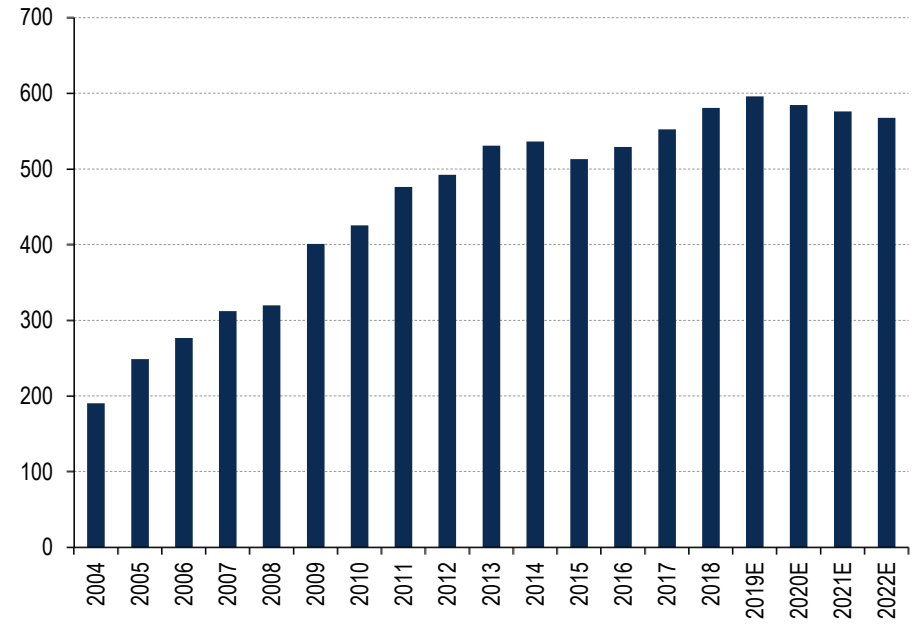
Source: World steel, USGS, World bank, CIA world fact book, IISI, UN statistics

Regional per capita consumption of steel

We expand our analysis and compare China per capita consumption trends and GDP per capita vs. trends observed in other important steel consuming regions. In Europe, the US and Japan we note that per capita steel consumption rises as GDP per capita rises before levelling off even as GDP per capita continues to grow. In these economies, per capita steel consumption growth "flat lines" once an installed base of steel has been put in place. Hence in the long-term steel consumption trends tend to move with population growth (or decline). Looking to South Korea, we note that per capita steel consumption growth has not tapered but continued to rise with higher GDP per capita. We think this can be explained by the nature of South Korea's economy which includes a large export focussed industry developing high quality machinery, capital equipment and automotive products. Essentially, steel is consumed domestically in South Korea but exported in the form of finished products. Bearish views on Chinese steel consumption point to long-term per capital steel consumption level of steel in Europe and the US (c. 350-

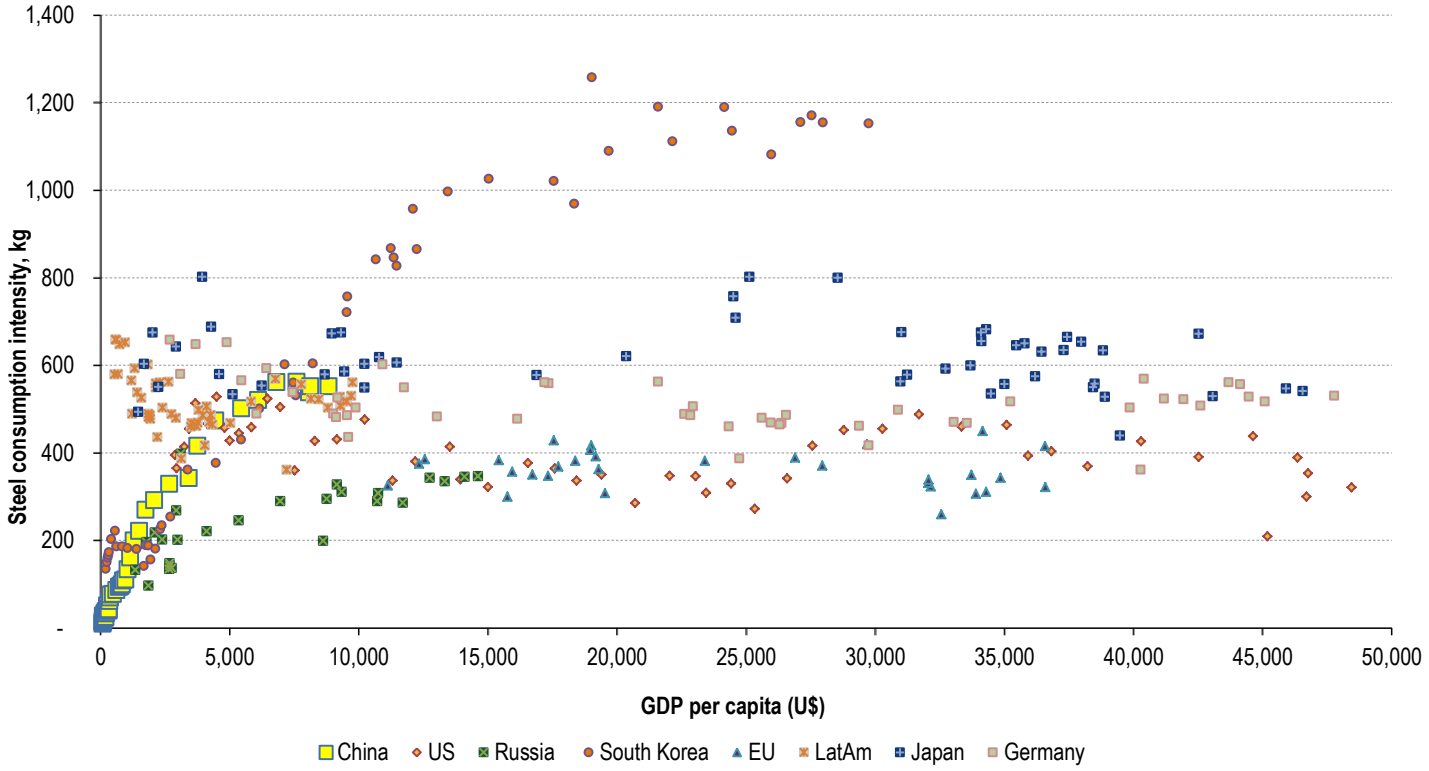
400kg/capita) vs. Chinese per capita consumption of 532kg; suggesting total annual steel consumption in China could fall by c30% in the near-term. We think per capita consumption of steel in China has peaked but expect only a very moderate decline in per capita consumption in the medium term.

Chart 28: China per capita consumption of finished steel (kg/capital)



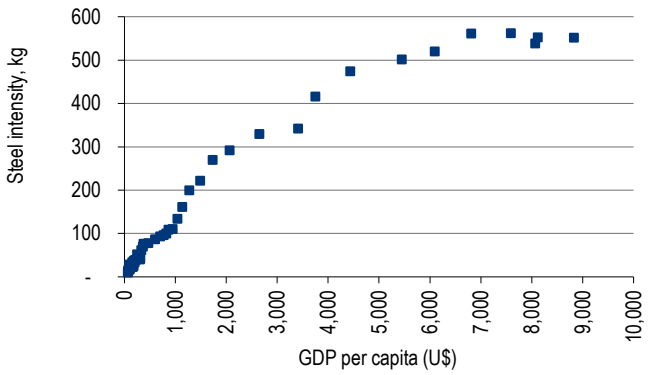
Source: BofA Merrill Lynch Global Research estimates

Chart 29: Per capita consumption trends in major steel consuming markets (1960 -2017)



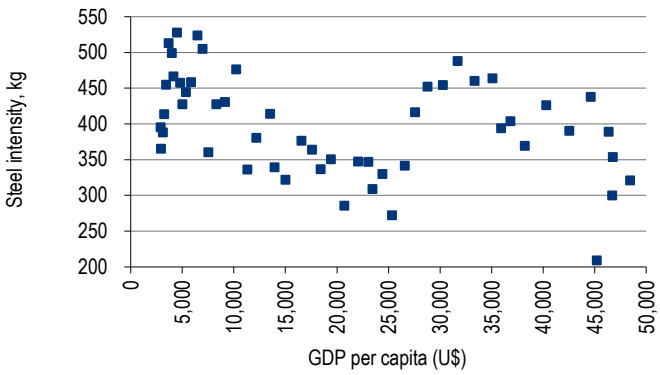
Source: World steel, USGS, World bank, CIA world fact book, IISI, UN statistics

Chart 30: China: Steel consumption per capita vs. GDP per capita, 1960-2017



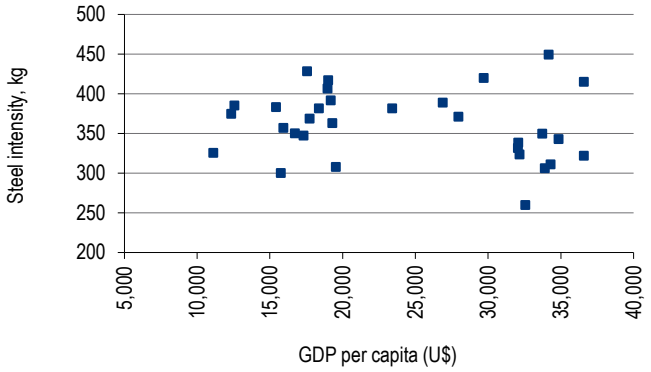
Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Chart 31: US: Steel consumption per capita vs. GDP per capita, 1960-2017



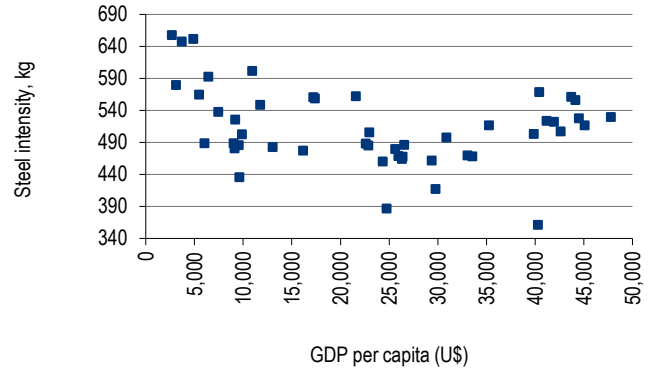
Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Chart 32: EU: Steel consumption per capita vs. GDP per capita, 1960-2017



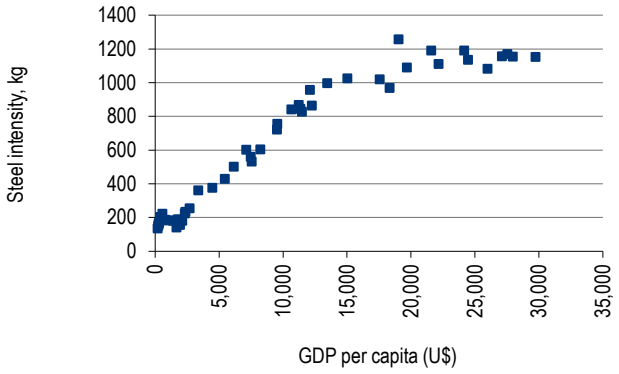
Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Chart 33: Germany: Steel consumption per capita vs. GDP per capita, 1960-2017



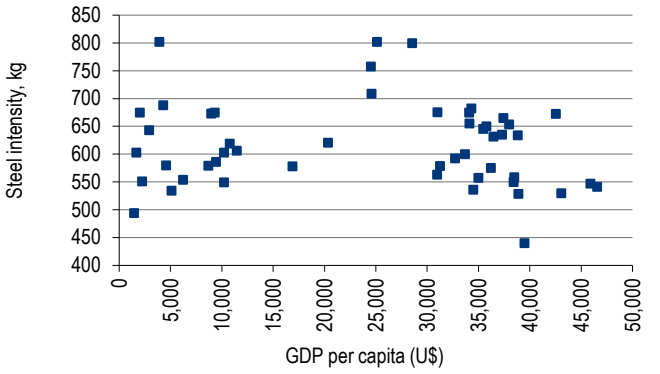
Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Chart 34: South Korea: Steel consumption per capita vs. GDP per capita, 1960-2017



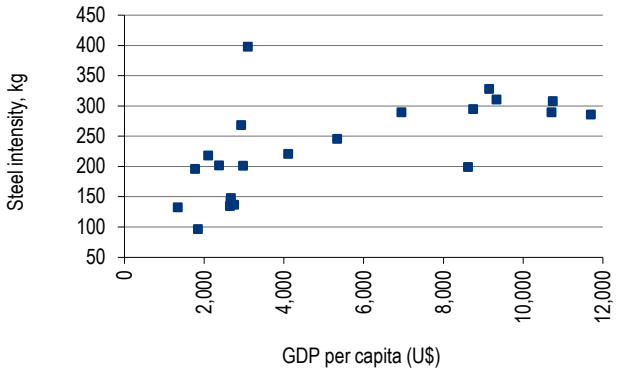
Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Chart 35: Japan: Steel consumption per capita vs. GDP per capita, 1960-2017



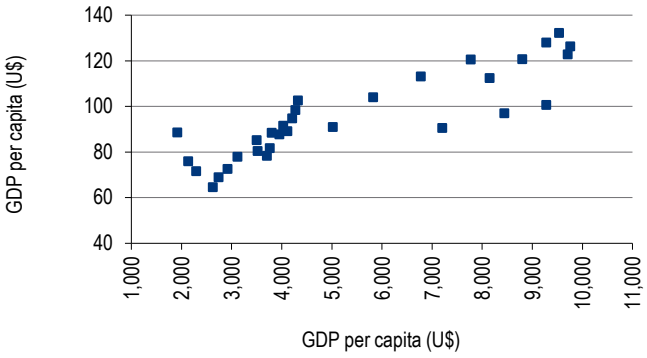
Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Chart 36: Russia: Steel consumption per capita vs. GDP per capita, 1960-2017



Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Chart 37: Latam: Steel consumption per capita vs. GDP per capita, 1960-2017



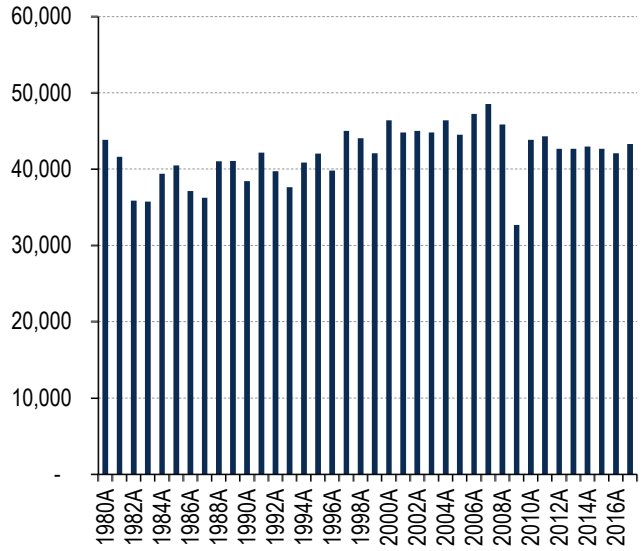
Source: BofA Merrill Lynch Global Research estimates, CRU, World Bank, World Steel Association

Steel demand/production in developed markets not growing, China demand forecasted to flat line

We contrast the trend of steel production in developed economies (Germany, Japan and the US) vs. the trend in China. We think steel production is a fair proxy for steel demand as producers will tend to shut capacity to the extent supply exceeds demand.

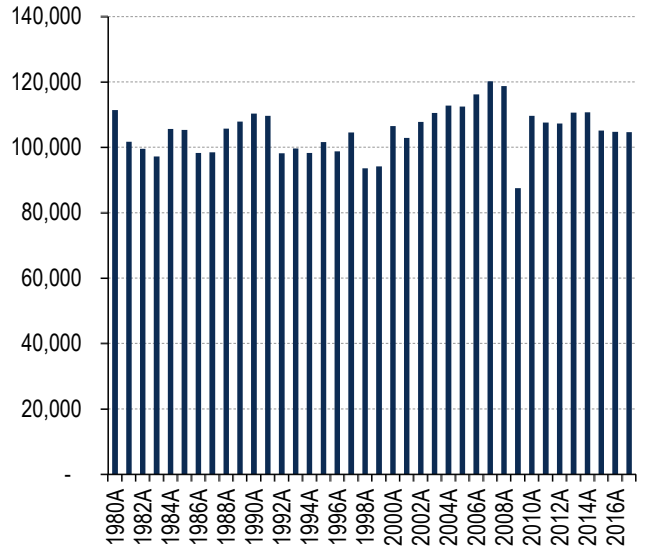
These charts highlight the plateau in steel demand in developed economies over the last 30 years. Chinese production/demand has increased more than 8 times over the period. However, from here we see the trend of steel production in China following a similar pattern to that in developed economies – reaching a plateau, or even slightly declining in the medium term.

Chart 38: Germany - Crude steel production, kt



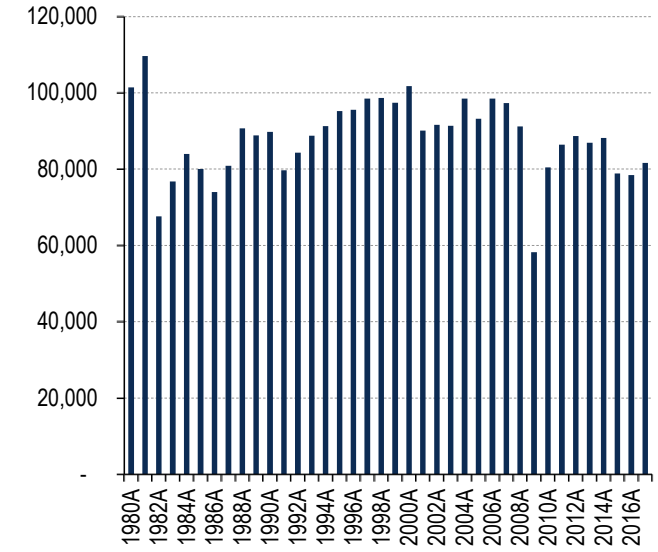
Source: World Steel Association

Chart 39: Japan - Crude steel production, kt



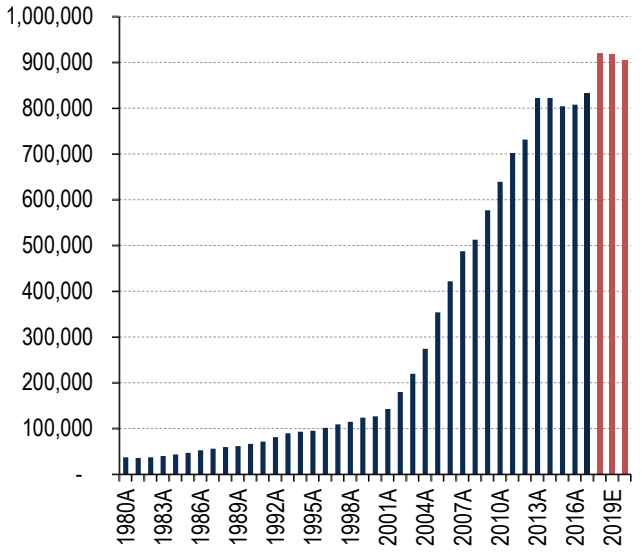
Source: World Steel Association

Chart 40: US - Crude steel production, kt



Source: World Steel Association

Chart 41: China - Crude steel production, kt



Source: World Steel Associate, BofA Merrill Lynch Global Research estimates. Note: Pre-2018, illegal production not reported.

One Belt, One Road: implications for global steel demand

So far, our analysis suggests limited domestic steel demand growth in China and other key steel consuming regions. We now consider the potential for steel demand to be supported by China's "One Belt, One Road" initiative.

In March 2015, the Chinese government published a major strategic development program titled "One Belt, One Road (OBOR)", which aimed at fostering regional economic growth over the next few years with a total funding of c.$200bn. As big as this number sounds, it is only equal to 1.8% of China's 2016 GDP to be spent over a number of years, across a number of projects, sectors and commodities with some contracts potentially being awarded to companies outside of China. At the stage, we suspected that the impact from OBOR on the steel sector would not be meaningful as funding faces a key bottleneck and execution outside China remains challenging. (See our China team's note China: An Equity Strategist's Diary: One-Belt One-Road, a reality check 15 May 2017). In addition, the program will be rolled out over a number of years across a number of sector/projects suggesting an annual impact to global steel demand could be very muted.

We believe that the most important benefit of OBOR is political, i.e. closer ties with many countries important to China's long term security. Economic impact should be moderate – 1% of China's FAI is equivalent to Rmb0.5tr spending a year, exceeding the most optimistic estimate of OBOR infrastructure spending in the foreseeable future. Despite numerous benefits the programme can bring China, it is likely to face potential resistance from recipient countries due to various political and economic reasons. Besides, funding based on known sources can be a bottleneck.

We provide a summary of the OBOR program as published by our Chinese strategist, David Cui.
China: One Belt & One Road, Great Expectations 16 March 2015

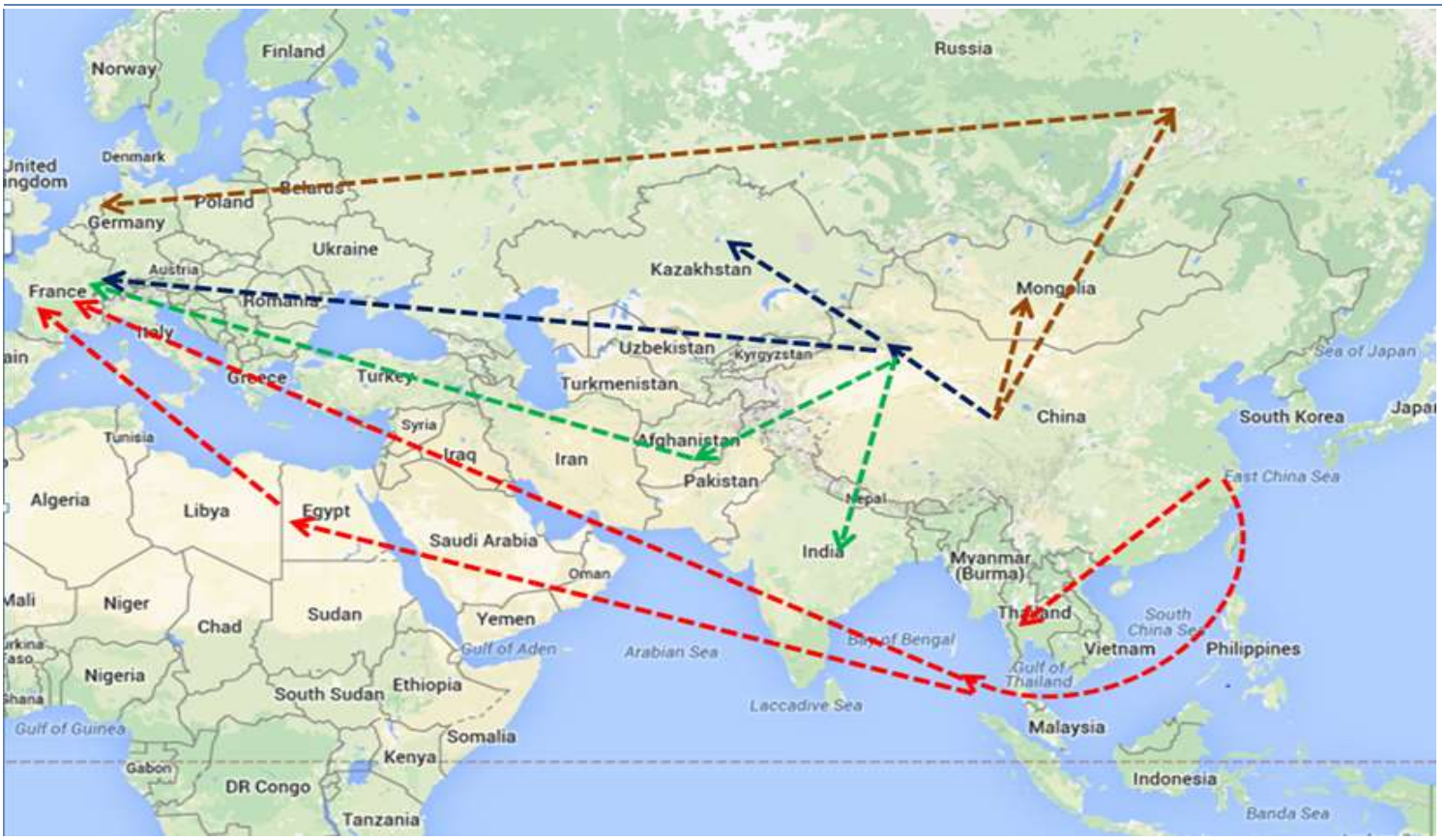
An introduction to One Belt, One Road

China has pursued close economic and political ties with neighbouring countries for decades, For example, the Eurasian Land Bridge, a 4,131km long rail/road transport route connecting 14 provinces in China ultimately with Rotterdam, was officially opened

in 1990 (with first container shipment occurred in 1992). The OBOR program represents a major expansion of the government's initiative on this front. President Xi first raised the concept of one belt in September 2013. Subsequently, he has highlighted the OBOR initiative at least five times at high-profile international events based on our count.

One Road, or the so-called ground silk road, aims to link China's inland provinces with central Asia and Europe; while One Belt, or the so-called marine silk road, starts from China's coastal region and goes all the way to Europe via Southeast Asia and Africa. According to various speeches by President Xi and Foreign Affairs Minister WANG Yi, One Road has three routes: 1) North China – Mongolia – Russia – Europe; 2) China – Middle Asia –Europe; 3) China – Middle Asia – West Asia/Middle East; and One Belt, China – ASEAN – Middle East –-Europe. Obviously, economic benefits may extend to countries adjacent to the routes.

Exhibit 18: Possible OBOR routes



Source: Various news flow, BofA Merrill Lynch Global Research

Why China wants OBOR

We see a number of benefits from China from the One Belt, One Road program. First, it may enable China to forge close economic and political alliances with countries strategically important to China and expand China's sphere of influence. For example, the pipeline through Myanmar affords China direct access to the Indian Ocean and reduces China's over reliance on the Strait of Malacca for oil supply security. Another example is a close alliance with resources rich countries that may help to cement long term mutually benefiting trading relationship.

Second, it helps China to export, especially in sectors with overcapacity, e.g. railway equipment, construction, and building materials. By the way, exporting capital, importing foreign demand and addressing overcapacity are really different aspects of the same issue – China's excessive savings needs an outlet. Traditionally, the government was happy to passively buy US treasury bonds. Now, it seems that, the government wants to

shift at least part of the savings to higher risk direct investment and/or lending to OBOR countries. In 2014, overseas direct investment by Chinese companies had surpassed FDI for the first time and the trend will most likely carry on, in our opinion.

Third, it may help to "upgrade" the Chinese economy. OBOR may open doors in destination countries for China to establish a foothold in important service sectors, including banking, power and telecom. In this regard, a wide spread usage of RMB globally can be a major initiative to expand the influence of China's financial sector. With better connectivity, in the long term, China may be able to relocate some of the low end manufacturing capacities, especially those heavily polluting, elsewhere while focussing on the more value added parts of the value chain.

Fourth, it may help China to rebalance between coastal and some of the inland regions. So far, the main force behind regional rebalancing has been to relocate manufacturing capacity from coastal regions to inland areas because of the latters' cheaper land, labour and environment-related costs. However, as exports are largely shipped seaborne, so logistic costs are substantial. OBOR can divert part of the export shipments from coastal regions to inland regions. For example, about a third of Yiwu (in coastal Zhejiang)'s exports are to Arabian countries, which are geographically and culturally closer to western China.

By providing the investment or lending in RMB, OBOR may also help the government's efforts to internationalize the currency, and perhaps even help to draw OBOR countries into an RMB block in the long term.

Hurdles to implementing OBOR and why other countries may not be as supportive

We believe that the key hurdles are at the destination countries' side, for both political and economic reasons.

Politically, not all countries want to come to rely on China too much. India and the Philippines are prime examples given the territory disputes. Also close US allies may be less keen to pursue too close a tie to China. Even countries traditionally perceived to be close to the Chinese government, e.g. Sri Lanka, may change their mind when domestic political dynamics changes.

Economically, not all countries welcome foreign investment. This is quite counter intuitive but true. In general, any countries with sufficient domestic savings are probably better off without importing foreign capital unless the capital brings something more than just funding, say technology or management expertise. This has largely been the situation for China for at least a decade – FDI gets equity-like returns in China while the Chinese government recycles the US dollars and buys treasuries with much lower returns. This represents a significant negative spread (unless FDI brings in significant externalities). This is the main reason why we think the Chinese government had by and large removed tax incentives for most foreign capitals by now.

From this perspective, it's quite interesting to note that OBOR countries as a group have consistently run a positive current account balance since the late 1990s, suggesting, broadly speaking, sufficient domestic savings in these countries. Another way to view this is that, despite abundant global savings and ultra-low interest rates in recent years, these countries as a group had not felt the urge to borrow overseas and build domestic infrastructure. It's difficult to see why, all of a sudden, they all want to take China's capital just because of the Chinese government's OBOR program (of course, unless the deals are too sweat to resist; more on this later).

Within the group, there are indeed countries that run fairly large current account deficits relative to GDP – for example, Mongolia, Maldives, Cambodia, Benin and UAE all had their current account to GDP ratio above 5% in 2013 (Chart 8).

However, economically the size of these countries are small– together, they accounted for some 2% of the total OBOR countries' GDP in PPP terms in 2013 based on IMF's estimates. On the other hand, big countries like India (31% the group's GDP), Russia (14%) and Indonesia (8%) and Iran (5%) run moderate deficits or surpluses (although things in Russia and Iran might have changed in recent years due to economic sanctions).

Funding remains a key bottleneck

In addition to the potential hurdles at the destination countries mentioned in the previous section, funding on the Chinese side may also present a problem.

The two major sources are funding are 1) the government; and 2) private capital (including SOEs' for the purpose of this discussion). We believe that government financing will be the majority of the two.

In the current economic and political backdrop, it seems to us that both SOEs and private corporate have taken a cautious approach to fund OBOR projects due to more stringent capital outflow controls and a less-than-enthusiastic voice from the top leadership. Also note that, albeit that OBOR projects might be granted some leeway to invest in overseas projects, the government might prefer projects in high-tech industries to manufacturing or construction industries.

Regional country default risk as potential hurdles to China government funding

Here is the dilemma for China to finance infrastructure and other projects in OBOR countries - a winner's curse in a way: the ones with current account surplus don't really need China's capital so they probably won't take it unless it's being offered at extremely attractive terms; the ones with large current account deficits may be willing takers of China's money but they tend to have unfavourable economic fundamentals, so they are high risk borrowers. The chart below illustrates the challenged state of the financial system in many OBOR countries.

Table 9: NPL ratios of OBOR countries, 2013 (%)

Name	Ratio	Name	Ratio	Name	Ratio	Name	Ratio
Afghanistan	5	Iraq	NA	Nepal	NA	Sri Lanka	6
Bangladesh	9	Kazakhstan	19	Nigeria	3	Syrian	NA
Benin	NA	Kirghizstan	NA	Oman	2	Tajikistan	16
Brunei	5	Kuwait	4	Pakistan	13	Thailand	2
Cambodia	NA	Lao	NA	Philippines	2	Turkmenistan	NA
Egypt	9	Malaysia	2	Poland	5	Ukraine	13
India	4	Maldives	NA	Qatar	2	UAE	7
Indonesia	2	Mongolia	NA	Russia	6	Uzbekistan	0.4
Iran	NA	Myanmar	NA	Singapore	1	Vietnam	NA

Source: World Bank, BofA Merrill Lynch Global Research

The main impact of OBOR can be domestic

Rather than in an overseas market, we suspect that the main OBOR related spending can incur in the domestic market. We have noticed that pretty much all local governments have embraced OBOR enthusiastically at first, probably because it presents a convenient reason for them to spend more on investment, including on local infrastructure and free-trade-zones, to boost growth.

At this stage, we expect the central government to keep a tight leash on local government debt, thus their spending capabilities. In addition, the subdued property market may also constrain their income and spending power. As a result, we don't expect incremental local government spending as a result of OBOR to be anything major – it's possible that local governments may build many projects directly or indirectly tied to OBOR, but unless the overall debt control by the central government is eased, net increase in infrastructure spending by them should be limited. In another word, OBOR projects may simply largely replace projects for other purposes.

Limited short to medium term impact on the steel industry

In the near to medium term, the steel industry is likely to see limited impact from OBOR due to potential funding problems and hence a slower than expected project pipeline. In the table below we highlighted five major construction-related projects under OBOR which account for barely 5% of the total planned funding of US$200bn. In addition, the scale of OBOR investments, in our estimates, is unlikely to exceed 1% FAI in China in the near future.

Table 10: Highlighted construction projects under OBOR

Project	Country	Funding	Details	Source
Padma Bridge	Bangladesh	4.9bn taka (US$60m), of which 4bn taka from Saudi Fund Development and 0.9bn taka from the Bangladeshi government	Sinohydro Corporation Limited (China SOE) signed the official construction contract with the Bangladeshi Roads and Highways Department in Feb 2017 to build the bridge to connect with Bandar and Sadar.	Yidaiyilu.gov. China Daily
China-Laos railway	Laos	40bn RMB (US$5.8bn), of which 70% funded by China and 30% Laos	The China-Laos railway has a total length of 414km. Operating speed on the route is designed at 160 km/hr. Construction of the project is scheduled for 5 years	Yidaiyilu.gov. China Daily
China-Belarus Industrial Park	Belarus	US$5.6bn, of which initial funding US$1.5bn from China and US$500m from Belarus	A 90 sqkm industrial park jointly developed by China and Belarus which has attracted Chinese companies such as Huawei, ZTE and China Merchants Group.	Yidaiyilu.gov. China Daily
Malaysia-China Kuantan Industrial Park	Malaysia	10.5bn ringgit (US$3.4bn), split c50% each from China and Malaysia	A 12 kmsq industrial park jointly developed by Malaysia and China in which investors will be given a 15-year tax exemption period	Yidaiyilu.gov. China Daily
China-Myanmar railway	Myanmar	est. RMB10bn (US$1.5bn)	A 1.9km railway connecting Kunming and Yangon with designed speed at 160 km/hr	Yidaiyilu.gov

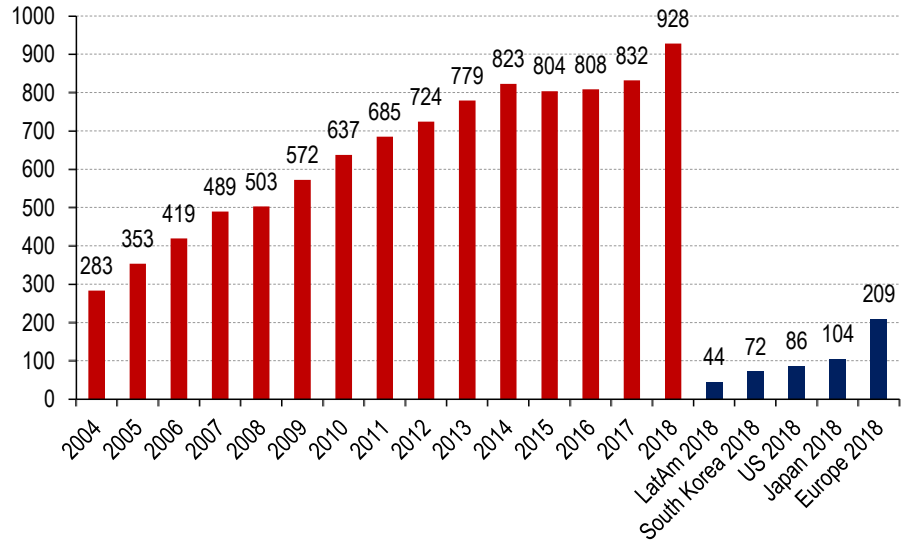
Source: China Daily, One Belt One Road official website (yidaiyilu.gov), BofA Merrill Lynch Global Research

Steel supply

- China dominates the global steel market producing and consuming roughly 50% of all steel globally.
- There is limited incentive to add upstream capacity in steel. China has in fact closed capacity under its “supply-side reform” program.
- Outside of China, some investments are being made in steel capacity but these are focused on downstream, niche products.
- Consolidation is a theme both in Europe and China. In addition, in Europe we note ArcelorMittal’ s acquisition of ILVA. In China, government support for SOEs and a push to consolidate fragmented industries has resulted in the merger of Baosteel and Wuhan Iron and Steel in 2016. In 2019 Baowu announced further plans to acquire a majority stake in Magang.
- We see potential for more consolidation in China.

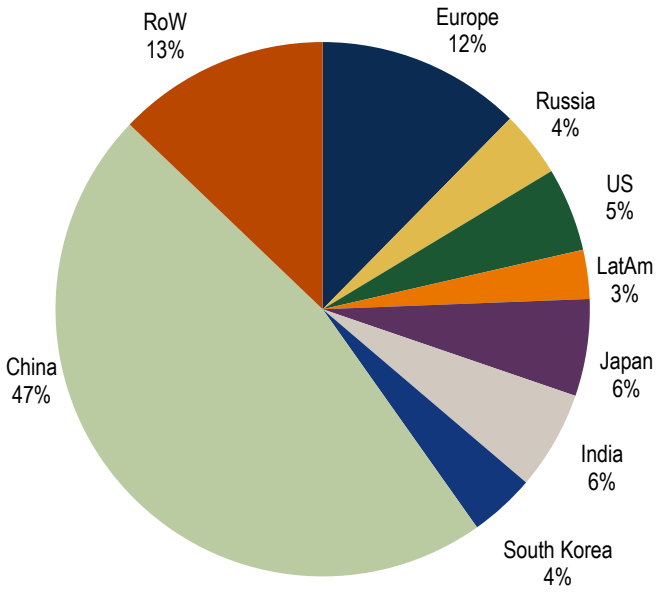
China dominates the global steel market, producing and consuming c.50% of steel globally. In 2018, Europe, Japan, India, US, Russia and South Korea made up 12%, 6%, 6%, 5%, 4% and 4% of total global supply respectively. On a company level, the top 10 global steel producers accounted for a total of 503Mt production capacity, or 29% of global supply; of which China accounted for 6 out of 10 largest global steel producers with a total capacity of 247Mt (c.14% of global supply).

Chart 42: China crude steel production vs. other major steel supplying countries



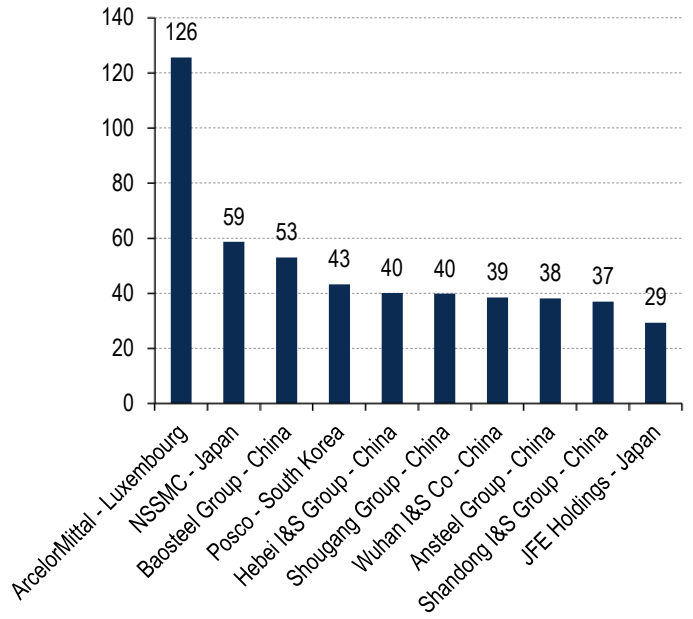
Source: BofA Merrill Lynch Global research estimates, World Steel Europe. Note: Pre 2018, Chinese illegal production is not reported.

Chart 43: Global crude steel capacity by country, CY2017



Source: BofA Merrill Lynch Global Research estimates, World Steel, CRU, Steel Business Briefing.
Note: Europe includes Turkey

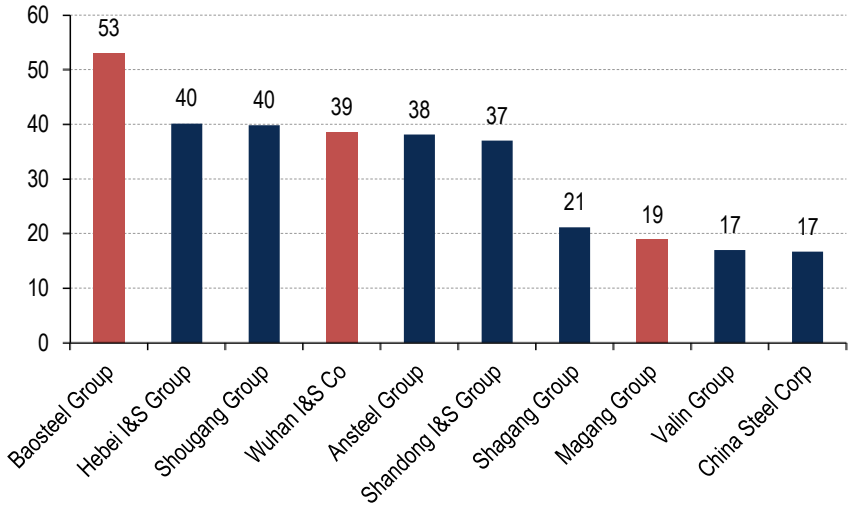
Chart 44: Top 10 global steel producers by capacity (Mt), CY2018



Source: BofA Merrill Lynch Global Research estimates, CRU

The top 10 Chinese steel producers by capacity make up c.30% of the total China market with the rest of the market highly fragmented controlled by a large number of smaller private operators. Consolidation is underway in China with Baosteel, Wuhan and Magang now all controlled by 1 group.

Chart 45: Top 10 Chinese steel producers by capacity (Mt), CY2018



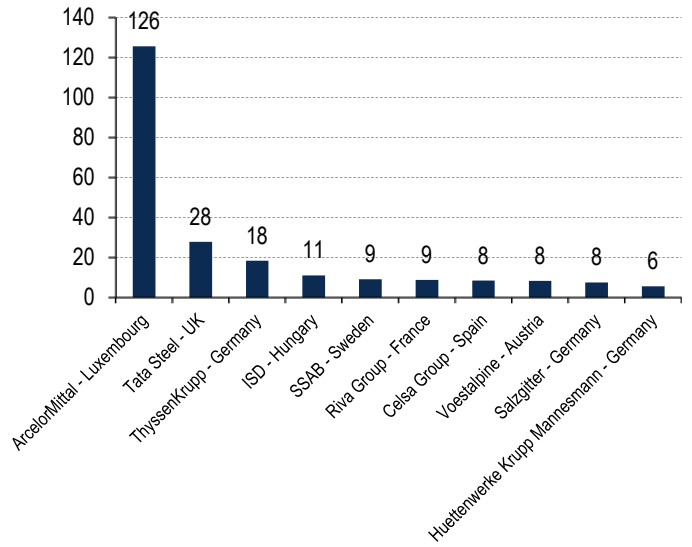
Source: BofA Merrill Lynch Global Research estimates, CRU

In response to weak industry profitability and lack of supply discipline the Chinese government implemented a program of "supply side reform" mandating capacity elimination targets and driving industry consolidation. In September 2016, Baosteel completed a merger with Wuhan Iron & Steel thus creating China's biggest steelmaker. We provide more details on China's plans to transform its steel industry in our section on the Chinese steel industry.

Other major producers

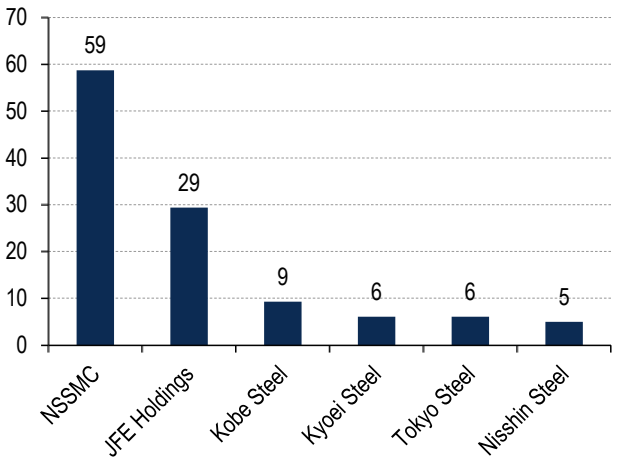
We highlight the top steel producers by capacity in other major markets.

Chart 46: Top 10 European steel producers by capacity (Mt), CY2018



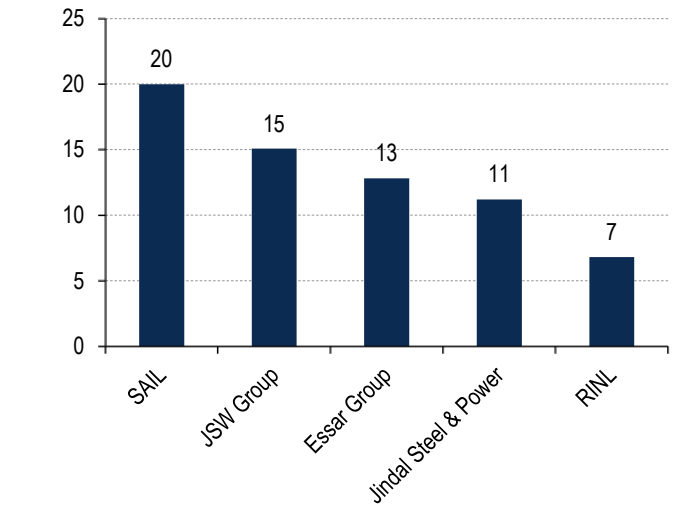
Source: BofA Merrill Lynch Global Research estimates, CRU. Note: (1) NKM is a JV among Salzgitter, Thyssenkrupp and Vallourec. (2) ArcelorMittal's capacity is spread across Europe, North America, Brazil, CE Europe/Asia and Africa

Chart 47: Top Japanese steel producers by capacity (Mt), CY2018



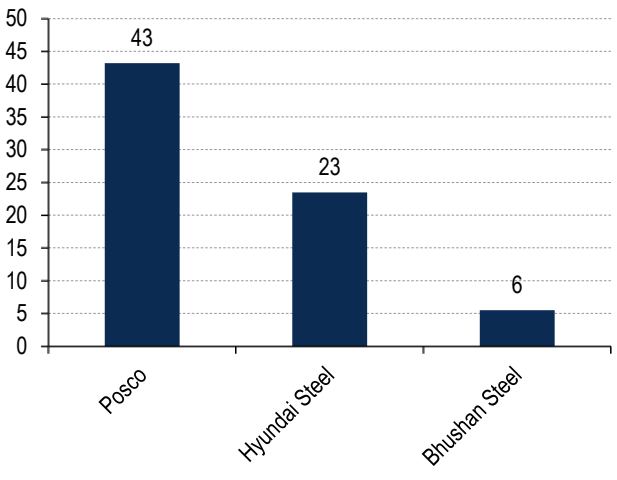
Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 48: Top Indian steel producers by capacity (Mt), CY2018



Source: BofA Merrill Lynch Global Research estimates, CRU

Chart 49: Top South Korean steel producers by capacity (Mt), CY2018



Source: BofA Merrill Lynch Global Research estimates, CRU

The Chinese steel industry and steel demand from property

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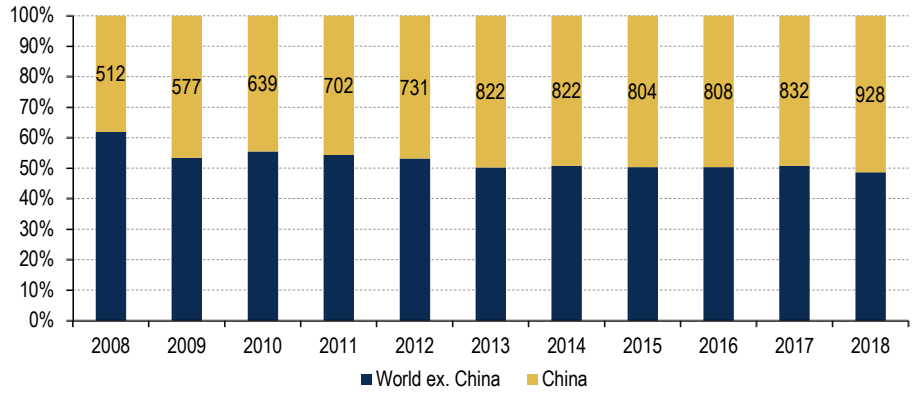
China dominates the global steel market, producing and consuming c.50% of steel globally.

Chart 50: China crude steel production in mnt and as % of world production



Source: World Steel Association, BofA Merrill Lynch Global Research

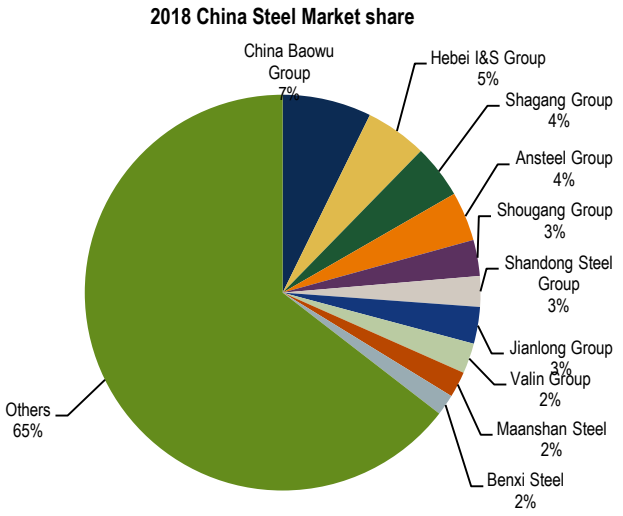
As of end-FY18, the top 5 steelmaking provinces (areas) in China were Hebei (237.3mnt or 25.6%), Jiangsu (104.3mnt or 11.3%), Shandong (71.8mnt or 7.8%), Liaoning (68.7mnt or 7.4%) and Shanxi (53.9mnt or 5.8%). The chart below displays the crude steel production distribution across the nation (Darker colour indicates the higher production). It can be seen that crude steel production is quite concentrated around the nation's capital Beijing.

Exhibit 19: China Crude Steel Production Distribution as of end-FY18

Source: NBS, BofA Merrill Lynch Global Research
Note: Provinces / Areas with crude steel production have been listed in the map. *Darker blue indicates higher crude steel production.

China steel market snapshot

Chart 51: China steel market share (FY18 crude steel production)



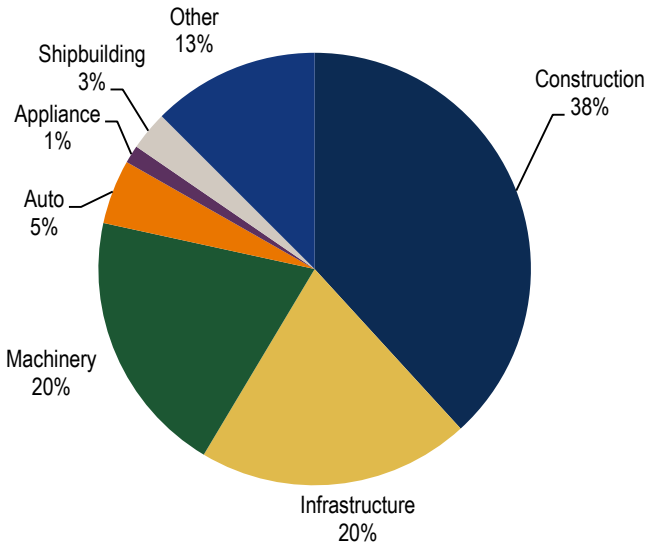
Source: World Steel Association, BofA Merrill Lynch Global Research

Table 11: FY18 crude steel production by province (area)

Province (Area)	Prod (mnt)	% of total
Hebei	237.3	25.6%
Jiangsu	104.3	11.3%
Shandong	71.8	7.8%
Liaoning	68.7	7.4%
Shanxi	53.9	5.8%
Anhui	31.0	3.4%
Hubei	30.7	3.3%
Henan	28.9	3.1%
Guangdong	28.8	3.1%
Jiangxi	25.0	2.7%
Sichuan	24.0	2.6%
Hunan	23.1	2.5%
Inner Mongolia	23.1	2.5%
Guangxi	22.6	2.4%
Fujian	21.0	2.3%
Tianjin	20.2	2.2%
Yunnan	19.3	2.1%
Shanghai	16.3	1.8%
Zhejiang	12.7	1.4%
Jilin	12.0	1.3%

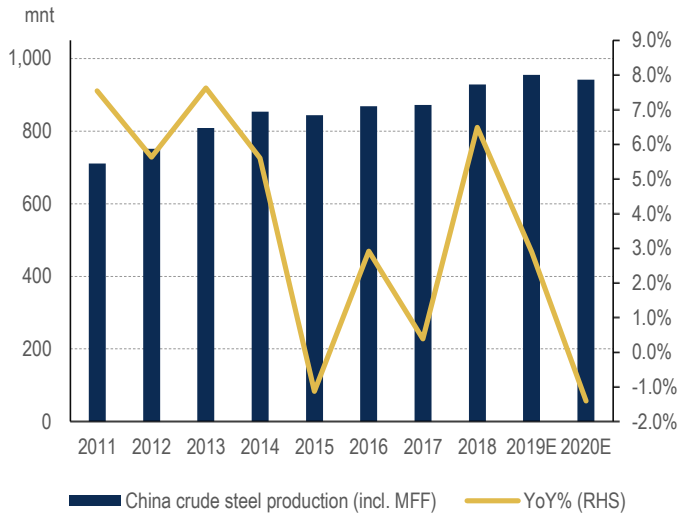
Source: Wind, BofA Merrill Lynch Global Research

Chart 52: China steel end demand by use



Source: NBS, CISA, Mysteel, BofA Merrill Lynch Global Research

Chart 53: China crude steel production (incl. MFF)



Source: NBS, Mysteel BofA Merrill Lynch Global Research

Major producers

China Baowu Group

China Baowu Group is established by consolidation and restructuring of former Baosteel Group Corporation and Wuhan Iron & Steel (Group) Corporation. After the merger, Baowu Steel Group Corporation, as a pilot SOE with a staff of 177k people, has become the biggest steel producer in China, with FY17 crude steel production of 70mnt. Its business involves 6 major sectors: steel and relevant manufacturing sector, new material industry, modern trade logistics, industrial service, urban service industry and industrial finance. Steel manufacture is the Group's main business, with three premium product types of carbon steel, stainless steel and special steel.

Hebei I&S Group

As one of China's largest iron and steel material manufacturers and comprehensive service suppliers, Hebei I&S Group encompasses over 30 subsidiaries with nearly 120k employees enrolled. Centred on steel making, the group is also involved in mineral resources, industrial chain finance, modern logistics, iron and steel trade and equipment manufacturing. Its major products cover almost all steel types, such as cold-rolled sheet, high-strength rebar, wide and heavy plate, steel pipe, hot-rolled steel strip and special steel bar.

Shagang Group

Headquartered in Zhangjiagang, an emerging industrial port city on the coast line of the Yangtze River, Shagang Group owns total assets of RMB150 billion and more than 30,000 employees. Its major products include heavy plate, hot strip coil, cold-rolled strip coil, high-speed wire rod, barincoil, ribbed steel bar, special steel bar and so on, which have been classified in 60 series, 700 varieties and over 2,000 grades.

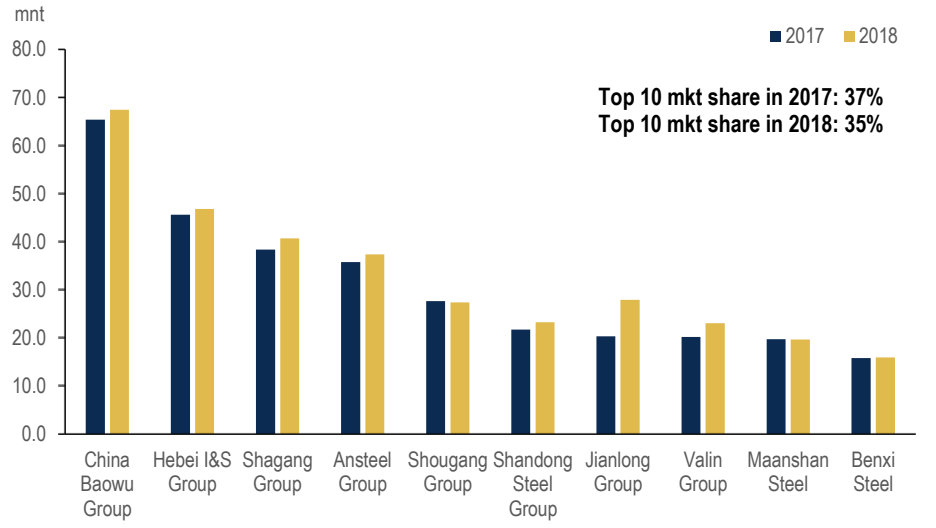
Ansteel Group

Originated from merger and reorganization of Anshan Iron and Steel Group Corporation and Pangang Group Co., Ltd in 2010, Ansteel Group Corporation operates 7 production bases in steel production, and owns rich iron ore resources. Its complete series of steel products (hot-and-cold-rolled sheet, galvanized sheet, color coated sheet, cold-rolled silicon steel, heavy rail, seamless pipe and so on) are sold to more than 60 countries and regions and are widely used in such as railway, building, automobile, shipbuilding and home appliances industries.

Shougang Group

Established in 1919 and headquartered in Beijing, Shougang Group has developed into a large-sized enterprise group, focusing on iron and steel, with 90,000 employees. Shougang Group produce mainly high-end steel plates, high-quality auto plates, electric steel, and tin plates.

Chart 54: **China's top 10 steel mills (20**17-18 crude steel production)



Source: World Steel Association, BofA Merrill Lynch Global Research

Key themes for Chinese steel

Supply side reform has become the most important theme in steel industry since FY16 for China and even for the world as China is the biggest producer across the globe. We observe strong determination of China's government and effective execution so far, not only in excessive capacity cuts, but also in environmental constraints. We expect supply side reform would continue to play an important role for China's steel industry, and the second stage (market consolidation) to play out in 2019-20E, after first stage, mandatory capacity cuts seen in 2016-18.

Government's capacity closures target achieved by end-FY18, ahead of schedule

With the long-term target of shutting down 140-150mnt during FY16-20 being achieved, large-scale mandatory capacity phase-out, driven by central government, is unlikely to be repeated in FY19 and onward. Instead, we expect more policies to be rolled out at the provincial or municipal government level.

- Within the '2018-2020 excessive capacity phase-out plan, Hebei Province requires total crude steel capacity cuts during FY18-20 to reach no less than 40mnt. To be specific, higher than 10mnt/10mnt/20mnt shutdown for FY18/19/20E, and total capacity amount to be controlled within 200mnt by end-FY20. In addition, according to the provincial environmental bureau, FY19 capacity suspension target is lifted to 14mnt in Jan-2019; the number of steel mills is to lower by 60 by closing down small-sized plants. To improve air quality in the long run, all steel mills have been asked to meet ultra-low emissions standards, and capacity relocation to outside of the region is being encouraged.
- Similarly, Jiangsu Province requires cutting crude steel capacity by no less than 17.5mnt during FY18-20, and capacity relocation outside the key cities to be accomplished by Oct-FY20E. New capacity additions have been strictly prohibited in Shandong Province, and most capacity in cities of Jinan, Zibo, Liaocheng, Binzhou, etc, have been asked to relocate to coastal areas in the next few years.

…more industry consolidation and higher market concentration are future trends

The government's initiatives in supply-side reform can be divided into two stages – the first one is mandatory capacity closure, which has been completed by shutting down 140-150mnt legal capacity and another 120mnt illegal MFF capacity during FY16-18; and the other is to improve the market structure, enhance steel produce quality and raise mills' pricing power, which we think would be the major tasks for FY19-20, by encouraging more industry consolidation, especially the leading mills that are likely to gain more market share with mergers and acquisitions. Moreover, the Chinese government had earlier mentioned another target for the steel industry, i.e., increasing the market share of top-10 mills to over 60% by end-FY20 vs. only 35% as of end-FY18 – this suggests a large room in the industry for further consolidations and industry leaders should be the key beneficiaries.

- Merger of Baosteel Group and Wuhan I&S Group – it was first announced in June 2016, which in our view, signaling the start of consolidation within the steel industry. We see the merger as a good example of synergy benefits as both groups are located in East China and produce flat products. Owing to substantial efforts by the two groups and industry upcycle on the supply-side reform, the BaoWu merger has achieved good results – take the listco Baosteel for example, the company recorded RMB1.36bn synergy in FY17 and more than RMB2.00bn in FY18.
- Baowu Group to obtain 51% Magang group for free – In June 2019, Anhui SASAC was reported to transfer its 51% stake in Magang Group to China Baosteel-Wuhan Steel Group (China Baowu Group) for free. Based on the latest

data from World Steel Association, China Baowu group (No.1 domestic crude steel producer) produced 67.4mnt crude steel in 2018, and Magang group (No.9) did 19.6mnt. If the proposed deal gets approved, the newly merged group will account for 9.4% of China's total production or 87mnt, followed by Hebei I & S's 5.0% (46.8mnt). According to the statement, the deal is a major government move to speed up consolidation and restructure within the industry.

- ⇨ Winner gains more – Given their strong cash flow generation ability and healthy balance sheets, we believe leading mills are better positioned to grow capacity and thus gain more market share, even though the total industry capacity is strictly capped by the government. For example, Baosteel plans to construct a third blast furnace in Zhanjiang after the first two fully ramp up – the new blast furnace will be designed for 4mnt annual capacity, with 1mnt quota from its Meishan base and the other 3mnt from the Parent Group. Similarly, another listco Angang Steel has completed the acquisition of Chaoyang Steel from its Parent Group with cash settlement, which helped expand Angang Steel capacity to nearly 25mnt from 22mnt previously.

Production suspension on environmental protection occurs from time to time

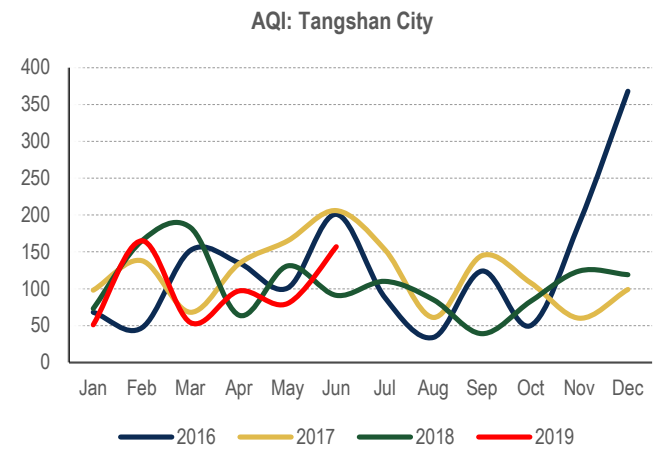
During our May-2019 meetings with industry contacts in Shanghai and Tangshan, we were told that year-to-date production halts during the non-heating season in Tangshan city was rather lower than the government requirement (at only ~20% even with normal maintenance counting that shall be excluded vs. 30% per the document) and market expectation. The reasons behind the disappointing production halts were mainly: 1) air quality in Tangshan and nearby areas had been relatively good then; 2) local steel mills have been investing heavily in the recent several years on equipment upgrading, aiming for more environmental friendly operation, and thus pollutant emissions have dropped quite a lot; 3) they were willing to grasp as many profits as possible before any concrete production halts kick in.

That said, more recently, Tangshan city was ranked the 11th most polluted city among the 168 cities under the regular monitoring list. As such, the largest steelmaking base in China's top steel province (Hebei) has begun observing stricter production curbs on all their steelmaking processes, from sintering to steel refining, as the government had mandated on 23 June 2019.

As reported, city authorities ordered local steel producers to observe a new round of restrictions commencing June 23 as part of Tangshan's battle against air pollution. In the first draft, around 30 (among which 4 are under suspension already for a while) local steelmakers are required to limit their operative sintering, pelleting, converter and lime kiln capacities by half starting June 23 and must maintain them at that 50% level until the end of July. The cutbacks on blast furnace operations are supposed to start from June 27. Only six steel producers – whose environmental protection performance the government has appraised as good – are being rewarded with more lenient restrictions, being required to trim their operations by only 20% throughout the period.

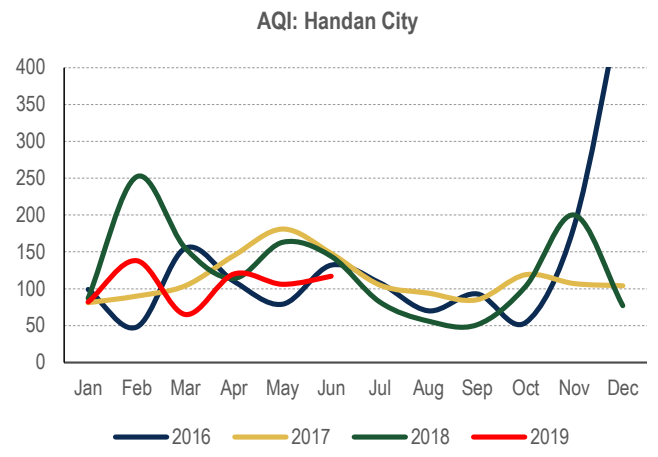
Despite some exemptions allowed in the final document, with certain steel mills to be exempted from production halts during the certain period, Mysteel still expects daily pig iron production loss to be 87.4kt (vs. previous forecast of 93.0kt) , a/c 25.71% of the production prior to the production suspension.

Chart 55: AQI (Air Quality Index) gets worsen into June notably: Tangshan City, Hebei Province



Source: Wind, BofA Merrill Lynch Global Research estimates

Chart 56: AQI (Air Quality Index) gets worsen into June slightly: Handan City, Hebei Province



Source: Wind, BofA Merrill Lynch Global Research estimates

Capacity swap and relocation to dominate from here

Mysteel expects capacity swap to be the new market trend – capacity swap to be completed in the 2-3 years reaches ~150-170mnt, and there shall be some capacity reduction post each swap program. For example, there will be a 20% reduction if the capacity is to be swapped into the so-called 'sensitive' areas like Beijing-Tianjin-Hebei, Yangtze Delta Area, Pearl Delta Area etc. The government would monitor such swap program closely so as to avoid the increase in total capacity. Relocation is also encouraged by the local government (like Tangshan, Hebei Province), mainly from the city center to rural/coastal areas.

China's steel medium term supply/demand outlook

Key factors to consider when assessing steel supply outlook in China

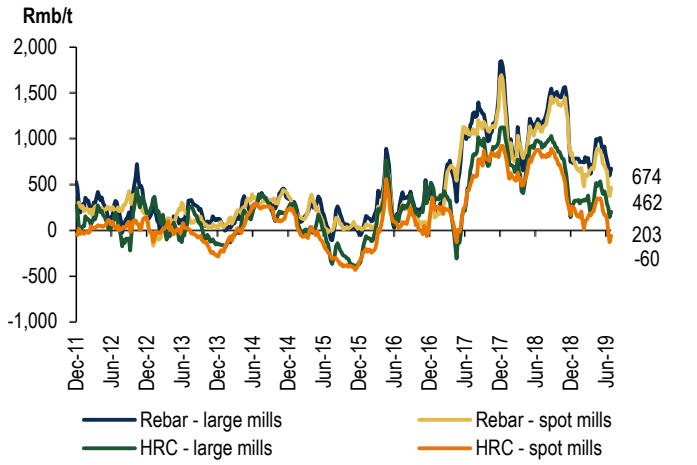
- Supply side reform policy: how will the market consolidation to play out in FY19-20E; whether illegal MFF operations will resurge (governments still push forward checks on such operations from time to time)
- Production suspension on environmental protection, which is highly related with the air quality in those 'sensitive' areas: Beijing-Tianjin-Hebei, Yangtze Delta Area, Pearl Delta Area etc., likely leading to unexpected production losses
- Capacity swap and relocation: need to monitor if such programs could be strictly implemented, and total capacity will be controlled or reduced
- Ramp-up of EAF: mills margin at producers using EAF really matters, and due to the nature of higher cost compared with traditional mills utilizing blast furnaces, they are more price/margin sensitive

Key indicators to consider when assessing steel demand outlook in China

- China's property new starts, sales, inventory and policy stance;
- Infrastructure FAI and construction activities;
- Machinery/equipment production trend and mining companies capex plan;
- China's auto sales and steel intensity change;
- Home appliance production and inventory;

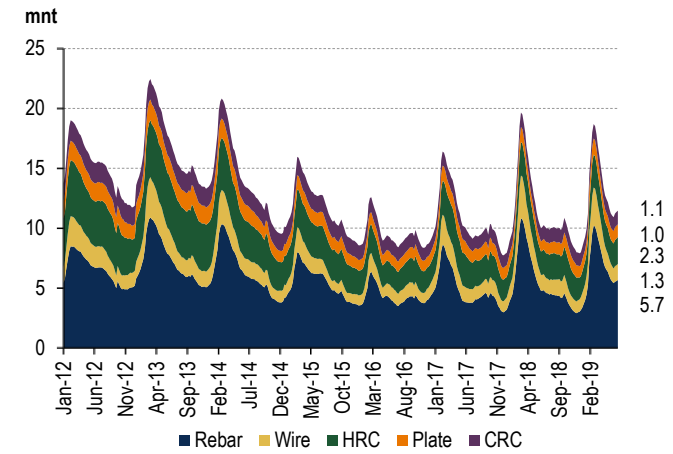
- Industrial production and PMI trends;
- Overall GDP trends

Chart 57: Steel Mills Cash Margins



Source: Bloomberg, Sxcoal, BofA Merrill Lynch Global Research

Chart 58: Steel inventory at key cities

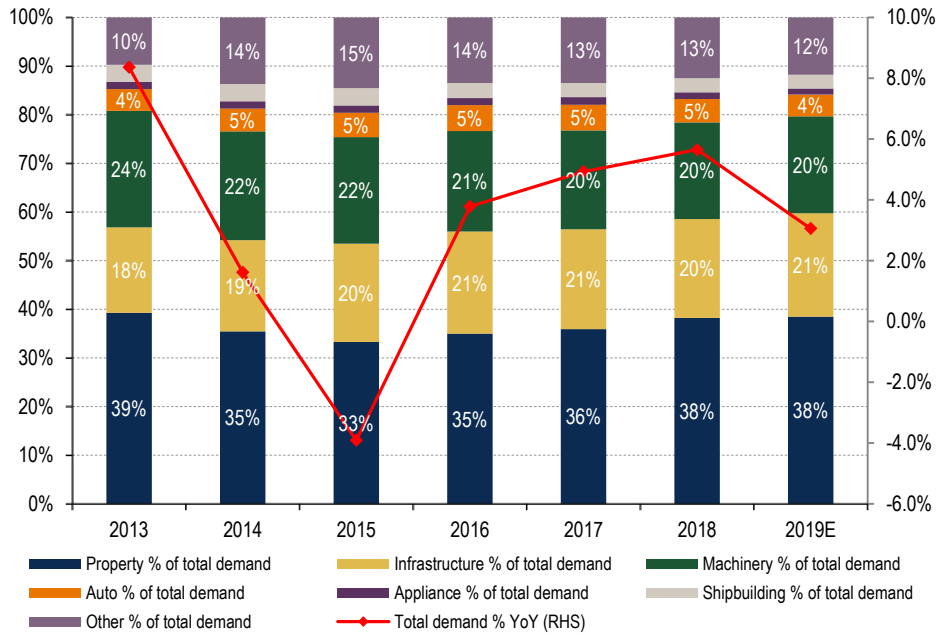


Source: Wind, BofA Merrill Lynch Global Research

Take a closer look at the main driver - property

In 2018, 277Mt of finished steel, or c.34% of China's end steel demand was used for urban property. End demand in China is strongly levered into construction activity, particularly residential property development. We take a closer look at the Chinese property market.

Chart 59: China finished steel demand breakdown



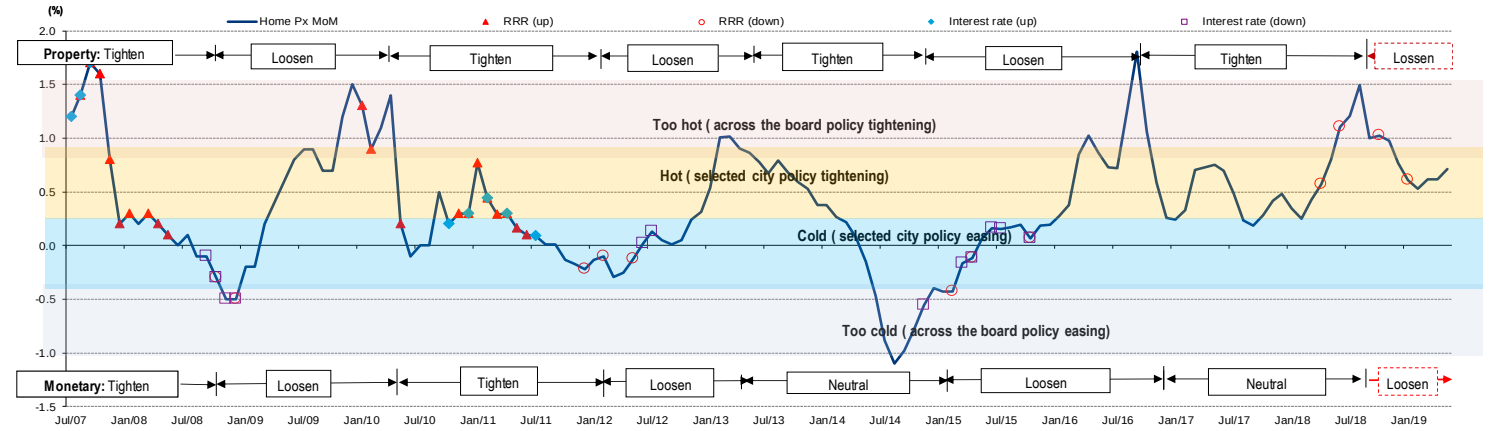
Source: NBS, Mysteel, BofA Merrill Lynch Global Research estimates

Monetary and property polices play a pivot role in the property market

According to our China property analysts, the government has been playing a very active role in the real estate market. The exhibit below summarises the housing price movements in relation to monetary and property policies. Over the past 10 years there have been much longer periods of market tightening than loosening, and each loosening period corresponded with expansionary monetary policies and rising property prices.

Exhibit 20: 70 City commodity housing price (MoM) vs. monetary and property market policy cycles

	'07-'08	'08-'10	'10-'11	'11-'12	'12-'13	'13-14	'14-15	'16-17	'18
1st home downpay:	raised to 30%	lowered to 20%	raised to 30%	flat at 30%	flat at 30%	flat at 30%	lowered to 25%	raised to 30%	30%
1st mort. Discount:	Flat at 85%	lowered to 70%	raised to 100%	lowered to 85%	flat at 85%	90%-110%	85%-100%	95-100%	105-115%
2nd home downpay:	raised to 40%	flat at 40%	raised to 60%	flat at 60%	Some up to 70%	flat at 6--70%	lowered to 30%-40%	Some revised up to 70%	40-80%
2nd mort. Premium:	raised to 110%	lowered to 100%	raised to 110%	flat at 110%	flat at 110%	110-120%	100-110%	100-110%	110-130%
HPR?	No	No	Yes	Yes (loosened)	Yes (tightened)	Yes (eased since Jun '14)	Yes (most eased)	Yes (tightened)	Yes (tightened)



	'07-'08	'08-'10	'10-'11	'11-'12	'12-'13	'13-14	'14-15	'16-17	'18
M2 growth:	lowered to 17.8%	raised to 18.9%	lowered to 13.6%	raised to 13.8%	lowered to 13.6%	lowered to 12.2%	rose to 13.3%	Lowered to 8.6%	
RRR:	raised to 17.5%	lowered to 15.5%	raised to 21.5%	lowered to 19.5%	raised to 20.0%	flat at 20.0%	lowered to 17.0%	Flat at 16.5%	lowered at 15.5%
5-yr Interest rate:	raised to 7.83%	lowered to 5.94%	raised to 7.05%	lowered to 6.55%	flat at 6.55%	lowered to: 6.15%	lowered to 4.90%	flat at 4.90%	flat at 4.90%

Source: NBS, PBoC, BofA Merrill Lynch Global Research

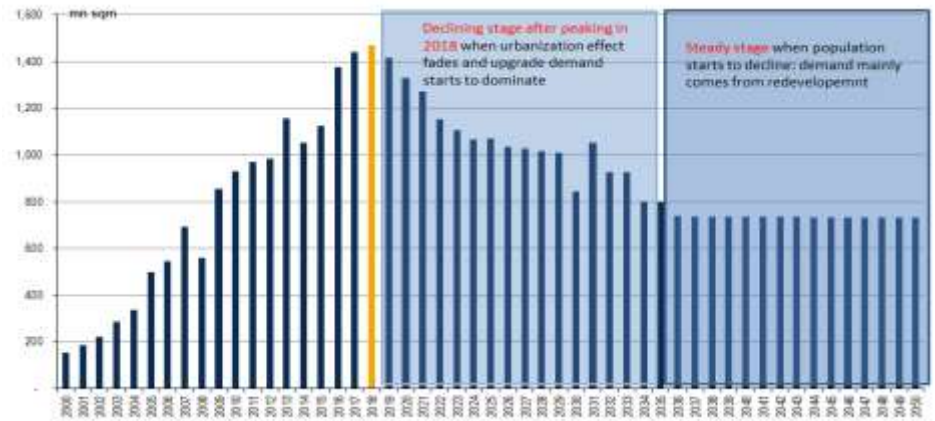
Demand likely to moderate meaningfully beyond 2020

2019-21E: Our property team's long-term demand model shows the decline could be more structural over the next three years with yearly range of -3% to -5% in 2019-2021E.

2021-35E: They expect China's new home demand to gradually drop to below 1bn sqm GFA per year in 2021-35, as China's urbanization and population growth slow.

2035-50E: They expect China's new home demand to drop to 700mn sqm GFA per year on average beyond 2035, when demand will primarily come from replacement.

Exhibit 21: Demand likely to moderate meaningfully beyond 2020



Source: Bloomberg, BofA Merrill Lynch Global Research estimates

Composition of China's new housing demand vs. total population forecast

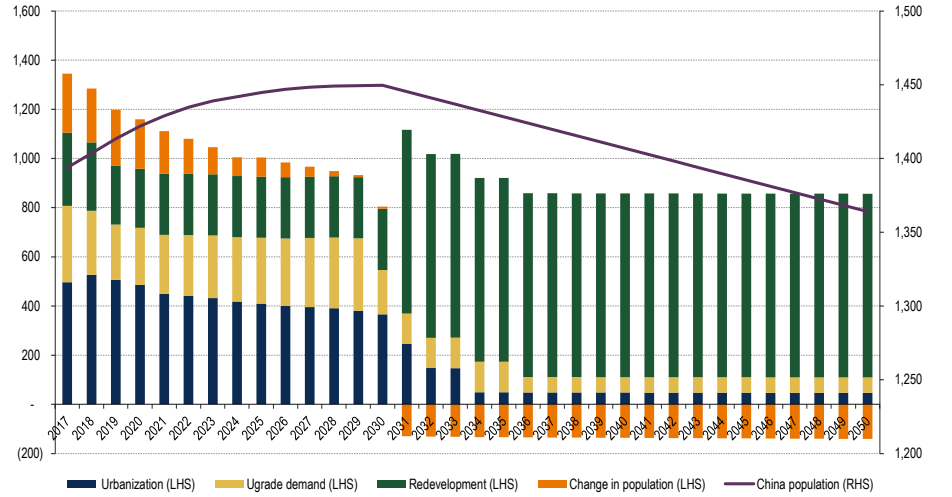
Population: Based on the government's forecast, China's population is projected to grow less than 1% annually from 1.4bn in 2016 to peak in 2030, then decline gradually to 1.36bn by 2050.

Urbanization: Consistent with the government's target, we expect China's urbanization to continue to rise from 57% in 2016 to 70% in 2030, and climb modestly per year thereafter.

Upgrade demand: We expect the living space per capita for urban population to rise from about 37 sqm GFA in 2016 to around 43 sqm GFA by 2030, and grow modestly per year thereafter.

Redevelopment: In the near term, we expect redevelopment demand to be about 250-300mn sqm GFA per year, mostly from shanty town redevelopment.

Exhibit 22: **China's new housing demand (mn sqm GFA) vs. total population forecast (mn)**

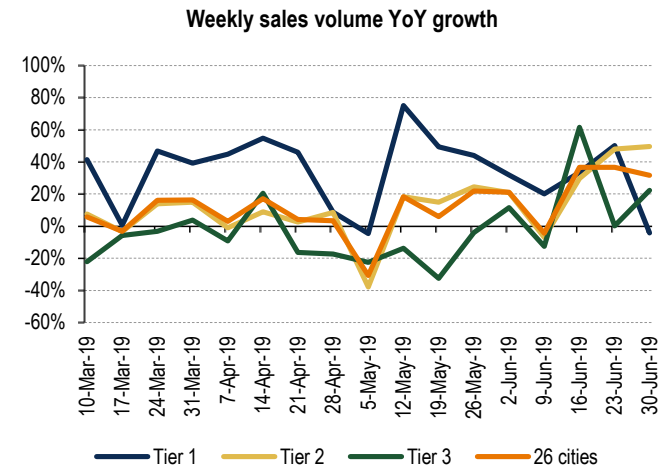


Source: Bloomberg, BofA Merrill Lynch Global Research estimates

What has happened in 2019 YTD and how about the rest of year?

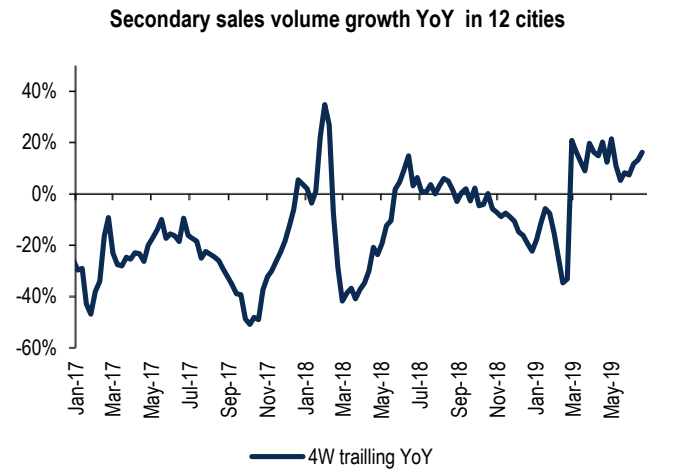
Physical market has held up well in Tier 1-2 cities so far – with both primary and secondary market recording resilient growth.

Chart 60: Volume growth remained resilient in primary market so far



Source: CREIS (Soufun), BofA Merrill Lynch Global Research estimates

Chart 61: Secondary market also posted steady growth



Source: Wind, BofA Merrill Lynch Global Research estimates

According to China NBS data, in the first five months of 2019, national residential housing sales volume (mn sqm) declined 0.7% y-y, and new starts of residential housing across the nation recorded a solid growth rate of 11.4% y-y.

Exhibit 23: Residential housing sales volume -0.7% and new started +11.4% in 5M19

	2011	2012	2013	2014	2015	2016	2017	2018	YoY	5M19	YoY
Sales value (Rmb bn)											
National	4,862	5,347	6,769	6,240	7,275	9,906	11,024	12,639	15%	4,502	9%
Sales volume (Million sqm)											
National	970	985	1,157	1,052	1,124	1,375	1,448	1,479	2%	487	-0.7%
ASP (Rmb/sqm)											
National	5,011	5,430	5,850	5,932	6,472	7,203	7,614	8,544	12%	9,243	10%
Construction starts (Million sqm)											
National	1,460	1,307	1,458	1,249	1,067	1,159	1,281	1,534	20%	591	11%
Completions (Million sqm)											
National	717	790	787	809	738	772	718	660	-8%	188	-11%
Under construction (Million sqm)											
National	3,884	4,290	4,729	5,049	5,033	5,114	5,364	5,700	6%	5,186	10%
Residential real estate investment (RMB bn)											
National	4,431	4,937	5,895	6,435	6,460	6,870	7,515	8,519	13%	3,378	16.3%

Source: NBS, BofA Merrill Lynch Global Research

Chart 62: China YTD residential floor space sold and new starts % YoY

Source: NBS, BofA Merrill Lynch Global Research

Chart 63: China YTD residential floor space sold and residential land sold % YoY

Source: NBS, BofA Merrill Lynch Global Research

Exhibit 24: Land sales prices have rebounded strongly since March 2019

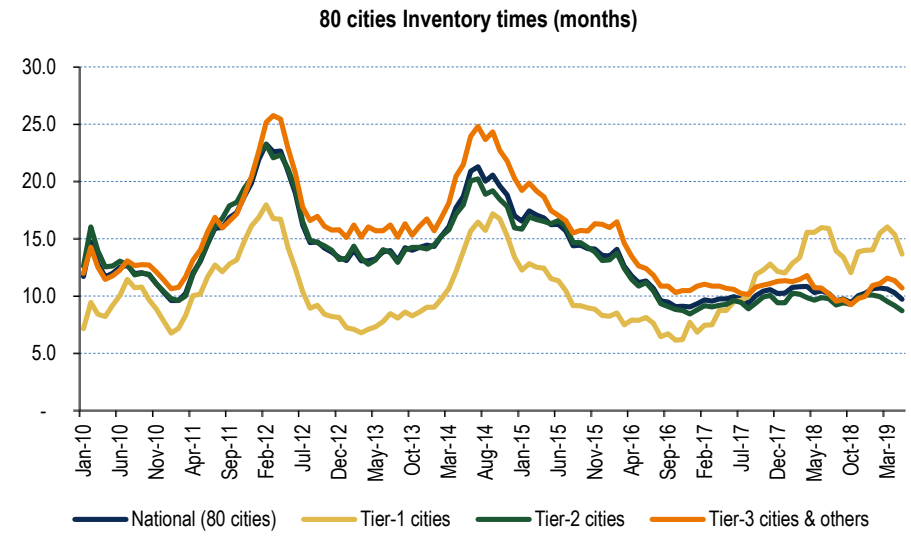
		2012	2013	2014	2015	2016	2017	2018	6M19	YoY
Nationwide (302 cities)										
Residential land supplied	GFA (sqm mn)	1,340	1,641	1,204	912	782	926	1,157	508	6%
Residential land sold	GFA (sqm mn)	1,003	1,333	898	688	669	813	902	416	5%
Supply-to-sold ratio	x	1.3	1.2	1.3	1.3	1.2	1.1	1.3	1.2	0%
Average land price (A.V.)	RMB/sqm	1,327	1,619	1,806	2,228	3,359	4,097	3,784	4,615	16%
Land premium rate	%	8%	7%	10%	10%	50%	34%	15%	20%	0%
Land sales revenue	RMB bn	1,331	2,158	1,622	1,533	2,248	3,331	3,412	1,921	22%
Tier 1 Cities										
Residential land supplied	GFA (sqm mn)	27	38	32	31	17	31	31	13	20%
Residential land sold	GFA (sqm mn)	25	36	29	30	15	29	28	12	34%
Supply-to-sold ratio	x	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.0	0%
Average land price (A.V.)	RMB/sqm	4,600	7,572	11,745	11,533	16,573	15,159	13,967	16,760	30%
Land sales revenue	RMB bn	115	273	344	344	247	440	388	203	74%
Tier 2 Cities										
Residential land supplied	GFA (sqm mn)	550	617	464	360	341	368	431	226	21%
Residential land sold	GFA (sqm mn)	446	532	380	302	301	333	350	190	21%
Supply-to-sold ratio	x	1.2	1.2	1.2	1.2	1.1	1.1	1.2	1.2	0%
Average land price (A.V.)	RMB/sqm	1,655	2,061	2,047	2,602	4,919	5,345	4,948	5,785	10%
Land sales revenue	RMB bn	738	1,097	778	786	1,482	1,779	1,733	1,100	33%
Tier 3/4 Cities										
Residential land supplied	GFA (sqm mn)	764	985	708	521	424	526	696	269	-5%
Residential land sold	GFA (sqm mn)	532	764	489	356	353	451	524	214	-7%
Supply-to-sold ratio	x	1.4	1.3	1.4	1.5	1.2	1.2	1.3	1.3	0%
Average land price (A.V.)	RMB/sqm	898	1,031	1,023	1,132	1,470	2,466	2,465	2,886	5%
Land sales revenue	RMB bn	478	788	500	404	519	1,113	1,291	617	-3%

Source: Soufun database, BofA Merrill Lynch Global Research estimates

Inventory destocking has been successful on surface

Currently inventory months for top 80 cities remained healthy at only 10 months on average, and also around the same period for Tier 2 and 3 cities. Some pick-up in March 2019 was mainly due to more new launches and softened sales sentiment then.

Chart 64: Inventory month by city tier (incl. launched and under development inventory)



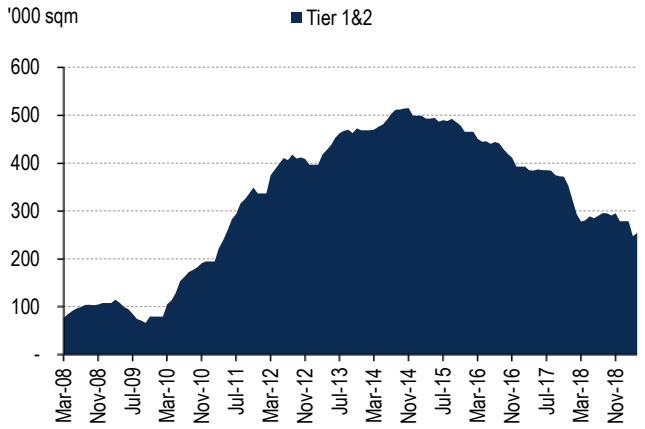
Source: CRIC, BofA Merrill Lynch Global Research estimates

But broader-defined inventory looks less healthy

Broader inventory, defined as cumulative construction starts less sales volume, that measures "inventory" need to be leased out or sold in secondary market has fallen more from peak in Tier-1/2 cities than in Tier-3/4 cities.

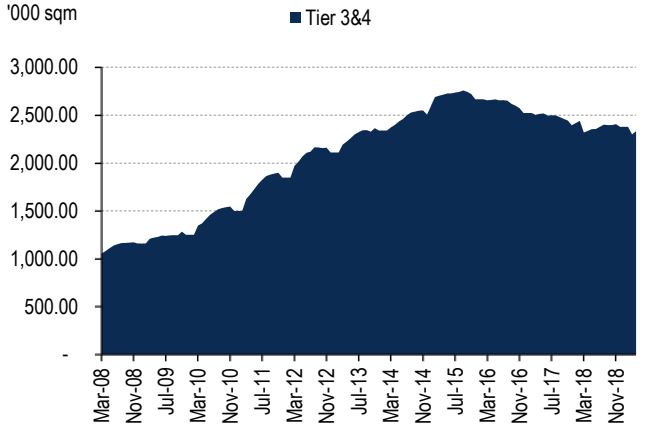
This suggest a lot of units in Tier 3-4 cities will stay vacant unless there is substantial leasing demand or unmet demand in secondary market, while such demands tend to be less in lower tier cities.

Chart 65: Broader-defined inventory in Tier 1 & 2



Source: NBS, BofA Merrill Lynch Global Research

Chart 66: Broader-defined inventory in Tier 3 & 4

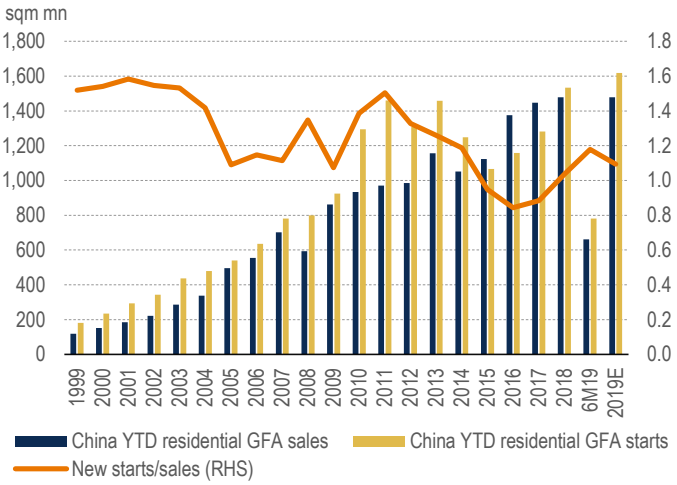


Source: NBS, BofA Merrill Lynch Global Research

New starts in residential housing likely to slow down in 2019

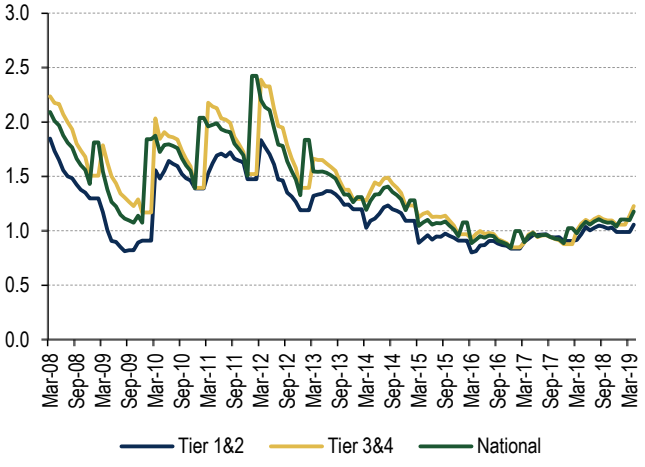
Our property team expects new starts to slow down to mid-single-digit in 2019 given their cautious view on residential housing sales volume. In addition, it expects the developers at current backdrop may not be very willing to pile up stock aggressively.

Chart 67: China YTD residential GFA new starts to sales



Source: NBS, BofA Merrill Lynch Global Research estimates

Chart 68: Construction new starts to residential sales



Source: NBS, BofA Merrill Lynch Global Research estimates

Medium-term China steel demand outlook

Our steel analysts in China expect a moderate decrease in FY20 steel demand, seeing a mild drop (1.4% y-y). Property market is expected to slowdown, recording a negative growth in demand for steel in FY20, partly offset by robust infrastructure investment and rebound in auto production/sales. During FY19-20E, net steel products exports are likely to remain at ~60mnt, and crude steel production would be 955mnt (+2.9% y-y) and 942mnt (-1.4% y-y), respectively. EAF capacity is estimated to increase by 10mnt per year.

Exhibit 25: China steel supply/demand summary

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E
China crude steel production - NBS reported	**572.2**	**637.2**	**685.3**	**723.9**	**779**	**823**	**804**	**808**	**832**	**928**	**955**	**942**	**932**	**923**
% YoY growth	*13.7%*	*11.4%*	*7.5%*	*5.6%*	*7.6%*	*5.6%*	*-2.3%*	*0.6%*	*2.9%*	*11.6%*	*2.9%*	*-1.4%*	*-1.0%*	*-1.0%*
Total China crude steel production incl. MFF effect			**711**	**751**	**808**	**853**	**844**	**868**	**872**	**928**	**955**	**942**	**932**	**923**
% YoY growth				*5.6%*	*7.6%*	*5.6%*	*-1.1%*	*2.9%*	*0.4%*	*6.5%*	*2.9%*	*-1.4%*	*-1.0%*	*-1.0%*
Blast furnace			614	659	721	773	755	760	770	837	840	817	795	773
EAF			71	65	58	50	49	48	61	91	115	124	137	150
MFF			26	27	29	31	40	60	40	0	0	0	0	0
Per capita output of steel kg/capita	**430**	**476**	**528**	**555**	**594**	**624**	**614**	**628**	**627**	**664**	**681**	**668**	**661**	**654**
China finished steel production	545.2	605.8	675.9	714	769	811	802	825	828	873	898	885	876	867
Net exports	**-7.0**	**-26.1**	**-33.3**	**-42.2**	**-48.3**	**-79**	**-100**	**-95**	**-62**	**-56**	**-60**	**-62**	**-65**	**-68**
China net finished steel production	**538.2**	**579.7**	**642.6**	**672**	**721**	**731**	**702**	**730**	**766**	**816**	**838**	**823**	**811**	**799**
China demand for finished steel from crude	**533.9**	**569.1**	**641.2**	**666**	**722**	**734**	**705**	**732**	**768**	**811**	**836**	**824**	**812**	**800**
% YoY growth	*26.1%*	*6.6%*	*12.7%*	*3.9%*	*8.4%*	*1.6%*	*-3.9%*	*3.8%*	*4.9%*	*5.6%*	*3.1%*	*-1.4%*	*-1.5%*	*-1.5%*
Steel demand crude equivalent	565.0	599.0	674.9	701	759	772	742	770	808	863	889	877	864	851
Per capita consumption of finished steel	**401**	**425**	**476**	**492**	**531**	**536**	**513**	**529**	**552**	**581**	**596**	**584**	**576**	**567**
Installed base of finished steel per tonnes/capita	3.69	4.10	4.54	5.00	5.50	5.98	6.42	6.87	7.34	7.84	8.36	8.85	9.36	9.86
Total crude capacity	**717.8**	**800.3**	**863.3**	**970**	**1074**	**1084**	**1064**	**1044**	**1022**	**1026**	**1045**	**1050**	**1055**	**1060**
BF	632.8	710.6	755.6	866	968	978	968	948	906	894	903	898	893	888
EAF	85.0	89.7	107.7	104	106	106	96	96	116	132	142	152	162	172
Net capacity additions/closures	73.8	82.5	63.0	107	104	10	-20	-20	-22	4	19	5	5	5
Total crude capacity (incl MFF capacity)	**0**	**0**	**913**	**1030**	**1134**	**1164**	**1164**	**1164**	**1022**	**1026**	**1045**	**1050**	**1055**	**1060**
Average utilization rate crude steel (NBS reported)	***84%***	***84%***	***82%***	***79%***	***76%***	***76%***	***75%***	***77%***	***81%***	***91%***	***92%***	***90%***	***89%***	***87%***
Average utilization rate crude steel (incl MFF capacity)	***0%***	***0%***	***0%***	***77%***	***75%***	***74%***	***72%***	***75%***	***80%***	***91%***	***92%***	***90%***	***89%***	***87%***
Domestic demand vs domestic capacity	*79%*	*76%*	*78%*	*73%*	*71%*	*71%*	*69%*	*74%*	*79%*	*85%*	*85%*	*83%*	*82%*	*80%*

Source: NBS, Mysteel, World Steel Association, BofA Merrill Lynch Global Research estimates

Global steel production forecasts

Table 12: Steel supply and demand model

Crude steel capacity, Mt	2006A	2007A	2008A	2009A	2010A	2011A	2012A	2013A	2014A	2015A	2016A	2017A	2018A	2019E	2020E	2021E	2022E
EU	228	230	233	233	231	240	242	235	235	235	235	216	216	216	216	216	216
Other Europe and Turkey	29	33	41	42	48	51	51	52	52	53	53	53	53	53	53	53	53
Total Europe	**257**	**264**	**273**	**275**	**280**	**291**	**293**	**287**	**287**	**288**	**288**	**269**	**269**	**269**	**269**	**269**	**269**
Russia	83	89	93	85	80	80	80	80	83	83	87	87	87	87	87	87	87
CIS ex. Russia	59	61	55	48	54	54	54	54	54	54	57	57	57	57	57	57	57
US	113	112	111	114	116	116	117	113	115	111	111	110	111	112	115	119	124
Other NAFTA	41	41	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
South America	56	58	60	62	65	68	70	71	71	69	65	65	65	65	65	65	65
Middle East	23	25	27	28	30	33	37	41	46	47	47	47	47	47	47	47	47
Japan	126	131	132	132	133	134	133	131	133	132	130	126	125	125	125	124	124
India	51	58	61	65	77	83	90	102	110	122	128	130	131	137	144	149	149
South Korea	56	57	60	64	77	82	80	86	88	86	86	86	86	86	86	86	86
RoW	90	92	94	95	107	113	112	117	121	130	135	135	135	135	135	135	135
World ex. China	**954**	**986**	**1004**	**1008**	**1058**	**1093**	**1106**	**1122**	**1146**	**1162**	**1175**	**1152**	**1153**	**1159**	**1170**	**1178**	**1183**
China	472	610	644	718	800	863	970	1074	1084	1064	1044	1022	1026	1045	1050	1055	1060
World	**1426**	**1596**	**1648**	**1726**	**1858**	**1956**	**2076**	**2196**	**2230**	**2226**	**2219**	**2175**	**2179**	**2204**	**2220**	**2233**	**2243**

Crude steel production, Mt	2006A	2007A	2008A	2009A	2010A	2011A	2012A	2013A	2014A	2015A	2016A	2017A	2018A	2019E	2020E	2021E	2022E
EU	205	209	196	139	173	178	169	166	169	169	162	168	168	162	163	166	166
Other Europe and Turkey	31	30	31	29	32	37	38	36	36	34	36	41	41	37	38	39	40
Total Europe	**235**	**239**	**228**	**167**	**205**	**215**	**206**	**203**	**206**	**203**	**198**	**209**	**209**	**199**	**201**	**205**	**206**
Russia	71	73	68	60	67	69	70	69	70	71	71	72	72	72	73	74	75
CIS ex. Russia	49	52	45	37	41	44	40	39	34	30	31	30	29	30	30	30	31
US	99	97	91	58	82	86	89	87	88	79	79	82	86	91	93	95	96
Other NAFTA	33	34	34	24	31	32	33	32	33	32	31	34	34	34	35	35	36
South America	45	48	48	38	44	48	46	46	45	44	40	44	44	46	47	47	47
Middle East	15	16	16	17	19	20	22	23	28	27	29	32	36	37	37	38	38
Japan	116	120	119	88	110	108	107	111	111	105	105	105	104	103	104	105	105
India	43	50	55	63	68	74	77	82	89	90	98	102	110	116	123	131	134
South Korea	48	52	54	49	59	69	69	66	72	70	69	71	72	73	74	74	74
RoW	40	49	46	37	44	44	44	44	49	50	53	63	67	67	67	67	67
World ex. China	**794**	**828**	**803**	**637**	**769**	**808**	**805**	**801**	**825**	**801**	**804**	**843**	**864**	**867**	**883**	**901**	**908**
China	419	489	503	572	637	685	724	779	823	804	808	832	928	955	942	932	923
World	**1213**	**1317**	**1306**	**1210**	**1407**	**1493**	**1522**	**1580**	**1648**	**1605**	**1612**	**1674**	**1792**	**1822**	**1825**	**1833**	**1831**

Utilisation rates	2006A	2007A	2008A	2009A	2010A	2011A	2012A	2013A	2014A	2015A	2016A	2017A	2018A	2019E	2020E	2021E	2022E
EU	90%	91%	85%	60%	75%	74%	70%	71%	72%	72%	69%	78%	78%	75%	75%	77%	77%
Other Europe and Turkey	104%	90%	77%	68%	66%	73%	74%	70%	69%	64%	68%	76%	77%	70%	72%	73%	74%
Total Europe	**91%**	**91%**	**83%**	**61%**	**73%**	**74%**	**70%**	**71%**	**72%**	**71%**	**69%**	**78%**	**78%**	**74%**	**75%**	**76%**	**76%**
Russia	86%	82%	73%	71%	84%	86%	88%	86%	85%	86%	82%	83%	83%	83%	84%	85%	86%
CIS ex. Russia	83%	85%	82%	77%	77%	82%	75%	73%	64%	57%	55%	53%	52%	52%	53%	53%	54%
US	88%	87%	82%	51%	71%	75%	76%	77%	77%	71%	71%	74%	78%	81%	81%	80%	78%
Other NAFTA	81%	81%	86%	61%	78%	82%	83%	79%	82%	79%	78%	83%	84%	85%	86%	87%	88%
South America	81%	84%	80%	61%	68%	71%	67%	65%	64%	63%	62%	68%	69%	71%	72%	72%	72%
Middle East	65%	64%	59%	61%	63%	62%	59%	57%	61%	58%	61%	68%	76%	77%	79%	80%	81%
Japan	93%	92%	90%	67%	82%	80%	80%	84%	83%	80%	81%	83%	84%	82%	83%	84%	84%
India	85%	85%	91%	97%	89%	89%	86%	80%	81%	74%	76%	79%	84%	85%	85%	88%	90%
South Korea	86%	90%	89%	76%	77%	84%	86%	77%	81%	81%	79%	82%	84%	84%	85%	85%	85%
RoW	44%	53%	49%	38%	41%	39%	39%	37%	41%	38%	39%	46%	50%	50%	50%	50%	50%
World ex. China	**83%**	**84%**	**80%**	**63%**	**73%**	**74%**	**73%**	**71%**	**72%**	**69%**	**68%**	**73%**	**75%**	**75%**	**75%**	**76%**	**77%**
China	89%	80%	78%	80%	80%	79%	75%	73%	76%	76%	77%	81%	91%	91%	90%	88%	87%
World	**85%**	**83%**	**79%**	**70%**	**76%**	**76%**	**73%**	**72%**	**74%**	**72%**	**73%**	**77%**	**82%**	**83%**	**82%**	**82%**	**82%**

Source: BofA Merrill Lynch Global Research estimates

Steel prices, margins and the link to raw materials

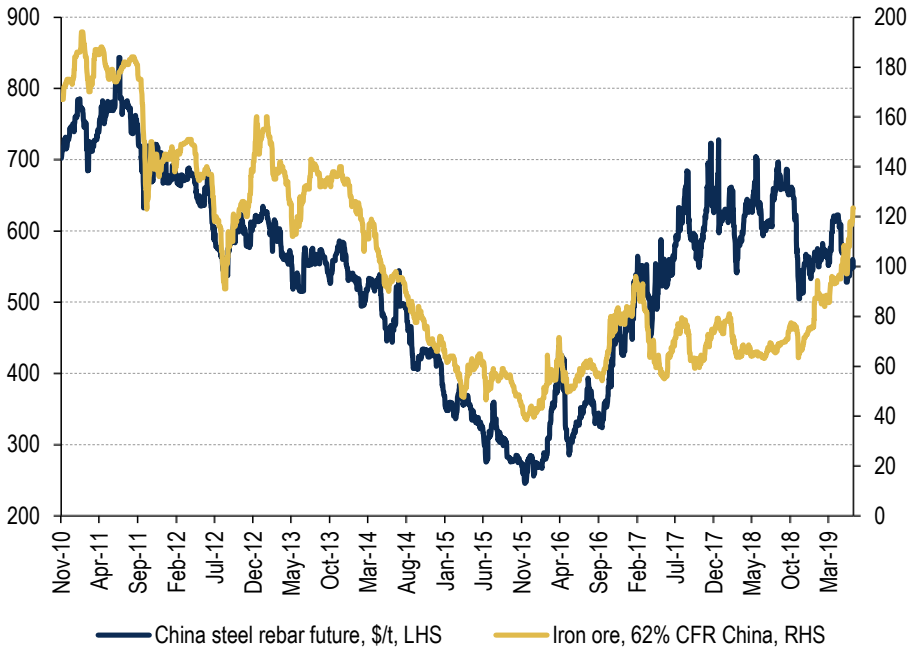
- Steel prices and iron ore are highly correlated.
- China remains the marginal supplier globally, hence China steel pricing trends dictate global trends
- Long-term, steel prices are global however short-term regional dislocations can be observed.
- Trade protection has not been effective in "shutting" European and US markets from imports.
- Steel producers currently generate EBITDA/t in line with the long-term average while miners seem to be overearning vs. recent history.

Steel prices correlated with iron ore

Historically steel prices had been closely correlated with raw materials (especially iron ore). Steel is a globally oversupplied market and hence if raw material costs declined, steel producers tend to cut prices in an attempt to defend/gain market share. In 2017 and 2018 , steel prices in China decoupled to a small extent from iron ore and coking coal prices. The resilience in steel prices seen in 2017-2018 is attributed to both a recovery in steel demand post the 2015 China slow down and to the capacity cuts undertaken by China as part of its "supply side reform" program.

In 2019 steel prices have "recoupled" with strong iron ore prices (the iron ore market has been "tight" as a result of supply disruptions – Vale, and Rio to a lesser extent).

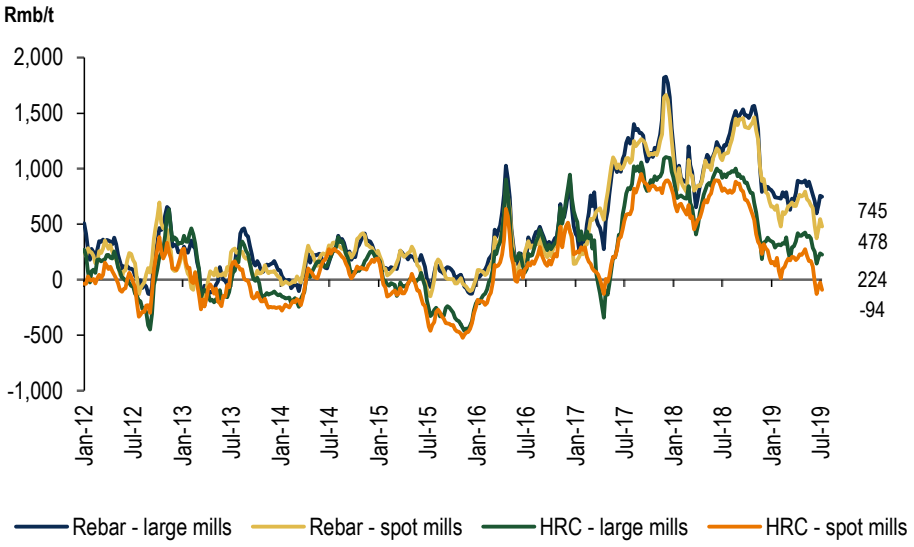
Chart 69: China rebar vs. iron ore



Source: Bloomberg, BofA Merrill Lynch Global Research estimates

The narrowing spread between iron ore and China steel rebar suggest lower margins for steel producers in 2019 vs. 2017/18. Currently, steel producers are under margin pressure with spreads back at H1 2016 lows. We do not higher spreads for long products relative to flat products. Historically spreads have been fairly similar for different product groups. Stronger demand in long product applications – property and infrastructure – vs. flat products, e.g. Autos, explain the deviation.

Chart 70: Spot margins in China – HRC and rebar



Source: Bloomberg, Sxcoal, BofA Merrill Lynch Global Research

Our Chinese metals and mining team expect a normal margin for rebar of RMB300-RMB500/t going forward vs. breakeven margins pre supply cuts.

China continued to set the global market clearing price in steel

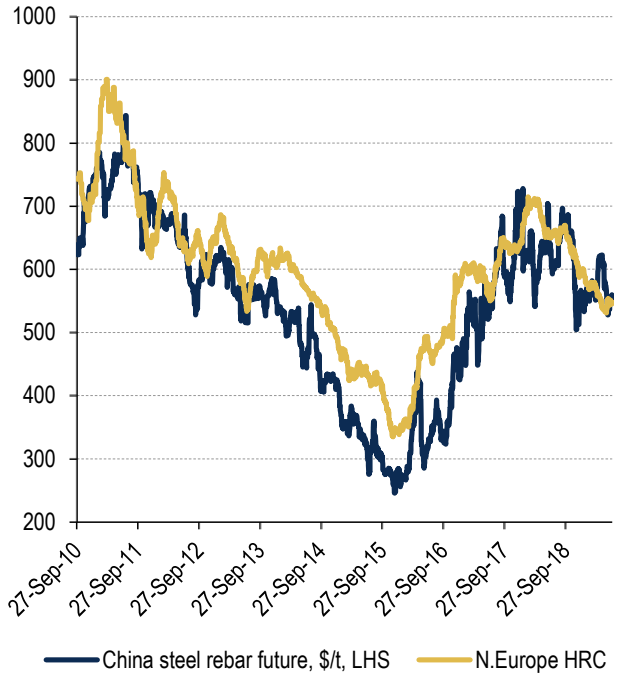
We think Chinese steel prices, and iron ore prices by implication, set the tone for global steel price movements in the majority of markets. Markets can decouple from China prices where imports are not required to support demand – where imports "come into" a market, import pricing parity is a driver for price discovery over time.

China produces c.50% of steel globally and is expected to export 60Mt of steel in 2019, roughly 7% of steel consumption ex. China. We expect China to continue to export >50Mt per year going forward. We argue that these export tonnes can drive global prices for the following reasons:

- We think steel buyers view China as the supplier of last resort and use lower Chinese steel prices as a bargaining chip during contract negotiations with "traditional domestic steel producers
- Chia steel demand is the driver for iron ore demand and prices. Hence stronger China steel prices and iron ore prices will be a feedback to global steel prices through raw material costs.
- China is the "elephant in the room" with 100-150Mt of under/unutilised capacity (even after capacity closures). The under/unutilised capacity can be channelled into exports and fill the production gap of other countries, as the mills operate for cash profits. Despite various forms of trade protectionism, we think the Chinese steel producers can get around through retaliatory trade barriers or circumventing direct export routes and other measures. We view the global steel market as a whole and think the largest producer sets the margin/clearing price.

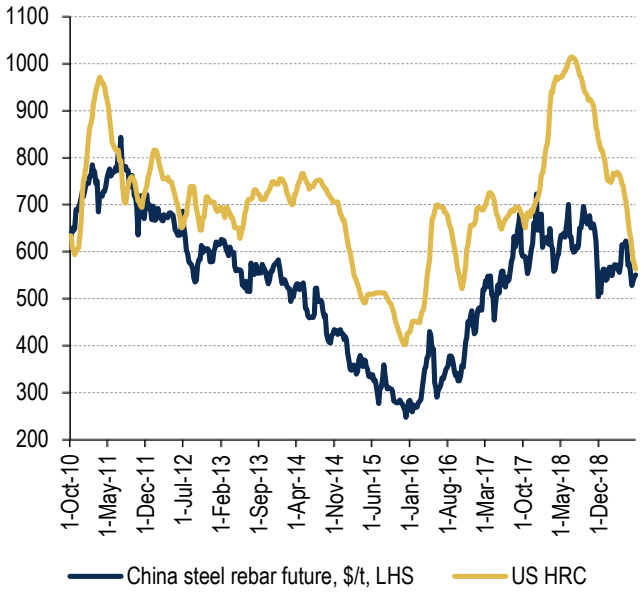
See the charts below for the correlation in price movements of China steel rebar vs. Europe HRC and US HRC respectively.

Chart 71: China steel rebar future vs. Europe HRC price ($/t)



Source: Bloomberg, BofA Merrill Lynch Global Research estimates

Chart 72: China steel rebar future vs. US HRC price ($/t)



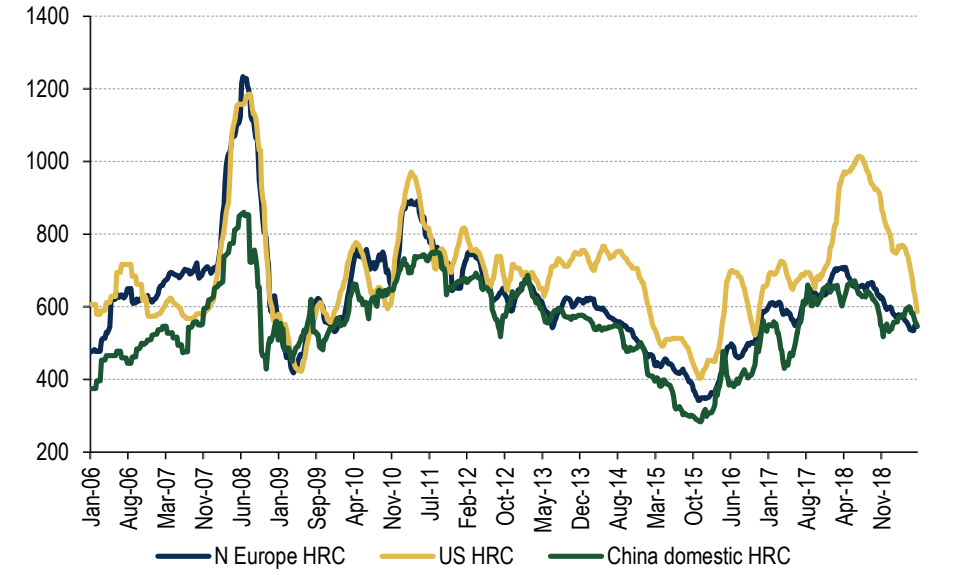
Source: Bloomberg, BofA Merrill Lynch Global Research estimates

Regional pricing short-term, global pricing long term

On a short-term basis, we observe steel price differentials across regions. We think this is due to demand seasonality, currency impacts (currency depreciation could make imports less attractive), new tariffs/quotas or unexpected supply disruptions (as was observed in the US in 2018). However, on a longer-term view, imports tend to flow into higher priced regions.

There is a scenario where import parity may not drive steel prices – where a market is self-sufficient in supply domestically.

Chart 73: HRC price trends in China, Europe and US, $/t

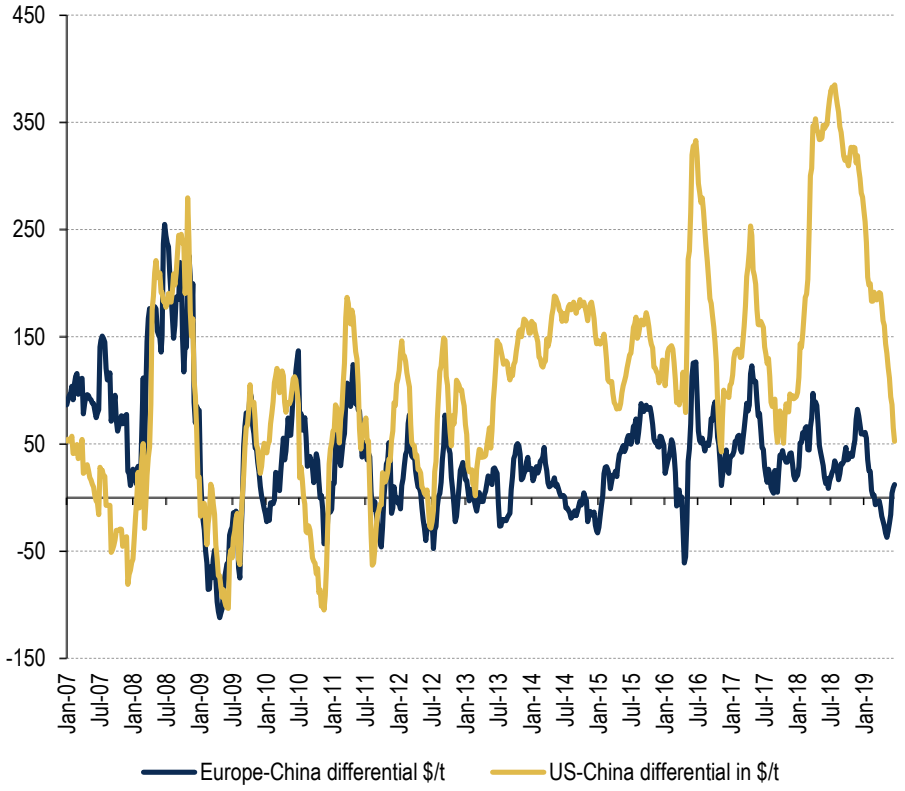


Source: Steel Business Briefing, BofA Merrill Lynch Global Research estimates

Tracking the import differential

Investors in steel equities tend to track the import differential between China and other major steel producing regions in order to assess the potential for increasing/declining steel imports into a specific region, and hence the future outlook for steel prices. Import differentials should be adjusted for tariffs in order to understand the final economic incentive to import, or not.

Chart 74: Europe and US HRC import differential vs. China ($/t)



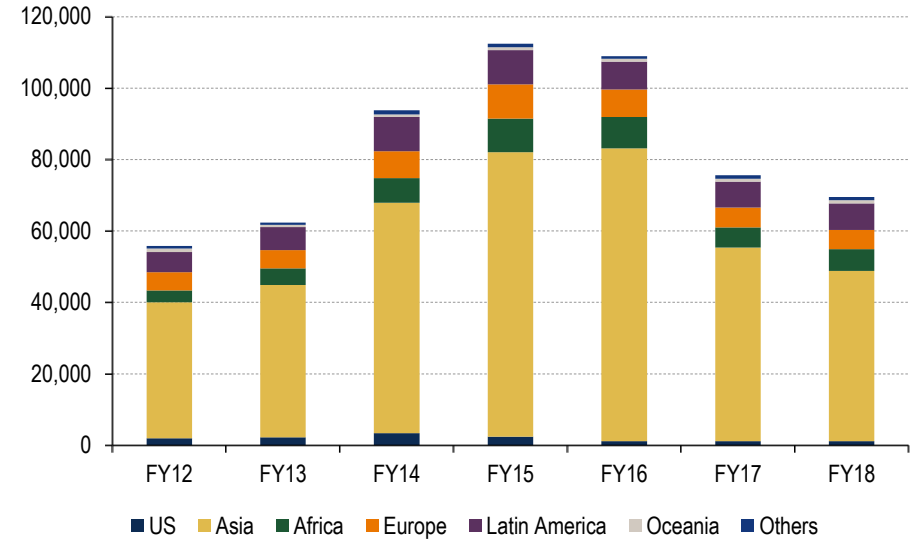
Source: Steel Business Briefing, BofA Merrill Lynch Global Research estimates

Chinese steel exports and the changing protectionist backdrop

2018 was a period of rising protectionism in steel. The US has taken a hard line again imports and imposed Section 232, applying a blanket 25% tariff on all steel imports (some exemptions given where quotas were agreed). Europe has followed with its import safeguard policies putting quotas in place.

The surge in trade protection in our view can be traced back to the sharp increase in Chinese exports over 2014-2016. At its highest point, China was exporting c.135Mt of steel on an annualised basis – more steel than that produced in the US and Japan and c.70% of all European steel production. Countries responded by putting in place a number a trade protection initiatives. Post the imposition of trade protection on a global basis, Chinese exports have come down after peaking in late-2015. We think the decline in Chinese steel exports reflects a mix of 1) stronger domestic demand (total steel consumption +3% YoY), 2) production capacity cuts (total capacity -2% YoY) and 3) international trade restrictions on Chinese exports.

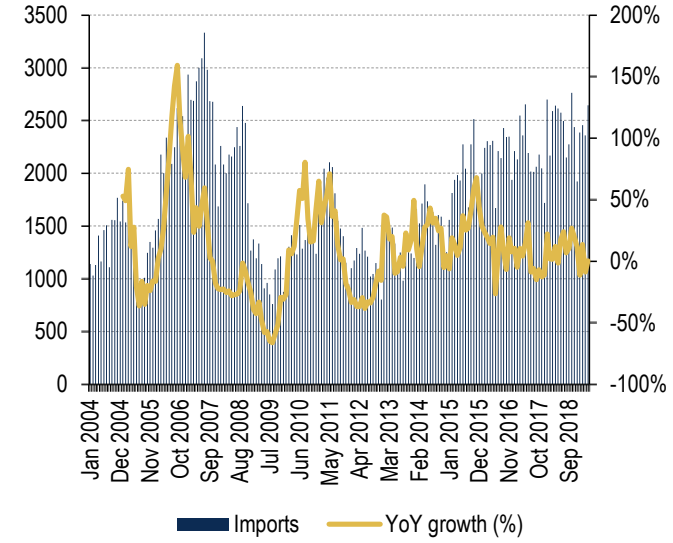
Chart 75: China total steel exports by destination, kt



Source: China customs data, CEIC

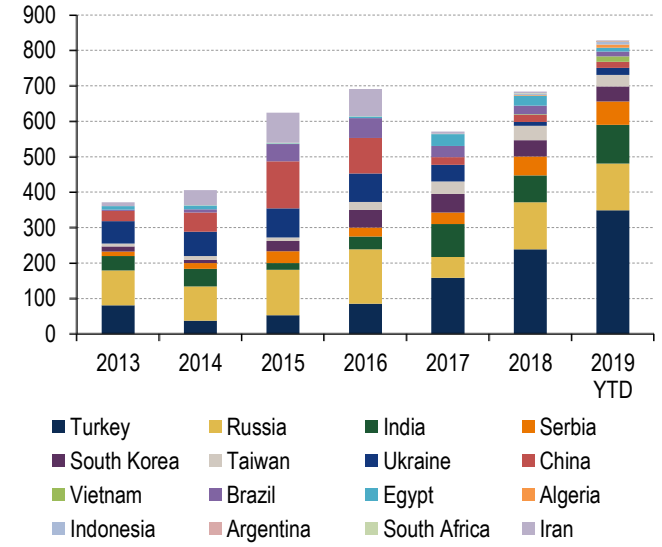
Despite trade protection in both Europe, imports have not declined. Trade protection has helped to only stabilise imports.

Chart 76: European steel imports, monthly, kt.



Source: BofA Merrill Lynch Global Research, Eurofer

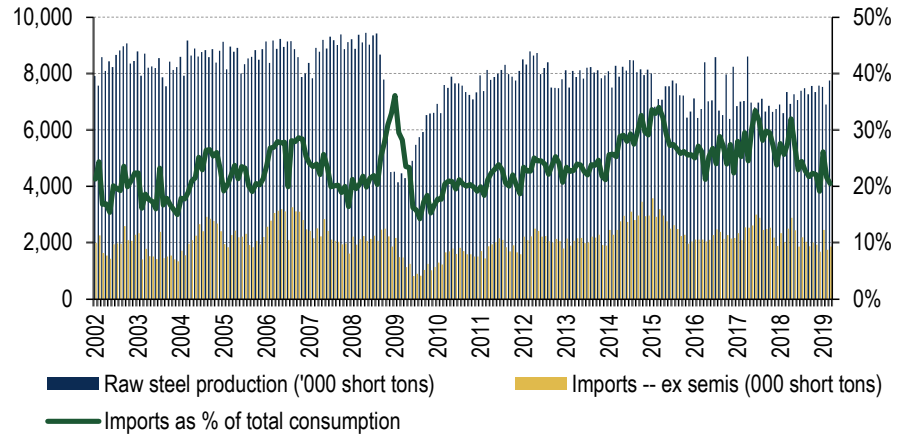
Chart 77: Average monthly imports of HRC into Europe, kt



Source: Eurofer

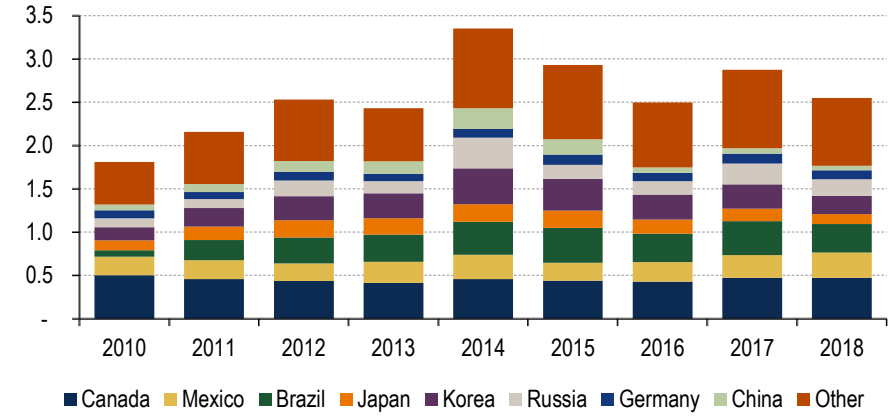
In the US, steel imports from China have also dropped since 2014 due to previous anti-dumping and anti-subsidy duties (-c.50% YoY 2014-16), while overall steel imports was on average down 14% YoY during the same period. Imports from other countries were on average down 12% YoY (2014-16). Import from Mexico grew 9%n from 2015-16, filling up the US total import supply. In addition, domestic steel producers have become decidedly more aggressive in filing trade cases since 2014, in an effort to reduce imports into the U.S. In particular, successful trade case results across hot-rolled, cold-rolled, and galvanized sheet in 2015 helped tighten markets and support prices. Trade cases in long products such as rebar have been less successful, while a plate trade case in 2017 against 12 countries helped support that market.

Chart 78: Monthly imports vs. U.S. crude steel production



Source: U.S. Census Bureau

Chart 79: Average U.S. imports monthly (Mt)



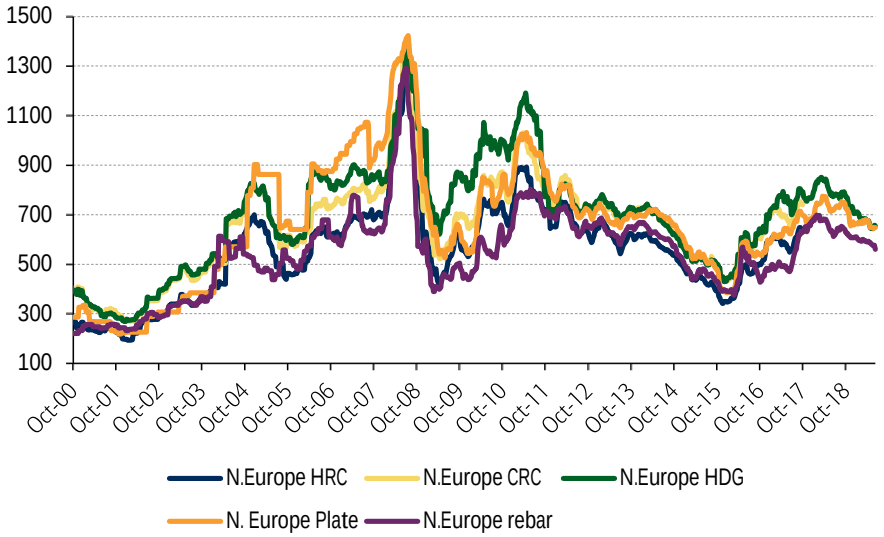
Source: U.S. Census Bureau

No homogenous product, but prices tend to move together

Steel differs from LME traded products (like copper, and zinc) in that there are potentially thousands of different steel grades and shapes depending on the demand of customers and end user, which can all command different prices. Products can differ on thickness, hardness, malleability, finish. Product specification can be determined at 2 steps of the production process: 1) liquid metal phase – alloys are added to give steel different qualities or 2) the finishing phase – steel can be cut, rolled or treated a variety of ways.

While prices for an upgraded product (CRC, Plate, AHSS as examples) can attract a premium over HRC (commodity grade flat steel) or rebar (commodity grade long steel) when producing an "upgraded product". Pricing for premium products tends to move in line with more commodity grade steel.

Chart 80: Relative pricing of various steel products in N.Europe ($/t)



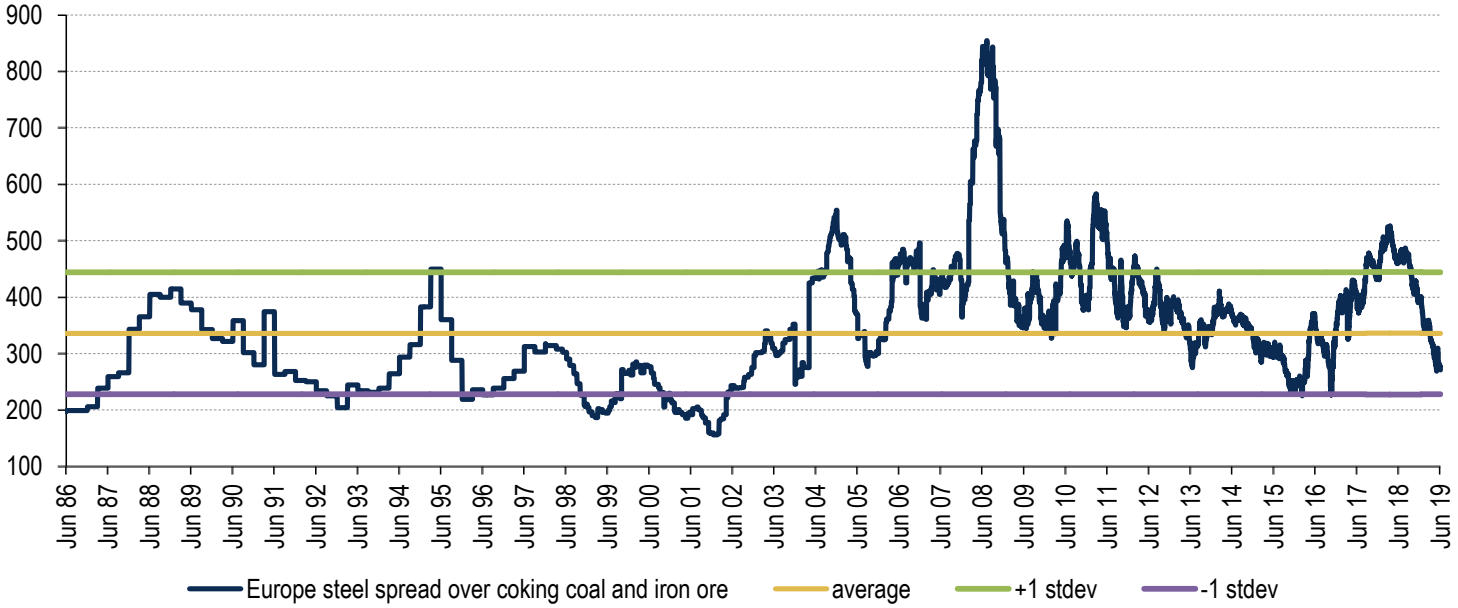
Source: Steel Business Briefing, BofA Merrill Lynch Global Research estimates

Steel margins under pressure

Global steel margins have risen aggressively in 2017-2018 after troughing in late 2015. The recovery in global margins was underpinned by a recovery of margins in China supported by 1) capacity closures under the Chinese government's supply-side reform program, 2) coupled with a synchronized recovery in global steel demand.

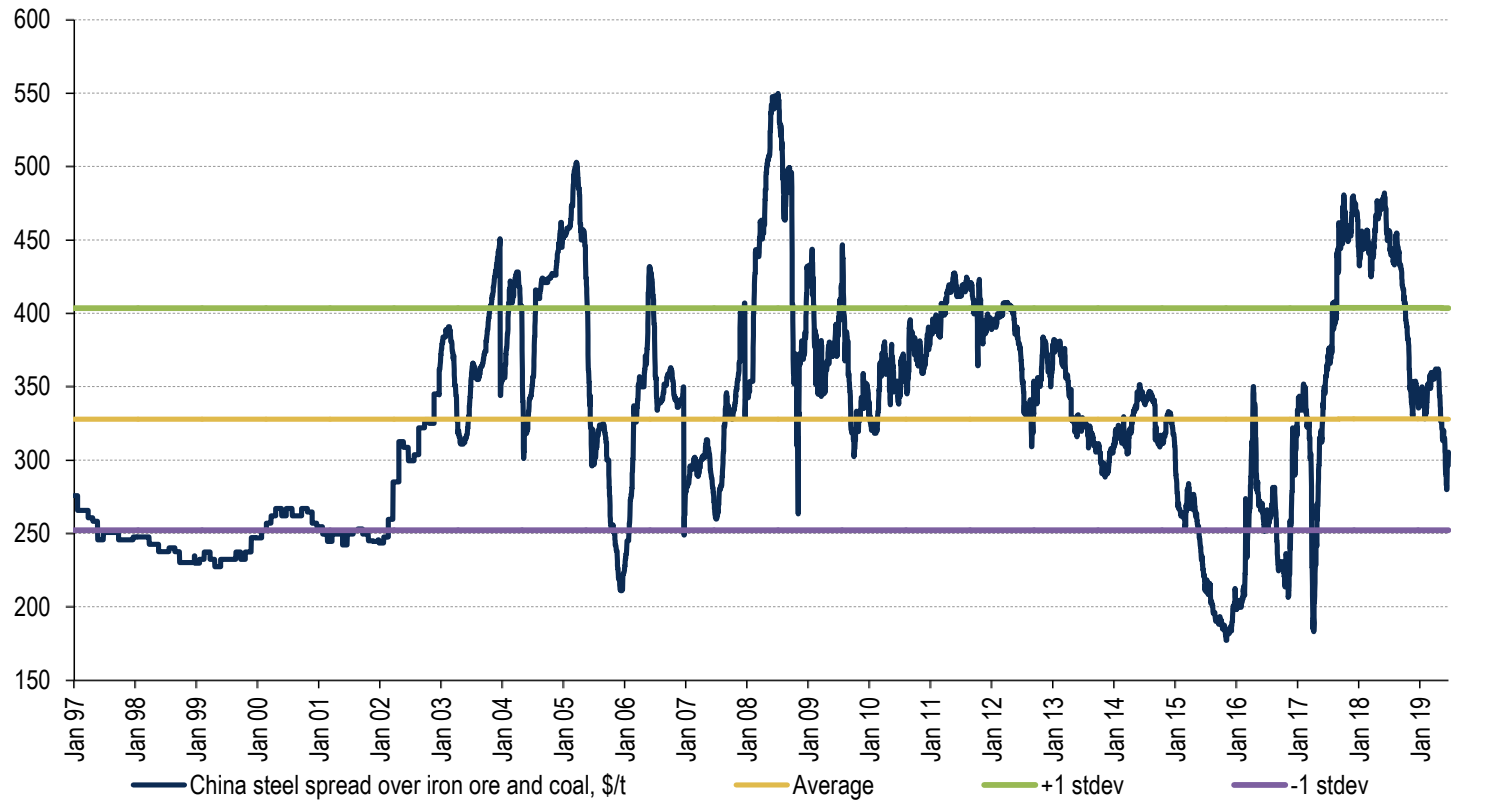
Steel spreads have corrected YTD, with European spreads under greater pressure due to weak domestic demand (autos particularly weak) and high import (Turkey).

Chart 81: Europe steel spread (HRC) over raw materials (iron ore and coal), $/t



Source: BofA Merrill Lynch Global Research, Bloomberg, BHP, steelindex.com

Chart 82: China steel spread (HRC) over raw materials (iron ore and coal), $/t



Source: BofA Merrill Lynch Global Research, Bloomberg, BHP, steelindex.com

Looking at margins from a different angle, we consider the EBITDA/t generated thought out the steel production value chain which then accrues to a steel producer, an iron ore miner and a coking coal miner at present vs. history.

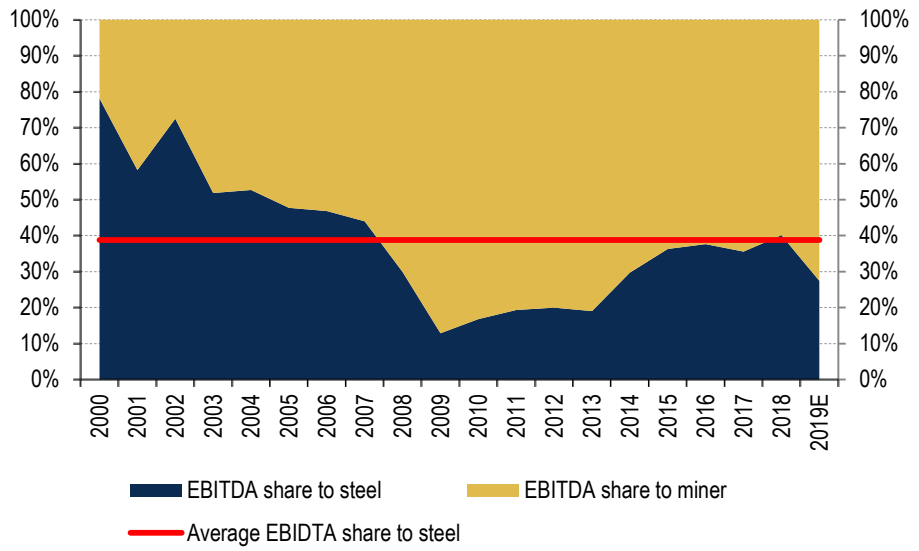
In our analysis, we apply Rio Tinto's EBITDA margin in iron ore to reflect the margin of a generic iron ore miner, assume Glencore's coking coal margin for a generic coking coal producer and in steel, assume the margin for a generic global steel producer is the average margin for a selection of global companies (ArcelorMittal, TK's European steel business, Salzgitter, Voestalpine, US Steel, AK Steel, Nucor, POSCO and Baosteel).

Key conclusions

- In 2019 we estimate the miner "over earns", capturing 73% of EBITDA vs. its long-term average of 61%. Expanding the analysis to consider profitability on a per ton basis suggests the miners over earns while steel simply generates EBITDA/t in line with the long-term average.

- We note: 1) recent actions by MT and US Steel to cut steel production in response to weak margins and 2) Vale's announcement that it will restart iron ore production in Brazil. This could drive a normalisation in the relative profitability of different points on the steel value chain in the medium-term.

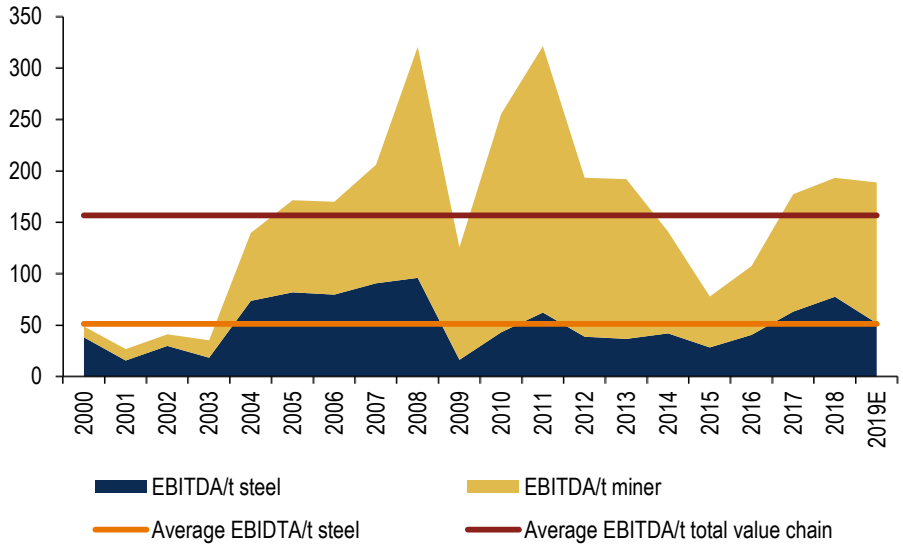
Chart 83: EBITDA accruing to steel vs. raw material producers



Source: BofA Merrill Lynch Global Research estimates, Bloomberg

Taking the analysis once step further, we calculate EBITDA/t generate in absolute terms. Our analysis highlights the material increase in EBITDA/t generated for miners in recent months.

Chart 84: EBITDA/t split between miner and steel producer



Source: BofA Merrill Lynch Global Research estimates, Bloomberg

Carbon costs are rising. Implications for European steel

Originally published on May 24th, 2019: Primer: Carbon costs rising. Implications for EU steel industry. Lead author: Cedar Ekblom, CFA

EU ETS reform = higher carbon prices = risk to margins

EU steel producers at our Global Metals, Mining and Steel Conference flagged the rising cost of carbon emissions as a headwind to profitability requiring investment and new technology. We see investors as somewhat complacent as financial costs from higher carbon costs are more of a medium term risk, and dependent on a number of unknowns. Key issues: 1) Future carbon emission pricing 2) Can new technology reduce emissions? 3) Will politicians act to support EU steel producers via a "green import tax"?

Carbon costs seem to be a more immediate issue for EU steel companies with producers being levied a direct cost for emissions. So far, we do not observe the same approach to getting mills to reduce emissions on other markets. Yes, China is clamping down on emissions and limiting production, but producers are not levied a cost/t of carbon produced when producing steel. There is potential carbon costs become global over time, but for now this appears to be a "European issue".

Carbon price more than doubled in last 12 months

Carbon prices in Europe have more than doubled in last 12 months post EU Emissions Trading System (ETS) reform with tighter supply conditions expected going forward. This could drive a material increase in costs for energy-intensive industries in Europe in our view. Our utilities team thinks CO2 prices could potentially double again over the next 12 months to EUR40-50/t before falling back to EUR25-30/t during the early 2020s.

Chart 85: European Emissions Allowance daily price (EUR/t)

Source: Bloomberg

Excess supply of credits about to disappear

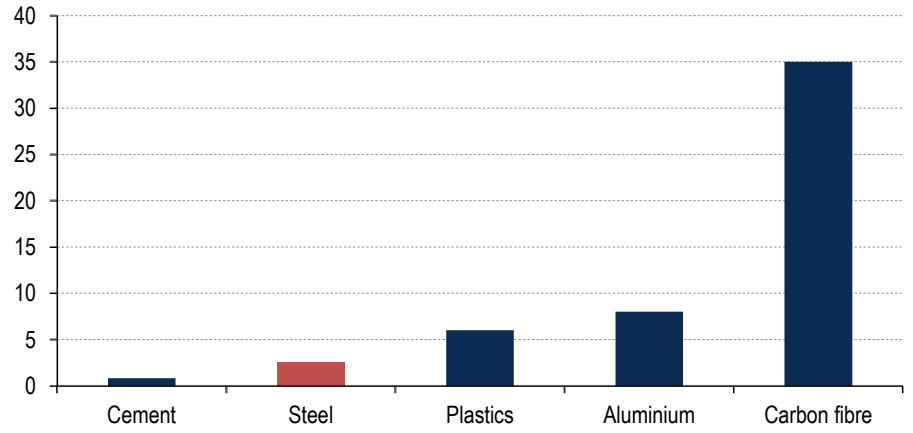
The EU ETS was introduced in 2005 and was designed to incentivise energy intensive industries in Europe to reduce GHG emissions. "Free" allowances were awarded to power generation, heating, metals, cement, refining and aviation. Unfortunately, due to a number of issues, more permits were issued than GHG's emitted resulting in excess

supply and low carbon prices. This meant little economic incentive for industry to cut its carbon footprint. As a result, the EU implemented broad reform of the system in 2018 which, over time, reduces "free" allocations and in our view will drive up carbon costs.

We outline a potential worst case scenario for the EU carbon steel group. We consider the potential cost of carbon on a per ton of steel basis relative to EBITDA/t of major EU steel producers. In scenario where producers are awarded no "free" allowances and do not invest to reduce carbon emissions, at spot carbon prices >80% of EBITDA could be lost. This speaks to the imperative steel, and other metal producers, in Europe have to 1) reduce carbon emissions and 2) secure political support to protect domestic industry.

ArcelorMittal estimates that, on average, c. 2.5t CO2 are emitted per ton of steel produced via the BOF (basic oxygen furnace) route. Company specific emissions will differ depending on 1) the efficiency of production, 2) raw material mix used, 3) carbon capture systems in place and 4) steel production route used (BOF emits more CO2 than EAF).

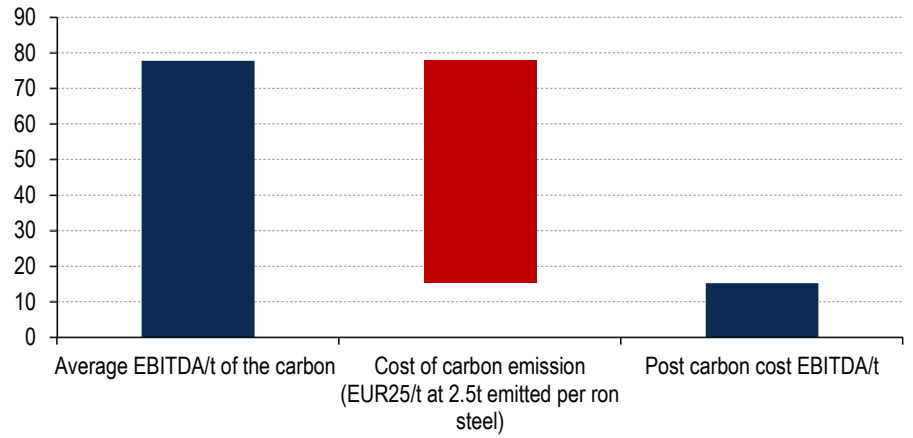
Chart 86: Ton of CO2 emitted on average



Source: ArcelorMittal company reports

We consider the average European division EBITDA/t in EUR over the last 5 years for the EU carbon steel group – MT, TK, SSAB, SZG, VOE. On average the group has delivered EUR78/t of EBITDA. Assuming "free" carbon emission allocations fall to zero in the long-term, and based on carbon prices at current spot levels of EUR25/t, producers could lose >80% of their EBITDA (assuming all emit CO2 in line with industry averages of 2.5t/ton of steel).

Chart 87: EBITDA downside risk in a worst case scenario for carbon emissions.

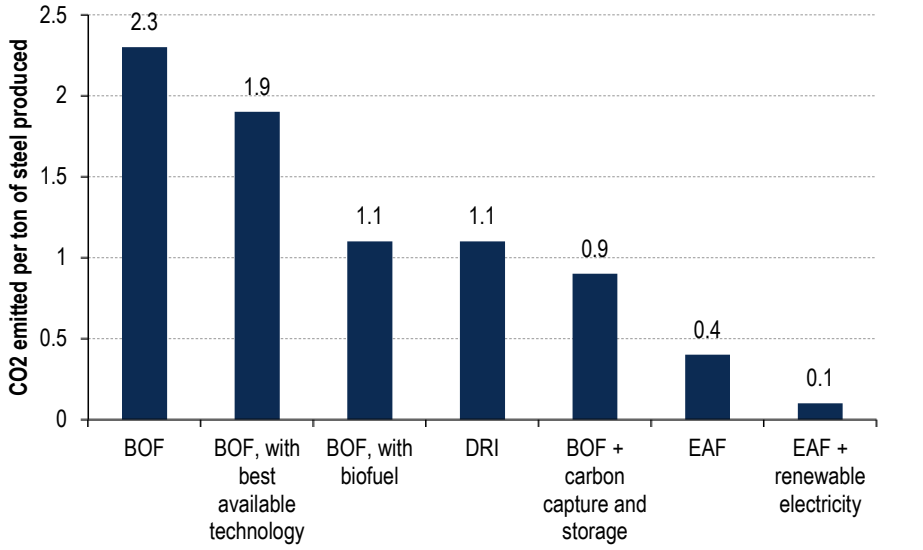


Source: BofA Merrill Lynch Global Research estimates

The severity of this scenario speaks to the imperative steel, and other metal producers, in Europe have to 1) reduce carbon emissions and 2) secure some kind of political support to protect domestic industry.

There are 2 main routes EU steel producers are exploring to mitigate CO2 impact on their businesses: Carbon capture: "capturing" carbon produced during steel production and utilising this to replace carbon required elsewhere in an industrial value chain (ArcelorMittal' s LanzaTech project, TK's Carbon2Chem). Carbon elimination: Full elimination of carbon in the steel production process. This can be achieved by 1) converting from BOF (average 2.5t CO2/t steel) to EAF (0.1-0.4 CO2/t steel) based steel production, or 2) new technologies for iron ore based steel production, such as SSAB's Hybrit project. Hybrit is a project for ore based steel production using hydrogen rather than coal. Hydrogen will be produced with electricity generated from renewable sources.

Chart 88: CO2 intensity of different steel production routes



Source: Material Economics 2018

Raw material perspective: Iron ore

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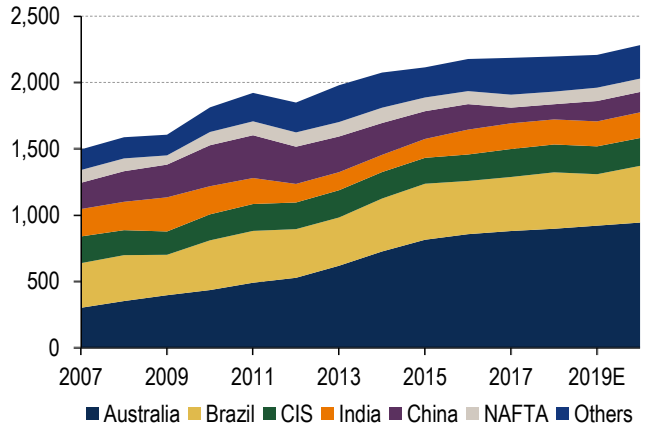
Iron ore is a key ingredient in the production of steel, where it reacts with metallurgical coal and energy in a blast furnace to produce pig iron that is further treated to produce crude steel. Generally, around 1.6 tonnes of iron ore and 0.6 tonnes of metallurgical coal are required to produce 1 tonne of steel, although this ratio can be altered depending on the quality of iron ore in the burden as discussed below.

In situ, iron ore exists as either hematite or magnetite. Hematite ores represent the majority of the iron ore used in global blast furnaces. Features include a relatively low extraction and processing cost due to their high grade and large scale deposits. Hematite ores vary by the content of iron ore, measured on a % grade, the level of impurities such as silica, phosphorus, and aluminium and lastly size as either lump or fines. Lump ores are added directly to a blast furnace while fines ores require sintering before they are added to a blast furnace so they can be reduced into steel. The key difference with magnetite ores versus hematite ones is their relatively lower grade, but ability to be processed into higher grade concentrates or pellets due to their magnetic properties. However, the extra cost of processing generally makes these ores more expensive to produce.

Main producers and consumers

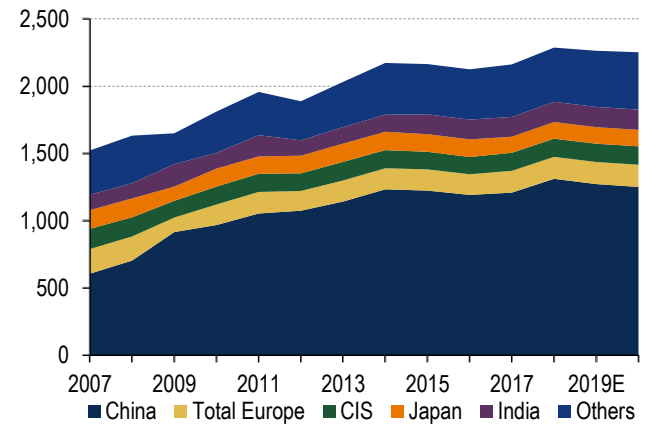
Iron ore production is around 2.2 billion tonnes (~1.6 bt traded in seaborne) and is concentrated both on a country and company basis, with Australia, Brazil and China the main producers and companies Vale, RIO, BHP the largest producers. There is a low level of vertical integration both on the country and company basis, which has given rise to a significant contestable market that represents around 80% of total iron ore production. China is the largest buyer of in this market, importing around 1.2 billion tonnes of ore through a multitude of buyers, followed by Europe, South Korea and Japan.

Chart 89: Global iron ore production (Mt)



Source: BofA Merrill Lynch Global Research estimates

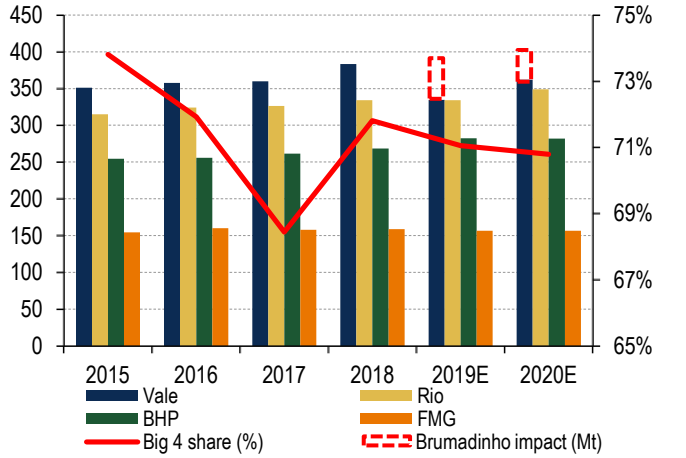
Chart 90: Global iron ore consumption (Mt)



Source: BofA Merrill Lynch Global Research estimates

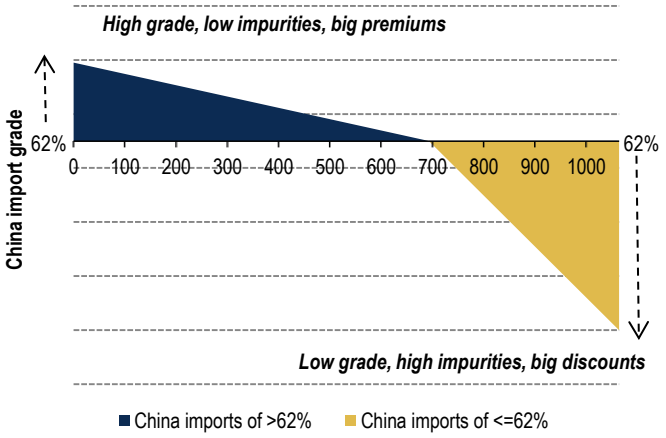
As with many commodities, China's impact on the iron ore market has been significant. Indeed, China's voracious appetite for iron ore between 2000 - 2015 outstripped the ability of incumbent producers to meet demand and led to high prices which incentivised the emergence of new producers such as Fortescue Metals Group, Roy Hill and Anglo American (Minas RIO) plus many smaller ones that on an overall basis has reduced the overall grade and quality of iron ore into seaborne markets. In the last years with increasing profitability in steel industry in China, iron ore quality gained relevance with the 65% ore trading a premium of $30/t in H218. Brumadinho accident in January 2019 changed supply dynamics in the market, with ~93mt production impact.

Chart 91: Big 4 iron ore production (Mt) and % of total seaborne production



Source: BofA Merrill Lynch Global Research estimates

Chart 192: 2/3rds of imported ores (Mt) into China are high grade >62% (CY2018)



Source: BofA Merrill Lynch Global Research estimates

A note on how iron ore is priced and we set our cost curves

We run our global supply and demand model on a wet metric tonne (wmt) basis, unadjusted for contained iron ore. Simply, this means we record supply as companies and countries report their data. However, iron ore prices are reported on a dry metric tonne (dmt) and adjusted for iron ore content (mainly a 62% of contained iron ore) in a fines quality delivered into China. Therefore, we also we run our cost curve on a dry, 62% adjusted basis. To do this, we convert the tonnes that competed in the seaborne market (total seaborne+ China) at the regional specific grade and moisture to reach the 62% dmt grade.

We note disparities in data as high frequency data that is often quoted is a mixture of dry and wet tonnes. Import volumes released by China customs are reported on a dry basis, as are the export volumes disclosed from the Australian Bureau of Statistics - all other volumes are reported on a wet basis. To gather data, we use a combination of data sources for historical data which includes China Customs, World Steel Association, and numerous statistic bureaus.

In terms of converting demand for steel into demand for iron ore, we start with volumes of pig iron production and use a country specific ratio of iron ore units to pig iron units. For China, we set this ratio at 1.7 units of iron ore per unit of pig iron. For our European iron ore demand estimates, we assume this ratio is lower at 1.5 iron ore units per pig iron unit, given the higher quality ores which tended to be used in the EU.

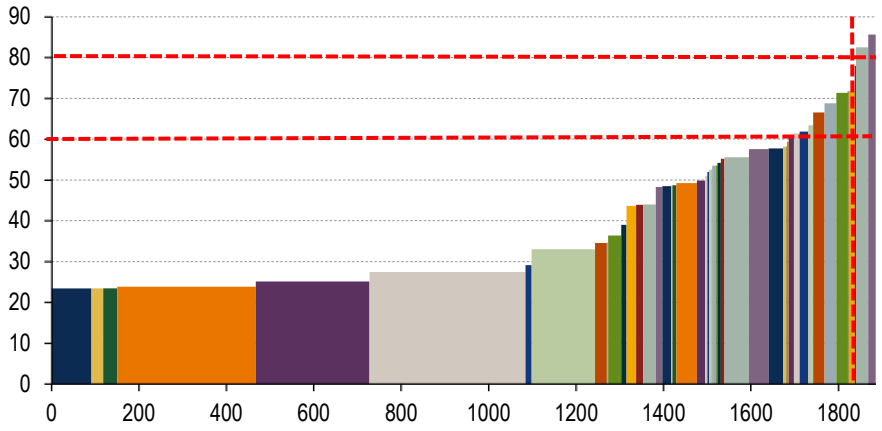
Our cost curve data takes into account the FOB unit cost including royalties, and then is adjusted for moisture, grade, and any other product premiums or discounts. We then assume a freight rate to arrive at a dry, 62% equivalent CFR cost basis - our cost curve analysis excludes sustaining capital and interest costs in the short term. However, sustaining capex is included in our long term price. We include all Chinese tonnes of iron

ore in the cost curve analysis, but assume state owned enterprise (SOE's) and private mines inland will remain producing irrespective of the seaborne price and therefore move these tonnes to the front (bottom left) of the cost curve.

Finally, to set our price, our team uses the intersection of the cost curve price with the 90th percentile of the seaborne+China demand profile – this is on a dry, 62% equivalent basis. Prices are set on a nominal basis, that is including inflation and also the impact of factors such as oil linked inflation and currencies.

We have mapped these cost elements a cumulative cost curve below. Key features of the curve are (1) significant industry concentration of low cost producers Vale, RIO, BHP and FMG and (2) the cost advantage that these producers enjoy over smaller and higher cost rivals.

Chart 93: Iron ore production cash cost curve (US$/t)



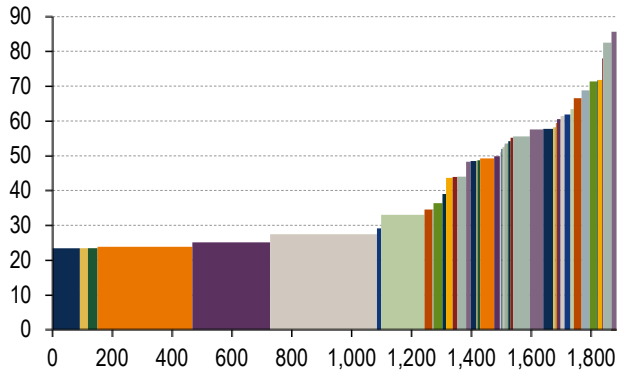
Source: BofA Merrill Lynch Global Research estimates

Cost curves can change

Traditionally, premia/discounts have been very constant as producers' product quality was similar and the relative cost ratio between iron ore and metallurgical coal also remained constant. Long term pricing is set off traditional discounts and premia prevailing. However, from late 2016 we observed a change to these discounts and premia: All else equal if raw material costs increase and at times of steel high demand and profitability, mills will have a preference for higher grades (maximising output) = discounts for low quality widening while at times of low profitability choosing low quality product = discounts narrowing.

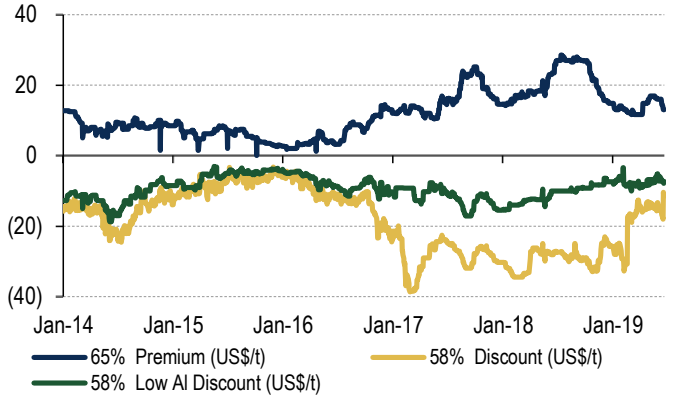
Indeed, the bifurcation in quality has expanded during the year as strong demand, high steel margins, combined with capacity curtailments have meant that remaining mills continue to prefer higher grades to lower grade material. The impact on our cost curve is profound adding significant shape to the tail, given only 2/3rds of ores imported into China are high quality (62% or better) and the lower grade producers generally occupying the top quartile of the cost curve after we normalise their discounted prices as extra costs.

Chart 94: Iron ore production cash cost curve (US$/t) – 2018



Source: BofA Merrill Lynch Global Research

Chart 95: Iron ore prices discount/premium to 62% grade (US$/t)



Source: BofA Merrill Lynch Global Research, Platts

Table 13: Seaborne Iron Ore Balance - Summary (Wet Mt, as reported)

Seaborne Iron Ore Balance														
Seaborne Exports	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Australia	269	310	381	428	465	526	616	757	813	857	880	897	908	944
Total Europe	8	9	8	9	11	29	14	16	11	16	18	18	1	2
CIS	51	46	50	63	67	70	67	64	64	58	75	70	68	70
NAFTA	26	26	31	34	39	40	49	45	36	41	46	43	49	49
Brazil	269	282	266	311	330	327	330	344	366	374	383	376	336	373
South/Other America	20	18	19	25	27	30	27	13	30	31	37	32	31	34
Middle East	5	5	7	15	22	23	27	23	15	20	30	30	30	30
Africa	42	48	55	59	65	68	94	111	86	76	87	79	80	81
India	94	101	91	96	39	28	14	10	4	25	29	18	14	11
RoW	2	9	15	16	50	65	71	43	31	30	30	30	30	30
Total Seaborne Exports	**787**	**855**	**923**	**1,056**	**1,115**	**1,206**	**1,309**	**1,425**	**1,457**	**1,526**	**1,615**	**1,594**	**1,546**	**1,624**
Seaborne Imports	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Total Europe	157	156	86	149	133	132	129	129	130	126	136	137	138	139
CIS	0	0	0	0	0	0	0	10	-1	0	0	0	0	0
NAFTA	7	7	2	8	2	2	1	2	4	6	5	5	6	6
South/Other America	1	2	1	2	2	2	1	2	2	-2	-2	-2	-1	-1
Middle East	11	18	12	20	27	25	22	27	28	31	33	34	35	36
Japan	139	140	106	134	129	131	136	136	131	130	120	124	123	122
South Korea	44	50	42	56	65	65	63	74	73	103	108	116	122	131
India	1	1	1	0	1	3	1	7	10	8	8	9	9	9
RoW	21	9	5	27	26	47	76	71	84	82	85	86	87	88
China	408	472	668	658	731	793	873	993	1,014	1,090	1,144	1,132	1,181	1,160
Total Seaborne Imports	**787**	**855**	**923**	**1,056**	**1,115**	**1,199**	**1,302**	**1,451**	**1,474**	**1,574**	**1,636**	**1,641**	**1,700**	**1,689**
Balance	**0**	**0**	**0**	**0**	**0**	**7**	**8**	**-26**	**-17**	**-48**	**-21**	**-47**	**-154**	**-65**

Source: BofA Merrill Lynch Global Research estimates

Table 14: Iron ore production summary - Mt

Iron ore Production	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E	2017-2020 CAGR
Australia	301	352	396	435	490	527	618	726	814	856	880	897	908	944	2.4%
Total Europe	35	32	27	37	39	40	41	44	39	54	57	57	40	41	-10.3%
CIS	201	188	176	196	203	201	206	200	195	200	211	210	210	210	-0.2%
NAFTA	96	97	70	100	105	108	109	116	104	98	98	95	101	101	0.9%
Brazil	337	346	305	375	391	367	364	399	423	401	407	426	388	428	1.6%
South/Other America	37	39	31	34	38	39	32	36	35	36	37	32	31	34	-2.9%
Middle East	22	20	24	28	36	38	38	49	39	40	60	60	60	60	0.0%
Africa	58	64	68	71	69	76	112	108	86	82	93	86	87	88	-2.2%
India	207	214	257	212	196	140	136	130	143	188	194	189	188	194	0.0%
RoW	3	5	5	16	33	33	55	29	28	30	30	30	30	30	0.0%
China	198	231	247	309	322	281	269	240	209	192	118	115	154	154	9.2%
Total Production	**1,496**	**1,587**	**1,607**	**1,813**	**1,922**	**1,849**	**1,980**	**2,075**	**2,115**	**2,177**	**2,186**	**2,196**	**2,195**	**2,282**	**1.4%**

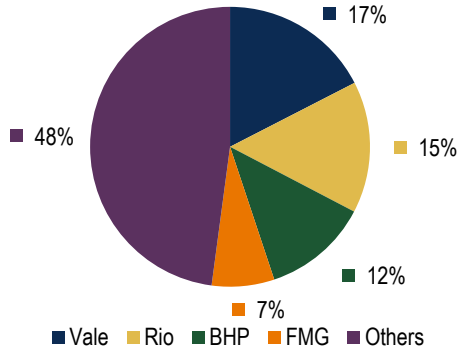
Source: BofA Merrill Lynch Global Research estimates

Table 15: Iron ore consumption summary - Mt

Iron ore Consumption	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E	2017-2020 CAGR
Total Europe	183	180	108	153	160	147	157	157	158	154	162	164	164	165	0.6%
CIS	150	142	124	133	135	131	138	135	131	128	134	135	136	137	0.7%
NAFTA	77	78	39	69	69	71	60	76	71	71	73	75	80	78	2.3%
South/Other America	95	97	57	84	83	60	49	72	69	68	73	74	76	77	2.0%
Middle East	29	33	29	34	38	40	33	52	52	48	52	53	55	56	2.8%
Japan	139	140	106	134	129	131	136	136	131	131	120	124	123	122	0.8%
South Korea	44	50	42	57	65	65	64	73	73	80	83	89	94	101	6.7%
India	114	113	167	117	158	114	123	127	148	147	147	150	150	151	0.8%
RoW	86	96	63	64	66	56	130	111	108	106	110	112	113	114	1.2%
China	606	703	915	967	1,053	1,074	1,142	1,233	1,223	1,191	1,208	1,311	1,272	1,251	1.2%
Total	**1,522**	**1,632**	**1,649**	**1,811**	**1,957**	**1,888**	**2,032**	**2,172**	**2,164**	**2,125**	**2,162**	**2,287**	**2,263**	**2,252**	**1.4%**
Change in China inventory	13	13	24	10	26	-17	7	5	-14	21	36	13	-7	-6	
Total Consumption	**1,535**	**1,645**	**1,673**	**1,821**	**1,983**	**1,870**	**2,039**	**2,178**	**2,150**	**2,146**	**2,198**	**2,300**	**2,255**	**2,246**	**0.7%**

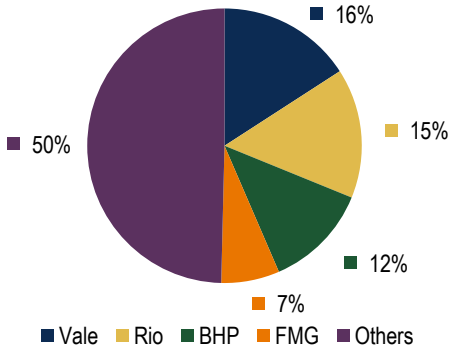
Source: BofA Merrill Lynch Global Research estimates

Chart 96: Big 4 iron ore production market share – 2018A



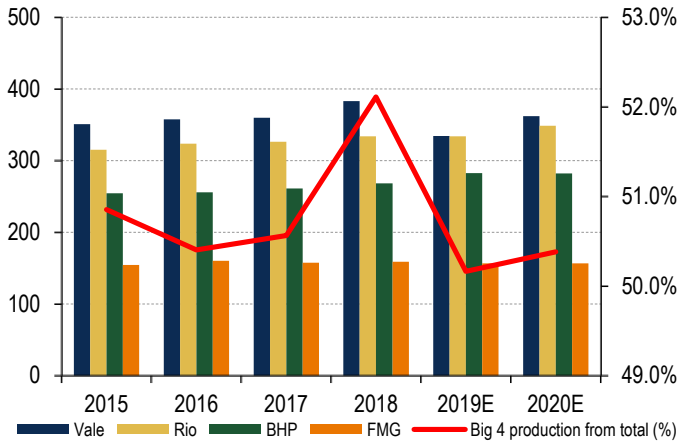
Source: BofA Merrill Lynch Global Research, company report

Chart 97: Big 4 iron ore production market share – 2020E



Source: BofA Merrill Lynch Global Research, company report

Chart 98: Big 4 iron ore production (Mt)



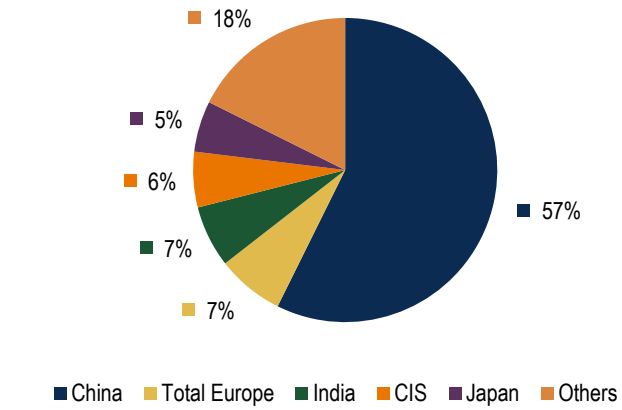
Source: BofA Merrill Lynch Global Research estimates, company reports

Table 16: Big miners will ramp up back to their capacities in 2020Eafter the supply disruptions in 2019E in Australia and Brazil

Company	Unit	2016	2017	2018	2019E	2020E
Vale	Mt	341	343	366	319	345
Rio	Mt	328	330	338	324	353
BHP	Mt	262	268	274	268	289
FMG	Mt	171	169	170	168	168
Roy Hill	Mt	23	42	50	55	55
Minas Rio	Mt	16	17	3	20	22
Volumes (mt)	**Mt**	**1141.7**	**1168.3**	**1200**	**1151.9**	**1231.1**
Period Δ	Mt	27.4	26.6	32.2	-48.6	69.2

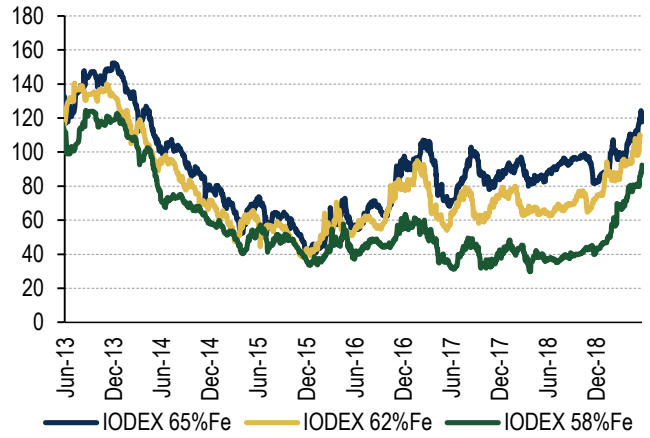
Source: BofA Merrill Lynch Global Research estimates, company reports

Chart 99: Iron ore share of consumption by country – 2018E



Source: BofA Merrill Lynch Global Research estimates

Chart 100: Iron ore prices for 58%, 62% and 65% grades (US$/t)



Source: BofA Merrill Lynch Global Research, Platts

Raw material perspective: Scrap

Steel is one of the most recycled material globally. Obsolete scrap can be sourced from used autos, steel structures, appliances, railroad tracks, ships, farm and other equipment. Industrial and manufacturing off take, also called prompt scrap, comprising about half of ferrous scrap supply. Scrap's sole end use is the production of steel, generally via remelting the metal in electric arc furnace (EAF)- based steel mills. Foundries and other industrial consumers also use scrap metal to make finished steel products.

The Institute of Scrap Recycling Industries claims recycling steel uses 60% less energy than traditional blast furnace methods, and cut CO2 emissions materially. Steel production via a BOF is reported to emit 2-2.5t CO2 per ton steel while EAF produced steel can omit <0.5t CO"

In 2017, 600mn metric tons of ferrous scrap were consumed globally in 2017. The U.S. is the largest exporter of ferrous scrap, and in 2017 shipped more than 13Mt predominantly to China, South Korea, Turkey, Taiwan, Mexico and India.

In terms of steel production industrialized countries tend to be larger adopters of EAFs, as they tend to have more readily available scrap metal. Developing countries do not tend to have as large of a scrap "reservoir," hence tend to use more blast furnace steel-making methods. Yet blast furnaces also can use scrap in their ferrous mix, varying from 10-15% of the mix to as high as 30% in newer furnaces. Chinese mills have recently claimed greater scrap consumption has helped their yield in blast furnaces, whereas older U.S. furnaces have tended to limit scrap use to avoid contaminants in more advances sheet grades.

US dominates global steel production using scrap

EAFs comprise about 65% of total steel production in the U.S, having gradually grown from less than 20% of the total 50 years ago. Also known as steel "mini-mills," these producers claim they can make virtually any product the blast furnace or integrated mills can make. Over the next several years we expect this claim to be put to the test given about 15Mt of new/restarting EAF capacity planned from 2018 through 2022E.

According to McKinsey, global scrap consumption has been growing at a CAGR of c.3% p.a. since 2000, while pig iron has been growing at c.5% p.a. This has corresponded with rapid growth in BOF capacity and steel production in China. Going forward, we see potential for scrap utilization rates to rise in China suggesting increasing scrap demand.

As the world's largest steel producer and consumer, China has a relatively low steel scrap utilization rate. In 2015, China consumed c.180Mt of scrap, or 27% of the global total (source: McKinsey). This compares to producing more than 50% of total steel globally. However China is evolving into a post-industrial economy, like the US, Japan and Europe, with a growing supply of steel scrap. Coupled with the country's increasing environmental concerns, we think Chinese steel scrap production is likely to take off in the medium term, a key driver behind the world's steel scrap industry.

Scrap sources

There are three main sources of steel scrap,

1. Home scrap – generated from waste during the steelmaking process, i.e. its supply is directly linked to steel production. Home scrap is typically recycled in the mill.

2. Prompt scrap – generated in the downstream manufacturing process. Prompt scrap is also fully recycled and returned to the steelmakers within the year.

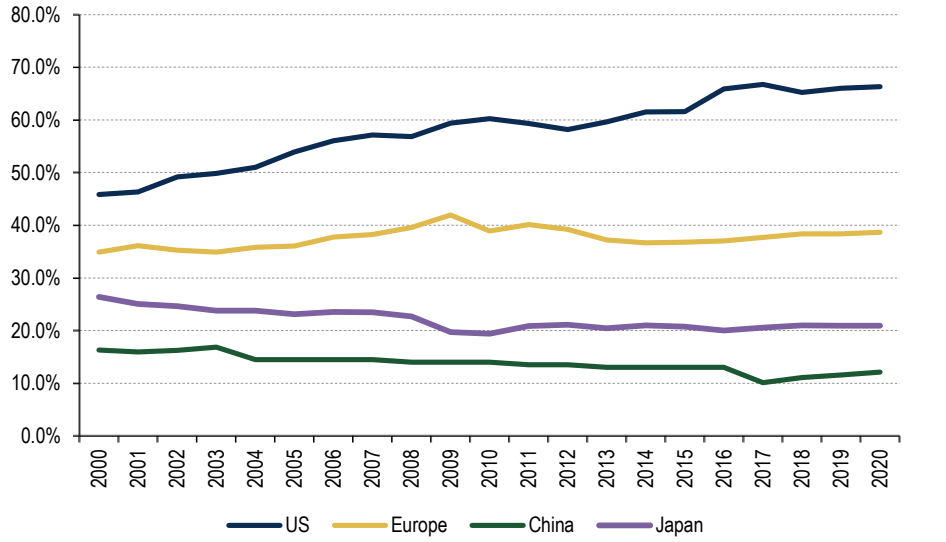
3. Obsolete scrap – collected and recycled when finished steel products reach the end of their useful lives. Theoretically, after experiencing a boom steel market over the past decades we are likely to have a growing obsolete scrap supply.

China EAF steel production should rise slowly as installed scrap inventory grows. Generally, it is more cost efficient and less polluting to consume scrap where it is generated. High scrap consumption rates hence require the build-up of a "scrap inventory" in-country in order to support the build out of an EAF steel industry.

We highlight the difference in EAF production as a percentage of total steel production in Europe, the US and China. Chinese scrap utilization has much room for growth when compared to other post industrialized nations. Aside from scrap inventory availability, factors that could impact the pace of EAF capacity build out include:

- The cost to build new EAF capacity relative to potential returns: steel industry oversupply can dissuade new steel capacity investment even as scrap availability rises.
- The required quality of product: higher quality products are often produced via the blast furnace route. We highlight the case of Japan where a large percentage of production is niche products geared into automotive and machinery applications. EAF capacity as a percentage of total capacity has stayed relatively stable over time even as a scrap inventory built up. We think this can be explained by Japanese steel producers targeting niche product output which often necessitates BOF production.
- Scrap recycling industry development. According to McKinsey scrap recycling in China is a highly fragmented industry that lacks vertical integration and mainly operates under the authorities' radar. In order to handle growing volumes of scrap, the sector will need to gain scale and efficiency. To date, it has been challenged by the uncertainties surrounding the government's plans to restructure the domestic steel.

Chart 101: EAF contribution to total production – US, Europe, China, Japan



Source: CRU

Supply side initiatives and market reform

From 2008 – Q1 2016 the global steel industry had seen a steady decline in sector margins and cashflow with margins. Utilisation rates were pressured by lacklustre steel demand growth (post GFC) and lack of capacity closures in developed markets, coupled by growing oversupply in China. The issue of weak global utilisation rates and dire industry profits came to a head in late 2015/early 2016 with the Chinese steel industry annualising, at its worst point, cash losses of $60bn based on our estimates. Global steel producers were also under significant pressure – ArcelorMittal raised $4bn - $3bn via a rights issue and $1bn from the sale of Gestamp in Q1 2016.

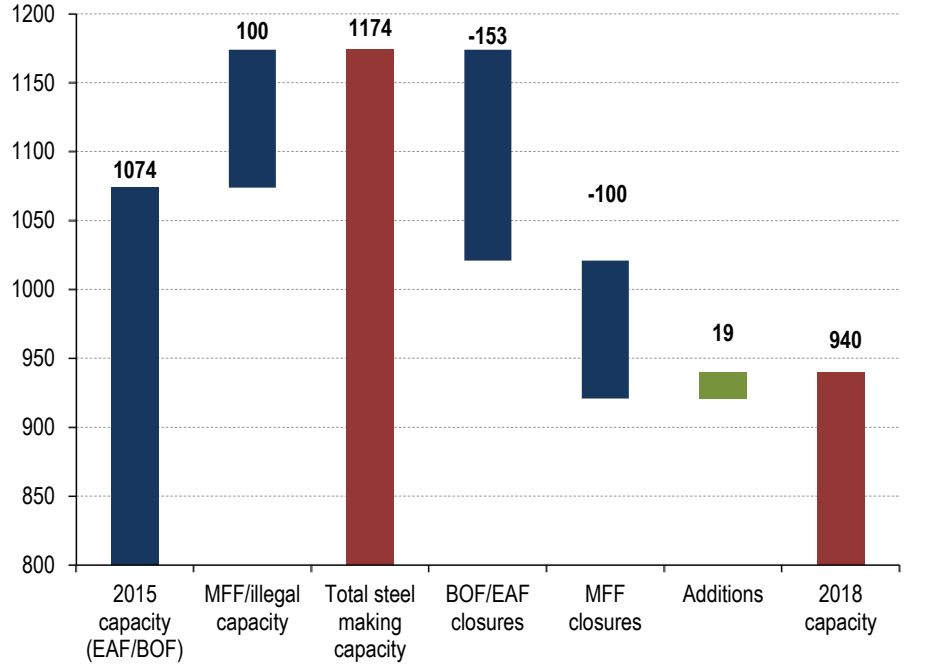
China has responded with supply-side reform with government mandating capacity closures and targeting industry consolidation. In Europe, we observed industry consolidation (ArcelorMittal' s acquisition of Ilva) and merger attempts (thyssenkrupp and Tata Steel deal unapproved by competition authorities).

China is serious on steel oversupply

Between 2015 and 2018, China has responded decisively, in our opinion, to weak industry margins by mandating capacity closures of 150mn t of traditional BOF/EAF capacity. In addition, the government has cracked down on illegal capacity (medium frequency furnace/induction furnace) production. Implementation of the program has been highly monitored by government inspectors with limited evidence of restarts despite recovery in industry profitability being observed.

We estimate crude steel making capacity will fall to 940mn tons from close to 1.2bn tons.

Chart 102: China crude steel capacity pre and post supply side reform



Source: BofA Merrill Lynch Global Research estimates, NBS

Strong oversight in supply-side reform implementation

Targets to cut steel capacity were outlined by China's National Development and Reform Commission. We observe a high level of commitment too and enforcement of the program. Some key characteristics of the program are:

- No new capacity will be approved, and in the case of a relocation, for every 1.25 t of capacity eliminated at the old location, only 1 t of capacity in the new location can be added in environmentally sensitive areas, though this is relaxed elsewhere to a maximum 1:1 ratio.

- A RMB 100bn fund has been set up to retrain or compensate workers.
- CRU reports that in Tianjin province (a major steel producing region), government has provided a RMB10,000 cash rewards for reporting an illegal steelmaking operations. There are also potential sanctions for government officials who do not meet capacity closure targets.
- Market consolidation is also encouraged. China targets 10 large steel groups controlling 60% of supply by 2020 vs. less than 30% from the largest steel producers at present. Completed mergers include Baosteel/Wugang.

Europe: Value over volume

Whilst global supply/demand backdrop is supportive as China supply side reform presents a "new era" for margins, the supply/demand balance in Europe is weaker as soft demand (autos) has met a sharp increase in cheap imports from Turkey. Yet we see supply moderating: (1) ArcelorMittal plans to cut 4.2Mt steel production on an annualised basis in response to weak prices, (2) domestic production in the region down 10Mt to April on an annualised basis. We think MT's supply cuts in Europe are decisive in supporting price and margin.

Capacity closures to come

ArcerlorMittal (MT) announced it will temporarily reduce steel production in Europe in response to weak demand and falling prices. Production curtailed at 3 facilities: Krakow (Poland), Asturias (Spain) and ILVA (Italy). We are encouraged by MT's approach as the supply leader in Europe; prioritising value over volume. Smaller names (SSAB, VOE, SZG) benefit from "free rider" position. Unusually, EU steel prices have decoupled from high raw material prices and higher YTD steel prices in China. We do not think this is sustainable – despite safeguards, the EU steel market remains "open" with imports setting the market clearing price in our view. We do acknowledge the current environment of excess supply in Europe, as a result of weak domestic demand. However we think actions taken by MT can help to balance the market allowing domestic prices to "catch up" to more resilient global prices and higher raw material costs. In short, we think MT's actions could signal a "floor" for EU prices.

ArcelorMittal acquired Europe's largest steel mill

In November 2018 ArcelorMittal (MT) completed the acquisition of Ilva – a fully integrated network of 3 steel assets located in Italy including upstream crude steel production, cold and hot rolling mills as well as shape products. Upon the completion of the transaction, MT created a new business cluster within ArcelorMittal Europe – Flat Products which holds the Ilva asset. The division is called ArcelorMittal Italia. MT holds a 94.4% equity stake in the business with Banca Intesa SanPaolo owning the remaining 5.6%.

Trade protection

Chinese steel exports surcharge in 2014/2015 in response to weaker domestic demand. At their highest levels, exports annualised 135mnt – more steel than that consumed in the US on an annual basis and roughly two thirds of European steel consumption. Governments globally have responded by putting in place trade protection initiatives.

On 19 April 2017, Secretary of Commerce Wilbur Ross initiated the S232 investigation. Section 232 (S232) is an investigation considering the effect of steel imports on US National Security. Generally, steel products fall into one of the following five categories (including, but not limited to): Flat products, long products, pipe and tube products, semi-finished products and stainless products.

Our US Steel analyst, Timna Tanners, highlights that in March 2018, President Trump set 25% tariffs on steel imports and 10% on aluminium imports. Although he said the tariffs would endure "for a long period of time," there is no guarantee they would not be scaled back, watered down, or removed early. In August 2018, President Trump pledged to double Section 232 steel import tariffs from Turkey via tweet, citing the weaker Lira and a deteriorating relationship with the country. Then in May 2019, the White House said it switched the Turkish tariff on imported steel back to Section 232 levels of 25%, reversing a move from August doubling the tariff after the currency weakened. Turkish steel has traditionally been disruptive due to heavily discounted prices. The U.S. also agreed to remove Section 232 tariffs on Mexico and Canada, without requiring any quotas, which it had previously insisted on but was seen as a barrier to the USMCA agreement being completed.

In Europe as well, since 2015, the European Commission shifted its attitude towards trade protection post a sharp rise in steel imports into Europe. A number of trade protection cases were ruled in favour of the European steel industry. Post the flurry of measures in 2016, 2017 has brought less protection with the ability for the steel industry to argue for protection impacted by a sharp recovery in profits. In addition, the Commission imposed provisional safeguard measures on imports of steel in July 2018. The provisional safeguard measures can remain in place for a maximum of 200 days.

As a result of the import duties applied by the US in March 2018 under Section 232, exporting steel to the US has become less attractive. As a consequence, steel suppliers have diverted some of their exports from the US to the EU – Turkish tons the most visible.

European Commission's measures concern 26 steel product categories and consist of tariff-rate quotas above which a duty of 25% will apply.

We provide a list of steel trade protection measures in place at present in key markets. This list is not exhaustive but only details trade protection on key products and key regions.

Table 17: Trade case status report

Complainant	Duties	Product(s)	Origin(s)	Status/comments
North America				
US	Import tariff	Steel	Global	The US has implemented a 25% tariff on steel imports as of March 2018. The US has reached agreements with Argentina, Australia and Brazil that will exempt those countries. Canada and Mexico were exempted May 19, 2019.
US	Quota	Steel	South Korea	An agreement was reached in March 2018 on changes to the US-Korea Free Trade Agreement, also known as KORUS. Imports of steel from South Korea will be subject to a product-specific quota equivalent to 70% of the average annual import volume of such products during the period of 2015-2017.
US	Quota	Steel	Brazil	Brazil in May 2018 accepted a hard quota system proposed by the US, which includes a 70% annual limit on finished steel exports to the US based on the average over 2015- 2017. Semi-finished products are eligible for a 100% quota under the same scheme.
US	AD	HRC	China	In a final determination in September 2018, Commerce said that China's Baosteel, Shanghai Meishan Iron and Steel, and Union Steel China did not demonstrate the need to be assigned a separate rate and will therefore be subject to the China-wide rate of 90.83%
US	AD	HRC	Australia, Brazil, Japan, Netherlands, Russia, South Korea, Turkey, UK	Final dumping margins of 2.06%-7.64% for Japan, 3.73% for the Netherlands, 73.59%-184.56% for Russia, 4.55%-10.11% for South Korea, 4.15%-6.77% for Turkey and 33.06% for the UK set in 2016. Australian HRC producer BlueScope Steel's final dumping rate was set at 99.2% in April 2019 following administrative review. Preliminary AD rates set at 0% for Turkey in November 2018 review
US	CVD	HRC	Brazil, South Korea, Turkey	Final duties applied at 3.89%-41.57% for South Korea and 11.09%-30.51% for Brazil. Negative determination made regarding Turkey. Final subsidy rates lowered to 0.55%- 0.58% for South Korea in June 2019 following an administrative review.
US	AD	CRC	Brazil, China, India, Japan, Russia, South Korea, UK	The ITC found no injury from Russian imports. Final duties remain for China 265.79%, Japan 71.35%, Brazil 9.58%-35.43%, UK 5.4%-25.56% and India 7.6%. Final duties of 2.68%-36.59% set for South Korea in May 2019
US	CVD	CRC	Brazil, China, India, South Korea, Russia	Final duties at 256.44% for China, 11.09%-11.31% for Brazil, 10% for India and 0.62- 6.95% for Russia. Final subsidy rates for South Korean producers set at 0.55%-0.58% in May 2019 following an administrative review
US	CVD	CRC and corrosion-resistant steel	Vietnam/China	Final AD and CVD cash deposit rates for CORE produced in Vietnam using Chinese- origin substrate set at 199.43% and 39.05%, respectively, in line with those levied against China. AD and CVD cash deposits on CRC imports at 265.79% and 256.44%, respectively, in line with Chinese rates.
US	AD, CVD	Galvanized sheet	China	Commerce found a 199.43% dumping margin and a 39.05%-256.44% range of subsidy rates
US	AD	Rebar	Japan, Taiwan, Turkey	Final margins of 5.39%-9.06% for Turkey, 206.43%-209.46% for Japan, and 3.50%- 32.01% for Taiwan set in 2017
US	AD	Rebar	Mexico	Preliminary weighted-average dumping margin for Mexican rebar producers -- with the exception of Deacero -- set at 3.70% in April 2019
US	CVD	Rebar	Turkey	Final subsidy for Habas adjusted to 15.99%. Preliminary subsidy rates for other producers set at 0.04%-1.37% in December 2018
US	AD	Rebar	Belarus, China, Indonesia, Latvia, Moldova, Poland, Ukraine	After a third sunset review in October 2018, duties will remain in place at 114.53% for Belarus, 113% for China, 71.01% for Indonesia, 16.99% for Latvia, 232.86% for Moldova, 52.07% for Poland, and 41.69% for Ukraine
US	AD	Cut-to-length plate	South Korea	Commerce set a final weighted-average dumping margin of 1.43% for Dongkuk Steel Mill Co. and 4.19% for Hyundai Steel Co., following an administrative review in May 2019
US	AD	Cut-to-length plate	Austria, Belgium, Brazil, China, France, Germany, Italy, Japan, South Korea, South Africa, Taiwan, Turkey	Final duties affirmed for Belgium 5.4%-51.78%, Brazil 74.52%, China 68.27%, France 6.15%-148.02%, Germany 5.52%-22.9%, Italy 6.08%-22.19%, Japan 14.79%-48.67%, South Africa 87.72%-94.14%, S. Korea 7.1%, Taiwan 3.62%-75.42%, Turkey 42.02%- 50%. Prelim duty of 174.03% set for Germany's Salzgitter in February 2019 on review; Austria's prelim rate set at 51.48%
US	CVD	Cut-to-length plate	Brazil, China, South Korea	Final subsidy rate set at 251% for China. ITC terminated the Brazilian subsidy investigation. Subsidy rate for Jiangsu Tiangong Tools, Tiangong Aihe, Jiangsu Tiangong Group, and Jiangsu Tiangong Mould Steel R&D Center was lowered to 24.04%. Prelim subsidy rates for South Korea set at 0.25%-0.44% in April 2019 administrative review
US	AD	Corrosion resistant steel	Taiwan	Dumping margins adjusted to 2.15%-4.9% in December 2018 following an administrative review of the June 2, 2016- June 30, 2017 period
US	AD	Corrosion-resistant sheet	China, India, Italy, South Korea, Taiwan	Final AD duties of 199.43% for China; India 3.05%-22.57%, Italy 12.63%-92.12%, South Korea 7.33%-8.75% and Taiwan 2.15%-4.9%. Final AD rate for India's Uttam Galva set at 71.09% in June 2019 following administrative review
US	CVD	Corrosion-resistant sheet	China, India, Italy, South Korea, Taiwan	Final CVD margins of 11.3%-588.43% for India; 0% to 38.51% for Italy; 0.57%- 8.47% for South Korea (on review) and 0% for Taiwan
US	CVD	Structural tube	Turkey	Final subsidy rates of 15.08%-23.37% set in July 2016; Final subsidy rate for Ozdemir Boru Profil set at 1.18% in November 2018 following review
US	AD	Structural tube	Mexico, South Korea, Turkey	Final duties of 2.34%-3.82% for Korea, 3.83%-5.21% for Mexico and 17.73%-35.66% for Turkey
US	AD	Mechanical tube	China, Germany, Italy, India, South Korea, Switzerland	Commerce set final dumping margins of 45.15%-186.89% for China, 3.11%-209.06% for Germany, 8.26%-33.80% for India, 47.87%-68.95% for Italy, 30.67%-48% for South Korea, and 7.66%-30.48% for Switzerland in June 2018

Table 17: Trade case status report

Complainant	Duties	Product(s)	Origin(s)	Status/comments
US	CVD	Mechanical tube	China, India	Final subsidy rate of 18.27%-21.41% for China and 8.02%-42.6% for India
US	AD	Stainless steel plate in coil	Belgium, South Africa, Taiwan	ITC extended AD and CVD duties for another five years in November 2017. AD duties at 8.54% for Belgium, 41.63% for South Africa and 10.2% for Taiwan
US	AD, CVD	Stainless sheet and strip	China	Final AD margins of 63.86% and 76.64% and final CVD duties of 75.6%-190.71%
US	AD, CVD	Stainless sheet and strip	Japan, South Korea, Taiwan	ITC extended duties of 57.89% for Japan, 58.79% for Korea and 21.1% for Taiwan for another five years in September 2017. South Korea assigned final subsidy rates of 0.54%-4.64%
US	AD	Stainless seamless pipe	India	Following a changed circumstances review, Commerce set a final weighted-average dumping margin of 30.92% for Viraj Profiles and Venus Wire Industries. The duties will also apply to companies affiliated with Venus Wire.
US	AD	Large-diameter welded line pipe	Canada, China, Greece, India, South Korea, Turkey	Final dumping margins set at 12.32% for Canada, 132.63% for China, 9.96% for Greece, 50.55% for India, 7.03%-20.39% for South Korea and 2.57%-5.05% for Turkey
US	CVD	Large-diameter welded line pipe	China, India, South Korea, Turkey	Final rates at 541.5% for India and 0.01%-27.42% for South Korea. ITC voted to terminate CVD investigations on China and Turkey
US	AD	Stainless steel wire rod	Japan, South Korea, Taiwan	Dumping duties extended for an additional five years in August 2016 following sunset review
US	AD	Wire rod	Mexico	Final dumping margins set at 3.94%-40.52% in June 2019 following administrative review
US	AD	Wire rod	Belarus, Italy, Russia, South Africa, South Korea, Spain, Turkey, UAE, UK, Ukraine	Final dumping margins at 280.02% for Belarus, 12.41%-18.89% for Italy, 436.80%- 756.93% for Russia, 135.46%-142.26% for S. Africa, 41.10% for S. Korea, 84.10% for UAE, 34.98%-44.03% for Ukraine, 10.11%-32.64% for Spain, 4.93%-6.44% for Turkey, 147.63% for UK
US	CVD	Wire rod	Italy, Turkey	Final subsidy rates set at 3.85-3.88% for Turkey and 4.16%-44.18% for Italy
US	AD	Stainless steel wire rod	India	Dumping margins of 48.8% to remain for another five years, after May 2017 sunset review
US	AD	OCTG	South Korea	Commerce set final dumping margins of 32.24% for Nexteel, 16.73% for SeAH, and 24.49% for all other South Korean OCTG producers and exporters in May 2019
US	AD	OCTG	Vietnam	Final redetermination at a weighted-average dumping margin of 72.25%-111.47% set in May 2017
US	AD	OCTG	India	In November 2018 the all others estimated weighted-average final dumping margin was set at set at 11.24%, up from 5.79% and in line with the rate set for India's Jindal SAW Ltd.
US	AD	OCTG	Turkey	Following an administrative review of the September 1, 2016 - August 31, 2017 period, the all-others rate was lowered to 1.59% from 35.86%. Commerce found that Turkey's Tosçelik had no exports, sales, or entries of subject merchandise to the US during the period of review.
US	AD	Light rectangular tubing	Taiwan	Duties of 40.97% upheld for another five years in August 2017 following sunset review
Canada	Safeguard	Heavy plate, stainless steel wire	Countries without a trade agreement	Canada introduced tariff-rate quotas on these products in May 2019 that are intended to last through October 24, 2021
Canada	AD, CVD	Hot rolled plate	India, Russia	Countries found not to have dumped in January announcement
Canada	AD	Plate	China	The Canada Border Services Agency has decided to continue duties of 27.3%
Canada	AD, CVD	Line pipes	China, Japan	Final dumping margin for China of 95% (subsidy rate of 30.3%) and Japan 22.1-95%
Canada	AD	Line pipes	South Korea	Final dumping margins of 4.1%-88.1%
Canada	AD	Welded pipe	Taiwan	Duties on Chung Hung and Shin Yang removed. Duties against other Taiwanese exporters reduced to 29.6% from 54.2%
Canada	AD	Welded pipe	Pakistan, Philippines, Turkey, Vietnam	Final margins of 66.8% for Pakistan, 18.1%-66.8% for the Philippines, 3.3%-45.8% for Turkey and 3%-54.2% for Vietnam set in January 2019
Canada	AD	HRC	Brazil, China, Ukraine	77% dumping margins extended for five years from August 2016
Canada	CVD	HRC	India	3,500 rupees/mt ($52/mt) duty extended for five years from August 2016
Canada	AD	Rebar	Belarus, Hong Kong, Japan, Taiwan, Portugal, Spain	Final determinations affirmed at 37.5% for Belarus, Taiwan 0-108.5% , Hong Kong 54-108.5%, Portugal 2.4-108.5%, Spain 37-108.5%, Japan 108.5%
Canada	AD, CVD	Fabricated structural steel	China, South Korea, Spain	The Canada Border Services Agency (CBSA) found weighted average dumping margins of 9-45.8% for China, 1.9-45.8% for South Korea and 0-45.8% for Spain. CBSA set CVD of Yuan 152-11,656/mt for China
Canada	AD	Corrosion-resistant sheet	China, India, Taiwan and South Korea	Final duties set at 3.6%-53.5% for China, 3.2%-33.2% for Taiwan, 9%-40% for South Korea and 40% for India.
Canada	AD, CVD	CR coil and sheet	China, South Korea and Vietnam	China's CRC exports to Canada received a final dumping margin of 91.9% and a subsidy rate of 11.6%, while CRC imports from South Korea received a final dumping margin of 53% and subsidy rate of 11.3%. CRC exports from Vietnam received a final dumping margin of 99.2% and subsidy rate of 6.5%.
Mexico	AD	Wire rod	China	Definitive duty of 49 cents/kg
Mexico	AD	CR sheet	China	Duties of 65.99%-103.41% imposed
Mexico	CVD	CR sheet	China	Duties of up to 103.42% on boron-added imports
Mexico	AD	Coated sheets	China, Taiwan	Definite antidumping duties of 22.22%-76.33% for China and 22.26%-52.57% for Taiwan
Mexico	CVD	HRC	Russia, Ukraine	Duties of 21% for Russia and 25% for Ukraine extended for further five years
Mexico	AD	Plate	Italy, Japan	Investigation launched
Mexico	AD	Plate	Russia	Duty of 29.3% renewed for another five years
Mexico	AD	Seamless pipe	Japan	Existing duty of 99.9% renewed
Mexico	AD	Welded tube	China	Final duties of $0.356-0.618/kg on imports of welded steel tube shipped by Chinese exporters, regardless of the country of origin
Mexico	AD	Seamless tubes	India, South Korea, Spain, Ukraine	Investigation launched in December 2016

Table 17: Trade case status report

Complainant	Duties	Product(s)	Origin(s)	Status/comments
Mexico	CVD	Seamless tubes	India, South Korea, Spain, Ukraine	Definitive duties of 20.67 cents/kg for India, 13.12 cents/kg for South Korea, 37.85 cents/kg for Spain, and 17.01 cents/kg for Ukraine.
Mexico	Import tariff	Slabs, plates, HRC, CRC, wire rod	Countries without free-trade agreements	Temporary import tariff of 15% extended for another six months in March 2019
Mexico	AD	Cold-rolled stainless coil	China, Taiwan	The investigation officially started on March 27, 2019 and was published in the country's official gazette on April 5.
South America				
Brazil	AD	Heavy plate	China	Duties of $211.56/mt extended to chrome-added and titanium-added heavy plate.
Brazil	AD	HR bars	China	Investigation launched in January 2017
Brazil	AD	Rebar	Turkey	Case started in January 2016, no timeframe disclosed
Brazil	AD	Seamless pipes	China	Camex studying an extension of the $743/mt duty
Brazil	AD	Steel wire, alloyed steel flat bar	China	The Ministry of Industry has set duties of $199.19/mt-$505.56/mt for imports of high- carbon steel wire and a duty of $495.73/mt on Chinese imports of alloyed steel flat bar
Brazil	AD	Austenitic stainless steel tubes	Malaysia, Thailand, Vietnam	Duties of $367/mt-$740.02/mt for Malaysia,$747.56/mt for Thailand, and $782.11/ mt-888.27/mt for Vietnam.
Brazil	AD	Seamless pipes	China, Romania	Duties extended for five years, until August 2022. China subject to $743/mt duty and Romania subject to an ad valorem tariff of 14.3% over the CIF price
Brazil	CVD	Hot-rolled flat steel	China	Camex trade secretariat has imposed a duty of up to $425.22/mt for five years. Camex has delayed the tariff for up to one year.
Europe and Turkey				
EU	Safeguard duties	Steel products	All suppliers	The European Commission introduced definitive tariff-rate quotas on a country-specific basis on the biggest steel-supplying countries February 2, 2019. HRC imports are subject to a global tariff-rate quota.
EU	AD	HR plate and seamless tubes	China	Final duties for heavy plate set at 65.1-73.7%
EU	AD	HRC	Brazil, Iran, Russia, Ukraine	Definitive fixed duties per ton added on to the CFR price once the material arrives in Europe. €53.40-63.00/mt for Brazil, €57.50/mt for Iran, €17.60-96.50/mt for Russia and €60.50/mt for Ukraine
EU	AD,CVD	HRC	China	AD and CVD total 18.1%-35.9% for China
EU	AD	CRC	China, Russia	Definitive retroactive duties of 19.7%-22.1% for China and 18.7%-36.1% for Russia
EU	AD	Corrosion-resistant coated steel	China	Final duties of 17.2%-27.9%
EU	AD	Rebar	China, Belarus	Definitive duties of 18.4%-22.5% for China, with no retroactive duties. Definitive duty of 10.6% for Belarus. Deposits collected under the provisional duties are to be released for certain Belarusian rebar exempt from the definitive duties.
EU	AD	Grain-oriented electrical steel	China, Russia, South Korea, US	Definitive duties were set at 21.5%-36.6% for China, Japan 35.9%-39.0%, Korea 22.5%, Russia 21.6% and US 22.0%
EU	AD	Stainless CR	China, Taiwan	The Commission ends absorption investigation without adjusting duties imposed in August (China 24.3%-25.2%, Taiwan 6.8%)
EU	AD	Butt-weld tube and pipe fittings	China	Duties in place since 1996 extended
EU	AD	Seamless pipe	China	Final duties of 29.2%-54.9%
EU	AD	Seamless pipe and tube	Russia, Ukraine	After an expiry review in October 2018, the European Commission has decided to continue duties of 12.3%-25.7% for Ukraine and 24.1%-35.8% for Russia
EU	AD	Hollow sections, pipe and tube	Macedonia, Russia and Turkey	Investigation launched October 2018
EU	AD	HDG	China	Provisional anti-dumping duties of 17.2%-28.5%
EU	AD	Stainless steel seamless pipe	China	EU Commission has extended duties of 48.3%-71.9%
EU	AD,CVD	Organic coated sheet	China	Expiry review initiated for dumping duties of 5.9%-26.1% and countervailing duties of 13.7%-44.7%
EU	AD	Sheet piles	China	Investigation launched
EU	AD	Wire rod	China	Final duties of 24% set in 2008
Turkey	AD	Heavy plate	China	Final duties of 16.89%-22.55%
Turkey	AD, CVD	HRC	China, Russia, Ukraine	Petition filed in October 2016
Turkey	Import duty	HRC	All suppliers	Duty reduced to 3.5% from 5% for re-rollers, effective Jan 1. General HRC import duties kept unchanged at 9%.
Turkey	AD	Seamless pipe	China	Final dumping margin of $100-120/mt
Turkey	AD	PPGI	China	Final dumping margin determined at 23.4%
Turkey	Import duty	Rebar	Third country imports	Duty increased from 10% to 30%, effective April 18, 2019. Custom duties do not apply to the EU and countries with which it has free trade agreements.
Asia				
Taiwan	AD	Hot-dip galvanized coil/sheet	China, South Korea	Final duties in the range of 4.22%-77.3%, with producers from South Korea hit with the heaviest penalty of 77.3%.

Table 17: Trade case status report

Complainant	Duties	Product(s)	Origin(s)	Status/comments
Taiwan	AD	Heavy plate	Brazil, China, India, Indonesia, South Korea, Ukraine	Final duties of 30.29%-59.73% for China, Brazil 31.1%, India 25.85%, Indonesia 46.84%, South Korea 8.66%-80.5% and Ukraine 26.57%
South Korea	Import tariff	Stainless steel bars	Italy, Taiwan	The Korea Trade Commission has proposed duties of 9.47%-18.56% for Taiwan and 10.21%-13.74% for Italy for a period of five years
Taiwan	AD	Steel products	China	Investigation launched
South Korea	AD	Stainless steel plate	Japan	The Korea Trade Commission has requested the Ministry of Trade extend 13.17% duty for three years
South Korea	AD	Galvanized steel wire	China	Final duty of 8.6% for five years, as of May 2018
Thailand	AD	HRC	Brazil, Iran, Turkey	Final duties of 34.4% for Brazil, Iran 7.25%-38.27% and Turkey 6.88%-38.23%, effective for five years from May 16 2017
Thailand	AD	HDG coil/sheet	China, South Korea, Taiwan	Investigation launched in September 2016
Thailand	AD	Pickled and oiled HRC	South Korea	Investigation announced on February 4. Sahaviriya Steel Industries alleges a dumping margin of 22.11%
Thailand	AD	Al-Zn alloy coated sheet	Vietnam	Final duties of 6.20%-40.49% levied
Thailand	AD	Painted HDG, Painted Al-Zn alloy steel	Vietnam	Final duties of 4.3%-60.26% levied
Thailand	AD	Mild HRC, pickled coil and HR plate	China, Malaysia	Duties of 30.91% for China and 23.57%-42.51% for Malaysia extended for another five years, effective June 23 2017
Thailand	AD	Welded pipe	China, South Korea	Final duties of 3.22%-66.01% for China and 3.49%-53.88% for South Korea, effective for five years from July 19 2017
Thailand	AD	Alloy-added high-carbon Wire rod	China	Final duties of 12.26%-36.79%, effective from December 22 2016, for five years
Thailand	AD	Low-carbon Wire rod	China	Duties of 12.81%-31.15% no longer apply to products under the single HS code of 7227.9000.090
Thailand	AD	HRC	14 countries including South Korea, Japan, India, Taiwan, Russia	AD duties of 3.45%-128.11% extended for five years from May 2015.
Thailand	AD	Stainless steel pipes	China, South Korea, Taiwan, Vietnam	Duties of 310.74% for Vietnam, South Korea 11.96%-51.53%, China 145.31% and Taiwan 2.38%-29.04%
Thailand	Safeguard duties	Alloy-added H-beam	All suppliers	Final duties will span two years, at an initial rate of 31.43% for the first year and 31.05% thereafter. 180 countries exempt
Malaysia	AD	HRC	China	Duties of 6.35%-12.19% imposed in February 2015
Malaysia	AD	CRC	China, South Korea, Vietnam	Final duties of 3.78%-23.78% for China, 3.78%-21.64% South Korea and 3.06%- 13.68% Vietnam
Malaysia	Safeguard duties	HR plate	All suppliers	Safeguard duties extended for further three years in July 2016
Malaysia	AD	Rebar	Singapore, Turkey	Malaysia launched an antidumping investigation into rebar imports from Singapore and Turkey in April 2019
Malaysia	Safeguard duties	Rebar, wire rod, deformed bar-in-coil	42 countries including China, Japan, US and EU countries	Rebar 13.42% in year one, down to 12.27% and 11.10% in years two and three; Wire rod and bar-in-coil 13.90% in year one, down to 12.90% and 11.90% in years two and three
Malaysia	Import duties	Rebar, wire rod	Importers	5% import tariff reinstated in June
Malaysia	AD	Colour coated coil	China, Vietnam	Duties of 00.6% to 52.10% (all Chinese exporters) imposed in January
Malaysia	AD	Hot-dipped galvanized sheet	China, Vietnam	Malaysia imposed antidumping duties of up to 16.13% on HDG from China and Vietnam for five years effective March 8, 2019
Malaysia	AD	CR stainless coil and sheet	China, South Korea, Taiwan, Thailand	Final duties of 2.68%-23.95% for China; 4.44%-7.27% for South Korea (Hyundai BNG Steel and Hyundai Steel Company are excluded); 2.79%-14.02% for Taiwan (China Far Industrial Factory and Yieh United Steel Corporation (YUSCO) are excluded); 22.86%- 111.61% for Thailand.
Vietnam	AD	CR plate	China, Taiwan, Indonesia, Malaysia	Duties imposed in September 2014
Vietnam	Safeguard duties	Billet	Malaysia, Kazakhstan	Vietnam said it will impose a 17.3% safeguard duty on these products effective June 13, 2019
Vietnam	Safeguard duties	Colour coated sheet	All importers	Investigation launched in July 2016
Vietnam	AD	HDG and aluminium/zinc-coated steel	China, South Korea	Final duties of 3.17%-38.34% for China and 7.02%-19% for S. Korea, for five years effective April 14
Vietnam	AD	HDG, coated sheet	China (including Hong Kong), South Korea	Temporary duties of 3.45%-34.27% for China and 4.48%-19.25% for South Korea to be applied effective June 25, 2019 for roughly four months before final determinations in the AD investigations are made
Vietnam	AD	Wide-flange beams	China	Final duties of 20.48%-29.17%, effective September 5 2017
Vietnam	AD	PPGI/PPGL colour-coated products	China, South Korea	Investigation launched October 2018
Indonesia	Import duties	All upstream steel products	Most Favoured Nations including India, South Korea, Japan, CIS, Latin America	HRC, CRC, plate and wire rod duties raised to 15%; galv and coated sheet raised to 20%; rebar raised to 17.5%
Indonesia	AD	Colour-coated sheets	China and Vietnam	Indonesia has decided not to implement anti-dumping measures, citing national interests.

Table 17: Trade case status report

Complainant	Duties	Product(s)	Origin(s)	Status/comments
Indonesia	Safeguard duty	Aluminium/zinc-coated sheet (Galvalume)	All suppliers	Duties extend for three years. Initial rate of INR 2,891,858/mt will fall to INR 2,186,030/ mt in year two and to INR 1,480,202/mt in year three.
China	AD	Grain-oriented electrical steel	EU, Japan, South Korea	Provisional AD duties of 39%-45.7% for Japan, 14.5%-29.5% for South Korea and 46.3% for EU mills
China	Export duty	Billet	All suppliers	China's finance ministry abolished the 10% export duty on steel billet, effective January 1, 2019.
Japan	AD	Carbon steel butt welding parts	China, South Korea	Preliminary dumping margins of 43.41%- 73.51% for South Korea and 60.84% for China
India	AD	HR coil, sheets and plates	China, Japan, South Korea, Russia, Brazil, Indonesia	Final duties equivalent to the difference between the CFR Mumbai price and the reference price of $478-489/mt on HRC and $561/mt on HR sheets and plates
India	AD	Stainless CR	South Korea, Taiwan, Thailand, South Africa, US	Duties extended for further five years until 2020. Investigation into claims exporters are circumventing duties
India	CVD	HR, CR stainless flat products	China	Unfair trade investigation opened into Jan-Dec 2015 period
India	AD	HRC, CRC	All importers	India has pushed the response deadline for it HRC and CRC AD investigations to June 20
India	AD	CRC	China, Japan, South Korea, Ukraine	Final duties equivalent to the difference between the CFR Mumbai price and the reference price of $576/mt CFR Mumbai, effective for five years from August 17, 2016
India	Safeguard duties	Hot rolled sheet, plates	All importers	Duties applied at 10% on imports of hot rolled sheets and plates of thickness 150mm or less and width 600mm and more, for 1 year
India	AD	Alloy and non-alloy colour-coated/pre-painted flats	China, EU	Investigation launched
India	AD	Seamless pipes and tubes	China	Duties of $961.33-$1,610.67/mt on popular grades of seamless tubular products imported from China.
India	AD	Hot rolled alloy and non-alloy steel bars and rods	China	Finance ministry imposed at minimum price on import of $449-538/mt for six month, effective November 2 2016
India	AD	Coated/pre-painted steel 6mm+	China, EU	Margins of 50%-60% for China and 70%-80% for EU
India	AD	Straight length alloy steel bars and rods	China	Duties ranging from $44.89-$185.51/mt imposed for five years effective October 2018
India	Tariff	Iron and steel products	US	Tariffs in the range of 20%-25% for several steel and iron products, including some flat-rolled steel
India	AD	Non-cobalt grade, high-speed steel	Brazil, China, Germany	Investigation launched
India	AD	Coated flat steel	China, South Korea, Vietnam	India launched a probe into alleged antidumping of coated flat steel from three countries in April 2019

Source: Platts

Regional perspective: Europe

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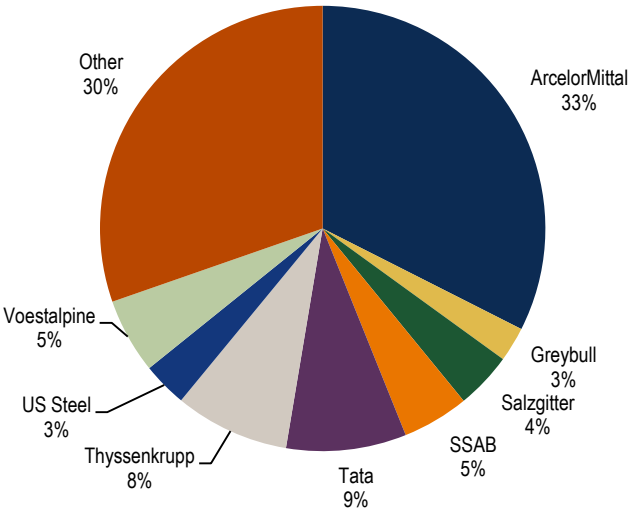
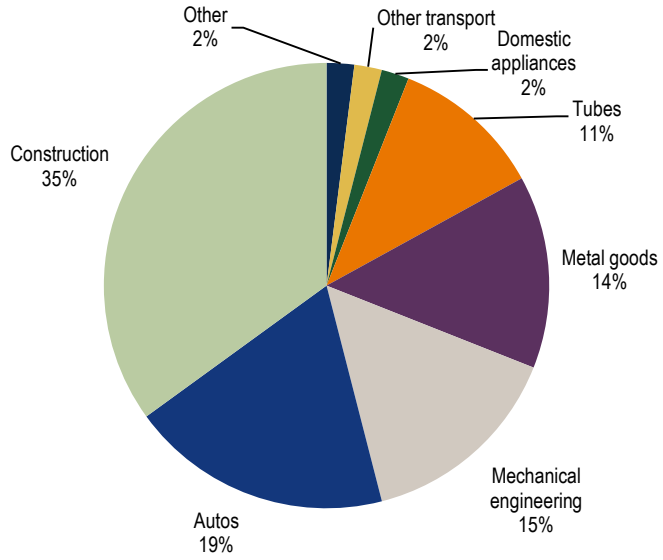
Market snapshot

Chart 103: European steel market share – all products – based on upstream capacity, 2018A



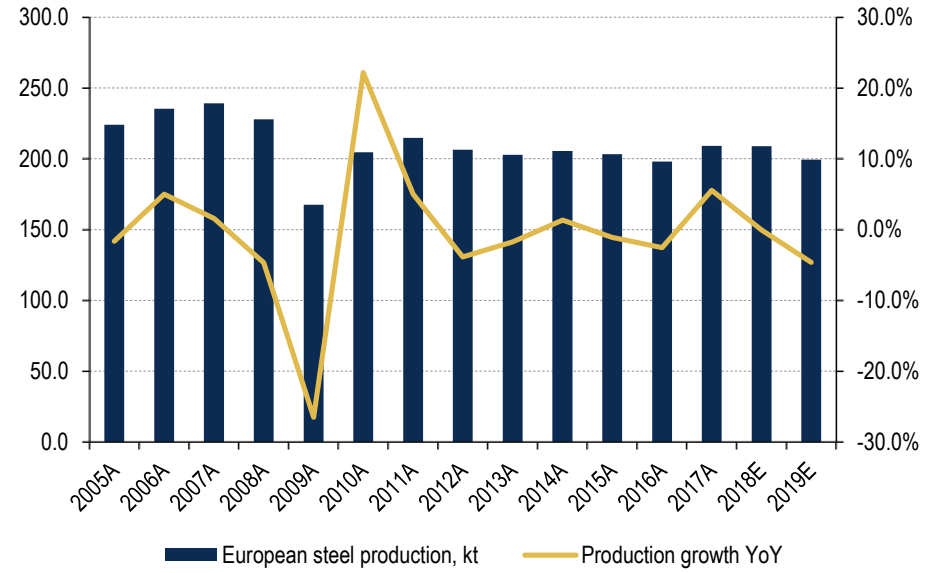
Source: CRU

Chart 104: European steel end demand by use in 2017



Source: Eurofer, WSA

Chart 105: Europe steel production trend



Source: WSA, BofA Merrill Lynch Global Research estimates

Major producers

ArcelorMittal

ArcelorMittal was formed from the merger of Arcelor and Mittal Steel in 2006. It is the leader in all major global markets, including automotive, construction, household appliances and packaging. Its industrial presence in Europe, Asia, Africa and America gives the Group exposure to all the key steel markets, from emerging to mature. In addition to steel, ArcelorMittal produces c.60Mt of iron ore. ArcelorMittal recently acquired ILVA. ILVA operates the largest single steel mill in Taranto, Italy (10Mt)

thyssenkrupp

thyssenkrupp is a diversified conglomerate with interests in both carbon and stainless steel, as well as possessing several engineering and distribution businesses. It employs more than 184,000 employees worldwide. The company is structured around five segments: Steel, Stainless, Technologies, Elevators and Services.

Salzgitter

Salzgitter has a number of divisions spanning steel (flat rolled products, tubes products, beam, plate, pipes and tubes), trading and technologies (filling and packaging systems). The company is also exposed to the energy markets (off- and on-shore pipeline projects).

Voestalpine

Voestalpine is an Austrian based manufacturer of high quality steel strip and specialty steel, turnouts and processed wire for the railway sector, sections and components for the automotive industry. It is listed on the Vienna stock exchange.

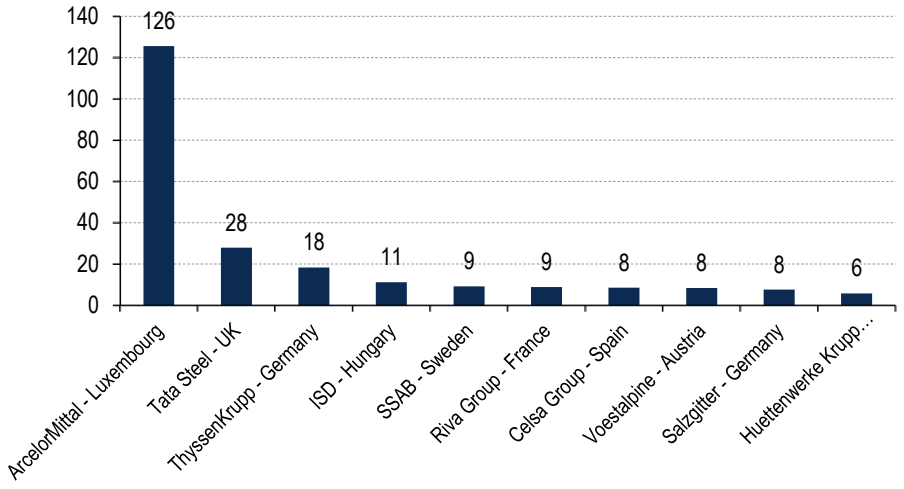
SSAB

SSAB is a producer of high-quality strip and plate steel products. Post SSAB's merger with Rautaruukki, the company is split into four divisions 1) Special Steels: focused on Q&T steels and advanced high strength steels, 2) SSAB Europe: strip and plate products for the European market, 3) SSAB Americas: plate products for the North American market, 3) Tibnor: Nordic steel distribution and 4) Ruukki Construction: provider of energy efficient building and construction solutions.

Tata Steel

Tata is an Indian listed steel producer that also operates assets in Europe which it acquired from Corus Group, in 2007. In 2016 Tata sold facilities producing long products in Scunthorpe and Teeside to private equity. It retains its flat products facilities in the UK and Netherlands. Tata and thyssenkrupp did attempt to merge their European assets but the regulators blocked their deal in 2019.

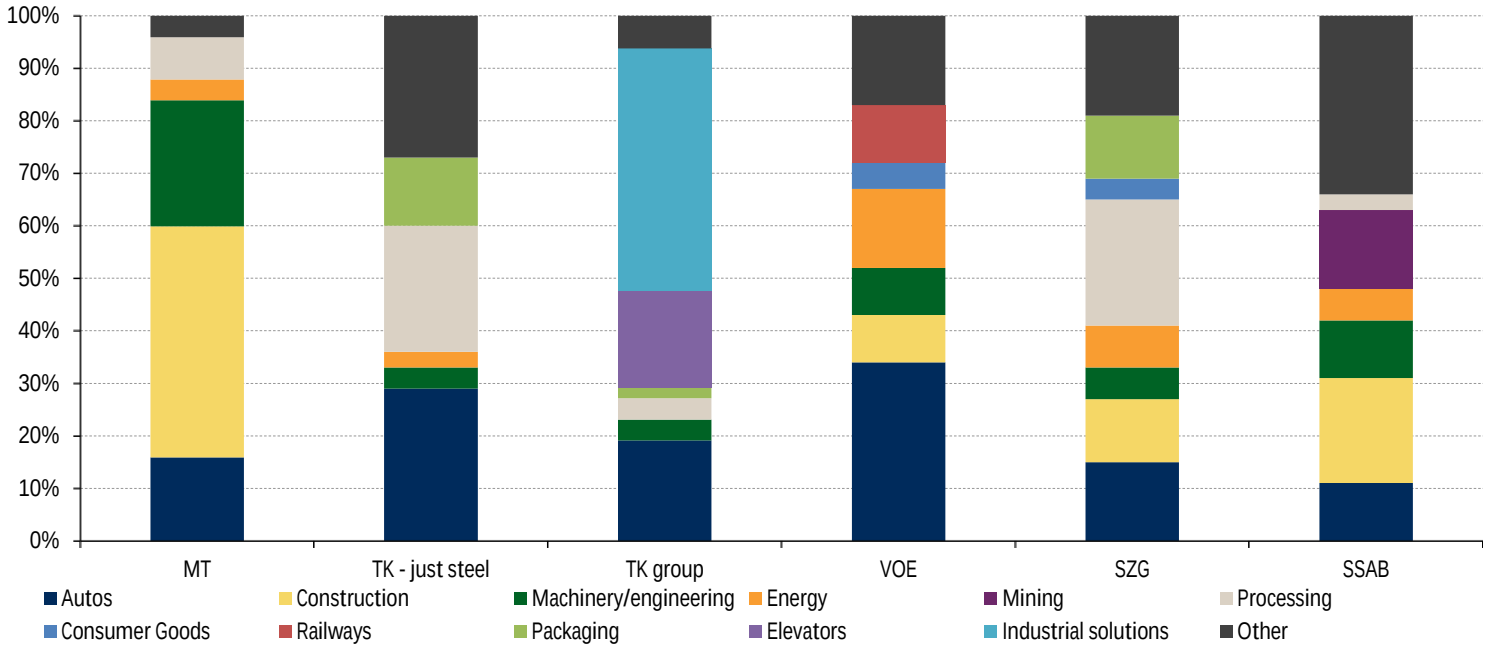
Chart 106: Top 10 European steel producers by capacity (Mt), CY2018



Source: BofA Merrill Lynch Global Research estimates, CRU. Note: (1) NKM is a JV among Salzgitter, Thyssenkrupp and Vallourec. (2) ArcelorMittal's capacity is spread across Europe, North America, Brazil, CE Europe/Asia and Africa

End market exposures

Chart 107: End market breakdown



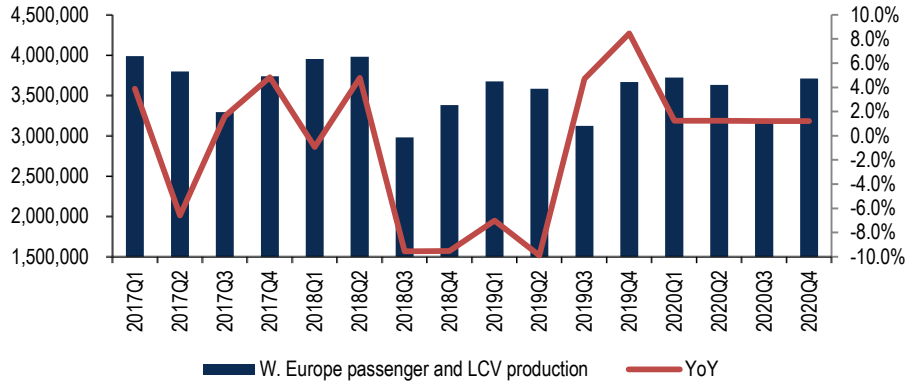
Source: BofA Merrill Lynch Global Research estimates

Europe: construction proves more resilient than autos / consumer demand

In Europe, on a relative basis, we see weaker end market trends in the consumer, machinery and automotive segments vs. construction where activity appears to remain resilient.

Saying that, we have seen recent data points (consumer confidence, Germany Industrial Manufacturing Orders) suggesting a stabilising demand environment. Focussing on autos, which has been a key area of weak end demand this year in Europe, production of passenger vehicles and light commercial vehicle declined -7% YoY in Q1 and -10% YoY in Q2. We see production trends stabilising in 2H with production expected to rise 5% in Q3 and 8.5% in Q4. While some of this is down to "easier comps", ultimately we see demand from the auto sector stabilising.

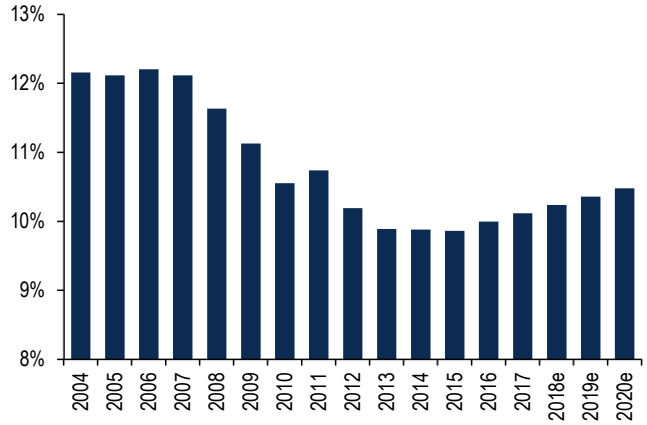
Chart 108: Western Europe passenger vehicle and light commercial vehicle production trends



Source: BofA Merrill Lynch Global Research estimates, IHS

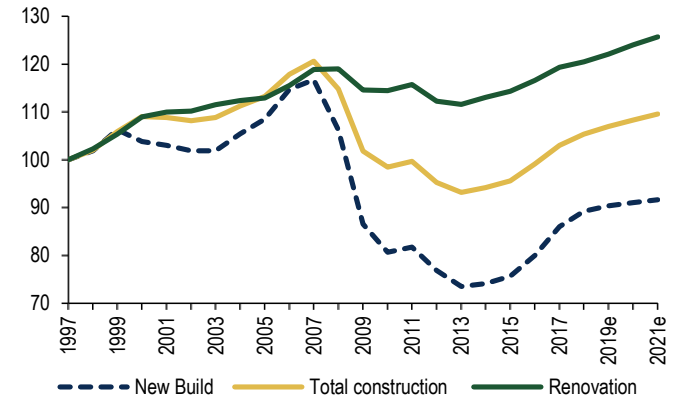
Key indicators for construction end markets seem to suggest end demand remains supportive. This could support long product steel volumes relative to flat product volumes in 2019. We do note, however, that construction confidence, which has been improving at a steady pace for 3 years, has stabilised recently, albeit at a high level.

Chart 109: Construction spend as a % of GDP construction



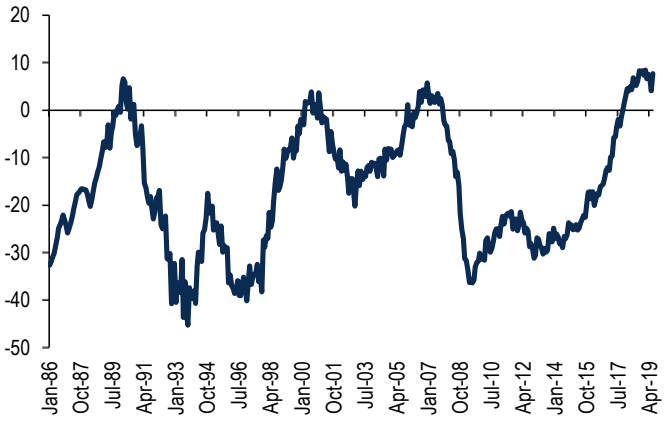
Source: BofA Merrill Lynch Global Research estimates, Bloomberg, Euroconstruct

Chart 110: Currently depressed cyclically but Euroconstruct expects improvement



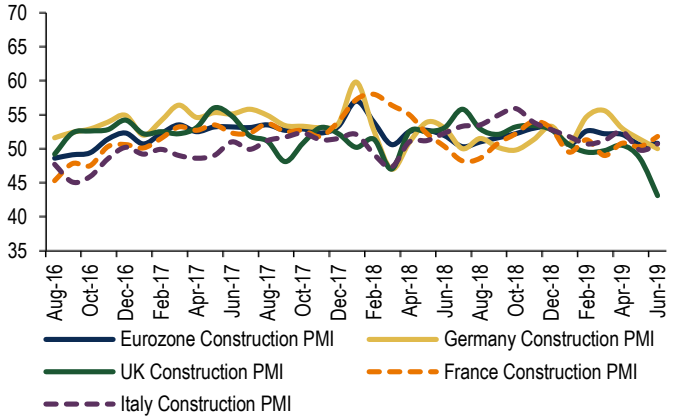
Source: BofA Merrill Lynch Global Research estimates, Bloomberg, Euroconstruct

Chart 111: European Construction confidence still improving



Source: BofA Merrill Lynch Global Research, Bloomberg

Chart 112: EU PMI



Source: BofA Merrill Lynch Global Research, Bloomberg

Regional perspective: U.S.

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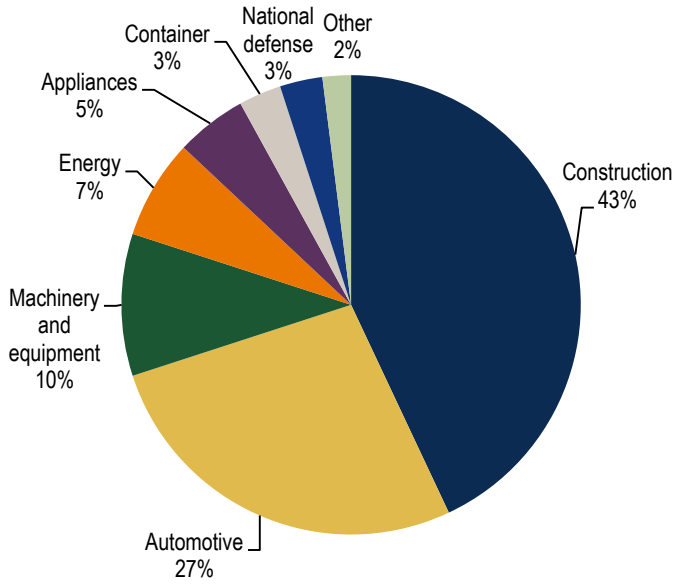
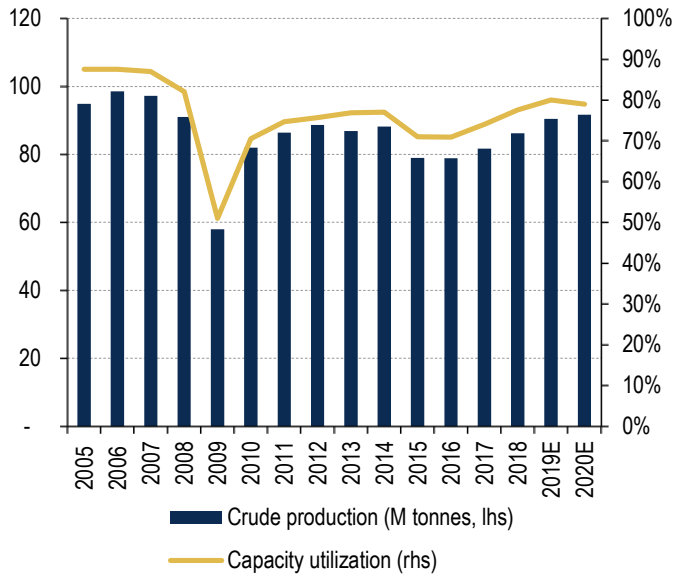
Market snapshot

Chart 113: U.S. steel end demand by use



Source: American Iron and Steel Institute (AISI)

Chart 114: U.S. steel annual production trend



Source: AISI, worldsteel, BofA Merrill Lynch Global Research estimates

Major producers

Arcelor Mittal North America

ArcelorMittal was formed from the merger of Arcelor and Mittal Steel in 2006, and in the early part of the decade Mittal (previously ISG) consolidated a number of bankrupt blast furnaces. ArcelorMittal has over 28.1M metric tons of production capacity in North America, making it one of the largest producers in the region with production in U.S., Canada and Mexico. It mostly produces sheet, but also makes plate, and is a major name in the U.S. automotive markets.

AK Steel

AK Steel produces flat-rolled carbon, stainless, and electrical steels via both blast furnaces and electric arc furnaces. In 2014, AK acquired Severstal Dearborn and in early 2019E it decided to permanently shut its Ashland Works operations. Automotive markets represent ~80% of AK's net sales. AK hedges much of its iron ore and coal costs, and buys largely from local U.S. producers.

Commercial Metals

Commercial Metals is a long products-focused steel maker, and one of the largest domestic producers of rebar, with scrap and downstream operations as well. In 2018 CMC acquired U.S. rebar steel mill and fabrication assets from Gerdau S.A., adding 2.5M short tons in capacity. It also has a 1.3M-short-ton rebar mill in Poland. We estimate U.S. non-residential construction comprises over 80% of its revenues. CMC is vertically integrated through its recycling operations, steel mills, and downstream-processing facilities.

Gerdau SA

Gerdau is a Brazilian-based steel producer that has large participation in the North American long products market, accounting for 9M short tons of electric arc furnace-based crude steel production capacity in North America, serving the construction, automotive, agricultural, and energy markets. Its mills are vertically integrated through its recycling operations, steel mills and downstream processing facilities. It produces special bar quality (SBQ), merchant bar, beams and rebar.

Nucor

Nucor is the largest U.S. producer of carbon steel and an electric arc furnace-based steel manufacturer, with three segments: raw materials, steel mills, and steel products. Production capacity is almost 27M short tons with recycling capacity around 21M short tons, and it is the most diversified of the mills, producing carbon sheet, bars, beams, and plate. In addition, it has downstream operations that include joist, deck, structural tubing, and rebar fabrication. In 2019 Nucor announced plans to invest on a new 1.2Mst/yr greenfield plate mill, in addition to new brownfield capacity at its Gallatin, KY sheet mill that would add ~1.4Mst/y. Nucor also announced projects to upgrade its bar mills and enhance its sheet rolling and value-add offerings, designed to improve its penetration in the auto industry. Since the 2009 downturn it expanded its downstream capacity and boosted its leverage to non-residential construction. We estimate 60% of Nucor's demand comes from non-residential construction.

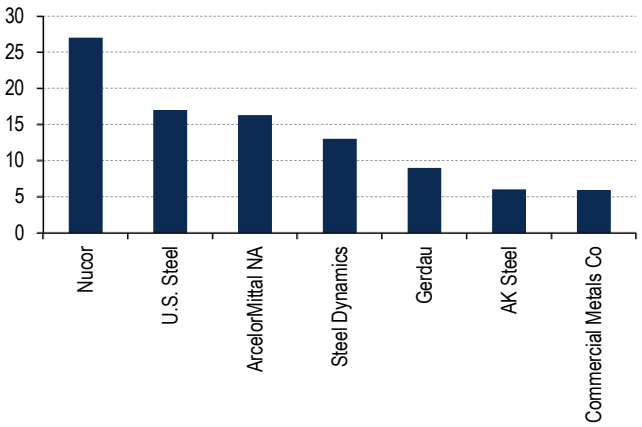
Steel Dynamics

Steel Dynamics is an electric arc furnace-based steel producer with metals recycling and fabrication operations. Carbon steel capacity is roughly 13M short tons. STLD is highly exposed to sheet at about 50% of its total production, and also produces rail, beams, and bars. It has been expanding its downstream capabilities in recent years. In Nov 2018 STLD announced plans to grow its sheet portfolio with a 3Mst/yr new mill in either Texas or Louisiana, anticipated to cost $1.75B and start operations in 2021E. Non-residential construction represents STLD's largest end market, followed by manufacturing and automotive.

U.S. Steel

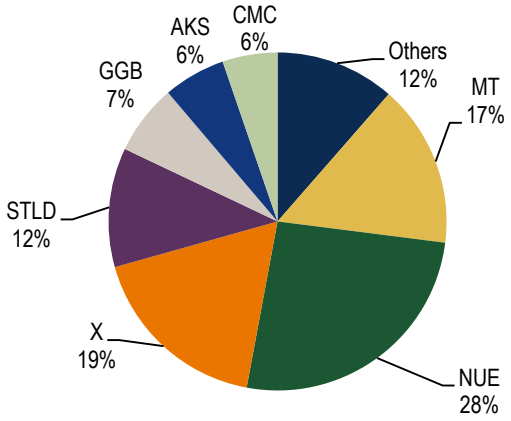
U.S. Steel is an integrated (blast furnace) steel producer with major production operations in the U.S. and Slovakia, and three segments: Flat Rolled Products, Tubular, and U.S. Steel Europe. It also mines iron ore in the U.S. that it consumes in its domestic blast furnaces. Key end markets include automotive, consumer, industrial and oil country tubular goods (OCTG) markets. U.S. Steel has approximately 17M short tons of domestic steel capacity and 5M short tons in Europe. It had scheduled a 2020E start-up of its Fairfield, Al rounds mill, which adds an EAF to its portfolio and allows it to be vertically integrated in its seamless pipe production operations.

Chart 115: Crude steel capacity of U.S. largest steel producers - total U.S. capacity 122M short tons



Source: Company reports, AISI, World Steel Association

Chart 116: North America steel market share - based on 2018 production



Source: Company reports, AISI

Key issues for U.S. steelmakers

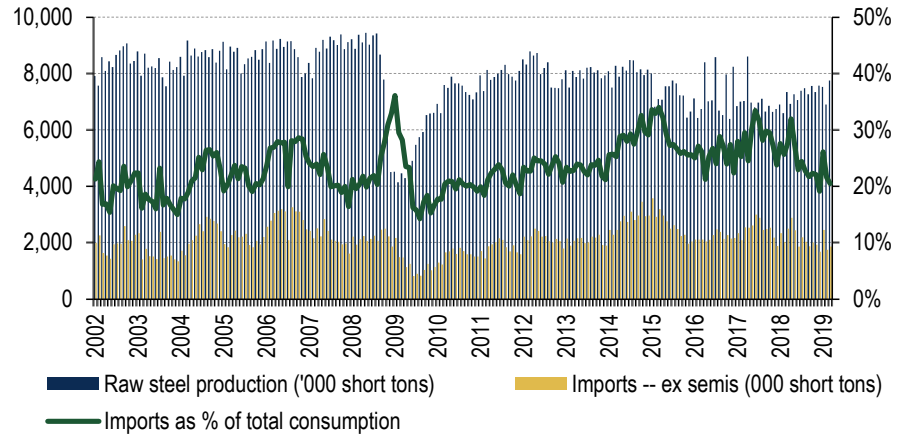
U.S. steel trends will continue to be dictated by global markets, particularly the supply and demand balance in China, in our view. However, we also highlight key regional-specific issues driving the outlook for the American steel industry, specifically trade protection and new capacity additions planned from 2018 to 2022E.

Trade protection

In March 2018 President Trump set 25% tariffs on steel imports and 10% on aluminium imports, excluding several countries. These tariffs were an executive order under Section 232, designed to encourage domestic steel production. At the time President Trump said the tariffs would endure "for a long period of time". In June 2018 he added Mexico, Canada, and the EU to countries included under the tariff, leaving exceptions for just a few countries: an outright exclusion on Australia and quotas on Brazil, South Korea, and Argentina. In August 2018 President Trump doubled Section 232 steel import tariffs on Turkey citing a weak lira and deteriorating relationship with the country, then reversing this move in May 2019. Turkish steel has traditionally been disruptive due to heavily discounted prices. At the same time, the U.S. agreed to remove Section 232 tariffs on Mexico and Canada, without requiring any quotas, which it had previously insisted on but was seen as a barrier to the new regional trade agreement, USMCA, being completed.

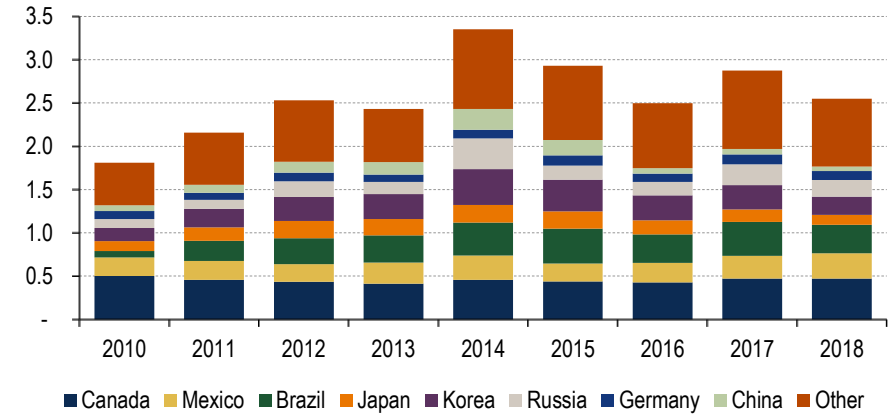
On top of 232, domestic steel producers have become decidedly more aggressive in filing trade cases since 2014, in an effort to reduce imports into the U.S. In particular, successful trade case results across hot-rolled, cold-rolled, and galvanized sheet in 2015 helped tighten markets and support prices. Trade cases in long products such as rebar have been less successful, while a plate trade case in 2017 against 12 countries helped support that market.

Chart 117: Monthly imports vs. U.S. crude steel production



Source: U.S. Census Bureau

Chart 118: Average U.S. imports monthly (Mt)



Source: U.S. Census Bureau

Substantial new capacity additions

From 2018 to 2022E U.S. steel mills announced restarts, brownfields and greenfield capacity additions far exceeding past plans. We launched the term Steelmageddon™, to describe a period of U.S. steel market oversupply and the resulting aftermath and consequences to the industry of this transparent looming glut. This oversupply can result in a severe price war, leading U.S. prices to underperform global until supply and demand return to balance. We anticipated the additional supply can total an approximate 20-25% increase on the installed U.S. steel capacity as of early 2018, with the most disruption in sheet, but new supply also in plate, rebar, and SBQ.

We consider three waves of supply additions: 1) restarts; 2) capacity additions (brownfields); and 3) new capacity (greenfields). The first wave has been characterized by restarting capacity that had been idled in the last market downturn, with most of this supply ramped up as of mid-2019, between U.S. Steel's Granite City furnaces and JSW's Q4 restart of JSW's Mingo Junction (detailed in Table 18). Mingo should continue to ramp up through 2019E and 2020E, however. The second phase includes some restarts, finishing half-built capacity in the case of U.S. Steel's Fairfield EAF, and expansions of existing mill capacity that were always designed to grow. This second wave should hit the market in 2020E-21E, with more impact on sheet in H220E. New capacity dominates the third wave, with at least two new mini-mills expected in 2022E from Nucor and Steel Dynamics, and potentially a third from Big River Steel.

The new capacity all at one time likely followed strong industry cash position and optimism from a combination of strong demand, the Section 232 tariffs, and lower U.S. corporate tax rates under the Trump administration. While Section 232 tariffs encouraged benchmark HRC prices to rise from ~$600/st at the start of 2018 to a peak of >$900/st in July 2018, excess U.S. supply response contributed to prices falling back to nearly $500/st as of July 2019.

Table 18: New and restarting U.S. steel capacity

Restarting/new capacity	Min (Mt/yr)	Max (Mt/yr)	Type	Product	Cost ($M)	Start up
CMC new micromill in Durant	0.35	0.35	Electric arc furnace	Rebar	250	Q218
STLD new Roanoke, VA line	0.1	0.125	Electric arc furnace	Rebar	38	Q218
U.S. Steel Granite City furnace restart	1.5	1.5	Blast furnace	Sheet	10	Q318
U.S. Steel second Granite City furnace restart	1	1	Blast furnace	Sheet	10	Q418
Liberty Georgetown, SC restart	0.75	0.75	Electric arc furnace	Wire rod	NA	H218
STLD Columbia City, IN new line	0.24	0.24	Electric arc furnace	Rebar	75	Q418
JSW Mingo furnace restart	1.5	3	Electric arc furnace	Sheet	500	Q418
Republic Steel's Lorain, OH restart	1	1	Electric arc furnace	SBQ	NA	Q219E
NUE Sedalia, MO micromill	0.35	0.35	Electric arc furnace	Rebar	250	Q419E
Gerdau Monroe, MI SBQ expansion	0.16	0.16	Electric arc furnace	SBQ	69	2020E
JSW Baytown, TX mill	1	1	Electric arc furnace	Plate	500	H120E
NUE Frostproof, FL micromill	0.35	0.35	Electric arc furnace	Rebar	240	H120E
U.S. Steel's Fairfield, Al rounds mill	1.6	1.6	Electric arc furnace	Rounds	215	H220E
Big River Steel expansion at Osceola, AR	1.65	1.65	Electric arc furnace	Sheet	715	H121E
STLD new sheet EAF in SW	3	3	Electric arc furnace	Sheet	1750	H221E
Nucor Steel Gallatin expansion in KY	1.4	1.4	Electric arc furnace	Sheet/plate	650	2021E
NUE new Brandenburg, KY plate mill	1.2	1.2	Electric arc furnace	Plate	1350	2022E
Possible restarts/new capacity	**Min (Mt/yr)**	**Max (Mt/yr)**				
Gerdau brownfield beam and merchant bar expansion	0.53	0.53	Electric arc furnace	Beams/merchants	120	2021E
North Star Bluescope expansion	0.8	0.9	Electric arc furnace	Sheet	700	2022E
Big River Steel proposed Brownsville, TX sheet mill	1.65	3.3	Electric arc furnace	Sheet		
Stelco Hamilton Works furnace restart	2.2	2.2	Blast furnace	Sheet		
New/restarting capacity	**17.2**	**18.7**				
Total possible restarting	**22.3**	**25.6**				

Source: Company reports. Note: NUE says of rebar capacity just 150Kt or so is incremental, rest is redirected existing capacity

Over the past decades, U.S. mills have been consolidating different product lines. In 2014 carbon sheet consolidation included ArcelorMittal buying Calvert from ThyssenKrupp for $1.6B, AK Steel buying Dearborn from Severstal for $700M and Steel Dynamics buying Columbus from Severstal for $1.6B. In rebar, CMC bought much of Gerdau's North American rebar assets. However, some of this consolidation has been offset by new entrants, such as JSW, Big River Steel, and the revived Stelco, as detailed in the table above.

Other issues

Substitution: Higher tariffs have played a hurt demand for U.S. steel and products with high steel content made in the U.S., in our view. Although difficult to quantify, industry sources have shared many examples in which products that were previously made from steel in the U.S. were increasingly imported from overseas as finished product, avoiding tariffs. One example is in electrical steel, where customers have begun importing semi-finished transformer components called cores to avoid paying a tariff to import electrical steel, with just one domestic producer left. End customers have bought finished products made from steel increasingly from China, taking share outside of the U.S. market. Automakers have shifted some demand to aluminium due to light weighting benefits, prompting domestic steel makers to make overdue investments in high-strength, lightweight steels in order to keep market share.

U.S. steel medium term supply/demand outlook

Key indicators to consider when assessing steel demand outlook in the U.S.

- Non-residential construction spending
- Automotive demand
- U.S. rig counts
- Industrial production and PMI trends
- Overall GDP trends

Table 19: U.S. steel supply/demand (M metric tons)

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019E	2020E	2021E	2022E
Crude production	**95**	**99**	**97**	**91**	**58**	**82**	**86**	**89**	**87**	**88**	**79**	**79**	**82**	**86**	**91**	**93**	**95**	**96**
(plus) Imports	29	41	30	29	15	22	26	30	29	40	35	30	34	31	27	25	24	22
(less) Exports	9	9	10	12	8	11	12	12	11	11	9	8	10	8	7	6	7	7
Net Exports (Imports)	(20)	(32)	(20)	(17)	(7)	(11)	(14)	(19)	(18)	(29)	(26)	(22)	(25)	(23)	(21)	(19)	(17)	(16)
Crude consumption	**115**	**131**	**117**	**108**	**65**	**93**	**101**	**107**	**105**	**117**	**105**	**100**	**107**	**109**	**111**	**112**	**112**	**112**
Inventory change	(2)	3	(3)	(2)	(3)	2	1	0	(0)	1.5	(1.6)	(1.1)	0.5	-	(0.5)	-	-	-
Consumption	**117**	**127**	**121**	**110**	**67**	**91**	**100**	**107**	**105**	**116**	**107**	**101**	**106**	**109**	**112**	**112**	**112**	**112**
% growth y/y	**-8.0%**	**13.8%**	**-10.2%**	**-7.8%**	**-40.3%**	**44.2%**	**8.0%**	**6.6%**	**-2.0%**	**11.7%**	**-10.6%**	**-4.4%**	**6.2%**	**2.1%**	**2.3%**	**0.4%**	**0.4%**	**-0.4%**
Crude utilization	88%	88%	87%	82%	51%	70.5%	74.7%	75.7%	76.9%	77.0%	71.0%	70.9%	74.0%	77.6%	81.4%	81.0%	80.0%	78.0%

Source: AISI, Dept of Commerce, BofA Merrill Lynch Global Research estimates

Steel prices tend to be volatile and we would not expect to draw a straight line between our annual forecasts. Key factors affecting our pricing outlook would include: 1) any new or shuttered capacity; 2) demand above or below our expectations; and 3) any change in import/export trends, including the value of the U.S. dollar and trade policy changes.

Regional perspective: Russia

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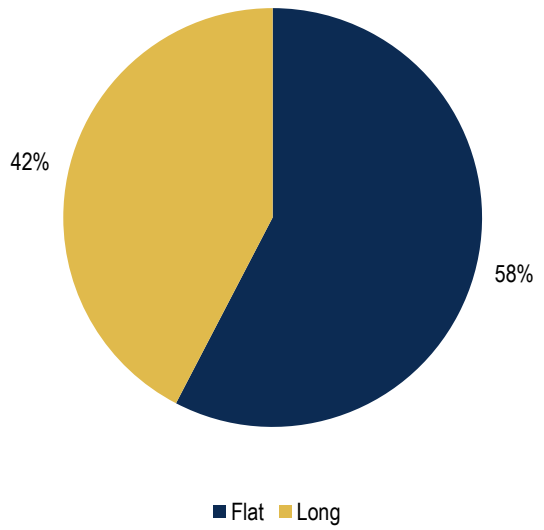
High consolidation of the market

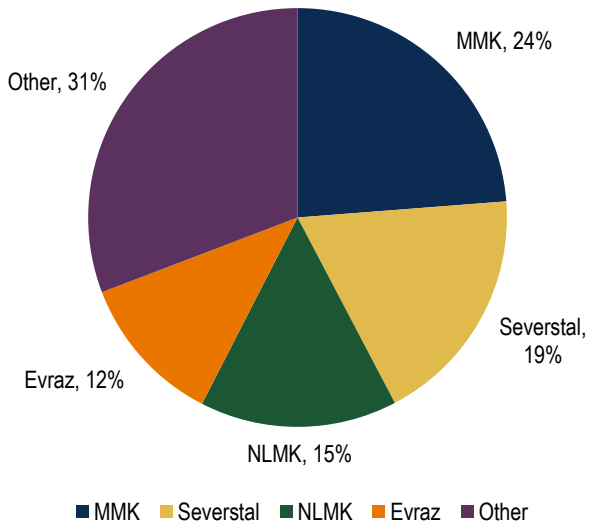
Russia produced 72MMt of crude steel in 2018, or 4% of global steel output, ranking 6th globally. Flat steel products account for 58% of all steel produced in Russia, long steel – the remaining 42%. The Russian steel market is dominated by four names: MMK (24% share in total capacity), Severstal (19%), NLMK (15% market share), and Evraz (12%).

Chart 119: Russian steel capacity per type



Source: BofA Merrill Lynch Global Research estimates, Metal Expert

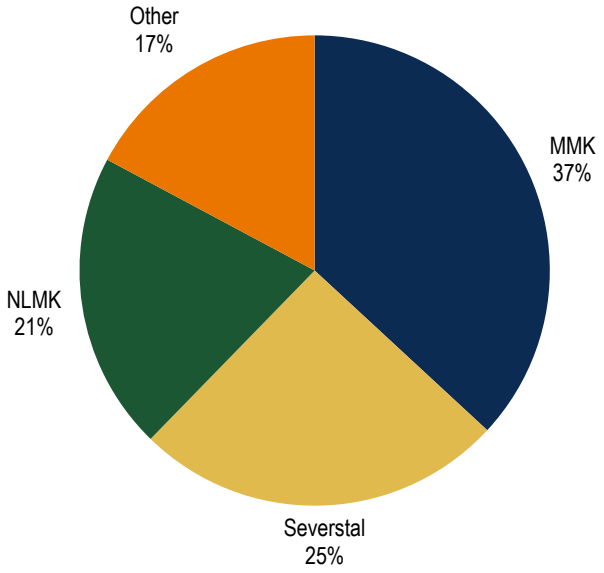
Chart 120: Russian steel capacity per company



Source: BofA Merrill Lynch Global Research estimates, Metal Expert

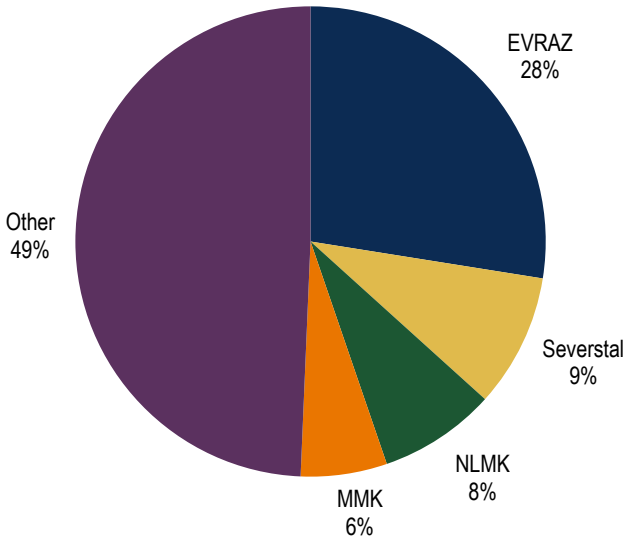
Out of the four key names, Severstal, NLMK and MMK are mainly flat steel producers, while Evraz currently produces only long steel (28% of Russian long steel capacity). In October 2018, Evraz announced plans to build 2.5mtpa flat casting and rolling facility.

Chart 121: Russian flat steel capacity per company



Source: BofA Merrill Lynch Global Research estimates, Metal Expert

Chart 122: Russian long steel capacity per company



Source: BofA Merrill Lynch Global Research estimates, Metal Expert

Key names and market share

NLMK

NLMK is 17th largest steel producer globally (WSA 2019). Its key asset is Lipetsk plant (12.7mnt annual capacity) that focuses on flat products and is self-sufficient in iron ore. Also the company includes long steel segment in Russia, plates and strip products business in Europe and steel rolling facilities in the US.

Severstal

Severstal is 34th largest steel producer globally (WSA 2019). As a Russia-focused steel producer, Severstal sells more than 60% domestically and is vertically integrated into iron ore and coking coal. Total output amounted to 12mn t in 2018.

Evraz

Evraz Plc is a UK-domiciled holding company for Evraz, the 30th largest global steel maker (WSA 2019). The steelmaking assets (19.3Mtpa total capacity) comprise plants in Russia (13.5Mtpa), North America (2.4Mtpa), Ukraine (1.4Mtpa), Europe (0.5Mtpa) and Africa (1Mtpa). Evraz owns 82% stake in Raspadskaya (coal-mining company, 7Mtpa) and is over 100% self-sufficient in coking coal.

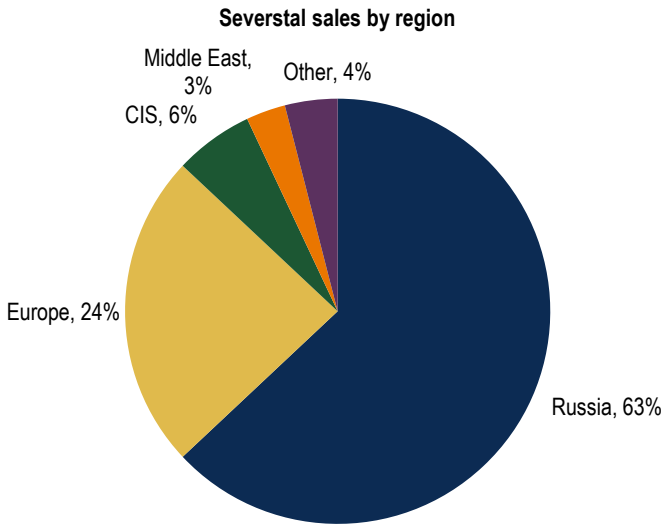
MMK

MMK is the 31st largest steel producer globally (WSA 2019). The main production site is situated in Magnitogorsk and has 13.9mt of steelmaking capacity. Among Russian producers MMK has the largest share of domestic shipments (above 70%) and lowest vertical integration.

Sales structure, costs, profitability

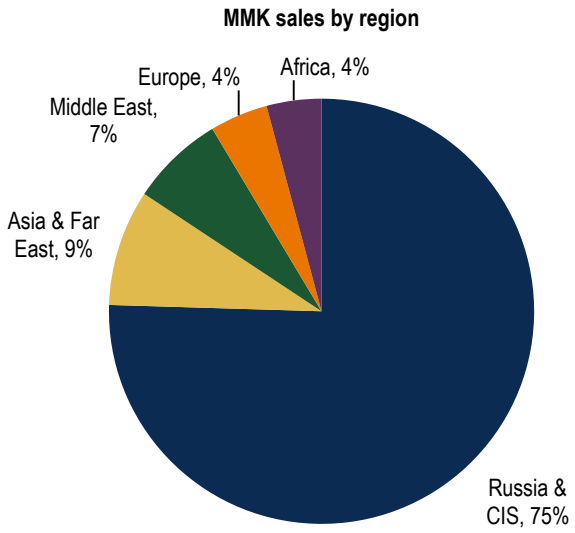
Russian steel producers sell steel to domestic and export markets, mainly to Europe, North America, Asia and Middle East. MMK and Severstal have the highest domestic exposure among all (exceeding e.g. 70% domestic sales volumes and 60% domestic sales, respectively).

Chart 123: Severstal sales by region (2018)



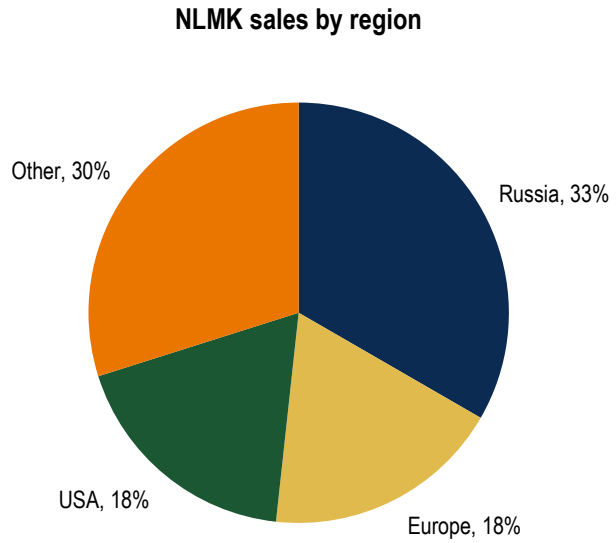
Source: Company data

Chart 124: MMK sales by region (4Q 2018)



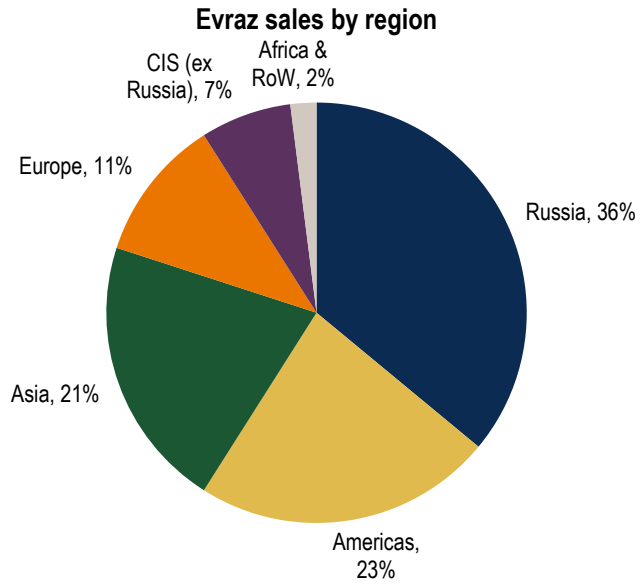
Source: Company data

Chart 125: NLMK sales by region (2018)



Source: Company data

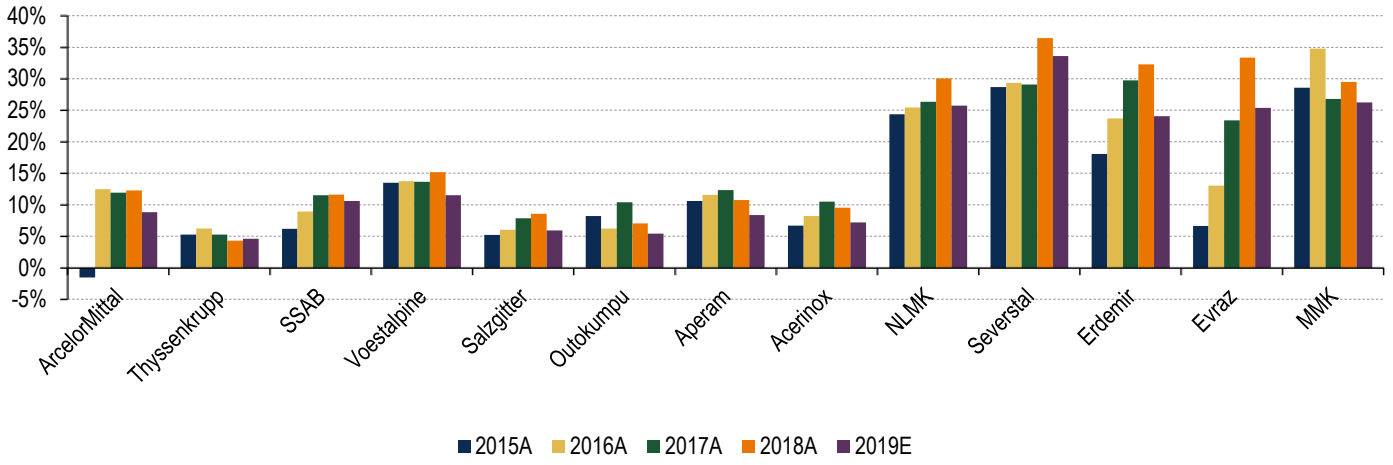
Chart 126: Evraz sales by region (2018)



Source: Company data

Russia steel names appear defensive to us in the current volatile price environment. On our estimates, all four Russian steel producers should earn EBITDA margins of around 25-30% in 2019E, putting them in a different league from their global steel peers with average margins of 5-15%.

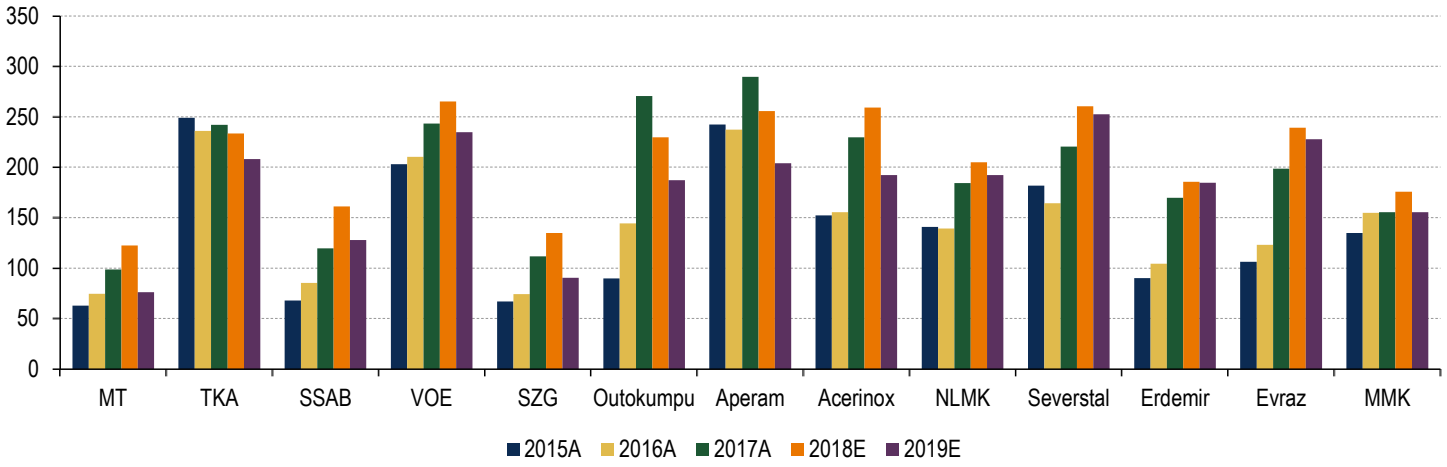
Chart 127: **Russian steels' EBITDA margins are materially** above European peers



Source: BofA Merrill Lynch Global Research estimates, company report

Russian steels should earn US$150-250/t of EBITDA in 2019E, on our estimates.

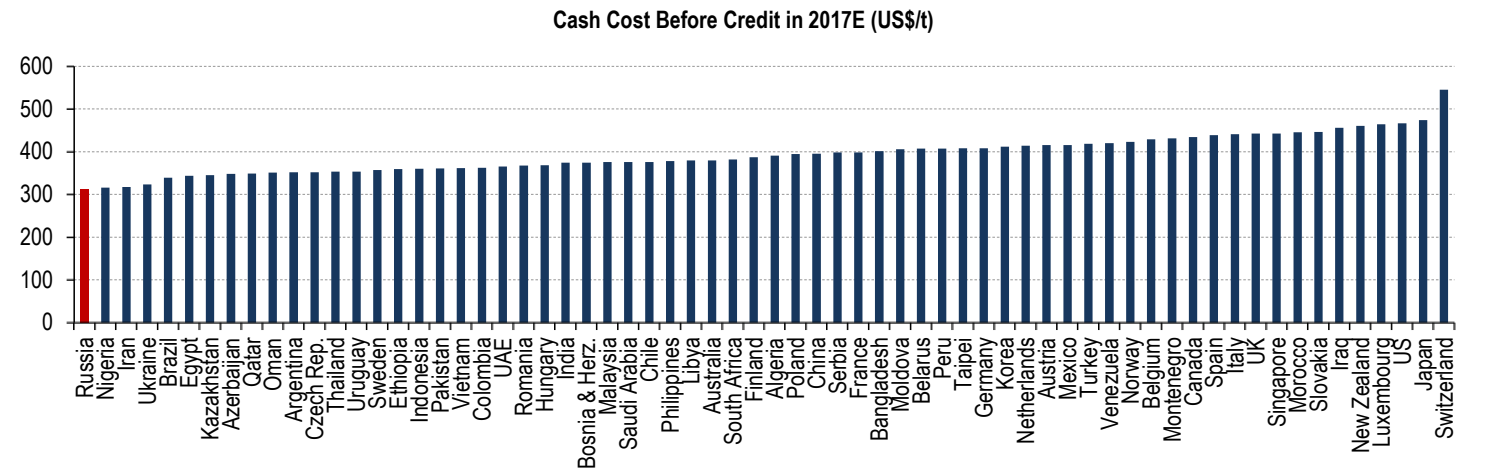
Chart 128: EBITDA in US$/t for global steels



Source: BofA Merrill Lynch Global Research estimates, company report

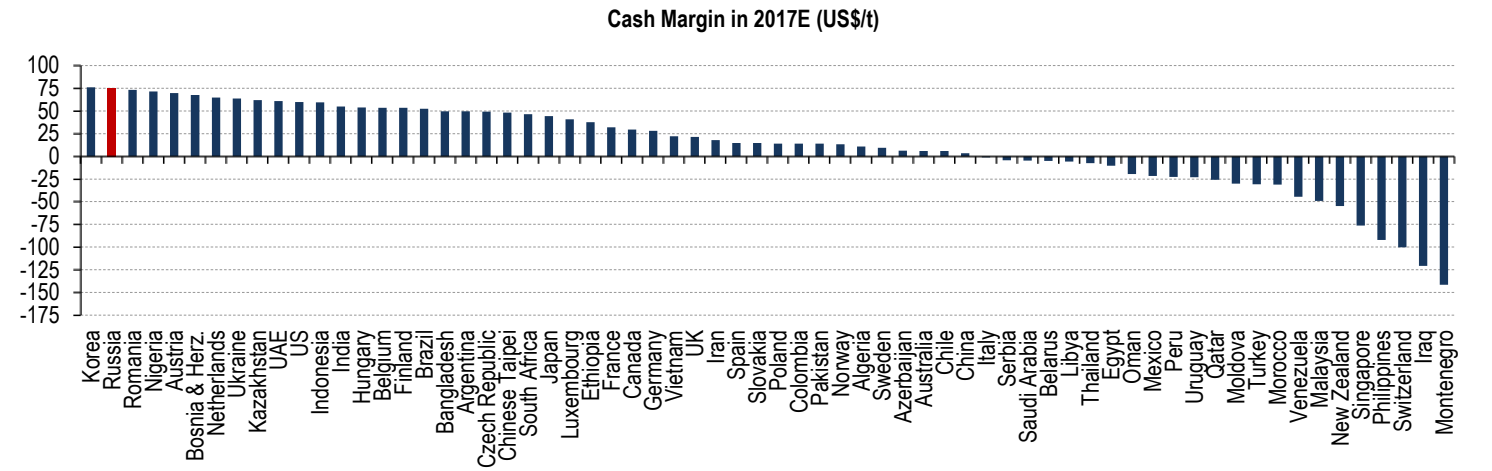
The higher profitability of Russian steels is mainly due to their domestic low cost advantage and high level of vertical integration. With the cash cost of steel production at slightly above US$300/t in 2017E, Russia is the cheapest in the global context, according to AME Group data.

Chart 129: Russia remains the cheapest steel producer globally



Source: AME Group

Chart 130: Russia earns one of the highest cash margins in steel globally

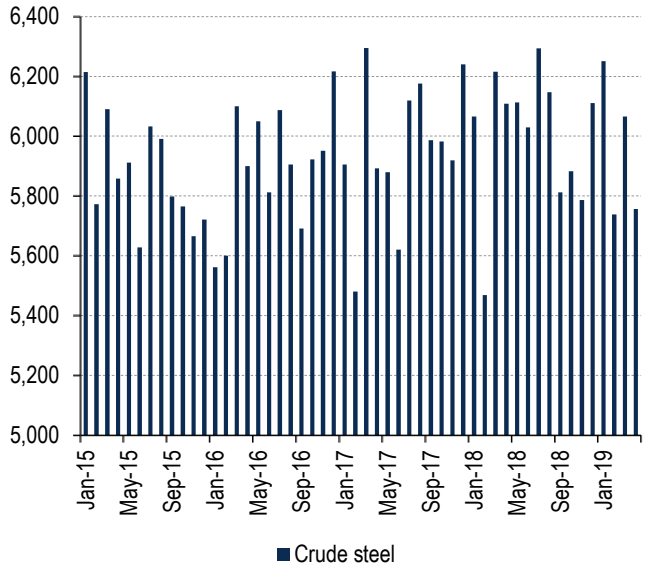


Source: AME Group

Russian steel market and outlook

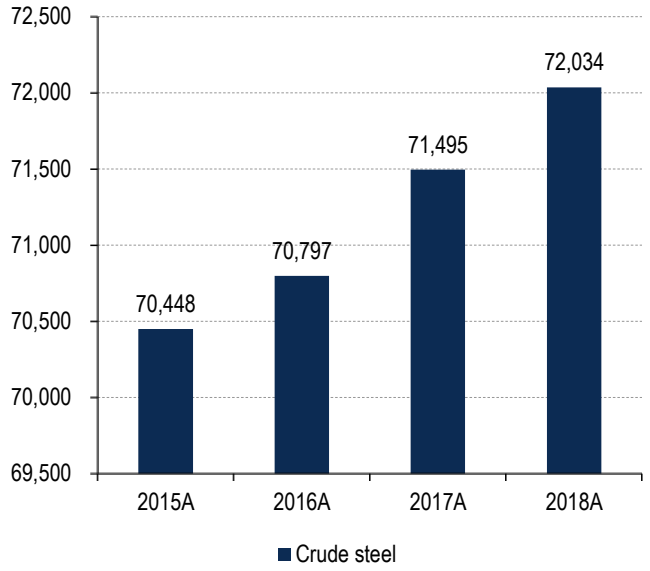
In 2018, Russia produced 72MMt (+1% YoY) of crude steel. Russian crude steel production showed a moderate 1% decline in 2015-16 after a 3.6% rise in 2014. However, starting from 2017, Russian crude steel production resumed slow growth driven by domestic demand recovery.

Chart 131: Monthly crude steel production, k tonnes



Source: Metal Expert

Chart 132: Annual crude steel production, k tonnes



Source: Metal Expert

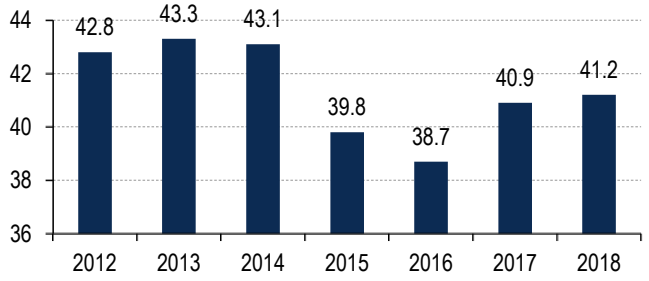
Russia's capacity utilisation rate stood at 82% in 2019, exceeding the global rate.

On the demand side, construction and pipe production represents around 50% of domestic steel consumption, followed by the machinery and equipment sector with close to 10% share and the automotive industry with more than 5% share.

Russian steel demand has contracted sharply over 2014-16 (a 12% drop in 2016 vs. 2014), following a period of rapid growth in 2011-13 (e.g., on average +3.8% pa). The demand destruction was driven by challenging macroeconomic conditions: 3% and 0.5% GDP growth declines in 2015 and 2016, a sharp RUB devaluation and international sanctions.

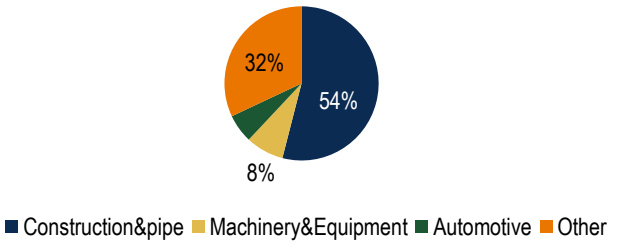
Starting from 2017 , Russian steel demand started gradual recovery as the macro economic situation improved in the country. Russian apparent steel use was up about 6% in 2017 and c1% in 2018. Going forward, we expect Russian steel demand to grow by around 2-3% as the Russian state is planning to launch a number of infrastructure projects.

Chart 133: Russia apparent steel use (mn t)



Source: WSA 2019

Chart 134: Russian steel consumption breakdown by sector (2014), %

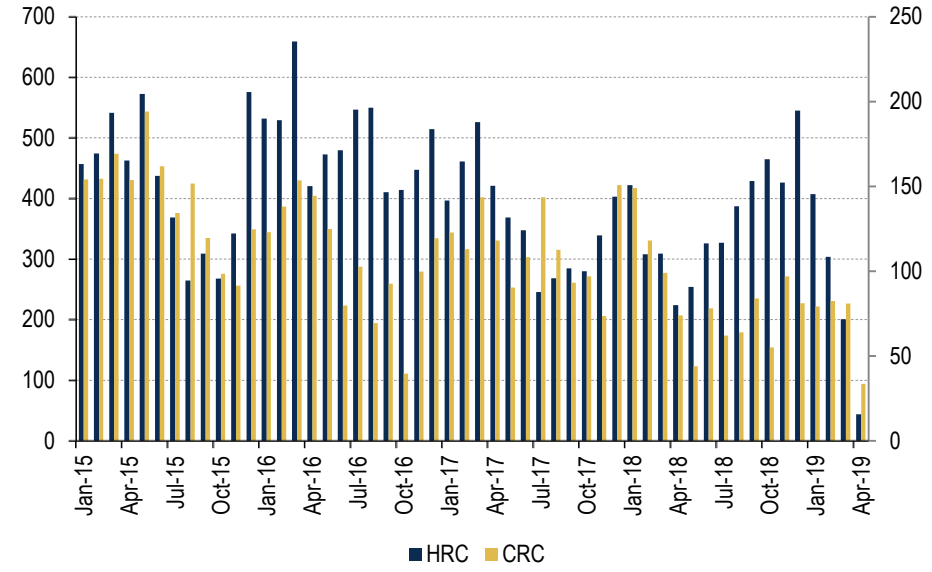


Source: OECD

Russia is a net exporter of steel:

- in 2018, Russian net exports of finished products stood at 7.3MMt
- net exports of semi-finished (i.e. slabs and billets) were 16.1mt in 2018

Chart 135: Russian net exports of HRC and CRC, k tonnes



Source: Metal Expert

Regional perspective: Latam

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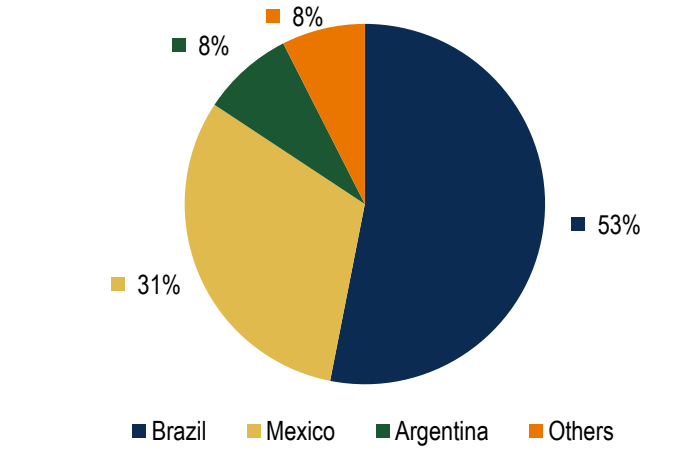
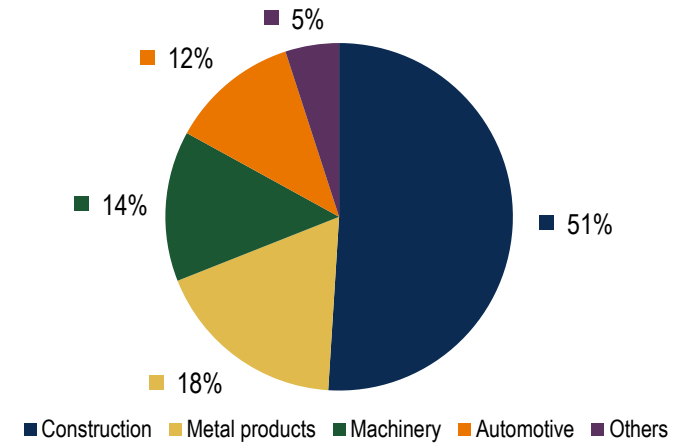
Market snapshot

Chart 136: Latam steel production share by country



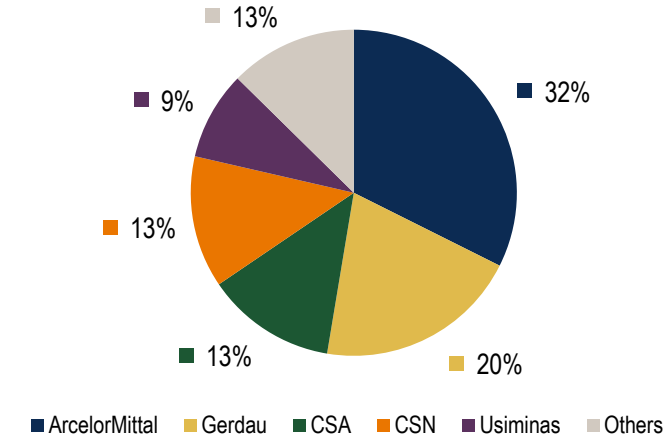
Source: BofA Merrill Lynch Global Research Team, Worldsteel

Chart 137: Latam steel apparent consumption share by sector



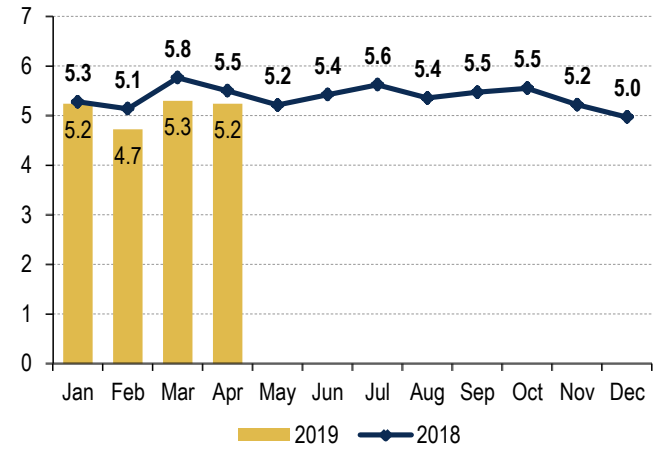
Source: BofA Merrill Lynch Global Research Team, Worldsteel

Chart 138: Brazil steels market share (%)



Source: BofA Merrill Lynch Global Research, IABr

Chart 139: Latam steel production (Mt)



Source: BofA Merrill Lynch Global Research Team, Worldsteel

Major producers

ArcelorMittal Brazil

Arcelor Mittal is present in Brazil since 1921, when ARBED acquired a national steel producer. Operations are either part of Arcelor Mittal Acos Longos (since 1921), focused on long steel production, or Arcelor Mittal Tubarao (operational since 1983), focused on

flat steels. AM is currently the largest steel producer in Brazil, with an output of 11.5mt in 2018 (69.4% flats and 30.6% longs).

Ternium

Ternium is the largest steel producer in Latin America, with lines of both flat and long steels and a production of 12.9Mt in 2018. The company is based in Argentina and was formed in 2005 with the fusion of Siderar (Argentina), Sidor (Venezuela) and Hylsamex (Mexico). Ternium operates mainly in Mexico (2/3 of net revenues) and Argentina (1/3 of net revenues) and has production centres in Argentina, Mexico, Guatemala, Colombia and the USA. In 2017 Ternium acquired CSA operation adding 5.0mt of crude steel capacity.

Gerdau

Gerdau is the largest steel producer in Brazil after ArcelorMittal (15.3Mt in 2018, 5.5Mt in Brazil) and the largest long steel producer in the Americas. The company is present in across 14 countries, being segmented in four divisions: Brazil (45% of EBITDA 2018), USA (27% of EBITDA), Specialty Steels (19% of EBITDA) and Latam (10% of EBITDA). Gerdau has been focusing deleveraging since late 2015, selling underperforming assets mainly in Latam, Europe and India. Gerdau is based in Brazil and is controlled by Metalurgica Gerdau, also listed in the Brazilian stock exchange (B3).

CSN (Companhia Siderurgica Nacional)

CSN is the third largest steel-maker company in Brazil (5.1Mt in 2018), focusing mainly on flats and with plants located in Brazil, Portugal and Germany. The company was founded in 1941 as part of a governmental investment program and privatized in 1993. CSN has also significant iron ore operations in Brazil, representing 52% of the company's EBITDA in 2018.

Usiminas

Usiminas was in 1956 as part of a governmental investment program and privatized in the late 1991. Usiminas' current controlling shareholders are Nippon Steel (32%) and Ternium (32%).The Company produces flat steels and concentrates sales and operation in Brazil, with total production of 3.6Mt in 2018.

CSP (Companhia Siderurgica do Pecem)

Companhia Siderúrgica do Pecém (CSP) was founded in 2008 and is a joint venture between the Brazilian miner Vale, which owns 50% of the shares, and the South Koreans Dondkuk (30% shares), the world largest steel slabs buyer, and Posco (20% shares), the world's fourth largest steel company and the largest in Korea. After the conclusion of the first stage project, the company started producing steel slabs in June 2016, with an installed capacity of 3mt.

CSA (Companhia Siderúrgica do Atlântico), now Ternium Brazil

Companhia Siderúrgica do Atlântico (CSA) was Thyssenkrupp's (TK) slab plant in Brazil. In 2005, TK decided to expand its steel business into the Americas. The original plan was to produce slabs at low cost in Brazil and process and sell them in the USA and Europe. CSA was acquired by Ternium in February 2017 for EUR1.5bn.

AHMSA (Altos Hornos de Mexico)

Altos Hornos de Mexico (AHMSA) is the largest steel producer in Mexico, producing and converting crude steel into finished products. Subsidiaries of the company mine iron ore for conversion into steel, and coal, not only for the steelmaking process, but also for sale to fuel power plants. Grupo Acerero del Norte (GAN) is its controlling stockholder. In 2018, the company sold 3.8Mt of steel products. Domestic sales corresponded to 13% of Mexican steel market.

Grupo Simec

Grupo Simec produces a range of finished steel products and operates in North America. The company has a total of 15 production and processing plants, located mainly in Mexico and the US, but also producing in Brazil. Steel volumes sold totalled 2.2Mt in 2018.

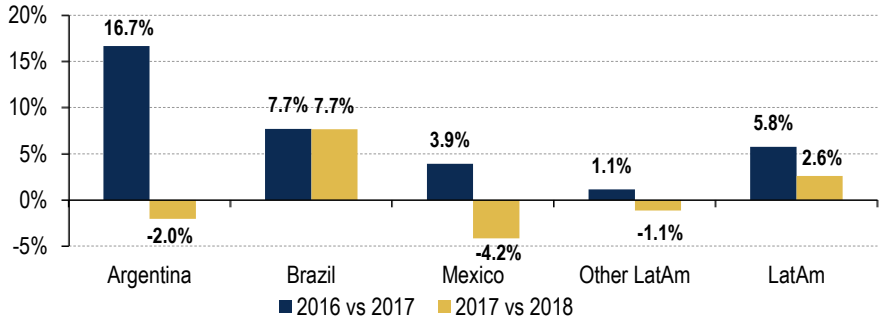
Latam steels on recovery mode – good potential for 2020

Latam steels went through a demand and pricing power compression in 2014/16, with economic recessions in Brazil/Argentina. The outlook improved significantly in 2017, and we expect the pace of the recovery to accelerate into 2019-20 with reforms approval in Brazil. Consumption and investments should recover from a 10 year low in Brazil, while the political stabilization and economic rebound in Argentina is also key.

2014-16 were challenging years for Latam. 2017 and 2018 improved

Total Latam steel consumption increased 2.6% in 2018, following a 5.8% increase in 2017, mainly due the Brazilian economy stabilization. In fact, demand in Brazil increased 7.7% in both 2017 and 2018, according to Worldsteel. Meanwhile, Argentina and Mexico posted a -2.0% and -4.2% consumption decreased in 2018, respectively, impacted by economic slowdown.

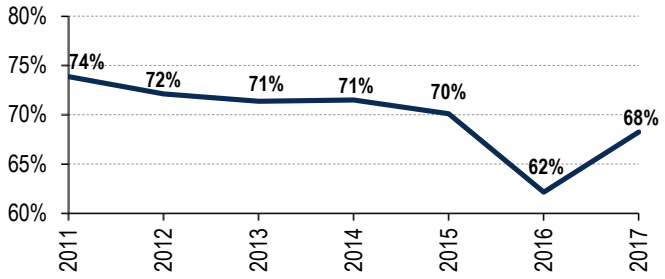
Chart 140: Latam apparent steel consumption (y/y %)



Source: BofA Merrill Lynch Global Research, Worldsteel

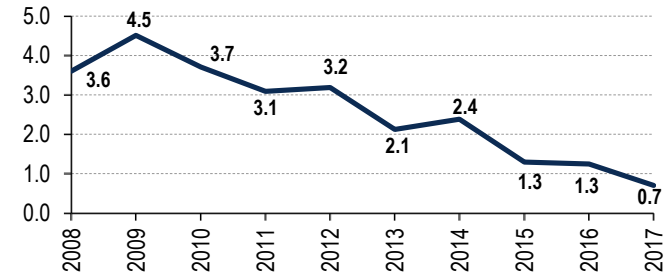
Brazil is the major driver, as the country represents 53% of total production and 31% apparent consumption. After hitting 62% of capacity utilization in 2016, higher demand led it to 68% in 2017. The trend is set to continue as the country recovers from its worst recession in history.

Chart 141: Brazil steel capacity utilization rate (%)



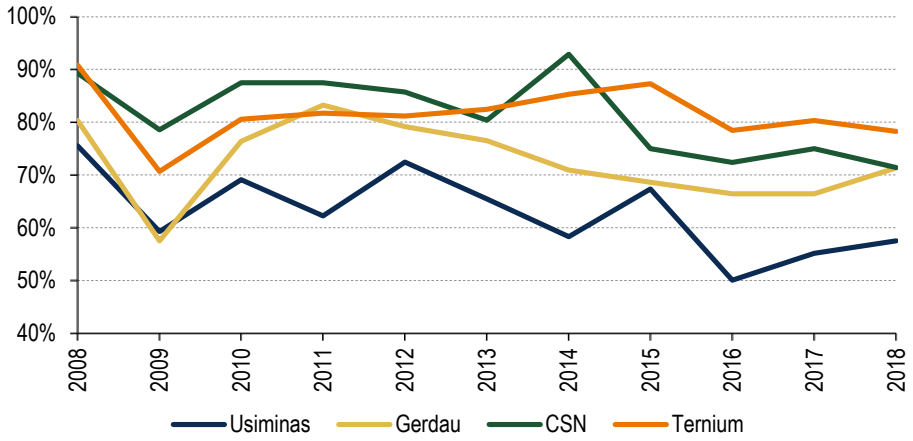
Source: IABr, BofA Merrill Lynch Global Research Team

Chart 142: Brazilian steel-makers investments (U$M)



Source: IABr, BofA Merrill Lynch Global Research Team

Chart 143: Capacity utilization rate from Latam producers (%)



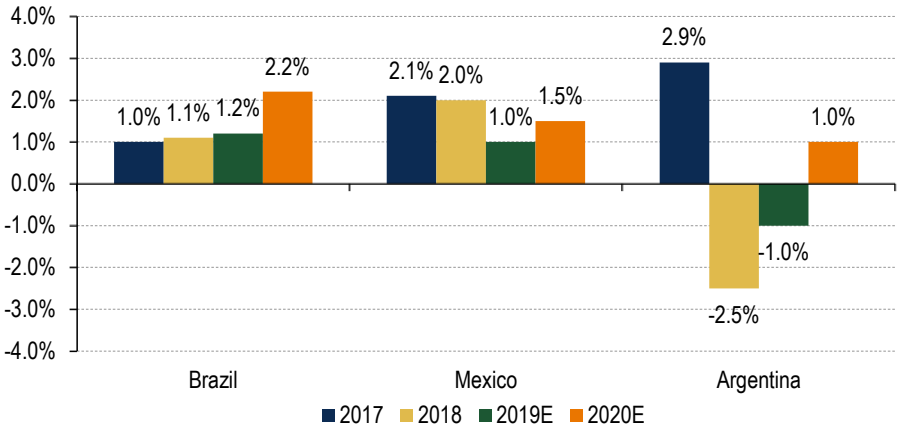
Source: Usiminas, Gerdau, Ternium, CSN, BofA Merrill Lynch Global Research Team

Usiminas shut down blast furnace 2 in Ipatinga mill in 2015 and fully shut its primary production on its Cubatao mill, while Gerdau is on an asset optimization strategy which had to the divestment of operations in Chile, Spain, Colombia and India. Most recently Gerdau sold to CMPC – 2.5mt of rebar steel capacity and its fabrication business.

However, the recovery on sight

Although 2017 showed significantly better trends for Latam steelmakers, 2018 was marked as a year of political and economic uncertainty for three main producers – Brazil, Mexico and Argentina. The path remains cloudy, but the three countries are expected to have a stronger economic recovery in 2020, with the steel market going along with it.

Chart 144: Historical and forecast GDP growth (y/y %)



Source: BofA Merrill Lynch Global Research estimates

In Brazil, domestic demand is already on the road of recovery, but production is still affected by Argentina's weak economic activity – the country represents roughly 70% of Brazilian auto exports and ~10% of Brazilian steel exports. Flat steel demand is recovering, while long steels remain flattish in 2019, as the pick-up in demand on the construction sector is only expected in 2020.

Consolidation

Large M&A operations occurred over the last years:

- ArcelorMittal and Votorantim Siderurgia – AM and VS announced the merger of their long steel operations in February 2017, which would lead to a total long capacity of 5.6mtpy.

- Ternium acquired CSA - Ternium acquired in February 2017 Thyssenkrupp's slab plant in Brazil, CSA. The acquisition increased its vertical integration and opened the doors for TX to improve its product mix over time. The company announced it will invest US$1.1bn for a new 3.7mt HRC line in Mexico with 2H20 start-up, looking to integrate CSA's exports. Roughly 40% of Mexican steel production is imported. A new high-end HRC line enables TX to gain share of imports, leverage on CSA's quality and improve its portfolio mix.

With capacity utilization still low, no capacity additions are planned in Brazil. However, certain Brazilian producers have been studying the restart-up of idled mills.

Latam steel medium term supply/demand outlook

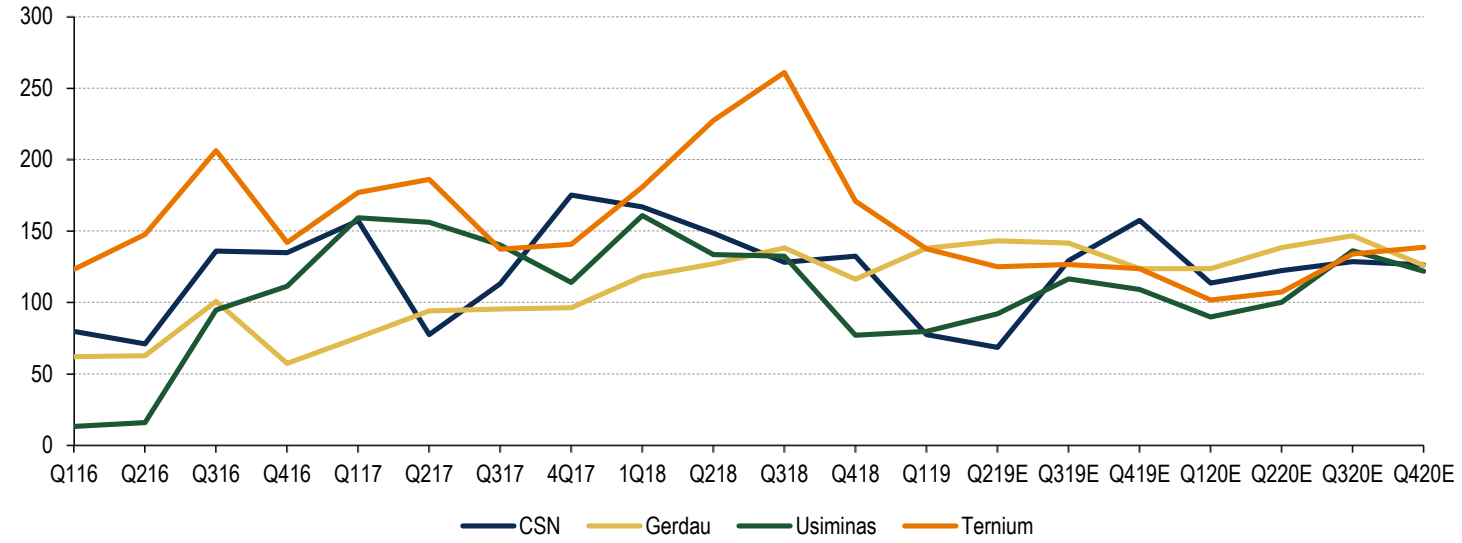
Key indicators to consider when assessing steel demand outlook in Latam

- Focus on Brazilian, Argentinian and Mexican economic data:
    - GDP growth (mainly in Argentina, where growth has been subdued for years) and how elections affect it (2018 in Brazil and Mexico and 2019 in Argentina);
    - Industrial production (mainly capital goods production);
    - Brazilian and Mexican auto production;
    - Home appliances production;
    - Cement production;
    - Apartment and housing launches;
    - Chinese HRC and Turkish rebar prices (affecting import amount);
    - FX rate (affecting import amount);
    - AD measures under discussion.

Key factors to consider when assessing steel supply outlook in Latam

- Capacity utilization increases mainly in Brazil, which will depend on the economic pace of recovery (mainly in IP, auto production and civil construction)
- Chinese HRC and Turkish rebar prices + FX rate (affecting price setting);
- Key operations and negotiations on-going in the market, leading to volume consolidations;
- Coal prices, since the majority of steel makers use blast furnaces, and iron ore;
- Further AD measures against mainly on Brazilian steel.

Chart 145: EBITDA/t in LatAm main steel producers (US$/t)



Source: BofA Merrill Lynch Global Research estimates, company reports

Regional perspective: India

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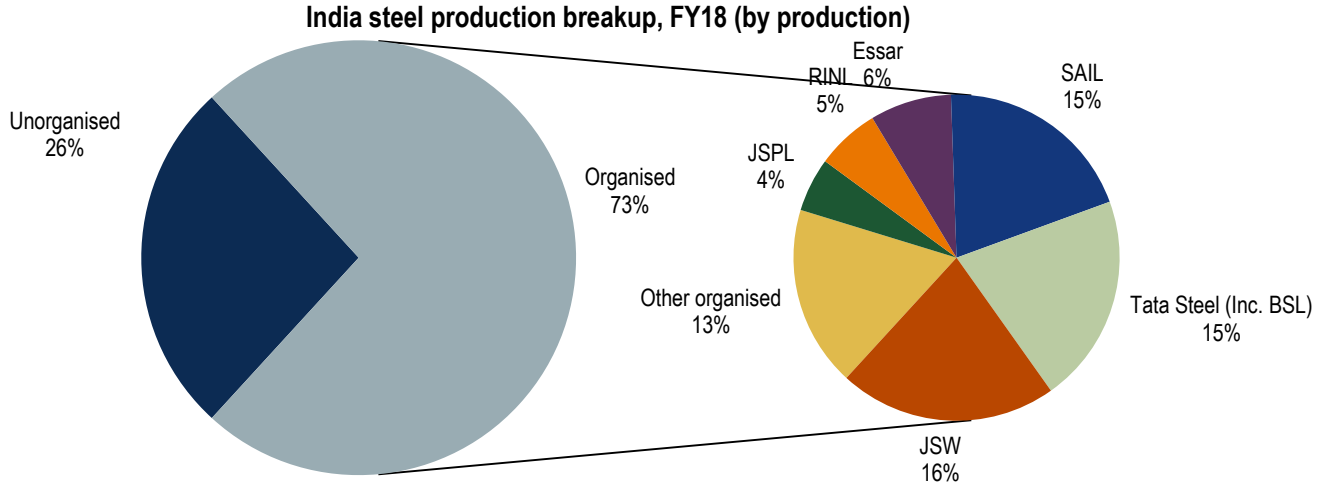
anuj.singla@baml.com

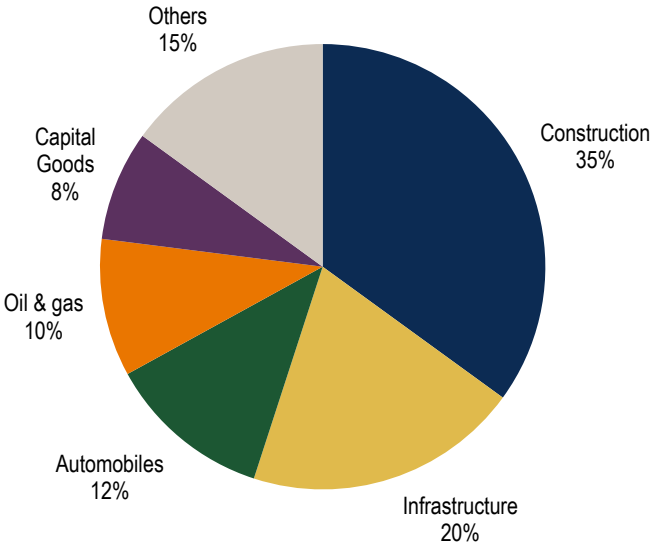
Market snapshot

Chart 146: Indian steel market share – based on crude steel production FY2018A



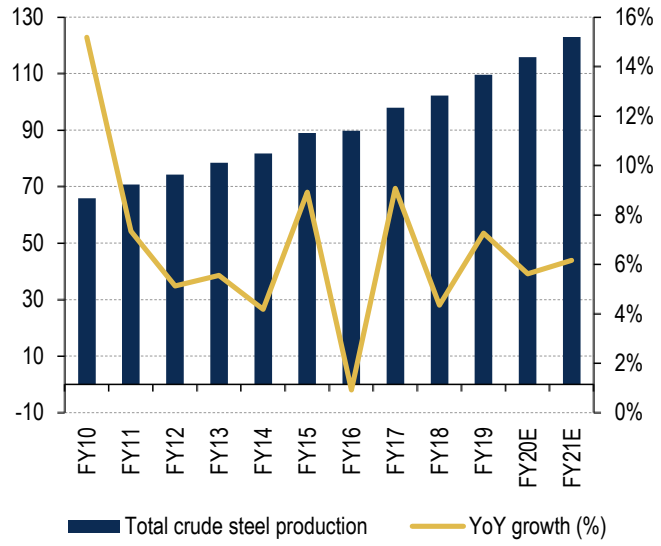
Source: JPC, BofA Merrill Lynch Global Research estimates

Chart 147: Indian steel demand break-up*



Source: IBEF, BofA Merrill Lynch Global Research estimates (*Break-up for FY2016)

Chart 148: India steel production trend



Source: JPC, BofA Merrill Lynch Global Research estimates

Major producers

JSW Steel

JSW Steel (JSW) is a part of the Sajjan Jindal led JSW Group which operates in the sectors of steel, cement, energy, infrastructure and power. JSW is among the top 3 producers of steel in India (capacity: nearly 18m tons) and has expanded capacity at ~14% CAGR over the last 12 years, making it the fastest growing steelmaker in India. JSW has a technical collaboration with JFE Holdings (15% share in JSW) which provides

it access to high end steelmaking technology including auto-grade products. JSW differentiates itself vs its peers on (i) strong execution skills with minimal delays on project delivery, (ii) ability to execute expansion projects at significant discount to global peers – US$500-600/t vs global benchmark of US$1,000-1,400/t, (iii) low conversion costs, and (iv) ability to respond quickly to market conditions including change in sales mix (domestic/exports).

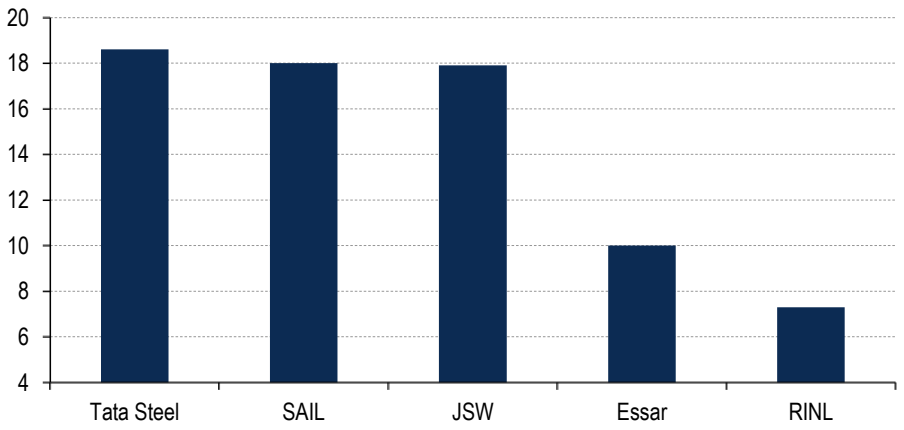
Tata Steel

Tata Steel (Tata) is the oldest steel producer in India and operates steel making assets across India, Europe (integrated steel assets) and Southeast Asia (EAF and rolling operations). Tata Steel India is among the top 3 producers of steel in India and has a strong sustainable cost advantage vs its peers supported by access to low cost captive supplies of key steelmaking raw materials - 100% self-sufficiency in iron ore and 30% in coking coal, which make it one of the lowest cost producers of steel globally. It recently acquired controlling stake in Bhushan Steel that took its crude steel capacity in India to 18mt. Apart from steel, Tata also operates three ferrochrome plants in India (again supported by captive mining assets). In terms of international operations, Tata has 12mt of capacity in Europe, which it acquired in 2007 and it recently signed an agreement to sell its steelmaking operations in South-east Asia.

Steel Authority of India Limited (SAIL)

Government owned SAIL is among the top 3 producers of steel in India with capacity spread across five integrated steel plants and three alloy steel plants. SAIL sources its complete requirement for iron ore from captive mines but is dependent on merchant sources for coking coal. The conversion costs for SAIL are among the highest among the major steel makers in India primarily on account of high legacy employee costs. SAIL embarked on an extensive modernization and expansion plan in 2007, which has faced inordinate delays and is in final stages of completion and will take its crude steel capacity to 21.4 mt.

Chart 149: **Crude steel capacity of India's top**-five steel producer – FY19



Source: JPC, BofA Merrill Lynch Global Research estimates

Key issues for Indian steel

Key regional-specific issues driving the outlook for the Indian steel industry are

1. Subdued near term demand outlook with weakness in auto, property and other key steel using sectors,

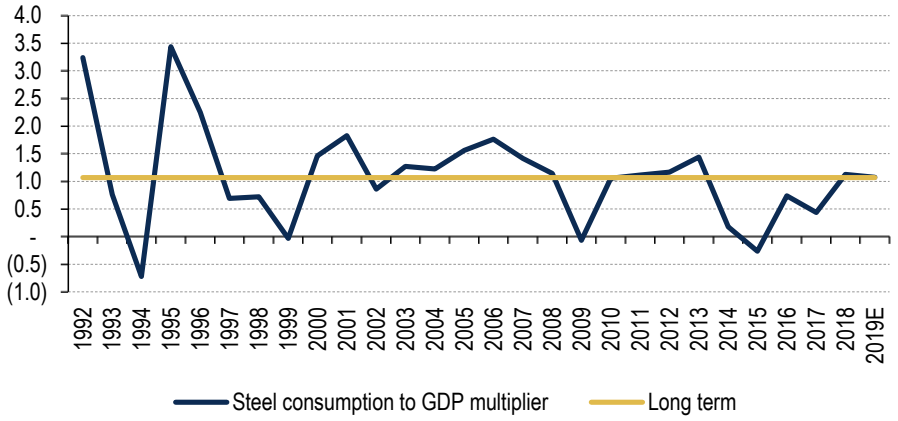
2. Risk of rise in low priced steel exports from FTA countries (Korea, Japan) leading to pricing pressure in domestic India market,

3. Risk of potential iron ore production disruption with multiple iron ore leases expiring and coming up for auction by Mar'20

Subdued near term demand

After two consecutive years of strong growth in the domestic steel demand where it surprised positively vs our expectations, there has been a moderation in a growth outlook owing to weakness in key steel using sectors – autos, property. However, we remain optimistic on a recovery from the current levels supported by higher infrastructure investment by the government, post recent completion of the federal elections where the winning party got a strong mandate.

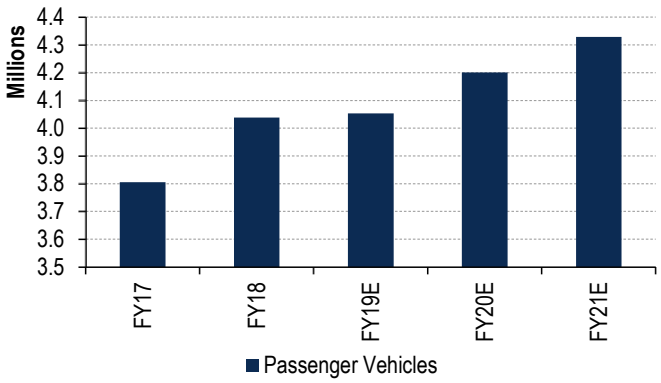
Chart 150: Steel consumption to GDP multiplier has been trending near the long-term average



Source: RBI, JPC

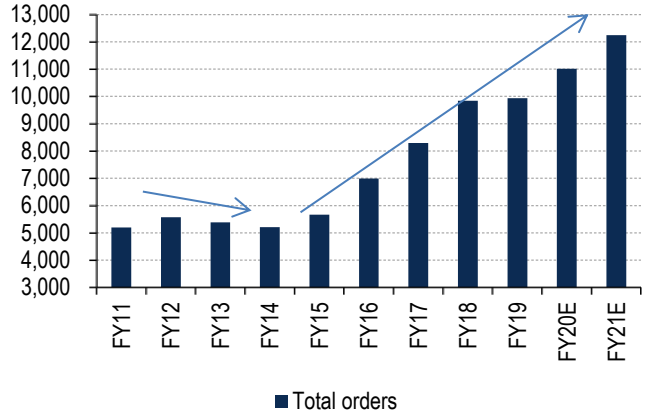
Despite the current weakness, the long-term growth outlook for the Indian steel industry remains strong. The near-term demand uptick is likely to come from: (i) volume growth for automobiles and consumer durables remains strong for the long term; and (ii) government spending on boosting infrastructure.

Chart 151: Volume growth outlook for Passenger vehicles remains strong



Source: BofA Merrill Lynch Global Research estimates

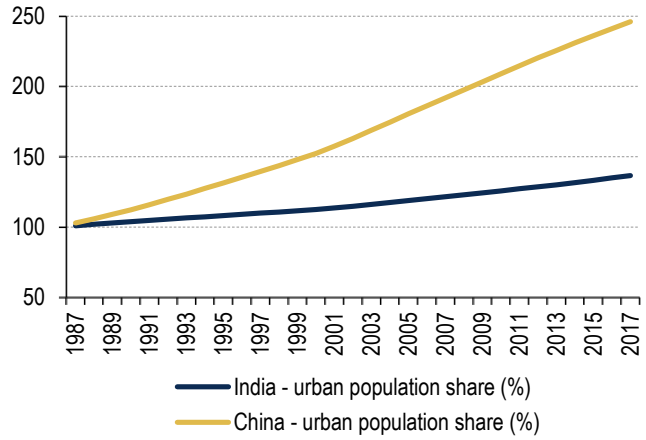
Chart 152: Infra orders (INR bn) have picked pace in recent times



Source: BofA Merrill Lynch Global Research estimates

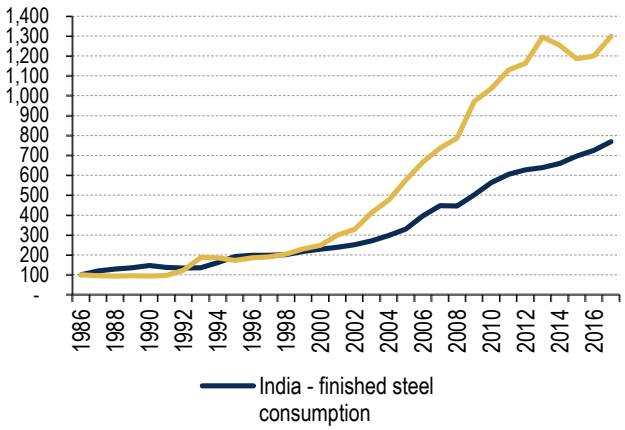
Over the long term, rapid urbanization is one of the major drivers spurring steel demand in India (like in China), mainly due to the additional requirement from steel-intensive infra (buildings, bridges, rails etc.) and growth in steel-consuming appliances (like vehicles, consumer durables). The proportion of urban population to total has increased at a steady pace and currently stands at ~34%, leaving ample scope for growth (China's share of urban population at ~58%). With increasing government focus on urbanization, we expect demand growth trajectory to become steeper from here.

Chart 153: Rapid urbanization in China was one of the key drivers of **steel demand uptick ...**



Source: IMF, BofA Merrill Lynch Global Research

Chart 154: **...India** could see a similar demand growth as pace of urbanization picks up

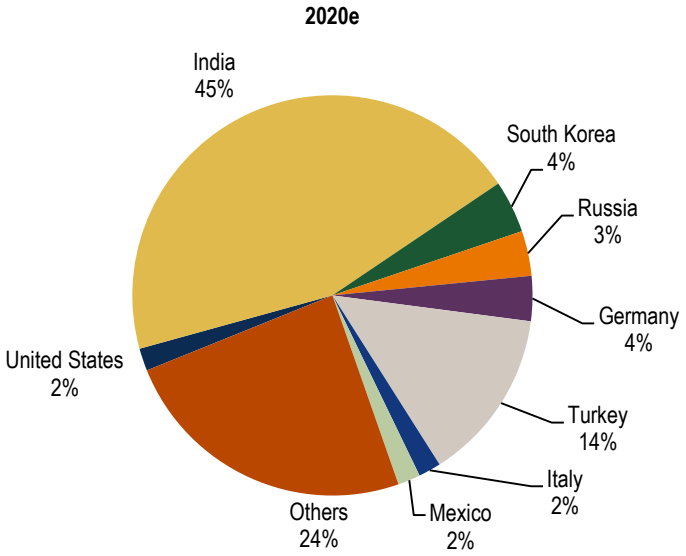


Source: IMF, BofA Merrill Lynch Global Research

WSA expects India to contribute 45% of incremental global consumption

The World Steel Association (WSA) also remains positive on the steel demand outlook in India, with the country contributing ~45% of the incremental global consumption growth in CY20 – the highest among the key steel consuming countries. We believe that a revival in the domestic capex cycle could further accelerate the domestic steel consumption growth, however, timing remains uncertain.

Chart 155: India to contribute ~45% of incremental global steel demand in CY20e



Source: World Steel Association, BofA Merrill Lynch Global Research estimates

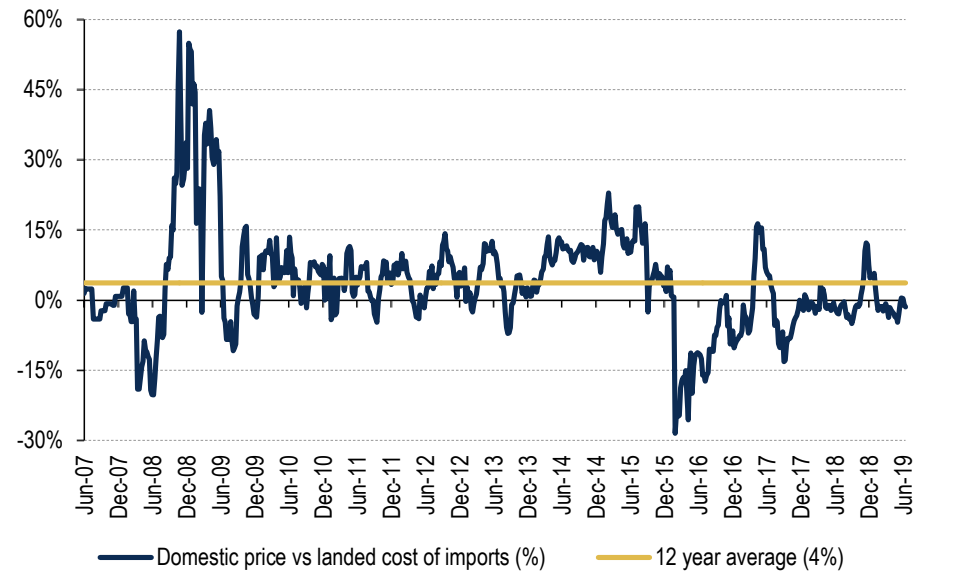
Risk of rise in low priced steel exports

The healthy steel demand growth outlook exposes India to the risk of higher low cost imports including diversion of steel exports with trade barriers being set up across key steel consuming countries including US. Domestic steel pricing in India is strong linked to the landed cost of imports, like many other key steel consuming countries. In this context, the rise in low cost steel imports from FTA countries (Korea, Japan) forms a key risk to domestic steel pricing, despite a constrained domestic supply environment. While Indian government took lead in the recent cyclical downturn by imposing Minimum Import Price (MIP) in Feb'16 and replacing it by long-duration anti-dumping duties (ADD) applicable till 2021, the price levels are significantly lower than the prevailing steel prices globally and do not account for the rise in raw material costs since they were

instituted, and hence are currently ineffective. Also, with the successful resolution of bigger non-performing steel assets in the recent IBC auctions (Bhushan Steel, Essar Steel, Bhushan Power), it remains to be seen what kind of regulatory support we can expect to see for the sector.

Domestic vs. import pricing trend

Chart 156: Domestic steel prices are trading at ~1.5% discount to landed cost of imports from China (vs 4% premium historically)



Source: BofA Merrill Lynch Global Research, Bloomberg

Risk of **potential iron ore supply disruption in Mar'20**

Many merchant iron ore mines are scheduled to expire by Mar'20 and auctioned as per the new metals and mining bill (MMDR). We estimate that this includes 50mt of iron ore producing mines in the Indian state of Odisha - produces more than 50% of domestic iron ore production – at risk of disruption in case delays in execution of the auction process. We believe there are lot of regulatory issues related to the seamless auction of mines and hence this exposes the domestic steel producers like JSW Steel – which do not have captive iron ore - to the risk of constrained domestic supplies.

Indian steel medium term supply/demand outlook

Key indicators to consider when assessing steel demand outlook in India

- Government infra spend and order outlook
- Residential and commercial construction outlook
- Consumer confidence and auto sales
- Industrial production and PMI trends

Key factors to consider when assessing steel supply outlook in India

- We expect steel supply growth to lag the steel demand growth as the capacity expansion pipeline has dried up following the recent commissioning of capacities. With Arcelor in advanced stages of entering into Indian steel market through its acquisition of Essar Steel, its capacity growth plans in India will also remain critical for the supply outlook for the medium term. On a sector level, we expect the volumes to continue to move from unorganized names to the organized names on recent steps towards formalization of economy by the government.

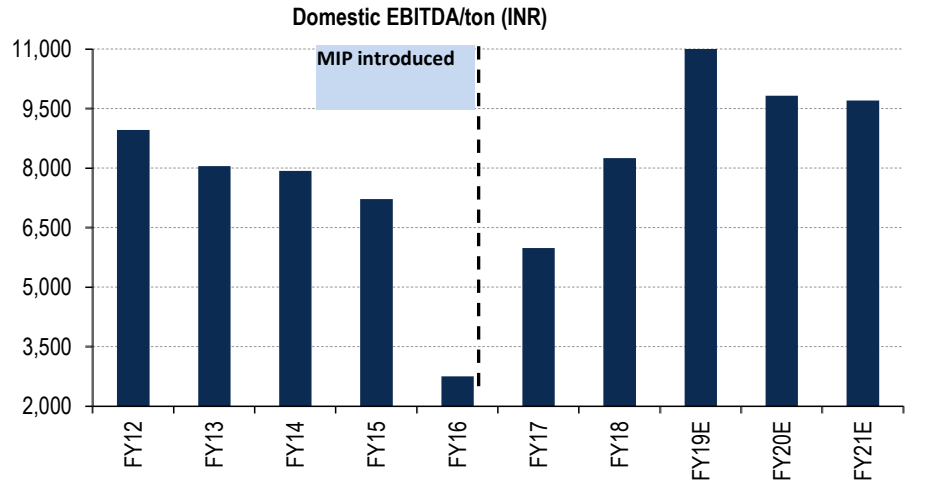
Table 20: India steel supply-demand, 2008-20E

(in mn. tonnes)	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20E
Crude steel (CS)- YE capacity	**59.8**	**64.4**	**75.0**	**80.4**	**90.9**	**97.0**	**102.3**	**109.9**	**122.0**	**128.3**	**130.1**	**130.6**	**136.6**
CS production													
Tata Steel (BOF)	5.0	5.6	6.6	6.9	7.1	8.1	9.2	9.3	10.0	11.7	12.5	13.2	13.9
SAIL (BOF)	14.0	13.4	13.5	13.8	13.3	13.4	13.6	13.9	14.3	14.5	15.0	16.7	18.0
JSW Steel (including SISCOL, Ispat from FY13)	3.6	3.7	6.0	6.4	7.4	11.2	12.2	13.1	12.6	15.8	16.3	16.7	16.9
Essar (EAF)	3.6	3.3	3.5	3.4	4.4	4.2	3.2	2.9	3.7	5.4	6.1	7.2	7.5
Ispat (EAF)	2.8	2.2	2.7	2.4	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
JSPL (EAF/BOF)	1.2	1.5	2.0	2.3	2.8	3.0	2.8	2.8	3.6	3.2	4.0	5.1	6.6
RINL (BOF)	3.1	3.0	3.3	3.2	3.1	3.1	3.2	3.3	3.6	4.0	4.7	5.3	5.8
NMDC (BOF)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Total CS production of major producers	**33.3**	**32.7**	**37.4**	**38.3**	**40.6**	**43.0**	**44.2**	**45.4**	**47.7**	**54.5**	**58.6**	**64.1**	**69.0**
Other producers	5.8	6.4	8.6	10.3	9.8	9.5	9.9	14.6	15.7	16.2	16.6	18.0	18.7
Secondary steel (Induction Furnaces)	16.9	18.1	19.8	22.1	23.9	25.9	27.6	28.3	26.8	27.0	27.0	27.5	28.0
Total crude steel production	**56.1**	**57.2**	**65.8**	**70.7**	**74.3**	**78.4**	**81.7**	**88.3**	**90.2**	**97.7**	**102.2**	**109.6**	**115.8**
YoY growth (%)		*2%*	*15%*	*7%*	*5%*	*6%*	*4%*	*8%*	*2%*	*8%*	*5%*	*7%*	*6%*
CS capacity utilization	*94%*	*89%*	*88%*	*88%*	*82%*	*81%*	*80%*	*80%*	*74%*	*76%*	*79%*	*84%*	*85%*
Additional production during the year		1.1	8.7	4.8	3.6	4.1	3.3	6.6	1.9	7.5	4.5	7.4	6.2
Finished carbon steel production	**53.3**	**51.2**	**56.3**	**63.3**	**69.3**	**69.9**	**74.2**	**76.3**	**75.2**	**86.5**	**92.4**	**97.4**	**102.9**
Import	6.6	5.8	7.4	6.7	6.9	7.9	5.4	9.3	11.7	7.2	7.5	7.4	6.6
Export	4.6	4.4	3.3	3.6	4.6	5.4	6.0	5.6	4.1	8.2	9.6	5.5	3.0
Net imports	**2.0**	**1.4**	**4.1**	**3.0**	**2.3**	**2.6**	**-0.5**	**3.7**	**7.6**	**-1.0**	**-2.1**	**1.9**	**3.6**
Apparent consumption of finished steel	**55.2**	**52.6**	**60.4**	**66.4**	**71.6**	**72.5**	**73.7**	**80.0**	**82.8**	**85.5**	**90.2**	**99.3**	**106.5**
% growth YoY		*-4.7%*	*14.8%*	*9.8%*	*7.9%*	*1.2%*	*1.7%*	*8.6%*	*3.5%*	*3.2%*	*5.6%*	*10.1%*	*7.2%*

Source: JPC, BofA Merrill Lynch Global Research estimates

Long-term industry profitability

Chart 157: Indian steel sector profitability to moderate on lower steel prices unless supported by regulatory measures



Source: BofA Merrill Lynch Global Research estimates, company report

Regional perspective: Japan

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Long-term contraction in demand

Domestic demand in the Japanese steel market has been on a long-term downtrend. This is due to (1) waning domestic demand for construction applications, and (2) Japan's manufacturing industry (particularly autos) relocating production facilities overseas and the fading presence of Japan's industry owing to competition from overseas companies (in such areas as home appliances and shipbuilding). We expect steel demand to continue to contract as the population declines, though at a more moderate pace than before.

Construction and autos drive domestic demand: Domestic demand for steel in Japan is around 64mn tons. Of that, construction-related demand and auto-related demand each account for about 21mn tons, or one third of the total (an estimated 70% of specialty steel is used for auto applications).

Steel exports on downtrend: In tandem with declining domestic demand, the steel export ratio has been rising since the 2010s. It has settled down at over 30%. However, steel export volumes are on a downward trend owing to such factors as (1) Japan's waning cost competiveness compared to overseas steel mills, and (2) growth in steel production in China and Southeast Asia.

Table 21: Japan steel supply/demand outlook

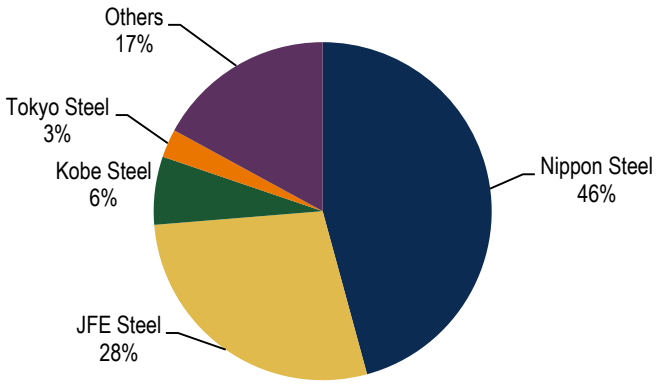
(million tons)	CY2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019E	2020E	2021E
Ordinary steel																	
Construction total	28.2	27.8	26.6	25.9	20.3	18.7	18.9	20.3	22.7	22.7	22.1	21.4	21.6	21.4	21.1	21.5	21.5
Civil engineering	7.1	6.7	6.8	7.2	6.5	5.6	5.3	6.0	6.5	7.2	7.0	6.9	6.9	6.8	6.8	6.9	6.9
Construction	21.1	21.1	19.8	18.7	13.7	13.0	13.6	14.3	16.2	15.5	15.2	14.6	14.8	14.6	14.3	14.6	14.6
Manufacturing total	35.4	37.0	37.5	36.3	26.2	29.8	29.4	29.2	28.3	29.0	27.8	27.2	28.0	28.5	28.0	28.0	28.0
Shipbuilding	5.5	5.8	6.0	6.4	6.1	5.8	5.7	4.6	4.1	4.3	4.4	4.3	4.2	4.1	4.1	4.3	4.6
Automobile	13.2	13.9	14.2	13.7	9.1	11.1	10.3	11.6	11.3	11.3	10.8	10.9	11.2	11.5	11.3	11.3	11.2
Industrial machinery	6.0	6.3	6.5	6.0	3.3	4.3	4.9	4.8	4.9	5.3	4.9	4.4	4.9	5.2	5.1	5.1	5.1
Electronic appliance	3.9	4.1	4.1	3.9	3.0	3.3	3.2	3.1	3.0	3.1	3.0	2.9	3.0	3.1	3.0	2.9	2.9
Secondary products	3.4	3.5	3.4	3.2	2.3	2.6	2.6	2.4	2.4	2.4	2.3	2.2	2.3	2.3	2.2	2.2	2.1
Container	1.7	1.8	1.8	1.6	1.4	1.5	1.5	1.4	1.3	1.3	1.2	1.2	1.1	1.1	1.1	1.1	1.1
Others	1.7	1.6	1.6	1.6	1.1	1.2	1.2	1.3	1.3	1.3	1.2	1.3	1.2	1.2	1.2	1.2	1.1
Domestic total	63.6	64.5	64.1	62.2	46.5	48.5	48.3	49.4	51.0	51.6	50.0	48.6	49.7	49.9	49.1	49.6	49.5
Export	19.9	21.1	19.8	24.0	21.2	28.5	26.2	26.5	27.2	26.1	27.4	27.0	24.1	23.5	22.5	23.0	24.0
Total	**83.5**	**85.6**	**83.9**	**86.7**	**67.7**	**76.9**	**74.5**	**76.0**	**78.2**	**77.7**	**77.4**	**75.6**	**73.9**	**73.4**	**71.6**	**72.6**	**73.5**
(Total growth, YoY)	-1.7%	2.5%	-1.9%	3.2%	-21.9%	13.6%	-3.2%	2.0%	2.9%	-0.6%	-0.5%	-2.3%	-2.3%	-0.6%	-2.5%	1.4%	1.3%
Specialty steel																	
Domestic	14.9	15.3	15.0	15.7	9.1	13.5	13.5	13.3	13.1	13.7	12.9	12.9	13.8	14.0	13.7	13.4	13.2
Export	5.4	5.7	5.9	6.1	4.1	6.6	6.6	6.6	6.9	7.3	6.0	6.5	6.6	6.5	6.3	6.6	6.9
Total	**20.4**	**21.0**	**21.5**	**21.7**	**13.3**	**20.2**	**20.2**	**19.9**	**20.0**	**20.9**	**18.9**	**19.5**	**20.3**	**20.5**	**20.0**	**20.0**	**20.0**
(Total growth, YoY)	2.7%	3.2%	2.3%	1.0%	-38.9%	52.1%	-0.1%	-1.3%	0.3%	4.8%	-9.7%	3.0%	4.6%	0.6%	-2.3%	0.1%	0.2%
Total demand																	
Domestic	76.1	78.5	79.8	78.1	78.3	56.6	62.0	61.8	62.7	65.3	62.9	61.5	63.4	63.9	62.8	63.0	62.7
Export	28.7	25.3	26.8	26.7	29.5	23.9	35.1	32.9	33.2	33.3	33.4	33.5	30.7	30.0	28.8	29.6	30.9
Total	**104.7**	**103.8**	**106.6**	**105.4**	**107.8**	**80.5**	**97.1**	**94.6**	**95.9**	**98.6**	**96.2**	**95.1**	**94.2**	**93.9**	**91.6**	**92.6**	**93.6**
(Total growth, YoY)	5.0%	-0.9%	2.7%	-1.1%	2.2%	-25.3%	20.6%	-2.5%	1.3%	2.9%	-2.4%	-1.2%	-0.9%	-0.4%	-2.4%	1.1%	1.1%
Crude steel production	**112.5**	**116.2**	**120.2**	**118.7**	**87.5**	**109.6**	**107.6**	**107.2**	**110.6**	**110.7**	**105.1**	**104.8**	**104.7**	**104.3**	**102.5**	**103.6**	**104.7**
(Total growth, YoY)	-0.2%	3.3%	3.4%	-1.2%	-26.3%	25.2%	-1.8%	-0.3%	3.1%	0.1%	-5.0%	-0.3%	-0.1%	-0.3%	-1.7%	1.1%	1.1%
Utilization	**91%**	**93%**	**92%**	**90%**	**67%**	**82%**	**80%**	**80%**	**84%**	**83%**	**80%**	**81%**	**83%**	**84%**	**82%**	**83%**	**84%**
Capacity	**122.9**	**125.6**	**130.6**	**131.5**	**131.6**	**133.0**	**134.0**	**133.4**	**131.2**	**132.6**	**131.7**	**129.9**	**125.5**	**124.9**	**124.9**	**125.4**	**124.0**

Source: BofA Merrill Lynch Global Research estimates

Two main names: Nippon Steel and JFE Steel

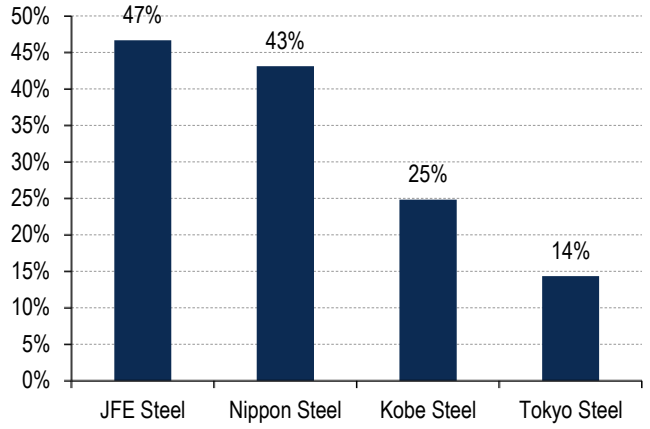
The market is dominated by Nippon Steel and JFE Steel, which together share around three quarters of the market as the result of industry consolidation. Nippon Steel merged with Sumitomo Metal Industries and absorbed Nisshin Steel in the 2010s, while JFE Steel was established in 2002 on the merger of Kawasaki Steel and NKK. Features of the two majors include (1) steel production using blast furnaces and (2) high steel export ratios. Kobe Steel also operates blast furnaces, but its business has become diversified. Tokyo Steel and other companies produce steel with electric arc furnaces. In 2018, electric arc furnaces accounted for only 25% of production; Japan's shift to electric-arc production has lagged that in other developed economies.

Chart 158: Crude steel production shares in Japan (2018)



Source: Company, BofA Merrill Lynch Global Research estimates

Chart 159: Steel products export ratio by major Japan steel names in 2018



Source: Company, BofA Merrill Lynch Global Research estimates

Issues are aging facilities, declining cost competiveness

Japan's steel mills were built mainly in the 1960s and 1970s. After operating for around 50 years, serious problems have emerged with the aging of facilities and waning cost competiveness. In recent years, there have been frequent production problems stemming from such issues as the aging of facilities and an inexperienced workforce, leading to declining cost competiveness. Steel companies have been actively investing capital in such areas as upgrading facilities and leveraging IT to resolve such problems.

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Disclosures

Important Disclosures

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Investment rating	Total return expectation (within 12-month period of date of initial rating)	Ratings dispersion guidelines for coverage cluster*
Buy	≥ 10%	≤ 70%
Neutral	≥ 0%	≤ 30%
Underperform	N/A	≥ 20%

* Ratings dispersions may vary from time to time where BofA Merrill Lynch Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

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