Understanding steel scrap and the new LME ferrous contracts

From the LME Research Team

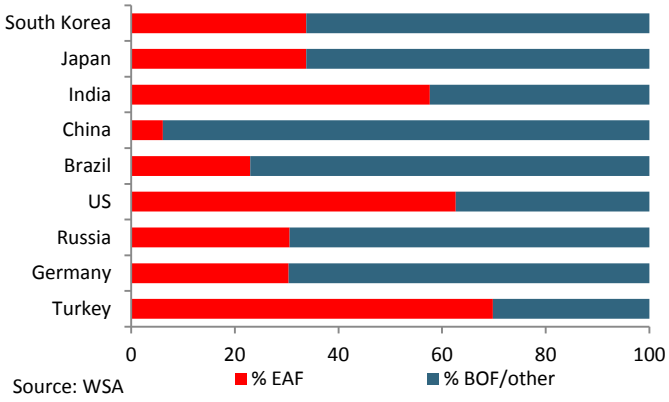
Scrap markets have historically been very volatile, often even challenging the level of fluctuation seen in major currencies. With scrap representing up to 70% of steel production costs, the steel industry has to date been vulnerable to such price moves. The LME Steel Scrap contract launches on 23 November, at a crucial time for the steel industry which is suffering squeezed margins. This new contract will allow steel producers to lock in raw material prices - currently trading at six-year lows - and gain the certainty that comes with managing price volatility. LME Steel Scrap is cash settled according to the TSI Turkish Import HMS #1&2 80:20, CFR Iskenderun Port Index price, a uniquely relevant price for scrap markets globally.

Importance of scrap in steel production

Steel is produced via two main methods: electric arc furnace (EAF) and blast oxygen furnace (BOF). In an EAF scrap steel is melted by the heat from an electric arc; while blast furnaces melt iron ore and coking coal to create pig iron, which is then combined with oxygen and limestone to make steel.

Scrap consuming EAFs are responsible for 426 million tonnes of annual steel production, or 26% of global output. In the West, EAFs are more dominant and produce 60% of US and 70% of Turkish steel[1].

Steel output by production method, 2014

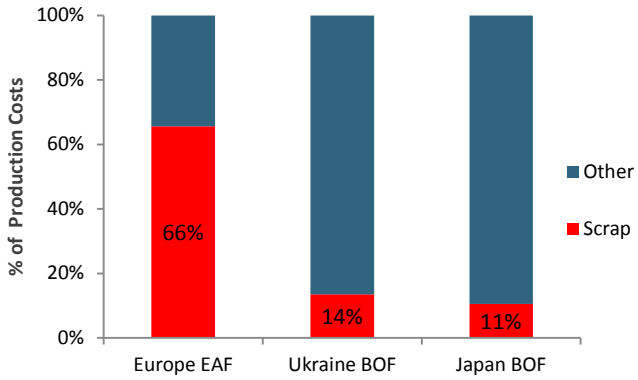


Source: WSA

In total, EAFs make up over 80%[2] of the long steel production capacity in Europe. With the launch of the LME Steel Scrap contract in tandem with the LME Steel Rebar contract, the LME will cover the whole supply chain for long steel production from initial inputs (scrap) through intermediate stages (billet) to final products (rebar).

Even in iron ore-consuming blast furnaces, scrap remains an important additive and can make up 10-20% of the total raw material mix.

Scrap as a percentage of steel production costs, 2015



As a proportion of costs, movements in scrap prices can have a major impact on a steel mill's profitability.

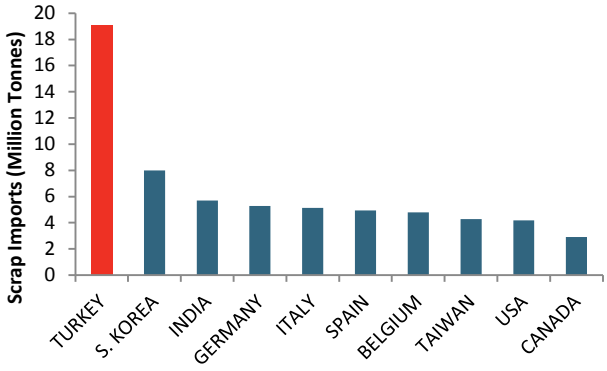
Scrap represented over 60% of the conversion costs of a typical EAF in 2015. Blast furnaces can also have more than 10% of their costs related to scrap inputs[3].

A global price for scrap markets

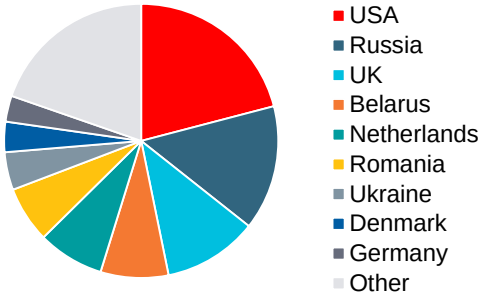
Turkey is the largest global importer of scrap, importing over 19 million tonnes in 2014, the equivalent of 19% of the global scrap trade[4], from diversified sources spread across the world. As a result, the Turkish import price is best positioned to become an effective global price.

Given the continuous level of interaction Turkish steel mills have with scrap suppliers globally, it is to be expected that the Turkish import price has a strong correlation with other major prices[4].

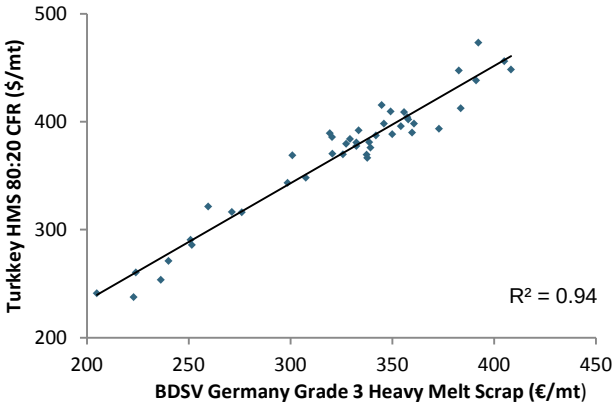
Steel scrap imports by country, 2014



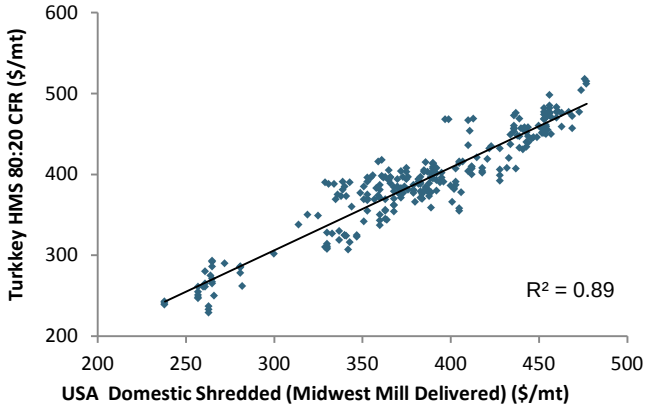
Turkey's steel scrap imports by source country, 2014



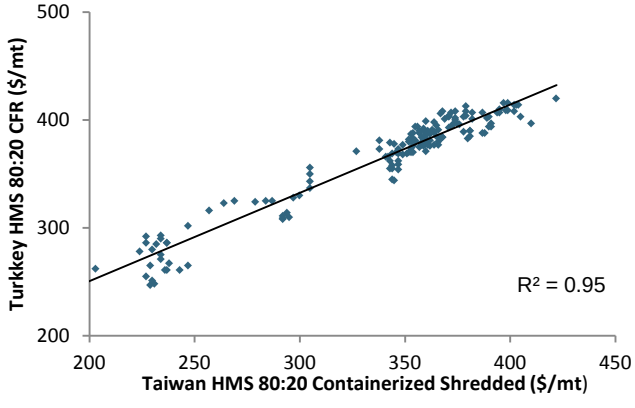
HMS 80:20, Turkey CFR v Germany domestic (Monthly, 2012 - Aug 2015)



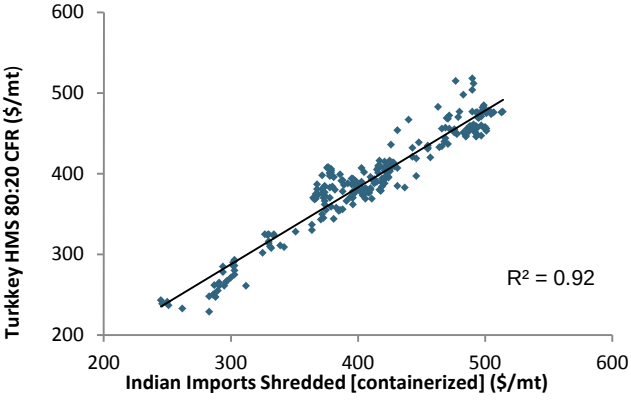
HMS 80:20, Turkey CFR v Shredded USA Domestic (Weekly, Apr 2010 - Aug 2015)



HMS 80:20, Turkey CFR v Taiwan Import (Weekly, May 2012 - Aug 2015)



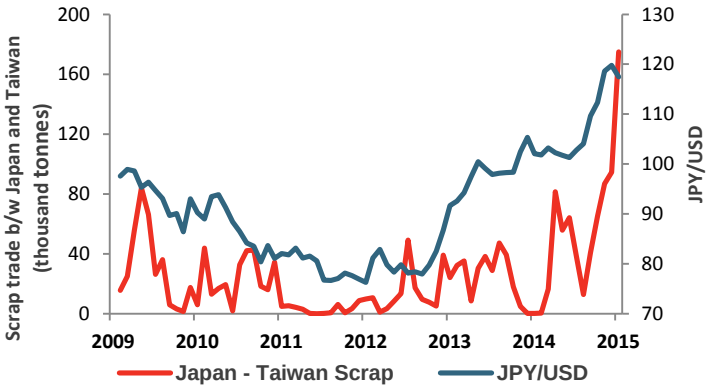
HMS 80:20, Turkey CFR v Indian Shredded Import (Weekly, Nov 2010 - Aug 2015)



Note: All prices are based on Platts/TSI with the exception of BDSV Germany

Blips in pricing as importing countries flip to cheaper exporter currencies are commonplace. This can deplete supply as consumers shun sources, and rebalances competition.

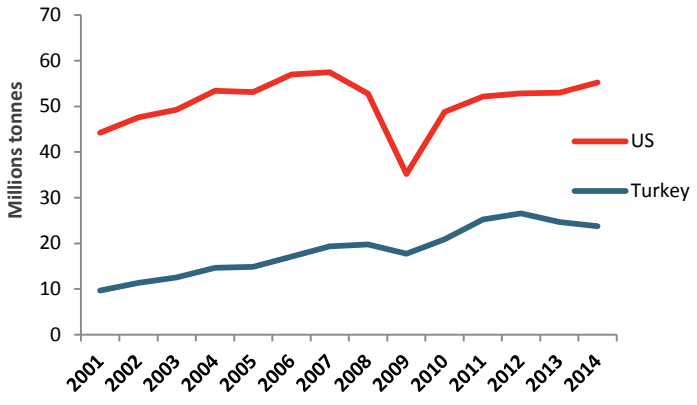
Scrap trade b/w Japan and Taiwan v JPY/USD, 2009-2015



2. Steel goes electric, demand surges

EAFs, which rely mostly on scrap, are responsible for approximately 26% of global steel production and have been growing at an average rate of 5% since 2010[6]. The dominant production method, converting iron ore by blast furnace, is more capital intensive, more polluting and less flexible to pausing and restarting. A continued shift towards EAFs has the potential to create a significant tightening of future scrap supply.

Electric arc steel production in US v Turkey, 2001-2014



The US is the largest electric arc steel producer and EAFs represent over 60% of domestic output. Accordingly.its domestic scrap consumption far outweighs its exports, even as the largest exporter globally. Other major steel producing countries still remain heavily reliant on blast furnaces and any shift to cheaper electric production will be done mill by mill. The extent to which a fragmented steel industry can react to the availability of scrap as it builds new capacity may have significant implications for supply tightness and future price volatility.

The OECD identifies over 50 million tonnes of new EAF capacity will be added outside of China in the next two years. Turkey, the world's largest importer of scrap has plans to more than double total crude steel production to 70 million tonnes by 2023[7].

3. Scrap supply is inherently inelastic

Scrap supply is, in principle, inelastic, since the ability for suppliers to react to structural changes in demand is extremely limited. Stocks can be drawn down and collection rates can be moderately increased, but these changes have limited scope. Primary scrap sources are not incentivised by prices in the same way as the sources of other commodities. Consumers are no more or less likely to scrap their cars as scrap prices move, and yet automobiles were the largest source of US scrap last year. A total of 60% of steel scrap was generated from old goods and these can have a significant time lag before they appear as scrap, by Western standards[8]:

- Automobiles – 12+ Years
- Appliances – 15+ Years
- Construction – 30+ Years

Only a small proportion of scrap, is generated from the off-cuts of producing steel goods. Known as "prompt scrap" because of its immediateness to re-circulate, it is more closely linked to the demands of the steel sector, but its

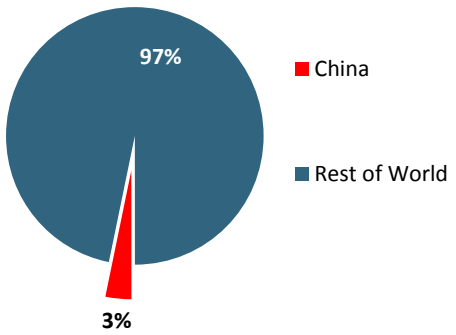
contribution is limited. According to the USGS, 23% of last year's US supply was prompt scrap, which is a global leader in steel recycling. On a global level it would take other countries a significant amount of time and effort to reach this contribution, which still falls short of a nearlythree-times--more-dominant reliance on old goods. In China, the share of consumer goods and automobiles in the scrap mix is believed to be close to 85%[9].

Countries can try to improve their scrap collection process and numerous government and private initiatives are underway to do so - it is, however, a serious feat of logistics. With mature economies seemingly closer to their peak in scrap generation, the outlook depends on the ability of developing economies to increase their contribution.

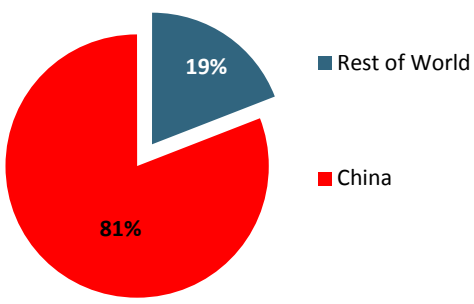
4. China – the long term wildcard?

China's relationship with scrap is unique for commodities in that it is currently a minimal importer and consumer, relative to its 823 million tonnes of annual steel production.

Global scrap imports, 2014



Global iron ore imports, 2014

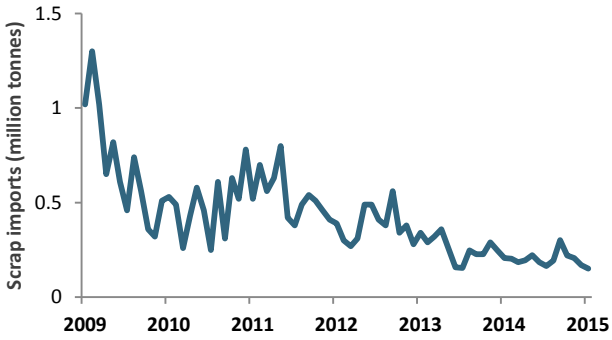


China produces around 50% of the world's steel but electric furnaces make up only 6% of its production. Meanwhile its share of scrap in blast furnaces is as low as 8% compared with a typical 15-20% in other countries[10]. A move to 15% may mean as much as 54 million tonnes of scrap consumption, that's an extra US' worth of demand!

As the Chinese government tackles pollution, the industry is being pressured to increase its scrap consumption. Every tonne of scrap used in steelmaking is expected to reduce 1.6 mt of carbon dioxide emissions and 3 mt of solid waste, compared with iron ore usage.

A key factor for scrap utilisation is the tax regime. Scrap utilisation and imports have fallen after the Chinese government removed a 70% rebate on scrap VAT in 2011 sending prices significantly higher for mills. A reinstatement of this rebate could have a significant impact on scrap consumption.

Chinese steel scrap imports, 2011-2014



The extent to which China's shift to scrap will affect global markets will ultimately depend on its ability to generate and collect its own scrap domestically. BHP estimates that by 2020 China's scrap usage in blast furnaces could be as high as 20%. China's recollection period of scrap from goods is expected to be far shorter than in the West, as waves of poorly built buildings are set to be demolished.

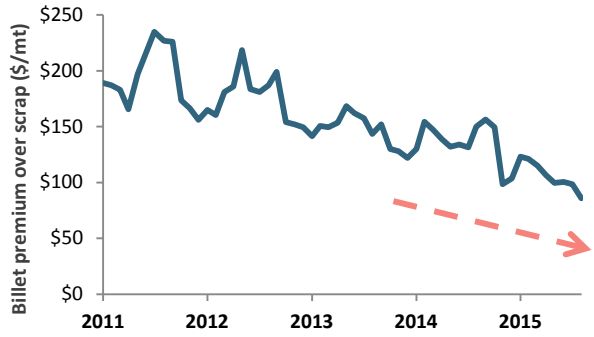
The question is whether the government's aims for scrap usage can wait that long and whether

the major logistical feat of collecting and distributing China's scrap generating potential can be achieved once furnaces accustom to a higher scrap mix. A failure to meet growing demand domestically would be a major strain on global supply.

5. Chinese billet competes with scrap

China may be currently a minimal customer and supplier of internationaly traded scrap but a recent surge in exports of low priced steel billet (the semi-processed precursor product to rebar) has had a notable effect by displacing mills purchases of scrap.

Turkey imports, billet premium over scrap, 2011-2015

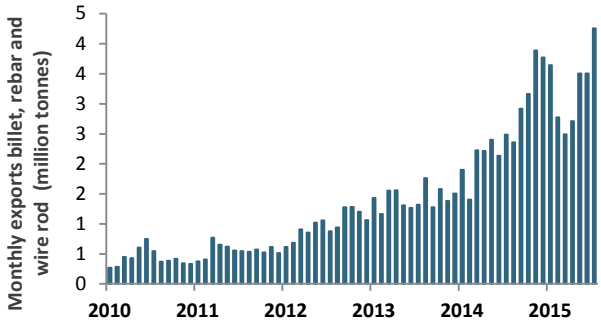


Where competively priced, mills prefer to purchase billet over scrap because of the lower conversion costs (billet is rolled directly into rebar). Likewise, Chinese steel producers are reported to prefer exporting in billet form to save on the additional conversion costs and find billet considerably easier to market to consumers.

Total Chinese rebar/rod and billet exports surged to 31 million tonnes in 2014, as exports in the second half jumped by 50%. By the first half of 2015 exports had already reached 18 million tonnes[11].

How long this record supply of cheap Chinese billet can continue is uncertain. Much of the billet on offer at prices displacing scrap is expected to be loss making. Meanwhile many countries have levied antidumping charges and duties on imports. The future of the scrap markets could hinge on the outlook for China's exports.

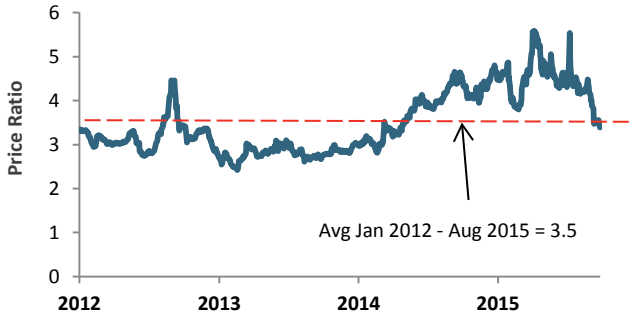
Chinese exports of billet, rebar and wire rod, 2010-2015



6. Iron ore miners take aim at low prices

In times of rising iron ore prices blast furnaces can substitute an increased amount of scrap into their raw material feed. When iron ore prices fall they do the opposite. This substitution has limits, but as a result the ratio of scrap to iron ore prices is closely watched and these prices shared a correlation rate of 75% from 2012.

Scrap v iron ore ratio, Jan 2012 – Aug 2014



The iron ore industry is by consensus one of overcapacity, as is steel. The difference however is that iron ore is far more consolidated. The "Big 4" miners produce 35% of global supply, comparatively the top ten steel producers only produce less than 27%[12].

Should correlations continue to hold true, efforts by the iron ore industry to issue a supply response to falling prices and overcapacity will

[1] World Steel in figures 2015 – World Steel Association
[2] CRU – London presentation, 22 June 2015
[3] Steelonthenet, DZI
[4] Turkish Steel Exporters Association, ISSB
[5] ISSB
[6] World Steel in figures 2015 – World Steel Association
[7] Investment Support and Promotion Agency of Turkey 2013, World Steel in figures 2015 – World Steel Association
[8] The Global Steel Industry and Raw Materials Looking Towards 2015, Alan H. Price, American Scrap Coalition Thomas A. Danjczek, Steel Manufacturers Association
[9] The Australian – http://www.theaustralian.com.au/business/mining-energy/miners-steel-against-chinas-scrap-growth/story-e6frg9df-1226729549122
[10] WSA, Customs various/ Bloomberg LP, Reuters – http://www.reuters.com/article/2015/02/06/china-steel-scrap-idUSL4N0VG46Q20150206
[11] Beijing UC Steel, Rebar and wire Rod China exports, Bloomberg ticker: CNXMABQT Index
[12] Bloomberg Intelligence "New Iron Ore Model" May 2015, World Steel in figures 2015 – World Steel Association