World Steel Dynamics (WSD) is a leading steel information service in Englewood Cliffs, N.J.

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WSD's steel experience, steel database and availability of steel statistics are the principles for performing steel forecasts, studies and analysis for international clients. WSD seeks to understand how the "pricing power" of steel companies the world over will be impacted by changes in the steel industry's structure.

The views and opinions expressed in this article are solely those of World Steel Dynamics and not necessarily those of AIST.

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China Steel Scrap: The Global Wild Card.

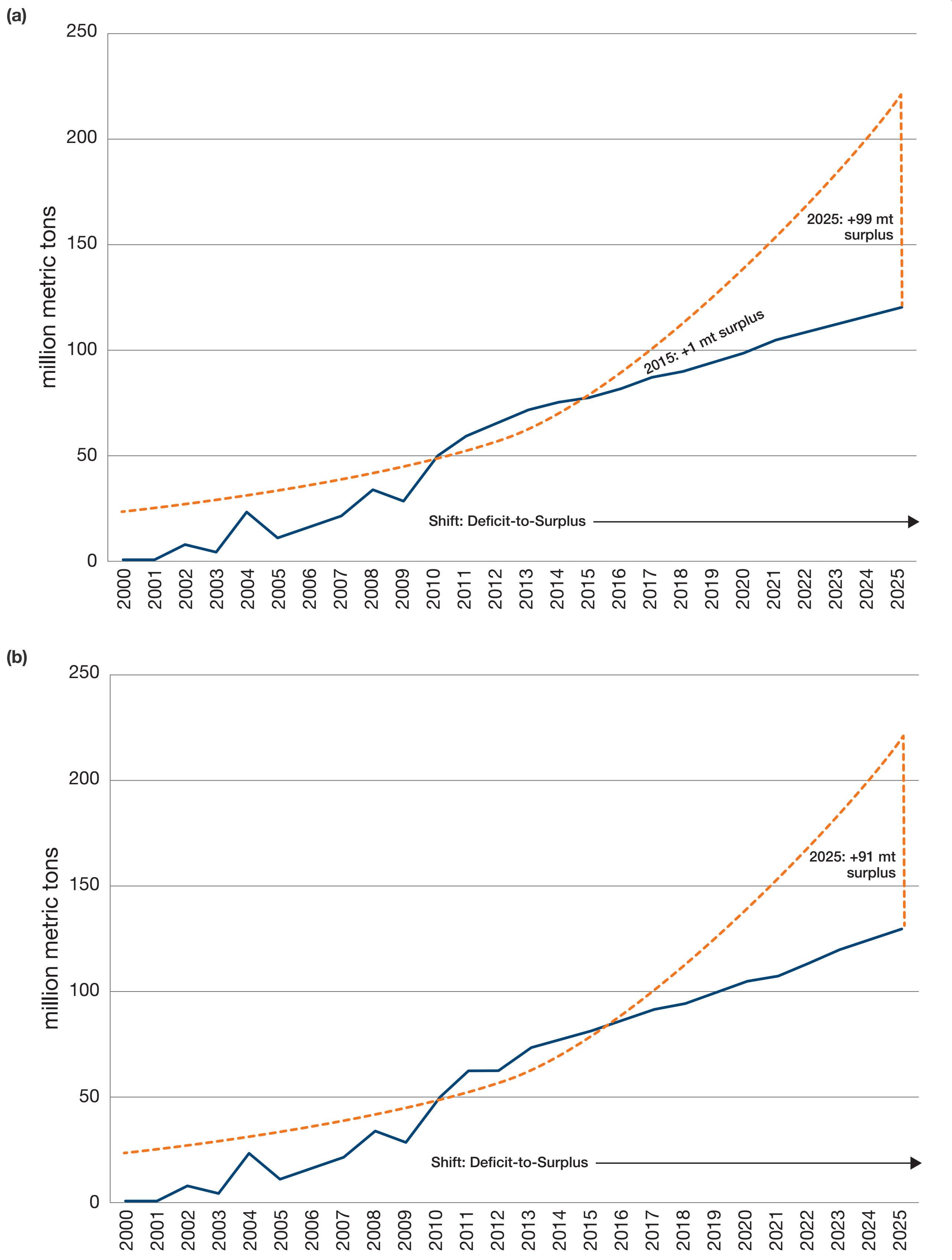
From 2000 to 2012, Chinese apparent consumption of finished steel products rose at an average annual rate of 13.6% per annum to 641 million metric tons. WSD contends that the obsolete scrap reservoir is comprised of steel consumed 10–40 years prior. Taking into account this massive growth in Chinese steel consumption from 2000 to 2012, the global metallics balance system forecasts that the Chinese obsolete scrap reservoir will expand 10.9% per annum, from 64 million metric tons in 2013 to 222 million metric tons in 2025. The extent to which this is accurate may depend on the following:

- The life cycle of Chinese infrastructure and commercial building projects that account for a great deal of the steel consumption during this period.
- The price of steel scrap relative to the raw material cost to produce pig iron. High scrap prices induce greater scrap collection.
- The price of alternate steelmaking metallics and raw materials. If the prices of spot iron ore and coking coal remain low, Chinese steel producers may have limited incentive to drastically change their steelmaking practices.

Assuming that China does, in fact, have a rapidly growing supply of steel scrap, this may lead to significant ramifications for both the Chinese steel industry and for steelmakers outside of China. Assuming no dramatic changes in the proportion of steel produced via the basic oxygen furnace (BOF) and electric arc furnace (EAF) steelmaking routes, obsolete scrap demand may be only 20 million metric tons higher in 2025 versus today, compared to an increase of 155 million metric tons in steel scrap supply.

Currently, the global metallics balance system estimates that an average Chinese BOF metallics charge consists of 86% blast furnace pig and 14% steel scrap. A surplus of obsolete scrap may result in a shift toward greater scrap consumption in the BOF. A change in the proportion of steel scrap charged in the BOF to perhaps 20% would imply 174 million metric tons of scrap required for Chinese BOF steel production in 2025 compared to 142 million metric tons, assuming a static 14% charge — an increase of 31 million metric tons of obsolete scrap consumption (Figure 1a).

Figure 1



Chinese obsolete steel scrap: supply demand balance: BOF scrap charge increased from 14% of total metallics to 20% of total metallics (a); and EAF steelmaking's share of total steel production increased from 10% to 20% (b).

Although WSD believes it is unlikely that the Chinese steel industry will shift to a greater proportion of steelmaking via the EAF route, a shift from a current split of 90% BOF and 10% EAF to perhaps an 80/20 BOF/EAF split in 2025 could dramatically increase obsolete scrap demand. Under this assumption, Chinese EAF production in 2025 would amount to 135 million metric tons and the scrap requirement for EAF steelmaking would be about 95 million metric tons, implying a 40-million-metric-ton increase in demand for obsolete steel scrap (Figure 1b).

Potential restrictions on the future exports of steel scrap from China are a major wild card for the price of steel scrap (and other key steelmakers' metallics) traded on the global market. In the absence of restrictions, a significant proportion of any surplus of Chinese scrap is likely to be exported to other regions, thereby increasing the metallics supply for the world ex-China and potentially reducing the overall price level in the metallics bathtub.

The Tyranny of Large Numbers: The Error Quotient Is Large.

Example 1 — Two large numbers are subtracted from one another, with the remainder subject to a large error. In WSD's global metallics balance system, it is calculated for 2013 that the demand for steelmakers' and foundry producers' metallics was approximately 2 billion metric tons based on aggregating the data for 44 countries. Then, pig iron production, home and new scrap generation and steel scrap substitute production are subtracted by country, which adds up to approximately 1.6 billion metric tons. The remainder is equal to the global

Table 1

China Floor Space Under Construction and Completed (billion square meters)

	Dec 2006	Dec 2007	Dec 2008	Dec 2009	Dec 2010	Dec 2011	Dec 2012	Dec 2013e	Dec 2014e
Floor space under construction *Residential building*	1,868.3	2,261.4	2,615.3	3,108.7	3,768.2	4,669.6	5,163.9	5,960.0	6,700.0
Floor space completed *Residential building*	594.1	661.3	658.1	788.8	834.3	991.4	1,069.3	1,260.0	1,496.0
Ratio of under construction/ completed *Residential building*	3.1	3.4	4.0	3.9	4.5	4.7	4.8	4.7	4.5

Source: WSD estimates.

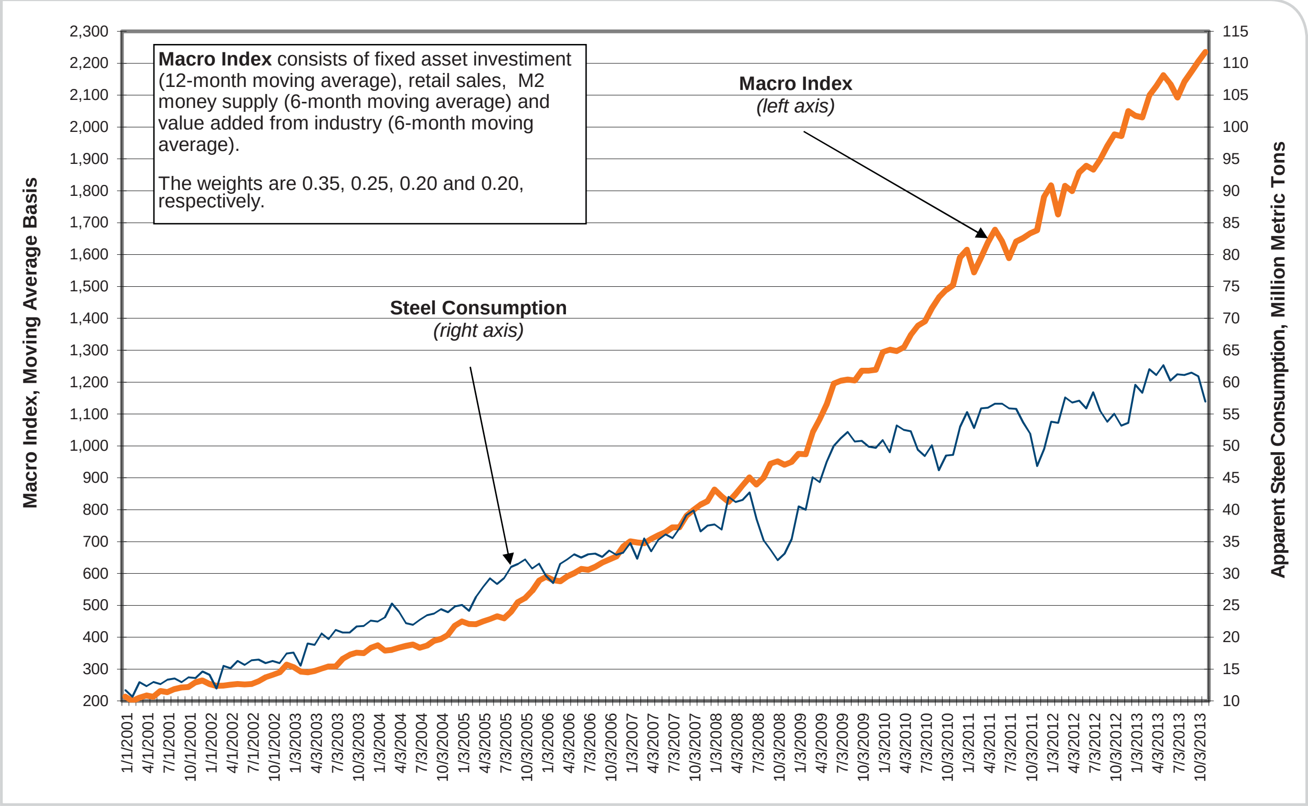
Table 2

China Apparent Rebar Consumption and GDP (million metric tons, billion US$)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013E
Production*	47.12	71.23	83.04	101.07	97.09	121.50	130.96	152.56	175.38	200.00
y-to-y %		*51.2*	*16.6*	*21.7*	*-3.9*	*25.1*	*7.8*	*16.5*	*15.0*	*14.0*
Import	0.19	0.09	0.06	0.05	0.03	0.06	0.05	0.05	0.07	0.05
Export	1.17	1.74	3.74	5.90	1.17	0.31	0.22	0.22	0.26	0.60
Apparent consumption	46.14	69.58	79.36	95.22	95.95	121.25	130.79	152.39	175.19	199.45
y-to-y %		*50.8*	*14.1*	*20.0*	*0.8*	*26.4*	*7.9*	*16.5*	*15.0*	*13.8*
GDP *(US$ billion)*	1,944.0	2,291.0	2,798.0	3,517.0	4,566.0	5,107.0	5,985.0	7,277.0	8,237.0	9,219.0
GFCF** *(US$ billion)*	835.0	952.0	1,168.0	1,464.0	1,999.0	2,408.0	2,877.0	3,516.0	4,095.0	4,661.0
% of GDP	43.0	41.6	41.7	41.6	43.8	47.2	48.1	48.3	49.7	50.6
Rebar/GFCF *(million metric tons/US$ billion)*	0.055	0.073	0.068	0.065	0.048	0.050	0.045	0.043	0.043	0.043

Note: *Including double counting. **GFCF = Gross Fixed Capital Formation. Source: WSD estimates.

Figure 2



WSD China macro-economic steel index (moving average basis) vs. apparent steel consumption. Source: WSD estimates.

requirement for obsolete steel scrap, which is approximately 350 million metric tons.

Example 2 — The after-the-fact revisions of the Chinese annual steel and iron ore production figures. In February 2013, there was a major upward revision in the steel production data for 2012, causing WSD to adopt a new figure of 731 million metric tons versus the December 2012 estimate of 679 million metric tons. In the case of iron ore, in the summer of 2012, the China Iron and Steel Association revised China's gross iron ore production for 2011 down by 14% to 1,144 from 1,327 million metric tons, with the figures for 2012 and the following years based on the revised 2011 figure.

Example 3 — A number becomes so large that a 10% increase or decrease is a huge amount. Chinese residential construction in 2013 was estimated at 5,960 billion square meters (Table 1). Hence, a 10% increase would be an astounding 596 million square meters of floor space (which is estimated for 2014). On a related basis, rebar production in 2013 was about 200 million metric tons (Table 2); thus, a 10% rise in 2014 would be 20 million metric tons (which is more than three times the rebar production in the United States in 2013).

Example 4 — The Chinese macro-economic data figures in many cases are not accurate. They are impacted by reporting inconsistencies and seasonal adjustments (Figure 2). ✦