



Long Range Demand Projections in the Resources Industry

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1. Introduction

With iron ore and coking coal prices only recently recovering after falls of some 40% from their 2012 peaks, the sense of anxiety over the future path of carbon steel material and other bulk commodity demand is undeniable.

Of immediate concern is whether Chinese demand has peaked earlier than expected as officials seek to replace steel-intensive capital investment with consumption as the principal source of growth. Furthermore, with the US and EU economies still struggling, the prospect of an export-led recovery appears dim for not only China, but also Japan and South Korea, collectively amongst the largest steel producing nations. Re-evaluating long-term investment decisions in light of recent price volatility requires an understanding of likely pathways of future commodity demand.

Indeed, whilst forecasts of commodity demand in the short to medium term are constantly monitored and updated, long range demand projections (i.e. those that extend 20, 30, even 50 years ahead) are considerably more difficult to generate.

This paper discusses some of the considerations in modelling long range carbon steel material demand and outlines an approach to forecasting that enables more informed decisions to be made when confronted with the following questions:

- Is the China-led boom over or is the economic growth path multi-modal where this is simply the end of the first capital-intensive phase?
- If China becomes a diminishing source of demand growth which other country, region, or cluster of countries could be expected to pick up the slack?
- Can the mature economies of Europe and East Asia be relied on for continued marginal increases in steel demand?
- Will US steel demand accelerate given the need for large-scale infrastructure replacement and repair?
- What development paths will countries that are on the cusp of transforming from an agriculture-based economy towards a commodity-intensive base take?
- To what extent will BF/BOF steelmaking be displaced by the EAF route in China as stocks of obsolete scrap continue to build into the future, potentially reversing current iron ore/scrap pricing relativities?

2. Why The Long-Run Is Important

Over the long run the market for carbon steel materials, including iron ore and metallurgical coal, can be derived from end-user demand for applications including construction and industrial usage. As efficient as technical and procedural processes have become, the lead time to conceptualise, plan, produce and distribute products to destination markets is still considerable. Given the long payback periods typically required for greenfield developments, a thorough analysis of long run demand is therefore essential for successful project evaluation.

A failure to consider the state of commodity demand in the long run could mean:

- Delaying growth projects and/ or missed acquisition opportunities leading to sub-optimal market positioning
- Incurring unnecessarily high capital costs by expanding during 'boom' periods when input scarcity drives costs higher

- Staying in a structurally unattractive market for too long or not diversifying quick enough
- Failure to pick up emerging trends in the industry
- Any business strategy work, however well-intentioned, lacks an accompanying analytical counterpart

3. Characteristics Of Bulk Commodity Demand

Carbon steel material demand is driven by different factors over different time horizons. For example, iron ore demand over a fortnight is determined more by the flow of inventory at iron/steel traders in Shanghai, stockpiles at the port of Tianjin, and the number of cargoes awaiting bidders at Bohai Bay rather than on the fundamentals of the Asian economy and any stimulus investment on infrastructure.

When looking beyond days and weeks and into quarters and seasons, more fundamental factors such as stimulus spending and planned construction activity, are more relevant for explaining iron ore and metallurgical coal demand. Extending the horizon and transcending decades, factors such as the rate of urbanisation, the composition of the economy, technology and potential GDP play crucial roles.

In the years ahead, significant amounts of new iron ore and metallurgical coal capacity is expected to be brought online globally. Whether these tonnages can be absorbed by prospering provinces in China, or new demand in South East Asia, remains an important but hitherto unanswered question.

Since different horizons call for different forecasting methods, the resource industry has largely had to rely on 'piecewise' means of putting together future demand forecasts. Brokers and industry analysts provide guidance on the short term, economists and research institutes have provided forecasts over the medium to long term, leaving the very long term to the realm of qualitative predictions and sometimes judgement calls.

4. VCI's Approach To Long Range Demand Projections

Putting together the ideas discussed above it should be acknowledged that there is not a one-size-fits-all or 'integrated' approach to forecasting bulk commodity demand for short through long time horizons.

In the short term, demand is perhaps best modelled through an analysis which combines sentiment, inventory management, economic news, and 'on-the-ground intelligence'. In the medium term, a study of the primary commodity-consuming sectors, such as construction, machinery, automobile, and bulk carriers, is typically instructive if appropriately calibrated against both short and long term forecasts.

In the long term, which the principal focus of this paper, the evolution of steel demand can best be illustrated in Figure 1, which shows the typical path of per capita consumption over time:

- Phase I Initial position
- Phase II Take-Off/Convergence (to Saturation)
- Phase III Saturation/Peak
- Phase IV Transition to service-based economy¹

¹ A structural change leading to consumption of physical commodity units rising at a slower rate than population, leading to a decrease in per capita consumption.

Such a consumption profile is consistent with the intensity of use hypothesis, which postulates that commodity demand, as a ratio of a country's measure of national income, can be correlated with per capita income.

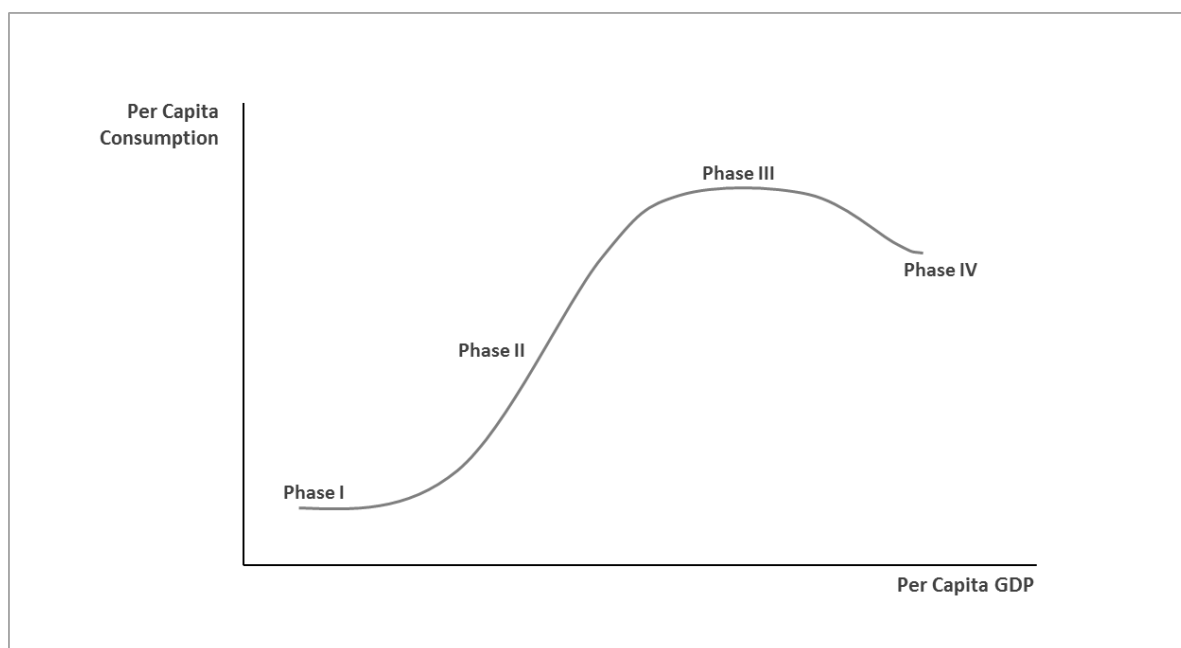


Figure 1: Development phases in commodity demand (illustrative)

With respect to steel demand, India is currently at Phase I of the curve, China is at Phase II, South Korea is at Phase III, and other mature economies such as the US and countries in the European Union are at Phase IV.

In terms of generating long range forecasts for these and other countries, the selection of an appropriate econometric functional form is not trivial. Phases I and II in isolation suggest an exponential function. Phases II to III in isolation suggest a logarithmic function. Phases I through III suggest the use of a Sigmoid, or S-shaped, function. Finally, phases I to IV together require a Sigmoid function which is augmented with a long run component to capture the transition away from a commodity-intensive to a services-intensive economy.

VCI uses a model (augmented Sigmoid function) that can capture the four phases, first in fitting historical data, and thereafter to use the fitted model to forecast per capita consumption. To capture the element of convergence, where developing countries to an extent follow similar paths as developed countries before them, the model is estimated using annual pooled time-series cross-sectional data comprising of developing and developed countries.

The model's explanatory variables include a range of economic, social and demographic drivers of carbon steel material. To generate the forecasts these variables are extrapolated forward using sources such as the United Nations, IHS Global Insight, the World Bank/IMF, and sensitivity analyses can be performed to fine tune the model using scenarios, as discussed below.

In econometrics, point forecasts are useful to the extent that they reflect the predictions of the model conditional upon the information set, which comprises previous and current data, and the underlying theoretical construct. In practice, when pushing the lens out to the time frame we are discussing, there is

an inevitable and insoluble uncertainty, thereby limiting the utility of point forecasts. In this regard, two issues are worth discussing.

First, a thorough set of scenario analyses should be applied to the econometric forecasts. The scenarios encompass the key drivers of uncertainty, both in terms of the explanatory variables of the model, as well as the 'state of the world'. Table 1 depicts a number of potential pathways/ drivers that might be incorporated into the long range demand projections model.

Table 1: Potential pathways/ drivers of long range demand growth

Pathway/ Driver	Description	Variables/Parameters to Tune	Potential Net Effect
Two Simultaneous Growth Pillars	Economic recovery in Europe beginning the next decade coinciding with a cluster of countries in South East Asia breaking out of Phase I and into Phase II (see Figure 1), catching analysts who have solely been fixated on China and India slightly off guard	GDP, Fixed Asset Investment (FAI), Applying parameters estimated from a panel of countries which experienced a rapid Phase II progression to the cluster of countries, Modelling the second wave in Europe	Resource companies jostle for position in African mining projects, as capacity is stretched in existing Brazilian and Australian operations
China Growth	China, after taking over the US in terms of GDP, consolidates its position by focusing its 5-year plan on developing its central and western provinces to new heights	FAI, GDP, IP, Modelling commodity-intensive sectors in China's provinces, where coastal and inland provinces have different drivers	Demand for commodities in China experiences a second accelerating wave
India Growth	India overcomes its political barriers and, on the back of its sustained GDP growth and large population base, accelerates its commodity-intensive sectors of consumption, private and government investments	GDP, FAI, Population, Export/Import share of GDP	Demand by India reaches a point where domestic supply needs to be supplemented by significant imports, coastal areas experience growth and port/rail/road infrastructure development projects are boosted
Technological Innovation	Technology breakthroughs fundamentally alter the economics of steel production and transform raw material input requirements	In steelmaking metallic model the split between pig iron, DRI and scrap inputs are allowed to deviate from their long time norms	Demand for iron ore and metallurgical coal may grow at a progressively slower rate, at the same time presenting exploitable opportunities

Second, when confronted with a cluster of long range projections it is human nature to gravitate towards those that confirm pre-existing beliefs about the future, the so-called confirmation bias. This and other cognitive biases including herd mentality can also work in a way to generate a convergence of the projections themselves in the first place. Having and applying appropriate techniques to overcome these systematic biases can be a powerful tool in forecasting and decision-making.

Therefore, the illustrative phases above do not necessary suggest that, for example, China will follow a smooth path towards Phase III and beyond. In fact, multiple demand trajectories are possible, with robust long range demand modelling required to identify the pathways and assess likelihood of occurrence.

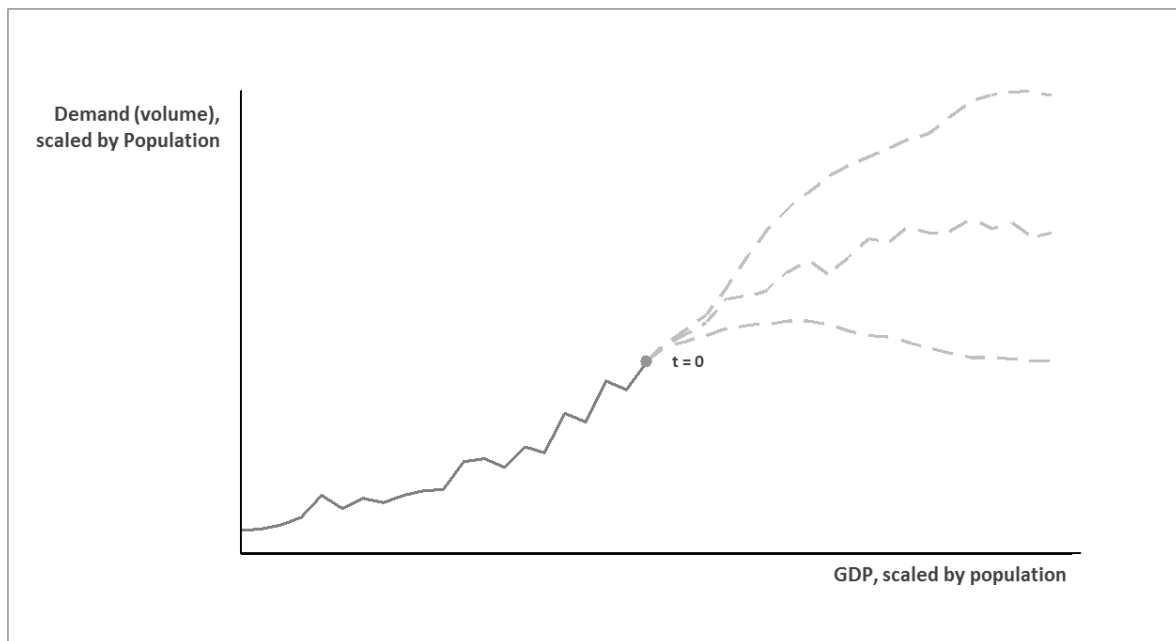


Figure 2: Alternative pathways for Long Range Demand Projections

5. Conclusion

“If you can look into the seeds of time, and say which grain will grow and which will not, speak then to me ...” – William Shakespeare

The ability to look into the future and use the information to help identify which projects are viable and which streams of work are not is among the core decisions of an operations’ business model.

Far from ‘crystal ball gazing’, modern econometric techniques coupled with state of the art scenario processes are grounded in economic theory, statistically sound and allow the researcher to test a-priori beliefs about the state of the world they are projecting.

These techniques can be capitalised to arrive at a series of projections for long range commodity demand, which would form a good duality with existing business strategy.

6. To Learn More

To learn more about how improved long range projections could transform your organisation, please contact any one of the following VCI Global Partners:

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