Pricing of South African thermal coal exports

by M. Steyn* and R.C.A. Minnitt†

Synopsis

Until 2000, pricing involved profit taking and cost covering combined with limited global published information. Market information was mostly subjective in nature and large resource companies benefited exclusively from aggregated company information and data. The market constituted producers and consumers only. The nineties saw massive cost cutting drives and re-engineering initiatives and this underwrote the structural changes evident in the late 1990s' economy. This supported South African producers on the international FOB cash cost curve, and ensured profitable coal mining operations. As the debate on relative scarcity of fossil fuels ensued, producers and buyers looked to the developing terminal coal market for direction. The much needed direction was provided when the API coal indices were developed and derivative trading was embraced to include financial institutions, trading houses and hedge funds. The liquidity of coal trades increased rapidly and vastly and market information became obtainable on a daily basis. Interpretation of current and future coal prices became available to all market players and contributed to the sophistication of the market that is now able to participate in risk management of prices, capital expenditure and brownfield developments.

Keywords

Thermal coal markets, supply-demand balance, aggregate supply, price strategy, transparency, volatility, market share, stockpiles, risk management, derivative trading, marketing indices.

Introduction

Coal, either directly or indirectly, is an essential part of everyday life, the energy infrastructure, and therefore the national economy. Recent rises in coal prices have created continuing economic, social, and political instability and uncertainty, and presents a challenge to the international community. It is an international priority in the short, medium and long-term, to ensure stable, secure, and sustainable global commodity markets at a national, regional and international level. For each commodity this requires insights into the quality, size, location, and nature of the mineral reserves and the products to be delivered to the markets. In addition, issues such as supply and demand, and more specifically understanding the fragility or robustness of the supply-demand balance, are essential. Other aspects, generally considered less important, but nevertheless crucial to the marketing plan include the transport of the product from the mine site to the discharge port, the suitability and long-term quality of transport infrastructure, ensuring long-term durability of the relationships with customers, the detail of marketing contracts, the way in which invoicing is undertaken and the overall structure of the marketing plan.

Although pricing mechanisms for coal have evolved significantly over the past decade they are still principally a function of the basic economic parameters of supply and demand. In South Africa coal comprises only 5 per cent of the global resource base, but is the third main contributor to the country's export earnings after platinum and gold (SAMI 2007). Planning, establishing, and executing optimal pricing structures in the context of the global coal markets requires that the global macro–economic environment and the domestic micro-economic environment are understood in detail. A significant development took place in 2000 with the establishment of GlobalCoal, a pricing and over-the-counter platform for globally traded coal. From this platform indices for free-on-board (FOB) Richards Bay Coal Terminal (RBCT), FOB Newcastle, and customer insurance freight (CIF) Europe prices, were established; these are referred to as API #4, API Newcastle, and API #2, respectively. This was the start of the coal terminal market (an exchange on which futures contracts or spot deals are traded) that brought transparency to the industry for the first time, and risk management through derivative trading

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instruments were introduced. Standardization of product specifications was effected, namely, RB1 and RB 2 specification for thermal coal.

The introduction of API pricing and product standardization has provided an across the board standardization of coal markets, with pricing being effected through current market movements, and their influence on future pricing. Producers are now in a position to take a view of future pricing, and manage the perceived and associated risks. Informed views on pricing and the availability of instruments to mitigate risk allow producers and consumers to plan pricing and costing into the future, and has changed the nature of capital investment in brownfield projects.

Sales of the end product at optimal prices is perhaps the most important aspect of the mining value chain and nowadays marketing professionals require an array of skills that include aspects of mining, metallurgical, financial and derivative trading competencies. These skills requirements for trading coal have developed over the years due to the complexities of market supply and demand for bulk traded commodities in the 21st century.

Pricing theory

Business marketing and pricing of industrial products looks beyond economic theories and must take account of company costs, customer perception of value, and competitor prices for similar goods. Beyond these, most marketers must tailor their pricing decisions to optimize profit, keeping the company's overall pricing policy objectives, either return on investment or return on sales, in mind. It may also be stated in terms of expected gross margin or profit contribution after marketing expense (Hayes *et al.*, 1996). Although costs are a significant determinant of profit, few firms rely solely on a cost-based approach to pricing because of the important distinctions between cost types, and the way in which individual companies may define them. Fixed costs are generally independent of volumes produced, and include such items as physical plant and equipment, long-term leases, or interest on long-term debt (Figure 1). Without covering these costs the operation may run on a care-and-maintenance basis, but makes no profit. Semi-fixed costs do not vary as a function of volume produced, but can be varied in the short-term and include such items as salaries, general administrative expenses, R&D expenses, or advertising commitments. Variable costs are directly linked to the number of units produced, and include such items as raw materials, direct manufacturing labour, freight, and commissions (Figure 1). The term total cost takes on meaning only for specific volumes of coal sold. These definitions are of particular importance to the coal industry where cash costs are an important lever that enables a company to establish sustainability in a volatile market.

The floor pricing decision is among the most important aspects of coal marketing. A number of key aspects of costs that need to be taken into account for pricing decisions (Nagle and Holden, 1995:39; Figure 1). Both the recovery of investments in fixed costs, and levels of production beyond simply breaking even, are important to mineral producers, so price must cover variable costs, and realize a total contribution (revenue minus variable costs) that covers all fixed costs, as well as returning some predetermined level of contribution to profit, R&D, or investment in other opportunities. Since no company would normally price their product below variable costs, this cost becomes the company's floor for the pricing decision.

A key concept is the per unit contribution or the difference between unit revenue and per unit variable cost. A break-even production volume, where revenue equals total cost (Q1), is calculated by dividing fixed costs per unit contribution. In Figure 1, the desired profit contribution is constant. Here the required volume is where revenues equal total cost plus desired contribution (Q2). Whereas most companies avoid pricing at a level that falls below what is considered total costs, there may be occasions when such a price will make a positive contribution toward fixed costs, even though they are not fully recovered.

The relation of fixed to variable costs is a critical aspect of pricing in general and coal pricing in particular. The high fixed-cost nature of the coal mining industry demands that higher profit margins are required in order to cover fixed costs. In periods of weaker markets, when production capacity substantially exceeds industry demand, the pressure to secure orders frequently leads to 'price wars' that further weaken prices to levels that do not fall below fixed costs and provide at least some contribution.

Factors affecting price

A number of factors, including the requirements of IFRS system, the sophistication of customers, the nature of competition, attempts to increase market share, the elasticity of demand, and the involvement of agents and distributors, as well as other factors influence coal pricing. The IFRS accounting policies and practices within the coal mining industry such as depreciation, inventory valuation, fixed asset valuation, and impairment also affect costs and ultimately prices of the commodity. For example, when fixed costs include a depreciation component, accelerated depreciation schedules show higher costs.

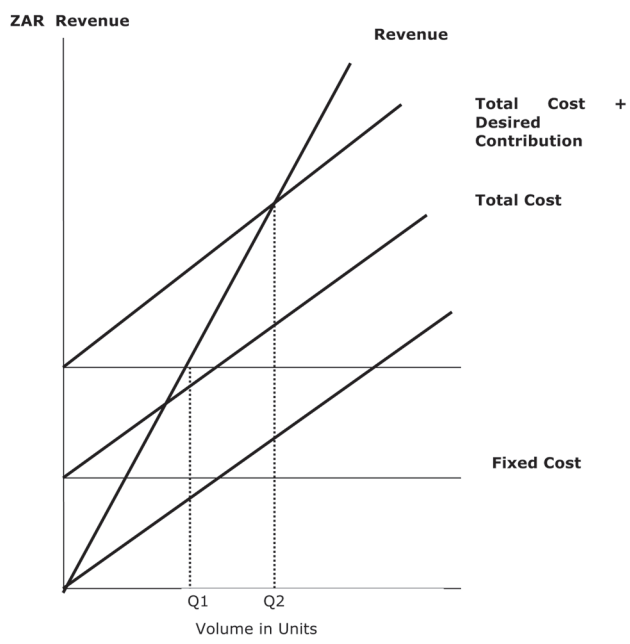

Figure 1—Costs in relation to revenue and volumes of production (Source: Nagle and Holden 1995:50)

Perhaps the most salient aspect of pricing is that customers are not passive entities in the commodity exchange process. These professionals carefully analyse a coal supplier's product in terms of intrinsic value and relative to competitive supplies. For bulk commodities such as coal, given that a terminal market exists, market price is transparent, and pricing is usually fixed, depending on the producer's strategy and its recovery within the price.

The international market for coal is highly competitive and any pricing decision by producers must also account for the presence and influence of competitors. For mature products and bulk commodities such as coal, the company's flexibility in pricing may be influenced by the extent to which customers perceive differences between competitive suppliers and the specifications of their product. Orders may be secured in cases where customers specifications are particularly stringent in the limits of deleterious elements such as potassium or phosphorus. The coal industry in particular is characterized by the presence of price leaders, that is producers which, by virtue of size, reputation, or past practice play a dominant role in determining the overall level of prices in the industry. In some instances, price leaders may initiate changes in price that set a trend that is widely followed by others in the industry. More frequently, and in particular price reductions, the initiative to change prices is taken by smaller companies, but it is the action by the price leader that legitimizes the new price level. Customers are fully aware of the practices and in some cases will identify a producer who is aiming to expand output and capture more market share. In such cases large customers will approach the producer and offer to take all the newly added supply, provided it comes at a premium prices which then becomes an industry benchmark. Once this new reduced price is announced smaller producers may be forced to follow suit.

In times of increased demand for coal the opportunity may exist for producers to increase industry prices, but some companies may elect to forgo price increases in an attempt to increase share. Similarly, in times of increasing costs the pressure on producers to pass the additional cost to customers may be foregone in favour of increasing market share through lower prices (Hayes *et al.* 1996). The volatility experienced in the coal market since mid-2008 has provided just such opportunities, especially since increases in market share became an important objective to producers.

The pricing of coal products may also be a function of the relatively inelastic downstream or secondary demand for the customer's product or service; in the case of Japan this would be steel, and in the case of Europe this would be power generation (electricity). In the case of steel and electricity, primary demand for coal is fundamentally determined by the secondary demand that the customer faces, and total or industry demand for the products and services may be so inelastic in the long run that it is not influenced by price. The problem is the difficulty of precisely estimating industry price elasticity of demand in the long run. The recent slump (2008) in the coal price is evidence that the price is not that inelastic; demand for coal is strongly linked to economic activity and it does affect prices. Nagle and Holden (1995:53) maintain that assumptions can be made as to whether demand is in the elastic zone, in which case an industry price increase will result in revenue decrease, or in an inelastic zone, in which case an industry price increase will lead to a revenue increase. These assumptions play a major role in determining price levels in an industry and can significantly affect responses to competitors' price moves.

Coal producers selling their product(s) directly to their customers have complete control over the price. Where distributors or other intermediaries are involved, the price at which goods are offered, should take theses costs into account in the price determination process. Vertical price fixing between producers and distributors, is illegal.

Coal demand

A variety of macro-economic, environmental, and seasonal factors influence the demand and supply of coal, and generally provide an indication of the direction of the market in the short-term, which could include forward prices. The major determinants of demand for coal are linked principally to demand for energy, the intensity of coal use per capita income, and at a national level the state of economic and industrial development. Tilton (1985) has suggested that income, own price, price of substitutes and complements, technological change, consumer preferences, and government activity (policy), are the principal determinants of demand for any commodity.

The dangers of using price as a proxy for the levels of demand have been pointed out on numerous occasions, but the overall price trends for coal in a range of different uses, shown in Figure 2, have undeniably increased over the last decade. However one treats the caveats, there is little doubt that despite messages to the contrary, the demand for coal is increasing.

In terms of the theory underlying the demand curve, a moderately downward sloping curve from left to right, Tilton (1985), has highlighted several points. Movements to the left or right on the demand curve are directly linked to changes in price, up or down along the demand curve, and generally reflect a change in the commodity's own price. Theoretically these movements are considered to be continuous and reversible, and they are if price changes are small and short-term; in reality significant price increases move consumers to find substitutes or other technologies to meet the demand. The total demand curve may indicate the quantity consumers are willing to buy at a given price, but quite different curves

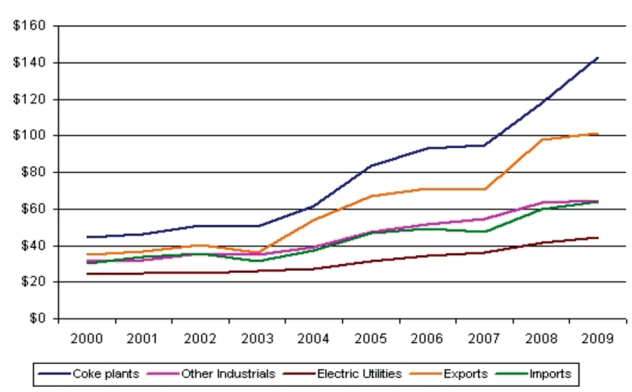

Figure 2—Delivered US coal prices, 2009–2009 (Nominal dollars per short ton) Source: http://www.eia.doe.gov/cneaf/coal/page/special/fig7.html

may exist for different markets, e.g. national of international. Demand curves do not give any indication of production, consumption, or stock changes, even though the position on a demand curve may be influenced by the levels of production, particularly in monopoly markets. Demand curves may be constructed for the immediate, short run, long run and very long run, but they do not reflect the changes in demand due to changes in price over time.

In practice GDP growth projections per nation or major economic activity per region also predict increases in demand for electricity and energy and vice versa. Global economic sentiment and the projected impact on BRIC GDP growth and other economies, particularly high growth in developing economies, indicate increasing coal consumption. The Brent Crude price has become an indicator of the direction in which coal prices will move, as it lags Brent Crude by 3–5 days; this is mainly due to the fact that both commodities are energy fossil fuels.

On the other hand, at a more local level, signals for the start of depressed demand and a weakening price are provided by long vessel queues and high stockpiles in discharge ports. Such indicators have been proved to be for the short-term only as market volatility generally clears stockpiles within a relatively short time. Higher ocean freight rates and the Bulk Commodity Index are leading indicators of increased demand for bulk commodities. In many countries, (apart from South Africa), demand could force coal prices upwards if dry summer conditions result in reduced barging capacity along the major rivers which are used for inland coal transport.

Traders taking long positions (stockpile) on a particular coal type may further exacerbate an already downturned price trend if they are forced to sell their abnormal stock holdings into a market with a falling price index. The unwinding of thermal coal paper positions by financial institutions and banks is probably a signal that demand is weak and could precipitate a decline in prices.

The depreciation and/or appreciation of coal producing countries' (Australia, South Africa, Indonesia) currencies against the US dollar and changes in exchange rates will also affect demand. Currency depreciation usually has a lowering effect on US dollar coal prices, whereas appreciation of these currencies usually sees coal prices increase. The cycle of volatility has a cycle of between 5 and 10 days on average.

The effect of permissioning and construction of nuclear power plants or other technologies (wind power) as an alternative energy source may affect prices negatively in the short run, whereas the effect of carbon trading, and clean coal requirements reduce the demand for coal, but increase the price of tradeable coal over that of reigning market prices. Sentiment, above fundamentals, often drives the market, but only for a short period.

Coal supply

As with commodity demand, there are similar determinants of supply that underlie the delivery of individual products to the market. Tilton (1985) identified own price, input costs, technological changes, government activity (or legislation), and market structure as the principal determinants of supply. The relationship between supply and price is portrayed as a positive, left-to-right upward sloping supply curve that shows how much the producers will offer to the market place at a given price if all the other determinants of supply are constant. The basic premise is that the higher the price the more producers will deliver to the market, and this should not be confused with rates of consumption or production. General economic theory states that the point where the demand curve and the supply curves intersect is the strike price, or the price at which supply is perfectly matched by demand and the market clears. Another important attribute of the supply curve is that it is effectively the marginal cost curve, and the ordering of producers according to costs will produce a curve that mimics the supply curve. For coal in particular, the nature of long-term contractual arrangements means that the supply curve is flat, and that producers will deliver all their coal at a fixed price irrespective of movements in the market, until the contract is renegotiated. The stability and level of aggregate coal supply at a national level depends significantly on the availability of resources and reserves, the state of readiness for mining extraction, and the stage of project development for indicated and planned production. Planned supply is usually driven by demand already expressed and for coal mines is usually in the order of 20 to 40 years or more.

Economic activity in terms of energy (electricity) generation can imply introduction of policies to restrict coal exports from producing nations. State intervention through policies that restrict thermal coal exports tend to immediately reduce supply on a global scale (Steyn, 2010). Competitor producing nations, such as China, immediately planned to supply into the shortfall. In terms of the global supply of thermal coal, China's influence remains critical as she moved from being a net importer in March 2008, to being a net exporter of thermal coal by the end of the same year. Infrastructure bottlenecks within China have also raised concerns about their ability to fully satisfy their domestic demand (Steyn, 2010).

The lack of funding for mineral development, mining, infrastructure, exploration, new power projects, and for coal projects in particular is evident in current market conditions which are viewed as a global financial crisis. Producing nations and South Africa in particular, continue to be constrained by rail and port capacity forcing prices up. The widely publicised undercapacity of South Africa's rail infrastructure, as well as the queue of 40 vessels waiting to load at Australian ports, is decreasing supply on an annual basis (Steyn, 2010).

The major financial meltdown of 1998 precipitated by Indonesia and Asia occurred just as a large number of independent power plants were about to be constructed. Most of these were never built and the thermal coal price declined and remained depressed until 2004. Although significant market and financial recovery occurred in 2004, the impact of stop-start decisions on prospective power stations and steel mills that have already been factored into the supply-demand balance, can be significant. By the same token, the same could be said to apply to supply-side expansions, especially those that rely on a promoters' ability to borrow money.

Risk management and derivative trading

The risk that producers face of declining commodity prices is a function of the balance between demand and supply. Weakened demand or oversupply could both lead to depressed prices, whereas constraints on supply or newly

developed applications for the commodity could initiate significant upward price trends. Crowson and Sampson (2000), define commodity price risk in terms of supply and demand fundamentals that include the level and structure of economic activity, technological advancements, and prevailing commodity prices. At a global and national level increased prosperity and confidence about future economic growth and increased consumption, induces consumers to buy more goods and industrialists to invest in new plant and buildings. The opposite is true for periods of recession when fabricators rapidly run down their inventories and buy raw materials on a strictly hand-to-mouth basis. Consumers spend less and capital spending programmes are postponed or curtailed. These were the hallmarks of the coal industry as they were in other mineral developments during the period from late 2008 and throughout 2009. As the coal industry began its recovery from the worldwide recession in late 2009, prices began to improve, but a note of caution and impending déjà vu overhangs the recovering industry.

There is no reason to expect that the various dterminants of supply and demand will move in offsetting ways during times of crisis. Natural disasters could reduce the supply at any time, regardless of the state of demand, and a major strike is probably more likely to be staged when the product is in great demand. Since the supply of commodities is relatively inflexible in the short-term, changes in demand linked to cyclical fluctuations in business activity are directly reflected in changes in the level of inventories and in prices. Cyclical variations in prices are seldom predictable with any degree of accuracy (Steyn, 2010).

One of the principal means producers use for protecting themselves against adverse changes in price is to construct a paper hedge around the commodity price. In some cases the actual delivery of the product takes place, but in most instances the position is unwound before the due date of the contract. A hedged price therefore is a price that a producer will lock in, for example will pay or receive for future deliveries of the commodity (Crowson and Sampson, 2000). In the case of coal, the producer wishes to lock in a specific price for his coal at a particular mining operation, or because the coal prices currently available on the forward market are attractive and the producer wishes to fix these prices against anticipated business. The two main reasons for establishing a hedged position are to lock in coal prices that are attractive relative to one's internal costs, and to secure a coal price to set against an external contract.

Contract and spot pricing

Contract and spot pricing are utilized simultaneously by large producers to obtain optimal prices in any financial year. Given the preference of the buyer, a contract or spot price is usually negotiated. The pricing strategy will guide the seller's preference for contract or spot pricing, which includes important considerations such as the aggregate position of the country on the cost curve, and the position of the individual company on the national cost curve.

Contract pricing is referred to as a fixed price for a specific volume over a specific period of time, for example,

- *US$80.00 FOB RBCT*—300 000 metric tonnes to be delivered July to September 2009, or
- *US$82.50 FOB RBCT*—1 000 000 metric tonnes per annum, for 3 years, starting September 2009.

Spot pricing is done for spot sales, or for contracts where spot pricing is preferred and indicated as such. Usually for shorter tenor contracts, but longer-term contracts can also be priced for spot. Spot pricing is determined by the weekly API #2 and API #4 indices, and for purposes of the following examples, reference is made only to API #4:

- *Spot sale in RBCT*—immediately traded. 120 000 metric tonnes; API #4 Index which is published every Friday serves as the current spot price, or according to over-the-counter available pricing data
- *120 000 metric tonnes*—Delivered Q4 2009; pricing API #4. API #4 Index published every Friday is then used for invoicing—cumulatively or otherwise negotiated by the parties
- A form of risk management is also to price 50% of a contract at a fixed price and 50% of the contract at API #4
- *120 000 metric tonnes*—to be delivered between June and August 2009. 50% of contract priced at API #4 and 50% of contract priced at US$65.00 FOB.

Price curves for thermal coal

The price history of thermal coal prior to 2003 was collected by regional information services such as South African Coal Report and published on a quarterly basis. Price information could be bought only from publishers, but it was at least one quarter after negotiations have been concluded, and detail on regional prices was often skewed.

Since the inception of the tradable indices, API #2 and API #4, information had been obtainable on a weekly basis, and on a daily basis from bids and offers on the OTC market. Buyers and sellers have since had the advantage anticipating market movements or negotiating on most current achieved prices. Thermal coal prices ex South Africa had consistently been in the range of US$18–27 per tonne FOB since the 1980s until late 2003. At the end of 2003, prices lifted above US$30 /tonne FOB, and since 2004 have never been lower than approximately US$39/tonne FOB.

Figure 3 denotes the API #2 and API #4 price curves for the past 5 years. The difference between the API #2 and API #4 curve is implied freight. Freight cost is the difference between the RBCT FOB price and the delivered price in Europe (Amsterdam Rotterdam Antwerp (ARA)). As indicated by the curves in Figure 3, thermal coal prices fluctuated between US$45–60 FOB in the period between November 2004 and September 2007. After October 2007, thermal coal (and coking coal alike) prices rallied to unprecedented levels, almost reaching US$200/tonne FOB in July 2008.

During this period a global commodity boom controlled the behaviour of both producers and buyers. The global boom drew heavy speculative participation in the market from hedge funds, which saw prices rallying for almost 12 months. In October 2008, major global financial crises erupted and prices plummeted in free fall to levels below US$60/tonne FOB. The financial crises have influenced producers and consumers alike as demand had diminished and oversupply became evident on a global scale.

Currently, early 2010, producers and sellers struggle to find price direction in the market as demand for thermal coal has been significantly altered, and a subsequent oversupply situation is evident. The terminal coal market supplies

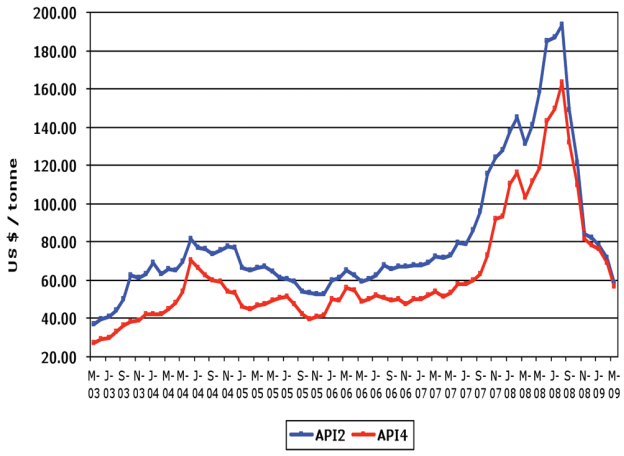

Figure 3—API #2 and API #4 price curves (Source: Reuters, May 2009)

forward curves, such as those shown in Figure 4, on a weekly basis to the industry. Forward curves aim at directing the market price for a maximum forward period of 3 years. Forward curves are derived from micro- and macro-economic information, coupled with price information from most recent trades. Producers and consumers use forward curves for various different reasons, and for indicative price levels at different time frames. Forward curves often form the basis of the hedging decision, indicating a decreasing or increasing price over the 3-year period.

As seen in Figure 4, for both Rotterdam and Richards Bay, the steep upward slope in the tail of the forward curves means the price is considered to be in contango, and anticipates a strong increase in price over the next 3 years. In the event that the tail part of the curve is lower than the starting point it is considered to be in backwardation, implying that forward period prices are set to decrease. In Figure 4, a view was taken in February 2009 that the short-term price was set to decline (backwardated) by Q2 2009. Thereafter it moved to a contango position showing a steep price increase by 2011. The difference between the Rotterdam and Richards Bay curve is implied freight, which is the difference between loaded and delivered material.

Coal risk management and derivative trading

According to Pringle (1985:4–3), there are four stages of continuous risk management:

- *Identification*—identify the risks that can be managed (production risk, credit risk, coal price risk, rail and freight price risk, currency risk, etc.)
- *Quantification*—assess the severity of the risk (i.e. its impact on the business), and the probability of occurrence. This makes it easier to rank the risks in the order of preference to actively manage them
- *Managing*—the company must now establish a strategy of how to manage the risk. The company must understand the impact of the risk, and the impact of managing it, along with the costs involved. The company must then plot a course of action as to how to deal with the risk management
- *Monitoring*—risk factors vary from time to time, and the company should continuously update its risk management strategy in order to cope with changes in the risk profiles. Additionally, a control process must be implemented which ensures that the trades are kept within their mandate for risk management actions.

For the purposes of risk management, the term hedging is used. Hedging is relevant to coal price risk and currency risk. Adapted from Haug (2007:198), the key issues related to coal price hedging are the following:

- Credit: the coal market is not currently a cleared market, and hence there is no day-to-day margining. As a result, and with prices being somewhat volatile, swaps counterparties may see rather large changes in their credit exposure to each other. Currently, most companies that trade coal swaps are very careful as to whose credit they will accept since many companies have credit default status
- *Performance*—performance or production risk is very relevant when positions in the market are hedged, because changes in the availability of coal will immediately affect the effectiveness of the hedge
- *Liquidity*—the liquidity of the market directly affects the ability of a risk manager to effectively hedge. It is important that a large position can easily be bought or sold without major movements in the market, and generally the maturity of a market affects its liquidity

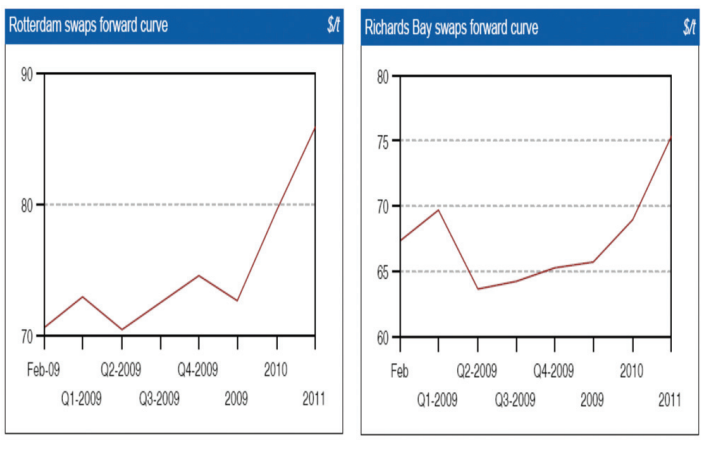

Figure 4—Rotterdam (API #2) and Richards Bay (API #4) forward price curves (Source: Argus Coal Report, May 2009)

- *Strategy*—implementing a risk management strategy is of vital importance. Generally, the most important aspects are to keep transactions confidential, to use the most suitable financial institution, act decisively when the opportunity arises, and stick with the preset strategy rather than speculate (i.e. to sell or buy at a fair price).

The index

An index refers to a price marker that is supposed to be representative of the underlying market price of a specific product for delivery during a specific time period. An index can be objectively or subjectively derived. Traditional transactions (physical) can be linked to indices whereas swap trades (derivatives) are always based on an index. Furthermore, an index (1) provides independently determined benchmark pricing; (2) allows parties to trade 'at market'; (3) promotes security of off-take and supply even during times when buyers and sellers have very different views on where prices should be; and (4) provides flexibility (Pardo, 2008:74).

Buyers and sellers can independently hedge their cargoes, and thus they can achieve different prices from the same cargo. However, where derivatives are used, buyers and sellers must take care to clearly identify what objectives they wish to achieve. Derivatives, when used properly, provide a very effective risk management tool.

Critical elements for an index to work effectively are that:

- Liquidity and transparency should characterize the index in order to attract a sufficiently large group of buyers and sellers. This group normally does not just consist of producers and consumers, but also traders and financial institutions
- The index numbers must be determined using reliable methodologies. This can be by using reputable publications, or by using trading platforms. Both such systems have been effectively used in other commodity markets
- The market participants need to be comfortable that index numbers reflect the actual physical market.

Available indices

For the international coal market, there are currently two relatively liquid publication based indices, one for coal delivery into Europe (API #2) and another for coal delivery ex-South Africa (API #4). There are also web-based indices, of which the Newcastle index is the most liquid (globalCOAL NEWC). Others are being developed for the Far East markets. For purposes of this article, only the traded indices from and related to South Africa will be discussed, i.e. API #4 and API #2.

Publication based indices

European Index

The TFS API #2 index, for coal delivery into ARA (Amsterdam, Rotterdam and Antwerp, which are the major coal ports in Europe). This index is related to coal coming from Russia, South Africa, Colombia, Indonesia, Australia and others. Physical coal traded into this market is approximately 190 million tonnes per year, of which a reasonably large portion is priced against the index. Financially traded coal, which also settles against this index, is now approaching 650 million tonnes per year, and growing. This is a phenomenal achievement, considering that the financial coal deals started trading only in 1998, showing that this market has been one of the fastest developing derivative markets.

South African Index

The TFS API #4 index is for coal delivery from South Africa. It relates to coal exported from Richards Bay Coal Terminal. Physical coal exported via this terminal is currently approximately 60 million tonnes per year, and coal derivative trades against this index are currently over 250 million tonnes per year. This index started trading only in February 2001, showing good growth since then.

Web-based indices

South African Index

The RB 1 Index is for coal delivery from South Africa, and the API #4 index relates to coal loaded at RBCT. Large volumes of this specification coal are traded on the OTC broker market.

Compilation of an index

Publication based = TFS API #2 and TFS API #4

These indices are all calculated and published by independent publications on a weekly basis, and the average of the weekly numbers for any given month makes up the official index number for that month. The numbers are based on a combination of actual deals and a market survey for prompt delivery (being within the 90 days). The relevant publications available are as follows:

- The prices used for TFS API #2 (CIF ARA) are the average numbers of the McCloskey Coal Report and the Argus Energy Coal Daily Report
- The prices used for TFS API #4 are the average numbers of the McCloskey Coal Report, the Argus Energy Coal Daily Report and the South African Coal Report.

Web-based = RB from globalCOAL

The RB index is calculated by using a combination of actual deals done on the platform and an average of bids and offers within a certain range in order to arrive at index number. This is usually done at the end of each week, and a monthly number is compiled from the weekly averages, and is published on a real-time website.

Utilizing an index

An index is used with physical and derivative transactions, given it is for hedging or speculative purposes (Pringle, 1985: 4–8, 9).

Physical deals

Index pricing can be used for either spot or contract (term) business. This becomes particularly useful where buyers and sellers cannot agree on what fixed price to use, but they still wish shipments to continue. Similarly, where the parties have

a strategy to continuously price coal 'at market', index pricing becomes very effective. Buyers and sellers simply agree which index period will apply to each relevant shipment and the seller invoices the buyer once the index numbers becomes known. For example, the parties can agree that the shipment will be priced against the average index number for the month of shipment. Should the shipment take place very early in the month, the parties may consider doing a provisional invoice for cash flow purposes, and the final invoice once the month average index is published.

Derivative deals—hedging

As an example, a buyer has bought a cargo of coal at index price. After the purchase, but before delivery, the market conditions might change, and perhaps the buyer now firmly believes that coal prices will rise. The cargo may thus be invoiced at higher numbers than initially expected. As a result, the buyer might want to convert to a fixed price basis, using derivatives, in order to limit the risk that prices will increase. Thus, a fixed price is locked in, effectively hedging the purchase against higher prices.

Derivative deals—speculative

Some companies, (producers, consumers, financial institutions and traders) have set up coal trading desks in the European market, and a similar trend is following expected in the Far East. Apart from pure hedging these trading desks are prepared to enter into speculative deals on pricing movements, either in the physical or financial markets. This is a specialized business strategy, and any company considering this route needs to carefully consider its objectives and methods. Speculative trading is part and parcel of any developed market, and contrary to popular belief, speculators provide much needed liquidity to the market (Pringle, 1985: 5–15, 18).

Settling index deals

Physical

Coal shipped against an index is simply invoiced for at the relevant official index for the relevant month or quarter of shipment. Although coal sales trade against an index vary from Handy-sized to Cape-sized vessels, it is possible to buy and sell coal in clips of 5 000 tonnes each (but always subject to the minimum load regulations of the relevant port).

Financial

Coal derivative deals are traded in clips of between 5 000 tonnes per month, or multiples thereof. Where a trade is done for a quarter or for a year, the tonnage is still refered to on a monthly basis, i.e. a deal done for calendar 2007 for 20 000 tonnes per month, covers 240 000 tonnes. Deals settle monthly, so at the end of each month the fixed price of each deal is compared to the index price for that relevant month, and a cash settlement takes place between the parties. Generally, deals are done for the next two or three months, the next six quarters, and the next three years. On occasion, deals are done for settlement three or four years out, and for structured deals it is possible to get quotes up to ten years out.

The coal derivative market is not an exchange traded market and is not cleared. No daily margining takes place and counterparties fix credit lines between themselves. Brokers will quote minute-by-minute forward numbers against the relevant indices, and it is thus easy to follow changes in the market. At the end of each day, counterparties use broker reports to market-to-market their book positions.

Hedging—swaps, futures and options

By definition, a derivative is a paper transaction which value depends, at least in part, upon a related commodity, in this instance coal. Derivative therefore is the generic term, the three main subgroups being swaps, futures and options (Pardo, 2008: 74–77).

A swap is a paper agreement between two counterparties: A buyer who believes in higher coal prices over a nominated period and a seller who believes in lower coal prices over a nominated period. The name swap arises from the fact that the transaction is effectively an exchange of a fixed price (the swap price) for a floating price (the chosen index).

A future is an agreement to buy/sell, on an organized exchange, a standard quantity of a specific commodity, financial instrument, or currency at a future date at a price agreed between two parties (coal swaps are not exchange traded).

An option is a contract, which confers the right but not the obligation to buy or sell an asset (being either a swap or physical coal) at a given price on or before a given date. The liquidity for options is very small, which make options extremely expensive.

A bid is made by a buyer, indicating the price the buyer is willing to pay; and an offer is made by a seller, at a price a seller is prepared to sell at. The bid-offer spread is the difference between the buy and sell prices. In order to get a deal done, one party often has to cross the spread to meet somewhere between (i.e. the buyer has to increase his buy price and/or the seller has to decrease his sell price).

A forward swap example

API #4 is used here as an example, but the same principle applies to API #2 and freight forwards, the transaction flow being shown in Figure 4. In this example the producer (seller) wishes to lock in a fixed monthly API # 4 price (FOB Richards Bay) for coal from April 09 to September 09.

The transaction

Producer (seller) sells a fixed price swap and buys a floating price swap as shown in Figure 5. A suitable financial institution buys a fixed price swap and sells a floating price swap. Floating price swap is the 6 monthly average price of API # 4, quoted by TFS/McCloskey/ Argus reports.

The major attribute to using a forward swap is that a guaranteed price is locked in, whereas no upfront premium is payable. Opportunity costs arise if the price moves higher than the fixed or locked-in price, but the producing company is guaranteed the fixed price (Figure 6). The fixed price swap

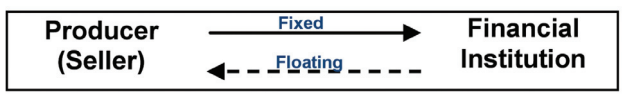

Figure 5—Transaction flow of a hedge

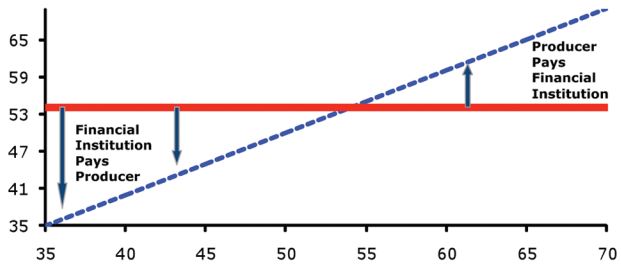

Figure 6—Cash flows of a forward swap (Source: Standard Bank, 2008)

is transacted for April to September 2009 at a fixed price of $54/t. Cash flows are exchanged between producer (seller) and the financial institution that reflects the monetary value of the difference between the fixed price and the monthly average of API #4 quoted by TFS/McCloskey /Argus reports.

Cost of hedging

Generally, the cost of hedging coal is relatively cheap. Broker costs are very low, varying from $0.02 to $0.04 for paper transactions, to $0.05 upwards for physically brokered coal deals. Some structured or option transactions may involve slightly higher brokerage. Broker costs are generally paid at the end of the month in which the deal is done (irrespective of when delivery of the coal takes place or when the swap deal settles). Indirect costs to hedging is that the documentation (ISDA) and administration can be quite time consuming, and financial institutions have to apply for Reserve Bank approval and approve credit lines for transacting.

Conclusion

The macro-economic pricing of coal is dependent on the cost structure for each company or operation, and the FOB cash costs are indicative of the producer's longevity as a market player. On the micro-economic level, pricing will be derived from fixed and variable cost structures and return on investment prerequisites. Although the micro- and macro-economic fundamentals of costs are the foundation of pricing, the different consumer markets follow different pricing regimes.

Export pricing has always been based fundamentally on global supply and demand fundamentals and has either been contracted or spot price contracts. The coal markets have, however, evolved to the extent that financial institutions, commodity traders and hedge funds are now participators trading the commodity based on its price volatility. This resulted in the determination of price based on volatility, rather than actual demand and supply. Chinese and Indian-lead energy demands have contributed to the major growth in global coal demand, whereas supply side economics have been focusing on infrastructure solutions in Australia, Indonesia and South Africa. Furthermore, the industry has had to absorb structural changes such as renewed nuclear interest and planned power plant construction and the effect of carbon trading and clean coal technologies and requirements.

In recent years, the development of coal derivatives has contributed significantly to forward price hedging. The API #2, API #4 indices are published on a weekly basis by Argus International and McCloskey Coal Research and are used for price setting, forward derivatives and contracting. Furthermore, the RB1 and RB2 indices have also been developed for South African OTC traded coal. The use of derivative pricing is for producers are exclusively for risk management, although speculative practices by hedge funds have contributed to the vast growth of this terminal market. Swaps, futures and options are the traded derivates available in coal trading. Although swaps and futures are widely traded, the coal market's illiquidity restricts the trading of options.

The transparency of pricing enhanced the tradability of coal as a commodity to the extent that junior miners are included and can price at the same levels as major producers. Overall, market players have a far better understanding of macro-economic fundamentals and how they influences the market. These are now implemented to expand micro-economic price considerations to arrive at competitive and profitable pricing regimes. Pricing has evolved since the beginning of the century, and marketing professionals not are required only to have mining and metallurgical skills, but a firm understanding of derivate trading.

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