

## Leithner Letter No. 188-191

### 26 July-26 October 2015

*Because we are now running out of gas and oil, we must prepare quickly for a third change, to strict conservation and to the use of coal and permanent renewable energy sources, like solar power.*

U.S. President Jimmy Carter  
(18 April 1977)

*We've embarked on the beginning of the last days of the age of oil.*

Mike Bowlin  
Chairman of ARCO and the American Petroleum Institute  
(9 February 1999)

*The end-of-the-fossil-hydrocarbons scenario is not therefore a doom-and-gloom picture painted by pessimistic end-of-the-world prophets, but a view of scarcity in the coming years and decades that must be taken seriously.*

Deutsche Bank Research  
(2 December 2004)

*What's going to happen is, very soon, we're going to run out of petroleum, and everything depends on petroleum. And there go the school buses. There go the fire engines. The food trucks will come to a halt. This is the end of the world.*

Kurt Vonnegut, Jr.  
*Rolling Stone*  
(24 August 2006)

*It is very difficult to predict energy markets. In 35 years in the industry, I have never seen a forecast of the future that has been right.*

Jim Rogers, CEO of Duke Energy  
"U.S. Boom Won't Hurt [Australian] LNG, Says Duke"  
(*The Australian*, 26 February 2013)

## Why Has the Price of Oil Plunged? What Will Be Its Price in a Year? In Five Years?

Observers of and participants in financial markets typically prophesy confidently and frequently. Indeed, many predict like they breathe – that is, constantly and without conscious thought. Very few, in other words, bother to describe and justify (or even mention) the reasoning and data that underlie their prognoses. This, I suspect, is because most “forecasts” – including those of alleged “experts” – are at best simple extrapolations from recent trends; at worst, they’re mere random guesses. People who purport to foresee, in other words, characteristically “see” the future exclusively through the lens of the present: if today it’s sunny and warm, then they’re upbeat and anticipate that tomorrow’s weather will be even more pleasant; but if it’s presently storming and cold, they’re downcast and expect that the gloom will persist and worsen.

The price of oil provides an amusing – and salutary – example. On 6 May 2008, when the price of Brent crude was \$125 per barrel and had doubled during the previous 12 months, *Bloomberg* (“Goldman Says Oil ‘Likely’ to Reach \$150-\$200”) reported: “oil may rise to between \$150 and \$200 a barrel within two years as growth in supply fails to keep pace with increased demand from developing nations, Goldman Sachs Group Inc. analysts said.” Never mind Goldman: the price didn’t reach \$150 by 2010. Quite the contrary: during 2009 it collapsed below \$50 – and within a few years it doubled.

On 16 January 2015, on the other hand, when the price of West Texas Intermediary fell below \$50 and by half since mid-2014, *The Australian* (“Oil Prices Could Stay Low for a Decade”) reported: “the ‘new normal’ in the price of oil could last over the next decade because of a structural shift [which it didn’t bother to justify, or even describe] in the dynamics of the oil market ... Yesterday, Bank of America Merrill Lynch lowered its oil price forecasts, and said it now expected U.S. oil prices to tumble to \$32 a barrel by [31 March 2015].”<sup>1</sup> It didn’t happen: the price of WTI, which was \$47.22 per barrel on 4 January, closed the first quarter of the year at \$47.72; moreover, during April the price averaged \$54.45 and during May it averaged \$59.25.

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<sup>1</sup> See also “Oil Price ‘to Fall to \$20’ as Gulf States Battle Shale Drillers in US” (*The Times*, 14 January 2015) and “Why Oil Prices Will Stay Low for Decades” *The Wall Street Journal* (6 January 2015).

Investors, it seems to me, do themselves a great disservice whenever – which, alas, is usually – they regard economic and financial “experts” as authorities. They err even more grievously if they take experts’ predictions (not always educated “guesses” is, I think, more apt) seriously. If anything, “experts” are reliable anti-authorities. By this I mean that when the herd – of which experts are leading members – extrapolates a recent extreme event (such a plunge of the price of oil, surge of the stock market, etc.) into the indefinite future, it’s more likely that the opposite will before long commence. In this one respect, Canada’s PM, Stephen Harper, speaks wisely. “[Canada’s oil and gas] industry has lived through changes this extreme and more,” he told *The Financial Post* on 6 January 2015. “This [sharp fall of price since mid-2014] is not without precedent. It’s a resilient industry and it will once again see its way clear to a prosperous future” (see also “The Petro Plunge Will Be Painful, But We Will Adapt,” *The National Post*, 28 January 2015).

*The blunt truth is that neither you nor I nor anybody else can know the economic and financial future. Yet investors must act today in light of their expectations – however misplaced – about tomorrow. How, then, to proceed? It’s also true that, given valid reasoning, reliable data and plausible and workable premises, investors can and intermittently do make rough sense of the past; and what’s happened historically can occasionally provide credible clues about what might subsequently occur.* The key word is “occasionally” – most of the time, we simply cannot foresee with any reliable degree of accuracy the price of oil (or of a stock or the level of a market index like the S&P/ASX 200, etc.). Fortunately, extreme short-term changes of the returns of individual stocks, overall markets, etc., often subsequently regress towards their long-term means. Similarly, the greater has been the decrease of the price of oil during any given twelve-month period, the larger, on average, will be its subsequent rebound.

As a simple antidote to the torrents of convoluted gibberish, self-interested nonsense and downright idiocy that normally permeate this subject matter, which is often uttered by people who’ve received advanced degrees from prestigious (and thus influential) educational institutions and now receive very large salaries from powerful (and thus persuasive) financial institutions, this Newsletter analyses the price of oil. Its basis is theoretical and this basis is – whether you regard yourself as Austrian, mainstream (e.g., Friedmanite or Keynesian) or Marxist – non-controversial: in the short term, the demand for and the supply of oil (and gas and LNG) are inelastic with respect to its price. Hence the “spot” prices of oil and gas are innately and inherently volatile.

Indeed, if today's price is so low that producers cannot (given today's costs, technology, etc.) produce it profitably – that is, cover their fixed as well as their variable costs – and if they believe that prices will remain depressed, then in the short term they'll attempt to reduce their variable costs (which tends to reduce their output) and in the long run they'll attempt reduce their fixed costs (perhaps by employing more productive technology). If in the short-term they succeed and supply falls, then – *assuming that demand remains unchanged* – today's price will rise (see, for example, "Oil's Plunge Could Help Send Its Price Back Up," *The Wall Street Journal*, 22 February 2015). Journalists routinely ignore this principle. We can summarise it thus: high (i.e., above trend) prices tend to cause lower prices, and low (i.e., below trend) prices tend to cause higher prices. Perhaps Leithner & Co. should be grateful: the inverse temporal correlation of observations, also known as "regression to the mean," has long been underpinned our operations. Over the years we've used it repeatedly, always cautiously and usually profitably.

## **Some Economic Characteristics of Oil**

### *It's a Commodity*

The mainstream media routinely utter but seldom define the term "commodity." As far as they're concerned, there's nothing much to describe and explain: a commodity is simply a raw material such as iron ore or an unprocessed agricultural product like wheat. Similarly, they commonly distinguish but seldom justify the distinction between "hard" (i.e., mining and energy) commodities which are extracted (and hence allegedly "non-renewable") and "soft," i.e., agricultural, commodities which are cultivated (and hence "renewable"). Alas, the mainstream's inability or unwillingness explicitly to define this class of goods renders them blind to important risks and opportunities.

Goods and services that the mainstream commonly dubs "commodities" are usually primary goods (i.e., inputs that produce more refined outputs). Carl Menger, who called them "goods of higher order" in *Introduction to Economics* (1871), was the first to define and analyse them rigorously. Oil, for example, is a higher good (input) with respect to the production of many secondary goods (outputs), or goods of lower order, such as petrol. Petrol-fuelled transport, in turn, is an input with respect to the output of countless goods and services. Natural gas is a higher good (input) with respect to the production of a secondary good (output), or good of lower order, such as electricity. Power, in

turn, is an input with respect to the output of myriad goods and services. Yet inputs are not necessarily commodities: the distinguishing feature of a commodity, Menger showed, is *fungibility*.<sup>2</sup> If a given quantity and quality of a particular good produced by Producer X is effectively identical to and thus interchangeable with an equivalent quantity and quality produced by Producer Y, and for this reason its consumer is not willing to pay more for any particular producer's output, then this good is a commodity. In principle, a power station in Japan doesn't care whether the gas it converts into electricity derives from American shale, Australian CSG, etc. From its point of view, the one is indistinguishable from and hence interchangeable with another; accordingly, gas is a commodity.

Similarly, from the point of view of the bakery which purchases wheat, the quality of this input may differ slightly (but within specified limits) from one batch to the next but is essentially uniform. As long as a given quantity of wheat meets standards of quality, the bakery neither knows nor cares who grew or processed it. As Karl Marx famously put it: "From the taste of wheat, it is not possible to tell who produced it; a Russian serf, a French peasant or an English capitalist." Making the same point in the 1970s, Warren Buffett sagely advised his son, Howard, who aspired to become a farmer: "No one goes to the supermarket to buy Howie Buffet's corn."<sup>3</sup>

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<sup>2</sup> Fungibility is the property of a good or a commodity whose individual units are capable of mutual substitution. For example, since one ounce of gold (as opposed to a particular item of gold jewellery) is equivalent to any other ounce, gold is fungible. Other fungible commodities include sweet crude oil, company shares, bonds and currencies. Fungibility refers only to the equivalence of each unit of a commodity with other units of the same commodity; it doesn't relate to the exchange of one commodity for another different commodity.

Fungibility is also a matter of degree rather than a binary distinction. To a significant extent it's also a subjective matter: many goods' and services' degree of commodification depends upon buyers' mentality. Many consumers, for example, regard a given quantity of a particular size of eggs as completely fungible; accordingly, low price is the only factor that guides their purchase. Other purchasers, however, not only take other factors besides price (such animal welfare) into consideration: these other factors are more important than price. To these customers, distinctions such as organic versus standard, cage- free, free range, etc. versus factory, etc., create classes – and, if they trust a particular producer, brands – of eggs, milk, etc.

<sup>3</sup> See Roger Lowenstein, *Buffett: The Making of an American Capitalist* (Random House, 1991), p. 338. A differentiable good or service can, through a process dubbed "commoditisation," become a commodity. Examples include motor cars and passenger air transport. Decades ago, Australians regarded Ford, Holden and Qantas as safer, more reliable, etc., than their foreign competitors. But no longer: as a result, motor cars and air transport have become commoditised. These days, Holden and Qantas are commodities rather than brands.

### *Inelasticity of Demand and Supply Beget Volatility of Price*

In the short- and medium-term (that is, periods of up to a decade), consumers' demand for oil and gas has been highly inelastic with respect to its price. That is, the quantity demanded falls little in response to a given increase of price, and it rises little in response to a decrease of price. Why? Commodities whose demand is "inelastic" have few or no substitutes. A gas-fired power generator can't quickly or easily or cheaply switch to coal, oil, nuclear, solar or wind: a host of issues (economic, financial, regulatory, technical, etc.) mean that it can take years to switch from gas to (say) wind generation. It thus requires quantity X of gas – regardless of today's price – in order to produce quantity Y of electricity.<sup>4</sup>

Similarly, in the short-term the quantity of oil and gas supplied is inelastic with respect to price. Although supply can occasionally shrink in response to a decrease of price, in the short term it typically rises little or not at all in response to an increase. Given its large up-front cost, which will be recouped (if at all) over many years, owners of oil and gas infrastructure –i.e., refineries, pipelines, etc. – seek to utilise it at or near its capacity. A modest increase of demand for oil thus poses a challenge to its suppliers because it's usually insufficient to justify the construction of (say) a new refinery. To build an additional one in response to a modest increase of demand is to operate it well below capacity – and thus, in all likelihood, at a loss. And in any case regulatory, technical and other reasons mean that its construction will typically take years. Accordingly, it's usually better to expand an existing plant. But that, too, can take considerable time. Similarly, it can easily take a year to extend a pre-existing pipeline and several more to construct a new one. Accordingly, in the short term it's not often easy to increase the supply of oil and gas.

*The more price-inelastic is a commodity's demand and supply, the more volatile its price will tend to be.* Diagram 1 and Diagram 2 provide textbook examples. Diagram 1 describes a good whose demand and supply are relatively inelastic:

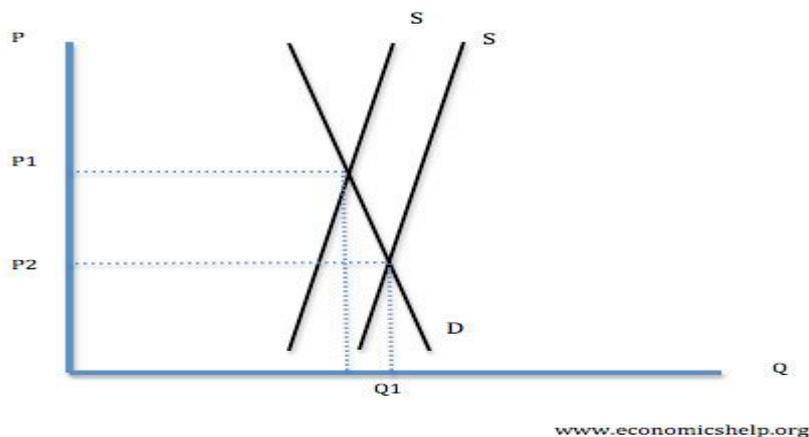
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<sup>4</sup> In the very long run, however, other sources of energy can – and, given the continued advance of technology, one day likely will – supplement and supplant oil and gas; for this reason, in the very long term utilities' demand for any source of energy including gas is elastic. It's also worth distinguishing utilities' relatively inelastic from residential households' increasingly elastic short-term demand for gas. In particular, advances of technology and subsidies from governments are increasingly allowing households to switch quickly and cheaply from power generated by utilities to power generated by household solar panels.

whatever the price, the quantity demanded varies little; similarly, whatever the price, the quantity supplied varies little. Diagram 2, on the other hand, depicts a good whose demand and supply are more elastic: depending upon price, the quantities demanded and supplied vary considerably.

Notice the consequence of a given increase of supply. Why might the curve shift to the right? Perhaps an advance of technology has increased suppliers' efficiency; as a result, they're able to produce more regardless of price. Notice in particular that, given constant demand, in both diagrams the increase of the quantity supplied (as measured by the distance along the horizontal axis between the unmarked line and Q1 in Diagram 1, and between Q1 and Q2 in Diagram 2) is the same. The decrease of price, however (that is, the intersection between demand and old supply (P1) and demand and new supply (P2)), is much greater in Diagram 1 than in Diagram 2. *A comparable increase of supply has a much greater impact upon the quantity demanded (and hence price) in Diagram 1 than in Diagram 2; price, in other words, is more volatile in the case of relatively inelastic demand and supply (Diagram 1) than when demand and supply are relatively elastic (Diagram 2).*

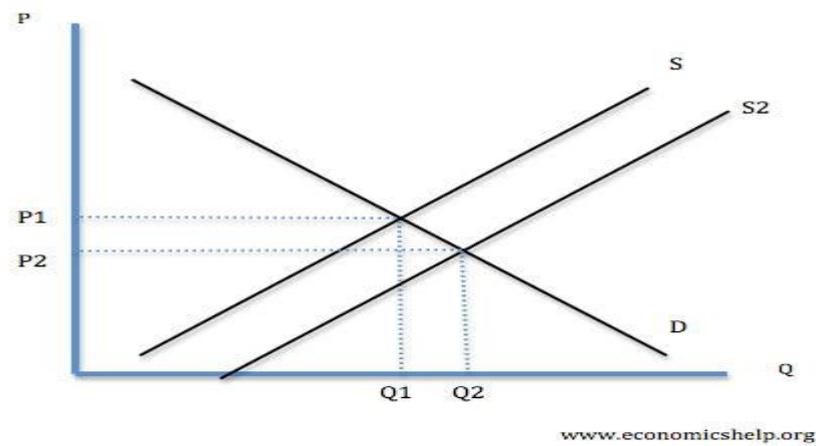
**Diagram 1:**  
**Price Is Relatively Volatile When Demand and Supply Are Inelastic**



Unlike demand for oil and gas, the quantity demanded of beef (and agricultural commodities more generally) is very elastic with respect to price. Oil and gas usually have no short-term substitutes; beef, however, has plenty – such as fish, mutton, poultry, pork, etc. If the price of beef rises relative to these substitutes, consumers can easily decrease their purchases of beef and increase their consumption of a substitute(s). Similarly, the quantity of beef supplied is relatively elastic with respect to price. Producers of beef can increase production

more quickly and easily than can producers of gas: it's much quicker and easier to induce a bull to inseminate a cow than it is to persuade a capitalist to finance and a government regulator to approve the extension of a pipeline. (Of course, a range of variables outside an individual pastoralist's control, such as the weather, can conspire to thwart his desire to increase his output. For these reasons, and despite pastoralists' best efforts, an increase of the price of beef won't necessarily prompt an increase of supply.)

**Diagram 2:**  
**Elastic Demand and Supply Leads to Smaller Changes of Price**



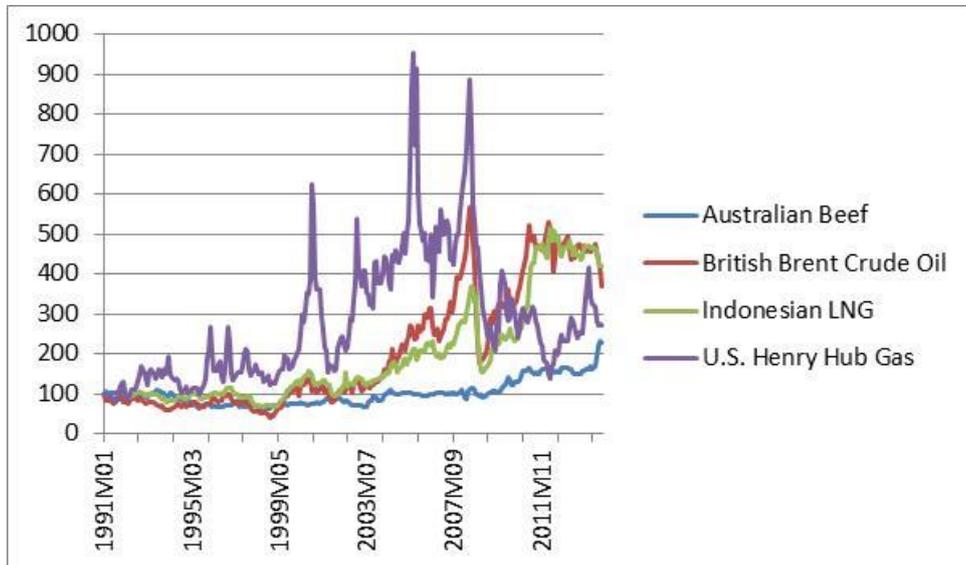
Given these very differing elasticities of demand and supply, it follows that the spot price of beef will be stable (relative to oil and gas) and that the price of oil and gas will be volatile (relative to beef). Figure 1, which summarises an analysis of data compiled by the International Monetary Fund (IMF), corroborates this expectation.

Figure 2, which plots the standard deviations of major commodity price indexes, provides further corroboration (a bigger standard deviation implies more volatile prices over time). The energy and fuel index (whose major elements are coal, gas, oil and uranium) has the biggest standard deviation (179) and hence the most capricious prices. The metals index (which comprises aluminium, copper, iron ore, lead, nickel, tin and zinc) is less volatile (sd=87) but nonetheless fluctuates much more than the food index (sd=32). Beef's standard deviation is lowest of all.<sup>5</sup>

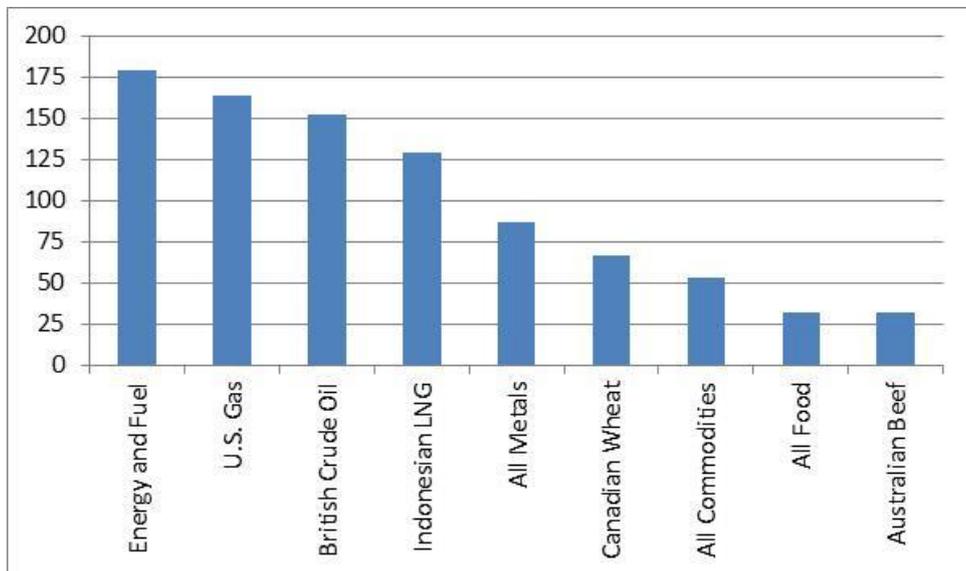
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<sup>5</sup> This is why, in principle, strong producers of oil and gas attract – and producers of agricultural commodities tend to repel. As we'll see, the regular downward volatility of the price of oil and gas can create opportunities to buy the stocks of strong producers at compellingly depressed prices – and the upswings of price can create the occasions to sell them at attractively elevated

**Figure 1:**  
**Standardised (January 1991=100) Indexes,**  
**Spot Prices of Selected Commodities, January 1991-December 2014**



**Figure 2:**  
**Standard Deviations of Spot Commodity Indexes (January 1991=100),**  
**January 1991-December 2014**



*Producers of Commodities Are Price-Takers – and Must Therefore Become Low-Cost*

prices. In sharp contrast, “ag booms” are comparatively rare. Hence I’m sceptical about the contention that growing demand from Asia will permanently boost Australian farmers’ incomes. I suspect that for farmers as a whole the next few decades will resemble the previous several: the prices of their output (and hence their revenues) will be stagnant and the cost of their inputs will steadily rise; as a result, their profit margins will continue to shrink – and the relentless pressure to “get big or get out” will certainly persist and perhaps intensify.

## *Producers*

Because they're commodities, there's no such thing as a brand of crude oil, petrol or gas. Nobody believes that BP's petrol differs from Shell's; accordingly, motorists purchase fuel almost exclusively on the basis of price and the convenience of the petrol station's location. Producers of branded goods and services prosper partly by distinguishing their goods and services from others'; hence they go to considerable effort – not least via advertising – to do so. To producers of commodities, however, these activities are pointless. How, then, can producers of commodities prosper? They must become and remain the most efficient (i.e., lowest-cost per unit of capital) producer. How can they do that? In capital-intensive industries such as oil and gas, the lowest-cost producer utilises its capital most efficiently via economies of scale; in plain English, the lowest-cost producer is typically the highest-volume producer.

During April and May 2015, Andrew (“Twiggy”) Forrest, the non-executive chairman and previously chief executive officer of Fortescue Metals Group (formerly Allied Mining and Processing), and also the richest Australian in 2008, sought to convince Australians otherwise, but he's simply mistaken: *producers of commodities – even the biggest ones such as BHP-Billiton and Rio Tinto – possess no market power*. A firm that possesses market power is able to raise its prices without losing customers. Can BHP and Rio do so? Entities that can, whose numbers are surprisingly few, are sometimes called “price makers” – and all others are “price takers.” Producers of commodities are price-takers. A price-taker must accept the prevailing price of its output in the market: its own transactions, quantity of output, etc., are unable to affect the market price.<sup>6</sup> Why are producers of commodities price-takers? Their output is fungible: for all practical purposes, one producer's oil and gas – and iron ore – is identical to its competitors'. Accordingly, if it increases its price then its customers will purchase elsewhere.

## **The Regression of Brent and WTI to their Historical Means**

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<sup>6</sup> Specifically, price-takers meet four conditions: (1) all firms produce a fungible good or service; (2) the market comprises a large number of firms; (3) each firm supplies only a very small portion of the total amount supplied; and (4) no barriers limit entry into or exit of firms from the market. Under these conditions (they're ideal-types which rarely if ever exist in the real world), firms must accept the market price. If the firm sets a price above the market level, consumers will simply buy from other sellers. Similarly, a sub-market price would merely reduce that firm's revenues. Because its output is perfectly fungible, an individual firm that's a price taker thus faces a perfectly elastic demand for its output.

Brent Blend is the primary global benchmark, and Dubai Crude and West Texas Intermediate (WTI) are the major secondary yardsticks, of crude oil. Because they influence other benchmarks such as Tapis<sup>7</sup> (which, in turn, is a basis of crude oil and petrol prices in Australia), Brent and WTI are most relevant for our purposes. Brent, an index based upon 15 oil fields in the North Sea, is the basis of prices in Western Europe. As its name implies, WTI plays the same role in the U.S. Given their somewhat different compositions, the cost of transport, etc., at any given point in time a difference (“spread”) normally exists between Brent and WTI; but given the considerable arbitrage between these indexes, as well as their common denomination (in \$US), the spread is usually modest.<sup>8</sup>

It’s not hard to do, nobody else did it so I did: I analysed all available monthly observations to December 2014 (i.e., since May 1987 for Brent and since January 1948 for WTI). Specifically, I computed the percentage change of price during each twelve-month period, i.e., May 1987 to May 1988, ... and December 2013 to December 2014 for Brent and January 1948-January 1949 and so on for WTI. In each series, the average twelve-month change is ca. 12%. I then ranked-ordered these changes and grouped them into deciles, i.e., ten groups that contain equal (net of rounding) numbers of observations. Figure 3 shows the results for Brent and Figure 4 the results for WTI.

Both show that the average change doesn’t occur very often: Figure 3, for example, shows that “average” increases of ca. 12% per year occur only ca. 10% of the time (Decile #6). Annualised percentage changes of Brent’s price, in other words, fluctuate considerably around their mean. The average change in the first (lowest) decile, marked “Previous Twelve Months,” is minus 39.8%;

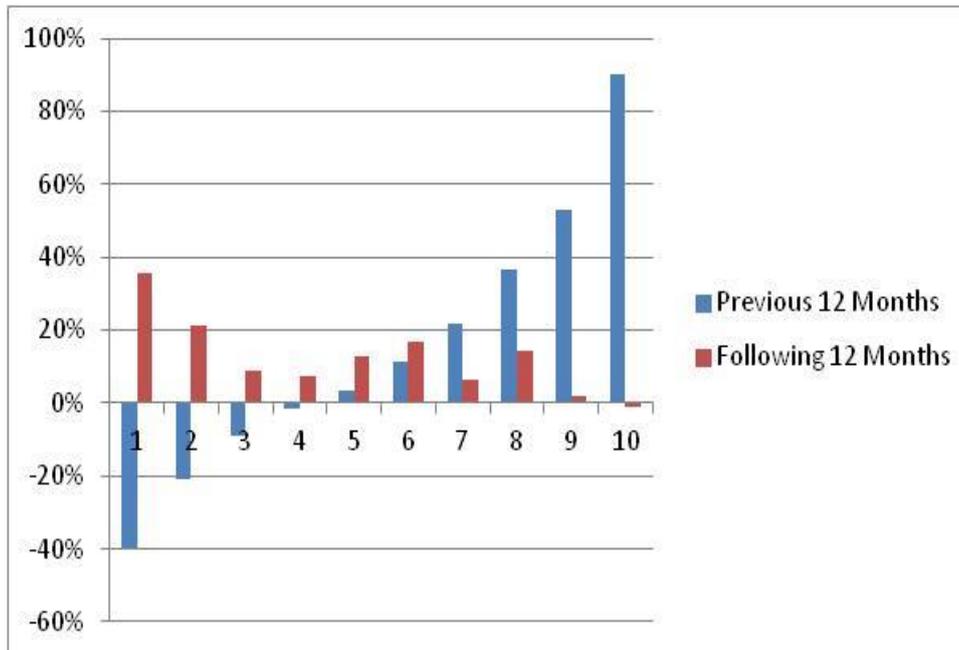
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<sup>7</sup> Tapis is very light and very “sweet” crude. It’s produced in Malaysia and used as a benchmark in Singapore – and, given Singapore’s importance as a hub of commerce, in Australia and across South-East Asia. Crude oil is classified as light, medium or heavy (density of the liquid) and as sweet or sour (sulphur content). Light, sweet oils like Brent and WTI – which floats on water and contains little sulphur – is prized because it requires less processing in order to convert it into usable products.

<sup>8</sup> Traditionally, Brent and WTI have tracked each other closely and have therefore been quoted interchangeably. But the shale boom in the U.S. has diminished WTI’s usefulness as a global barometer. Today it’s more a reflection of production and prices in the U.S. than it is a global benchmark. Meanwhile, this and other factors have cemented Brent’s position as the more accurate – or at least the most-referenced – global yardstick (see “Dueling Oil Benchmarks Converge in Their Price, but Diverge in Their Stories,” *The Wall Street Journal*, 23 January 2015).

during one-tenth of the twelve-month periods since 1987 the price of Brent Blend has fallen by ca. 40%.

**Figure 3: Brent Blend (\$US/barrel),  
Twelve-Month Percentage Changes of Price, Average by Decile, 1987-2014**



More generally, the means of Deciles 1-4 are negative: 40% of the time since 1987, Brent's price has decreased. The mean of the tenth (highest) decile marked "Previous Twelve Months," on the other hand, is 89.7%: during one-tenth of the twelve-month intervals since 1987, Brent's price has almost doubled. The means of Deciles 7-10 are at least 20%: in plain English, half of the time Brent's price rises by at least 20% per year. *We've already demonstrated it in principle and now we see it in practice: the price of oil has in the past often been and today remains volatile. I see no reason to assume that in the future the price won't continue to fluctuate.*

For each period, I've also calculated the percentage change of Brent's and WTI's price during each subsequent (where available) corresponding period. In other words, I matched Brent's change for May 1987-May 1988 to the change for May 1988-May 1989, etc. In Figure 3, *the greater is the decrease of price during a given twelve-month period, the greater the rise during the next period tends to be, and vice versa.* Reading from Deciles 1 to 10, the "previous" means tend strongly to increase and the "following" means gradually decrease. In Decile #1, the average change in the previous period is -40% whereas in the following period it's +36%. In Decile #10, the average change in the previous twelve

months is 90%; in the subsequent twelve months it's -1%. The greater is a given deviation from the overall mean (12%), in other words, the greater is the subsequent reversion ("regression") towards the mean. WTI shows the same pattern (see Figure 4).

**Figure 4: West Texas Intermediary (\$US/barrel),  
Twelve-Month Percentage Changes of Price, Average by Decile, 1948-2014**

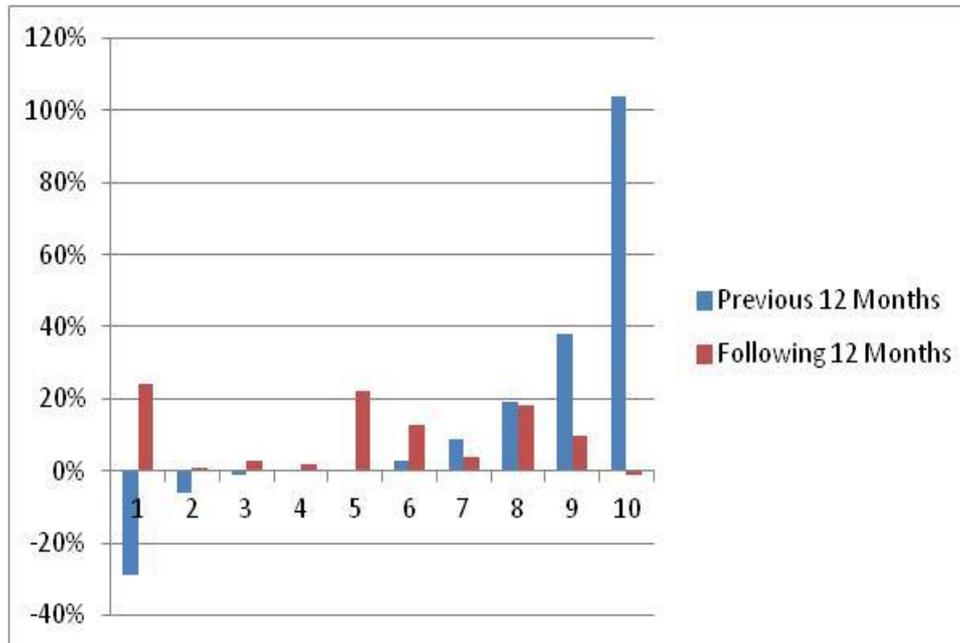
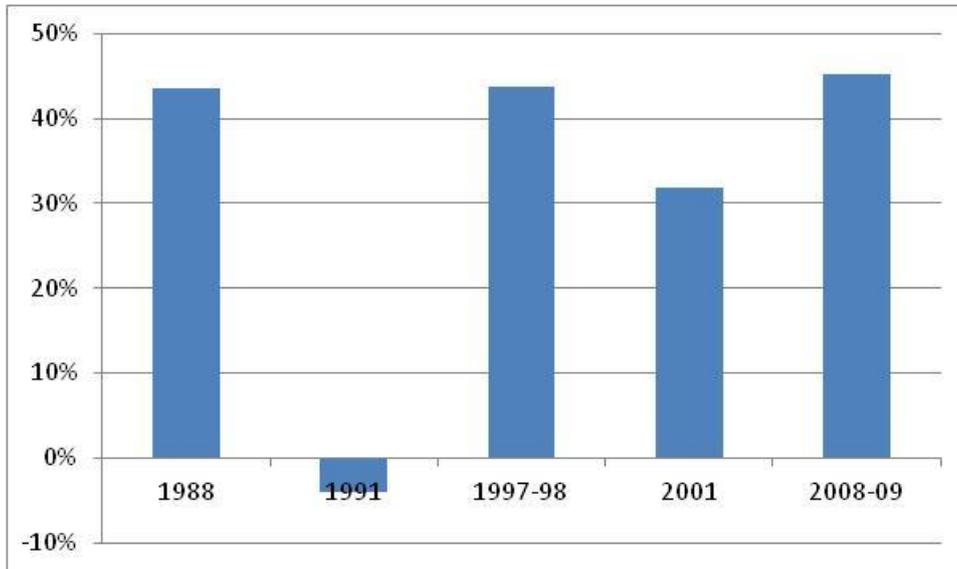


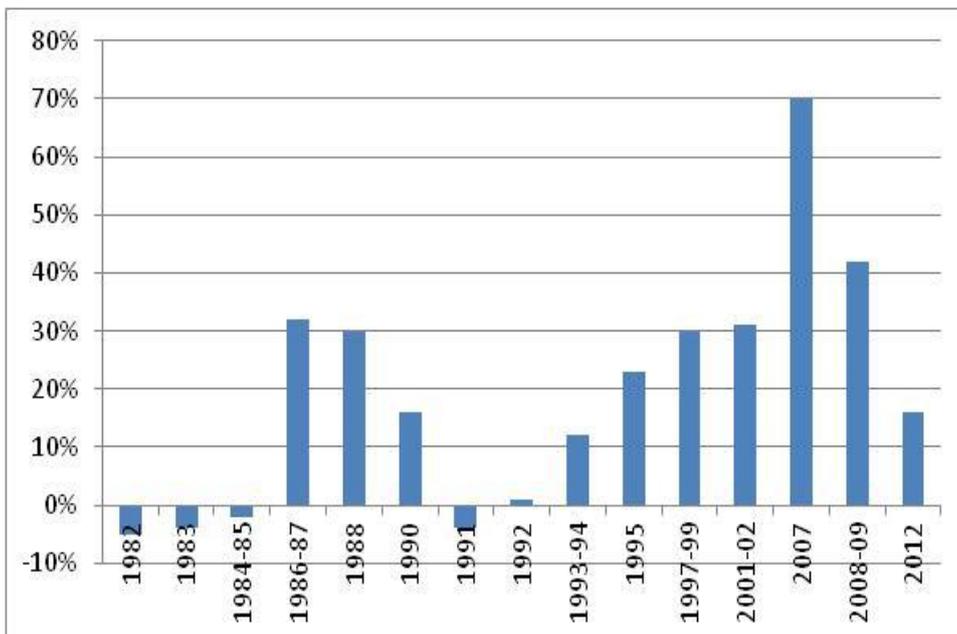
Figure 5 disaggregates the data in Decile #1 ("Following 12 Months") of Figure 3. Of those 31 observations, in which the price of Brent decreased by a minimum of 27% (August 1990-August 1991) and a maximum of 56% (December 2007-December 2008), three occurred in 1988, five in 1991, 11 in 1997-98, three in 2001 and 11 in 2008-2009. Their magnitude varies but their direction is quite uniform: in 4 out of 5 (80%) of these instances and 71% (22 of 31) of the underlying observations, Brent's price rises. *Given a sharp (ca. 40%) decrease during one 12-month period, Brent has usually risen sharply – that is, by an average of 38%, which is much greater than the overall average of 12% – during the following 12-month period.*

Figure 6 disaggregates Decile #1 of Figure 4. The results are much the same: in 11 out of 15 of these instances (in which the price of WTI fell by at least 11% and as much as 59% during the previous 12-month period) and in 68 out of 90 of the underlying observations, during the subsequent period WTI's price rises significantly.

**Figure 5: Annualised Changes of Price, Brent Crude, Twelve Months After an Annualised Decrease of 27% or More, 1988-2009**



**Figure 6: Twelve-Month Percentage Change of WTI Following a Twelve-Month Decrease of 11-59%, 1982-2012**

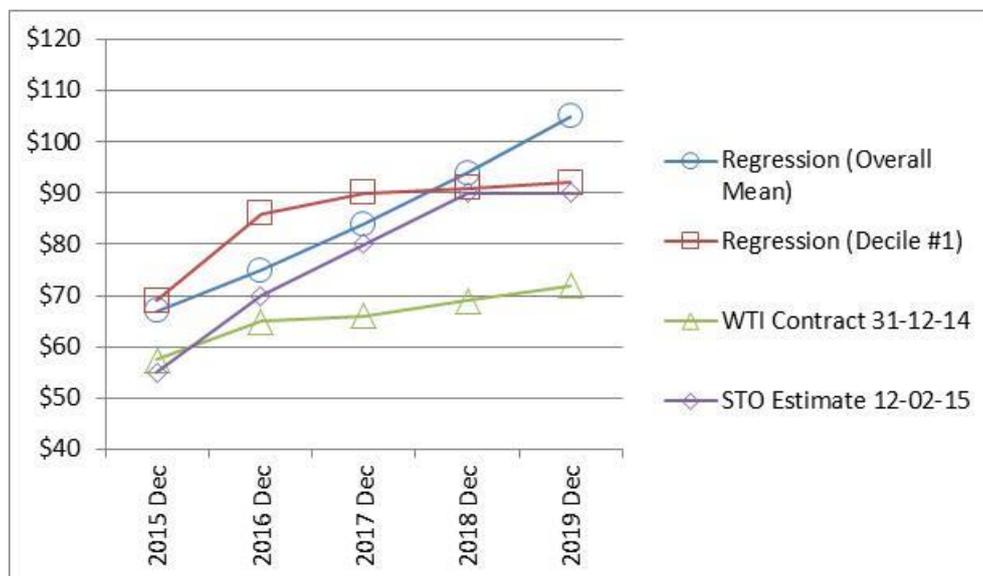


In December 2014 the price of Brent Blend averaged ca. \$60 per barrel. Given our analysis of the past, what can we say about its price in December 2015? We know that it's risen 12% during the average twelve-month period since 1987. On that basis, we can expect that in December 2015 it will cost  $\$60 \times 1.12 = \$67$  per barrel. We can, however, say more. Specifically, we know that during the year to December 2014 its price fell more than 40%. The extent of this

decrease corresponds to the first (lowest) decile of observations. We know that since 1987 when the price of Brent has decreased 40% during one twelve-month period it's subsequently risen 38%, on average, during the next twelve months. *If that generalisation remains valid, then in December 2015 we can expect that Brent's price will be ca.  $\$60 \times 1.38 = \$83$  per barrel.*

WTI's much greater number of observations allows us to make "forward projections." Figure 7 shows the prices that follow from the assumption that at specific junctures in the future (i.e., December 2015, December 2016, etc.) its price will rebound as it has in the past from a sharp (i.e., first decile of observations since 1948) decrease during the previous twelve months. *If, for example, we assume that in the next five years prices will rebound as they have in the past from a sharp (Decile #1 1948-2014) plunge, then by December 2016 they will rebound by an average of 47%; accordingly, we expect a price of  $\$57 \times 1.47 = \$84$  (see also Figure 8).*

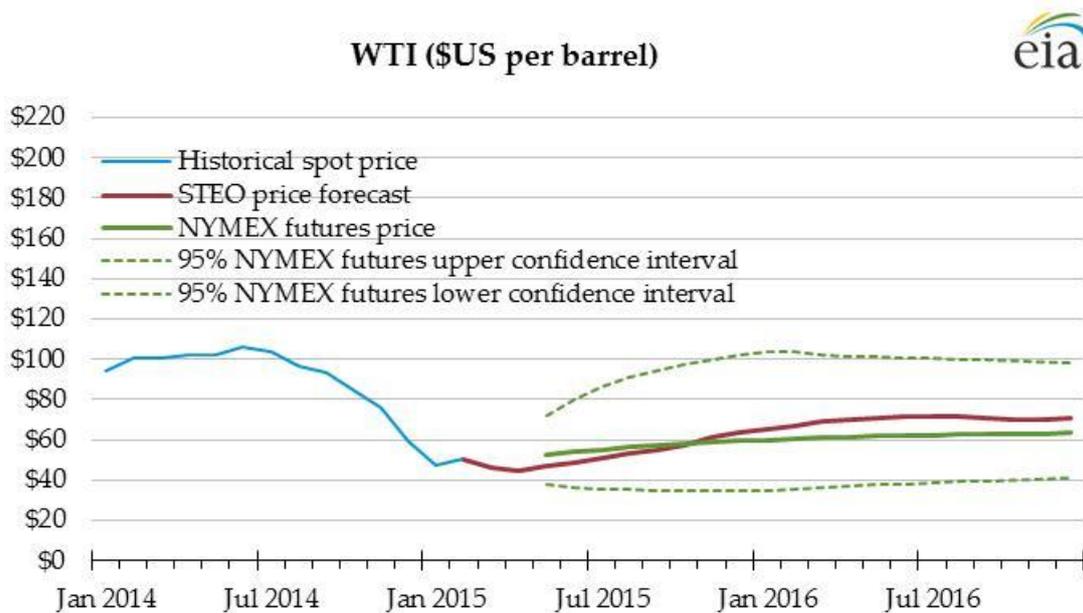
**Figure 7: Imputed Prices of WTI (\$US/Barrel), 2015-2019**



The distinction between the "spot" price (that is, for immediate delivery) and futures prices (that is, for delivery at specified dates in the future) is important. Since mid-2014, "spot" oil has plunged by half; in contrast, futures contracts have fallen by one-quarter or less. On 31 December 2014 the Brent contract for delivery in December 2016 was more than \$65 per barrel, and the contract for delivery in December 2019 traded above \$70. Actors in oil futures markets, whose expectations we represent in Figure 7 via the price of relevant contracts on 31 December 2014, also expect that the price of WTI will subse-

quently rise (albeit by less than our simple autoregressive model indicates). So too does Santos Ltd, which on 12 February 2015 released its estimates of the average price during each year to 2019.

**Figure 8: Projections of WTI to January 2017,  
U.S. Energy Information Administration**



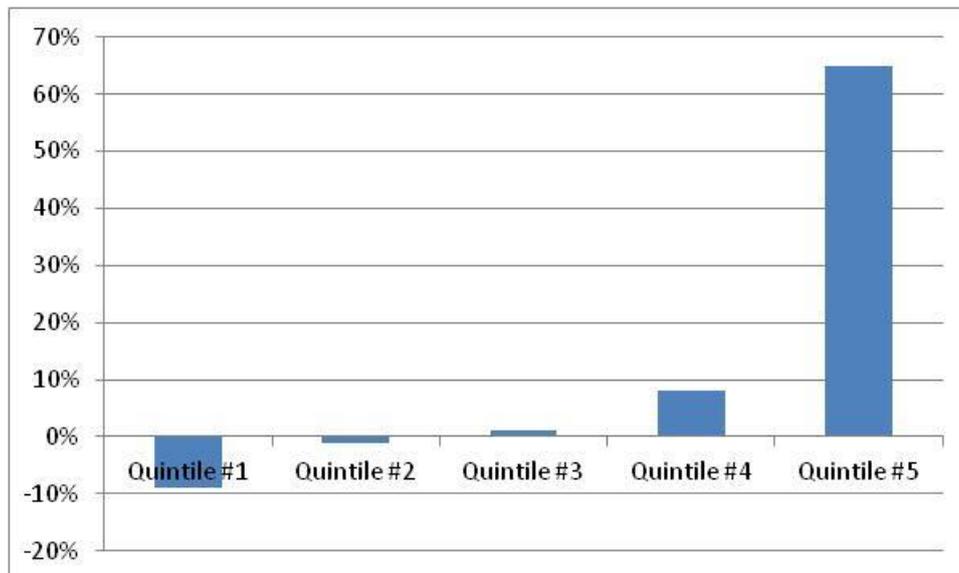
Source: U.S. Energy Info Admin, Short-Term Energy Outlook, March 2015

### **Much of the Time, the Price of Oil – and of Stocks, Markets’ Returns, Etc. – Isn’t Predictable**

It’s vital that we keep the foregoing analysis in perspective. *Only occasionally (namely the ca. 10% of the time when it plunges by ca. 40% within year) can we say with any degree of confidence that oil’s price will subsequently rise. Most of the time, given the wide fluctuation around the relevant mean, no clear inference is possible.* To see this, let’s extend the analysis. As before, I rank-ordered changes of WTI’s price during each twelve-month period since January 1948. Where possible, I also matched each period to the subsequent twelve-month period. I then excluded from consideration the top and bottom quartiles: what remains are the 25% of observations above and the 25% of observations below the series’ median. Within this half of the twelve-month periods since 1948, WTI’s twelve-month percentage change of price has ranged from 0% to 7% and averaged 2%.

What about the subsequent twelve-month periods? I rank-ordered them, grouped them into quintiles and computed each quintile's mean. On average during these periods, the price of oil rose 15%. The dispersion (see Figure 9), however, is very wide. One-fifth of the time (Quintile #1) the price of WTI decreased by an average of 9%; 40% of the time (#2 and 3) it remained essentially unchanged; and 40% of the time (#4 and 5) it rose more than 8%. During the twelve-month periods since 1948 when the price of WTI changed little in percentage terms, the price during subsequent corresponding periods either decreased, remained unchanged or increased. *Much of the time, in other words, "experts" might just as well base their "predictions" (whether they're forecasting the price of oil, the return of the stock market, etc., in a year's time) upon tosses of a coin!*

**Figure 9: Twelve-Month Percentage Changes of WTI Following an Annualised Change of 0-7%, 1948-2014**



**It's Probably Not Different This Time: As It Was in 1948-2014, So It'll Likely Be in 2015-2019**

Clearly, there's no statute that mandates either a rebound or precludes a further decrease of the price of oil during the next several years: in particular, a very low and decelerating rate of increase of CPI, as well as a recession that crimps demand, etc., could cause oil's price to sag further.<sup>9</sup> Conversely, a sud-

<sup>9</sup> "Although some companies have already delayed or even abandoned costly projects," noted *The Wall Street Journal* ("Coming to Terms with the New Oil Reality," 20 January 2015), "the impact on supply will take much longer to materialize." Given the average project's high up-front capital cost, long life and low ongoing operating cost, "it makes little sense ... to cut out-

den and unanticipated shock to supply, such as conflagration in the Middle East, etc., could cause the price to skyrocket. There's a first time for all things that have occurred in financial markets. As Figure 5 and Figure 6 showed, however, a year-on-year decrease of more than 5% has never – yet – followed an annualised decrease of 40%. We cannot know that during the next several years the price of oil will rise; nor are we simply guessing that it will. Instead, we've analysed long series of valid data; we've assumed that the next five years will resemble, at least broadly, the last 65 years; and we've added a healthy dose of caution. The results, it seems to us, are that the odds are that Brent and WPI won't fall dramatically from the levels they plumbed in December 2014-January 2015. Quite the contrary: we suspect that ere long they'll rebound significantly.

Perhaps because volatility begets headlines and the spot price is much more fickle than long-term contracts in futures markets, the mainstream media focusses overwhelmingly upon today's spot prices of Brent and WTI. Yet for investors, the implications of spot and forward prices differ greatly. Leithner & Co. is a long-term investor. *What's most relevant to us is not today's price, and not even prices a few years hence: what's most relevant is a given producer's long-term track record of cutting its sails to fit its cloth, i.e., of producing profitably under very different price conditions.* By focusing so heavily upon the spot price – and extrapolating today's extreme price into the indefinite future – speculators-who-think-they're investors will tend to overreact and thus invest poorly. Presently, not only are they (we think unreasonably) punishing major producers of oil and gas; they're unjustifiably rewarding major consumers of petroleum.

Speculators, I've often noted, blithely extrapolate today's headlines into the future; investors, on the other hand, carefully investigate whether present conditions will subsequently regress towards their historical mean (see in particular [Leithner Letter no. 90-92](#)). I've also emphasised that Leithner & Co. seeks to buy securities from pessimists – and, once they've become optimists, perhaps several years later, to resell them those same securities. Low prices, and particularly their rapid descent over short periods of time, often cause the anxiety, despondency and even panic that prompts others to sell securities to us. Conversely, extended and cumulatively large rises of prices typically beget the confidence, complacency and exuberance that trigger their purchases from us. Over time, then, the crowd's emotions careen wildly between terror and

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put just yet. ... [Hence] supply reductions big enough to push prices back to previous levels may not appear for several years ..."

euphoria; in contrast, and regardless of today's conditions and opinions about tomorrow's, the investor strives to retain his equanimity. Long-term investors seek to look beyond today's volatility and others' short-sightedness. Hence the plunge of the spot prices of Brent and WTI since mid-2014 hasn't tempted me to join the crowd, i.e., to shun producers of oil and gas. Quite the contrary: *today's downward volatility can create the very investment opportunities that underpin tomorrow's positive returns.*

To members of the crowd, it's not just cognitively counter-intuitive: it's emotionally painful not just to avoid investments where today's returns seem to lie, but actively to seek them where they definitely don't – *which, given that returns tend over time to regress towards their long-term mean, is exactly where tomorrow's returns are likely to occur.* In an op-ed article in *The New York Times* on 16 October 2008, Warren Buffett wrote "In waiting for the comfort of good news, [market participants] are ignoring Wayne Gretzky's advice: 'I skate to where the puck is going to be, not to where it has been.'" In order to sell high, we must first (since we don't short-sell) buy low; and in order to buy low and sell high, we need the opportunities that the crowd's short-sighted extrapolations create. *We need the crowd's swings of mood, but we're careful that we don't join it or share them.*

The herd finds strength in numbers and reassurance in the consensus of "experts." Leithner & Co., in diametric contrast, are nonconformists and contrarians: unison discomfits us and solitude suits us. And because we strive to think before we act, at opportune moments our analyses enable us to stand alone. Be it specifically in the oil market or more generally in stock and bond markets, on the infrequent occasions when we encounter extremes, simple but rigorous logic and dispassionate analysis of reliable evidence give us an edge over extrapolating "experts" and the emotional crowd. Having completed our homework well in advance, we're able (to borrow a line from Rudyard Kipling's *If* (1895)), to keep our heads when all about us are losing theirs.

*Chris Leithner*