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ECONOMIC OUTLOOK

The Fed Funds Rate and the Goldilocks Price for Oil

THE CARLYLE GROUP

GLOBAL ALTERNATIVE ASSET MANAGEMENT

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The Fed Funds Rate and the Goldilocks Price for Oil

By Jason M. Thomas

It is no longer a question of *whether* the Fed will raise rates, but rather *how fast* policy rates will rise. Fed policy in 2016 is likely to be reactive, with short-term interest rates adjusting as necessary in response to economic conditions. The macroeconomic variable likely to exert the greatest influence on the path of the fed funds rate is the price of oil. The experience of the last twelve months suggests that oil prices can be *too low* as well as too high. The Fed may not pursue further rate hikes in 2016 unless oil moves up towards a "Goldilocks" price that is neither "too hot," so as to choke-off demand, nor "too cold" so as to cancel energy development projects and increase stresse in the financial system.

Rates Outlook Tied to Oil Prices

Members of the Federal Open Market Committee (FOMC) have signaled their intention to raise rates at the pace of nearly 1 percentage point per year.[1] Market participants expect a somewhat shallower path for rates, with hikes averaging about 0.5% annually. While the disconnect signals some risk that rates will rise faster than expected by market participants, such a surprise would only occur in the context of stronger than expected nominal income growth. A 2016 year-end fed funds rate above 1% would be a sign of strength, not a source of concern.

The price of oil tops the list of economic variables likely to determine whether the economy will be strong enough to warrant rate hikes; higher rates may very well depend on higher oil prices. Oil's impact on inflation is well understood: oil prices influence the rate of inflation directly, through gasoline prices, and indirectly through the price of petroleum-based industrial inputs and the cost of transporting goods. But it seems reasonable to suspect that somewhat higher oil prices could actually accelerate real GDP growth as well.

As an economy that imports 5 million barrels of oil per day, on net, and depends on household spending for nearly 70% of aggregate demand, the U.S. economy would be expected to benefit from lower oil prices.[2] However, there seems to be a price level below which the benefits of cheaper oil are more than offset by costs that slow growth through two channels: (1) a decline in real activity from less capital spending on natural resources development, renewable energy, and fuel efficient technology; and (2) increased financial stress from the rising risk of defaults in credits linked, directly or indirectly, to the price of oil.

The Costs of Cheaper Oil

The price of oil not only influences the real incomes of oil producers and consumers, but also helps to determine the expected return on energy exploration and development spending. Lower prices depress investment by making further exploration and development uneconomic. Over the course of 2015, energy-related equipment orders declined by about 30% in the U.S. with global exploration and production (E&P) capex down $250 billion (Figure 1).[3] Extractive industries account for such a large share of total capex (Figure 2) that a 30% decline in energy-related orders and weakness in foreign demand have pushed the U.S. industrial sector into recession.[4]

FIGURE 1

Oil Prices and Energy Development Spending[5]

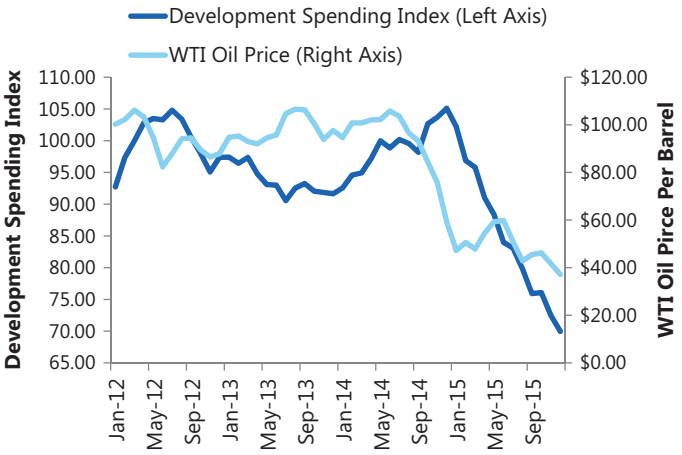
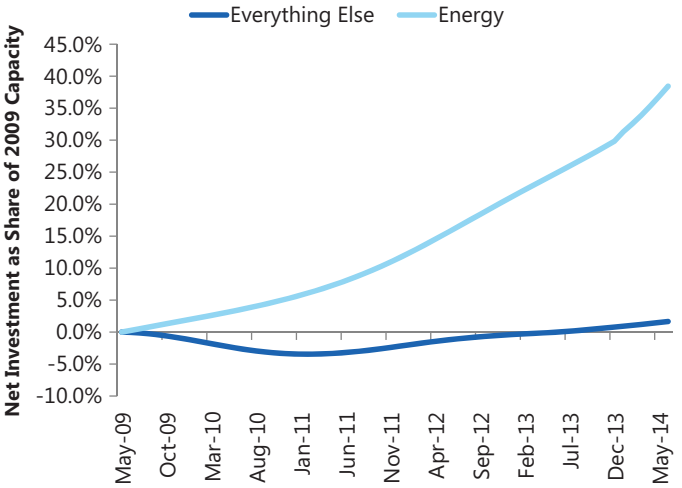


FIGURE 2

Cumulative Net Industrial Investment, 2009-2014[6]



1 Summary of Economic Projections, Federal Reserve, September 2015.

2 EIA, Top sources and amounts (million barrels per day) of U.S. petroleum imports, and percent share of gross imports, 2014.

3 Rystad Energy, "Rystad Energy: Future supply security at risk," December 2015.

4 Federal Reserve, G. 17, December 16, 2015.

5 Carlyle Analysis of Federal Reserve, G.17, December 14, 2015.

6 Carlyle Analysis of Federal Reserve, G.17, December 14, 2015.

Remarkably, the downturn in the industrial sector has occurred despite booming U.S. auto production. In 2015, households saved roughly $140 billion on fuel costs relative to 2014, which contributed to 0.5% faster growth in household consumption.[7] Much of the increase was spent on SUVs, cross-overs, and light-duty trucks, the sales of which increased by 12.5% in 2015 as consumers shifted to less fuel efficient vehicles.[8] Yet, despite a 12% increase in domestic auto production, aggregate industrial production declined at a 1.2% annual rate due to the collapse in orders for machined parts, precision tools, engines, transmissions, pumps, and the many other intermediate goods sold into the global mining, metals, and energy development value chain.

The shift to less fuel-efficient autos also underlines another cost of cheaper oil. The bulk of the R&D spending of energy-consuming industries and their suppliers has been concentrated in the development of more fuel efficient technology. As energy prices decline, the attractiveness of more fuel efficient engines, airframes, and transmissions fades, which impairs the capitalized value of manufacturers' past R&D. Rather than boost spending in response to the shock, oil-consuming businesses may prefer to postpone product development and wait for more information about the future evolution of prices.[9] Lower carbon-based energy prices have also depressed spending and employment at renewable energy companies whose competitiveness has been compromised by the oil price shock.[10]

Financial Distress

At the same time, the oil price shock has also introduced significant default risk on the $485 billion of speculative grade loans and bonds used to finance previous energy development projects. As of December 2015, the price of energy-linked high-yield bonds had declined below $70 per $100 of par, as credit spreads had risen from 380 basis points in June 2014 to over 1250 bp in December 2015. With energy accounting for roughly 15% of the high-yield bond universe, losses on energy have pushed overall credit returns into negative territory for the year. When coupled with losses on related sectors (mining and metals) and the industrial slowdown, energy-related distress has contributed to a marked pull-back in the financing terms available to corporate borrowers in wholly unrelated sectors. Effective yields on high-yield bonds *outside* of energy now average 8.5%, up from just 5.5% six months earlier, with average prices down to 89 percent of face value (Figure 3).[11]

The distress in energy credit has interacted with extreme illiquidity in credit markets to drive the price of oil down further. As dealer inventories of credit market securities have declined from over $300 billion in 2007 to virtually zero at the end of 2015,[12] creditors have found themselves unable to sell energy loans and bonds without incurring significant liquidity discounts. As an alternative to outright sales, many creditors have reduced their net notional exposure to energy credit through short positions in oil futures contracts. Weekly changes in the net short position of money managers have been -75% correlated with the average price of high-yield energy bonds over the last 18 months (Figure 4). As the price of oil declines, fund managers must increase the size of their hedge, which places more downward pressure on the price of oil, increases default risks, and intensifies the feedback loop.[13]

FIGURE 3

Average High-Yield Bond Price as a Percent of Face Value (Total Market)[14]

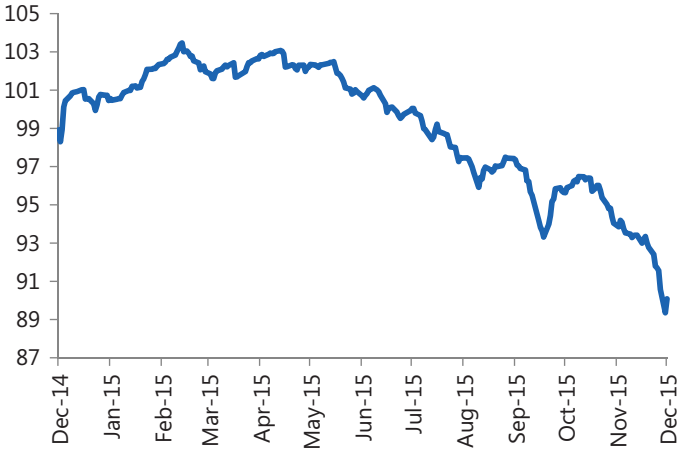
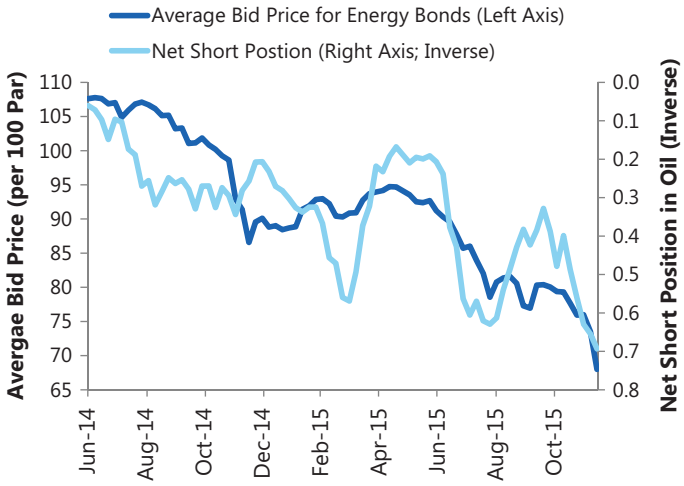


FIGURE 4

Energy Bond Prices and Oil Hedging Activity by Fund Managers[15]



7 Federal Reserve Bank of St. Louis, Personal Income and Outlays, December 14, 2015.

8 Motor Intelligence Survey, December 1, 2015.

9 Jo, S. (2014), "The Effects of Oil Price Uncertainty on Global Real Economic Activity," *Journal of Money, Credit, and Banking.*

10 "Are Low Oil and Gas Prices Undermining Renewable Energy Yieldcos?," *OilPrice*, October 25, 2015.

11 Carlyle Analysis of BAML, Global Index System Database, December 14, 2015.

12 Federal Reserve Board of Governors, L. 129, December 2015.

13 An investor in a bond issued to fund oil development is effectively short a put option written on oil futures. The size of the optimal hedge ratio increases as the put moves further into the money (i.e. the price of oil declines below per barrel production costs or collateral values).

14 Carlyle Analysis of BAML Global Index System Database, December 16, 2015.

15 Carlyle Analysis of CFTC Data, December 14, 2015. Net short position is the ratio of aggregate short positions to aggregate long positions of money managers in NYMEX oil futures contracts and related derivatives.

Credit market shocks of the sort triggered by the commodity price collapse can prove quite damaging to broader economic conditions. Sudden increases in credit spreads often signal a contraction in the financial system's risk-bearing capacity. Such contractions result in an inefficient increase in businesses' cost of capital, which depresses investment and hiring.[16]

Estimates of the Goldilocks Price

If oil prices of $40 or below introduce costs that exceed the benefits of cheap oil, where is the "Goldilocks price" that would stabilize credit markets and industrial orders without depressing consumer spending? While any estimate is inherently speculative, a range of between $50 and $65 seems most appropriate. If oil moves into this range in 2016, it would be reasonable to expect nominal income to grow at a pace that would allow the Fed to move forward with further rate hikes.

As shown in Table 1, the full-cycle breakeven costs of most unconventional oil development projects in the U.S. are generally estimated to range between $45 and $65 per barrel. If oil moved into the Goldilocks range, energy development spending would likely stabilize rather than contract at current rates. More importantly, increases in the value of energy collateral would reduce credit losses relative to the loss rates implied by current spreads. Broader credit conditions would likely improve thanks to the decline in associated risk premia.[17] Creditors would suffer losses on more speculative development projects, but the total financial cost of the oil price shock would be contained.

FIGURE 5

Spot Oil Prices and Estimates of Fundamental Value[18]

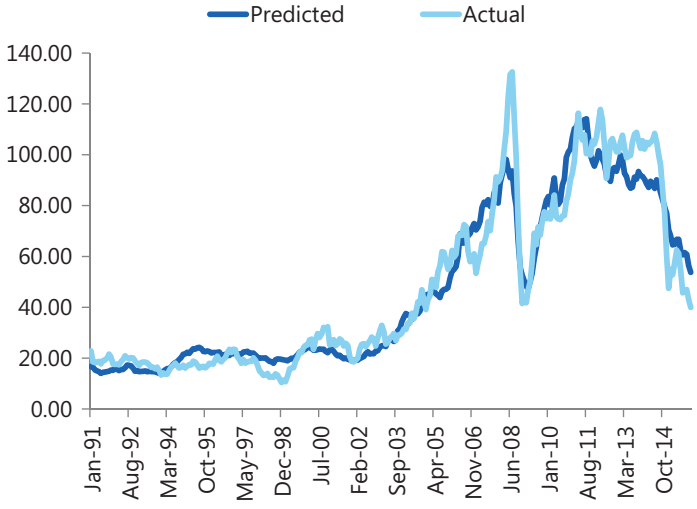


TABLE 1

Estimates of Breakeven Oil Prices

Basin	Breakeven Oil Price Per Barrel
Marcellus Shale – SW Liquids Rich	$24.23
Marcellus Shale – Super Rich	$25.63
Utica – Wet Gas	$32.39
Mississippian Horizontal – East	$42.15
Utica – Liquids Rich	$44.04
Eagle Ford – Liquids Rich	$46.05
Niobrara – Wattenberg	$46.10
Wolfcamp – N. Midland (Horizontal)	$53.92
Eagle Ford – Oil Window	$55.29
Wolfcamp – S. Midland (Horizontal)	$61.57
Mississippian Horizontal – West	$64.05
Wolfberry	$64.63
Bakken Shale	$64.74
Wolfcamp – N. Delaware (Horizontal)	$68.54
Uinta – Green River	$68.77
Uinta – Wasatch (H)	$72.15
Granite Wash – Liquids Rich Horizontal	$73.10
Uinta – Wasatch (V)	$74.95
Barnett Shale – Southern Liquids Rich	$84.45

An oil price in this range is also consistent with statistical estimates of "fundamental value" based on a principal components analysis of non-oil market variables. Global trade volumes, industrial metals prices, and the foreign exchange value of the U.S. dollar (the currency in which oil is invoiced) combine to explain about 93% of the observed variation in the market price of oil over the past 25 years (Figure 4).[19] As of December 2015, these variables are consistent with a per barrel oil price of about $55, roughly 40% higher than the current spot price.

The observed relationship between oil and the exogenous variables are about as one would expect: a 1 percentage point increase in global trade volumes is associated with a 0.9% increase in oil prices; a 1 percent increase in industrial metals prices results in a 0.52% increase in oil prices; and a 1 percentage point increase in the U.S. dollar index is associated with a 1.2% decline in oil prices. This analysis suggests that downward pressure from credit-related hedges and oil market-specific factors (Iran, OPEC, surprising persistence in U.S. oil output, etc.) have kept the market from balancing at a per-barrel price near $55. Oil prices in the Goldilocks range would also be consistent with regular U.S. gasoline prices between $2.00 and $2.60 per gallon, which would save U.S. households roughly $150 billion on fuel expenses relative to 2013 averages, which would provide ongoing support for household spending.[20]

16 Gilchrist, S. and Zakrajsek, E. (2012), "Credit Spreads and Business Cycle Fluctuations," *American Economic Review.*

17 The credit risk premium – the amount of compensation investors earn after accounting for default losses, liquidity, and other factors – is shown to be a linear function of the expected loss rate in Thomas, J. (2015), "The Credit Risk Premium and Return Predictability in High Yield Bonds," in Fridson, M. (ed) *High Yield, Future Tense.*

18 Carlyle Analysis of BAML, Global Index System Database, December 14, 2015.

19 Carlyle Analysis; Federal Reserve Bank of St. Louis Data, December 14, 2015.

20 Carlyle Analysis, EIA gasoline consumption data; Federal Reserve Bank of St. Louis data on gasoline prices.

2016 Outlook

Not only are there no guarantees that oil prices will move up towards the Goldilocks range, the longer prices remain "too cold," the higher is the probability that future prices will be "too hot" as sharp cuts in development spending today result in inevitable supply shortages tomorrow. Cycles have been and will remain the dominant feature of commodity prices, with concomitant booms and busts in related capex.[21] Yet, the near inevitability of higher prices sometime in the future will be of no consolation in 2016.

If oil prices do not rebound and the slump in resource development and speculative credit deepens, it is difficult to imagine inflation and GDP figures strong enough to warrant additional rate hikes in 2016. The Fed has elected to end its zero interest rate policy, but further increases in rates are far from assured. The hoped-for decline in energy prices from unconventional drilling delivered very real benefits to consumers, but also served as history's latest illustration that one can desire too much of a good thing.

21 Cashin, P. et al. (2002), "Booms and Slumps in World Commodity Prices," *Journal of Development Economics.*

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Mr. Thomas has earned the Chartered Financial Analyst (CFA) designation and is a financial risk manager (FRM) certified by the Global Association of Risk Professionals.

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