

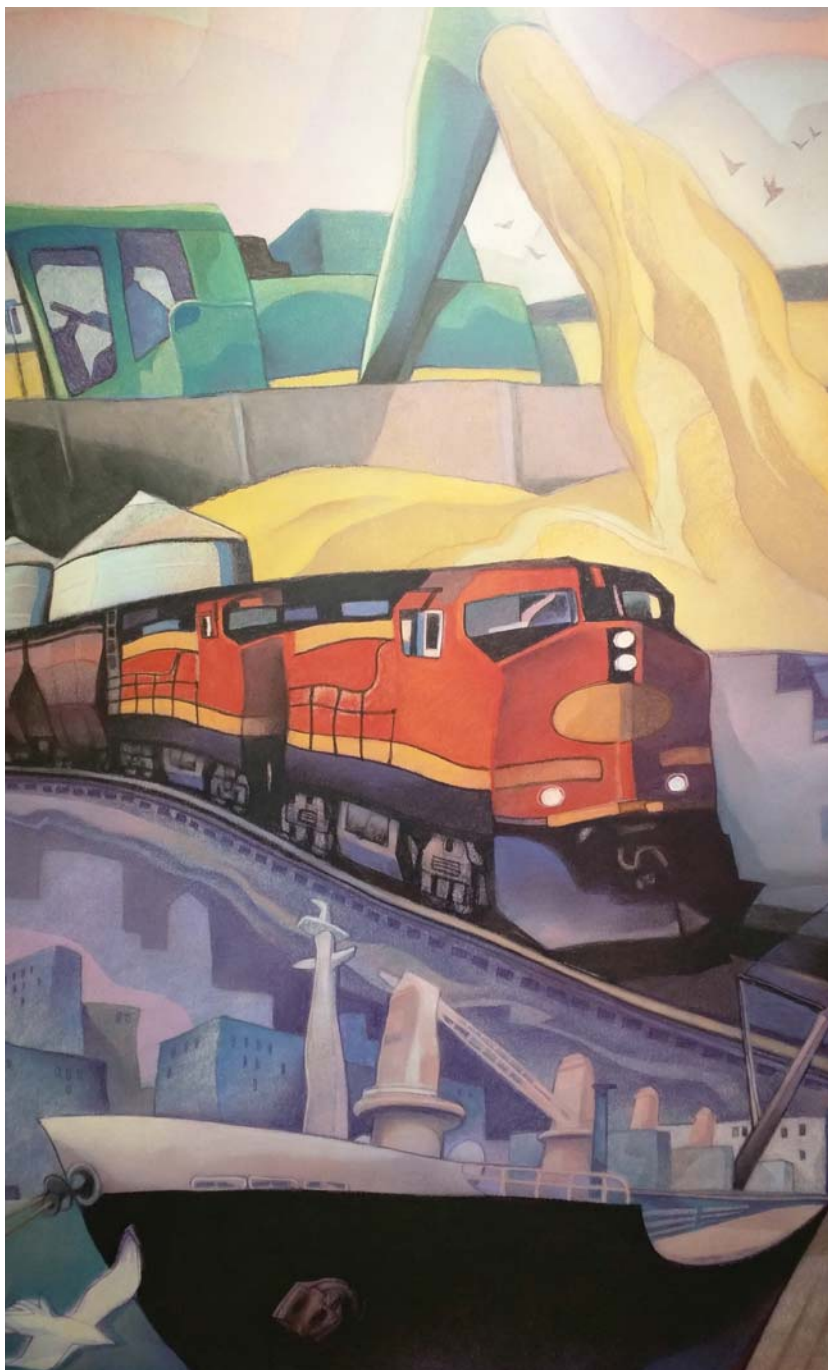
**J.P. MORGAN CENTER  
FOR COMMODITIES**  
UNIVERSITY OF COLORADO  
DENVER BUSINESS SCHOOL



# GLOBAL COMMODITIES

APPLIED RESEARCH DIGEST

FALL 2016



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generous grant from

**CME GROUP  
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 **Business School**  
UNIVERSITY OF COLORADO DENVER



The *Global Commodities Applied Research Digest (GCARD)* is produced by the J.P. Morgan Center for Commodities (JPMCC) at the University of Colorado Denver Business School. The aim of the *GCARD* is to serve the JPMCC's applied research mission by informing commodity industry practitioners on innovative research that will either directly impact their businesses or will impact public policy in the near future. The digest is published twice per year and has been made possible by a generous grant from the CME Group Foundation.

The *GCARD's* Contributing Editor is Hilary Till, M.Sc. (Statistics), Solich Scholar at the JPMCC and member of the JPMCC's Research Council. The *GCARD's* Editorial Assistant is Katherine Farren, CAIA, and the *GCARD's* Publication Consultant is Barbara Mack, MPA.



The JPMCC is honored to have a distinguished [Research Council](#) that is responsible for shaping the applied research agenda of the Center. Accordingly, the *GCARD*, in part, draws from insightful presentations and discussions that occur at the Center’s semiannual Research Council meetings. The JPMCC’s Research Council members are listed on the next page.



Dr. Ajeyo Banerjee, Executive and Faculty Director of the J.P. Morgan Center for Commodities at the University of Colorado Denver Business School, welcoming Research Council members to the Council’s December 4, 2015 meeting. On Dr. Banerjee’s left is Dr. Dave Hammond, Ph.D., of Hammond International Group.



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**From El Niño to La Niña: Implications for Natural Gas, Agricultural Price Volatility, and the Potential for Hurricanes** **14**  
*By Bluford Putnam, Ph.D., Chief Economist, CME Group*

This article discusses the shift of weather patterns from El Niño 2015 (warmer waters along the east equatorial Pacific Ocean) to the potential La Niña 2017 (colder waters along the east equatorial Pacific Ocean) and the effects this shift could plausibly have on energy and agricultural markets.

**The Great Suppression** **20**  
*By Colin Fenton, Managing Partner and Head of Research, Blacklight Research LLC*

As of July 29, 2016, US GDP estimates confirmed that the US economy was in a broad and sustaining slump. Blacklight Research had previously identified this decline and termed it, “The Great Suppression.” This article explains the five main suppressants that drive the *Great Suppression*: climate policy, FOMC monetary policy, US crude export policy, OPEC production policy, and international policy toward the Syrian crisis.

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The Contributing Editor’s collection of four articles covers issues that are relevant to the agricultural, metals, and energy markets, reflecting the J.P. Morgan Center for Commodities’ commitment to include all commodity sectors in both its applied research and educational efforts.

**The Fundamental Elements of a Commodity Investment Process** **28**

This digest article covers how to further distill returns in the commodity markets beyond that which is available through passive exposures to various commodity sectors. A manager can potentially do so through the use of well-chosen entry and exit rules, trade construction, and downside risk management. In addition, an actively managed commodity portfolio will tend to have dynamic exposures to the various commodity sectors, given the seasonal nature of a number of commodity trading opportunities.

**A Brief Primer on Commodity Risk Management** **32**

This digest article discusses the practical issues involved in applying a disciplined risk management methodology to commodity futures trading. Accordingly, the paper shows how to apply methodologies derived (Continued next page)



## Contributing Editor's Collection (Continued)

from both conventional asset management and hedge fund management to futures trading. The article also discusses some of the risk management issues that are unique to leveraged futures trading.

### Why Haven't Uranium Futures Contracts Succeeded? 41

The Spring 2016 "Contributing Editor's Collection" of articles included an article on "Brief Case Studies on Futures Contract Successes and Failures." That article noted that even though the U.S. futures markets have evolved in a trial-and-error fashion, one can nonetheless identify the key elements that determined whether particular futures contracts succeeded or failed. In this issue, we add to this past analysis by examining why a particular metals futures contract has not succeeded thus far: the uranium futures contract. Such an analysis, as in this article, may be valuable for new financial centers as they build successful futures markets.

### Timing Indicators for Structural Positions in Crude Oil Futures Contracts 46

Should an investor enter into long-term positions in oil futures contracts? In answering this question, this paper covers the following three considerations: (1) whether crude oil inventories are scarce or not; (2) how to avoid the risk of oil prices crashing; and (3) the use of financial assets for diversification purposes. The paper concludes that positions in crude oil futures contracts should (a) not only be actively timed, but (b) must also be twinned with financial assets in order to hedge against

both the possibility of deflationary conditions and/or periodic oil-market-share price wars.

## Research Digest Article

### China: Credit, Collateral, and Commodity Prices 52

*As summarized by Keith Black, Ph.D., CFA, CAIA, Managing Director, Curriculum & Exams, CAIA Association*

This digest article summarizes a joint research paper by Shaun K. Roche, Ph.D., of Temasek International and Marina Rousset of the International Monetary Fund. In summary, investors and suppliers have long sought to understand and predict commodity prices using supply and demand analysis. Historically, commodity demand was measured by the quantity of commodities consumed through food or industrial uses. After the Chinese Property Law was enacted in October 2007, an increasing amount of industrial metals have been placed into storage and used as collateral for loans. Including these warehouse stocks in demand estimates, especially in copper, seem to overestimate the ("real") demand for industrial metals in the Chinese market. Investors and suppliers of industrial metals should adjust their supply and demand models to account for the risk of these inventories being sold off if financial conditions deteriorate.



## Reports on the Research Council Meetings

### Case Study on Olam International 56

At the JPMCC's December 2015 Research Council meeting, Professor Forest Reinhardt of Harvard Business School (HBS) led a discussion on an HBS case study on Olam International. This discussion was based on an HBS case study that Professor Reinhardt had co-authored. This digest article summarizes Professor Reinhardt's case study lecture.

### The Determinants of the Price of Crude Oil: The Relative Importance of Fracking, China, and Geopolitics 61

At the JPMCC's December 2015 Research Council meeting, Professor James Hamilton of the University of California, San Diego, discussed why it turned out that oil priced at \$100 did not hold, starting in 2014. Dr. Bluford Putnam of the CME Group and Professor Yosef Bonaparte of the University of Colorado Denver discussed Professor Hamilton's research from both practitioner and academic perspectives, respectively. This digest article summarizes Professor Hamilton's panel session.

## Editorial Advisory Board Commentary

### Swing Oil Production and the Role of Credit 70

*By Hilary Till, Contributing Editor, and Jan-Hein Jesse, Editorial Advisory Board Member, GCARD*

The article begins with the classic definition of a swing producer and notes that North American tight oil (shale) producers would not normally fit this strict definition. The paper then argues that advances in well-

production estimation techniques naturally led to an explosion of creative financing solutions for investing in shale. As a result, the appetite of credit markets for taking on shale-production risk became a key driver for the outlook for North American oil production. Next the article proposes that we *might* be able to refer to shale producers as swing producers as long as we loosen the definition of swing producer to be one in which there are fairly uniform production decisions that take place over up to a 12-month timeframe. The paper then notes that at some point, geological constraints (much more than the credit cycle) could come back into play and the baton would thereby pass back to the Middle East Gulf oil producers as the undisputed swing producers. Lastly, the paper returns to a shorter-term perspective, describing how the capital markets will likely be much more cautious in investing in shale oil production, even with a continuation in the recovery of the price of oil.

## Interview

### Interview with a Thought Leader in Commodities 89

In the Fall issue of the *GCARD*, we interview Dr. Margaret E. Slade, Ph.D., Co-Chair of the J.P. Morgan Center for Commodities' (JPMCC's) Research Council. In this interview, Dr. Slade discusses her motivation for becoming the Co-Chair of the Research Council and notes that there are no other academic centers like it. She also provides highlights of the 2015 Research Council meetings and details her goals for the Council. In addition, Dr. Slade (Continued next page)





## Interview (Continued)

discusses how she became involved in the commodity markets. She then notes key findings of her recently published work. Lastly, Dr. Slade also provides feedback on the *GCARD*, regarding the types of topics that should be covered, given its practitioner focus.

## Global Commodity Issues [Editor's Choice]

### Introduction to *Global Commodity Issues* [Editor's Choice] 94

The J.P. Morgan Center for Commodities also produces the *Global Commodity Issues (GCI)* [Editor's Choice] eJournal, which is edited by Professor Marcelle Arak of the University of Colorado Denver Business School. The *GCI* [Editor's Choice] distributes working papers and abstracts of accepted papers in commodities, including agricultural, minerals/mining, and energy-related commodities worldwide.

## JPMCC Professional Education

### JPMCC Professional Education 95

### Commodity Data Analysis 96 *November 9 – 11, 2016*

Guided by veteran industry practitioners, and utilizing one of the most user-friendly statistics packages on the market, students gain a core practical competency in econometrics and price modeling for the commodity markets. Students become familiar with not only the dominant methods for modeling forward curve dynamics, but also advanced methods

employed by the most sophisticated market participants.

### Foundations of Commodities 98 *March 20 – 21, 2017*

In the Spring 2017 Professional Education offering, attendees gain a high level of understanding of the commodities industry from physical aspects (supply chain, fundamentals, asset monetization) to the financial (market structure, spreads, futures and derivatives). Risk management and regulation compliance are covered at a high level. The goal of this course is to educate professionals on the foundational concepts of commodities in the physical and financial arenas including key terms and concepts, underlying principles, market structure, futures and derivatives, risk management, and regulation. This course provides an affordable and accelerated curriculum for new hires in commodity-related businesses.

### Professional Education Content Director & Subject Matter Expert (SME) Biographies 100

## JPMCC Student Programs

### Certificates in Commodities and Specializations in Commodities for Graduate Students 103

At the JPMCC, students acquire a better understanding of the commodities market in its entirety, from both the physical and financial perspective, including trading operations, supply chain and investment management. With strong industry support, courses in this specialization are designed around real business problems in the commodities sector.



## Contributing Editor's Letter

Dear Reader,

My colleagues and I are happy to present the Fall 2016 issue of the [Global Commodities Applied Research Digest \(GCARD\)](#) to you. For the benefit of the GCARD's practitioner readership, we have pulled together insights from the following J.P. Morgan Center for Commodities' (JPMCC's) sources: (a) its [Research Council membership](#); (b) the presentations at the Research Council meetings; (c) the JPMCC's [Global Commodity Issues \[Editor's Choice\]](#) eJournal; and from (d) the [GCARD's Editorial Advisory Board membership](#). The expertise and diversity of these sources result in the GCARD being able to further the JPMCC's goal in becoming the focal point of highly relevant commodities thought-leadership.

### Welcome to Dean Rohan Christie-David, Ph.D.

In this letter, I will discuss the content of the current issue as well as provide a preview of the next issue's articles, too. But first, all of us at the JPMCC are delighted to welcome the new Dean to the University of Colorado Denver Business School, Dr. Rohan Christie-David! [Dr. Christie-David joined the Business School on August 1, 2016](#). He has specialized in the areas of banking, derivatives, and market microstructure. Dr. Christie-David's published work includes jointly published articles in the *Journal of Futures Markets*, the *Review of Futures Markets*, the *Journal of Banking and Finance*, and in the *Journal of Regulatory Economics*. Regarding the University of Colorado Denver Business School, Dr. Christie-David has observed that it "has great potential for growth and excellence." The Provost of the University of Colorado Denver, Roderick Nairn, noted that he is "excited to have someone of Dr. Christie-David's caliber joining the ranks of CU Denver's leadership team." At the GCARD, we are, too!



Dean Rohan Christie-David welcomed the JPMCC's Research Council to its September 30, 2016 meeting. The September meeting was the Council's third meeting since its inception in April 2015. This particular meeting included panel sessions on commodity supply chain management and emissions trading. Dean Christie-David noted that it was wonderful to meet so many of the researchers, who are well known in the commodities academic literature, during the Council's morning session.

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### Content for the Fall 2016 Issue

This issue of the *GCARD* mainly consists of the following 6 sections: (1) the Research Council Corner; (2) the Contributing Editor's Collection; (3) the Research Digest summary; (4) Reports on the Research Council Meetings; (5) the Editorial Advisory Board Commentary; and (6) an Interview with a Thought Leader in Commodities. We have also included three additional sections, which introduce readers to three other activities at the JPMCC: (a) the *Global Commodity Issues [Editor's Choice]* eJournal; (b) the Center's Professional Education offerings; and (c) the Center's Student Programs.

In the **Research Council Corner**, our authors separately highlight the impact of complex weather patterns and large macro policy decisions on both commodity prices and economic growth, respectively. In the former case, Dr. Bluford Putnam of the CME Group generously contributes his expertise for the benefit of *GCARD's* readers while in the latter case, Mr. Colin Fenton of Blacklight Research LLC excerpts from his "Great Suppression" thesis. Both Dr. Putnam and Mr. Fenton are members of the JPMCC's Research Council.



The **Contributing Editor's Collection** of digest articles includes practitioner insights that span the energy, agricultural, and metals sectors. The collection specifically consists of four articles, which variously cover the gasoline, copper, corn, natural gas, uranium, and crude oil markets.

In the **Research Digest Article**, Dr. Keith Black of the CAIA Association summarizes a scholarly paper on the demand for industrial metals in China. Dr. Black is also an Editorial Advisory Board member of the *GCARD*. We are grateful to Dr. Black for his highly accessible digest article on one aspect of China's demand for copper: the need for credible collateral for loans. Interestingly, at the J.P. Morgan Center for Commodities' inaugural April 2015 Research Council meeting, one of the Council's agricultural experts had noted that soybean inventories in China may have also been used as collateral for financing other entrepreneurial activities. The driver for soybean demand in that case would not have been food demand. That said, in future issues of the *GCARD*, we will also include articles on the "real" demand for commodities in China, given the concerns in that country "with the basic necessities of life [such as] power, water, metals, [and] energy," as stated by Mr. Robert Gray, CFA, of Resource Capital Funds during the JPMCC's April 2015 Research Council meeting.

The **Reports on the Research Council Meetings** section includes two summaries from the December 2015 Research Council meeting's presentations, namely (1) a case study on Olam International, which is a leading agri-business that operates in 70 countries; and (2) a lecture on the relative importance of fracking, China, and geopolitics in determining the price of oil. The case study on Olam International was provided by Dr. Forest Reinhardt of Harvard Business School while the lecture on crude oil prices was given by Dr. James Hamilton of the University of California, San Diego. Both Professor Reinhardt and Professor Hamilton are members of the JPMCC's Research Council. The next issue of the *GCARD* will include a report on the September 30, 2016 JPMCC Research Council meeting.



Professor Vince Kaminski, Ph.D., of Rice University, provided a lecture on the involvement of financial institutions in the commodity markets at the JPMCC's Research Council meeting on September 30, 2016. Professor Kaminski is a member of the JPMCC's Research Council. His presentation will be covered in the Spring 2017 issue of the *GCARD*.

In the **Editorial Advisory Board Commentary**, both myself and *GCARD* Editorial Advisory Board member, Jan-Hein Jesse, discuss "Swing Oil Production and the Role of Credit." This article benefited from comments by Thorvin Anderson, CFA, also an Editorial Advisory Board member of the *GCARD*. This commentary argues that advances in well-production estimation techniques naturally led to an explosion of creative financing solutions for investing in shale (tight oil) production. As a result, the appetite of credit markets for taking on shale-production risk became a key driver for the outlook for North American oil production. But can North American shale producers be considered the new swing oil producers? The article concludes that the answer is perhaps yes, but only imperfectly so, given that it may take up to 12 months for fairly uniform production decisions to be made. More precisely, one can be "confident about ... US tight oil production ... [becoming] the marginal [oil] producer. That's because it's the high-cost producer," as stated by JPMCC Research Council member, Professor James Hamilton, during his December 2015 presentation to the Research Council.

In the first issue of the *GCARD*, we interviewed Professor Colin Carter of the University of California, Davis, and Chair of the JPMCC's Research Council. In this issue's **Interview with a Thought Leader in**



**Commodities**, we have the privilege of interviewing Professor Emeritus Margaret Slade of the University of British Columbia. Dr. Slade is also the Co-Chair of the JPMCC's Research Council. She discusses what motivated her to become the Co-Chair of the Council, and she also summarizes the key findings of her recently published research work.

### **Preview of Spring 2017 Issue**

Amongst the next issue's content, we will be highlighting articles from the *GCARD's* Editorial Advisory Board members, covering the following topics: (1) Oil (by Ebele Kemery of J.P. Morgan Asset Management); (2) Natural Gas (by Peter O'Neill, CFA, of Uniper Global Commodities North America, a wholly-owned subsidiary of E.ON); and (3) Gold (by Professor Fergal O'Connor, Ph.D., of York St John University (UK).) In addition, Anne-Sophie Corbeau will be contributing a digest article on liquid natural gas for the forthcoming issue. Ms. Corbeau is a Research Fellow at KAPSARC (Saudi Arabia.)

Both my colleagues at the JPMCC and I welcome feedback from *GCARD's* readers on what future topics we should cover in the exciting and always dynamic field of commodities!

Best Regards,

Hilary.Till@ucdenver.edu

Founding Contributing Editor, *Global Commodities Applied Research Digest*; and  
Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School



## From El Niño to La Niña: Implications for Natural Gas, Agricultural Price Volatility, and the Potential for Hurricanes

### Bluford Putnam, Ph.D.

Chief Economist, CME Group; and Member of the J.P. Morgan Center for Commodities' Research Council at the University of Colorado Denver Business School



Dr. Bluford Putnam (right), Chief Economist at the CME Group, was the industry discussant for the presentation on “Fracking, China, and the Geopolitics of Oil” by Professor James Hamilton (left), University of California, San Diego at the J.P. Morgan Center for Commodities' (JPMCC's) Research Council meeting in the Center's CoBank Lecture Hall on December 4, 2015.

El Niño 2015 is long gone. Now there is high potential that La Niña 2017 is forming. The impacts of these weather events can be very far reaching. El Niño 2015 led to less rain in the monsoon seasons of India, Malaysia, and Indonesia, and the drought conditions created more wildfires. In Brazil, El Niño 2015 eased drought conditions and water shortages around São Paulo. Going against historical patterns, in North America the storm track failed to move southward, so southern California did not get as much rain as hoped, the Pacific Northwest experienced storm after storm, and the US Midwest winter was warmer than predicted.

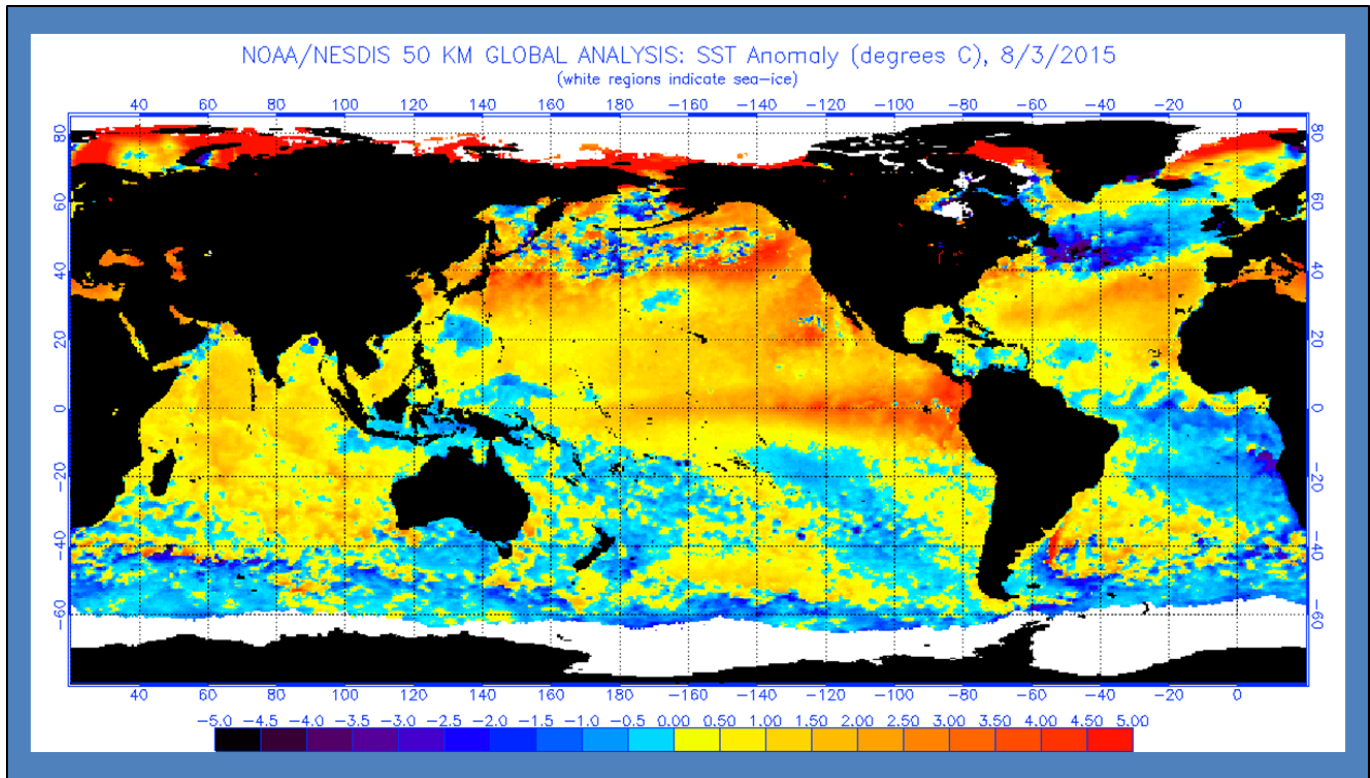


In “Science” (June 24, 2016, Volume 352, Issue 6293), Eli Kintisch analyzed what factors contributed to forecasts failing to work as planned, especially the failure of the North American storm track to move further south. The key to how winds above North America are impacted depends on the “southern oscillation.” In 2015, the Pacific Ocean off the coast of North America was much warmer than in the previous strong El Niño’s of 1982 and 1997, and the warmer northern Pacific is getting credit for keeping the storm track from moving south.

**Now that El Niño has departed, weather analysts are observing the potential (current probabilities are in the 60% to 70% range) for La Niña to form, which means colder than usual waters along the equatorial Pacific Ocean. A flip from El Niño (the boy) to La Niña (the girl) is typical, especially when El Niño was quite strong, as occurred in 2015.**

**Figure 1**

**August 2015 – Strong El Niño**



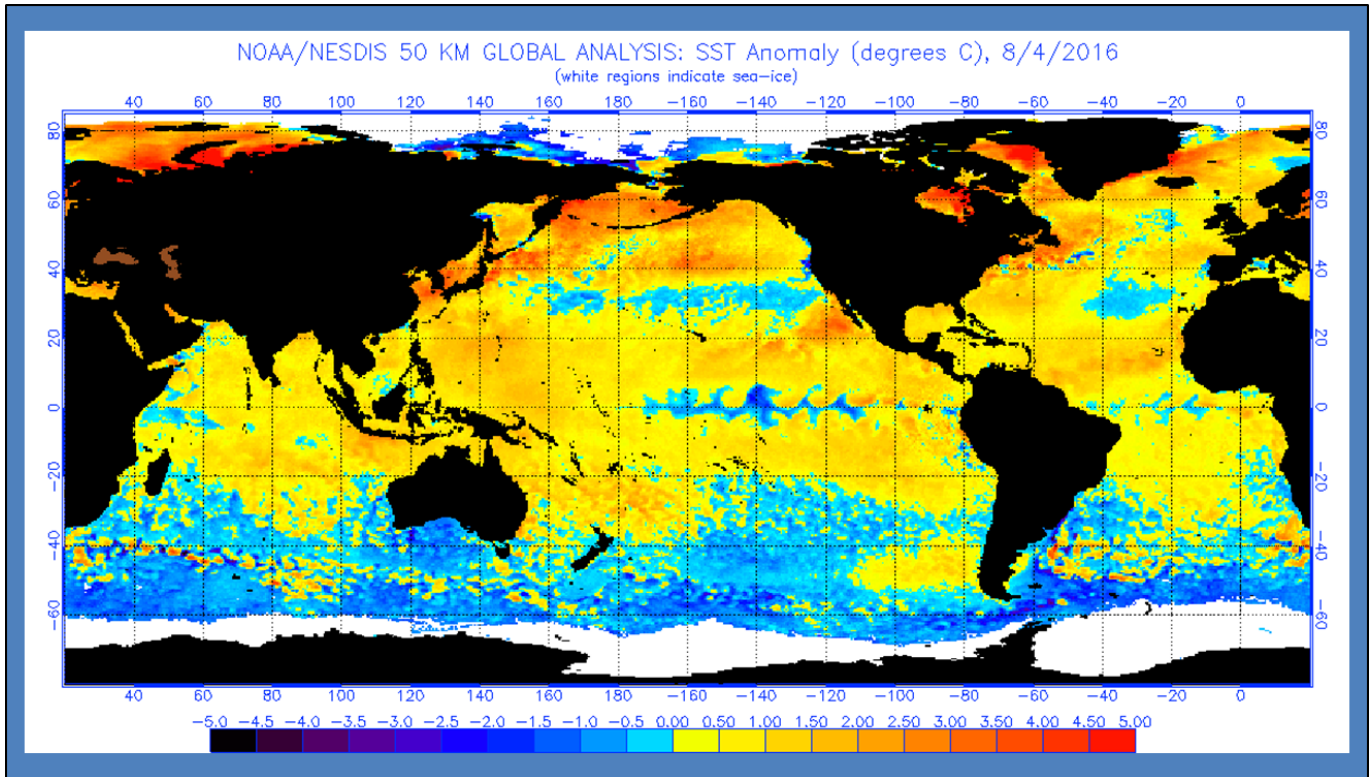
Orange indicates warmer than usual sea surface temperatures. El Niño is warmer waters along the east equatorial Pacific Ocean.

Source: <http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/>





**Figure 2**  
**August 2016 – La Niña Forming?**



Blue indicates colder than usual sea surface temperatures. La Niña is colder waters along the east equatorial Pacific Ocean.

Source: <http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/>

### Focus on Natural Gas in North America

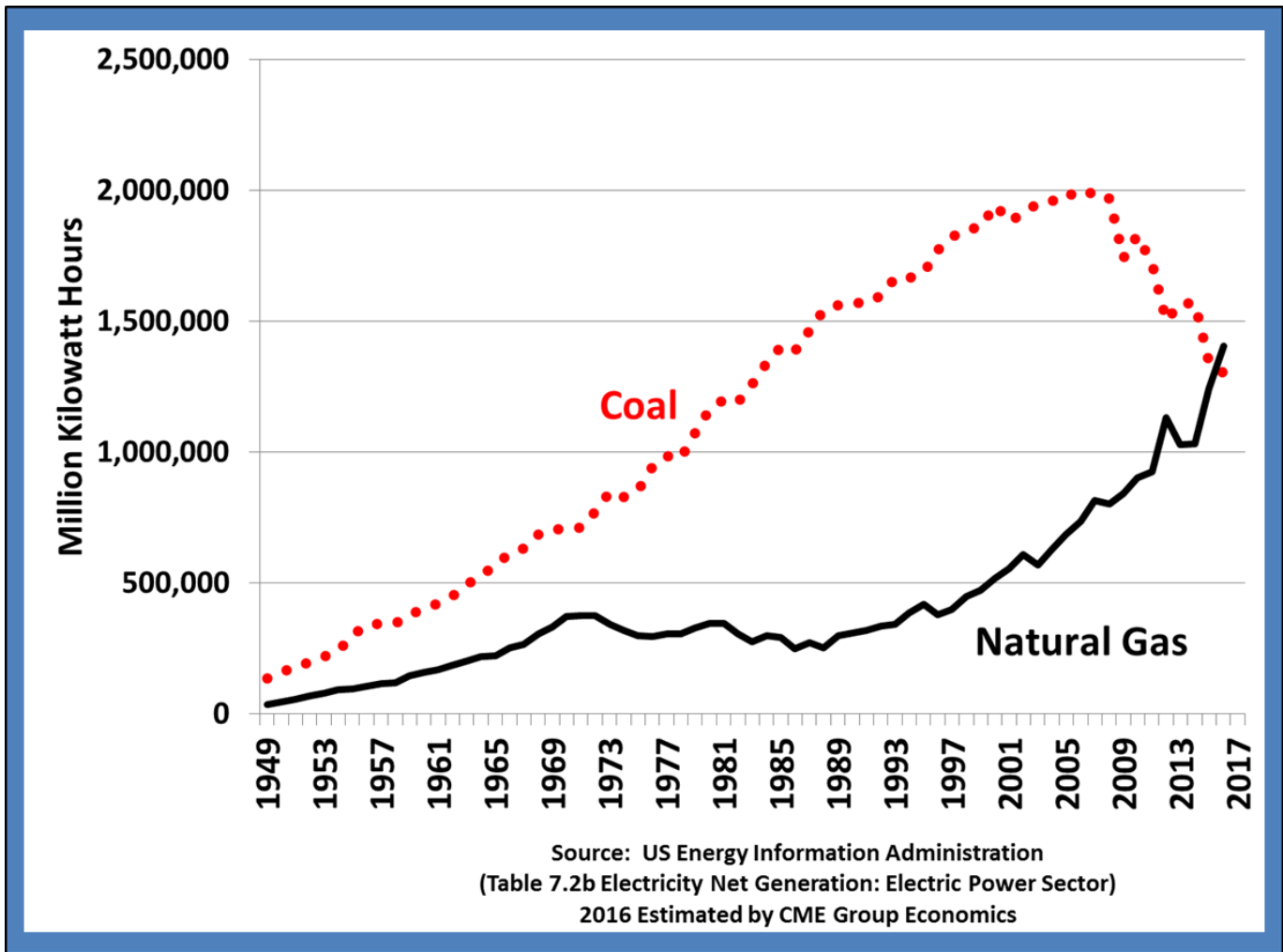
With La Niña 1998-99 came a very cold winter that helped to deplete natural gas supplies in the US, and eventually, with a lag, led to sharply higher natural gas prices. This time around could be different, depending on whether the sea temperatures in the Pacific Ocean off the coast of North America cool down and reinforce La Niña as they did in 1999 and also in 2007, or they could stay warmer than usual and partly counteract a strong La Niña.

We know, however, that there have been other changes in the natural gas market since 1999. First, there is much more natural gas production in the US. In 2015, US natural gas production was 42% higher than in 2000. The boom really got in high gear after 2006 and has not looked back. Second, much more US electrical production has shifted to natural gas from coal. Indeed, natural gas as a source of electrical power generation will most probably surpass coal for the first time in 2016.



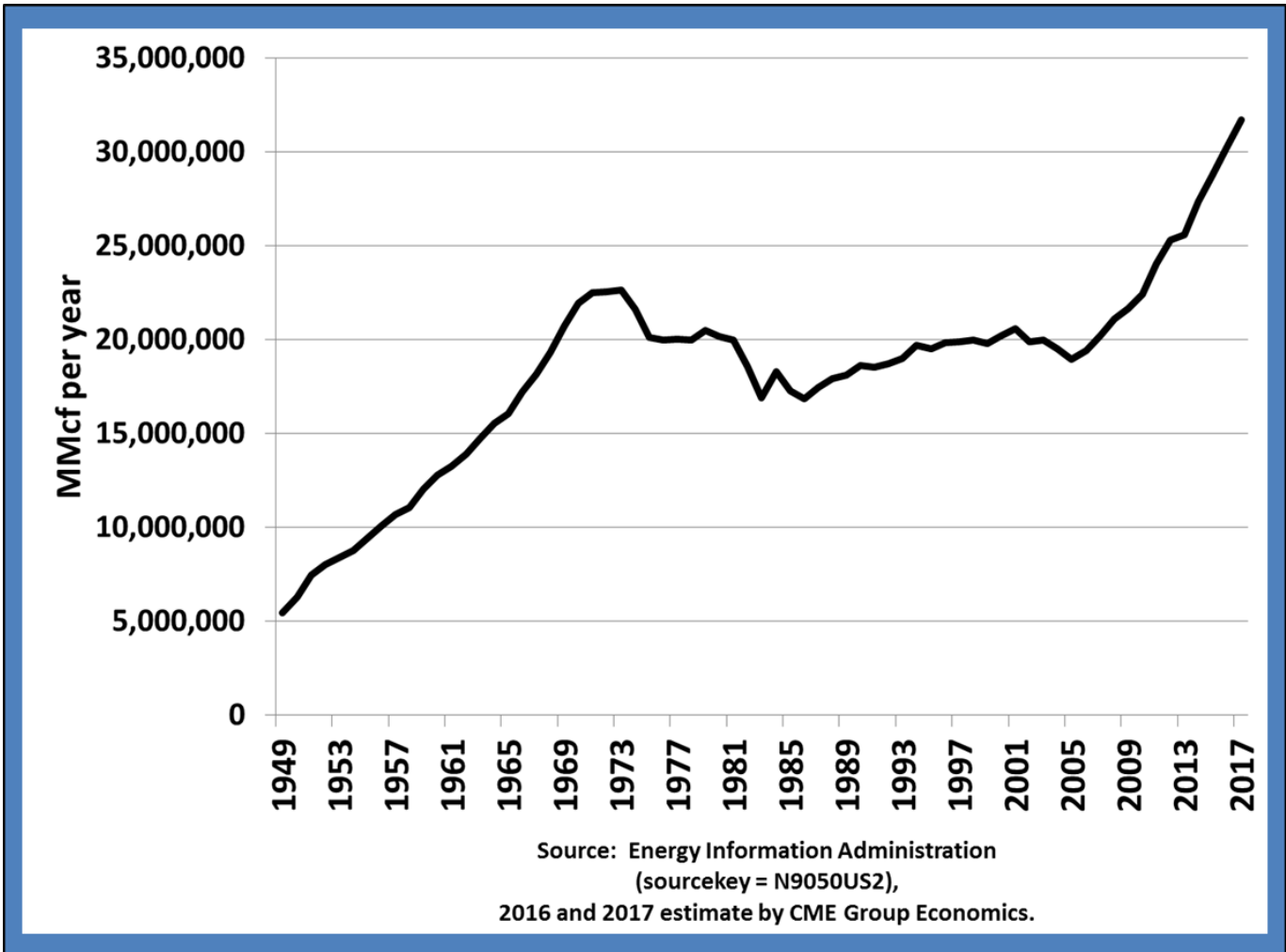
The implication of more power generation from natural gas is that if there is an exceptionally cold winter, the additional demands on the electrical grid may help to work off natural gas inventories faster than the last La Niña. The implication due to vastly expanded natural gas production is that the upside potential for price movement is not as great as in 2000-2002. Still, natural gas prices are likely to see considerable volatility and a rapid reaction to a shift from El Niño to La Niña, if it happens.

**Figure 3**  
**US Electrical Generation Energy Sources – Coal versus Natural Gas**





**Figure 4**  
**US Natural Gas Production**



**Agricultural Price Volatility**

The potential for agricultural price volatility rises with shift from El Niño to La Niña. More rain comes to India and Indonesia, as well as Australia and Africa, **while drought potential rises in Peru, Chile, and the US southwest.** For now, the US corn-belt is in very good shape regarding moisture.

**Hurricanes and Cyclones, Too**

Finally, we note that there could be economic disruptions in the US and China due to storms. If it comes about, **La Niña 2017 would likely be associated with the potential for many more hurricanes or cyclones to form and make landfall,** which could impact both the US east coast and the Chinese east coast.



## Endnotes

All examples in this report are hypothetical interpretations of situations and are used for explanation purposes only. The views in this report reflect solely those of the author and not necessarily those of CME Group or its affiliated institutions. This report and the information herein should not be considered investment advice or the results of actual market experience.

## Author Biography

### **BLUFORD PUTNAM, Ph.D.** **Chief Economist, CME Group**

Dr. Bluford (Blu) Putnam is Managing Director and Chief Economist of CME Group. He manages the Strategic Intelligence & Analytics team, which includes both data science and management analytics. As Chief Economist, Dr. Putnam is responsible for leading economic analysis on global financial markets by identifying emerging trends, evaluating economic factors and forecasting their impact on CME Group and the company's business strategy. He also serves as CME Group's spokesperson on global economic conditions and manages external research initiatives.

Prior to joining CME Group, Dr. Putnam gained experience in the financial services industry with concentrations in central banking, investment research and portfolio management. He most recently served as Managing Partner for Bayesian Edge Technology & Solutions, Ltd., a financial risk management and portfolio advisory service he founded in 2000. He also has served as President of CDC Investment Management Corporation and was Managing Director and Chief Investment Officer for Equities and Asset Allocation at the Bankers Trust Company in New York. His background also includes economist positions with Kleinwort Benson, Ltd., Morgan Stanley & Company, Chase Manhattan Bank and the Federal Reserve Bank of New York. Dr. Putnam holds a bachelor's degree in liberal arts from Florida Presbyterian College (later renamed Eckerd College) and a Ph.D. in economics from Tulane University.

Dr. Putnam has authored five books on international finance, as well as many articles that have been published in academic journals, including the *American Economic Review*, *Journal of Finance*, and *Review of Financial Economics* among others.

Dr. Putnam is also a member of the J.P. Morgan Center for Commodities' Research Council at the University of Colorado Denver Business School.



## The Great Suppression

### Colin P. Fenton

Managing Partner and Head of Research, Blacklight Research LLC; and Member of the J.P. Morgan Center for Commodities' Research Council at the University of Colorado Denver Business School



Colin Fenton (with microphone), Managing Partner, Blacklight Research LLC, participating in the J.P. Morgan Center for Commodities' (JPMCC's) inaugural Research Council meeting in the Center's CoBank Lecture Hall on April 18, 2015. Mr. Fenton is also the Co-Chair of the JPMCC's Advisory Council. Professor James Hamilton, Ph.D., University of California, San Diego and member of the JPMCC's Research Council, is on Mr. Fenton's right in the photograph.

The US GDP estimates published on July 29, 2016 confirm the US economy is in a broad and sustained slump. In December 2015, we identified this decline and termed it "The Great Suppression" for reasons we explain below.

But first: the data. The US Department of Commerce says 2Q2016 US real GDP was 1.2% qoq-ann. Consensus opinion had expected 2.6%. In addition to this huge miss, Commerce also substantially lowered its real GDP numbers for the previous two quarters. Estimated growth in 1Q2016 is now 0.8%, revised down from 1.1%. The revision for 4Q2015 is larger: 1.4% has been cut to 0.9%. This means average US real GDP growth over the past three quarters has reportedly been just 1.0%, down from



2.2% in the three previous quarters. Further revisions are scheduled, as per normal practice. We expect the GDP numbers will be lowered again, much as the Federal Reserve lowered 65 of the preceding 80 monthly growth rates for US industrial production in its April 1, 2016 annual revisions.

## Five Main Suppressants Drive the Great Suppression

What is the Great Suppression? In December 2015, we wrote:

*“The global economy is in a slump. The slump is broad, significant, and sustained. Contractions are visible in select but large channels for investment, trade, rail freight traffic, industrial production, consumption, and corporate profits, though not yet global GDP. Symptoms of distress are rising across all capital markets. They are in credit, commodities, equities, interest rates, and foreign exchange. Several high-yield mutual funds are liquidating. The S&P 500 appears to have made a primary top in May. After years of rigidity in the value of the offshore Saudi riyal, there have been two swoons in the past 12 months, albeit small on a percentage basis. These signals, among others, go beyond mere corrections and idiosyncratic adjustments. Some of them are the strongest changes in 40 to 50 years. Collectively, they suggest a more serious and common challenge for markets and the global economy. To help explain what we think is happening, we give the slump a name: the Great Suppression.” (Blacklight Research, *The Great Suppression: Policy choices spurred the slump, can policy reversals fix it?*, December 21, 2015).<sup>1</sup>*

To suppress means to withhold. It can also mean stop, curb, reduce, or prevent. On net, a suppressant can be beneficial or harmful. It can be expertly managed or not. It can be suitable for the current condition of the world or an artifact of a time gone by. But suppressants always restrain. This is the core concept.

The Great Suppression is centered in energy and emerging markets (EM). Five main factors have guided its evolution over several years.

**The first suppressant can be traced back through Beijing’s efforts to address China’s exceptionally poor air quality and overinvestment in non-residential construction.** On May 27, 2013 the government in Beijing ordered that coal-fired boilers within Beijing's Fourth Ring Road be replaced by clean energy alternatives before the end of 2015. The order applies to all boilers with a generation capacity of at least 20 tons of steam per hour. These units are principally used for residential heating. The Chinese government also began to rein in non-residential construction growth, which had the direct effect of reducing demand for coking coal and iron ore in China's steel mills. These policy decisions were reinforced by two bilateral climate agreements with the United States, settled in November 2014 and September 2015. The primary purpose of these agreements is to reduce carbon dioxide (CO<sub>2</sub>) and other emissions from the world’s two largest emitters.

Cynics have doubted Beijing’s commitment to reduce its hydrocarbon demand on such an abrupt time frame. Yet, China's coal consumption growth contracted by 0.77% YoY in 2014 and then by another 1.48% YoY in 2015, after posting a compound annual growth rate (CAGR) of 4.1% in the prior 5 years, according to *BP Statistical Review* data published in June 2016. This voluntary halting of coal demand



growth was the single largest factor in curbing global primary energy demand growth to 1.1% in 2014 and 1.0% in 2015, or less than half of the normal 2.5%. In the past four decades, such weak growth has happened only during recessions or near-recession years: 1974-75 (0.4%), 1980-82 (-0.5%), 1991-93 (0.6%), 1998 (0.7%), 2001 (1.1%), and 2008-09 (-0.1%).

In response to China's turn away from high-sulfur coal imports, on January 12, 2014 Indonesia announced a ban on export of all unprocessed mineral ores, hoping to spur investment in a domestic nickel refining industry. The rushed announcement at first confused markets on whether it was effective immediately or would be phased in through 2017. In any case, the net effect was depressive for demand. Restricted nickel ore exports helped spur a 59% price increase in LME cash nickel prices in the first 18 weeks of 2014. This temporary price spike helped curb demand for stainless steel products and reinforce the impression of a broad slump in China's demand for metal-based consumer and construction goods.

Australian and Brazilian miners responded differently to China's policy shift. They cut offer prices for their ores in an effort to find demand but still saw their shipments to China plunge. Suppressed commodity trade flows to China have substantially weakened GDP growth in Australia and Brazil—the world's seventh- and twelfth-largest national economies.

**A second major suppressant in the Great Suppression is the Federal Reserve's zero interest rate policy (ZIRP) and the engineering of negative interest rates by the BoJ and ECB.** The FOMC kept interest rates too low for too long. ZIRP overstimulated debt-driven investment in energy supply. Excessive ZIRP financed marginal projects in US light tight oil (LTO) production capacity that are uncompetitive at lower prices and now need to be unwound. US crude oil production (including lease condensates) increased to 9.6 million b/d as of June 2015 from 4.9 million b/d in January 2009. That is an 11% CAGR over six years in a domestic industry that had experienced a 17% cumulative decline in output across the previous seven years. After backing out comparable light sweet crude imports and optimizing refinery input slates, this burgeoning LTO supply became increasingly stranded within the United States due to federal trade restrictions on the free export of crude oils.

**This is the third major suppressant: an antiquated ban on crude exports from the United States—the world's largest and fastest-growing liquids producer—that was finally removed in December 2015.** Policymakers belatedly began to address this bottleneck in June 2014, when Washington creaked open a narrow bypass by allowing free export of processed condensates. Though these volumes were small, they helped redraw the global cost curve because LTO full-cycle marginal costs in the US Midcontinent are meaningfully lower than marginal costs in the rest of the world (though \$25 per bbl above current WTI cash prices). Simultaneously, there was a large increase in legally-compliant outflows of crude oil to Canada and of natural gas liquids (NGLs) and other "unfinished oils" to a rising number of international buyers (n=16 in June 2015 versus n=6 in August 2013). This trade competition surprised complacent supply chains and forced significant downward pressure on both bids and asks in many crude and product markets. Following Congress' outright removal of the US crude export ban in December 2015 and the sharp uptick in US crude exports that has followed, these deflationary pressures have intensified.



**Slower oil demand growth and rising supply availability incents the fourth major suppressant: OPEC production policy.** In November 2014, OPEC's members, led by Saudi Arabia, chose to abandon price stability as a policy objective in favor of promoting their market shares. This expansion of output is a repeat of a competitive tactic deployed with great success in 1986-91. OPEC's oil ministers voted to maintain the policy at their next two meetings in June and December 2015. Media reports have repeatedly interpreted OPEC's actions as directed toward suppressing competition from the LTO producers in the US Midcontinent. This assumption is only modestly correct and overlooks a far more important reason. There is intense competition within OPEC—specifically among Saudi Arabia, Iraq, and Iran—for primacy in supplying the Chinese import market. There are also religious and geopolitical considerations at work.

**Riyadh's actions also stem from a fifth and final major suppressant: the world's repressed response to the Syrian crisis.** Washington drew a "red line" in Syria and then failed to enforce it in August 2013. That month, the UK Parliament also voted against air strikes in Syria. Suppression of military force by these two great powers led to a diplomatic agreement brokered by Russia, which then annexed Crimea within six months. Russia subsequently inserted troops into Syria and began its own airstrikes in September 2015.

These steps backward and forward did not go unnoticed by the regional (and would-be) powers in the Middle East. One purpose of OPEC's Saudi-led production policy is to curb production from Russia—a rival for the Chinese market and an indirect military adversary on the battlefields of Syria and Yemen—and of Mexico, which has reversed course on its own half century of suppressant measures in investment. But the use of oil as a policy tool to increase treasure and project power (and suppress a rival's earnings and influence) comes at the price of diminished spare capacity, notwithstanding the present overhang in inventory. The world's spare oil production capacity is now only 1.20 million b/d rather than the 2.12 million b/d expected a year ago. Projections for spare capacity rise only to 1.35 million b/d by the end of 2017. This production buffer is very small.

**These five major suppressants—climate policy, FOMC monetary policy, US crude export policy, OPEC production policy, and international policy toward the Syrian crisis—are the largest drivers of the Great Suppression.** Each derives from intentional decisions. Management of these factors will determine whether the Great Suppression becomes a global recession or merely threatens one in a long expansion.

Given the enormous public and private debt burden in the US, we are acutely concerned about the risk of a double-dip recession. We see a potential parallel for 2014-18 from the example of 1980-82. We ask whether 2014-2016 is comparable to the shallow recession of 1980, whether 2Q2016 to 1Q2017 will prove comparable to the "Oasis" year of 1981, and whether late 2016 through mid-2018 will bring a debt crisis reminiscent of 1982. One main difference between these cycles is 2014-18 is resulting from highly accommodative monetary policy and working first through EM, commodities, and investment channels before it fully hits developed markets possibly in a US debt crisis. In contrast, the 1980-82 double-dip recession resulted from highly restrictive monetary policy that targeted US consumption and consumer price inflation, before slamming into EM in the debt crises of 1982. We peg the odds of a formal US recession starting before January 2017 at two-in-three.





## Endnote

1 This research paper is available upon written request to [colin.fenton@blacklightresearch.com](mailto:colin.fenton@blacklightresearch.com).

## Author Biography

### COLIN FENTON

**Managing Partner and Head of Research, Blacklight Research LLC**

In addition to Mr. Fenton's responsibilities at Blacklight Research LLC, he is also a non-resident Fellow at Columbia University's Center on Global Energy Policy. From 2010 through 2015, Fenton supervised commodities research at J.P. Morgan Chase & Co., where he was also the firm's chief commodities strategist. Earlier in his career, Fenton was a managing partner at Curium Capital Advisors, a managing director at Duquesne Capital Management, the Chief Intelligence Officer of Ospraie Management, and a member of the Commodities Research Group at Goldman, Sachs & Co. Fenton holds a Master's of Science in Foreign Service from Georgetown University's Edmund A. Walsh School of Foreign Service. He also is a graduate of Princeton University, where he studied history.

Mr. Fenton is also the Co-Chair of the Advisory Council at the J.P. Morgan Center for Commodities (JPMCC) at the University of Colorado Denver Business School as well as serving as a member of the JPMCC's Research Council.



## Contributing Editor's Collection

### Hilary Till

Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, [\*Global Commodities Applied Research Digest\*](#)

This collection of four articles covers issues that are relevant to the agricultural, metals, *and* energy markets, reflecting the J.P. Morgan Center for Commodities' commitment to include *all* commodity sectors in both its applied research and educational efforts.

Each of this collection's four articles is summarized below.

### The Fundamental Elements of a Commodity Investment Process

This digest article covers how to further distill returns in the commodity markets beyond that which is available through passive exposures to various commodity sectors. A manager can potentially do so through the use of well-chosen entry and exit rules, trade construction, and downside risk management. In addition, an actively managed commodity portfolio will tend to have dynamic exposures to the various commodity sectors, given the seasonal nature of a number of commodity trading opportunities.

*The article includes examples from the gasoline and copper markets.*

### A Brief Primer on Commodity Risk Management

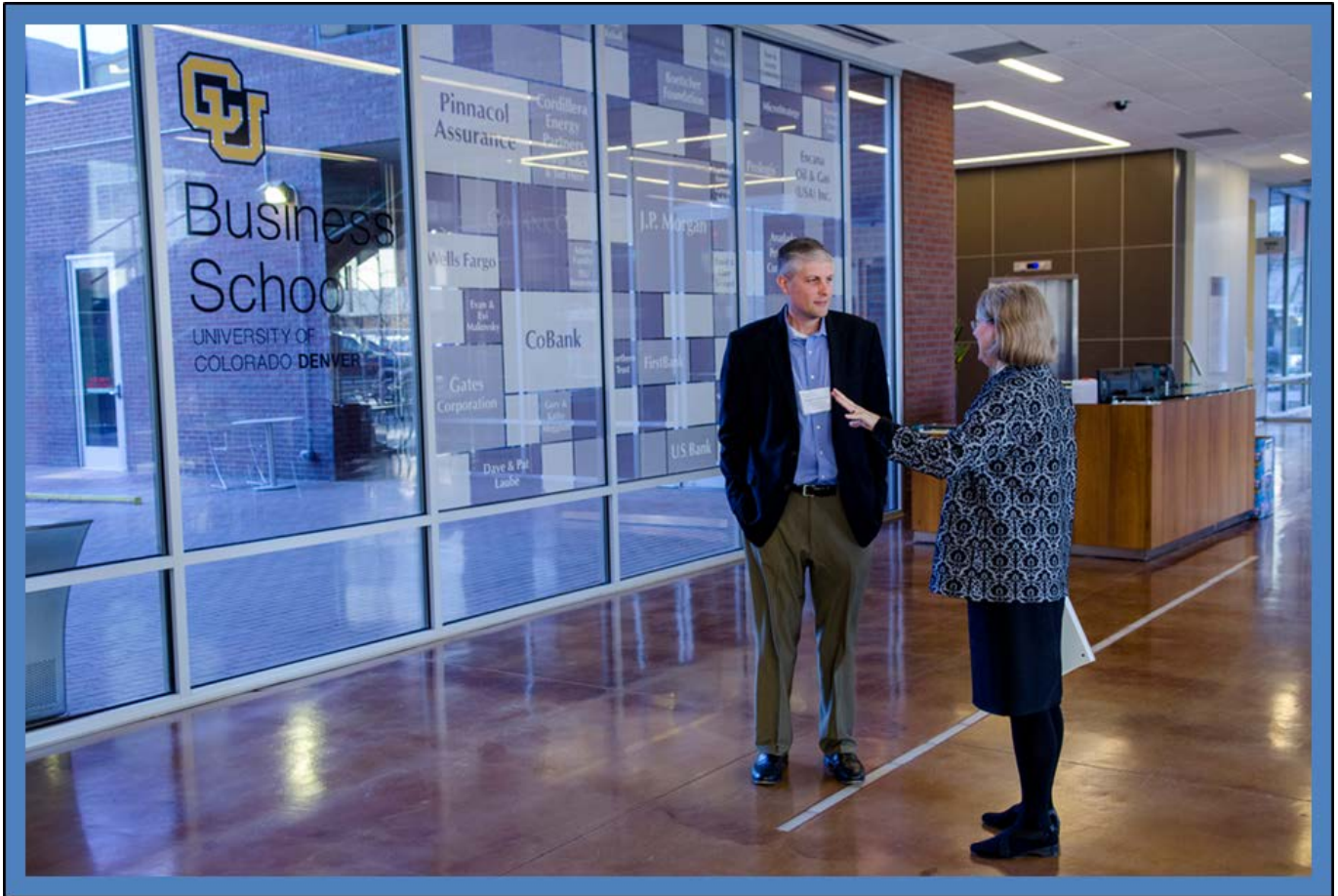
In covering the topic of commodity risk management, this practitioner-oriented paper proceeds as follows. A number of trading strategies exist because the trader is paid to bear risk: that is why the strategies can continue to exist, even if well-known. But then in order for a trading program to be viable in the long-term, a trader must implement disciplined risk management procedures. The key parameters for a risk-management program include quantifying a client's risk tolerance and attempting to ensure that one does not exceed that tolerance as well as understanding the price behavior of commodity futures prices and their potential for explosive behavior. Both of these parameters are essential for the choice of leverage level and hedging strategy for a trading program. Next the paper covers two types of useful risk metrics for a trading program, which include Value-at-Risk and historical worst-case measures. The article then discusses how to avoid inadvertent concentration risk, namely by understanding the fundamental drivers of a strategy. The paper also advocates the use of (a) out-of-the-money options to hedge against identifiable extreme scenarios and (b) disciplined exit strategies for when trading strategies exceed worst-case outcomes. Finally, the paper enumerates what should be included in a trading program's risk-management reports.

*The article includes examples from the corn and natural gas futures markets.*



## Why Haven't Uranium Futures Contracts Succeeded?

The [Spring 2016 "Contributing Editor's Collection" of articles](#) included an article on "Brief Case Studies on Futures Contract Successes and Failures." That article noted that even though the U.S. futures markets have evolved in a trial-and-error fashion, one can nonetheless identify the key elements that determined whether particular futures contracts succeeded or failed. In this issue, we add to this past analysis by examining why a particular metals futures contract has not succeeded thus far: the uranium futures contract. Such an analysis, as in this article, may be valuable for new financial centers as they build successful futures markets.



Hilary Till (right), Contributing Editor of the *GCARD*, discusses synergies with Thorvin Anderson, CFA (left) during the JPMCC's Research Council meeting on December 4, 2015. Anderson is the Content Director of the JPMCC's [Professional Education Program](#) and is also an Editorial Advisory Board member of the *GCARD*. In addition, both Till and Anderson are members of the JPMCC's Research Council.



## **Timing Indicators for Structural Positions in Crude Oil Futures Contracts**

Should an investor enter into long-term positions in oil futures contracts? In answering this question, this paper covers the following three considerations: (1) whether crude oil inventories are scarce or not; (2) how to avoid the risk of oil prices crashing; and (3) the use of financial assets for diversification purposes. The paper concludes that positions in crude oil futures contracts should (a) not only be actively timed, but (b) must also be twinned with financial assets in order to hedge against both the possibility of deflationary conditions and/or periodic oil-market-share price wars.



## The Fundamental Elements of a Commodity Investment Process

### Hilary Till

Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, *Global Commodities Applied Research Digest*

*This digest article briefly covers how to combine structural sources of return in the commodity markets within a comprehensive investment process. This paper is especially relevant for investors in developing markets who are newly embracing the investment opportunities available in commodity futures markets.*

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### Opportunity Set

The first step in designing a commodity program is to survey the commodity investment universe for opportunities. During times of price stability, the commodity markets that have historically had the highest returns all share one characteristic: they typically trade in backwardation, whereby the nearer month contract trades at a premium to the deferred delivery contracts. This is typically an indication of scarcity.

### The Further Distillations of Returns

An active manager can attempt to further distill the returns in the commodity markets that typically trade in backwardation. The manager can do so through entry and exit rules, trade construction, and downside risk management. A primer on commodity risk management, in turn, is covered in Till (2016b), which follows this digest article.

#### Entry Rules

Once one has chosen the commodity markets to focus on, there are a number of ways to distill a market's returns. This includes through well-chosen entry rules, such as by entering positions based on:

- Positive curve dynamics, namely that the commodity's futures curve is in backwardation; or
- Favorable entry levels; or by entering positions during
- Times of seasonal strength.

#### Exit Rules

Another way of distilling a market's returns is through well-chosen exit rules.

This includes exiting positions based on:

- Reaching a price target;
- A time stop, which means that one only expects a trade to work over a specific timeframe; or if
- A worst-case loss is reached.



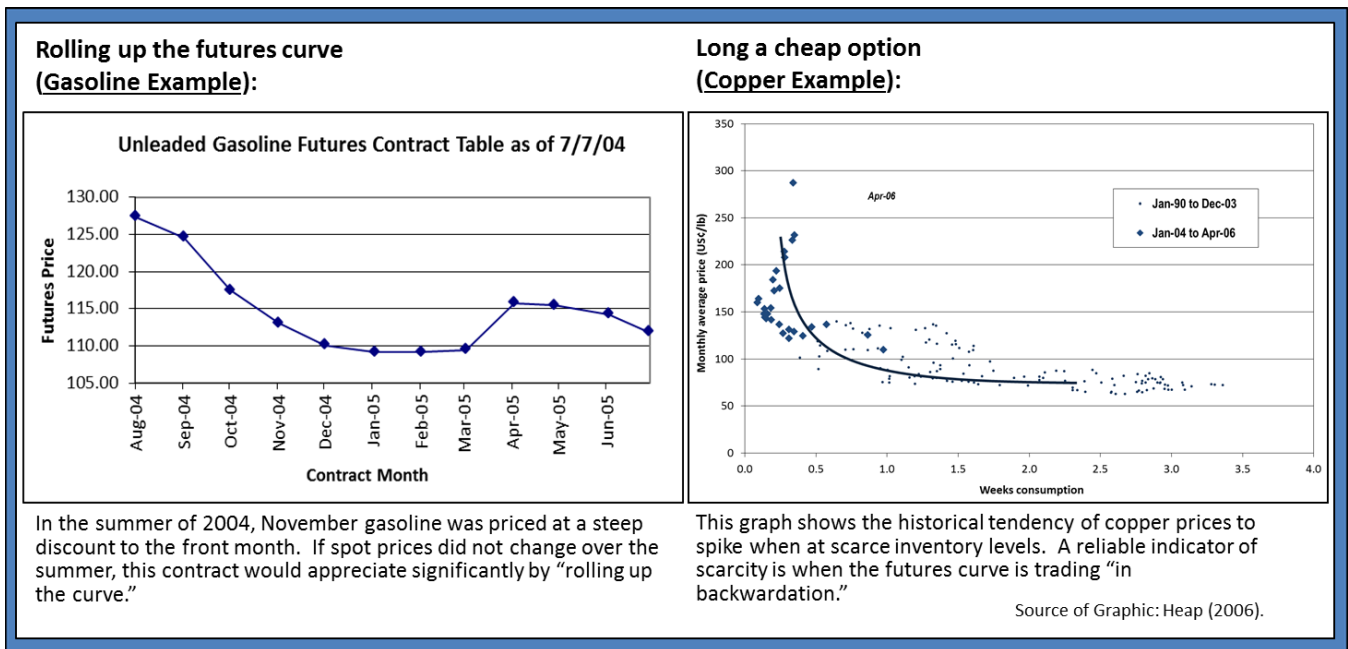
Trade Construction

An additional way to distill a market’s returns is via the judicious choice of trade construction. This includes whether to express a view on a market through outright, calendar spreads, intermarket spreads, or options.

**Specific Examples: Gasoline and Copper**

Two examples of strategies, which rely on periodic backwardation, follow. The first example is in the gasoline market. The left-hand-side of Figure 1 illustrates a gasoline futures curve during July 2004. The horizontal axis is the maturity of each futures contract while the vertical axis is the price level for each futures contract.

**Figure 1**



In July 2004, the gasoline contract that matured in November was priced at a steep discount to the front-month contract. If spot prices did not change over the summer, the November contract would appreciate significantly by “rolling up the curve.”

The right-hand-side of Figure 1 provides a copper market example. The horizontal axis is the amount of copper inventories in weeks of consumption while the vertical axis is the price of copper. This graph shows the historical tendency of copper prices to spike when at scarce inventory levels.



### The Monitoring of Fundamental Drivers

One job of an active manager is to monitor whether the fundamental drivers for his or her strategies are still intact. In the two examples provided above, one needs to monitor whether each commodity sector’s inventories are expected to remain structurally low.

### Portfolio Construction

Now when constructing a commodity portfolio, the goal is have at least 4 to 7 largely uncorrelated strategies at any one time. At times, one can find strategies that normally have correlations amongst each other of -20% to +20%. With such low correlations, portfolio volatility is quite dampened as one adds each of these strategies to a portfolio. But then the portfolio manager has to be careful with eventful correlations, as discussed in Till (2016b).

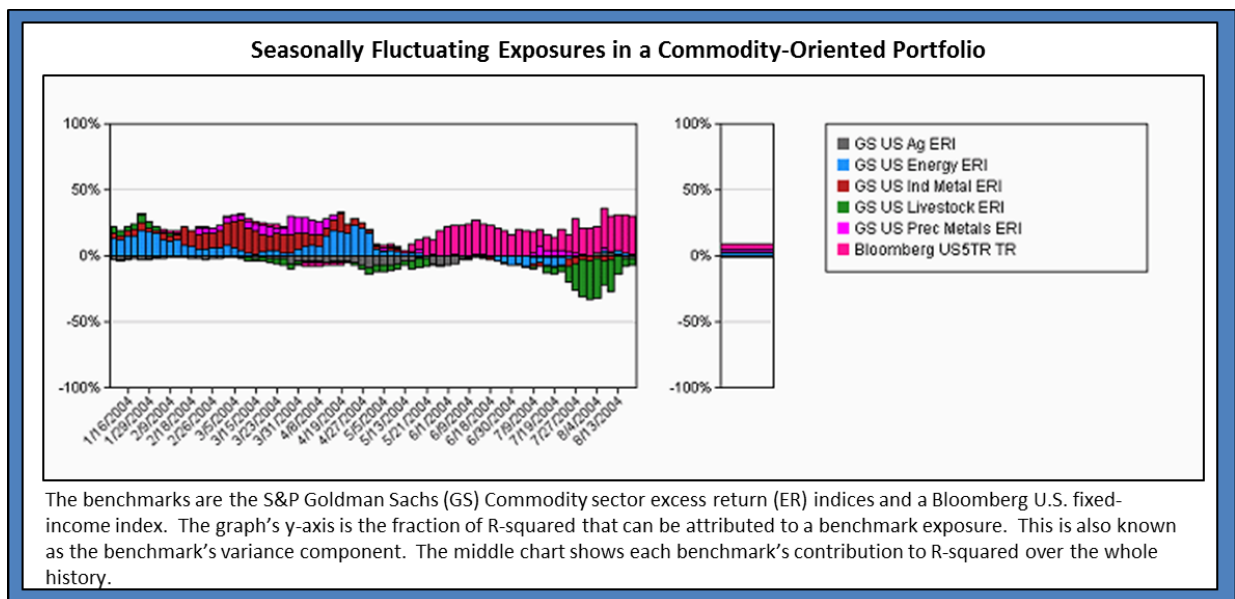
### Systematic Risk Hedging

A long-biased commodity program will have systematic risk to severe shocks to the business cycle. Therefore, a commodity manager will have a tendency to include long fixed-income positions in the portfolio as a natural hedge to this systematic risk.

### Dynamic Exposures to Commodity Sectors

An active commodity program will have fluctuating exposures to various commodity sectors. Figure 2 shows a returns-based analysis of a commodity portfolio from the Fall of 2004.

Figure 2



Source: Prism Analytics.



Using daily data, this returns-based analysis determined which sectors best explained this active program's returns over time. In particular, Figure 2 shows dynamic exposures to energies, metals, U.S. fixed income, livestock, and the agricultural markets in an actively traded commodity-oriented portfolio.

## Conclusion

After isolating the commodity markets where there are structural opportunities, a commodity manager can choose to further distill returns in those markets through the use of well-chosen entry and exit rules, trade construction, and downside risk management. The manager must then ensure that the factors that have led to the portfolio's trading opportunities are still intact. A commodity manager will then endeavor to ensure that each additional strategy added to his or her portfolio is not highly correlated to strategies that are already included in the portfolio. If a commodity portfolio has a tendency to have long commodity positions, then it will be exposed to a sharp shock to business confidence, for which a fixed-income hedge would be a natural hedge for this portfolio. Finally, an actively managed commodity portfolio will have dynamic exposures to various commodity sectors, given the seasonal nature of various commodity-market opportunities.

*GCARD* readers whom are interested in a more in-depth discussion on commodity-futures-program design considerations are encouraged to review the longer essay in Till (2016a).

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## Endnotes

This paper is excerpted from a seminar provided by the author at the [Chicago Institute of Investment](#) on August 1, 2016. The research work included in this seminar was jointly developed with Joseph Eagleeye of [Premia Research LLC](#).

Research assistance from Katherine Farren, CAIA, of Premia Risk Consultancy, Inc. is gratefully acknowledged.

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## Keywords

Commodity program, futures contract





## A Brief Primer on Commodity Risk Management

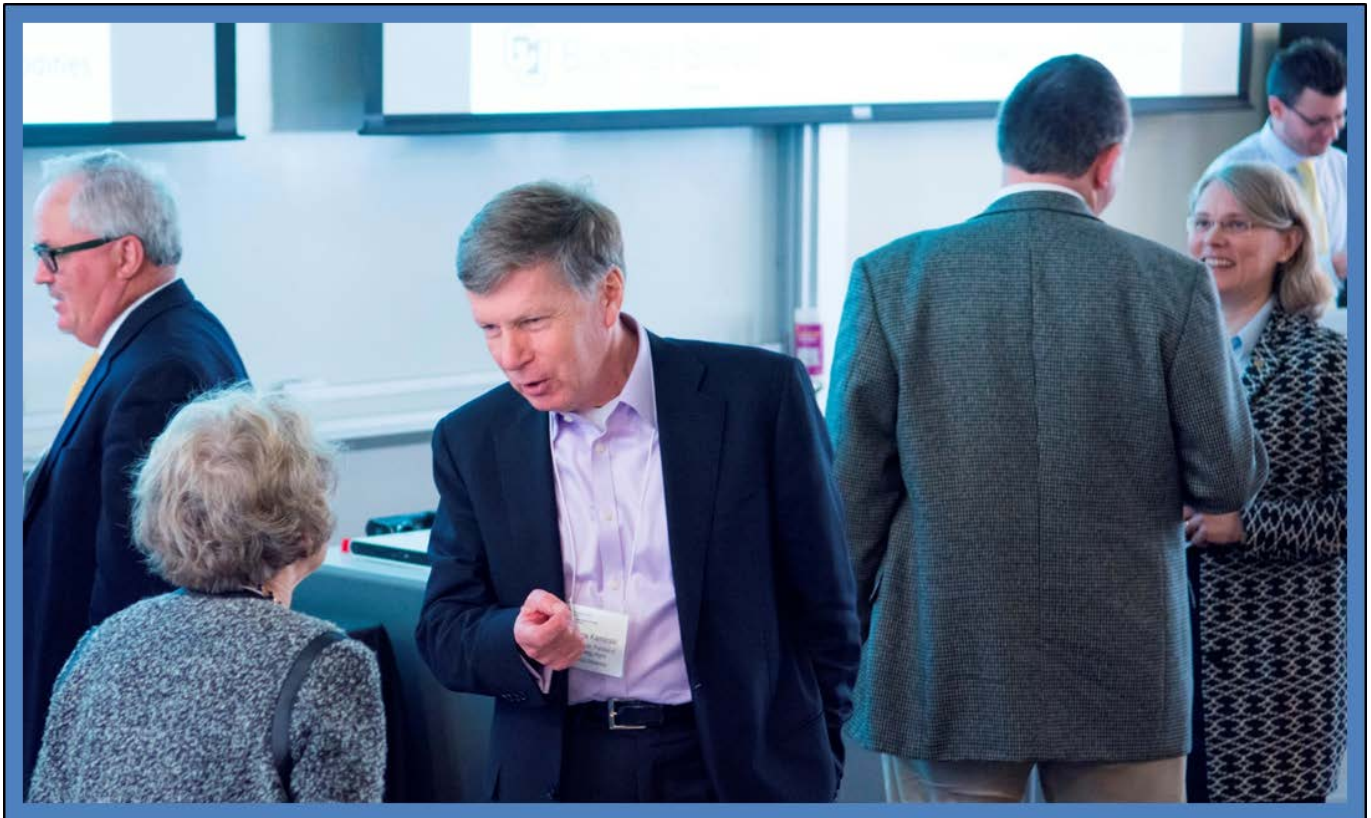
### Hilary Till

Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, *Global Commodities Applied Research Digest*

*This digest article discusses the practical issues involved in applying a disciplined risk management methodology to commodity futures trading. Accordingly, the paper shows how to apply methodologies derived from both conventional asset management and hedge fund management to futures trading. The article also discusses some of the risk management issues that are unique to leveraged futures trading.*

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Commodity futures trading is such a niche discipline that discovering how to succeed using disciplined risk-management principles usually only occurs through hard-won experience. This article provides an alternative approach: one can instead review a logical structural framework, as set forth in this digest article.



At the inaugural Research Council meeting in the Center's CoBank Lecture Hall on April 18, 2015, from left-to-right, Professor Colin Carter of University of California, Davis and Chair of the J.P. Morgan Center for Commodities (JPMCC) Research Council; Professor Marcelle Arak, University of Colorado Denver Business School; Professor Vince Kaminski, Rice University; Professor Lutz Kilian, University of Michigan, Ann Arbor (back); and Hilary Till, M.Sc. (Statistics), Solich Scholar, JPMCC, all of whom are members of the JPMCC's Research Council. Enrico Leone, Assistant to the Deans, University of Colorado Denver Business School is on the far right of the photograph.

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## **Risk is the Flipside of Return**

A number of derivatives trading strategies are well known and publicized, which does not prevent them from continuing to exist. In discussing consistently profitable grain futures trades, Cootner (1967) stated that the fact that they “persist in the face of such knowledge indicates that the risks involved in taking advantage of them outweigh the gain involved. This is further evidence that ... [commercial participants do] not act on the basis of expected values; that ... [these participants are] willing to pay premiums to avoid risk.”

In a number of statistically significant futures trades, an individual who implements these trades assumes some specific event risk that others do not want to assume, which is why there is a return to efficiently bearing this risk in the first place.

## **The Most Important Element of an Investment Process**

The key to a successful trading program is not in discovering proprietary strategies: a diligent literature search will turn up a great number of strategies. Instead, the most important element of an investment process may well be how one implements the program’s portfolio construction and risk management methodologies so that one can have both smooth performance and stay in business during dramatic market moves.

## **Product Design Issues**

In derivatives trading, one has a lot of flexibility in designing an investment program. Futures trading requires a relatively small amount of margin. The result is that one can easily adjust one’s leverage level to magnify gains (and of course, magnify losses, too.) Trade sizing is mainly a matter of how much risk one wants to assume. A trader is not very constrained by the amount of initial capital committed to trading. With the use of options, one can also be very particular about the risks that the trader wishes to hedge away by paying option premia.

CTA investors frequently expect futures trading programs to be equity diversifiers, so clients thereby expect that a trading program will not do too poorly in the face of a large equity decline.

The parameters of a program’s risk management policy should directly flow from the return, risk, and correlation expectations of the program’s client base. When attempting to adhere to these top-level parameters, the actual implementation of a program’s risk management policy will rely heavily on the particular assumptions about the statistical properties of futures prices.

## **Viability of a Futures Program**

As noted earlier, a number of statistically significant trading opportunities exist because of the possibility of rare, but nonetheless large, losses. One can build a business or investment program around these positive expected value opportunities, but the particular leverage level and hedging strategy chosen will determine the ongoing viability of the program.



## Standard Risk Management Methodology

The way that risk management is applied at conventional asset managers is typically as follows:

- Translate the client's guidelines into return and risk targets with respect to an index or benchmark;
- Determine the active bets away from a program's benchmark;
- Make assumptions about the expected returns, volatility, and correlation of the active bets;
- Construct the client's portfolio so that the client's return and risk targets will be achieved if one's statistical assumptions are correct; and
- Continually monitor the portfolio's actual return and risk performance for adherence to the established targets.

The conventional asset manager approach to risk management is a useful first step in designing a risk management program for leveraged futures trading. As will be discussed, one still needs to add several layers of risk management to this approach because of the unique statistical properties of commodity futures contracts and because of the different way futures products are marketed.

## Understanding Price Behavior

Research from the 1970's showed that diversified portfolios of equities have returns that appear to be symmetrically distributed. It is a different matter for commodity prices.

Commodity prices tend to exhibit positive skewness. During times of ample supplies, there are two variables that can adjust to equilibrate supply and demand: more inventories can be held *and* the price can decrease. But, if there are inadequate inventories, *only* the price can respond to equilibrate supply and demand, given that in the short run, new supplies of physical commodities cannot be instantly mined, grown, and/or drilled.

## Value-at-Risk

One should calculate the portfolio's volatility from the recent volatilities and correlations of the portfolio's instruments. This is the standard Value-at-Risk approach. Now, this approach alone is obviously inadequate for a commodity portfolio, which consists of instruments that have a tendency towards extreme positive skewness.



While the Value-at-Risk measure is useful, it has to be used jointly with other measures and actions. The measure is useful since one wants to ensure that under normal conditions, a commodity position has not been sized too large that one cannot sustain the random fluctuations in profits and losses that would be expected to occur, even without a dramatic event occurring.

### Scenario Testing

Using long-term data, a trader should also directly examine the worst performance of a commodity strategy under similar circumstances in the past. In practice, such a measure will sometimes be larger than a Value-at-Risk measure based on recent volatility.

If one is relying on historical data to find pockets of predictability in the futures markets, then examining worst-case outcomes can also serve another purpose. If the loss on a particular commodity futures strategy exceeds the historical worst case, this can be an indication of a new regime that is not reflected in the data. This would trigger an exit from a systematic trade since one no longer has a handle on the worst-case scenario.

### Deep Out-of-the-Money Options

In a systematic program based on historical data, one can make determinations about its expected return. One result is that a trader can decide to give up a small fraction of this expected return in order to hedge against catastrophic risk. A trader can do so with deep out-of-the-money options.

### Exit Strategy

Although strictly speaking not a risk management issue, one should employ an exit strategy that recognizes the mean-reverting properties of commodities. This means examining historical data to determine the typical size of moves during supply/demand imbalances.

### Diversification and Concentration Risk

A commodity manager can potentially set up dampened risk portfolios of commodity futures trades, which are very nearly uncorrelated with each other.

In leveraged commodity futures trading, one must be careful with commodity correlation properties. Seemingly unrelated commodity markets can become temporarily highly correlated. This becomes a problem if commodity managers are designing their portfolios so that only a certain amount of risk is allocated per strategy. The portfolio manager may be inadvertently doubling up on risk if two strategies are unexpectedly correlated.



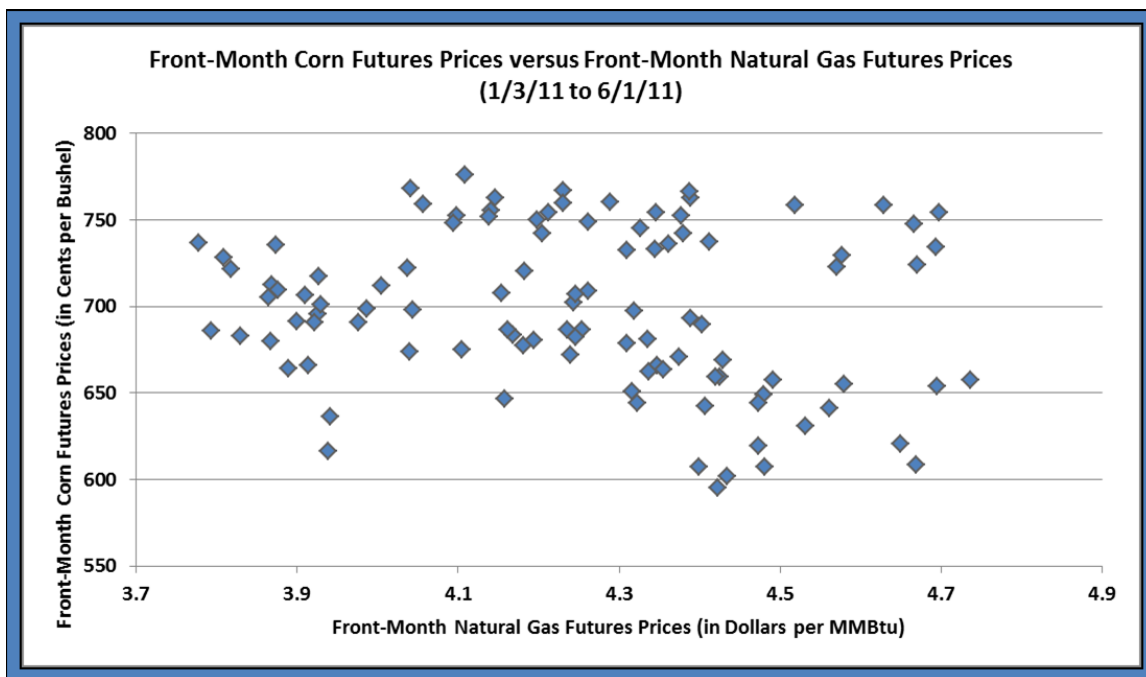
Understanding the Fundamental Drivers of a Strategy

The antidote for this problem is two-fold. One is to understand what the key factors are which drive a strategy’s performance, and the other is to use short-term recent data in calculating correlations. If two trades have common drivers, then it can be assumed that their respective performances will be similar. Recent data can frequently capture the time-varying nature of correlations that long-term data average out.

*Corn and Natural Gas Example*

The graphs in Figures 1 and 2 below provide an example from 2011 that shows how seemingly unrelated markets can become temporarily very related.

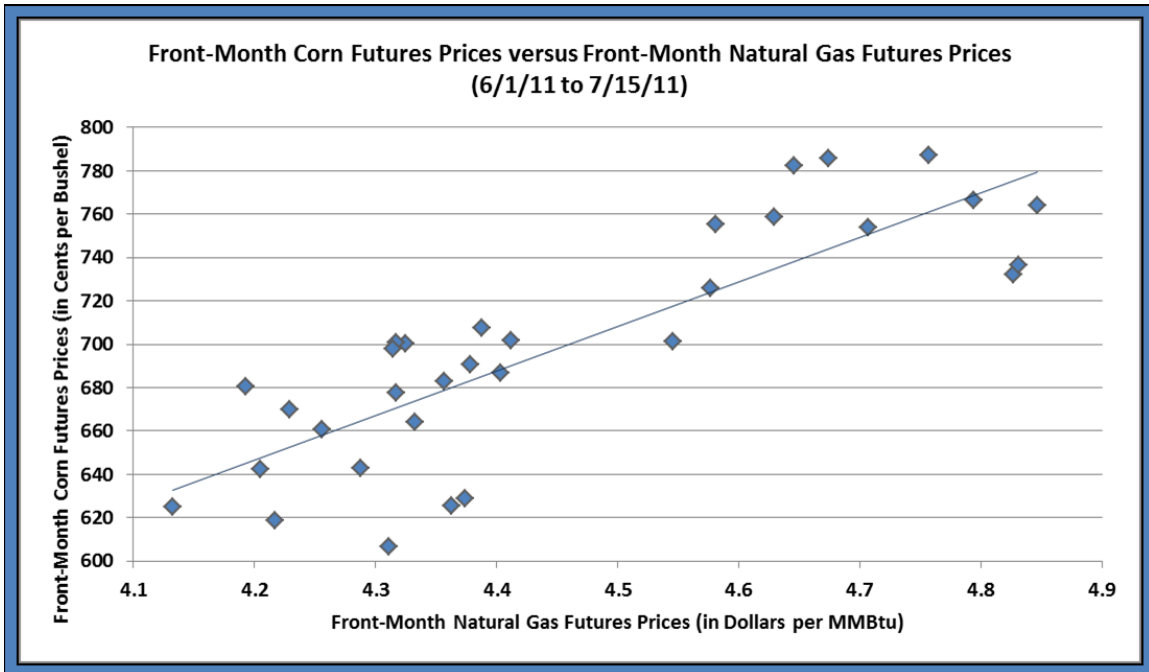
**Figure 1**



Source of Data: The Bloomberg.



Figure 2

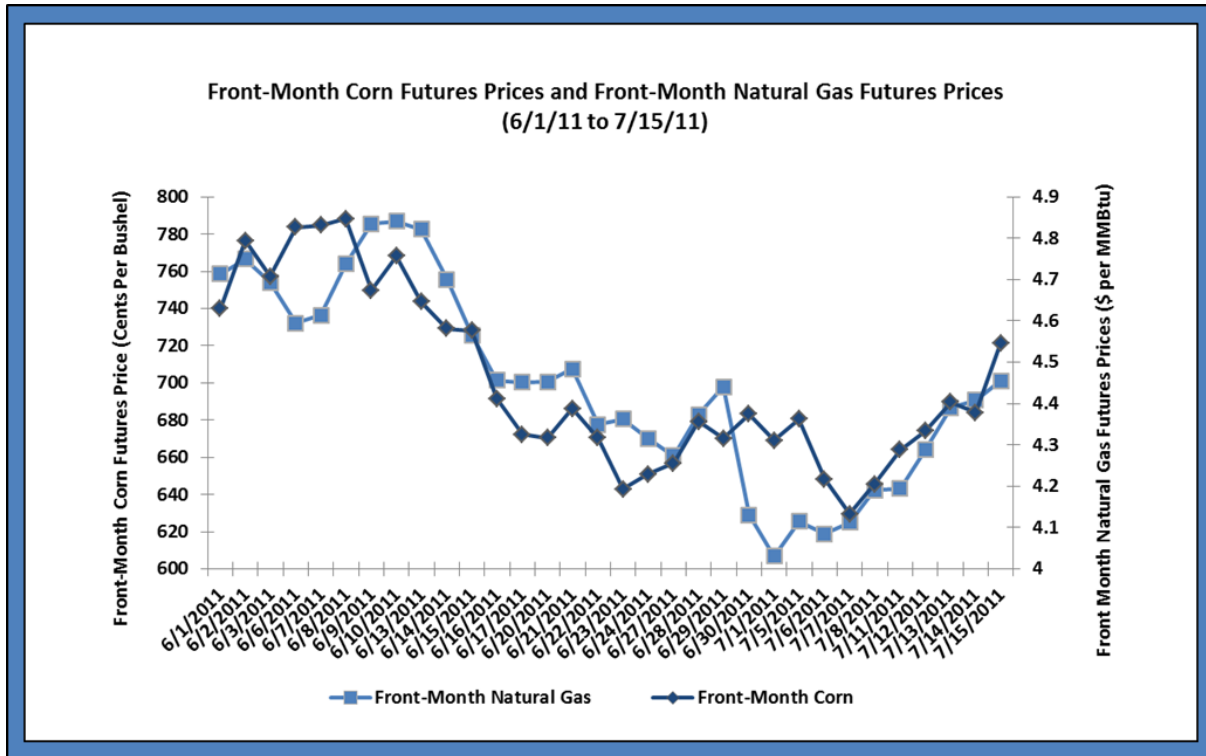


Source of Data: The Bloomberg.

Normally, natural gas and corn prices are unrelated. How could these two seemingly different trades be, in fact, the same trade? Both the July corn and natural gas trades are heavily dependent on the outcome of weather in the U.S. Midwest. Figure 3 on the next page further illustrates how both corn and natural gas had common reactions to the possibility of extreme heat in 2011: their prices frequently waxed and waned at similar times during the summer.



Figure 3



Source of Data: The Bloomberg.

Our conclusion is that in order to avoid inadvertent correlations, it is not enough to measure historical correlations. Instead, a trader needs to have an economic understanding for why a trade works in order to best be able to appreciate whether an additional trade will act as a portfolio diversifier.

Extraordinary Stress Testing

For a commodity futures portfolio, it is also prudent to examine how the portfolio would have performed during various well-defined stock market declines, given that such programs are frequently marketed as equity portfolio diversifiers. If a portfolio shows sensitivity to certain extreme events when the stock market has declined, this does not necessarily mean that the portfolio should be sized differently or constructed differently. It may mean that a macro portfolio hedge would be in order.



## Risk Management Reports

On a per-strategy basis, it is useful to examine each strategy's:

- Value-at-Risk based on recent volatilities and correlations;
- Worst-case loss during normal times;
- Worst-case loss during well-defined eventful periods;
- Incremental contribution to Portfolio Value-at-Risk; and
- Incremental contribution to Worst-Case Portfolio Event Risk.

The latter two measures give an indication if the strategy is a risk reducer or risk enhancer.

On a portfolio-wide basis, it is useful to examine the portfolio's:

- Value-at-Risk based on recent volatilities and correlations;
- Worst-case loss during normal times; and
- Worst-case loss during well-defined eventful periods.

Each measure should be compared to some limit, which has been determined based on the design of the futures product. So for example, if clients expect the program to lose no more than say 7% from peak-to-trough, then the three portfolio measures should be constrained to not exceed 7%. If the product should not perform too poorly during financial shocks, then the worst-case loss during well-defined eventful periods should be constrained to a relatively small number. If that worst-case loss exceeds the limit, then one should devise macro portfolio hedges accordingly.

## Conclusion

There are a number of derivatives strategies, which earn returns due to assuming risk positions in a risk-averse financial world. The returns are not necessarily due to inefficiencies in the marketplace. How traders design and carry out their risk management policies is key to a program's viability, especially in leveraged commodity futures trading.

*GCARD* readers whom are interested in a more in-depth discussion on commodity risk management are encouraged to review the longer essay in Till (2016).

---

## Endnote and Acknowledgement

The ideas in this article were jointly developed with Joseph Eagleeye, co-founder of [Premia Research LLC](#).

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**Keywords**

Futures trading, risk management, commodity



## Why Haven't Uranium Futures Contracts Succeeded?

### Hilary Till

Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, *Global Commodities Applied Research Digest*

*Why have some seemingly promising futures contracts not succeeded in the recent past? In this digest article, we examine one such example, the uranium futures market. Two related papers analyze additional futures market failures: namely, in the pulp market (in Till (2015a)) and in the weather derivatives market (in Till (2015b)).*

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The structure of this brief paper is as follows. First we provide some background on the uranium futures contract as well as a description of this contract, and then we note how the uranium market does not sufficiently match up against the criteria for the successful launch of a futures contract.

### Background on the Uranium Futures Contract

Very helpfully, a report by the U.S. Senate in 2014 provides details on the uranium futures contract. According to U.S. Senate (2014):

- The uranium futures contract “was established and began trading for the first time on May 6, 2007.”
- “This financially-settled contract is traded on the CME Globex and CME ClearPort trading platforms, and is linked to prices provided by Ux Consulting Company, LLC.”
- “In recent years, the uranium futures market has had relatively few participants, the U308 contract has rarely traded, and open interest has generally remained relatively low.”
- “There are frequently zero reported trades per day.
- For example, for the week of September 9-September 16, 2014, only one trade was reported, involving 50 contracts.”

The specifications for the CME Group's uranium futures contract are provided in Exhibit 1 on the next page.



**Exhibit 1**

UxC Uranium U308 Futures Contract Specifications		
Product Symbol	UX	
Venue	CME Globex, CME ClearPort	
Trading Hours	CME Globex (Electronic Platform)	Sunday - Friday 6:00 p.m. - 5:15 p.m. (5:00 p.m. - 4:15 p.m. Chicago Time/CT) with a 45-minute break each day beginning at 5:15 p.m. (4:15 p.m. CT)
	CME ClearPort	Sunday - Friday 6:00 p.m. - 5:15 p.m. (5:00 p.m. - 4:15 p.m. Chicago Time/CT) with a 45-minute break each day beginning at 5:15 p.m. (4:15 p.m. CT)
Contract Size	250 pounds of U308	
Price Quotation	U.S. Dollars and Cents per pound	
Minimum Fluctuation	\$0.05	
Floating Price	The Floating Price for each contract month will be the month-end spot U308 price published in Ux Weekly for the contract month by Ux Consulting Company, LLC (UxC). For settlement of this contract, the month-end spot price provided by UxC will be considered final on the payment date stated in Rule 970.08 and will not be subject to any further adjustment.	

Source: [http://www.cmegroup.com/trading/metals/other/uranium\\_contract\\_specifications.html](http://www.cmegroup.com/trading/metals/other/uranium_contract_specifications.html), which was accessed on November 23, 2014.

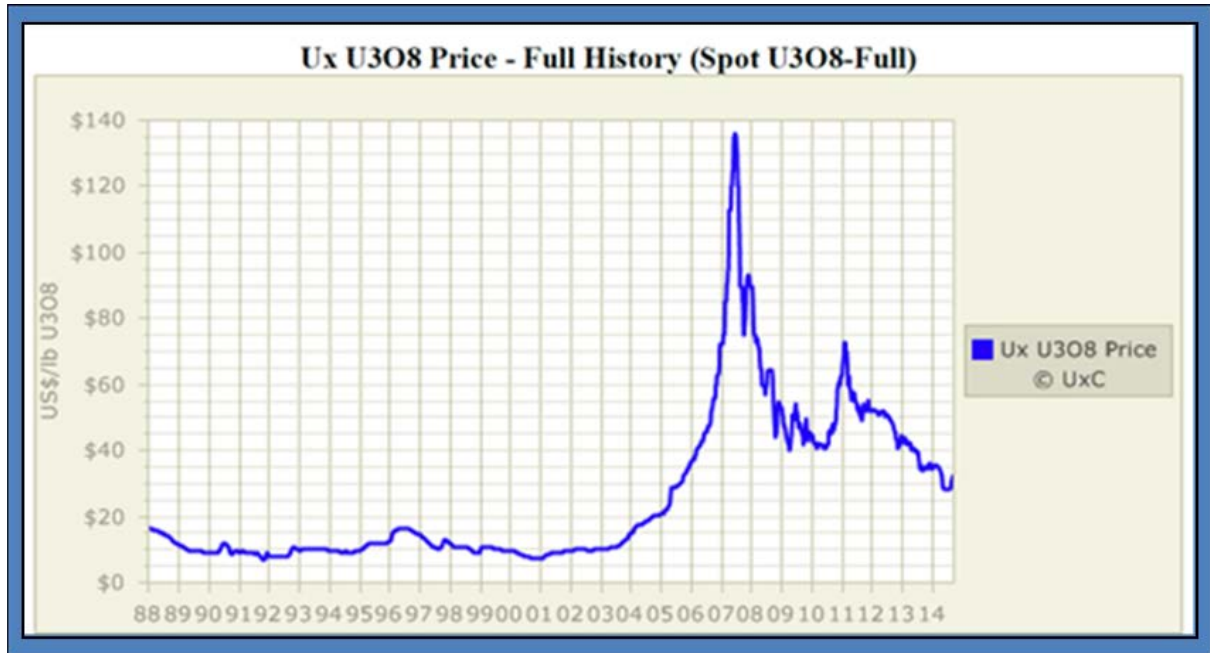
**The Uranium Market versus the Criteria for the Successful Launch of a Futures Contract**

Sandor's Criterion Met: There Should be Sufficient Volatility

Sandor (1973) notes that one criterion for a futures contract to be successful is that the price variability of the commodity must be sufficient. That would appear to be the case for uranium prices. Noted U.S. Senate (2014): "In recent years, the uranium market has experienced significant price fluctuations, based on massive swings in market sentiment towards nuclear power and technology changes for alternative sources of energy." This is illustrated in Figure 1 on the next page.



Figure 1



Source of Graph: U.S. Senate (2014), p. 122, which, in turn, accessed the graph from the Ux Consulting Company, LLC, <http://www.uxc.com>.

### Pirrong's Criterion Not Met: There Should be Fragmented Marketing Chains

Pirrong (2014) notes that “futures contracts are most viable when ...” not only are there “large holdings of inventories to be hedged,” but also when “there are relatively fragmented marketing chains ...”

In contrast, there is a “lack of [trading] counterparties in the [uranium] market, [which] add[s] to the risk of holding uranium assets,” according to the 2014 U.S. Senate report, which, in turn, cited a December 2008 Goldman Sachs memorandum on uranium trading.

In explaining why pulp futures contracts have never become successful, Pirrong (2014) explained that there has been “a lot of *vertical integration* in pulp, and even freely traded pulp ... [has] not been traded in long chains like grain or oil is. [As a result, there are] few trader intermediaries [in the pulp markets].” (Italics added.)

Does this consideration apply to uranium? The short answer is yes.

According to the World Nuclear Association (2014), “With the main growth in uranium demand being in Russia and China, it is noteworthy that the vertically-integrated sovereign nuclear industries in these countries (and potentially India) have sought equity in uranium mines abroad, bypassing the market to some extent.”



### Gray's and Silber's Criterion Not Met: There Should be a Level Playing Field Amongst Participants

Both Gray (1966) and Silber (1985) discuss how, in order to be willing to provide liquidity to a futures market, speculators should not be at a large informational disadvantage.

In contrast, the 2014 U.S. Senate report quoted a December 2008 Goldman Sachs memorandum as stating that the uranium "market was characterized by 'long-term physical participants trading with each other,' which could lead to significant informational disadvantages for new entrants ..."

### **Conclusion**

While uranium prices have been sufficiently volatile to merit a futures contract, it appears that the industrial organization of the uranium industry has not been conducive to the success of a futures contract, analogous to other failed futures contracts.

GCARD readers whom are interested in a more in-depth discussion of what has separated successful futures contracts from failed contracts are encouraged to review the longer essay in Till (2016).

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### **Endnotes**

This article is excerpted from a seminar in Chicago on why some futures contracts have succeeded while others have failed, which was provided by the author to staff from the Shanghai Futures Exchange.

The information in this article has been assembled from sources believed to be reliable, but is not guaranteed by the author.

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### **Keywords**

Futures, volatility, commodity, speculator, uranium



## Timing Indicators for Structural Positions in Crude Oil Futures Contracts

### Hilary Till

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*This digest article will argue that it is plausible that there are two fundamental metrics that could be useful for deciding upon crude oil futures positions: (1) whether there are ample inventories or not; and (2) whether spare capacity is at pinch-point levels or not. The article will further argue that a dynamic allocation strategy alone is not sufficient for holding the line against losses in a crude-oil-dominated strategy: financial asset diversification must also be employed.*

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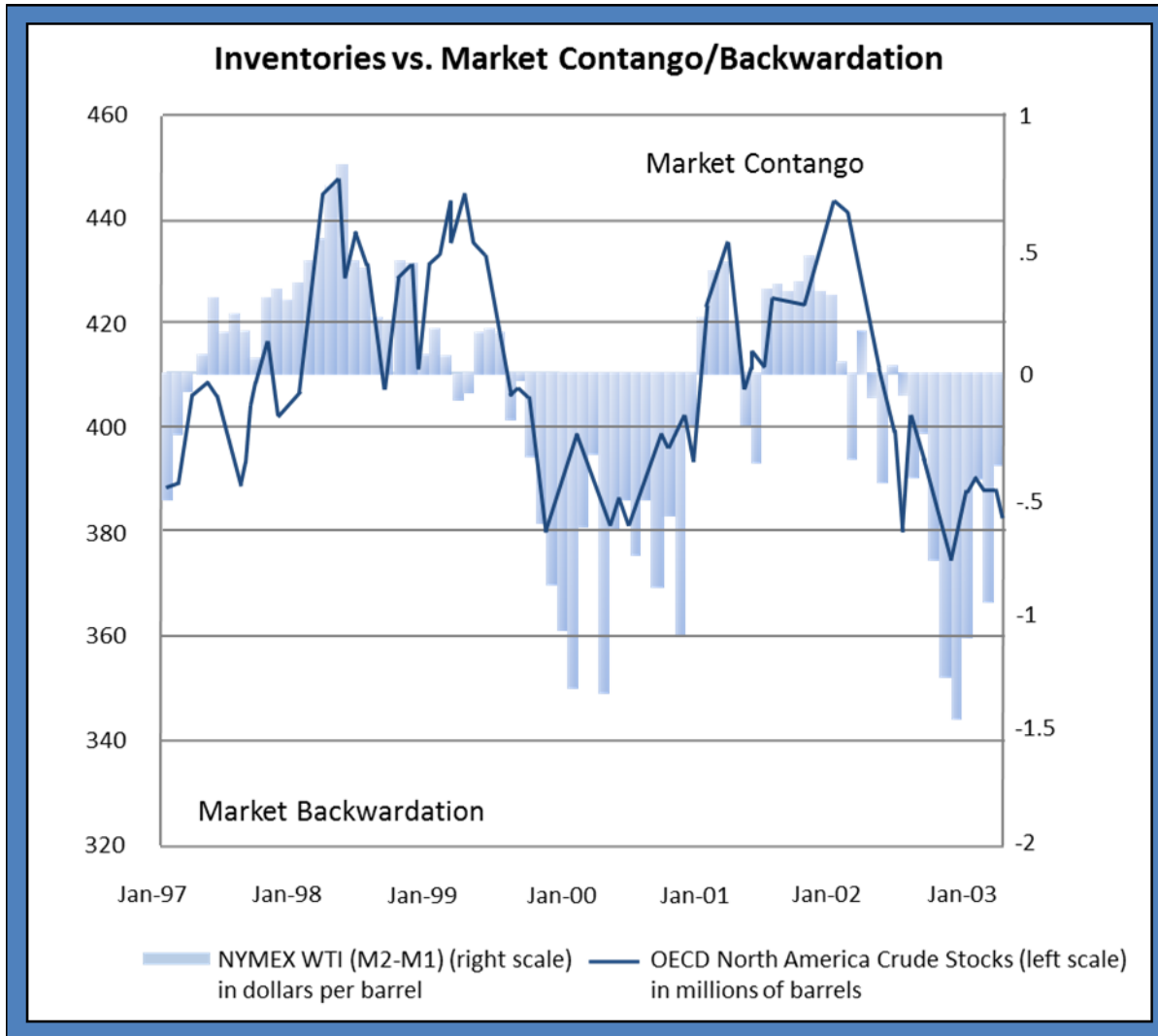
### Ample Inventories Can Potentially Be Proxied By Roll-Yield-Related Measures

A futures contract's roll yield is positive when the near-month futures contract trades at a premium to deferred-delivery contracts, forming a curve shape referred to as "backwardation." Conversely, the roll yield is negative when the near-month futures contract trades at a discount to deferred-delivery contracts, forming a curve shape referred to as "contango."

When crude inventories have been ample, the front-to-back futures spread has been in contango; and when inventories have been scarce, the front-to-back spread has been in backwardation. This is illustrated in Figure 1 on the next page. One should consider only taking long-term positions in oil when inventories are scarce, as indicated by the futures curve shape.



Figure 1



Graph based on Tchilinguirian (2003), Left-Hand-Side of Slide 18.

Explanation of Abbreviations: NYMEX = New York Mercantile Exchange; OECD = Organization for Economic Co-operation and Development; and M2- M1 = Second-Month Futures Contract Price Minus First-Month Futures Contract Price.

### The Avoidance of Crash Risk by Examining the Spare Capacity Situation

One could argue that there is a second fundamental metric that should be taken into consideration with oil positions, and that is the spare capacity situation for oil. To motivate why spare capacity might be quite important to the behavior of crude oil prices, one can review the circumstances of 2008. We found out from the events of that year what happens when the oil excess-capacity cushion becomes quite small. In July 2008, the role of the spot price of oil was arguably to find a level that would bring about sufficient demand destruction so as to increase spare capacity, after which the spot price of oil spectacularly dropped.





As discussed in Till (2016), in addition to OPEC spare capacity, one “may also [need to] include North American drilled, but uncompleted wells, as *de facto* spare capacity” as well.

It may be wise to exit a long-term position in oil futures contracts if there is an indication of low spare capacity (properly defined) in order to avoid the potential of an eventual crash risk. Further, for some market participants, it may also be advantageous to avoid crude oil futures exposure when there is minimal global oil spare capacity so that their trading strategy would not be viewed as “predatory,” as advocated by Joseph Eagleeye of Premia Research LLC.

**Return Comparison**

How would have returns from holding a structural position in Brent oil futures contracts changed if one only took positions in crude oil when (a) the crude futures curve was backwardated; *and* (b) there was sufficient spare capacity? The answer is that historically, negatively skewed returns became positively skewed. This return comparison is shown in Figure 2.

**Figure 2**

<b>Brent Futures (Excess) Returns</b>		
<b>February 1999 through January 2015</b>		
<b><u>Based on Monthly Data</u></b>		
	<b><u>Unconditional Monthly Returns</u></b>	<b>Conditional on Previous Month's OPEC Spare Capacity &gt; 1.8 mbd AND Brent Front-to-Back Spread &gt; 0 <u>Monthly Returns</u></b>
<b>Arithmetic Average:</b>	<b>1.2%</b>	<b>2.0%</b>
<b>Skew:</b>	<b>-0.18</b>	<b>0.12</b>
<b>Minimum:</b>	<b>-34%</b>	<b>-15%</b>

Source: Till (2015b), Figures 9 and 13.

Sources of Data: The Bloomberg and U.S. Energy Information Administration.

Explanation of Abbreviation: "mpd" stands for million barrels per day.

The strategy, conditional on both ample spare capacity *and* the Brent futures curve trading in backwardation, is positively skewed with its worst monthly return being -15%. In this case, one only held crude oil futures contracts 45% of the time, and the returns shown in the right-hand column of Figure 2 were only calculated when both conditions held.



A strategy of historically only entering into Brent futures contracts when (1) there had been sufficient spare capacity and (2) when there had been low inventories (as implied by the futures curve) has historically had appealing option-like characteristics. This dynamic allocation strategy has historically behaved as if it owned collars on crude oil. Collars are a combination option strategy of buying out-of-the-money puts financed by selling out-of-the-money calls. Across quartiles of Brent futures returns, the conditional strategy essentially gave up the possibility of very large returns in exchange for avoiding quite negative returns, as discussed in Till (2015a).

In examining the level of fees that hedge funds have been able to charge for moving the return distribution of an asset class to the right, one might conclude that investors highly prize positive skewness. Therefore, it is useful to examine a strategy's potential option-like characteristics such as was briefly done in this section.

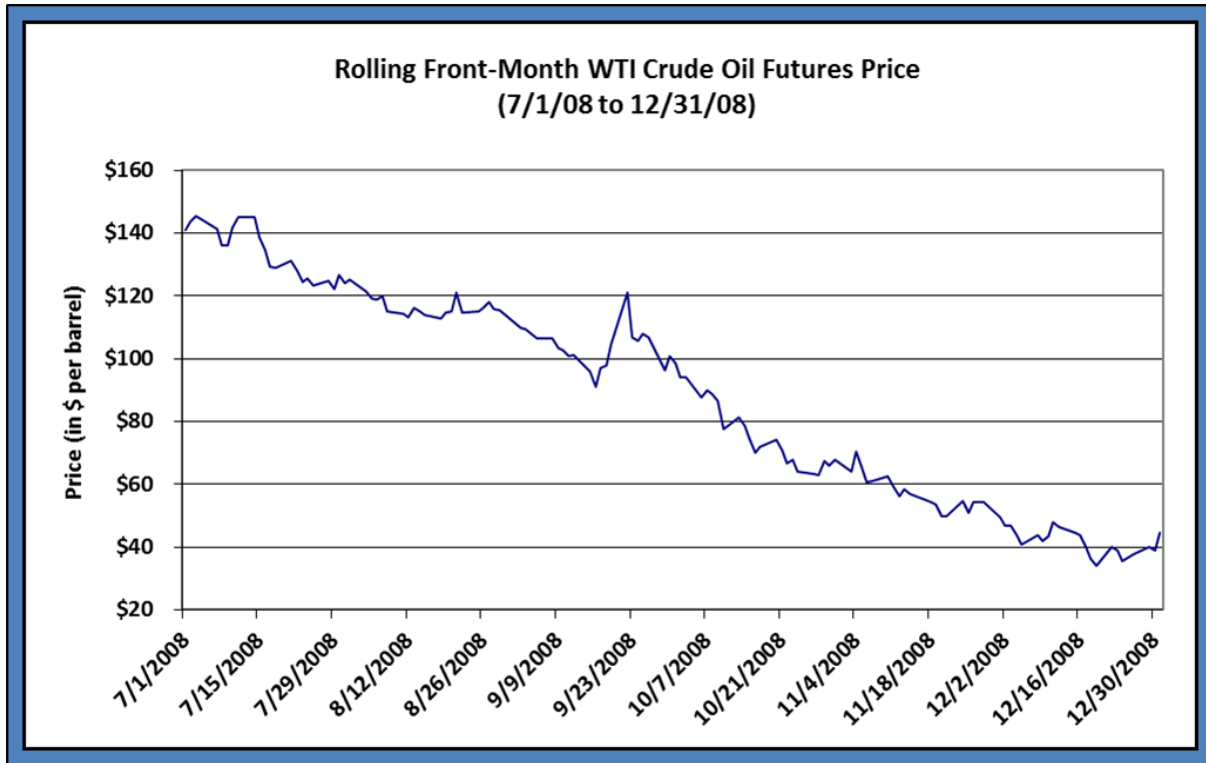
### **Financial Asset Diversification for Downside Hedging**

The use of timing indicators for deciding upon crude oil futures holdings may be necessary, but is probably not sufficient for this allocation decision. Based on historical data, it appears that one should also consider natural hedging strategies. As explained by Evans-Pritchard (2014), whom in turn cited data from HSBC: "Tumbling oil prices ... have been a bonanza for global stock markets, provided the chief cause has been a surge in crude supply rather than a collapse in economic demand." In this scenario, an equity hedge would serve as an appropriate hedge for petroleum complex holdings. That said, declining oil prices have not always preceded equity-market rallies. If oil prices are undergoing a dramatic decline because of "the forces of global recession," this can overwhelm "the stimulus or 'tax cut' effect for consumers and non-oil companies of lower energy costs," summarized Evans-Pritchard (2014). Under that scenario, a Treasury hedge may be the most effective hedge for petroleum complex holdings.

For example, during the collapse of oil prices during the Great Recession and Global Financial Crisis of the latter half of 2008, Treasuries performed quite well. Please see Figure 3 on the next page.



**Figure 3**  
**Crude Oil Prices and Treasury Note Futures Returns During 2H08**



Source of Data: The Bloomberg.

**10-Year U.S. Treasury Note Futures Excess Returns:**  
Under 2H2008 Scenario  
**13.8%**

[Calculated based on rolling the futures contract on the first business day of the first-notice-day month.]

Source of Data: Commodity Research Bureau.

Calculations based on work by Joseph Eagleeye of Premia Research LLC.

If one accepts this article’s arguments, then what should be the precise mix of oil-dominated commodity positions, equities, and bonds? In practice, this depends on an investor’s (a) return expectations, (b) loss aversion, and (c) tolerance to periodically underperforming one’s peer group. For example, in practice, institutional investors are averse to underperforming their peer groups over three-to-five year timeframes, and this consideration has historically (apparently) dominated maximizing long-term returns. If this is the case for a particular investor, then this fact may need to be taken into consideration in determining an investor’s precise asset allocation mix, including oil.



## Conclusion

In addition to examining whether crude oil has ample inventories, which can be inferred from the crude oil's curve shape, a trader or investor might find it advisable to also examine the spare capacity situation for crude oil. But for long-term position-taking in oil futures contracts, even these timing indicators may not be sufficient for holding the line against losses, especially during a deflationary shock. In that case, it may be that prudent portfolio construction is also necessary.

*GCARD* readers whom are interested in a more in-depth discussion on timing indicators for structural position-taking in crude oil futures contracts are encouraged to review the longer essay in Till (2015b).

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## Keywords

Crude oil futures, spare capacity, structural positions, futures contracts, contango, backwardation, asset allocation



## China: Credit, Collateral, and Commodity Prices

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[http://www.hkimr.org/uploads/publication/433/wp-no-27\\_2015.pdf](http://www.hkimr.org/uploads/publication/433/wp-no-27_2015.pdf)

*“We review how China has become a dominant influence in global commodity markets due to the economy’s size and commodity intensity. We then focus on the emergence of China’s credit market as a new influence on commodity prices ... We find that a 1 percentage point (ppt) surprise increase in China’s bank lending results in statistically significant price increases of 10-12 percent for some base metals, including copper. This contrasts with a 1 ppt shock to China’s industrial production which leads to a statistically significant change of 7-9 percent of aluminum, copper, and crude oil. We suggest that one reason for the large influence of China’s credit aggregates may be the important role that some commodities play as collateral for lending in a financial system still bedeviled by information asymmetries, particularly for private sector borrowers.”*

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### Introduction

China has long had a large demand for commodities, serving as the world’s largest consumer in a long list of commodities, now consuming 22% of the world’s energy in addition to 26% of crops and 47% of base metals. It was long thought that increases in consumption and industrial production were the key drivers of commodity demand. This paper explores an alternate explanation, one in which apparent commodity demand, and therefore price increases, can be traced to increases in credit availability in the Chinese market, some of which is related to financial market investments rather than investments in the real economy.

### Why the Paper’s Research Question is Important

The global commodity market has historically based supply and pricing decisions on the interaction of supply and demand. The large demand coming from the Chinese market has led to a substantial increase in commodity supply, much of which was financed through increasing debt loads. The new level of supply, especially in base metals, makes an assumption that Chinese demand will continue to grow. However, these demand numbers may be difficult to believe, as the demand from copper may not be exclusively related to industrial activity. This is worrisome, as copper that is placed in storage rather than used in the production of industrial and consumer goods, may eventually return to the market as extra supply and pressure copper to trade at lower prices. In the long run, this overestimated

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*This digest article was written by Dr. Keith Black, Ph.D., CFA, CAIA, Managing Director, Curriculum and Exams, Chartered Alternative Investment Analyst Association.*



demand can lead to excess supply, lower prices, and the impairment of debt issued by higher cost copper producers.

### **Background: Commodities as Collateral**

The use of commodity inventories as collateral for financial borrowings and investment, especially in copper, may have an even larger price impact than demand for industrial uses. Given the information asymmetries between borrowers and lenders in China, a large portion of bank loans require collateral pledges, often with a required collateral value twice the amount of the loan. This makes inventory levels, which can be opaque in China, especially important in understanding the full supply and demand picture and the likely long-run impact on commodity prices. Banks had previously preferred property assets as collateral, but the 2007 Property Rights Law expanded other types of collateral, including more categories of “movable assets,” amongst which is copper held in certified warehouses. October 2007 serves as a break point, as inventory-use ratios rise after this date when commodities are imported but not consumed.

Copper held in bonded warehouses can be used as collateral for a carry trade. The firm finances imports using a US dollar denominated letter of credit at a low interest rate. Borrowing costs in a foreign letter of credit may be lower than the domestic borrowing cost due to a perceived increase in security of letters of credit relative to domestic bank loans. The proceeds from the borrowings are deposited into a Chinese bank at a higher interest rate. As long as the Chinese interest rate stays higher than the US dollar denominated interest rate and the Chinese currency does not depreciate faster than the carry earned on the borrowing and investment, the carry trade will be profitable. These commodity financing deals (CFDs) may account for over 30% of China’s short-term foreign currency borrowings and hold over 5% of the world’s annual copper production as collateral. Prior research shows that over 12% of the price increase in base metals from 2007 to 2014 may be attributed to CFDs.

### **Data Description**

The study seeks to correlate commodity prices to measures of industrial production as well as increases in credit availability, and to differentiate between the two influences on commodity demand. Variables include monthly observations on world commodity supply, global industrial production outside of China, China’s aggregate credit, China’s industrial production, US dollar short-term interest rates, the US dollar real exchange rate, and real commodity prices. Data were collected from January 2002 through May 2015. An important breakpoint was noted at October 2007, the date of the Chinese Property Law that allowed movable assets such as copper to be used as security for loans.

### **Description of Investigation**

The paper uses sophisticated statistical techniques to estimate the impact of change in aggregate credit and economic activity on commodity prices. Two studies are completed, one on the full sample from 2002 to 2015 and the second starting after the introduction of the Chinese Property Law in October 2007. Results linking commodity prices to credit growth appear to be stronger in the latter period, while industrial production seems to have a stronger impact over the full sample period.



A one percentage point surprise increase in Chinese bank lending leads to a price increase of over 10% over four quarters in some base metals, including copper. A similar surprise in industrial production leads to a four-quarter price change of over 6% in the price of aluminum, copper, and crude oil. Base metals have a stronger response to credit growth than is found in crude oil, as base metals are easier to store in warehouses.

### Findings from Other Research

#### Hoffman and Gilmartin (2016): “Quantifying ‘Real’ Chinese Copper Demand,” a *Bloomberg Intelligence* Report

“China’s carry trade – which uses metals as collateral to finance deals – inflated demand, kept prices higher, and led miners to raise output.” The authors note an inconsistency between the demand growth for copper of 117% since 2006 and the increase in cement of 11% and the 5.7% growth in the electrical grid over the same time period. Separating the demand for copper that is actually used in construction, home appliances, and demand for growing the electrical grid from that stored in warehouses for financial uses substantially changes China’s demand picture, which may show “real” copper demand as growing at just 5.8% per year. Hoffman and Gilmartin (2016) estimate that China’s (industrial) copper demand may be just 8.13 million metric tons a year, 29% below popular estimates, which would have led to China’s share of global copper demand at 36% of world use, far below the widely quoted 50% share.

Over 15 million tons of copper may sit in Chinese warehouses as collateral for carry trades that arbitrage the difference between Chinese and foreign interest rates. There is a concern that the apparent demand for copper could decline and warehouse stocks could be liquidated if and when the carry trade unwinds, which is likely with a weakening of the Chinese yuan or a decline in Chinese interest rates relative to borrowing rates in the foreign/funding currency.

#### Bi et al. (2015): “Copper in China: A Bottom-Up Approach to Long-Term Demand,” a *Macquarie Research* Report

China’s growth in copper demand has risen from 1.8 million tons in 2000 to 9.9 million tons in 2014, reaching 45% of global consumption after compounding growth at 13% per year. This rate of growth is likely to slow substantially, but may not contract as feared by some investors. The Macquarie researchers estimate annual growth of Chinese copper demand to be just 3.4% per year through 2020, reaching 13.5 million tons.

This article provides a bottom-up analysis of copper demand through an examination of five key sectors: infrastructure, construction, transportation, industrial goods, and consumer appliances. The report is data driven, including 72 figures describing in detail the drivers of copper demand in China. As the urban population stabilizes, the prior demand growth in infrastructure and construction will move toward growth in consumption sectors including automobiles and white goods, such as refrigerators, air conditioners, and laundry appliances.



Approximately 70% of copper demand in infrastructure is from the electrical grid, which will continue to grow from both primary and replacement demand as the urban share of the Chinese population grows from 54% to over 62% by 2020. The use in construction is likely to slow, especially with a slowing in new building construction, but could grow from the rehab demand for existing buildings. The use of copper in transportation has nearly doubled as a share of Chinese demand, from 4% to 7% since 2000, due to the growth in automobiles and motorcycles as well as trains and subway cars.

## Conclusion

To fully understand commodity prices, investors need to analyze both the commodity intensity and the credit intensity of the Chinese economy. While industrial production continues to have a large influence on commodity prices, credit growth and the use of commodities as collateral may have had an even larger influence on base metals prices over the last decade. Both suppliers and investors in base metals need to proceed with caution, as the large warehouse stocks of base metals in China may have to be quickly sold if financial markets deteriorate, either (a) by a contraction of credit in China, or (b) by a rise in US interest rates, or (c) if the value of the US dollar relative to the Chinese yuan causes losses to those who have borrowed in US dollars and invested in the proceeds in China. A maturation of the Chinese credit market or enhanced ability of Chinese to borrow overseas may make base metal collateral less necessary to justify loans, which could again weaken copper prices by bringing warehouse inventory back into world supplies.

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## Endnotes

The original article was also included in the February 2016 issue of the eJournal, *Global Commodity Issues [Editor's Choice]*, a publication of the J.P. Morgan Center for Commodities at the University of Colorado Denver Business School. The eJournal is available here:

<http://www.ucdenver.edu/academics/colleges/business/industry-programs/commodities/Pages/Global-Commodity-Issues.aspx>.

The author of this digest article is also a member of the Editorial Advisory Board (EAB) of the *Global Commodities Applied Research Digest (GCARD)*. The GCARD's EAB membership is listed here:

<http://jpmcc-gcard.org/editorial-advisory-board/>.

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<http://www.bloomberg.com/news/articles/2016-03-29/china-s-true-demand-for-copper-is-only-half-as-much-as-you-think>

## Keywords

Commodity markets, commodity prices, China, collateral, credit





## Case Study on Olam International

### Summarized by Hilary Till

Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, *Global Commodities Applied Research Digest*

At the JPMCC's December 2015 Research Council meeting, Professor Forest Reinhardt of Harvard Business School (HBS) led a discussion on Olam International. This discussion was based on an HBS case study, which he had co-authored in Bell *et al.* (2013). Professor Reinhardt is also a JPMCC Research Council member.

This 2013 case study's abstract is available at:

<http://www.hbs.edu/faculty/Pages/item.aspx?num=43838>, and it explains:

*“From modest beginnings as a cashew trader in Nigeria, Olam, founded by Indian nationals in 1989, has grown into a leading global agricultural trading company, with annual revenues of \$14 billion. The company recently has begun investing in farms and in the production of packaged goods, shifting from its traditional focus on the midstream of the value chain. The case raises questions involving competitive positioning, corporate strategy, sustainable development, and the management of business and political risk.”*



Professor Forest Reinhardt, Harvard Business School, presenting on Olam International at the December 4, 2015 Research Council meeting.

From 1989 through 1994, Olam's CEO and his early colleagues had successfully employed an asset-light strategy in Africa as an agricultural trader. Olam's early employees were largely well-educated, young Indians, and its employee attrition rate was high due to the difficult working conditions in "up country" Africa. In 1995, Olam extended its operations to other emerging market countries. During this phase of the company's development, it retained three characteristics: (1) focusing on developing countries in Africa and beyond; (2) staying asset-light; and (3) extending only into product and logistical areas that naturally tied into existing business operations.

In 2005, the company raised money for expansion via an initial public offering on the Singapore Stock Exchange, followed by further capital raises in 2007 and 2008, and culminating in large-scale mergers and acquisitions, including in developed countries.

In 2009, after the Global Financial Crisis, Olam's CEO and board moved more aggressively to change course, including (1) diving into additional developed markets; (2) becoming much more asset-heavy; and (3) investing in completely new agricultural ventures, seemingly unconnected to past areas of expertise. That said, Olam's African operations still remained a key part of the company's strategy.



In late 2012, an aggressive and well-known short-seller made the case that Olam’s business model was not sustainable; that its capital structure was extremely overleveraged; and that the firm should be valued at its liquidation value. This is the point at which the case study ends and the discussion on the case begins.

Professor Reinhardt told the assembled Research Council that Olam’s “most recent transformation ... [was] its most ambitious, and perhaps its riskiest.” He also noted that he had taught the Olam case study in “Boston, Africa, [the] Middle East, [and in] Asia. It’s a different discussion every time. I have never taught it in a room that has this many Ph.D. economists.” The case discussion gave the academic and practitioner members of the Research Council the chance to benefit from each other’s perspectives on the behavior of firms active in global commodity markets.

Amongst the insights that emerged from the discussion were as follows:

(1) While Olam performs many of the same functions—logistics, risk management, market development—as “ABCD” (Archer Daniels Midland, Bunge, Cargill, and Dreyfus, historically the dominant commodity traders, all based in the OECD), it initially did so exclusively in geographies and markets where ABCD were not very active. Now, like several other new firms based in Asia, it competes with them directly.

(2) Risk management increased in importance as the company’s fixed assets grew (as noted by Robert Greer, Scholar-in-Residence at the JPMCC);

(3) “The leadership [of Olam] is inseparable from the [company’s] economics and strategy,” as pointed out by Professor Reinhardt; and

(4) After the company’s strategic pivot, perhaps the CEO’s strategy for business acquisition was similar to his approach to his early employees: one expects a lot of attrition, but one will end up with some really great assets (as proposed by Sueann Ambron, Senior Advisor for the JPMCC and Former Dean of the University of Colorado Denver Business School.) Professor Reinhardt amplified Dr. Ambron’s point: perhaps this is the Olam view-of-the-world: “We are a pressure cooker. Not everyone can stand it. And not every asset is going up. But think how much we are learning [for the benefit of our overall business].”



Professor Forest Reinhardt (at the whiteboard), Harvard Business School, leading the discussion on the Olam International case study, during the December 4, 2015 JPMCC Research Council meeting. Back row (left-to-right): Ms. Hilary Till, Solich Scholar, JPMCC; Dr. Thomas Brady, Newmont Mining Corporation; and Dr. David Hammond, Hammond International Group. Front-row (left-to-right): Mr. Robert Greer, Scholar-in-Residence, JPMCC; Professor James Hamilton, University of California, San Diego; and Professor Emeritus Marcelle Arak, University of Colorado Denver Business School. All are members of the JPMCC Research Council.

Professor Reinhardt concluded the Olam-focused discussion by noting that the company is now majority-owned by Temasek, an investment firm owned by the Singaporean government. Another large shareholder is Mitsubishi Corporation. These big shareholders insulate the management of Olam International from the pressures imposed by aggressive short-sellers. Detractors of the firm would say it is buffering itself from capital market discipline, while Olam leadership would argue that the ownership structure frees it to pursue long-term value.



## Reference

Bell, D., Reinhardt, F. and M. Shelman, 2013, "Olam: On a New Course," Harvard Business School Case 513-044, April 2013.

### **FOREST REINHARDT, Ph.D.**

**Professor of Economics, Harvard Business School**

Forest L. Reinhardt is the John D. Black Professor of Business Administration at Harvard Business School. Reinhardt is co-chair of the Harvard Business School's Global Energy Seminar, a new executive education course for the leaders of firms that produce oil and gas, generate and distribute electricity, or play other important roles in the delivery of energy services. He also teaches regularly in the HBS Agribusiness Seminar. In the HBS Owner/President Management Program, Reinhardt teaches a core course on Global Markets. Drawing on microeconomics, macroeconomics, political science, and history, the course helps business leaders understand the economic and political environment in which business is conducted, and the strategic opportunities and risks to which globalization gives rise.

Reinhardt is interested in the relationships between market and nonmarket strategy, the relations between government regulation and corporate strategy, the behavior of private and public organizations that manage natural resources, and the economics of externalities and public goods. He is the author of [Down to Earth: Applying Business Principles to Environmental Management](#), published by Harvard Business School Press. Like that book, many of his articles and papers analyze problems of environmental and natural resource management. He has written numerous classroom cases on these and related topics, used at Harvard and many other schools in MBA curricula and in executive programs. Reinhardt received his Ph.D. in Business Economics from Harvard University in 1990. He also holds an MBA from Harvard Business School, where he was a Baker Scholar, and an A.B., cum laude, from Harvard College.

Professor Reinhardt is also a member of the J.P. Morgan Center for Commodities' Research Council at the University of Colorado Denver Business School.



## **The Determinants of the Price of Crude Oil: The Relative Importance of Fracking, China, and Geopolitics**

### **Summarized by Hilary Till**

Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, *Global Commodities Applied Research Digest*

The December 2015 JPMCC Research Council meeting featured a presentation by Professor James Hamilton of the University of California at San Diego. Professor Hamilton is an international expert on the oil markets and the macroeconomy as well as being a Research Council member of the JPMCC. His presentation was entitled, “Fracking, China, and the Geopolitics of Oil.” Dr. Bluford Putnam of the CME Group and Professor Yosef Bonaparte of the University of Colorado Denver discussed Professor Hamilton’s research from both practitioner and academic perspectives, respectively.



Professor James Hamilton, University of California, San Diego, presenting at the December 4, 2015 Research Council meeting on the key factors that have determined the price of crude oil.



## The Determinants of the Price of Crude Oil: The Relative Importance of Fracking, China, and Geopolitics

Like the other summaries in the *Global Commodities Applied Research Digest (GCARD)*, this overview of Professor Hamilton's presentation is highly condensed. For a more in-depth understanding of Professor Hamilton's presentation, one can download his slides at the U.S. Energy Information Administration's (EIA's) website: [https://www.eia.gov/finance/markets/reports\\_presentations/2015JamesHamilton.pdf](https://www.eia.gov/finance/markets/reports_presentations/2015JamesHamilton.pdf). (Professor Hamilton had also presented on "Fracking, China, and the Geopolitics of Oil" at the EIA's "Workshop on Financial and Physical Oil Market Linkages" on September 29, 2015 along with other international oil experts, as described in that workshop's agenda: [https://www.eia.gov/finance/markets/reports\\_presentations/2015WorkshopAgenda.pdf](https://www.eia.gov/finance/markets/reports_presentations/2015WorkshopAgenda.pdf).)

### **Presentation by Professor James Hamilton, Ph.D.**

At the outset of Professor Hamilton's JPMCC Research Council lecture, he discussed why it turned out that oil priced at \$100 did not hold, starting in 2014. In July 2014, he had believed otherwise. In his presentation to the Research Council, he stated that "it might be worthwhile to take a look at how I got that so spectacularly wrong. And my answer is [in] the title [of the presentation]: 'Fracking, China, and the Geopolitics of Oil.' What I propose ... is to take a look at each of those three categories, explain what my assumptions were, and recognize how the world turned out differently than ... [my expectations.]"

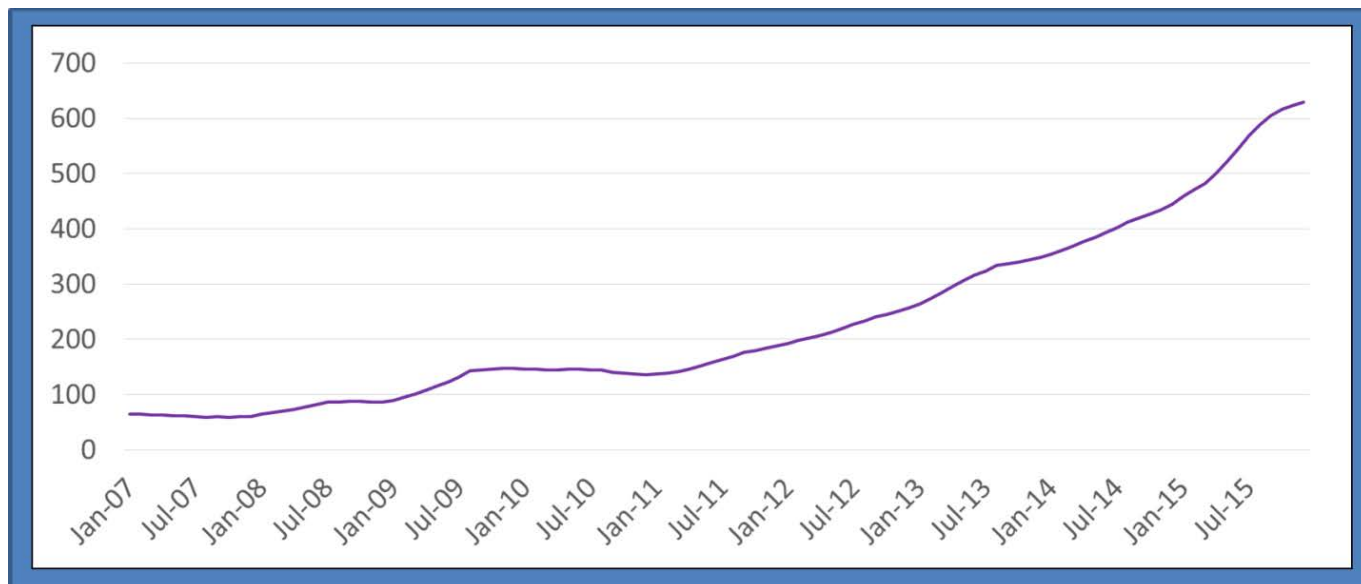
### Fracking

"[My] ... first assumption ... was that production of tight oil (different from conventional oil) would fall off very quickly if we stopped additional drilling, ... [and] we found that a year or two since then, it's even more true today than it ever was," stated Professor Hamilton. "My second assumption [had been] ... if the price fell ... below \$80, ... [one would] start to see dramatic cutbacks [in oil rigs in operation.] ... [T]o some degree, that's what happened ...", recounted Hamilton. His third assumption was that a "big drop in legacy [oil] production and [the] number of active drilling rigs would mean [a] big drop in US production," according to his presentation. Why did this assumption turn out to be incorrect? The answer is productivity, which is illustrated in Figure 1 on the next page.



## The Determinants of the Price of Crude Oil: The Relative Importance of Fracking, China, and Geopolitics

**Figure 1**  
**Drilling Productivity (Gross Added Barrels per Month per Rig) in Counties Associated with Tight Oil**



Source: Slide 10 of Professor James Hamilton’s December 4, 2015 presentation to the JPMCC Research Council.

### Geopolitics

Hamilton’s fourth assumption had been that “turmoil in the Middle East and North Africa would continue,” presumably leading to constrained production. While enormous upheavals have indeed taken place, the region has been “pumping more oil anyway,” summarized Hamilton’s presentation and which is illustrated in Figure 2 on the next page.

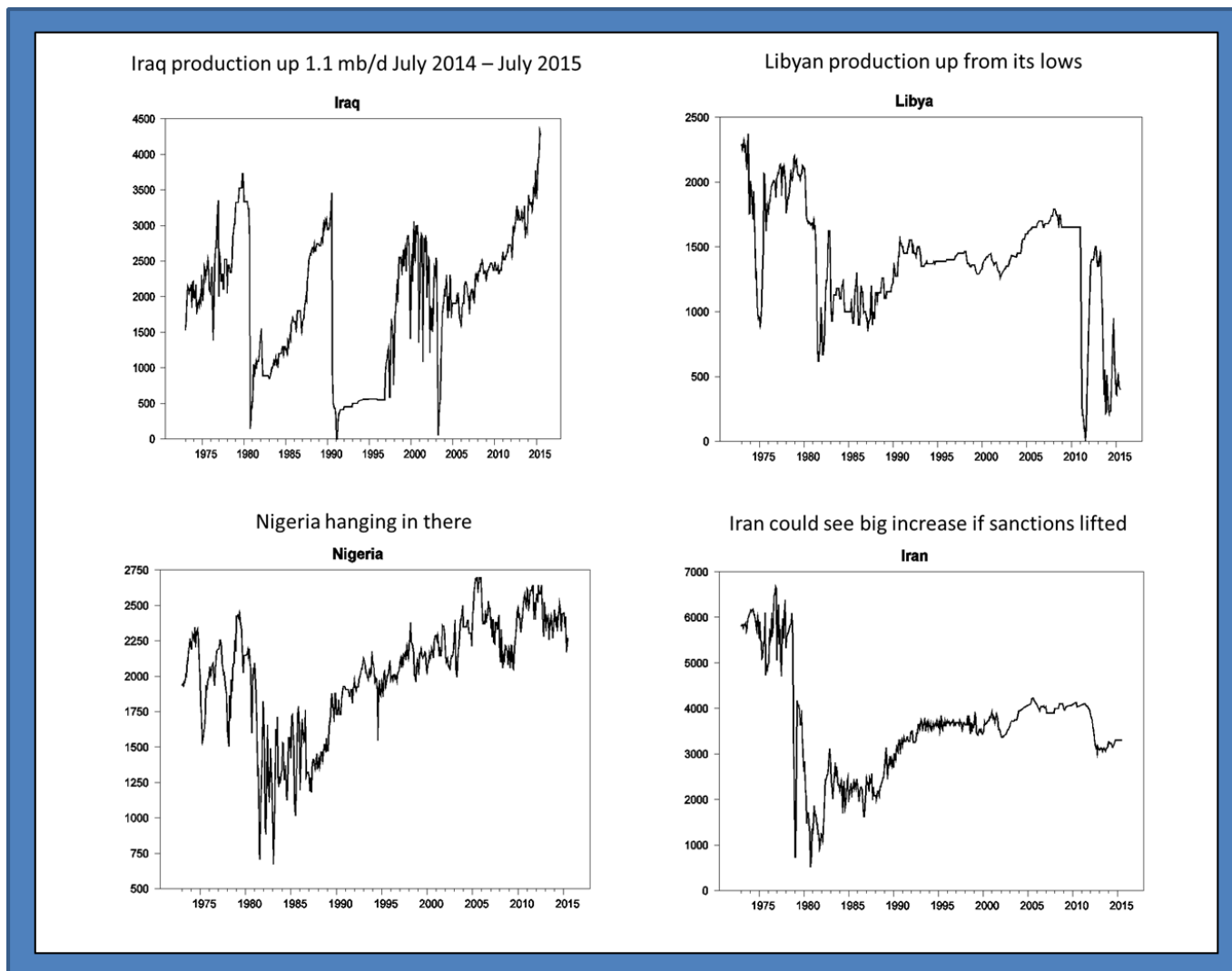




## The Determinants of the Price of Crude Oil: The Relative Importance of Fracking, China, and Geopolitics

**Figure 2**

**Crude Oil Production in Select Middle Eastern and African Countries (July 2014 to July 2015)**



Source: Slides 20 to 23 of Professor James Hamilton's December 4, 2015 presentation to the JPMCC Research Council.



## The Determinants of the Price of Crude Oil: The Relative Importance of Fracking, China, and Geopolitics

Hamilton's fifth assumption had been that "Saudi Arabia would never increase production above 10 mb/d [while in fact, the Kingdom] increased [production] from 9.8 mb/d [in July 2014] to 10.3 md/d [in] July 2015," noted his presentation. Given the relatively modest changes, though, in Saudi production, Hamilton stated that he thought analysts were "making a mistake when they put Saudi Arabia in the center of the story" on oil price changes since mid-2014.

### China

The presenter's sixth assumption had been that "China's energy demand would continue its phenomenal growth [and while] China's oil imports remain strong ... [the] future [is] unclear," according to his lecture.

### Conclusion

What forecasts can one be confident about, asked the presenter? It would be very difficult to predict the presence or absence of stability in the Middle East and in North Africa. Further, whether China experiences a "big economic downturn" or not is very unclear. But Hamilton stated that one could be "confident about ... US tight oil production ... [becoming] the marginal [oil] producer. That's because it's the high-cost producer. ... And that puts ... a floor under the long-term price of oil. ... [One] cannot continue to sell a product ... below its true marginal cost." Therefore, Hamilton predicted that the long-term price of oil had to be "well above \$50 [per] barrel."

### **Discussion: Professor Brian Wright, Ph.D.**

Professor Brian Wright of the University of California, Berkeley, participated in the JPMCC Research Council meeting via Skype from Chile. Professor Wright asked the presenter: "Would you like to comment on the idea that Saudi Arabia thinks that it can ... cut down shale production by dropping [the] price and then [will] raise the price later to dominate the market? It seems that everything you said ... [indicates] that shale can shut down, but shale can open up again."

Professor Hamilton answered: "I think that ... [shale] would be slower to open back up, [and] ... I think that [indeed] is one of the incentives for the Saudis ... [That said,] the actual changes in Saudi production are ... pretty modest. ... There is, [also] I think, a ... strategic element to this, but as I said, I think it is a mistake to put them at the center of [the oil-price-decrease explanation.] I think they are responding [to market forces] ... [and are being] opportunistic."

### **Discussion: Dr. Bluford Putnam, Ph.D.**

Dr. Bluford Putnam, the Chief Economist at the CME Group, was the industry discussant for Professor Hamilton's panel session. Dr. Putnam is also a member of the JPMCC Research Council. The following is an edited excerpt from Dr. Putnam's remarks.



## The Determinants of the Price of Crude Oil: The Relative Importance of Fracking, China, and Geopolitics

“We are in the middle of big transitions, and I don’t see any new normal coming. So let me begin with a couple of points on the paper. I found myself in the exact opposite position of James [Hamilton’s position-taking.] In July of 2014, I was explaining to my clients how I had been wrong for the last two years because I was looking at this incredible increase in supply. I was forecasting a dramatic decline in Chinese and emerging market growth. And the oil price was just staying at one hundred [dollars]. ...

I think when we look at China, we forget about looking at all of their trading partners. One of the main reasons China is slowing down in the short-run is that all of its trading partners aren’t growing. ... On the supply side, we know the story from the US and the fracking, but we should also take a look at what has changed in the geopolitics in the Middle East. I think ... [it was] mentioned today we had a roughly ten-dollar premium on oil prices for geopolitical reasons. I think a lot of that came from the Iraq/Kuwait War.”



The afternoon panel at the December 4, 2015 Research Council meeting (left-to-right): Professor James Hamilton (presenter), University of California, San Diego; Professor Yosef Bonaparte (academic discussant), University of Colorado Denver; and Bluford Putnam (industry discussant), Managing Director, CME Group. The panel was chaired and moderated by Professor Emeritus Margaret Slade (far right), University of British Columbia and Co-Chair of the JPMCC’s Research Council.



Dr. Putnam continued:

“We had that war in the early nineties, and Iraq shutdown production, and they burned Kuwait on the way out. It took a long time to build that back, and it comes from that frame of mind that if the Middle East were disrupted, it could be a huge impact on supply. In the last five years something very different is happening.

It’s not about a war with the United States anymore. It’s about all these civil wars going on. And every faction that I know about wants to control the oil revenue, and none of them want to destroy the facilities. And that’s a sea change on how I look at oil. And I tell you that oil analysts just didn’t get that in general. ... I think we are in for a fairly long period of increasing supply, not decreasing. And while there is certainly probability that there could be disruption, it is a very low probability. ...

[I]t is hard ... to talk about oil without talking about alternative supplies in energy and clearly natural gas. ... Transportation is becoming increasingly more fuel efficient. So as we go down the path, we’re going to see less growth in oil demand for a given growth in GDP.”

Dr. Putnam concluded: “I think the big event in 2015 has been the total lack of investment in this sector. When ... [one] doesn’t make new capital investments, it doesn’t show up tomorrow. It shows up down the road, year-by-year. I think in 2016 we’re going to see a much more dramatic falloff in US production that will be a surprise to the market. The market knows about Iran, the market knows about China, it knows about emerging markets, but I don’t think it really appreciates that there is, at least in my mind, the non-linear aspect to how production gets cut back. So with the lack of investment in 2015, I see a surprise, if you will, for markets in 2016.”

**Discussion: Professor Yosef Bonaparte, Ph.D.**

Professor Yosef Bonaparte of the University of Colorado Denver was the academic discussant for Professor Hamilton’s panel session. He emphasized the stress on Saudi Arabia’s budget due to the unexpected drop in the price of oil since mid-2014. Noted Bonaparte: “[T]he Saudis [could] ... go bankrupt in 5 years,” as they spend through their previously accumulated budget surpluses, given their reliance on the price of oil. Bonaparte also discussed the difficulty that a non-Middle Eastern analyst, unfamiliar with the region’s cultures, traditions, and languages, would find in interpreting geopolitical shifts. This confusion is illustrated in Figure 3 on the next page.



Figure 3



Source: Slide 6 of Professor Yosef Bonaparte's December 4, 2015 presentation to the JPMCC Research Council.

Regarding the geopolitical arena, Dr. Putnam added that “if you look at Russia, you just have to remember that they ... really want Navy ports; they believe in a strong Navy; and if you go back to the Ukraine, the Navy port was in Crimea: they wanted it back. They have a port in Syria. It's their only access to the Mediterranean. [Their interest in the Syrian conflict] ... is not about Syria [*per se*]. It's about their long-term military strategy: they feel they need Navy access. When you are a country as far north as them, ... you want some other ports [from a global projection-of-power perspective.]”

**JAMES HAMILTON, Ph.D.**  
Professor of Economics, University of California, San Diego

Professor Hamilton has published on a wide range of topics. His research in areas including econometrics, business cycles, monetary policy, and energy markets has been cited by more than 40,000 other studies. His graduate textbook on time series analysis has sold over 50,000 copies and has been translated into Chinese, Japanese, and Italian. He also contributes to Econbrowser, a popular economics blog. Academic honors include election as a Fellow of the Econometric Society and Research Associate with the National Bureau of Economic Research, receipt of the Best Paper Award for 2010-2011 from the International Institute of Forecasters, and 2014 award for Outstanding Contributions to the Profession from the International Association for Energy Economics. He has been a visiting scholar at the Federal Reserve Board in Washington, DC, as well as the Federal Reserve Banks of Atlanta, Boston, New York, Richmond, and San Francisco. He has also been a consultant for the



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National Academy of Sciences, Commodity Futures Trading Commission and the European Central Bank and has testified before the United States Congress. Hamilton received the UCSD Economics Department Graduate Teaching Award on five different occasions.

Professor Hamilton is also a member of the J.P. Morgan Center for Commodities' Research Council at the University of Colorado Denver Business School.



## Swing Oil Production and the Role of Credit

### Hilary Till

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### Jan-Hein Jesse

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### Introduction

In order to understand swing production and the role of credit, this digest article will cover the following five topics:

- (1) The paper begins with the classic definition of a swing producer and notes that North American tight oil (shale) producers would not normally fit this strict definition.
- (2) The article then argues that advances in well-production estimation techniques naturally led to an explosion of creative financing solutions for investing in shale. As a result, the appetite of credit markets for taking on shale-production risk became a key driver for the outlook on North American oil production.
- (3) Next the paper proposes that we *might* be able to refer to shale producers as swing producers as long as we loosen the definition of swing producer to be one in which there are fairly uniform production decisions that take place over up to a 12-month timeframe.
- (4) The article then notes that at some point geological constraints (much more than the credit cycle) could come back into play and the baton would thereby pass back to the Middle East Gulf oil producers as the undisputed swing producers.
- (5) Lastly, the paper returns to a shorter-term perspective and estimates that the price level where shale companies can comfortably operate *en masse* is currently at about \$65 per barrel, which would provide an acceptable internal-rate-of-rate, across projects. But even if oil does recover to \$65, there may not be an immediate recovery in production since the response of capital markets would likely be much more cautious than when shale companies were viewed as bullish growth opportunities, analogous to the tech stocks of the late 1990s. We would conclude that this makes shale producers quite imperfect “swing producers.”

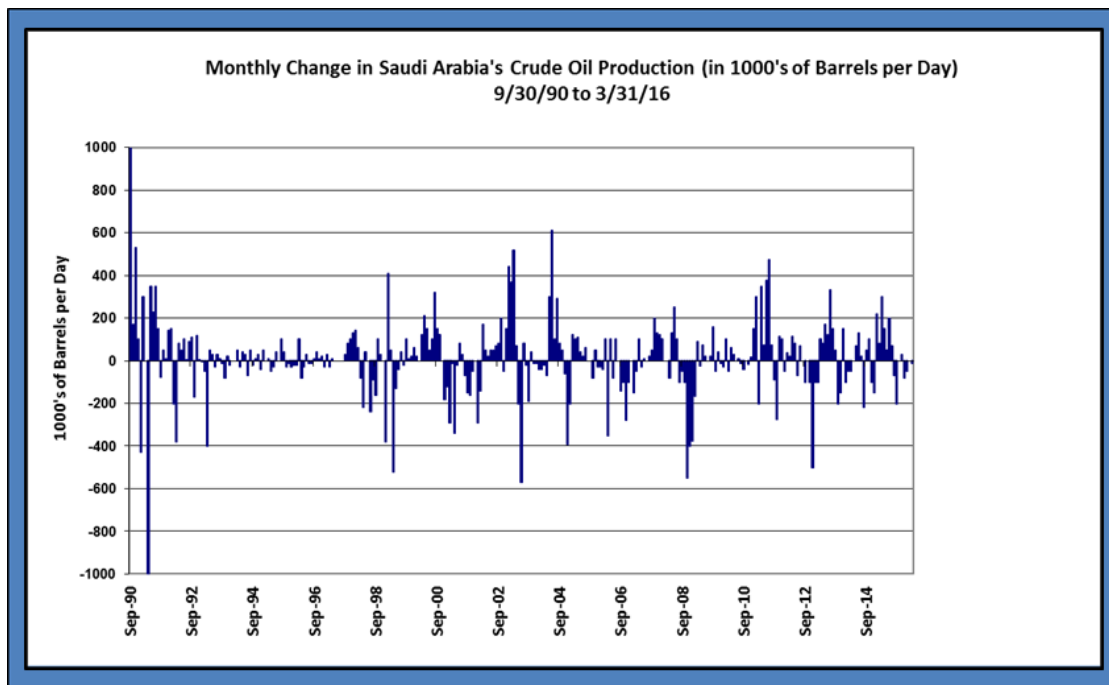


## Strict Definition of Swing Producer

### Historically, Gulf Producers Fit the Strict Definition of Swing Producer

We usually think of a swing producer as one that “has a large market share, spare capacity, and very low production costs, and ... is capable of acting strategically ... to raise and lower production to affect the price,” as described by Coy (2015). And historically, Gulf producers fit this definition. At least in the past, Saudi Arabia has been able to change production up or down by 1 million barrels per day within a month. This is illustrated in Figure 1.

**Figure 1**  
Capable of Acting Strategically



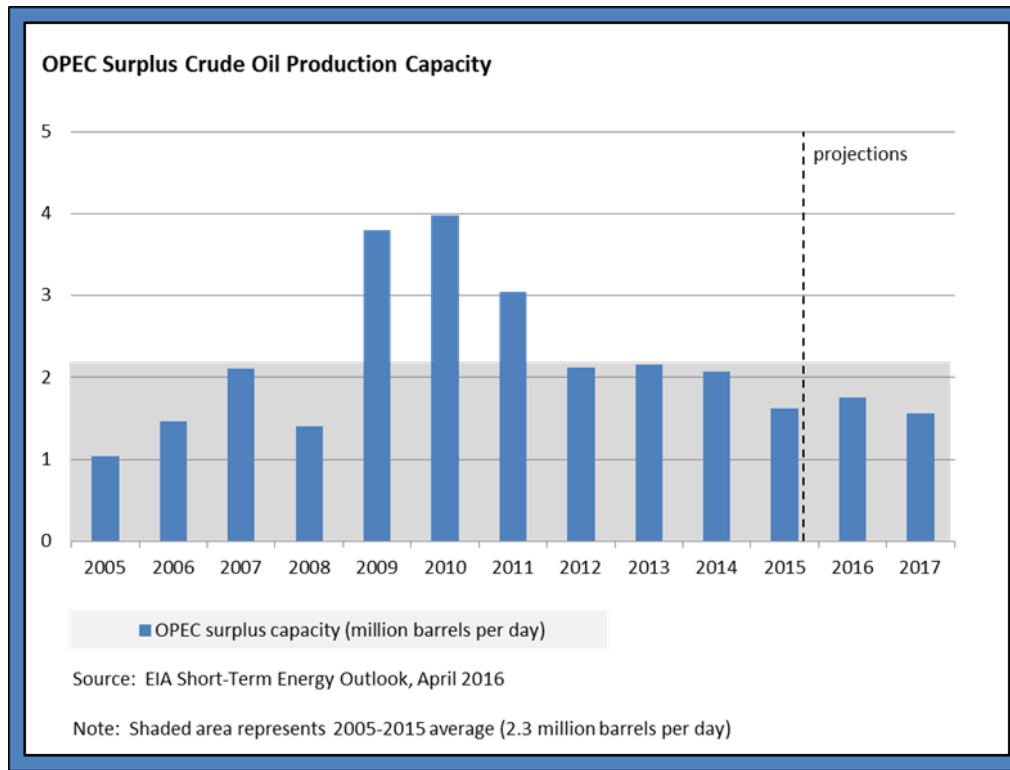
Source of Data: The Bloomberg.

“Spare capacity refers to production capacity less actual production; it quantifies the possible increase in supply in the short-term,” explained Khan (2008). According to EIA (2014), “Saudi Arabia historically has had the greatest spare capacity. Saudi Arabia has usually kept more than 1.5 - 2 million barrels per day of spare capacity on hand for market management.” OPEC surplus crude oil production capacity is illustrated in Figure 2 on the next page. Friedman (2016) notes that “Saudi Arabia accounts for about two-thirds of the spare capacity” in OPEC.





**Figure 2**  
**Sufficient Spare Capacity**



Source of Graphic: U.S. Energy Information Administration (2016b).

We should note that analysts also refer to “effective spare capacity,” which is defined as the volume of oil that can be (1) brought to market on a discretionary basis within weeks; can be (2) produced continuously for more than 3 months; and (3) is of a quality that it can be refined into valuable oil products by numerous refineries. It may be that actual effective spare capacity levels are even lower than what is presented in Figure 2.

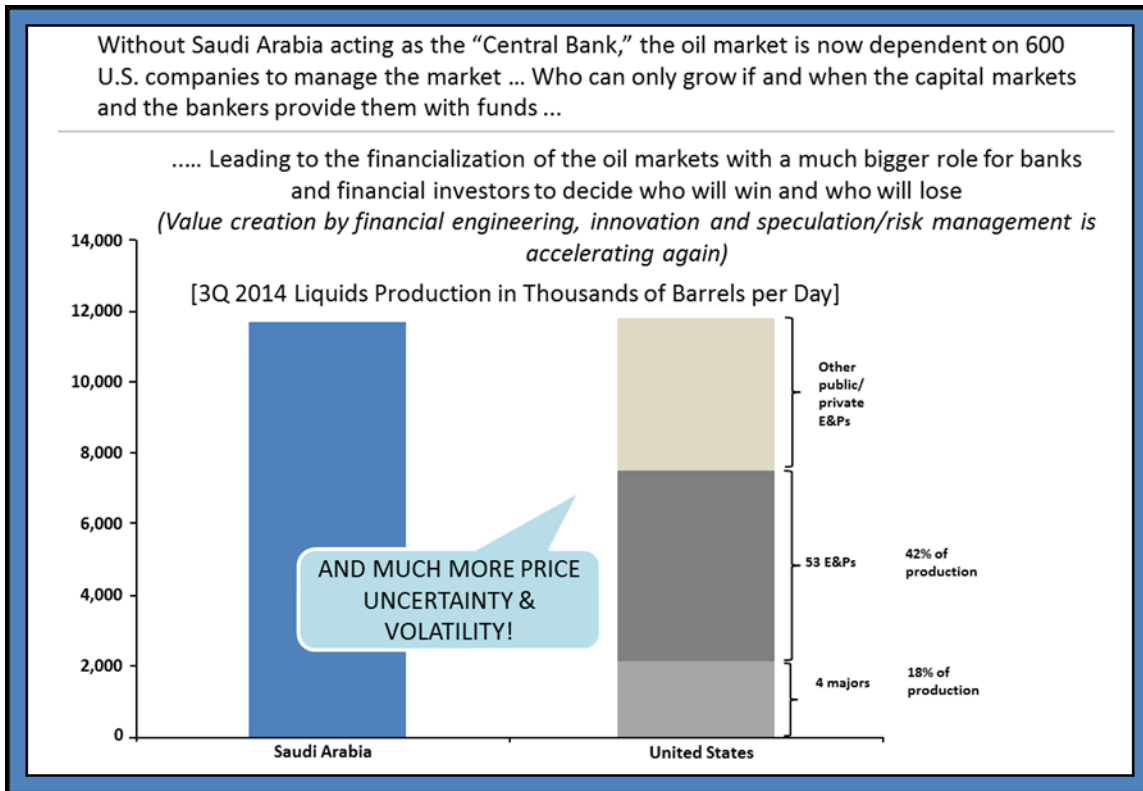
At any rate, from the summer of 2014 through at least September 2016, OPEC Gulf producers shook off their traditional role of balancing the oil market. As described in Till (2015), the Gulf oil producers had (until 2014) acted as the central banker of the oil market and had essentially provided a free put to the marketplace in preventing a free fall in oil prices, even in the face of new oil production, particularly from the United States. Arguably, one might compare the current price environment to 1986 when Saudi Arabia and other Gulf producers apparently decided upon prioritizing market share, according to Gately (1986).



Light Tight Oil Producers Do Not Fit the Strict Definition of Swing Producer

One would not normally include Light Tight Oil (LTO) producers in the swing producer category. The reason for this statement is because “U.S. production cannot be controlled by governments. It’s the result of a competitive market with hundreds of companies and tens of thousands of investors making as many decisions,” as explained in Citi Research (2016) and as illustrated in Figure 3.

**Figure 3**  
**Oil Market is Now Dependent on 600 U.S. Companies to Manage the Market**



Source of Graphic: Based on Jesse (2016), Slide 13, whom in turn cited Goldman Sachs.



## New Technology: New Financing Solutions

### Technological Advances

One noteworthy aspect of LTO producers has been how tightly their success has been bound up in capital-market innovations (or perhaps, more accurately, adaptations.) First of all, “even though hydraulic fracturing has been in use for more than six decades,” quoting EIA (2016a), it took further technological advances in both horizontal drilling and hydraulic fracturing to lead to the significant increase in oil production in the U.S. that we have witnessed over the last 5 years. As further explained in Barclays Equity Research (2016), “hydraulic fracturing ... has been around since the late 1940s, early 1950s, and horizontal wells ... really came into their prime in the late 1970s, early 1980s. [We have taken these] ... two old technologies ... and [combined] them ... in a novel way, [so] we now have a tool that engineers can use to extract ... large volumes of hydrocarbons that exist in these unconventional reservoirs.”

By way of further clarification, one should also note that shale oil resources had already been known for decades. However, they had been uneconomic with then prevailing technology. In addition, we should not even refer to the “exploration” of shale oil resources since they had already been known to be in the ground. Instead, what we are witnessing is the *exploitation* of these resources to turn them into “reserves.”

### Shale’s “Finance Friendly” Factors

With traditional projects, very “large upfront commitments” are required; in contrast, “the risk profile” is quite different with Light Tight Oil projects, according to Ashraf and Satapathy (2013). In fact, the authors noted: investments can be made at “a few wells at a time.”

Other factors which make LTO projects much more “finance friendly” than traditional projects include (a) the reduction in “country risk” since “shale production has been concentrated in the United States,” and (b) the “production profile” of shale projects, which have “strong initial production levels, but decline very rapidly, so ... [one] could say they pay out early,” as explained by Anderson (2016). Continued Anderson (2016): “[F]rom a financing perspective, the great bulk of the positive cash flows occurs early in each project’s life. This is preferred from a general risk and discounting perspective, but also figures very importantly ... [in] hedging efforts, as the oil [derivatives] market ... offers liquidity only out about 2-3 years or so. So there’s a better match between forward market liquidity and the shale production profile vs. the conventional production profile.”

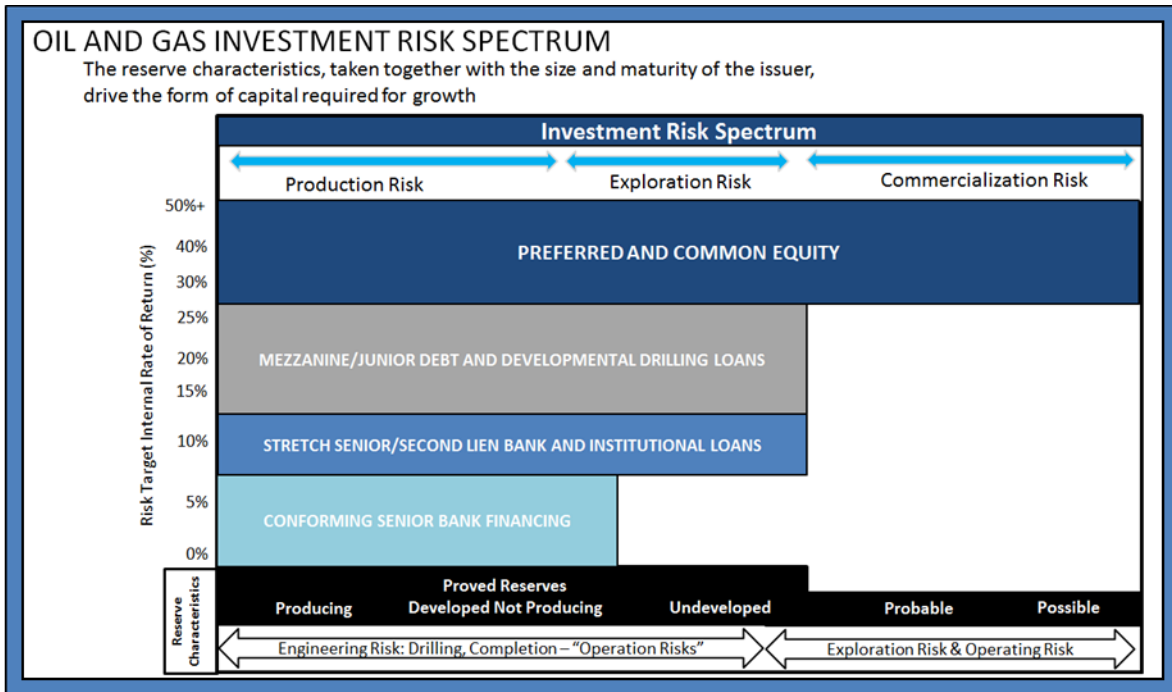
### Customizable Financing Solutions

Thanks to advances in seismic imaging and geophysical modeling, reservoir engineers can now estimate the quantity of oil or gas that is potentially recoverable from a reserve or well, along with the discovery’s initial production and decline rates. What we are highlighting here is not so much the ability of the engineers to actually get the oil that is stuck in narrow shale formations, but rather their ability to know with a *high degree of confidence* how much is there and how it is going to come out, if and when they decide to go after it.



Given the high degree of confidence in the production profile of shale projects, then as long as one has a set of credible oil price forecasts across time, one can value a shale company’s oil reserves along with the size and timing of cash flows from production. This means that very customizable financing solutions became available for numerous relatively small producers, investors, and lenders, who specialized in onshore oil projects. Please see Figures 4 and 5 below.

**Figure 4**  
**Various Forms of Capital, Depending on Reserve Characteristics**



Author’s Source: Prudential Energy Finance Group.

Source of Graphic: Clouser (2014), p. 11.



**Figure 5**  
**Capital Choices**

Proved Reserves	Sr. Secured/Unsecured Fixed Rate Debt	<ul style="list-style-type: none"> <li>➤ Cash Flow, Covenant Based Lending</li> <li>➤ Yield Range: 3.5% - 7.0%</li> <li>➤ \$10- \$200 million Investment</li> </ul>
	Second Lien Fixed/Floating Rate Debt	<ul style="list-style-type: none"> <li>➤ Coupon: 8% - 12%</li> <li>➤ No royalty or equity linked component</li> <li>➤ \$10- \$100 million Investment</li> </ul>
	Mezzanine	<ul style="list-style-type: none"> <li>➤ Targeted returns typically in the mid-to-high teens</li> <li>➤ Contractual coupon with varying types of yield enhancing features (e.g., warrants, ORRI, NPI)</li> <li>➤ Secured/Unsecured</li> <li>➤ \$10- \$50 million Investment</li> </ul>
Probable & Possible Reserves	Equity	<ul style="list-style-type: none"> <li>➤ Non-Control Position</li> <li>➤ Long Hold Period</li> <li>➤ \$10- \$50 million Investment</li> </ul>

*Source: Prudential Finance Energy Group*

Abbreviations: ORRI stands for Overriding Royalty Interest, and NPI stands for Net Profits Interest.

Source of Graphic: Clouser (2014), p. 13.

With the “greater production timing certainty afforded by shale wells[,] relative to conventional [sources,] this can make a portfolio of shale wells look like a dividend-throwing ‘cash cow’ ...”, further explained Anderson (2016).

Much Different Leverage Levels Than Previously

In addition, the fact that shale oil barely has any exploration risk, and that shale oil (and natural gas) exploitation has rapidly become an industrialized production process, led to the following consequence: banks and the capital markets became more confident in lending money to these entrepreneurial companies than they had in the past for the development of conventional oil and gas fields. Hence, these oil and gas companies could borrow much more and leverage up their balance sheets to levels “standard” oil companies would not and cannot do. Where the “standard” oil companies would have leverage of say 20-30% maximum, much smaller shale oil companies have had leverage percentages of easily above 50%, especially if deferred tax liabilities are included. The criteria to define how much banks and bond markets are willing to lend are therefore also very different than for large traditional oil field developments.



### Complicating Factors in Valuations

We should add that this article's brief descriptions and explanations regarding shale-production financing solutions have left out a number of complicating factors such as determining (a) which oil price forecasts should be used in valuing reserves, (b) at what periodicity should reserves be revalued, and (c) which discount rate on cash flows should be applied in valuations. But the key point here is that as long as the complex models for estimating well production could be assumed to be accurate, this opened up a whole host of financial engineering solutions for the development of North American onshore oil. One more caveat is that in order for these financing solutions to be economically valid, one has to also be able to assume that assets can be liquidated at a project's modeled valuation.

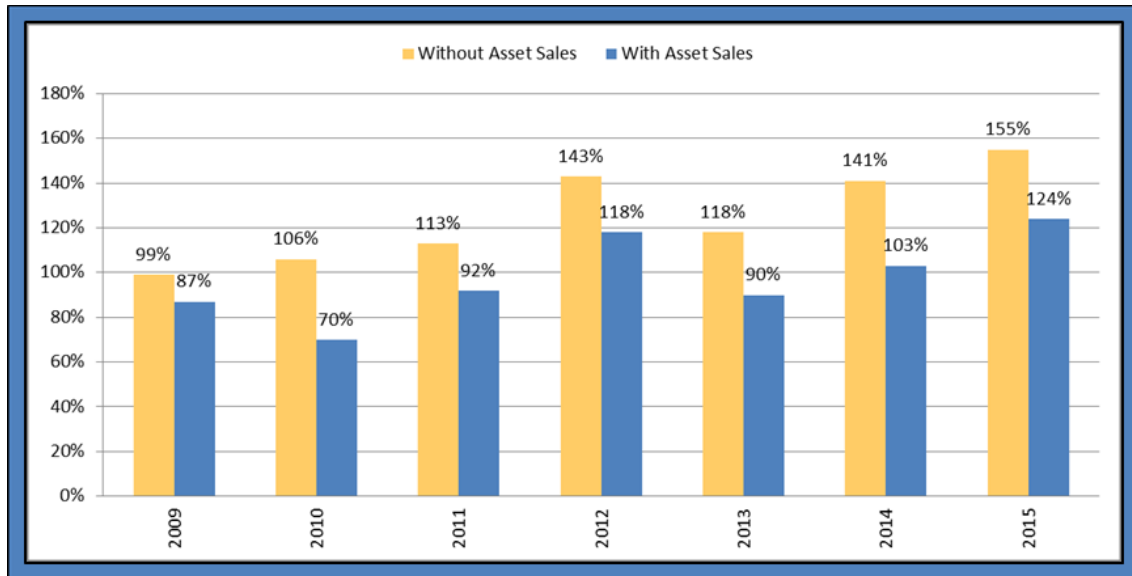
### Distinguishing Between the Credit Cycle and the Commodity Cycle

Given how crucial financial engineering has been to the boom in U.S. oil production, where we are in the credit cycle is essential to understanding production plans, going forward. As a result, Barclays Credit Research (2016) advised: "[W]e think investors need to distinguish between the commodity and credit cycles ..."

During the oil investment boom, E&Ps significantly overspent cash flow from operations, as shown in Figure 6 on the next page. In contrast, there is now an aversion in the capital markets for E&Ps to so significantly outspend cash flow. However, in the next oil-price upswing, outspending operational cash flows may very well happen again although perhaps to a less aggressive level, as covered later in this article.



**Figure 6**  
**E&Ps Significantly Overspent Cash Flow:**  
**Historical E&P Outspend (Capex as % of Cash Flow)**



Source of Data: The Bloomberg.

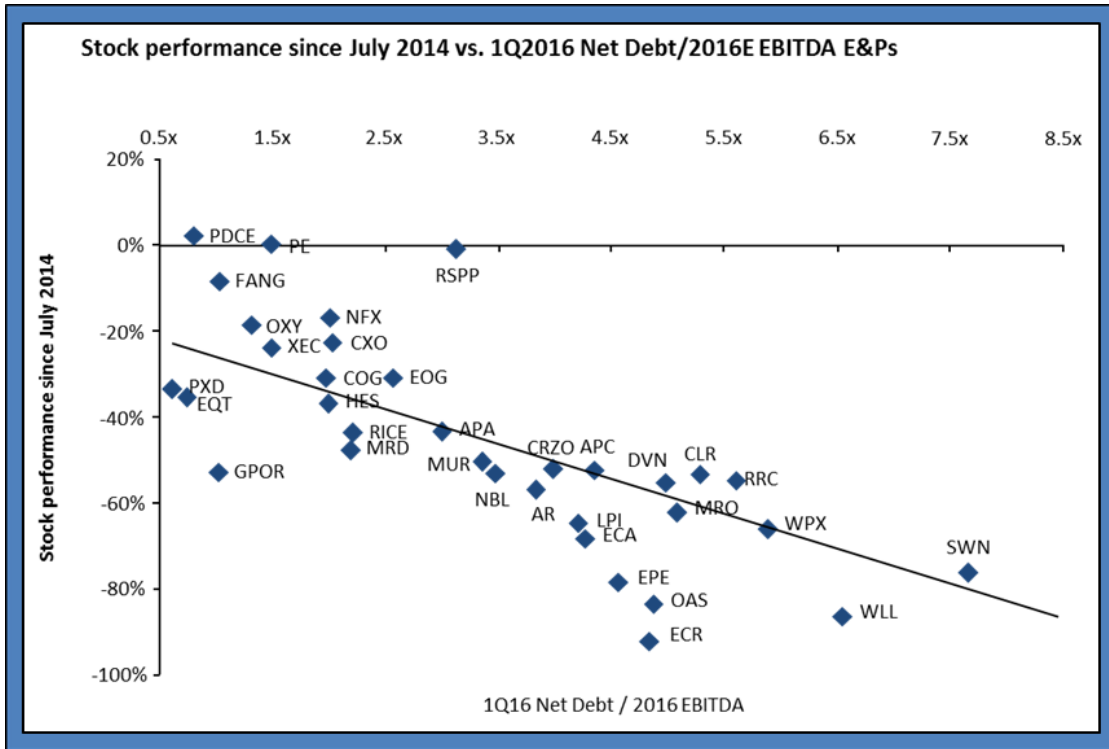
Source of Graphic: Morgan Stanley Research (2016), Exhibit 22.

As Morgan Stanley Research (2016) reinforced, “amid a prolonged cyclical trough, E&P balance sheets are stressed as credit, ... [Master Limited Partnership], and asset markets have tightened and combined to force the industry toward cash-flow neutrality.”

Similarly, equity investors have penalized highly leveraged E&P companies, as shown in Figure 7 on the next page. Therefore, these companies will likely be focused on deleveraging efforts, including sales of non-core assets.



**Figure 7**  
**Balance Sheet Strength Continues to be Primary Point of Emphasis for Investors**



Sources of Data: FactSet and Goldman Sachs Global Investment Research.

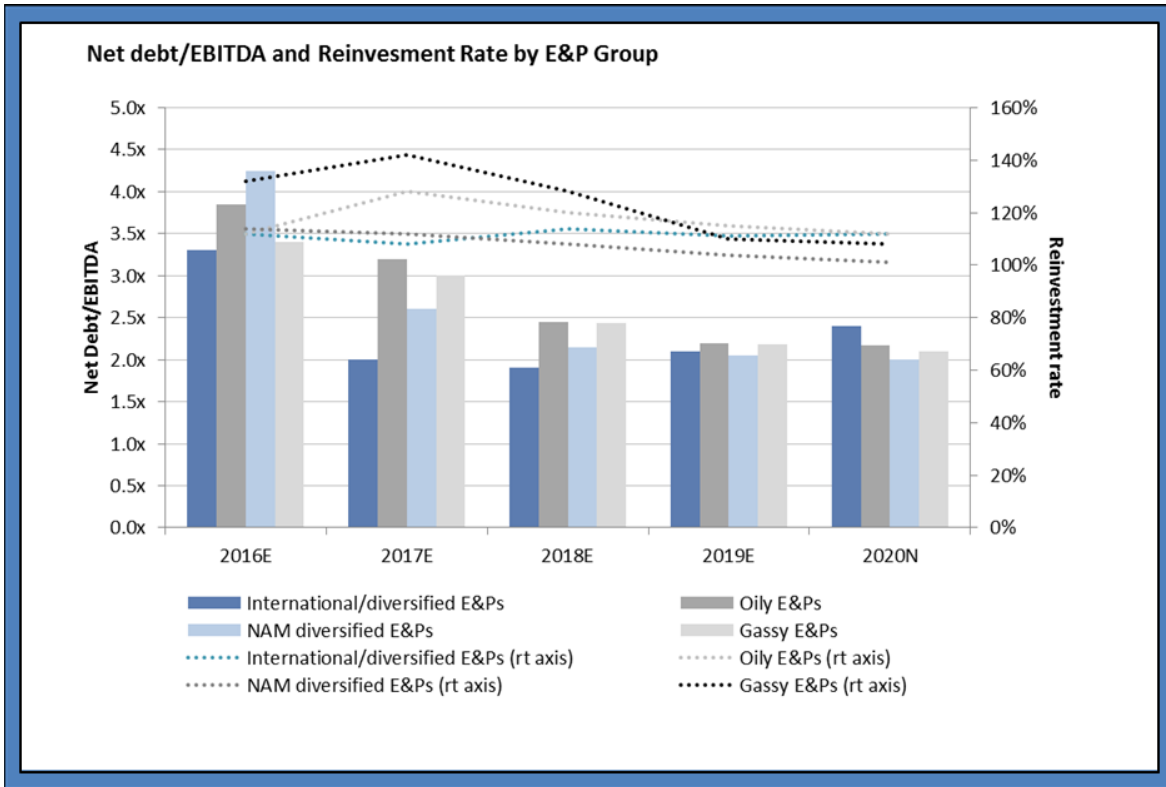
Source of Graphic: Goldman Equity Research (2016), Exhibit 10.

Argued Goldman Sachs Equity Research (2016), “We believe investors and E&P’s remain focused on deleveraging efforts ... We see non-core asset sales, discounted debt repurchases/exchanges and equity offerings as ‘tools in the toolbox.’” Please see Figures 8 and 9 on the next two pages.





**Figure 8**  
**Leverage is Substantially Elevated in 2016/17, But Should Normalize in 2018**

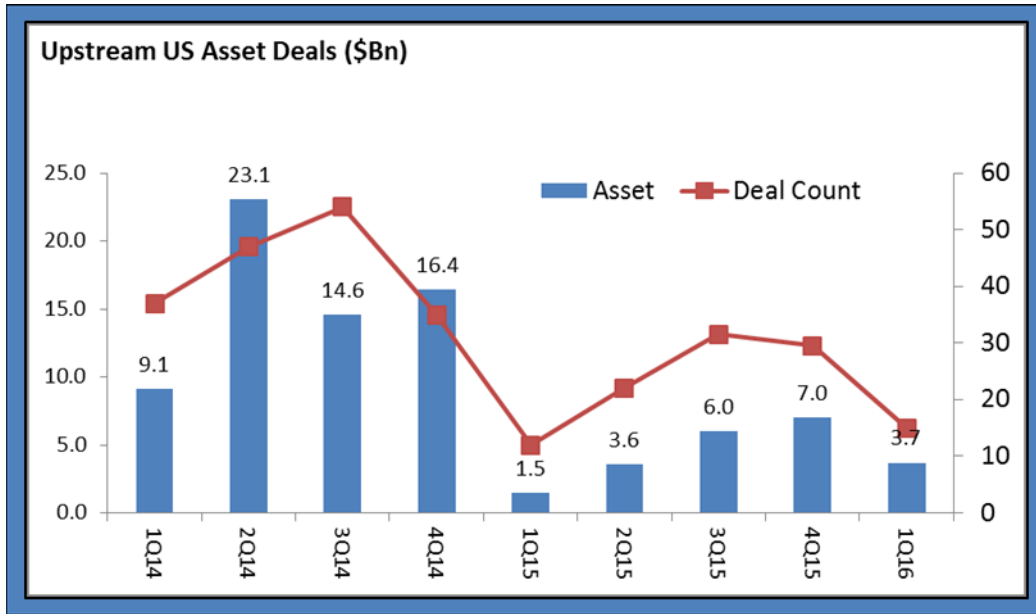


Sources of Data: Company data and Goldman Sachs Investment Research.

Source of Graphic: Goldman Equity Research (2016), Exhibit 11.



**Figure 9**  
**E&P Asset Deals will Accelerate in a Recovery**



Source of Data: IHS

Source of Graphic: Morgan Stanley Research (2016), Exhibit 66.

Essentially, future production will have to be financed at “levels of cash flow outspend” that keep a company’s “financial leverage consistent with historical levels,” according to Morgan Stanley (2016).



## Shale as an Imperfect Swing Producer, But Perhaps Only in the Short-Term Future

### “The Swing Producer in the Making”

Now, one could argue that the “[r]elatively short response time and favorable economics will likely make U.S. unconventional production the primary global ‘swing’ production when future oil growth is required, as many other forms of conventional oil production take 3-5+ years to respond materially to price signals,” as proposed by Morgan Stanley Research (2016).

By way of further explanation, the large difference between the development of shale oil and other conventional and unconventional oil is the amount of time and capital needed from the date that a final investment decision (FID) is made until the date that oil is actually produced. In the case of shale oil, this can be a matter of three to six months and a couple of million dollars per well with an aggregate supply of 750,000 barrels per day occurring in 15 to 18 months. In contrast, to deliver this supply from other types of oil-field developments takes at least five years.

### A Swing Producer ... But With a Delay

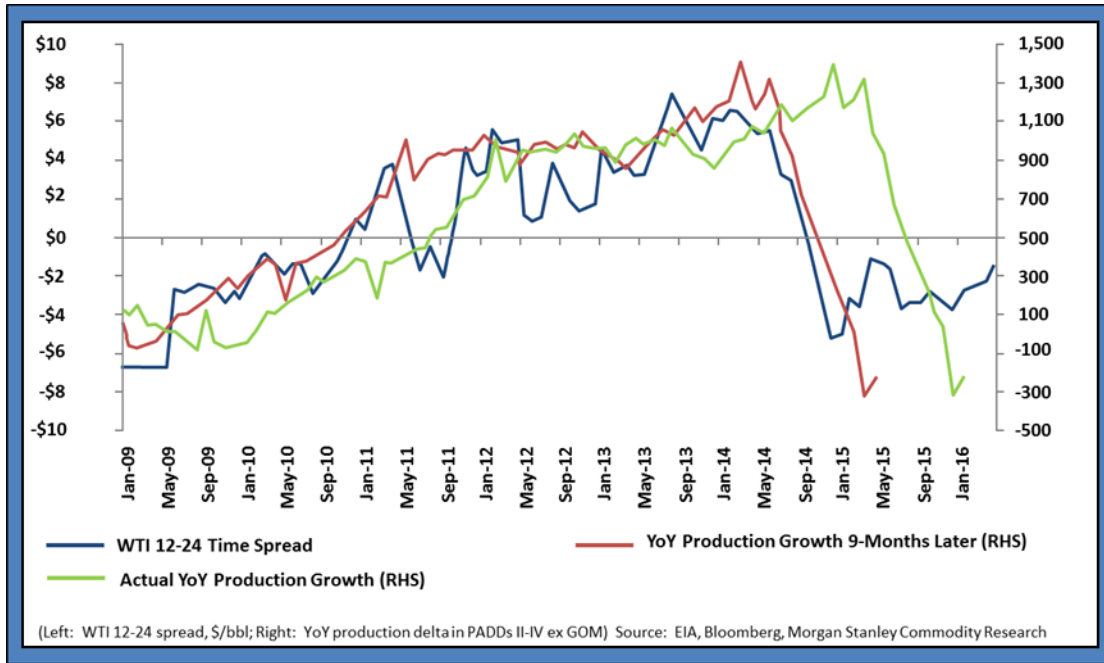
Does this short-response time make North American shale oil the new swing producer? Perhaps, but imperfectly so. Barclays Commodity Research (2016) explains that “U.S. supply is falling m/m and will not act like a light switch. Just as it was slow to react on the way down, its response on the upswing will likely be lumpy.”

Essentially, shale can only be seen as an imperfect swing producer because of the delays in responding to demand, whether it is because of the time it takes for service capacity additions or because of the impact of hedging.

The “lag between service capacity additions and production impact” is “frequently 6 months,” according to Morgan Stanley Research (2016). Further “history shows a 9-month lag between hedging and production,” again according to Morgan Stanley Research (2016), and as illustrated in Figure 10 on the next page.



**Figure 10**  
**WTI 12-24 Spread Reflects Hedging Behavior and Leads Onshore Production by 9 Months**



Source of Graphic: Morgan Stanley Research (2016), Exhibit 69.

**Ultimately, the Gulf Producers, Though, Could (Unquestionably) Revert to Being the Key Swing Producer**

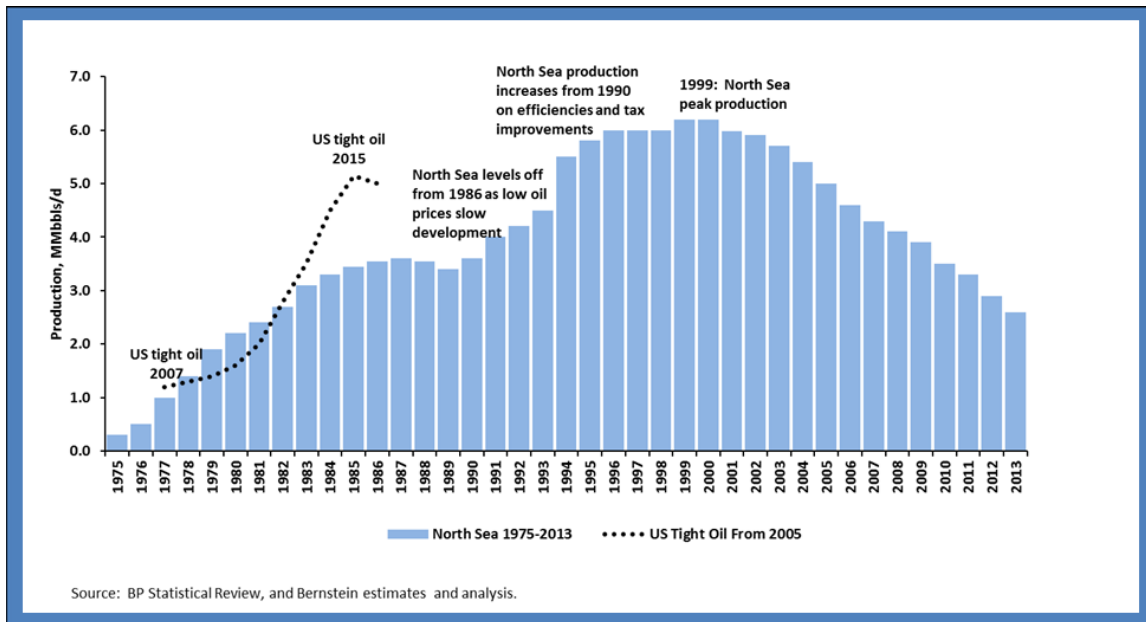
U.S. Shale Oil Production Might Peak This Decade

In conclusion, one intriguing perspective to consider is if the growth in tight oil production peaks this decade. Notes Bernstein Global View (2016), “the growth in tight oil production is likely going to be slower going forward than it has been in the past,” and as illustrated in Figure 11 on the next page.



**Figure 11**

**U.S. Shale Oil Production Growth to Peak This Decade as It Approaches the Peak Production Level of the North Sea with a Smaller Resource Base**



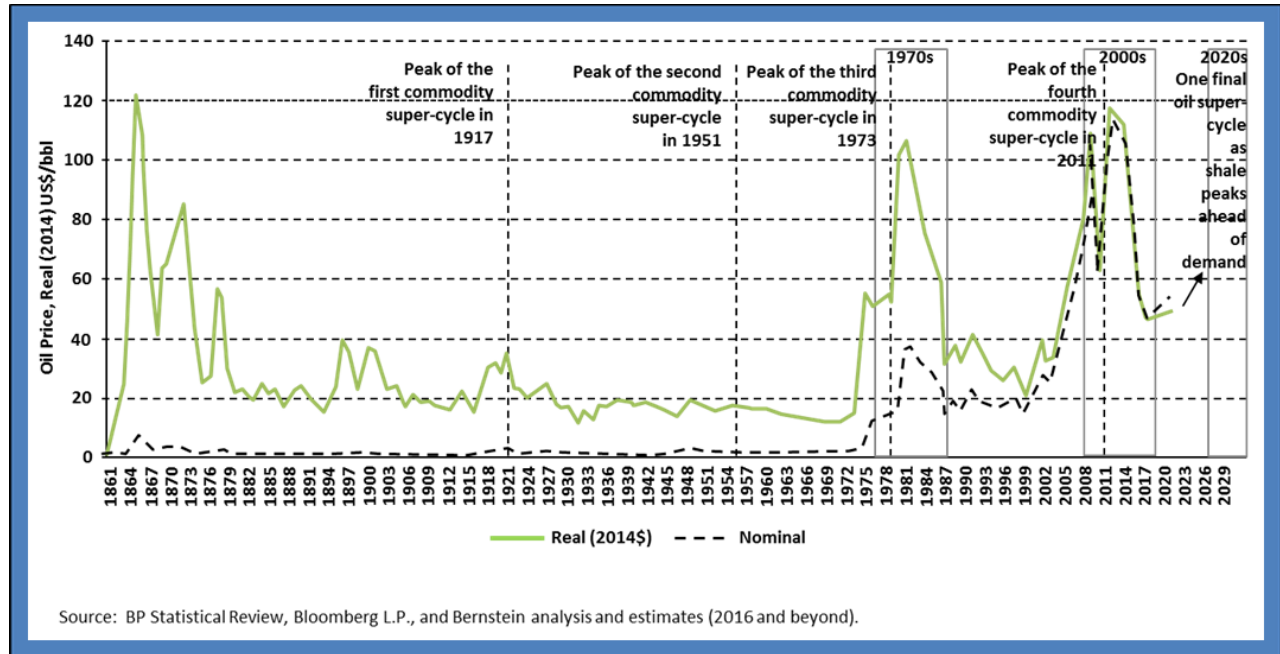
Source of Graphic: Bernstein Global View (2016), Exhibit 374.

OPEC Would Thereby Become the Dominant Force Again

Therefore, depending on global demand forecasts, “if tight oil does peak before demand does[,] it could result in another period of supply tightness as OPEC becomes a dominant force in supply, just as it did in the 1970s. ... [I]t is not inconceivable that we could be four or five years away from the start of the next super-cycle,” predicted Bernstein Global View (2016), and as illustrated in Figure 12 on the next page. [Italics added.]



**Figure 12**  
When Will the Next Oil Super-Cycle Be?



Source of Graphic: Bernstein Global View (2016), Exhibit 378.

### But from a Short-Term Perspective, What is the Required Price Level (and Likely Timeframe) for a Recovery in Shale Oil Production?

In the meantime, returning to a shorter-term perspective, the estimated price level where shale companies can comfortably operate *en masse* is currently at about \$65 per barrel, which would provide an acceptable internal-rate-of-rate, across projects, as discussed in Till (2016). As long as the capital markets, with all its many different financial participants, remain open to these companies, they can keep producing, despite a number of them massively overspending their free cash-flow.

In semiannual reviews by banks of the value of shale company oil reserves, some of the smaller companies in distress will likely not be refinanced and will have to go into Chapter 11 proceedings, but the majority will be fine since they have not utilized their full lending facilities, while the higher rated companies have not faced troubles in raising new equity (to refinance and repay debt and to finance future drilling.)

Even if oil recovers to \$65, there may not be an immediate recovery in production since the response of capital markets would likely be much more cautious than when shale companies were viewed as bullish growth opportunities, analogous to the tech stocks of the late 1990s. As far as drilled, but uncompleted wells are concerned, there will be a delay due to the time it would take to assemble the required manpower for fracking the wells. Each of these considerations mean a collective aggregate delayed response of up to 12 months could occur before an improved price environment would have a meaningful impact on production.



In conclusion, if it were acceptable to loosen the definition of swing producer to be one in which there were fairly uniform production decisions over about a year timeframe, then in that case, it would be appropriate to refer to shale producers (and their lenders and investors) as the “new swing producers.”

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## Endnotes

Hilary Till presented an earlier version of this article to the International Energy Forum (IEF) - Bank of Canada joint roundtable on "Commodity Cycles and Their Implications," which was held at the Bank of Canada in Ottawa on April 25, 2016, [http://www.edhec-risk.com/about\\_us/news/RISKArticle.2016-05-10.4352](http://www.edhec-risk.com/about_us/news/RISKArticle.2016-05-10.4352). Ms. Till participated in the concluding panel discussion on the theme, "What Will Be the New Swing Producer? The Role of Credit Conditions," which focused on the role of credit markets in the stability of the oil market. This roundtable was co-organized by Dr. Bahattin Büyükşahin, Senior Policy Advisor, Commodities Division, Bank of Canada. Dr. Büyükşahin is also an Editorial Advisory Board member of the *GCARD*.

Ms. Till's IEF – Bank of Canada presentation is available here:

<http://www.bankofcanada.ca/wp-content/uploads/2016/05/swing-production-role-credit.pdf>.

Research assistance from both Katherine Farren, CAIA, of Premia Risk Consultancy, Inc., and Hendrik Schwarz is gratefully acknowledged. The authors are also grateful for expert comments from Thorvin Anderson, CFA. That said, the authors alone are responsible for all opinions (and any inadvertent errors and omissions.)

This article is provided for educational purposes only and should not be construed as investment advice or an offer or solicitation to buy or sell securities or other financial instruments.

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### Author Biographies

#### Hilary Till

Solich Scholar, J.P. Morgan Center for Commodities, University of Colorado Denver Business School; and Contributing Editor, *Global Commodities Applied Research Digest*

Hilary Till is also a principal of Premia Research LLC, which designs investment indices that are calculated by S&P Dow Jones Indices and which are available here:

<http://www.customindices.spindices.com/custom-index-calculations/premia/all>.

Prior to Premia, Ms. Till was the Chief of Derivatives Strategies at Putnam Investments, and a Quantitative Analyst at the Harvard Management Company.

Ms. Till’s additional academic affiliations include her membership in the North American Advisory Board of the London School of Economics and Political Science and her position as a Research Associate at the EDHEC-Risk Institute, <http://www.edhec-risk.com>, in Nice, France. Her published articles can be found here:

<http://faculty-research.edhec.com/faculty-researchers/alphabetical-list/r-s-t/till-hilary-143898.kjsp?RH=faculty-gb1>

In Chicago, Ms. Till is a member of the Federal Reserve Bank of Chicago’s Working Group on Financial Markets; is an Advisory Board Member of DePaul University’s Arditti Center for Risk Management; and has provided seminars (in Chicago) to staff from both the Shanghai Futures Exchange and the China Financial Futures Exchange.

Ms. Till has presented her analysis of the commodity futures markets to the following institutions: the U.S. Commodity Futures Trading Commission, the International Energy Agency, and to the (then) U.K. Financial Services Authority. Most





recently, she was a panel member at both the U.S. Energy Information Administration’s workshop on the “evolution of the petroleum market and [its] price dynamics” and the Bank of Canada’s joint roundtable with the International Energy Forum on “commodity cycles and their implications.” She is also the co-editor of the best-selling Risk Book (London), *Intelligent Commodity Investing*, <http://riskbooks.com/intelligent-commodity-investing>.

Ms. Till has a B.A. with General Honors in Statistics from the University of Chicago and an M.Sc. degree in Statistics from the London School of Economics and Political Science (LSE). She studied at the LSE under a private fellowship administered by the Fulbright Commission.

### **Jan-Hein Jesse**

Founder, JOSCO Energy Finance and Strategy Consultancy, Amsterdam; and Member, Editorial Advisory Board, *Global Commodities Applied Research Digest*

Jan-Hein Jesse is an expert on commercial, financial, and technical aspects in the oil & gas, marine contracting, commodity trading, and the financial investment sector. Jan-Hein is the owner of JOSCO Energy Finance & Strategy Consultancy, advising oil (service) companies, banks, private equity, hedge funds, pension funds, oil trading companies and governments on a wide range of activities related to new business development, equity and debt capital products, finance, M&A, markets, industry trends and price formation. His career spans over 30 years including his roles as owner of JOSCO, CFO of Heerema Marine Contractors, Senior Manager at Royal Dutch/Shell, where he was responsible for the execution of large-scale acquisitions and divestments, and new business developments, leading transactions over \$1 billion, and Head of the Energy Finance department at ING Bank. During his career, Jan-Hein has lived in London and in Bahrain. He has travelled extensively (50+ countries) for business reasons, multiple times. He has a B.Sc. in Civil Engineering and Offshore Engineering at HTS Haarlem, and an M.B.A. at Nijenrode Business School, the Netherlands, which included the Wharton Business School Exchange Program in the U.S.



## Interview with Dr. Margaret E. Slade, Ph.D.

Professor Emeritus of Economics, Vancouver School of Economics at the University of British Columbia (UBC); and Co-Chair, J.P. Morgan Center for Commodities' Research Council



Standing at the podium is Professor Emeritus Margaret Slade, Vancouver School of Economics at the University of British Columbia (UBC) and [Research Council](#) Co-Chair, J.P. Morgan Center for Commodities (JPMCC) at the University of Colorado Denver Business School. Dr. Slade chaired the afternoon session of the JPMCC's Research Council meeting on December 4, 2015. On Dr. Slade's left is Professor Marcelle Arak, CoBank Professor of Commodities at the University of Colorado Denver Business School and Editor of the JPMCC's publication, [Global Commodity Issues \[Editor's Choice\]](#).

In the Fall issue of the [GCARD](#), we interview Dr. Margaret E. Slade, Ph.D., who graciously agreed to become the Co-Chair of the J.P. Morgan Center for Commodities' (JPMCC's) Research Council. In April 2015, Dr. Slade summarized her distinguished academic career during the JPMCC's inaugural Research Council meeting: "I have been at UBC for over 30 years [interspersed] with a 6-year ... [appointment] at the University of Warwick in the U.K. Before that I was with the [U.S.] Federal Trade Commission. ... My field is industrial organization, and I am interested in how markets are organized. ... I have worked in [the analysis of] ... the pricing of minerals, both non-fuel and energy, as well as [in] gasoline pricing, for example. I also work tangentially in agriculture, mostly in food processing. ... In fact, [while in Denver], I was at [the] Molson Coors [Brewing Company] ... [for] a project there on [the industrial organization of] North American beer [companies.]"



The Canadian Economics Association (CEA) has noted that Dr. Slade “contributed to the transformation of the fields of industrial, natural resource, and organizational economics” and has been a “pioneer and innovator throughout her career.” For her research achievements, Dr. Slade was awarded the CEA’s “highest honor, that of Fellow of the Canadian Economics Association” in 2014.

### **Interview with Dr. Margaret E. Slade, Ph.D.**

*What was your motivation for becoming the Co-Chair of the JPMCC’s Research Council?*

I was happy to assume the role of Co-Chair because I find the meetings – the presentations and discussions – to be stimulating. Furthermore, I think that the work that the Center is doing is important and participating as Co-Chair is one way of contributing to that work. In particular, I feel that I can influence the structure of future Council meetings as well as the direction and quality of the research that is undertaken.

*Is there any other academic center besides the JPMCC, which has a broad-based mission, incorporating all commodity markets?*

No, I don’t think that there is. While there are many centers that specialize in energy, mining, or agriculture separately, there appears to be none that combines all three. Moreover, very few centers involve a broad mix of academics and industry practitioners.

*What were the highlights of last year’s Research Council meetings in Denver?*

I have really enjoyed getting to know the Council members, who have a broad set of interests and skills that range from very applied to theoretical while sharing a common interest in commodities. As an academic, I don’t often meet a group of people with such a diversity of backgrounds. This means that the discussions, both formal and informal, have been very rewarding.

In addition, I am interested in learning more about the sort of academic research that is currently being undertaken in commodity markets, particularly in areas that are different from the focus of my own research. I have been able to do this by attending the talks given at Council meetings as well as by reading research grant proposals for the Center.

*What are some of your goals for the Research Council over time?*

The most important goal is to obtain adequate long-term funding. Without adequate funding, it is difficult to establish a world class Center for teaching, research, and industry interaction. The Center has done an amazing job with the support that it has obtained. Indeed, it has established an academic program at the Business School, has launched a journal and digest that are of interest to everyone who is involved with commodities, has awarded grants to researchers who are engaged in cutting edge commodity research, has initiated a program of speakers at, and longer term visitors to, the Center, and has established the Research Advisory Council with an impressive list of members. However, it needs to



ensure that these activities can continue and grow. All of the accomplishments that are listed above are important and should be expanded.

As for the activities of the Council, there are many people in academia, research institutions, and industry that are engaged in interesting work in the commodity-market area and the Center can benefit from inviting some of them to talk about their activities and findings. Finally, I would like to see the current program of research grants expanded.



During the JPMCC’s Research Council meeting on September 30, 2016, Professor Emeritus Margaret Slade (with microphone) addressed the morning session’s panelists. The panelists at the “Emerging Risks and Challenges in Commodity Supply Chains” morning panel were (from left-to-right) Professor Nikos Nomikos, Cass Business School, City University London (UK) and member of the JPMCC Research Council; Mr. John Schmitter, KEP LLC; and Mr. Steffen Hammer, Robert Bosch GmbH (Germany).



*How did you originally become involved in commodity research?*

When I began post-graduate work, I was employed on a part-time basis by the U.S. Geological Survey, which meant that I had to find a thesis topic that was related to natural resource commodities. I chose to study the copper and aluminum industries, specifically substitution possibilities between the two and recycling potential for both. Although my current field is Industrial Organization in general, my early interest in commodities has led me to study the organization of commodity markets and the pricing of fuel and nonfuel minerals. I have looked at both upstream aspects of the industry – production and physical investment – and downstream aspects – trading and pricing.

*What are some of the key findings in your recently published work that involve the commodity markets?*

I have been looking at entry and exit patterns in the copper industry and how those patterns relate to economic factors. I find that cost-lowering technological improvements and depletion of investment opportunities have been important factors whereas revisions of expectations (e.g., bubbles) and industry concentration have had a less pronounced impact on entry and exit.

In addition, I have been looking at real investment as an option. In particular, I have been assessing the impact of price volatility on investment (exercising the option) and, contrary to the predictions of most theoretical real-option models, I find that there are empirically relevant circumstances in which increased volatility encourages investment. This empirical finding, which can be explained theoretically, has led me to explore the factors that tend to encourage the counterintuitive effect of volatility on investment.

*What topics do you think we should cover in the future in the “Global Commodities Applied Research Digest,” given its practitioner focus?*

There are so many interesting topics in the area of commodities that it is difficult to single out a few. For this reason, rather than select a few areas that should be emphasized, I think that the Digest should cover the highest quality research regardless of area. On the other hand, choosing to emphasize a particular topic, for example options, investment, renewables, or commodity cycles, could be a fruitful way to organize a special issue. Since *GCARD* is a digest, I think that the choice of topics should primarily be dictated by the availability of current high quality research, either individual articles or groups of articles on a particular topic, rather than being decided from the top.



**MARGARET E. SLADE, Ph.D.**

**Professor Emeritus of Economics, Vancouver School of Economics at the University of British Columbia**

Margaret E. Slade (Ph.D., George Washington University) is professor emeritus at the Vancouver School of Economics at the University of British Columbia. She is also an Associate member of GREQAM, a research group based in Marseilles; a Research Fellow in the Economics Network for Competition and Regulation (ENCORE), based in Amsterdam; and a Fellow of the Canadian Economics Association.

As summarized by the Canadian Economics Association, “[Dr.] Slade began her career not as an economist, but as a mathematician, working, among other places, for Shell Development, and then for the US Geological Survey, where she was employed while completing her Ph.D. These experiences shaped her interests in methods as well as in the substantive issues of exhaustible resources markets and the importance of spatial factors, all of which found their way in her research throughout her career. After completing her Ph.D, she joined the Federal Trade Commission before serving on the faculty at UBC for more than 20 years. In 2002, she went to the University of Warwick and then returned to UBC in 2008. In recognition of her contributions to economics research and policy, she received an Honorary Doctorate from the Helsinki School of Economics in 2001. She also served as President of the European Association for Research in Industrial Economics (EARIE) from 2001 to 2003, and held the inaugural Leverhulme Professorship in Industrial Economics at the University of Warwick during her time there. She has consulted for firms and government agencies in Canada, Europe, and the United States, and has served on the editorial board of several leading journals in industrial organization, including the *Journal of Industrial Economics* and the *International Journal of Industrial Organization*. She still serves on the board of the *Canadian Journal of Economics*, the *Energy Journal*, *Managerial and Decision Economics*, and *Spatial Economic Analysis*.”

Dr. Slade is also the Co-Chair of the J.P. Morgan Center for Commodities’ Research Council at the University of Colorado Denver Business School.



## Introduction to [\*Global Commodity Issues \(GCI\) \[Editor's Choice\]\*](#)

The J.P. Morgan Center for Commodities also produces the [\*Global Commodity Issues \(GCI\) \[Editor's Choice\]\*](#) eJournal, which is edited by Professor Marcelle Arak of the University of Colorado Denver Business School. The *GCI [Editor's Choice]* distributes working papers and abstracts of accepted papers in commodities, including agricultural, minerals/mining, and energy-related commodities worldwide. The Research Digest section of the *GCARD* draws from the *GCI [Editor's Choice]* for content to summarize and distill for the *GCARD*'s practitioner-oriented readership. We would encourage those *GCARD* readers, who would like to explore commodity issues from an academic perspective, to also [subscribe](#) to the *GCI [Editor's Choice]*.



Professor Marcelle Arak, University of Colorado Denver Business School presenting on the *Global Commodity Issues [Editor's Choice]* to the JPMCC's Research Council on April 18, 2015. Mr. Matthew Fleming, Program Manager of the JPMCC, is seated in the left foreground.



## JPMCC Professional Education



*Thorvin Anderson, CFA (with microphone), Content Director, “Foundations for Commodities” Professional Education Program, J.P. Morgan Center for Commodities (JPMCC) at the University of Colorado Denver Business School, asks a question at the JPMCC’s December 4, 2015 Research Council meeting in the Center’s CoBank Lecture Hall. Robert Vigfusson, Ph.D., Chief, Trade and Quantitative Studies Section, International Finance, Board of Governors of the Federal Reserve System, is on Mr. Anderson’s right while on his far right is Benjamin Lee, Ph.D., Research Scientist, National Renewable Laboratory. All are members of the JPMCC’s Research Council.*

The commodities sector (oil, minerals/metals and energy) are a critical sector of the economy. However, they are generally underserved in terms of knowledge and skill enhancement opportunities. Working professionals and executives working on the operational side in the industry or those associated with the broader commodities sector (lawyers, insurers, accountants, attorneys, HR professionals) do not often have adequate opportunities to keep themselves current with the latest developments in the commodities marketplace. Commodities are everywhere—they touch every business in the world, yet general business education typically does not meet these specialized needs. The J.P. Morgan Center for Commodities is uniquely positioned to fill this gap, through its offer of 1-3 days courses on commodities with CE credits. The participant feedback for our recent offerings has been excellent.







## Commodity Data Analysis

**November 9-11, 2016**

**Goal:** Offer a short course to equip commodity-industry professionals with basic quantitative skills related to time series statistics, forecasting, and forward curve dynamics. Offer solid practical experience in the use of a common statistical software package. Provide an affordable and accelerated curriculum for new hires, aspiring analysts, and others interested in incorporating an increased quantitative rigor into their commodity-related activities.

**Course Description:** Guided by veteran industry practitioners, and utilizing one of the most user-friendly statistics packages on the market, students will gain a core practical competency in econometrics and price modeling for the commodity markets. Students will gain basic fluency in econometric forecasting and understanding of forecast validity and uncertainty. Students will become familiar with not only the dominant methods for modeling forward curve dynamics, but also advanced methods employed by the most sophisticated market participants. Skills and techniques learned in the course will be directly applicable to solving problems and framing decisions in the workplace.

### **Day 1: Introduction to commodity industry data, EViews, and basic econometrics**

- Types of commodities time series and forward price data
- Data conventions and transformations
- Commodity-specific features in data
- Introduction to EViews statistical suite
- Fundamentals of regression analysis

### **Day 2: Advanced econometric methods**

- Stationarity
- Multivariate models
- Cointegration
- ARCH models

### **Day 3: Forward curve modeling, practice workshop**

- Term structure and seasonality
- Black-Scholes volatility
- Application of principal component analysis and factor models to forward curves
- ***Afternoon special session: Independent and group lab exercises to integrate and apply course material***

**Intended Audience:** Commodities industry employees; junior personnel in commodity-related businesses; commodity and financial derivatives traders, support functions such as attorneys, accountants, sales or HR or IT managers, etc.; government officials; non-industry professionals wishing to adopt a data-driven understanding of commodity markets.

**Duration:** 24 hours

- Offered 1-2 times a year based on demand
- First offering November 9-11, 2016





## [Commodity Data Analysis \(Continued\)](#)

**Location:** University of Colorado Denver Business School, 1475 Lawrence St., Denver, CO 80202

**Course requirements:** 3 consecutive days, in-class sessions.

Lunch and coffee (during breaks) will be provided each day. Evening reception hosted by the Center at 5:30 pm following in-class session on Wednesday (November 9).

**Program Fee:** \$2500 per participant.

**Instructors:** Daniel Jerrett and Rossen Roussev

**For more information:** Matthew Fleming, E-mail: [matthew.fleming@ucdenver.edu](mailto:matthew.fleming@ucdenver.edu), or Phone: 303-315-8019

**Credit:** Not for academic credit - Certificate issued from the J.P. Morgan Center for Commodities, University of Colorado Denver. Certified by GARP for 24 credits and University of Colorado Denver for 5 Continuing Education Units (CEUs).



**Content Director:**

Thorvin Anderson, CFA, has extensive experience in complex transaction structuring, power and gas trading analysis, physical asset dispatch, and finance. He has spent seventeen years in the commodities space, both in industry and on Wall Street, with firms ranging from Koch Industries and Calpine Corporation to Bear Stearns and J.P. Morgan. Actively involved in commodities education throughout his career, Thorvin has orchestrated and led multiple training programs focused on introducing participants to key concepts in commodities. While working in the Commodities businesses of JPMorgan and Bear Stearns, Thorvin initiated and managed rotational programs to recruit and develop junior talent in a cross-disciplinary manner. Thorvin graduated from Stanford University with a B.A. in Economics in 1997, and received his CFA Charter in 2006.

**Instructors:**

Dr. Daniel Jerrett currently holds the position of Chief Economist at the Denver Regional Council of Governments. Daniel has more than ten years of experience teaching and building econometric models. His experience spans both the private and public sectors. Daniel has spent time in the investment management industry, working with state and local governments, and consulting with Fortune 500 companies. He teaches courses in econometrics and forecasting at the University of Colorado Denver, University of Colorado School of Public Health, and regularly lectures at the University of Colorado Denver's J.P. Morgan Center for Commodities. In addition, Daniel has led econometric training courses at the International Monetary Fund and World Bank. Daniel received his Ph.D. from the Colorado School of Mines.

Dr. Rossen Roussev is Executive Director of Quantitative Research with J.P. Morgan's Global Commodities business in New York. Rossen has more than ten years of experience developing sophisticated commodity market modeling techniques for Wall Street firms. Rossen specializes in broad application of mathematical methods for pricing and hedging complex derivatives, favoring analytical approximations to complex problems and the use of machine learning for calibration and relative value. He received his Ph.D. in Physics from Rutgers University.





## Foundations of Commodities

**March 20 - 21, 2017**

**Goal:** Offer a short course to educate professionals on the foundational concepts of commodities in the physical and financial arenas including key terms and concepts, underlying principles, market structure, futures and derivatives, risk management, and regulation. Provide an affordable and accelerated curriculum for new hires in commodity-related businesses.

**Course Description:** Gain a high level of understanding of the commodities industry from physical aspects (supply chain, fundamentals, asset monetization) to the financial (market structure, spreads, futures and derivatives). Risk management and regulation/compliance will be covered at a high level. Segments will focus on the following topics:

### **Day 1: Fundamentals of Agricultural, Energy & Mineral Commodities**

- Introduction to foundational commodities concepts
- Physical commodity supply and value chains
- Commodity transportation and logistics
- Structure of financial commodity markets and trading
- Legal, regulatory and compliance aspects of commodities markets

### **Day 2: Trading Commodity Financials and Derivatives**

- Managing commodity financial risks
- Commodity transaction structuring and finance
- Quantitative methods in commodity analysis
- Commodities price forecasting

**Intended Audience:** Commodities industry employees; new hires in commodity-related businesses; commodity and financial derivatives traders, support functions such as attorneys, accountants, sales or HR or IT managers, etc.; government officials; non-industry professionals wishing to learn more about the basics of the commodities industry.

**Duration:** 16 hours

- Offered 1-2 times a year based on demand
- First offered April 9-11, 2014

**Location:** University of Colorado Denver Business School, 1475 Lawrence Street, Denver, CO 80202

**Course requirements:** 2 consecutive days, in-class sessions.

Lunch and coffee (during breaks) will be provided each day. Evening reception hosted by the Center at 5:30 pm following in-class session on Monday (March 20).

**Program Fee:** \$1500 per participant.





## Foundations of Commodities (Continued)

**Content Director:** Thorvin Anderson, CFA

**Instructors:** 7 Subject Matter Experts (SMEs)

**For more information:** Matthew Fleming, E-mail: [matthew.fleming@ucdenver.edu](mailto:matthew.fleming@ucdenver.edu), or Phone: 303-315-8019

**Credit:** Not for academic credit – Certificate issued from the J.P. Morgan Center for Commodities, University of Colorado Denver. Certified by GARP and DORA Division of Insurance for 16 Continuing Education Credits.



Global Association  
of Risk Professionals



**COLORADO**

Department of  
Regulatory Agencies





## Professional Education Content Director & Subject Matter Expert (SME) Biographies



**Thorvin Anderson, CFA**, has extensive experience in complex transaction structuring, power and gas trading analysis, physical asset dispatch, and finance. He has spent seventeen years in the commodities space, both in industry and on Wall Street, with firms ranging from Koch Industries and Calpine Corporation to Bear Stearns and J.P. Morgan. Actively involved in commodities education throughout his career, Thorvin has orchestrated and led multiple training programs focused on introducing participants to key concepts in commodities. While working in the Commodities businesses of JPMorgan and Bear Stearns, Thorvin initiated and managed rotational programs to recruit and develop junior talent in a cross-disciplinary manner. Thorvin graduated from Stanford University with a B.A. in Economics in 1997, and received his CFA Charter in 2006.

**B. Salman Banaei** is a director and Head of North American Regulatory Affairs at IHS Markit. From 2009 to 2013, Salman served at the U.S. Commodity Futures Trading Commission (CFTC) where he most recently served as an advisor to a CFTC commissioner during the drafting and implementation of many Dodd-Frank Wall Street Reform and Consumer Protection Act reforms. Salman holds degrees from the University of Virginia, University of Denver - Sturm College of Law, Colorado School of Mines (M.S. in Mineral and Energy Economics), and the Institut Francais du Petrole (M.S. in Petroleum Economics and Management).



**Dr. Dave Hammond** currently serves as a Commissioner on the Engineering Accreditation Commission of ABET and recently was named recipient of the 2016 Mineral Economics Award by the American Institute of Mining, Metallurgical and Petroleum Engineers. Dave has over 40 years' experience in the mining and petroleum industries as a geologist, engineer, financial market analyst and mineral economist. He has had staff and management positions with Shell Oil, Atlantic Richfield, Anaconda Minerals, ARCO Coal, General Electric and PricewaterhouseCoopers. Most recently he was VP of Strategic Planning for International Royalty Corporation, having also served as Interim CFO during IRC's 2005 Initial Public Offering on the TSX. He holds BS and MS degrees in Geological Engineering from the South Dakota School of Mines and the University of Utah respectively, as well as an MBA in energy finance from the University of Denver and a Ph.D. in Mineral Economics from the Colorado School of Mines.





## Content Director & Subject Matter Expert (SME) Biographies (Continued)

**Dr. Christopher J. Hansen** specializes in energy sector economics, electricity market reform, and nuclear power, with more than 15 years of experience in the global energy industry. His current role is Principal, Hansen Advisors. He was previously Senior Director, Energy Insight at IHS and was based in Dubai in 2008-09, where he managed a comprehensive review of the Emirate's energy sector. His recent research includes an analysis of global nuclear power developments and the market potential for small nuclear reactors. He currently serves as the Chair of the Colorado Energy Coalition and the Executive Committee of the Denver Metro Chamber Leadership Foundation. Dr. Hansen holds a BSc in Nuclear Engineering from Kansas State University; a Graduate Diploma of Civil Engineering from the University of the Witwatersrand, South Africa; a Master of Science in Technology Policy from MIT; and a Ph.D. in Economic Geography from Oxford University.



**Andy Hecht** spent nearly thirty-five years on Wall Street, including two decades at the trading desk of Philipp Brothers, which became Salomon Brothers and ultimately part of Citigroup. Over the past three decades, he has researched, structured, and executed some of the largest trades ever made, which involved huge quantities of precious metals and bulk commodities. Andy is the host of a biweekly radio show *The Commodities Hour with Andy Hecht* that airs on [www.tfnn.com](http://www.tfnn.com) on Tuesdays and Thursdays from 5-6 PM EST. Andy's first book *How to Make Money with Commodities* was published by McGraw Hill in 2013 (<http://www.amazon.com/Make-Money-Commodities-Andrew-Hecht/dp/0071807896>). He is currently finishing his

second book *Luster*. Hecht contributes to *CQG*, *QT AG Online*, *NADEX* and consults for companies involved in trading, producing, and consuming commodities. Andy is also the commodities expert for About.com and a consistent and prolific contributor to Seeking Alpha where he is ranked as the #1 Commodities contributor. He is also highly ranked on the topics of gold and precious metals and foreign exchange on the site. Andy's articles on Seeking Alpha have received over 1.5 million reads since late August 2014.

**Dr. Daniel Jerrett** currently holds the position of Chief Economist at the Denver Regional Council of Governments. Daniel has over ten years of experience teaching and building econometric models. His experience spans both the private and public sectors. Daniel has spent time in the investment management industry, state and local governments as well as consulting with Fortune 500 companies. He continues to be active in academia and teaches courses in econometrics and forecasting at the University of Colorado Denver, University of Colorado School of Public Health and regularly lectures at the University of Colorado Denver's J.P. Morgan Center for (Continued on next page)





## Content Director & Subject Matter Expert (SME) Biographies (Continued)

Commodities. In addition, Daniel has led econometric training courses at the International Monetary Fund and World Bank. Daniel received his Ph.D. from the Colorado School of Mines and holds a Master's degree from DePaul University.



**Dr. Rossen Roussev** is Executive Director of Quantitative Research with J.P. Morgan's Global Commodities business in New York. Rossen has more than ten years of experience developing sophisticated commodity market modeling techniques for Wall Street firms. Rossen specializes in broad application of mathematical methods for pricing and hedging complex derivatives, favoring analytical approximations to complex problems and the use of machine learning for calibration and relative value. He received his Ph.D. in Physics from Rutgers University.

**Ken Shulklapper** leads the E&P derivative marketing team for J.P. Morgan's Global Commodities business. In this capacity, he works with energy producers to manage risks associated with the volatile oil and gas markets, as well as bankers in assisting on strategies to maximize liquidity for clients. He started in the commodity business more than 15 years ago at Enron, serving in various roles from marketing energy derivatives, trading natural gas and then working to build a new commodities market in the advertising space. Following Enron, Ken worked at an Oil and Gas producer, and then has been with J.P. Morgan for more 12 years. Ken received his MBA in 1999 from Cornell University's Johnson Graduate School of Management, and a BS in Business from the University of Vermont.





## **JPMCC Student Programs**

The J.P. Morgan Center for Commodities offers a Certificate in Commodities to Undergraduate & Graduate students and a specialization to MBA and Masters in Finance and Risk Management Students.

Students acquire a better understanding of the commodities market in its entirety, from both the physical and financial perspective, including trading operations, supply chain and investment management. With strong industry support, courses in this specialization are designed around real business problems in the commodities sector.

### **Scholarship Opportunities**

Students taking this specialization/certificate are eligible for multiple commodities scholarships up to \$5000. Eligibility for these commodity-specific scholarships requires admission to an offered program of the University of Colorado Denver and enrollment in a commodities course (prefixed CMDT).

### **J.P. Morgan Commodities and Finance Lab**

All commodities classes are held at the state-of-the-art J.P. Morgan Commodities and Finance lab. Through a generous donation from J.P. Morgan, we have been able to create this lab and furnish it with the most up-to-date software and technology available, including Bloomberg, CQG, Trading Technologies and Morningstar.

### **Internships and Networking**

Colorado is a commodity-rich state, with significant physical presence of oil, natural gas, minerals/metals, renewables and agriculture. As an experiential part of their study, students have the opportunity to visit physical commodity sites around Denver. In addition to the generous support provided by J.P. Morgan, our board of advisors is comprised of top executives from [over 20 commodity-related companies](#) located in Colorado and around the country. They provide direction and support to the Center by providing scholarships & guest speakers, hosting field trips and “shadow days,” and participating in networking events at the Business School. As the only Center of its kind in the world, we are committed to providing students the education needed to help them excel in a robust and competitive marketplace for commodities businesses.

When students opt for one of these commodities classes, they will have access to internship and employment opportunities with commodities firms in agriculture, energy, and minerals/metals.





## [JPMCC Student Programs](#)

### [BS in Business Administration Commodities Certificate](#)

### [BA in International Affairs Commodities Specialization and Certificate](#)

The J.P. Morgan Center for Commodities offers a Certificate in Commodities to Upper-Division Undergraduate Students. All such students can request access to CMDT courses to obtain the Certificate. The courses included in this certificate program are as follows:

**CMDT 4802 Foundations of Commodities**

**CMDT 4582 Commodity Supply Chain Management**

**CMDT 4682 Trading in Commodity and Financial Markets\***

### [Professional MBA & Masters in Finance and Risk Management Commodities Specialization and Graduate Certificate](#)

There are two parts to an MBA and MS Finance with a specialization in commodities. The Core Courses give students the breadth of a traditional Graduate Business degree. Students utilize four of their electives for Commodities specialization courses, which provide the tools for a career with commodities-related firms. Commodities specialization courses are:

**CMDT 6802 Foundations of Commodities**

**CMDT 6582 Commodity Supply Chain Management**

**FNCE 6382 Survey of Financial Derivatives**

**CMDT 6682 Trading in Commodity and Financial Markets\***

MBA and MS Finance Students specializing in Commodities will also be awarded a Certificate in Commodities by the J.P. Morgan Center for Commodities. Graduate non-MBA business students can also earn the JPMCC commodities certificate by taking the courses.

**For more information, please contact the Business School Admissions Team:**

**[bschool.admissions@ucdenver.edu](mailto:bschool.admissions@ucdenver.edu) or call 303-315-8100.**

\* In the “Trading in Commodities and Financial Markets” course, students receive hands-on experience in the commodities lab, including Bloomberg Terminals and Morningstar software. Students may be able to acquire Bloomberg and Morningstar certifications. Students can also choose to participate in the global CME Trading Challenge, which is a part of the experiential classroom activity in this course. The lab also provides access to specialized commodities trading software from CQG and Trading Technologies.



# GLOBAL COMMODITIES

APPLIED RESEARCH DIGEST

The *Global Commodities Applied Research Digest* is produced by the J.P. Morgan Center for Commodities (JPMCC) at the University of Colorado Denver Business School. The JPMCC is the first center of its kind focused on a broad range of commodities, including agriculture, energy and mining. Established in 2012, this innovative center provides educational programs and supports research in commodities markets, regulation, trading, financial fundamentals, investing, and risk management.

In addition to its education mission, the J.P. Morgan Center for Commodities' aim is to become a focal point for worldwide research on commodities.

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Business School

Image on the front cover is a photograph of a painting titled, "From Field to Market" by Gary Kelley, located in the CoBank Lecture Hall at the University of Colorado Denver Business School. (Photograph by Matthew Fleming)

## J.P. MORGAN CENTER FOR COMMODITIES

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DENVER BUSINESS SCHOOL

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