"Who Sank the Boat?"
The Role of Speculators in Commodity Risk Management

Presentation to the London Chapter of PRMIA at ISDA
http://www.prmia.org

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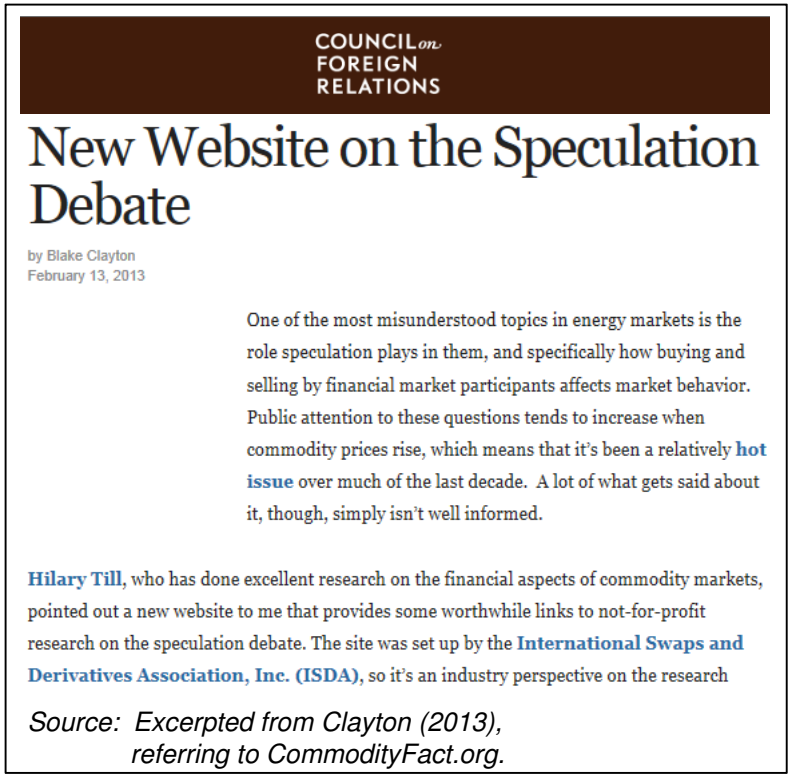
Icon above is based on the statue in the Chicago Board of Trade plaza.

Sources

- These slides are based on two articles by the presenter, one of which was published by the EDHEC-Risk Institute and the other by the Chartered Alternative Analyst Association (CAIA), both in 2012.

- The presenter's EDHEC-Risk article was referenced by CommodityFACT.org, which, in turn, was developed by the International Swaps and Derivatives Association, Inc. (ISDA) in its effort to pull "together facts, data and research from government, academia and think tanks about the causes of commodity price changes and volatility."



COUNCIL *on* FOREIGN RELATIONS

New Website on the Speculation Debate

by Blake Clayton
February 13, 2013

One of the most misunderstood topics in energy markets is the role speculation plays in them, and specifically how buying and selling by financial market participants affects market behavior. Public attention to these questions tends to increase when commodity prices rise, which means that it's been a relatively **hot issue** over much of the last decade. A lot of what gets said about it, though, simply isn't well informed.

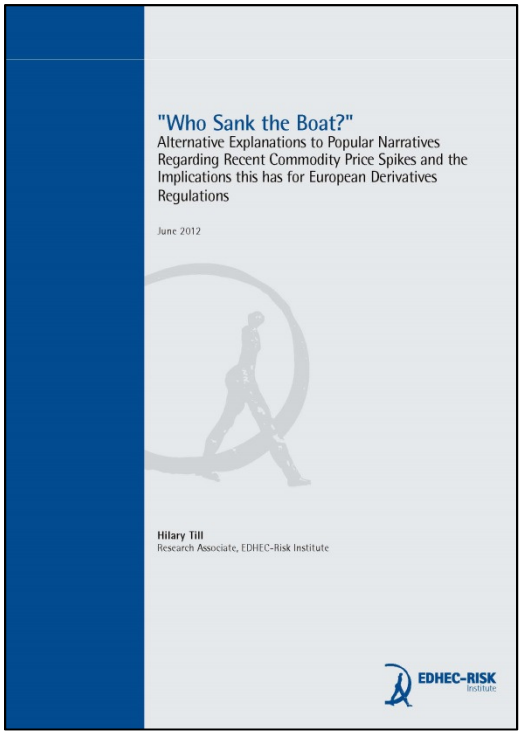
Hilary Till, who has done excellent research on the financial aspects of commodity markets, pointed out a new website to me that provides some worthwhile links to not-for-profit research on the speculation debate. The site was set up by the **International Swaps and Derivatives Association, Inc. (ISDA)**, so it's an industry perspective on the research

Source: Excerpted from Clayton (2013), referring to CommodityFact.org.

“Who Sank the Boat?”

I. Challenges to Popular Narratives on Commodity Futures Speculation

II. Responses to Popular Narratives on Commodity Price Spikes

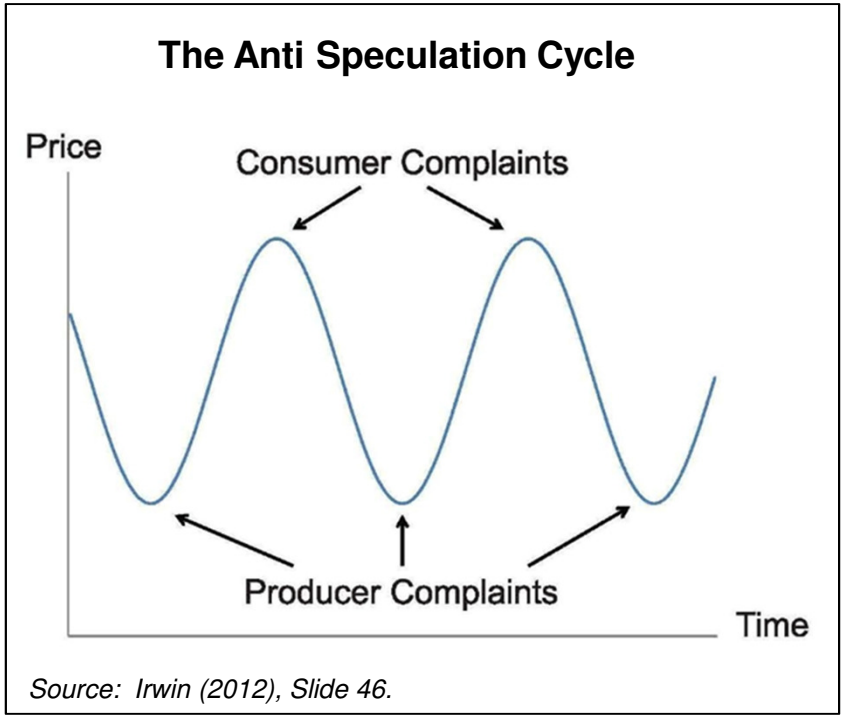


I. Challenges to Popular Narratives on Commodity Futures Speculation

A. Clarification on the Economic Role of Commodity Futures Markets

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

C. Evidence on the Impact of Speculators and Financial Investors on Commodity Futures Markets



Source: Irwin (2012), Slide 46.

A. Clarification on the Economic Role of Commodity Futures Markets

- The terms, “hedging” and “speculation,” are not precise.
- For example, a grain merchant who hedges wheat inventories creates a “basis” position and is then subject to the volatility of the relationship between the spot price and the futures price of the commodity.
- The grain merchant is, in effect, speculating on the “basis.”

A. Clarification on the Economic Role of Commodity Futures Markets

- The basis relationship tends to be more stable and predictable than the outright price of the commodity, which means that the merchant can confidently hold more commodity inventories than otherwise would be the case.

- Futures markets make possible the specialization of risk-taking rather than the elimination of risk.

- Who would take the other side of a commercial hedger's position? Answer: A speculator who specializes in that risk bearing.

A. Clarification on the Economic Role of Commodity Futures Markets

- The speculator may be an expert in the term structure of a futures curve.
- Or the speculator may spread the position against a related commodity.
- Alternatively, the speculator may detect trends resulting from the impact of a commercial's hedging activity.

A. Clarification on the Economic Role of Commodity Futures Markets

- What is the economic role of commodity speculation and its “value to society”?

- Ultimately, successful commodity speculation results from becoming an expert in risk bearing.
- This profession enables commercial entities to privately finance and hold more commodity inventories than otherwise would be the case because they can lay off the dangerously volatile commodity price risk to price-risk specialists.
- Those commercial entities can then focus on their area of specialty: the physical creation, handling, transformation, and transportation of the physical commodity.

A. Clarification on the Economic Role of Commodity Futures Markets

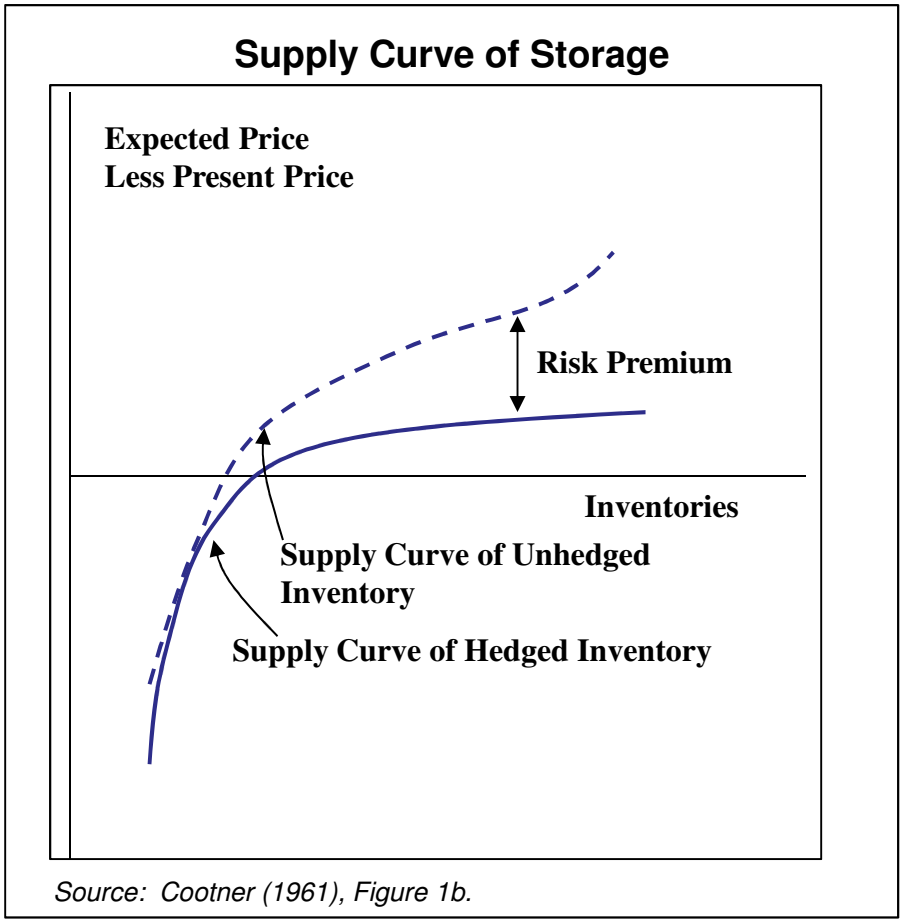
- Cootner (1961) wrote that in the absence of being able to hedge inventories, a commercial participant would not rationally hold “large inventories …

- … unless the expected price increase is greater than that which would be required to cover cash storage costs by an amount large enough to offset the additional risk involved.”

A. Clarification on the Economic Role of Commodity Futures Markets

- "The over-all shape of the supply curve of storage for a wide range of commodities [based on empirical studies] has fallen into the pattern shown in …" according to Cootner (1961).

- This graph illustrates that greater inventories can be held, when hedged, without requiring expected future price increases.



Source: Cootner (1961), Figure 1b.

A. Clarification on the Economic Role of Commodity Futures Markets

- If the existence of price-risk-bearing specialists ultimately enables more inventories to be created and held than otherwise would be the case, …

- … we would expect their existence to lead to the lessening of price volatility.

A. Clarification on the Economic Role of Commodity Futures Markets

- There is some empirical evidence to support the theory that speculative involvement *actually* reduces price volatility.

- Brunetti *et al.* (2011) examined five markets, including corn, over the period 2005 to 2009 and found that:

  > "… speculative trading activity largely reacts to market conditions and *reduces* volatility levels, consistent with the hypothesis that speculators provide valuable liquidity to the market." [Italics added.]

A. Clarification on the Economic Role of Commodity Futures Markets

- In addition, Professor David Jacks examined what happened to commodity-price volatility, across countries and commodities, before and after specific commodity-contract trading has been prohibited in the past.

- Jacks (2007) also examined commodity-price volatility before and after the establishment of futures markets, across time and across countries. Jacks' study included data from 1854 through 1990.

- He generally, but not always, found that commodity-price volatility was greater when there were not futures markets than when they existed over 1-year, 3-year, and 5-year timeframes. Jacks' results are summarized in Appendix A.

A. Clarification on the Economic Role of Commodity Futures Markets

Irwin and Sanders (2011) note that "[commodity] index positions [had] led to lower volatility in a statistical sense" when they examined 12 agriculture markets and 2 energy futures markets from June 2006 to December 2009. Specifically:

> "… there is *mild* evidence of a negative relationship between index fund positions and the volatility of commodity futures prices, consistent with the traditional view that speculators reduce risk in the futures markets and therefore lower the cost of hedging." [Italics added.]

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

- Professor Brian Wright has discussed the difficulty of understanding intuitively how to apportion causality when analyzing commodity price spikes.

- Wright (2011) uses a delightful example from the popular Australian (and New Zealander) children's story, "Who Sank the Boat?", to illustrate how a non-linear function can make it difficult to apportion blame amongst various contributing factors.

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

The Story of "Who Sank the Boat?"

"Imagine a pig carrying an umbrella, a sheep doing knitting, and a cow and a donkey and a mouse, all walking along on their back legs in single file.

What else is there to do on a fine sunny morning but to go for a row in the boat?

But there is one big question. 'Who sank the boat?'

We are told the outcome right up front, but who was the culprit? The tension and suspense is fantastic as each creature in turn gets aboard. The donkey is a smart critter since he knew how to balance the weight of the cow. The sheep was just as smart since he got on the opposite side to the pig. We are now very low in the water now, but still afloat.

The smallest and the lightest of the friends [a naughty little mouse] now gets on board. … 'You DO know who sank the boat' - don't you?"

The relevance of this story to commodity price spikes is as follows.

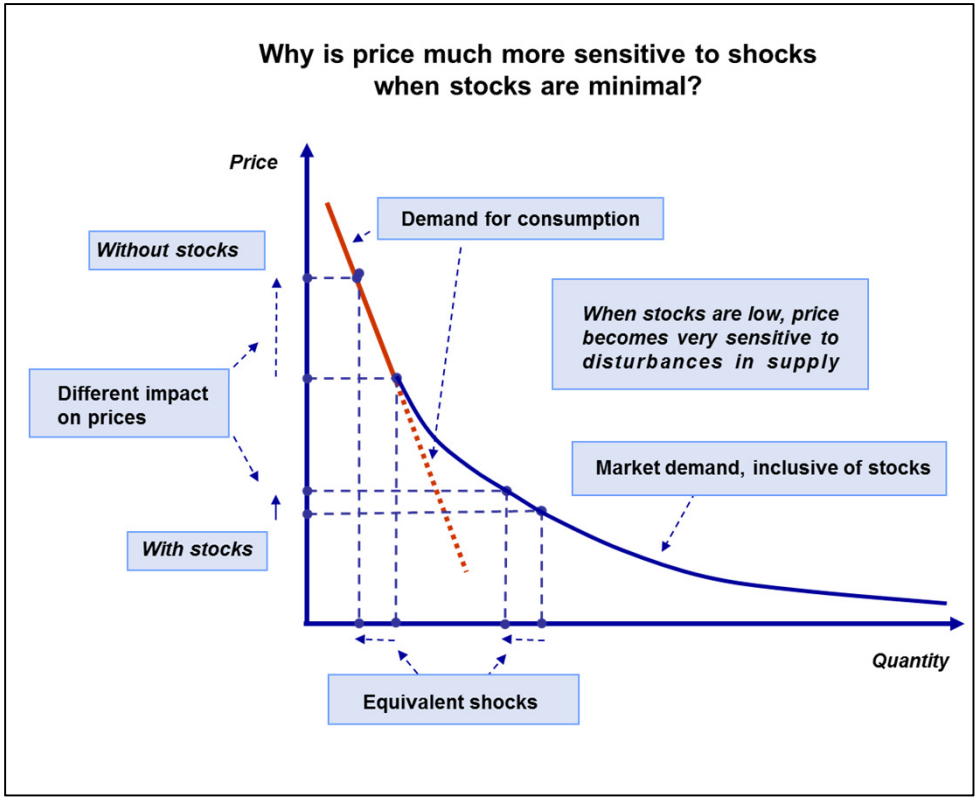
B. The Difficulty of Apportioning Causality for Commodity Price Spikes

- Gilbert (2007) explains that "when markets become tight, inelastic supply and demand make prices somewhat arbitrary, at least in the short term. There will always be a market clearing price but its level may depend on *incidental* … features of the market." [Italics added.]

- In Wright's retelling of the children's story, the *incidental* factor was the naughty little mouse jumping into the boat.

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

- Wright (2011) also provides a technical chart to show how a supply disturbance has a dramatically different impact on price …
- … depending on whether one is in a period of low-stocks-relative-to-consumption or not.



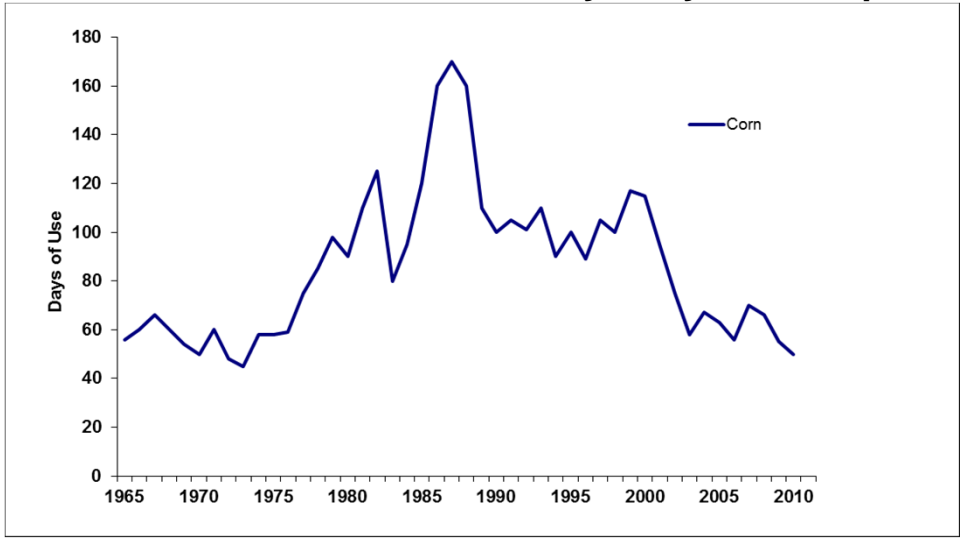
Source: Wright (2011), Slide 39.

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

Grains

- The chart on the right illustrates corn's inventory-to-use situation from 1965 through 2011.
- "This … [was] the most precarious level of corn inventories since 1974," notes Lewis (2011).

Inventory-to-Use Ratio for Corn
Total Available Stocks Divided by Daily Consumption



Source: Lewis (2011), Figure 1.

Author's Data Sources: Deutsche Bank and USDA.

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

Professor Scott Irwin explained in 2011:

- The corn "bull market rally, following so soon after the 2007-08 rally, seems similar to the early-mid 1970s series of rallies."
- "… 'the true spike or boom phase will probably last longer in this episode because of the biofuels mandates and high fuel prices working together.'"
- Because of governmental "policies mandating ethanol use," price cannot function to ration demand, a constraint that did not exist in the 1970s.

Source: White (2011).

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

Richard Gower, who is a policy advisor for Oxfam UK, has recommended that developed countries consider introducing:

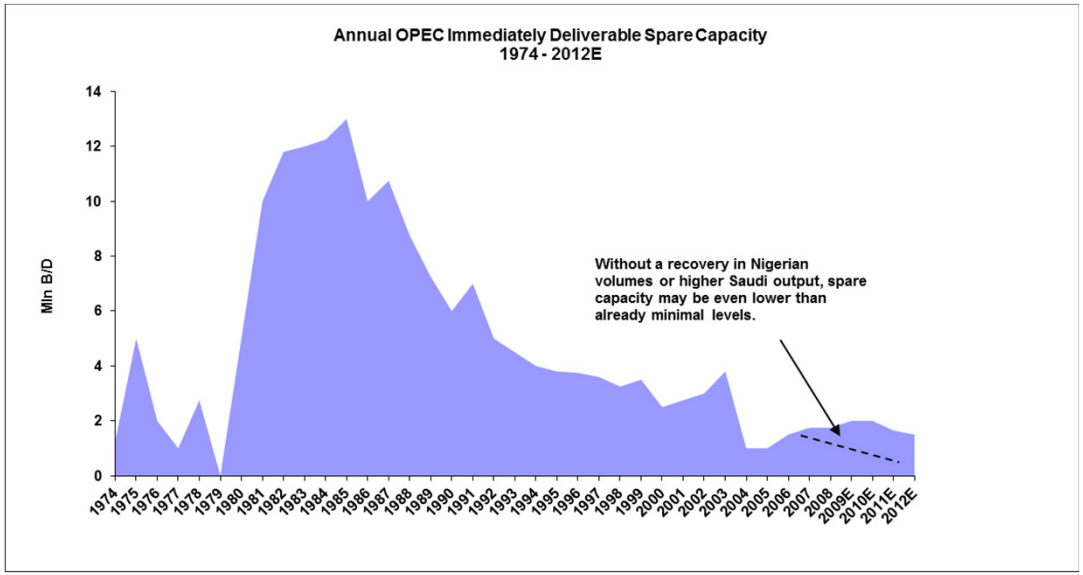
> "a price trigger so that when food prices are high, you divert those stocks of grains from fuel to food."

Source: Gower (2011).

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

Crude Oil

In July 2008, effective spare capacity in OPEC was only 1.5-million barrels per day, according to IEA (2008).



Source: Murti et al. (2008), Exhibit 3.

Data Sources: IEA, Goldman Sachs Research Estimates.

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

- Did commodity index investments in 2008 cause the 7-month oil-price rally that culminated in July of 2008?
- This is an unlikely cause, given that total over-the-counter (OTC) and on-exchange commodity index investment activity in oil-futures-contract-equivalents actually declined from December 31, 2007 through June 30, 2008.

Excerpt From
Staff Report on Commodity Swap Dealers & Index Traders
With Commission Recommendations

Total OTC and On-Exchange Commodity Index Investment Activity

	12/31/07	3/31/08	6/30/08
Crude Oil Index Values Measured in Futures [Contract] Equivalents	**408,000**	**398,000**	**363,000**

Source: CFTC (2008).

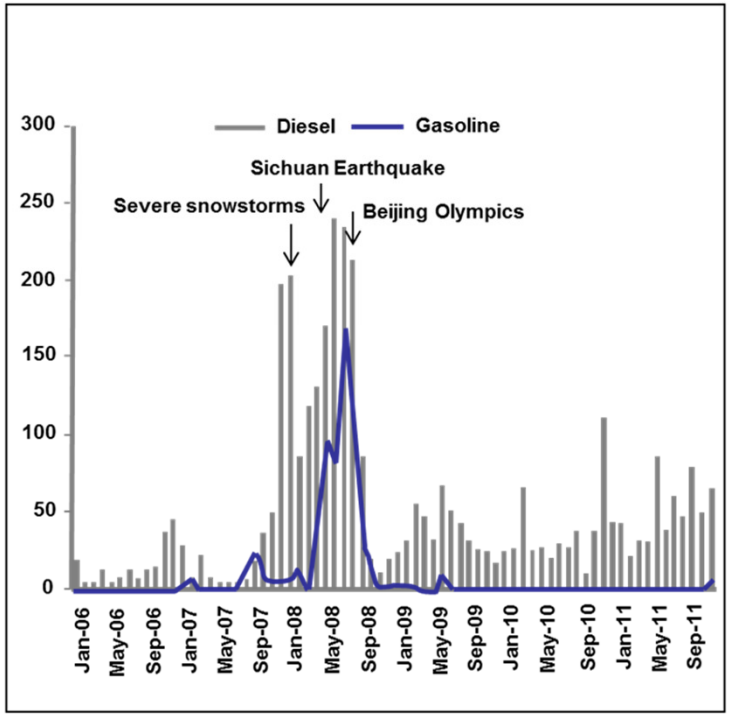
B. The Difficulty of Apportioning Causality for Commodity Price Spikes

- There were a number of plausible fundamental explanations that arose from any number of *incidental* factors that came into play when supply-and-demand was balanced so tightly, as had been the case with light sweet crude oil, and …

- … as explained in Amenc, Maffei, and Till (2008).

B. The Difficulty of Apportioning Causality for Commodity Price Spikes

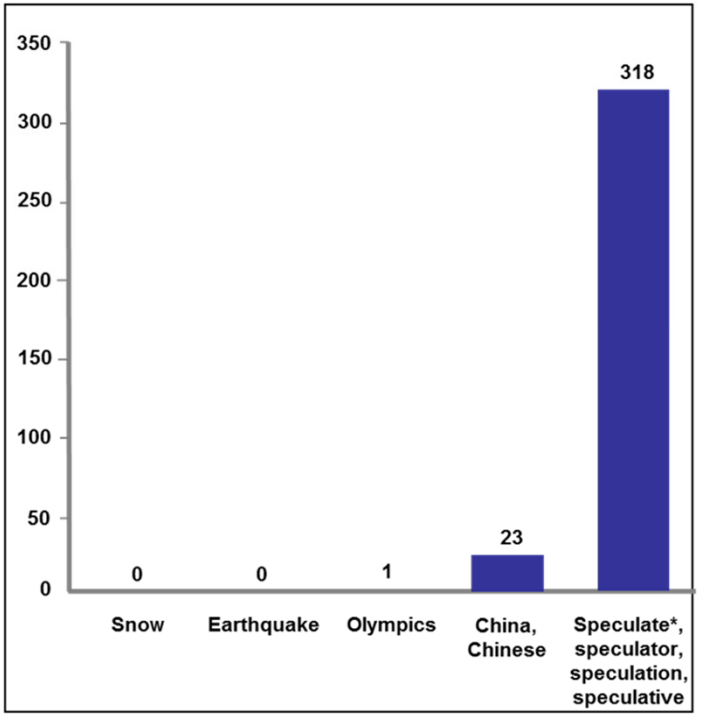
Chinese gasoline and diesel imports surged in 2008 due to a number of key events in China
Thousand barrels per day



Source: China Customs General Administration

"According to local news reports on February 23, 2008, 129 people were killed and 1.66 million people were evacuated in the January 2008 snowstorms. The storms were described as the heaviest accumulation in 50 years in some areas. The Sichuan earthquake killed 69,000 people (38X the death toll of Hurricane Katrina) and led Premier Wen to mobilize the army for search and rescue operations. These efforts, involving large numbers of truck and military equipment in mountainous terrain, were very diesel intensive."

Times word mentioned in Sept 2008 U.S. Senate Hearing before Subcommittee on Energy, "Speculative Investing in Energy Markets" (88 pgs, 52,935 words)



Source: U.S. Senate, J.P. Morgan Commodities Research

"The hearing took place before the Subcommittee on Energy of the Committee on Energy and Natural Resource, United States Senate, September 16, 2008. It was entitled 'Speculative Investment in Energy Markets.'"

* includes "speculating"

Source: Chaturvedi (2013), Slide 31.

C. Evidence on the Impact of Speculators and Financial Investors on Commodity Futures Markets

Fattouh *et al.* (2012) explain that:

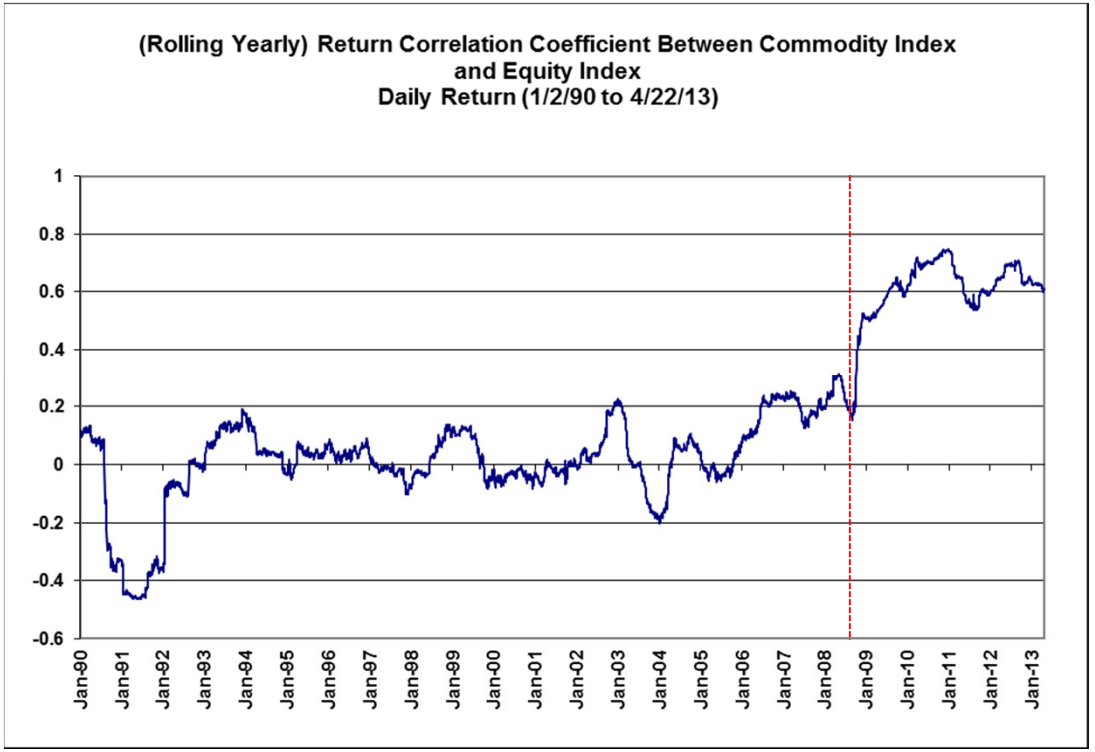
- "[E]vidence of increased co-movement between the spot price of oil, oil futures, and other asset prices does not imply that the [past] surge in the spot price was caused by financial speculators. …
- To the extent that global macroeconomic fundamentals have changed in recent years, … that fact could provide an alternative explanation for the observed co-movement ..."

C. Evidence on the Impact of Speculators and Financial Investors on Commodity Futures Markets

Kawamoto *et al.* (2011) observe that:

> "With regard to the cross-market linkage between commodity and stock markets, the correlation coefficient of the return between the markets has risen rapidly since the second half of 2008."

C. Evidence on the Impact of Speculators and Financial Investors on Commodity Futures Markets



The figure shows the one-year rolling correlation coefficients between the return of the global equity index (MSCI AC World Index) and that of the commodity index (S&P GSCI).

Note: The vertical line demarks the second half of 2008.

[Bloomberg tickers: MSCI AC World USD: MSEUACWF Index; and S&P GSCI Excess Return: SPGCCIP Index.]

Source: Updated and based on Kawamoto et al. (2011), Chart 2.

C. Evidence on the Impact of Speculators and Financial Investors on Commodity Futures Markets

- Market practitioners are well aware of the increase in correlations across all asset classes, including commodities, since the onset of the Global Financial Crisis.

- Williams *et al.* (2012) explain that:

> "In a world where disparate assets move in lockstep, their individual identities become lost. Assets now behave as either risky assets or safe havens … Synchronized markets provide little diversification …"

- They refer to this new market behavior as "Risk On – Risk Off (RORO)." RORO may be a "consequence of a new systemic risk factor."

C. Evidence on the Impact of Speculators and Financial Investors on Commodity Futures Markets

- Cheng *et al.* (2012) provide convincing evidence of one aspect of the "RORO" environment, which began after the 2008 Lehman crisis.

- "… [W]hile financial traders accommodate the needs of commercial hedgers in normal times, in times of financial distress, financial traders reduce their net long positions [in commodities] in response to an increase in the VIX[,] causing the risk to flow to commercial hedgers."

- The researchers also show how sensitive the returns of all individual commodities have become to changes in the VIX.

- Appendix B provides a summary of these quantitative results.

C. Evidence on the Impact of Speculators and Financial Investors on Commodity Futures Markets

The G20 Study Group on Commodities (2011) acknowledged this new state-of-the-world:

- "The expansion of market participants in commodity markets increases market liquidity (including in longer term contracts), thereby accommodating the hedging needs of producers and consumers. …

- On the other hand … (the) increased correlation of commodity derivatives markets and other financial markets suggests a *higher risk of spillovers*." [Italics added.]

II. Responses to Popular Narratives on Commodity Price Spikes

A. Placebos

B. Transparency of Position-Taking

C. Commodity Index Products

D. "Speculative" Regulatory Proposals

A. Placebos

- The main problem with proposals on restricting speculative participation, so as to avoid future price spikes, is that this solution may actually be a placebo.

- Former U.S. CFTC Commissioner Michael Dunn noted in an article by Loder and Brush (2011):

  – "My fear is that, at best, position limits are a cure for a disease that does not exist.

  – Or at worst, a placebo for one that does."

A. Placebos

According to Lynch (2010), a CFTC economist memorandum from the previous year stated that:

- "In our analysis of the impact of position limits, we find little evidence to suggest that changes from a position limit regime to an accountability level regime or changes in the levels of position limits impact price volatility in either energy or agricultural markets.

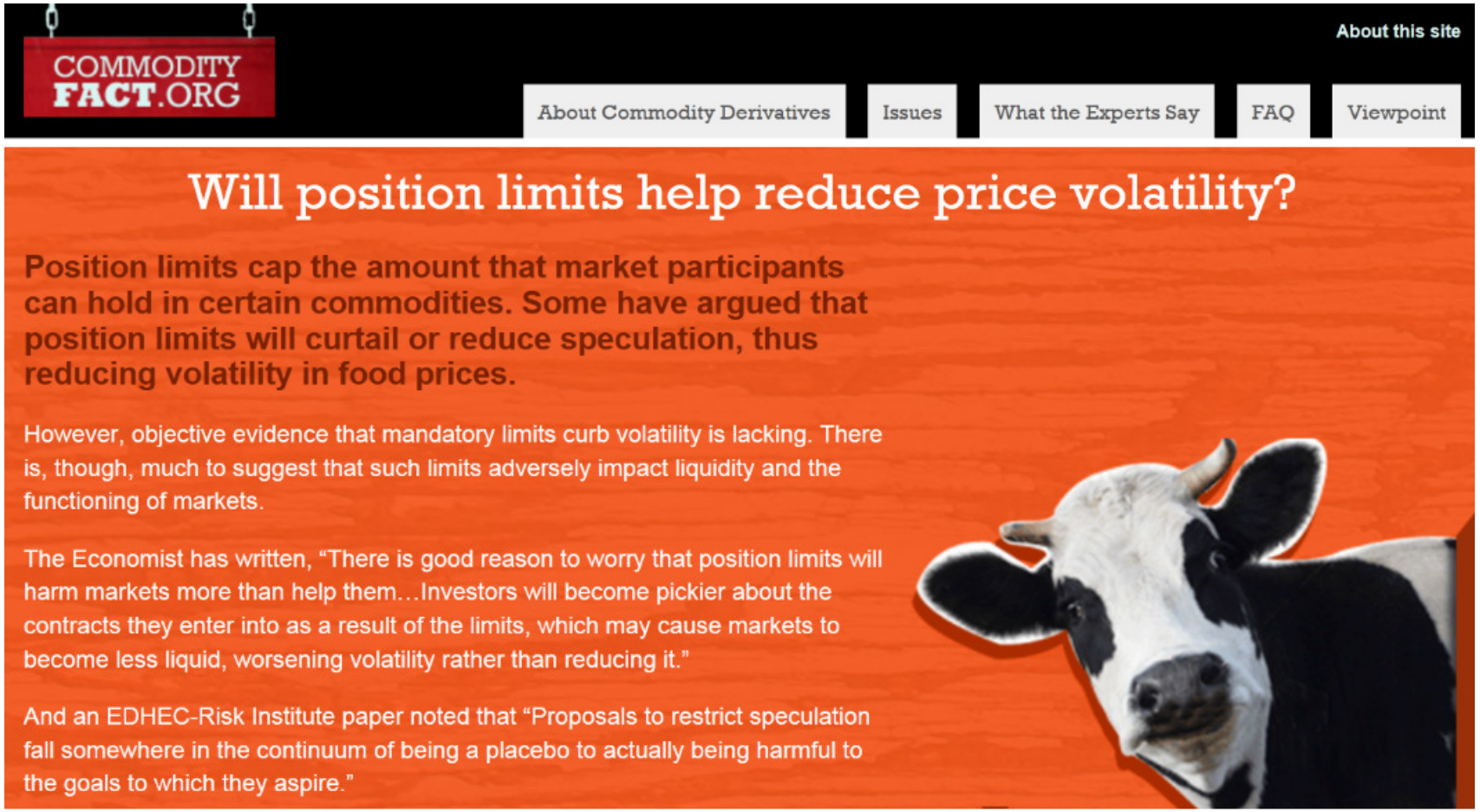
- Our results are consistent with those found in the existing literature on position limits."

A. Placebos

A 2010 policy brief from the Food and Agriculture Organization of the United Nations provides a useful note of caution, regarding making position limits too onerous:

- "Efforts to reduce speculation in futures markets might … have unintended consequences.
- Mechanisms to intervene in futures markets, if the futures price diverges from an equilibrium level determined by market fundamentals (a level which in itself will be difficult to determine), …
- … might divert speculators from trading and thus lower the liquidity in the market available for hedging purposes."

A. Placebos



Source: http://www.CommodityFact.org.

B. Transparency of Position-Taking

- One can easily endorse proposals for transparency in position-taking in all financial centers.

- This endorsement is the result of hard-won lessons from US history.

B. Transparency of Position-Taking

Essentially, the historical lessons from past challenges to futures trading in the United States are as follows:

- Constantly revisit the economic usefulness of commodity futures trading;

- Insist upon transparency in market-participation and position data in a sufficiently disaggregated fashion as to be useful, but also in a sufficiently aggregated fashion as to not violate individual privacy.

- Carry out empirical studies to confirm or challenge the benefits and/or burdens of futures trading.

C. Commodity Index Products

Regarding any proposals to ban commodity index products, one would think this would be an unfortunate precedent without solid evidence of these products being a “detriment to society.”

D. “Speculative” Regulatory Proposals

- Modern commodity futures markets have been the product of 160 years of trial-and-error efforts.
- One result has been the creation of an effective price discovery process, which in turn enables the coordination of individual efforts globally in dynamically matching current production decisions with future consumption needs in commodities.
- The price risk management benefits of these markets were also particularly emphasized in this presentation.
- Before performing surgery on these institutions, such as imposing draconian position limits, international policymakers may want to tread carefully and not adopt “speculative” regulatory proposals whose ultimate effects are unknown.

Appendix A

Price Volatility in 16 Markets Before and After the Establishment of Futures Contracts

	5 YEARS		*3 YEARS*		*1 YEAR*	
CHICAGO Wheat 1854-64 (monthly)	*Without futures*	*With futures*	*Without futures*	*With futures*	*Without futures*	*With futures*
I. Coefficient of variation	0.0591	0.0644	**0.0577**	**0.0361**	**0.0549**	**0.0337**
II. Average monthly change	**0.0895**	**0.0779**	**0.0935**	**0.0770**	**0.1036**	**0.0850**
III. Likelihood ratio test (all years, k=2)	**2.3335**					
NEW ORLEANS COTTON, 1866-76 (monthly)						
I. Coefficient of variation	**0.0977**	**0.0772**	**0.0837**	**0.0454**	**0.0662**	**0.0292**
II. Average monthly change	**0.0682**	**0.0331**	**0.0655**	**0.0350**	**0.0497**	**0.0426**
III. Likelihood ratio test (all years, k=2)	**3.9567**					
WINNIPEG OATS, 1899-1909 (monthly)						
I. Coefficient of variation	**0.0528**	**0.0343**	**0.0486**	**0.0322**	*0.0318*	*0.0320*
II. Average monthly change	**0.0815**	**0.0553**	**0.0708**	**0.0530**	*0.0383*	*0.0693*
III. Likelihood ratio test (all years, k=2)	**2.1724**					
NYC SUGAR, 1911-21 (monthly)						
I. Coefficient of variation	*0.1361*	*0.1938*	**0.1563**	**0.0882**	**0.0826**	**0.0580**
II. Average monthly change	*0.0597*	*0.0732*	**0.0607**	**0.0429**	*0.0524*	*0.0571*
III. Likelihood ratio test (all years, k=2)	**3.6360**					
NYC BUTTER, 1920-30 (monthly)						
I. Coefficient of variation	**0.0487**	**0.0325**	**0.0366**	**0.0229**	**0.0295**	**0.0262**
II. Average monthly change	**0.0666**	**0.0473**	**0.0665**	**0.0451**	**0.0665**	**0.0461**
III. Likelihood ratio test (all years, k=2)	**2.1252**					
NYC EGGS, 1920-30 (monthly)						
I. Coefficient of variation	**0.0902**	**0.0634**	**0.0778**	**0.0618**	**0.0797**	**0.0587**
II. Average monthly change	**0.1391**	**0.1015**	**0.1392**	**0.0991**	**0.1328**	**0.1100**
III. Likelihood ratio test (all years, k=2)	**2.4587**					
NYC RUBBER, 1921-31 (monthly)						
I. Coefficient of variation	*0.1740*	*0.2371*	**0.1365**	**0.1035**	**0.0913**	**0.0195**
II. Average monthly change	**0.1022**	**0.063**	**0.1135**	**0.0616**	**0.1427**	**0.0452**
III. Likelihood ratio test (all years, k=2)	**2.3668**					
NYC SILK, 1923-33 (monthly)						
I. Coefficient of variation	*0.0962*	*0.5120*	*0.0619*	*0.2662*	**0.0426**	**0.0206**
II. Average monthly change	*0.0510*	*0.0678*	*0.0359*	*0.0478*	**0.0408**	**0.0234**
III. Likelihood ratio test (all years, k=2)	**5.5591**					

Significant at the 10% level | Significant at the 5% level | Significant at the 1% level | Significant at the .1% level

Note: Figures in bold are those consistent with the hypothesis of dampened price volatility in the presence of futures markets; significance for criteria I-II refers to *t*-test on differences in means; significance for criterion III refers to an *F*-test for pooled and non-pooled estimates.

Source: Jacks (2007), Table 1.

Appendix A

Price Volatility in 16 Markets Before and After the Establishment of Futures Contracts

	5 YEARS		*3 YEARS*		*1 YEAR*	
	Without futures	*With futures*	*Without futures*	*With futures*	*Without futures*	*With futures*
NYC COPPER, 1928-38 (monthly)						
I. Coefficient of variation	**0.2099**	**0.0860**	**0.1909**	**0.0558**	**0.0852**	**0.0279**
II. Average monthly change	**0.0651**	**0.0564**	**0.0811**	**0.0456**	**0.0857**	**0.0591**
III. Likelihood ratio test (all years, k=2)	**2.7353**					
NYC SILVER, 1928-38 (monthly)						
I. Coefficient of variation	**0.0853**	**0.0415**	*0.0455*	*0.0479*	*0.0278*	*0.0317*
II. Average monthly change	**0.0331**	**0.0238**	**0.0440**	**0.0342**	**0.0366**	**0.0329**
III. Likelihood ratio test (all years, k=2)	**2.4190**					
NYC LEAD, 1929-39 (monthly)						
I. Coefficient of variation	**0.1852**	**0.1051**	*0.1195*	*0.1279*	**0.1002**	**0.0655**
II. Average monthly change	**0.0387**	**0.0307**	**0.0450**	**0.0341**	**0.0342**	**0.0241**
III. Likelihood ratio test (all years, k=2)	**6.0309**					
NYC ZINC, 1929-39 (monthly)						
I. Coefficient of variation	**0.1719**	**0.1017**	**0.1306**	**0.1139**	**0.1110**	**0.0598**
II. Average monthly change	**0.0480**	**0.0341**	**0.0504**	**0.0323**	**0.0498**	**0.0236**
III. Likelihood ratio test (all years, k=2)	**3.3138**					
CHICAGO SOYBEANS, 1932-9 (monthly)						
I. Coefficient of variation	**0.0907**	**0.0589**	**0.0714**	**0.0607**	**0.0596**	**0.0431**
II. Average monthly change	**0.0856**	**0.0732**	**0.1043**	**0.0680**	**0.0722**	**0.0670**
III. Likelihood ratio test (all years, k=2)	**1.3403**					
BOMBAY LINSEED, 1952-60 (monthly)						
I. Coefficient of variation	**0.0261**	**0.0148**	**0.0304**	**0.0157**	**0.0313**	**0.0181**
II. Average monthly change	**0.0456**	**0.0303**	**0.0418**	**0.0329**	**0.0456**	**0.0381**
III. Likelihood ratio test (all years, k=2)	**2.5052**					
CHICAGO LIVE HOGS, 1961-71 (monthly)						
I. Coefficient of variation	0.0637	0.0674	**0.0783**	**0.0638**	**0.0660**	**0.0309**
II. Average monthly change	0.0525	0.0598	**0.0580**	**0.0514**	**0.0642**	**0.0433**
III. Likelihood ratio test (all years, k=2)	**2.4375**					
JAKARTA RUBBER, 1980-90 (monthly)						
I. Coefficient of variation	**0.0545**	**0.0433**	*0.0380*	*0.0503*	**0.0406**	**0.0166**
II. Average monthly change	**0.0384**	**0.0307**	*0.0355*	*0.0358*	**0.0373**	**0.0276**
III. Likelihood ratio test (all years, k=2)	**2.2213**					

Significant at the 10% level | Significant at the 5% level | Significant at the 1% level | Significant at the .1% level

Note: Figures in bold are those consistent with the hypothesis of dampened price volatility in the presence of futures markets; significance for criteria I-II refers to *t*-test on differences in means; significance for criterion III refers to an *F*-test for pooled and non-pooled estimates.

Source: Jacks (2007), Table 1.

Appendix B
Commodity Returns and the VIX

		Coefficient on Contemporaneous Change in VIX			
		Post-Crisis		Pre-Crisis	
		15Sep2008-01Jun2011 T = 142 Weeks	01Jan2010-01Jun2011 T = 74 Weeks	01Jan2006-15Sep2008 T = 141 Weeks	01Jan2001-01Jan2006 T = 262 Weeks
		Coef. t-statistic	Coef. t-statistic	Coef. t-statistic	Coef. t-statistic
Grains	Chi W	-0.6174 [-6.8105]***	-0.9345 [-3.8257]***	0.0068 [0.0303]	0.0747 [0.8290]
	Corn	-0.4551 [-3.8024]***	-0.7121 [-4.8204]***	-0.1429 [-0.8316]	-0.0166 [-0.1937]
	KC W	-0.5688 [-6.9442]***	-0.8676 [-3.9568]***	-0.0354 [-0.1510]	0.113 [1.2397]
	Soybeans	-0.3718 [-4.6336]***	-0.4896 [-3.4953]***	-0.0344 [-0.2206]	0.0203 [0.2320]
	Soyb Oil	-0.4115 [-4.9881]***	-0.4951 [-4.1131]***	-0.0384 [-0.2652]	-0.0587 [-0.6628]
Livestock	F Cattle	-0.2252 [-3.9118]***	0.0065 [0.1067]	0.0524 [0.5151]	0.0477 [0.9251]
	L Hogs	-0.0919 [-1.1710]	-0.3613 [-2.3938]**	0.0143 [0.1208]	-0.1337 [-1.3270]
	L Cattle	-0.1963 [-4.9440]***	-0.0775 [-1.1357]	-0.042 [-0.4006]	0.0666 [1.3047]
Softs	Cocoa	-0.2134 [-2.3469]**	-0.1228 [-0.7663]	-0.3467 [-1.7125]*	-0.0691 [-0.5049]
	Coffee	-0.2914 [-4.0742]***	-0.4263 [-2.2689]**	-0.2348 [-1.7615]*	0.0336 [0.2606]
	Cotton	-0.371 [-6.4895]***	-0.3929 [-1.9713]*	-0.0891 [-0.5968]	-0.1032 [-0.8861]
	Sugar	-0.2701 [-2.0996]**	-0.5985 [-2.1881]**	-0.0577 [-0.3413]	0.2296 [1.7985]*
Energy	Oil	-0.4674 [-3.7665]***	-0.4941 [-2.6536]***	0.0206 [0.1382]	-0.076 [-0.6132]
	Heat Oil	-0.7731 [-3.7817]***	-0.3638 [-2.5819]**	0.0719 [0.4626]	-0.1516 [-1.1289]
	Nat Gas	-0.3597 [-2.5277]**	-0.3229 [-1.1624]	-0.0572 [-0.2505]	-0.2669 [-1.5913]
	Gas	-0.3531 [-2.4924]**	-0.4439 [-2.9168]***	0.1 [0.5812]	
Metals	Copper	-0.3648 [-3.9503]***	-0.6387 [-5.1094]***	-0.4338 [-1.8313]*	-0.1942 [-2.8210]***
	Gold	-0.1199 [-1.1664]	-0.0917 [-0.7926]	-0.1203 [-0.6312]	-0.0175 [-0.3034]
	Silver	-0.332 [-2.3913]**	-0.431 [-1.5223]	-0.4193 [-1.5138]	-0.0854 [-0.9789]

"We report coefficients from a weekly regression of commodity returns as the left-hand-side variable on contemporaneous and one lag of changes in the VIX as right-hand-side variables, controlling for lagged commodity returns, percentage changes in the BDI, changes in the Baa credit spread, and changes in Inflation compensation. Each row reports coefficients for a different commodity and each set of columns reports coefficients for different sample periods. For brevity, only the coefficients on the contemporaneous change in VIX are reported. Coefficients are reported where both returns and the VIX are in basis points. We use the Newey and West construction for standard errors with four lags. */**/*** denotes significant at the 10%, 5%, and 1% levels, respectively."

Source: Cheng et al. (2012), Table 4.

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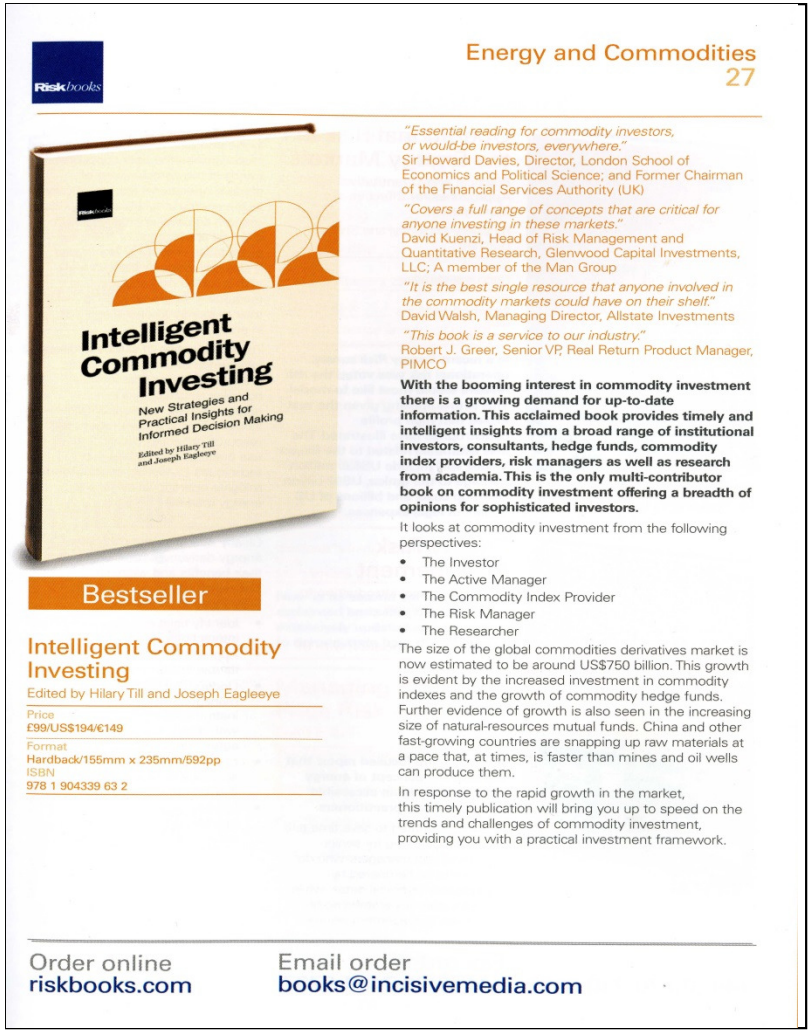

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