"Who Sank the Boat?"
Response to the Finance Watch paper "Investing Not Betting"

Alternative Explanations to Popular Narratives Regarding Recent Commodity Price Spikes and the Implications This Has for European Derivatives Regulations

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This EDHEC-Risk position paper specifically responds to a recent report by Finance Watch on regulatory proposals for commodity derivatives markets in Europe. Our paper describes an alternative narrative for what caused the recent commodity price spikes and then notes what implications this narrative has for addressing Finance Watch’s regulatory proposals.

In summary, this EDHEC-Risk position paper agrees with Finance Watch’s concerns regarding food and oil price spikes. Our main concern is that the public interest group’s specific proposals may actually be placebos (or worse) that distract from properly addressing the fundamental factors responsible for these price spikes.

We review both the theory and empirical evidence regarding how commodity futures markets work, including the role of the speculator. We also discuss how difficult it is to apportion causality for commodity price spikes when inventories-relative-to-consumption become sufficiently low.

We conclude by noting that modern commodity futures markets are the result of 160 years of trial-and-error efforts. Before performing surgery on these institutions, we suggest that Finance Watch’s supporters tread carefully and not adopt “speculative” regulatory proposals whose ultimate effects are unknown. We further recommend that European Union policymakers instead consider studying market practices globally and then adopt what is demonstrably best practice, rather than invent new untested regulations.

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A. An Ambitious New Public Interest Group

*Finance Watch* is a new international public interest group headquartered in Brussels, Belgium. The group was established in 2011 in response to a 2010 “call for a finance watch” by a group of members of the European Parliament, who believed there needed to be a counterweight to financial industry lobbying.

*Finance Watch* is “dedicated to making finance work for the good of society. Its mission is to strengthen the voice of society in the reform of financial regulation by conducting advocacy and presenting public interest arguments to lawmakers and the public. ... [T]he legitimate pursuit of private interests by the financial industry should not be conducted to the detriment of society.”

Furthermore, the “general objective of *Finance Watch*” is ambitious. The group’s goal is the creation of “an economic organisation of society where the needs of the real economy to have access to capital and to financial services are fulfilled in a sustainable, equitable and transparent manner.”

The group believes that a lesson from the Global Financial Crisis was that “competition and ‘self-regulation’ have proven unable to incentivise activities that bring value to society.”


With this perspective in mind, *Finance Watch* produced the position paper, “Investing Not Betting: Making Financial Markets Serve Society,” in April 2012. This paper was intended to provide a well-reasoned and well-argued set of proposals that would influence the future shape of European financial regulation. Amongst its proposals, the group specifically addressed European commodity derivatives regulation.

The group’s paper was occasioned by the debate over the forthcoming revisions to the European Union’s “Markets in Financial Instruments Directive (MiFID),” which is a key cornerstone of financial regulation in the EU.

C. Response to *Finance Watch*’s Commodity Proposals

It will be the task of this position paper to evaluate *Finance Watch*’s commodity proposals, which are only one part of the group’s ambitious paper. The public interest group’s paper also includes proposals that cover high-frequency trading, over-the-counter trading, and investor and employee protection.
II. Finance Watch's Commodity Narrative Can be Questioned

As with the overall Finance Watch paper, the commodity section presents a number of assertions as self-evident truths, which one might take issue with, whether one is self-interested or not.

In the following, we will summarize Finance Watch’s commodity narrative, and then we will discuss how this narrative might be challenged. We will then conclude with an evaluation of the public interest group’s concrete proposals.

A. The Finance Watch Narrative

1. Commodity Prices are a Life and Death Issue
   The Finance Watch paper notes how commodity prices are a “life and death issue”:
   “Billions of human beings rely on commodities to eat, heat, and commute. Brutal hikes in agricultural commodities in 2008 and 2011 caused malnutrition for hundreds of millions of people – and related ‘food riots’. The rise of energy-related commodity prices weighs on the daily lives of billions as well ...”

2. Speculators Must have a Minority Role in Futures Markets
   The policy group’s author believes that as long as futures market participants are largely producers and consumers, with speculators in a minority role, then futures markets bring “value to society as a whole.”
   The speculative participants “are looking for a remuneration of their risk by gaining from the underlying commodity’s price fluctuation.”

3. Excessive Speculation Undermines the Commodity Price Formation Mechanism
   The paper takes it as self-evident that if there is a rise in speculative participation, then futures markets will undermine “the price formation mechanism,” leading to a “disconnect” of futures prices from their fundamentals. “Producers and consumers make commodity futures markets efficient, not speculators.”

4. There Should Be a Linear Relationship Between a Commodity’s Supply-and-Demand Data and its Price
   The author provides a graph of world wheat supply-and-demand from 1997 to 2011, showing only modest shifts over time. The graph is then overlaid with the price of wheat. The price of wheat increases in the lead-up to 2008, declines after 2008, and then rises more recently. The author takes it as self-evident that this graph means that speculators caused price distortions in the wheat markets.

5. Investor Participation in the Commodity Markets is Betting
   Next, the paper takes investors to task for obtaining exposure to commodity prices through a variety of investment vehicles. “... [T]o call money going into commodity derivatives markets an ‘investment’ is a misnomer (investing is bringing money to productive use[,...] and money going into commodity derivatives does not go to [a] productive use) and should be called ‘betting’ ...”

6. Commodity Index Investment Pushes Prices Up
   The author asserts that commodity index investment and speculation have “the mechanical effect of pushing prices up ...” As evidence, the author shows a graph of commodity assets under management largely increasing since 2007.
II. Finance Watch’s Commodity Narrative Can be Questioned

The paper further claims that commodity index investing “distort[s] the price discovery function of commodity futures markets, thereby making those markets significantly less useful for hedgers.”

7. A Dynamic Model, Which Includes Speculative Behaviour, Produces Results that Mirror Recent Price Spikes

Next, the Finance Watch paper cites authors, who create a dynamic model that can account for the price spikes of 2007/2008 and 2010/2011. This quantitative model of food prices includes ethanol mandates and separately, speculative behaviour.

8. The Correlation of Commodity and Equity Prices Has Increased Since 2008

Finally, the public interest group quotes from research that shows how the correlation between commodity markets and equity markets, across high-frequency time slices, has increased since the 2008 Lehman crisis. To Finance Watch, this is quantitative evidence that commodity prices are not based on fundamentals, given the “financialisation of commodity markets.”

B. Challenges to Finance Watch’s Narrative

1. The Economic Role of Commodity Futures Markets

Unfortunately, the Finance Watch paper does not take into consideration the pathbreaking work of economists, dating back to the 1920s, who explained the economic role of futures markets. These early authors include Holbrook Working, Roger Gray, and Thomas Hieronymous, as recounted in Professor Scott Irwin’s 2011 presentation, “How Agricultural Economics Saved Futures Markets: An Untold Story of Leadership.” One might also include Paul Cootner and J.R. (John Richard) Hicks in the list of past economists who furthered our understanding of the economics of futures markets.

First of all, the terms, “hedging” and “speculation,” are not precise. 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”. 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 would otherwise be the case. What futures markets make possible is the specialisation of risk-taking rather than the elimination of risk.

Who would take the other side of the commercial hedger’s position? Answer: A speculator who specializes in that risk bearing. The speculator may be an expert in the term structure of a futures curve and would spread the position taken on from the commercial hedger against a futures contract in another maturity of the futures curve. Or the speculator may spread the position against a related commodity. Till and Eagleeye (2004, 2006) provide examples of both intra-market spreading and inter-market spreading, which arise from such risk-bearing.

Alternatively, the speculator may detect trends resulting from the impact of a commercial’s hedging activity, and be able to manage taking on an outright position from a commercial because the speculator has created a large portfolio of unrelated trades. Presumably, the speculator will be able to dampen the risk of an outright commodity position because of the diversification provided by other unrelated trades in the speculator’s portfolio. In this example, the speculator’s risk-bearing specialisation comes from the astute application of portfolio theory.
What then 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 commercials can lay off the dangerously volatile commodity price risk to price-risk specialists. Those commercial entities can then focus on their areas of specialty: the physical creation, handling, transformation, and transportation of the physical commodity.

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.”

“The overall shape of the supply curve of storage for a wide range of commodities [based on empirical studies] has fallen into the pattern shown in ...” Figure 1, according to Cootner (1961).

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

The 1996 book, The Great Wave: Price Revolutions and the Rhythm of History, discusses European history since the 1200s. Broadly speaking, past eras of grain price inflation, whatever the cause, resulted in devastating civilizational consequences. Over the centuries, two innovations have lessened these tragic episodes: international trade and the increase in inventory holdings. Commodity futures markets are a trial-and-error development that serves the latter civilizational advancement.

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. To be clear, why would this be the case?

The more speculators there are, the more opportunity there is for commercial hedgers to find a natural other side for hedging prohibitively expensive inventories. This in turn means that more inventories can be economically held. Then with more inventories, if there is unexpected demand, one can draw from inventories to meet demand, rather than have prices spike higher to ration demand.

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...”

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**Figure 1: Supply Curve of Storage**

![Supply Curve of Storage](source: Cootner (1961), Figure 1b.)
II. Finance Watch’s Commodity Narrative Can be Questioned

levels, consistent with the hypothesis that speculators provide valuable liquidity to the market.” [Italics added.]

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 no futures markets than when they existed, over 1-year, 3-year and 5-year timeframes.

More recently, Irwin and Sanders (2011) note that “[commodity] index positions [have] led to lower volatility in a statistical sense,” when examining 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.” (p. 24) [Italics added.]

2. Holbrook Working’s Speculative T-Index

The Finance Watch paper assumes that “speculators should be restricted to a minority of participants…” A surprising rebuttal to this statement is that historically this has been found not to be the case.

Even when commodity futures markets are viewed as “hedging” markets, there is still a vital role for speculators because there will not always be an even balance of short hedgers and long hedgers at any one time. Therefore, speculators are needed to balance the market.

The Stanford University economist, Holbrook Working, created the T index to measure this balance. The idea behind the T index is that the economic function (or “social value”) of commodity futures markets is for hedging and fulfilling risk-management needs. Historically, in the agricultural futures markets, there actually was an inadequacy of speculation to provide for commercial hedging needs.

Sanders et al. (2008) define the Working T index as follows:

\[
T = 1 + SS / (HL + HS) \text{ if } (HS \geq HL) \\
T = 1 + SL / (HL + HS) \text{ if } (HL > HS)
\]

where open interest held by speculators (non-commercials) and hedgers (commercials) is denoted as follows:

- \( SS \) = Speculation, Short
- \( HL \) = Hedging, Long
- \( SL \) = Speculation, Long
- \( HS \) = Hedging, Short

Some explanation is in order to make this statistic (hopefully) intuitive. The denominator is the total amount of futures open interest due to hedging activity. If the amount of short hedging is greater than the amount of long hedging, then speculative longs are needed to balance the market; and technically, speculative shorts are not required by hedgers. Any surplus of speculative short positions would thereby need to be balanced by additional speculative long positions. Technically, then the speculative short positions would appear to be superfluous or perhaps even “excessive.” The Speculative T index measures the excess
of speculative positions beyond what is technically needed to balance commercial needs, and this excess is measured relative to commercial open interest.

Sanders et al. (2008) write that:

"Working is careful to point out that what may be 'technically an excess of speculation is economically necessary' for a well-functioning market."

For the Speculative T index, are value(s) greater than 1 considered excessive?

The following are average T indices from historical agricultural studies, excerpted from Sanders et al. (2008):

- 1.21 (calculated from 1954-1958 data);
- 1.22 (calculated from 1950-1965 data);
- 1.26-to-1.68 (calculated from 1947-1971 data); and
- 1.155-to-1.411 (calculated from 1972-1977 data).

Evidently, the concern in these historical studies was the inadequacy of speculation in the agricultural futures markets, so these historical T indices would therefore not be considered indicative of excessive speculation.1

In other words, these historical studies contradict the assertion that well-functioning commodity futures markets should necessarily relegate speculative participation to a residual role. Perhaps if one sees commodity speculators as a heterogeneous set of risk-bearing specialists, then one would understand why it would not be beneficial to force speculative participation into a tertiary role.

3. J.R. Hicks and the Congenital Weakness on the Demand Side of Commodity Futures Contracts

The Finance Watch paper asserts that "[p]roducers and consumers make commodity futures markets efficient, not speculators."


"There are quite sufficient technical rigidities in the process of production to make it certain that a number of entrepreneurs will want to hedge their sales for this reason; supplies in the near future are largely governed by decisions taken in the past, so that if these planned supplies can be covered by forward sales, risk is reduced.

But although the same thing sometimes happens with planned purchases as well, it is almost inevitably rarer; technical conditions give the entrepreneur a much freer hand about the acquisition of inputs (which are largely needed to start new processes) than about the completion of outputs (whose process of production—in the ordinary business sense—may be already begun.) Thus, while there is likely to be some desire to hedge planned purchases, it tends to be less insistent than the desire to hedge planned sales. If forward markets consisted entirely of hedgers, there would always be a tendency for a relative weakness on the demand side; a smaller proportion of planned purchases than of planned sales would be covered by forward contracts.

But for this very reason forward markets rarely consist entirely of hedgers. The futures price (say, for one month’s delivery) which would be made by the transactions

1 - Appendix A provides a "simplified example of the calculation and interpretation of Working's [S]peculative T index" from Sanders et al. (2008).
of hedgers alone would be determined by causes that have nothing to do with the causes ordinarily determining market price; it would therefore be widely different from the spot price which any sensible person would expect to rule in a month’s time, and would ordinarily be much below that expected price. Futures prices are therefore nearly always made partly by speculators, who seek a profit by buying futures when the futures price is below the spot price they expect to rule on the corresponding date; [the] action [of speculators] tends to raise the futures price to a more reasonable level.

But it is of the essence of speculation, as opposed to hedging, that the speculator puts himself into a more risky position as a result of his forward trading - he need not have ventured into forward dealing at all, and would have been safer if he had not done so. He will therefore only be willing to go on buying futures so long as ... he can expect to receive ... a return for his risk-bearing, and it will not be worth his while to undertake the risk if the prospective return is too small." (pp. 137–138) [Italics added.]

In essence, Hicks’ theory is that producers are in a more vulnerable position than consumers so will be under more pressure to hedge than consumers. This leads to a "congenital weakness" on the demand side of commodity futures markets.2

4. Brian Wright and ”Who Sank the Boat?”

a. Grains

The Finance Watch paper shows two episodes of dramatic price rises in wheat and concludes that in the absence of notable changes in supply-and-demand that the referenced prices cannot possibly be due to fundamentals, and therefore speculative excess must be to blame.

Professor Brian Wright has discussed the difficulty of understanding intuitively how to apportion causality when dealing with non-linear functions, which may be appropriate to explain here.

Wright (2011b) uses a delightful example from the popular Australian 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.

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...”

2 – Hicks used the intuition underlying the commodity futures contracts’ “normal backwardation” hypothesis to develop his more widely known “liquidity premium” hypothesis for bonds. In this latter hypothesis, he notes that all things being equal, a lender would rather lend in short maturities since they are less volatile than longer-term-maturity bonds. On the other hand, an entrepreneur would rather borrow in a long maturity in order to fix his costs and better plan for the future. In order to induce borrowers to lend long, they must be offered a “liquidity premium” to do so. The result is that bond yield curves tend to be upwardly sloping. (Whereas, with a number of commodity futures contracts, the normal curve shape is downwardly sloping, i.e., in “backwardation.”)

The common idea behind both the “normal backwardation” hypothesis and the “liquidity preference” hypothesis is that commercial entities are willing to pay risk premiums from the profits of their ongoing businesses to hedge away key volatile price risks.

This latter point was further reinforced by Holbrook Working in 1948 in his “Theory of the Inverse Carrying Charge in Futures Markets.” In using futures markets, commercial hedgers have wider business considerations in mind than expressing opinions on where future spot rates will be:

“...the hedger, whose arbitrage is incidental to merchandising or processing, tends to be satisfied to take profits from his major operation and to require [futures] price relations only that they be such as not threaten him with [overall] loss.”
II. Finance Watch's Commodity Narrative Can be Questioned

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

Professor Christopher Gilbert has explained why temporarily large price rises in commodity markets can occur [in Gilbert (2007)]:

“Commodity markets are characterized by very low short-run elasticities of both production and consumption, although long-run supply elasticities are probably high. ... [In] a tight market in which only minimum stocks are held, the long-run price becomes irrelevant. With inelastic short-run supply and demand curves, the market clearing price ceases to be well-defined, not in the sense that the market does not clear, but in the sense that it will be very difficult to assess in advance at what price, market clearing will result. Fundamentals-based analysis may show where the price will finish but this will provide very little guide as to where it will go in the meantime.” (p. 23)

Gilbert (2007) further 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.”

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

Wright (2011b) 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. Please see Figure 2.

Wright (2011a) discusses how the empirical evidence shows that “[price] spikes occur when discretionary stocks are negligible.”

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**Figure 2:** Why is price much more sensitive to shocks when stocks are minimal?

![Chart showing the impact of stock levels on price sensitivity.](Source: Wright (2011b), Slide 39.)
In the recent past, have we been in a period where one had to be concerned about grain inventories?

Figure 3 illustrates corn’s inventory-to-use situation from 1965 through 2011.

Lewis (2011) explained the significance of Figure 3 as follows:

"[T]he world would exhaust global corn inventories in just 47 days on current consumption patterns. This is the most precarious level of corn inventories since 1974."

Professor Scott Irwin explained the situation with corn prices at the time to White (2011):

"We are in the part of the [corn] price curve that, in ‘economist-speak,’ is highly non-linear."

The current “bull market rally, following so soon after the 2007-08 rally, seems similar to the early-mid 1970s series of rallies,” recorded White (2011) in his interview with Irwin.

This comparison is apparent from Figure 3’s price series.

Continues Irwin in White (2011):

"... the true spike or boom phase will probably last longer in this episode because of the biofuel mandates and high fuel prices working together."

Because of governmental policies mandating ethanol use, price may not function effectively to ration corn demand in the future, a constraint that did not exist in the 1970s.

In contrast to corn inventories, "... global inventory-to-use ratios for wheat and soybeans ... [were] close to their long-run historical averages," wrote Lewis (2011), which is consistent with the Finance Watch author’s chart, showing a normal supply-and-demand situation for wheat.

The missing part of the Finance Watch narrative is that wheat prices are tied to corn prices because both grains can be used for feeding livestock. When corn prices rise above wheat, “it sends a pretty strong signal to livestock farmers to substitute the grains they are using in feed” and to use wheat instead of corn, which, in turn, potentially drives up the price of wheat, as explained by Farchy and Blas (2011).

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Figure 3: 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.
During the US Commodity Futures Trading Commission's (CFTC's) “Conference on Commodity Markets” in August 2011, Professor Wright discussed the consequences for grain prices when inventories get quite low [in Wright (2011c)]:

“[With a] non-linear function, ... you can’t say 10% is [due to] this; and 20% is [due to] that, because it is the last 5 or 10% that causes all the chaos. You drive ... [grain] stocks down to a very low level [as in 2008] and suddenly you get this very inelastic demand, making even tiny little pipsqueak countries like, for example, just to pick one at random, [Australia.] Australia’s drought will cause havoc in the markets when you have no stocks because once you ...[have] no stocks you’re naked before this and every price movement ... has to be met by someone not consuming and that’s very hard[]. What would the price have to be to stop you from having your muffins in the morning?”

In Wright (2011a), the commodity economist provides a more formal explanation:

“Wheat, rice, and corn are highly substitutable in the global markets for calories ..., and when aggregate stocks decline to minimal feasible levels, prices become highly sensitive to small shocks, consistent with the economics of storage behaviour. In this decade, aggregate stocks of grain calories available to participants in the global grain market ... declined, due to the imposition of new and substantial biofuel mandates on markets subject to otherwise fairly normal ranges of shifts in yields and demands, making markets unusually sensitive to all short-run disturbances including the Australian drought and other regional grain production problems, as well as biofuel demands in excess of mandates induced by spikes in petroleum prices.

To protect their own vulnerable ... consumers, key exporters restricted supplies in 2007, exacerbating the price rise. ... If [biofuel] mandates are kept at current levels, and petroleum prices do not rise higher, then it is likely that over time the market will adjust to a less volatile equilibrium, on a higher price path than without biofuels ... [I]t is possible that mandates could expand to outrun yield increases for many years, and keep grain prices high and volatile as they are today ...” (p. 33)

Agreeing with the concerns of both Irwin and Wright, Richard Gower, who is a policy advisor for Oxfam UK, noted in 2011 that developed countries should consider introducing “a price trigger so that when food prices are high, you divert those stocks of grains from fuel to food.”

4. “Who Sank the Boat?” [Continued]

b. Crude Oil

Effective spare capacity\(^3\) in OPEC was only 1.5-million barrels per day in July 2008, according to IEA (2008b). Figure 4 puts this excess-capacity cushion in historical context. One-and-a-half-million-barrels-per-day was an exceptionally small safety cushion, given how finely balanced global oil supply-and-demand was. Given the risk of supply disruptions due to naturally-occurring weather events as well as due to well-telegraphed and perhaps well-rehearsed geopolitical confrontations, one would have preferred at the time for this spare-capacity cushion to have been much higher.

In Till (2008b), we discussed what may have caused the oil price rally that culminated in the July 2008 price spike. There were a number of plausible fundamental explanations that arose from any number of incidental factors that came into play when supply-and-demand were balanced so tightly, as was the case with light sweet crude oil.

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3 - “Spare capacity refers to production capacity less actual production; it quantifies the possible increase in supply in the short-term,” explains Khan (2008).
In 2008, these incidental factors included a temporary spike in diesel imports by China in advance of the Beijing Olympics, purchases of light sweet crude by the US Department of Energy for the Strategic Petroleum Reserve, instability in Nigeria, and tightening environmental requirements in Europe. One should add that this is not an exhaustive list.

The natural conclusion to observing that many seemingly inconsequential factors, in combination, could lead to such a large rise in the price of crude oil during the first seven months of 2008, is that the market was signalling a pressing need for an increase in spare capacity in light-sweet crude oil, however achieved.

Once we understand that 1.5 million barrels of OPEC spare capacity is quite tight, one can understand the importance of stability in North Africa in preventing the potential for further oil price spikes. Figure 5 shows the components of OPEC spare capacity as of 2011.
5. Inflation-Hedging and a Call Option on Asian Growth

The Finance Watch paper refers to investors obtaining exposure to the commodity markets as "betting."

An alternative view may be solicited from US endowments, which had disastrous investment experiences during the inflationary 1970's. Figure 6 illustrates the historical evolution of the asset mix for Harvard University's endowment, which now includes a 23% weighting to real assets, of which 14% is allocated to commodities. (The commodity allocation within the policy portfolio has included not only a diversified basket of commodity futures contracts, but also timber and agricultural land.)

Figure 6: Harvard Management Company Policy Portfolio

Vasan (2011) noted that Harvard Management Company, the university's endowment manager, has exposure to commodities "in an effort to achieve further diversification and [as] a hedge against inflation …"

Interestingly, another investment rationale for obtaining exposure to commodities, as noted in Till (2007), has been to benefit from the economic growth of emerging markets.

Nishimura (2011) confirmed that rationale:

"… [C]ommodity markets seem to be serving to some extent as a proxy for investments in rapidly growing emerging market economies. This tendency may be stronger when monetary conditions are globally accommodative …

It would be helpful ... to broaden and deepen local bond and equity markets in those economies, thereby allowing funds to be channelled more directly to investments …"

Ironically, given Finance Watch's scepticism on European commodity derivatives markets, Nishimura (2011) recommends the exact opposite for Asia:

"I[It] is desirable that transparent and resilient commodity markets are developed in Asia, where strong demand for commodities is being generated. Developing such markets further would be beneficial for the area by enhancing liquidity of commodities in the Asian time zone, as well as by developing tradable markets for those commodities such as rice, which are in great demand and produced in the region, but whose global market is yet to be developed."

6. Evidence on the Impact of Commodity Index Funds

Finance Watch also asserts that commodity index funds have pushed up commodity prices – despite opposing evidence.

For example, did commodity index investments in 2008 cause the 7-month oil-price rally that culminated in July of 2008? According to data released by the CFTC on September 11th, 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 31st, 2007 through June 30th, 2008. Please see Figure 7.

Partly because of results such as in Figure 7, a futures exchange spokesman stated in early 2010 that the US regulatory attention on oil markets had shifted to a focus on “market concentration and not about speculation” because the evidence on excessive speculation did not bear out. “There was no smoking gun,” reported Collins (2010).

Irwin and Sanders (2010)’s study also provides an alternative conclusion to Finance Watch’s assertions. According to Irwin and Sanders (2010):

“[A set of] causality regressions provide no convincing evidence that positions held by index traders or swap dealers impact market returns. ... [Our] results tilt the weight of evidence ... in favour of the argument that index funds did not cause a bubble in commodity futures prices. ...”

The policy implication of the available evidence on the market impact of commodity index funds is straightforward: ... regulatory proposals to limit speculation – especially on the part of index funds – are not justified and likely will do more harm than good. In particular, limiting the participation of index fund investors would rob the commodity futures markets of an important source of liquidity and risk-absorption capacity at a time when both are in high demand.” (pp. 2-3)

Whereas the Finance Watch paper asserts that commodity index traders make commodity futures markets less useful for hedging, Irwin and Sanders (2010) argue the opposite:

“[T]ighter position limits on speculation in commodity futures markets combined with the removal of hedge exemptions could force commodity index funds into cash markets, where truly chaotic results could follow. The net result is that moves to tighten regulations on index funds are likely to make commodity futures markets less efficient mechanisms for transferring risk from parties who don’t want to bear it to those that do, creating added costs that ultimately are passed back to producers in the form of lower prices and to consumers as higher prices.” (p. 3)

7. Discomfort with Finance Watch’s Citation of a Dynamic Model that can Nearly Perfectly Explain Recent Grain Price Spikes

Regarding the Finance Watch paper’s citation of a dynamic model, whose results agree with the recent evolution of grain prices, there are four concerns with this work. One concern is the near perfection of the model’s results. Professional investors are taught to be sceptical about...
II. Finance Watch’s Commodity Narrative Can be Questioned

an investment track record in which the results look perfect in a back-test. Further, Professor Scott Irwin has stated in McDonald (2011), regarding this kind of research:

"I was taught in my first econometrics course ... to be very ... sceptical of any model that nearly perfectly fits the data."

The second concern is that the study cited by Finance Watch does not directly use standard statistical tests. A statistically trained practitioner would thereby be uncomfortable with relying on its results over studies that do use standard statistical tests.

The third concern is that the modellers decide upon a highly stylized definition of a speculator when simulating this participant’s behaviour. This decision does not take into consideration the heterogeneous collection of price-risk specialists that actually make up non-commercial market participation. Given that the modellers’ characterization of speculators is based on mechanically defined behaviours rather than on whether a participant has a commercial interest in agriculture (or not), one wonders whether some actual commercial market participants would be swept into the modellers’ hypothetical "speculator" category. In other words, the modellers’ behavioural definitions of speculators may accurately capture some (but not all) speculative behaviour, but perhaps at least one of their mechanical definitions also captures some aspects of commercial-market-participant behaviour as well.

Finally, it is unfortunate that the model-builders did not explicitly take into consideration the “economics of storage behaviour” in their work. This is a field of study that has a rich history and is well documented in Wright (2011a). In other words, it is not clear that their model includes that grain prices would be expected to be highly sensitive to any incidental factor (like the “the weight of the mouse,” using Wright’s metaphor) when the global provision of calories becomes stretched, as has occurred because of the large-scale diversion of food-to-fuel. But perhaps these researchers will successfully address this criticism in future work.

Now to be fair to the researchers who created the cited dynamic model, one needs to see over time how the model performs out-of-sample. The Finance Watch paper states that the cited model did work out-of-sample for 10 months. The reason a market practitioner has a natural scepticism to well-fit models is as follows. Many experienced traders have experienced how ephemeral market strategies are, or at least, how all strategies have life-cycles: "Just when you think you found the key to the market, they change the locks," declared the late Gerald Loeb, who was a highly successful financier and founding partner of E.F. Hutton, as quoted in Cashin (2008).

8. There is Indeed an Increase in the Co-Movements Between Commodity Prices and Financial Asset Prices, But What is the Implication for “Social Welfare”?

This is the question posed by Fattouh et al. (2012). These researchers note that in the case of oil:

"[G]reater financial market integration may reduce the market price of risk and increase the level of inventories by reducing the cost of hedging. While this mechanism induces an increase in the spot price, the higher level of inventories reduces the chances of future price hikes." (p. 8.)
Fattouh et al. (2012) continue:

“[E]vidence of increased comovement 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 comovement ...” (p. 8.)

The Finance Watch paper specifically cites evidence that since 2008, commodity markets have become more highly correlated to U.S. equities at high frequencies (such as at 5-minute frequencies.) Other authors have noted analogous results at longer frequencies. For example, Kawamoto et al. (2011) note 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." (p. 4)

Figure 8 graphically illustrates this particular increased correlation.

Market practitioners are well aware of the increase in correlations across all asset classes, including commodities, since the onset of the Global Financial Crisis. In April 2012, researchers from HSBC explained in Williams et al. (2012) 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 ... Synchronised markets provide little diversification ...” (p. 1)

HSBC refers to this new market behaviour as "Risk On – Risk Off (RORO)."

RORO may be a “consequence of a new systemic risk factor.”:

“We have seen global intervention, QE [Quantitative Easing] and policy response of an unprecedented scale across many countries – and markets are pricing in the bimodal nature of their consequences. Ultimately, either policy response works and there is indeed a global recovery, or they fail and the sovereign debt issues across the developed world lead to new and even more serious [financial] crises.
Individual assets [including commodities], while still influenced by their fundamentals, are dominated by the changing likelihood of such a recovery. Disparate markets now have an ascendant common price component and correlations surge whenever an unsettling event increases the degree of uncertainty.” (p. 4)

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 VIX is an index of equity option implied volatilities, calculated by the Chicago Board Options Exchange, and is frequently seen as an “investor fear gauge.”

The researchers state that:

“Our analysis shows that while the positions of CIIs [Commodity Index Traders] and hedge funds complement the hedging needs of commercial hedgers in normal times, their own financial distress rendered them liquidity consumers rather than providers during the financial crisis.” (p. 6)

Cheng et al. (2012) also show how sensitive the returns of all individual commodities have become to changes in the VIX; please see Appendix B for a summary of these quantitative results.

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.” (p. 43) [Italics added.]

In debating the significance of the “higher risk of spillovers,” one could also note, as the Deputy Governor of the Bank of Canada did, that “similar, if not larger, [price] spikes were witnessed during the Great Depression and the tumultuous 1970s and 1980s,” according to Hickley (2011).

The post-2008 risk environment may predominate for at least a decade. Ward (2012) quotes Ray Dalio of Bridgewater Associates as explaining:

“Deleveragings go on for about 15 years. The process of raising debt relative to incomes goes on for 30 or 40 years, typically. There’s a last big surge, which we had in the two years from 2005 to 2007 and from 1927 to 1929, and in Japan from 1988 to 1990, when the pace becomes manic. That’s the classic bubble. And then it takes about 15 years to adjust.”

What this means for commodity market participants, whether they are hedgers or speculators, is that results such as those in the Cheng et al. (2012) study will have to be considered in managing commodity risk. This is similar to the advice provided by HSBC in advising asset managers to rethink portfolio construction in an era of assets losing their “individual identities.”

Regarding the Cheng et al. (2012) study, one should add that it is not a new phenomenon for commercial market participants to have to step in when risk-bearing-specialists become in distress. As discussed in Till (2008a), the hedge fund, Amaranth, took
on price risk from physical natural gas participants, who, in turn, had wanted to hedge their forward production. When the hedge fund became in distress in 2006, it is likely that these commercial hedgers were then the ultimate risk takers on the other side of Amaranth’s distressed trades, and so benefited from the temporary dislocations that ensued from the fund’s collapse. In other words, it does not appear that the commercial natural-gas industry was damaged by the crisis caused by Amaranth; in fact, commercial-market participants likely benefited. Natural gas commercial hedgers would have earned substantial profits had they elected to realize their hedging windfall during the three months that followed the Amaranth debacle.

That said, what is new about the current risk environment is that a price-risk-bearing specialist may not be able to assume diversification across individual commodities (and other financial instruments) when using portfolio theory to manage commodity risk. As a result, this type of risk specialist must reduce leverage in this activity. Assuming this conclusion is embraced in a widespread manner, the “higher risk of spillovers” resulting from the “financialisation of commodities” may lessen.

II. Finance Watch’s Commodity Narrative Can be Questioned
A. Current European Commission Proposals

In October 2011, the European Commission summarized the proposed “new rules for more efficient, resilient, and transparent financial markets in Europe” in a press release. The press release called for “reinforced supervisory powers and a stricter framework for commodity derivatives markets.”

Specifically, the Commission noted that:

“The proposals will reinforce the role and powers of regulators. In coordination with the European Securities and Markets Authority (ESMA) and under defined circumstances, supervisors will be able to ban specific products, services, or practices in case of threats to investor protection, financial stability or the orderly functioning of markets.

The proposals foresee stronger supervision of commodity derivatives markets. It introduces a position reporting obligation by category of trader. This will help regulators and market participants to better assess the role of speculation in these markets. In addition, the Commission proposes to empower financial regulators to monitor and intervene at any stage in trading activity in commodity derivatives, including in the shape of position limits if there are concerns about disorderly markets.”

B. Finance Watch’s Proposals

The Finance Watch paper’s proposals are as follows:

1. Implement a European consolidated regulatory position reporting system, including positions from OTC [Over-the-Counter] and regulated trading of commodities and commodity derivatives.

2. Define hedging positions – objectively reducing risk[,] directly relating to commercial activities – as opposed to speculative positions.

3. Define and implement ex-ante individual limits on speculative positions on commodity derivatives markets (resulting from a transaction executed OTC or on a regulated venue), as a percentage of the total market – e.g. 2.5%, as a means to have at least 40 market participants, limiting the risk of market abuse.

4. Define and implement ex-ante market limits on speculative positions on commodity derivatives markets (resulting from a transaction executed OTC or on a regulated venue), as a percentage of the total market – e.g. 30%, as a means to protect the hedging function and the quality of the price formation mechanism of these markets from the detrimental effect of excessive speculation.

5. Position management arrangements have failed to prevent market abuse and do not have the purpose of limiting speculation. They are thus an inadequate alternative to position limits. However, used alongside position limits, they may provide regulators with an additional tool with which to oversee the markets.

6. Prohibit all financial products offering commodity index replication.”

C. Response to Finance Watch’s Proposals

1. The Real Problem

Before discussing Finance Watch’s proposals, one must first assert that attention to the grave problem of food insecurity is fully justified on Finance Watch’s part. Figure 9 provides one way of understanding
the lessons from Continental Europe’s experience with revolution in 1848: arguably food insecurity played a role in whether a country became destabilized or not. Figure 9 cleverly overlays the Middle Eastern and North African experience of last year with the European experience of 1848.

Each country and region has its own “hard-won lessons of historical experience.” Fischer (1996) noted that:

“Most historians in the United States are familiar only with one great [price] wave, the price-revolution of the sixteenth century. Its successor, the inflation of the eighteenth century, has been much discussed by French scholars in relation to the [French] revolution in 1789, but it is little known in America or Britain where its effects were less dramatic.” (p. 6) [Italics added.]

Therefore, in Till (2011) we noted that it was fitting that food security and food price volatility would be a topic that France, in its role as G20 president in 2011, would bring forth as an urgent agenda item, given its “hard-won lessons of historical experience.”

2. A Placebo
The main problem with the Finance Watch proposals on restricting speculative participation is that its solutions may actually be placebos.

In a different context, former US 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."

According to Lynch (2010), a US 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 a change 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. Agriculture
One should acknowledge that some US agricultural futures markets currently do

Figure 9: Bread Prices, 1848 and 2011

Source: Figure is based on Mason (2011), whom in turn excerpted the graph from Baring Asset Management (2011).
operate under a position-limit regime defined by the CFTC, so one does have to be careful in arguing that position limits are necessarily a particularly onerous constraint on market participants.

b. Oil
Consistent with Dunn’s view, IEA (2008a) warned, “Blaming speculation is an easy solution[,] which avoids taking the necessary steps to improve the supply-side access and investment or to implement measures to improve energy efficiency.”

3. Decrease in the Ability to Use Commodity Markets for Hedging Purposes
The public interest group calls for individual commodity position limits to be restricted to 2.5% of the market.

In contrast, the limits issued by the US CFTC in October 2011 are broader. These limits are expected to be in place later this year although there is a court challenge underway to potentially block these limits.

Specifically, CFTC (2011) advises that the limits will be as follows. “Spot-month position limits will be set generally at 25% of estimated deliverable supply. … Non-spot-month position limits … will be set using the 10/2.5 percent formula: 10 percent of the contract’s first 25,000 [contracts] of open interest and 2.5 percent thereafter.”

Summarizing from Young et al. (2012), one should note the following about the CFTC’s October 2011 position limit rules:

a. The CFTC did not “make a finding that its adopted position limits … [were] necessary.”

b. The “CFTC has not argued that position limits will be effective in lowering commodity prices.”

c. The “CFTC contends that it is imposing position limits because ‘Congress did not give it a choice.’”

d. The CFTC did “not provide empirical evidence to demonstrate that the position limits it is imposing are appropriate.”

e. A dissenting CFTC Commissioner stated that “whatever limits the Commission sets … [should be] supported by empirical evidence demonstrating those [limits] would diminish, eliminate, or prevent excessive speculation.”

f. The dissenting commissioner also stated that “without empirical data, we cannot assure Congress that the limits we set will not adversely affect the liquidity and price discovery functions of affected markets.” (pp. 2-4)

Perhaps this summary of the US experience would be useful to EU policymakers in understanding that the imposition of new position limits in the US was not based on empirical evidence, “demonstrating … excessive speculation” in the US futures markets.

Where the Finance Watch proposals do differ from the US experience is in the public interest group’s call for an aggressive limitation on overall speculation. As discussed earlier, this reflects a lack of understanding of how futures markets actually work. The extensive body of research by Holbrook Working is an indispensable resource for any aspiring student of the commodity futures markets.

A 2010 policy brief from the Food and Agriculture Organization (FAO) 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."

The FAO policy brief also reinforces the importance of appropriate regulatory measures, including “increasing transparency and the amount of available information on futures trading.”

Interestingly, the communiqué from the June 2011 G20 agricultural meeting in Paris largely bypassed the controversy surrounding agricultural futures trading, and instead embraced market-based solutions in dealing with food price volatility, amongst its many action items.

4. Transparency of Position-Taking
One can easily endorse Finance Watch’s call for transparency in position-taking. This endorsement is the result of hard-won lessons from US history.

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

a. Constantly revisit the economic usefulness of commodity futures trading;

b. 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.

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

In Working (1970), the economist described how fragile the existence of futures trading in Chicago had been since its inception in the nineteenth century. He also described how the Grain Futures Administration4 in the 1940’s had been led by statisticians who were trained in the natural sciences and who therefore allowed the data to provide answers to important policy questions.

While the Finance Watch proposals include calls for extensive data gathering and classification, the proposals do not explicitly include a call for academically trained economists, employed by relevant European regulators, to statistically evaluate that data, as has been the tradition in the United States.

5. Classification of Market Participation
One can easily agree with the Finance Watch proposal on classifying market participation as either hedging or speculative. One caveat is that there is a wealth of literature on how difficult this task actually is. See, for example, the listing of challenges in Peck (1982).

Also, at this time, the CFTC in its Commitments of Traders report now reports participation as “commercial” or “non-commercial” rather getting caught in the difficult debate of whether an activity is literally a hedge or not.

In 2009, the CFTC made further progress in classifying market participation in finer detail through its Disaggregated Commitments of Traders (DCOT) report.

The DCOT report divides up large trader participation according to four categories:

1. “Producer/Merchant/Processor/User,”
2. “Swap Dealers,”
3. “Managed Money,” and
4. “Other Reportables.”

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4 The Grain Futures Administration (1922 to 1936) and the Grain Futures Commission (1922 to 1936) preceded the Commodity Exchange Administration (1936 to 1942), Commodity Exchange Authority (1947-1974), and the Commodity Exchange Commission (1936 to 1974). The Commodity Exchange Commission and the Commodity Exchange Authority merged in 1974 to form the present Commodity Futures Trading Commission.
Both Till (2009) and Alquist and Gervais (2011), for example, used this (relatively) new dataset to examine whether speculation had been excessive (or not) in the US oil futures markets.

6. Commodity Index Products
The Finance Watch report calls for the banning of commodity index products. One would think this would be an unfortunate precedent without solid evidence of these products being a “detriment to society.”

7. Final Note: “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 assists in 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 article.

Before performing surgery on these institutions, Finance Watch’s supporters may want to tread carefully and not adopt “speculative” regulatory proposals whose ultimate effects are unknown. Perhaps the European Union could study market practices globally and adopt what is demonstrably best practice rather than invent new untested regulations.
Finance Watch’s concern with food and oil price spikes is fully justified. One can be concerned, though, that Finance Watch’s proposals in restricting speculation fall somewhere in the continuum of being a placebo to actually being harmful to the goals to which they aspire. One would hope that future authors for Finance Watch would conduct careful research on the economic theory and practice of commodity futures markets. They would then understand why a large body of academics and practitioners desire to protect these vital institutions.
Appendices

Appendix A
Simplified Example of Calculating Working’s Speculative T-Index

Sanders et al. (2008) define the Working T index as follows:

\[ T = 1 + \frac{SS}{HL + HS} \] if \( HS \geq HL \)

or

\[ T = 1 + \frac{SL}{HL + HS} \] if \( HL > HS \)

where open interest held by speculators (non-commercials) and hedgers (commercials) is denoted as follows:

\- SS = Speculation, Short
\- HL = Hedging, Long
\- SL = Speculation, Long
\- HS = Hedging, Short

“[C]onsider the intuitive case where HL = 0; then, \( T = \frac{SL}{HS} = 1 + \frac{SS}{HS} \). If long speculation (SL) just equals short hedging (HS), then T equals its minimum value of 1.00, where the level of speculation is just sufficient to offset hedging needs. Now consider if HL = 0, HS = 100, SL = 110, and SS = 10, then T equals 1.10, or there is 10% speculation in excess of that which is necessary to meet short hedging needs.” (p. 11)
Appendix B

After the 2008 Lehman Crisis, Changes in the VIX Consistently Had a "Strong Effect" on Individual Commodity Markets

"Commodity Returns and the VIX"

"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 [Baltic Dry Index, a measure of international shipping rates], 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 (1987) construction for standard errors with four lags. */**/*** denotes significant at the 10%, 5%, and 1% levels, respectively."

Coefficient on Contemporaneous Change in VIX

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Post-Crisis</th>
<th>Pre-Crisis</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>15Sep2008- 01Jun2011</td>
<td>01Jan2010- 01Jun2011</td>
</tr>
<tr>
<td></td>
<td>T = 142 Weeks</td>
<td>T = 74 Weeks</td>
</tr>
<tr>
<td></td>
<td>01Jan2006- 15Sep2008</td>
<td>01Jan2006- 01Jan2007</td>
</tr>
<tr>
<td></td>
<td>T = 262 Weeks</td>
<td>T = 262 Weeks</td>
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<tr>
<td>Grains</td>
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<tr>
<td>Chi W</td>
<td>-0.6174 [ -6.8105]***</td>
<td>-0.9345 [ -3.8257]***</td>
</tr>
<tr>
<td>Corn</td>
<td>-0.4551 [ -4.8204]***</td>
<td>-0.7121 [ -4.8204]***</td>
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<tr>
<td>KC W</td>
<td>-0.5688 [ -3.9568]***</td>
<td>-0.8676 [ -3.9568]***</td>
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<tr>
<td>Soybeans</td>
<td>-0.3718 [ -4.3953]***</td>
<td>-0.4896 [ -4.3953]***</td>
</tr>
<tr>
<td>Soyb Oil</td>
<td>-0.4115 [ -4.9881]***</td>
<td>-0.4951 [ -4.9881]***</td>
</tr>
<tr>
<td>Livestock</td>
<td></td>
<td></td>
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<tr>
<td>F Cattle</td>
<td>-0.2252 [ -3.9118]***</td>
<td>0.0065 [0.1067]</td>
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<tr>
<td>L Hogs</td>
<td>-0.0919 [ -1.1710]</td>
<td>-0.3613 [ -2.3938]**</td>
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<tr>
<td>L Cattle</td>
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<td>Cocoa</td>
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<tr>
<td>Oil</td>
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<td>-0.0917 [ -0.7926]</td>
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<tr>
<td>Silver</td>
<td>-0.332 [ -2.3913]**</td>
<td>-0.431 [ -1.5223]</td>
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</table>

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

The VIX is calculated by the Chicago Board Options Exchange (CBOE) as an index of implied volatilities of options traded on the S&P 500 equity index. According to Bloomberg, "The Chicago Board Options Exchange Volatility Index reflects a market estimate of future volatility, based on the weighted average of the implied volatilities for a wide range of strikes. 1st and 2nd month expirations are used until 8 days from expiration, then the 2nd and 3rd are used." The CBOE’s VIX is frequently thought of as an "investor fear gauge."


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