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Intersections

We met in 1993 at the University of Illinois, where one of us (Scott) was on a sabbatical leave from Ohio State and the other (Dwight) was a PhD student in agricultural economics. We had the good fortune of intersecting in several graduate classes, but two stand out. The first was a graduate seminar in the business college on the newly emerging field of behavioral finance taught by Professor Jay Ritter. The second was a graduate course on time-series econometrics taught by Professor Paul Newbold. In addition to being a brilliant 'near' Nobel-Prize-winning econometrician, Professor Newbold's mannerisms and dry British humor were seemingly pulled from a Monty Python skit. This delighted us no end, even though few others in the class seemed to appreciate the daily entertainment. I think it is safe to say that this is where our personal friendship and professional partnership began.

It was clear from the outset that both of us were fascinated by commodity futures markets, which provide both price discovery and risk management opportunities for commodity producers and consumers. These markets are central to the operation of much of the global commodity system. Naturally, being agricultural economists, our main interest was in agricultural futures markets, but we were also interested in other commodity futures markets, such as the relatively new crude oil futures market.

The next highly fortuitous intersection occurred in July 2005, when the roles were reversed, and Dwight contacted Scott about spending his sabbatical leave from Southern Illinois University back at the University of Illinois. Dwight was by then a faculty member at Southern Illinois and Scott had moved to Illinois from Ohio State in 1997. Commodity prices were just starting to take off and we thought this might be a good opportunity to dig into issues surrounding speculation in commodity futures markets. We would not be starting at ground zero because Dwight examined 'noise trader' issues in futures markets for his dissertation research and Scott had done a couple of papers on speculation and price volatility in futures. So we were fortunate to have that base to build upon.

What's the old saying, 'It's better to be lucky than good'? It was incredibly good fortune that Dwight ended up spending much of spring semester 2006 on the Champaign-Urbana campus for his sabbatical leave. Scott was advising an MS student, Robert Merrin, who was also interested in speculation issues. So an idea was born. We would jointly supervise Robert's thesis on the impact of hedging and speculative positions on agricultural futures prices. We would use the time-series statistical tests that Dwight employed in his dissertation. Who could have imagined what followed?

Commodity futures prices exploded in 2007–2008 just as we were finishing our work

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with Robert. At the same time, concerns about a new type of participant in commodity futures markets began to emerge. In particular, market participants, regulators, and civic organizations began raising concerns that inflows from new 'commodity index' funds were driving the increases in commodity prices instead of economic fundamentals. The main argument was that unprecedented buying pressure from these speculative long-only futures traders created massive bubbles that resulted in prices substantially exceeding fundamental value, as much as 80% by some accounts. If true, this would raise major questions about the efficiency of price discovery in commodity futures markets and the usefulness of the markets for managing risk. Numerous proposals were offered to restrict speculation in commodity futures markets around the globe, including the creation of a 'virtual reserve' whereby a public agency would take futures positions opposite speculators during periods of high market volatility, a tax on futures transactions, and tighter limits on speculative positions. During this period, it was not uncommon to link concerns about speculation to world hunger, food crises, and civil unrest.

The initial empirical analysis presented by those raising concerns about commodity speculation consisted of simple graphs that showed a concurrent increase in long-only index futures positions and price levels. These analyses were quite effective in catching the eye of politicians and the public. But they clearly failed to establish a rigorous statistical link between actual trader positions and futures prices.

We realized right away that the problem had to be well defined from an empirical perspective. This led us to argue for the importance of establishing a causal link strictly between futures positions and futures prices. Once the relevant empirical problem was defined, the proper commodity futures position data had to be utilized. We then used exhaustive empirical tests across numerous markets, time frames, and data sets to show that there was no consistent evidence that positions held by index investors caused large changes in commodity futures prices. Batteries of time-series and cross-sectional tests failed to find consistent temporal causality between index positions and futures prices. This body of work conclusively demonstrated that index speculation was not the main driver of the great commodity price spikes that occurred between 2007 and 2013.

While we and others have written review articles on the role of index funds in commodity futures markets, there is no single resource that provides a comprehensive and in-depth treatment of this important subject. In our own case, we have written more than two dozen articles and reports on this controversy since 2008. These publications have appeared in various journals over a more than 15-year span of time. We believe that there is value in collecting the most important of these articles in a single volume and organizing the articles in a manner that reflects how and why our work evolved as it did.

Hence, the purpose of this book is to present a curated selection of articles from our body of work on the impact of index funds on commodity futures prices. It is important to note at the outset that the selected articles do not simply represent a 'greatest hits' list based on citation totals. Instead, the selections roughly follow the chronology of our involvement in the worldwide debate about commodity speculation as it evolved after 2007. The 11 articles selected for inclusion in this volume highlight key issues that we addressed as the debate evolved. Some of the articles ended up being highly cited and some did not.

In addition to the articles in their original published form, we include new author forewords for each article that provide context and interesting backstories about the development of the research. The finished product functions as a guided tour through more than 15 years of work on index funds and the behavior of commodity futures prices.

A synopsis of each chapter in the book follows.

Chapter 2. Devil or Angel? The Role of Speculation in the Recent Commodity Price Boom (and Bust). This is the first paper that we wrote on the speculation controversy that erupted in 2007–2008. The article itself was largely a synthesis of the arguments we had been making about the role of index funds in the commodity price spike of 2007–2008 in presentations and other reports. We argued in this 2009 article that the charge of index funds creating a massive bubble simply did not stand up to close scrutiny. The charges were inconsistent

with some basic facts, such as the observation that price movements in commodity futures markets with substantial index investment were not uniformly upward in 2007–2008.

Chapter 3. New Evidence on the Impact of Index Funds in US Grain Futures Markets. We thought that the speculation controversy would die out as prices crashed in the second half of 2008. We quickly realized that we were wrong and set out to do our first econometric analysis of the relationship between index positions and price movements in grain futures markets. We obtained some interesting new data on commodity index trader (CIT) positions and showed that the big growth in index positions actually occurred before the massive grain price spike of 2007–2008. Hence, it was no surprise when our Granger causality tests did not find consistent evidence of a relationship between CIT positions and grain futures price movements.

Chapter 4. The Impact of Index and Swap Funds in Commodity Futures Markets. Not only did the commodity speculation debate fail to flame out as we expected, but it actually picked up steam heading into the early 2010s. Civic organizations such as Oxfam jumped into the speculation debate and tended to react in a fiercely negative manner. We were approached in the summer of 2009 by the Organisation for Economic Co-operation and Development (OECD) to produce a report on the controversy. When the report was published in June 2010 it started a global firestorm that spilled into the pages of major financial publications such as *The Economist*. The analysis was actually quite straightforward, but the results went against the grain of conventional wisdom in many places and organizations.

Chapter 5. Testing the Masters Hypothesis in Commodity Futures Markets. Critics of our OECD report focused on both data and methodological issues. The main data concern was the lack of accurate data on index positions in energy futures markets, particularly West Texas Intermediate (WTI) crude oil. The principal methodology issue was a supposed lack of power of Granger causality time-series tests. This 2012 paper was our response to those criticisms. It was the first to use positions from the new Commodity Futures Trading Commission (CFTC) *Index Investment Data* (IID) report and we also employed cross-sectional tests in addition to time-series statistical tests. The results were pretty much the same as before – no consistent relationship between index positions and commodity futures price movements. The article is probably most influential for having introduced the term 'Masters Hypothesis.'

Chapter 6. Financialization and Structural Change in Commodity Futures Markets. While working on the OECD report, it also became clear to us that there was a great deal of confusion about the nature of 'financialization' and the types of market impacts associated with it. In this 2012 article, we began by defining financialization as large-scale buying by financial index investors in commodity futures markets. A major complication in any analysis of the impact of financialization in commodity futures markets is that a number of historically large and important structural changes were taking place at roughly the same time as the rise of commodity index investment. For example, the switch from open outcry to electronic trading basically ran in parallel to financialization. This can make it difficult to disentangle market impacts due to financialization and other structural changes.

Chapter 7. A Reappraisal of Investing in Commodity Futures Markets. Another idea occurred to us while working on the OECD report: Did all this commodity index investment really make economic sense in the first place? A famous 2004 article by Gorton and Rouwenhorst was crucial in kick-starting the boom in commodity index investment, with its conclusion that commodity futures offered 'equity-like' returns. This ran directly counter to the evidence in classic commodity futures market studies by Telser, Rockwell, Dusak, and Hartzmark. In this 2012 article, we collected over five decades of daily futures prices and found that the return to individual futures markets was zero, consistent with the classics. This was also the first academic study to argue that 'roll yields' could not drive returns in commodity futures markets, which was considered conventional wisdom at the time. In some ways, this article was our most original and pre-dated the conclusions in other papers by nearly a decade.

Chapter 8. The 'Necessity' of New Position Limits in Agricultural Futures Markets: the Verdict from Daily Firm-level Position Data. CFTC proposals to extend speculative position limits to all futures markets for physical commodities became a focal point of the global controversy surrounding index trading in commodity futures markets. At the heart of the political and legal battle was the question of whether the CFTC had to meet the 'necessity' test before expanding position limits. Simply put, new regulations on trading had to be justified based on empirical evidence. For this 2016 article, we had access to daily data for a major private index fund and used them to bring new evidence to bear on the necessity question. The results were similar to our previous work, and we argued that the CFTC had flunked the necessity test.

Chapter 9. Bubbles, Froth and Facts: Another Look at the Masters Hypothesis in Commodity Futures Markets. This 2017 article is important for two reasons. First, it reflects the evolution of our understanding of the policy question at the heart of the controversy surrounding index funds in commodity futures markets. Second, we address the major criticisms that had appeared in the literature about the statistical methods we had used in previous studies. As a result, this article contains the most comprehensive set of time-series and cross-sectional tests of any of our published articles. We find once again that the Masters Hypothesis comes up short on its most basic market predictions.

Chapter 10. Mapping Algorithms, Agricultural Futures, and the Relationship between Commodity Investment Flows and Crude Oil Futures Prices. The 2014 study by Singleton is one of the most influential and widely cited in the financialization literature. He reports an economically large and statistically significant influence of index positions on crude oil futures prices. This truly puzzled us because it was completely at odds with virtually all of our own work. We discovered that Singleton (and others) inferred index positions in non-agricultural markets from index positions in agricultural markets. This is based on the seemingly sensible idea that there is an approximately fixed relationship among commodity index positions, reflecting the fixed nature of weights for the underlying target indexes. It turns out that Singleton's results can be directly traced to a surge of index investment in, of all things, feeder cattle futures during 2007–2008 that were not matched in crude oil futures. The implication is that Singleton's original results really are spurious.

Chapter 11. Sunshine versus Predatory Trading Effects in Commodity Futures Markets: New Evidence from Index Rebalancing. Many people do not appreciate that the failure of the Masters Hypothesis does not mean that we should end the search for price impacts of financialization in commodity futures markets. Rather, the search should focus on smaller price impacts associated with more rational market dynamics. The annual rebalancing of major commodity market indexes is tailor-made for just this type of investigation. In this article, we studied the annual rebalancing of the Standard and Poor's Goldman Sachs Commodity Index (S&P GSCI), which is by far the most widely tracked commodity index. We found that the price impact of S&P GSCI rebalancing reaches a peak of 72 basis points in the middle of the week following the rebalancing period, but the impact is temporary as it declines to near-zero within the next week. The findings showed that the impact of rebalancing order flows in commodity futures prices is modest and temporary, consistent with the prediction of sunshine trading theory.

Chapter 12. The Order Flow Cost of Index Rolling in Commodity Futures Markets. Investments that track the S&P GSCI roll positions forward from the nearby contract to the next deferred contract over a fixed 5-day window from the fifth to the ninth business day of every month. This is an especially interesting event to test theories of the market impact of financialization because the entire position of index investors in the commodity futures market must be rolled every month. We estimated that commodity index investors paid a total of $29 billion in order flow costs during monthly rolls over 1991–2019 and this was heavily concentrated in the growth period of financialization over 2004–2011. A careful examination of the yearly estimates revealed that order flow costs nosedived after 2006. This coincided almost perfectly with the transition to electronic trading in commodity futures markets. We concluded that a dramatic increase in the supply of liquidity brought on by the transition to electronic trading is primarily

responsible for the remarkable decline of roll order flow costs.

Chapter 13. Lessons Learned. The controversy over commodity index funds contains important lessons for the future. We examine those lessons in this final chapter and discuss useful directions for future research in the area.

Note that we reproduced the articles in Chapters 2–12 based on the final Word and Excel files submitted to publishers. To the extent possible, edits made in the galley proof stage for each article were also incorporated. While not necessarily exact reproductions of the original published articles, the versions included in this book are extremely close to the published versions. We also made a few minor editorial corrections that were missed in the original publication process. All articles were also reformatted to have a consistent style throughout the book.

We hope you enjoy reading this book as much as we did in putting it together.

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