Why Do Hedgers Trade So Much?

Ing-Haw Cheng and Wei Xiong

ABSTRACT

Futures positions of commercial hedgers in wheat, corn, soybeans, and cotton fluctuate much more than expected output. Hedgers' short positions are positively correlated with price changes. Together, these observations raise doubt about the common practice of categorically classifying trading by hedgers as hedging while classifying trading by speculators as speculation, as hedgers frequently change their futures positions over time for reasons unrelated to output fluctuations, which is arguably a form of speculation.

1. INTRODUCTION

Financial innovations such as derivatives not only facilitate risk sharing and price discovery, but critics argue that they also lead to reckless speculation that amplifies price volatility and hinders efficient risk sharing (Posner and Weyl 2013). This concern has led to a debate on the regulation of financial innovation and trading of financial derivatives and warrants a benefit-cost analysis of financial regulation. In this debate, as well as in other broad contexts of analyzing risk sharing and trading in financial markets, it is common to separate two groups of traders—one group of traders with established commercial interests labeled hedgers and another group of financial traders labeled speculators.

Perhaps because of this distinction, the debate heavily focuses on examining the behavior and impact of speculators, with little attention on how hedgers trade in practice. Policy prescriptions often focus on

ING-HAW CHENG is Assistant Professor of Business Administration at Dartmouth College. WEI XIONG is Professor of Economics at Princeton University. We are grateful to José Scheinkman and Glen Weyl for helpful comments. Xiong acknowledges financial support from Smith Richardson Foundation grant 2011-8691.

[*Journal of Legal Studies*, vol. 43 (June 2014)]
 0047-2530/2014/4302-0021$10.00

the behavior of the speculator group while exempting the hedger group.[1] Is this categorical treatment justified? Do hedgers trade just to hedge risk in their commercial business? Or might there be other factors driving their trading? In this paper, we systematically examine how hedgers trade in the futures markets of a set of agricultural commodities: wheat, corn, soybeans, and cotton.

Commodity futures markets offer a nice setting to examine the distinction between hedgers and speculators. Futures contracts on agricultural commodities were early financial innovations that have a long history of serving farmers and commodity producers to hedge the commodity price risk they face. The long-standing hedging pressure theory of Keynes (1923) emphasizes the imbalance between the need of commodity producers to short sell commodity futures contracts and the lack of interest from speculators to take the long side as a key determinant of commodity futures prices. Through the financialization of commodity futures markets in the last decade, commodity futures became a popular asset class for portfolio investors and have attracted large inflows of investment capital in the magnitude of hundreds of billions of dollars to the long side. The large capital inflows have led to a heated debate on the role of speculation in commodity futures markets, a debate particularly concerned with financial traders destabilizing commodity prices (see Cheng and Xiong [forthcoming] for a review). While this debate focuses on financial traders, more attention on how hedgers trade is also warranted.

The U.S. Commodity Futures Trading Commission (CFTC) publishes data on the aggregate position levels in its Commitments of Traders (COT) reports. By regulation, clearinghouses of commodity futures markets report the end-of-day positions of traders with positions larger than certain reporting thresholds to the CFTC, which classifies each reportable trader into several categories and reports aggregated weekly positions at the group level to the public. Individual traders are distinguished by whether they have commercial interests in each commodity (CFTC 2013). For the bulk of our analysis, we focus on the behavior of producer/merchant/processor/user positions reported in the CFTC's Disaggregated COT (DCOT) report and consider how these commercial hedgers trade.

1. For example, the Commodity Futures Trading Commission (CFTC) has considered position limits in futures markets, from which so-called bona fide hedgers may obtain exemptions.

Our analysis examines whether commercial hedgers' trading patterns are consistent with a simple benchmark notion of hedging in which risk-averse commercial hedgers take short positions in futures to mitigate their endowed commodity price and output risk. We proceed in two steps.

First, we compare the intensity of hedgers' trading with the uncertainty in the aggregate output of each commodity. Intuitively, in the absence of output uncertainty, a fixed hedging position equal to the size of the output would perfectly hedge the price risk faced by hedgers. In the presence of output uncertainty, Rolfo (1980) and Hirshleifer (1991) develop theoretical models to show that hedgers tend to underhedge as output is negatively correlated with price and that their hedging positions fluctuate with expected output. Our empirical analysis shows that although hedgers' futures positions are much smaller than output, the volatility of their positions is much higher than the output volatility measured by either the year-to-year output fluctuation or month-to-month fluctuation of professional output forecasts. Furthermore, although output uncertainty declines over the harvest season, hedgers' trading volatility remains stable throughout the year.

In the second step of our analysis, we examine what else might explain the volatility of hedgers' futures positions. We find that hedgers respond strongly to changes in price. They short more futures contracts when the futures price rises and reduce their short position as the futures price falls.[3] It is difficult to reconcile such trading behavior as purely that of hedging strategies of risk-averse hedgers seeking to hedge price and output uncertainty. For example, if prices rise in response to a demand shock, all else equal, there is no change in the quantity of expected output, yet our data suggest that hedgers' short positions increase in response to the increase in price.

Taken together, the high intensity of hedgers' trading and the sensitivity of their futures positions to prices are difficult to reconcile with the view that hedgers predominantly trade to mitigate cash flow volatility by reducing exposures. Our evidence suggests that, while the overall short positions of hedgers in commodity futures markets do offset commodity price risk, hedgers frequently change their positions over time for reasons unrelated to output fluctuations. Although more elaborate

3. In a related paper, Kang, Rouwenhorst, and Tang (2013) discuss how hedgers trade frequently and in a contrarian fashion and find that they provide liquidity to speculators. Our paper explicitly relates hedgers' trading to output forecasts.

models of hedging may explain a portion of this behavior (Rampini, Sufi, and Viswanathan 2014), an interesting question for these models is whether they can also simultaneously generate the significant trading we observe in the data.

Overall, the distinction between hedgers and speculators based on whether they have commercial interests or are financial traders is less informative than previously thought for benefit-cost analyses of financial regulation. Commercial hedgers appear to engage in both production as well as complex trading activities traditionally viewed as the province of financial firms with specialized trading operations. Both types of traders may be engaged in trades that contribute to price discovery or perhaps to notions of reckless speculation. The key challenge lies in distinguishing the motive behind trades.

The paper is organized as follows. Section 2 provides some institutional background and describes the data used in our analysis. Section 3 compares the volatility of hedgers' position changes with the uncertainty in aggregate commodity output. Section 4 examines the responses of hedgers' futures positions to price changes. We conclude in Section 5 with a discussion.

2. BACKGROUND AND DATA ON TRADERS' POSITIONS

Centralized futures markets for agricultural commodities are some of the earliest markets for derivatives in the United States, dating back to the mid-1800s and the formation of the Chicago Board of Trade. The futures markets for wheat, corn, soybeans, and cotton (the sample in our analysis) continue to thrive, with total open interest averaging $79 billion in 2010.

Data on positions in these futures markets are collected and published by the CFTC. Every day, traders' positions in excess of a specified reporting threshold, which varies by commodity, are reported to the CFTC by exchange clearing members, futures commission merchants, and foreign brokers. Positions are reported at the contract level (for example, December 2001 corn). These data are aggregated by the CFTC into the COT reports and have been published weekly on Tuesdays since 2000 and at a lower but regular frequency before then. Aggregate positions in the COT account for 70–90 percent of open interest in any given market.

The COT report categorizes positions into commercial and noncommercial on the basis of trader classifications self-reported to the CFTC.

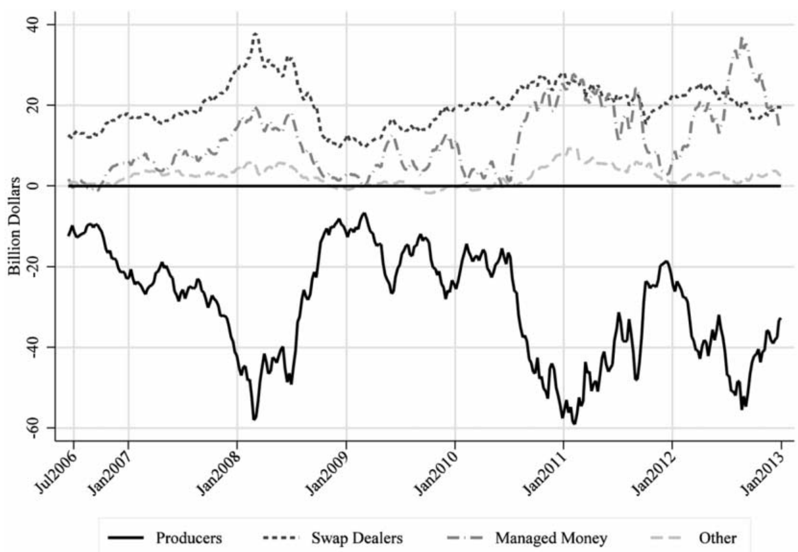

Figure 1. Aggregate notional value of net positions for wheat, corn, soybeans, and cotton

Traders who exceed the reporting threshold are required to file CFTC Form 40, which requires them to disclose information regarding the nature of their business and whether they are using futures to hedge business risk. On the basis of these forms and conversations with the trader, the CFTC decides the appropriate classification. Since 2009, the CFTC has published a DCOT report that separates positions into those of producers/merchants/processors/users, swap dealers, managed money, and other reportable traders. These data are available from 2006 by using existing 2009 classifications retroactively applied to 2006 data. The CFTC also published a Supplemental COT (SCOT) report that separates positions into those of commodity index investors, commercial traders, and noncommercial traders. Broadly, commercial (COT, SCOT) and producer/merchant/processor/user (DCOT) positions are meant to include the positions of traders who trade futures to hedge their business risk.[4]

Figure 1 plots the aggregated net (long minus short) notional position value (computed using front-month contract prices, downloaded from

4. For a discussion of other classes of trader, see Cheng, Kirilenko, and Xiong (2013). For a detailed discussion of the explanatory notes of the Disaggregated Commitment of Traders (DCOT) report, see CFTC (2013).

Bloomberg) for the different DCOT trader categories in the four sample agricultural commodities.[5] The figure shows that the net positions of producers/merchants/processors/users consistently form the short side, which suggests that producers' net short positions are much larger than users' net long positions and dominate the positions reported for the group as a whole. Swap dealers and managed money form the long side. Gross positions (open interest) have grown significantly since 2000, as have the net short positions of producers and net long positions of financial traders such as index traders and hedge funds (Cheng, Kirilenko, and Xiong 2013).

The U.S. Department of Agriculture (USDA) keeps close track of crop production in the United States and around the world. Between the 9th and 12th of every month, it publishes the World Agricultural Supply and Demand Estimates (WASDE) report, which tracks estimated production, demand, and stocks for a large number of agricultural and livestock products, including wheat, soybean, corn, and cotton. The latter three are spring-planted crops, while wheat is planted in both the winter and spring. Beginning in May, the USDA begins forecasting crop production using trend yields and estimates of intended and planted acreage.[6] In June, the USDA surveys a large representative sample of farms (in 1999, over 125,000) to gather information on planted acreage, which informs subsequent production estimates. Estimates are revised each following month on the basis of updated surveys about farmers' expected yields through the beginning and end of fall harvest, after which they are surveyed about actual yields until the end of April of the next calendar year. Estimates from the WASDE reports thus represent both the best real-time estimates of aggregate crop production in the United States for a coming or in-progress harvest and the best historical estimates of total crop production for previous harvests as well (see USDA 1999).

3. OUTPUT UNCERTAINTY AND HEDGING POSITION

A hedging strategy is often referred to as buying or selling of securities intended to offset price fluctuations of existing positions. As a farmer is naturally exposed to price fluctuations of crops in the field, a hedging

5. Front-month contract prices are available from the Bloomberg Professional service, accessed through Bloomberg-provided terminals.

6. For wheat, estimates of winter wheat are posted in May, with spring wheat added in July.

strategy entails shorting commodity futures contracts to offset any price drop at harvest time. If there is no output uncertainty, a fixed short position in commodity futures with a size equal to the output would perfectly hedge the price uncertainty faced by the farmer. In the presence of output uncertainty, the optimal hedging strategy is more subtle. Rolfo (1980) argues that output uncertainty leads producers to underhedge because output is negatively correlated with price. Indeed, by studying price and output uncertainty faced by cocoa producers in several countries, Rolfo shows that this insight helps explain the widely observed underhedging by farmers. Hirshleifer (1991) derives a theoretical model to systematically examine the optimal hedging strategy with both output and price uncertainty. It is intuitive that the optimal hedging position fluctuates with the expected output.

We first compare the volatility of positions with the uncertainty in output. We measure output uncertainty in two ways, through the year-to-year fluctuations in output and through the fluctuations in the monthly output forecasts provided by the USDA in the WASDE reports.

The aggregate output of a commodity, say wheat, is determined by the acres planted at the beginning of the season and the yield per acre. As the planting area is determined by people, the output uncertainty faced by farmers is mostly due to the yield. Figures 2–5 plot aggregate output and yield from 1960 to 2012 for wheat, corn, soybeans, and cotton. Indeed, the yield of each commodity is either the same or less volatile than the aggregate output, which indicates that part of the annual output fluctuation is due to changes in planting acreage.

Figures 6–9 plot the short positions of producers/merchants/processors/users from the DCOT as well as commercial positions from the COT in commodity futures (in output-equivalent units) in each of these four commodities together with the aggregate annual output.[8] The figures suggest that both groups' position changes are much more volatile than the annual output changes. While the DCOT data consistently show that producers/merchants/processors/users are net short, the COT data show that commercials often have near-net-zero (sometimes even long) positions, which highlights the comingling of swap dealers' and pro-

8. To convert the output-equivalent futures position, we use the size of the contract (5,000 bushels per contract for wheat, corn, and soybeans and 50,000 pounds per contract for cotton) as well as the metric conversions reported at the end of each World Agricultural Supply Demand Estimates (WASDE) report (.027216 bushels per metric ton for wheat and soybeans and .025401 bushels per metric ton for corn; cotton output is reported in millions of 480-pound bales).

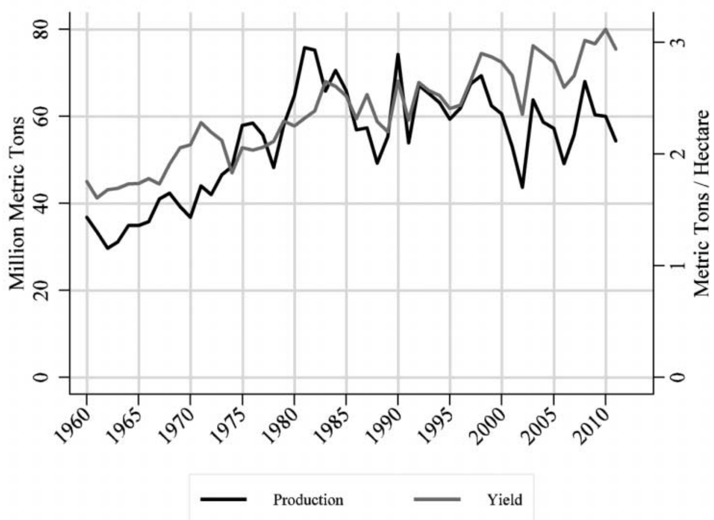

Figure 2. U.S. production and yields: wheat

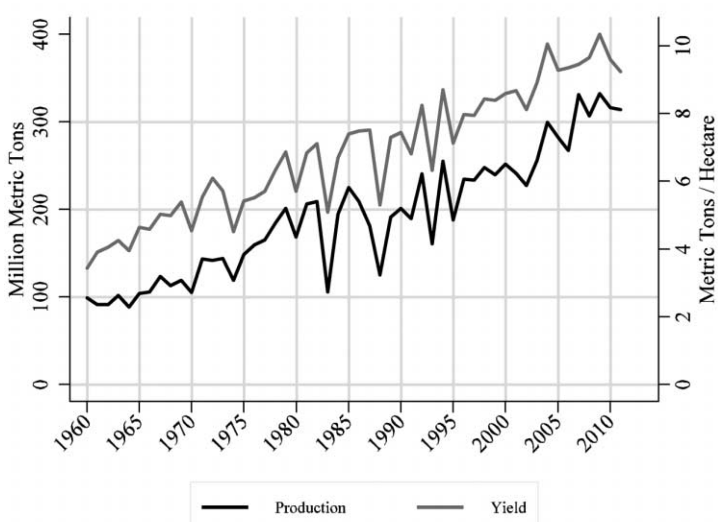

Figure 3. U.S. production and yields: corn

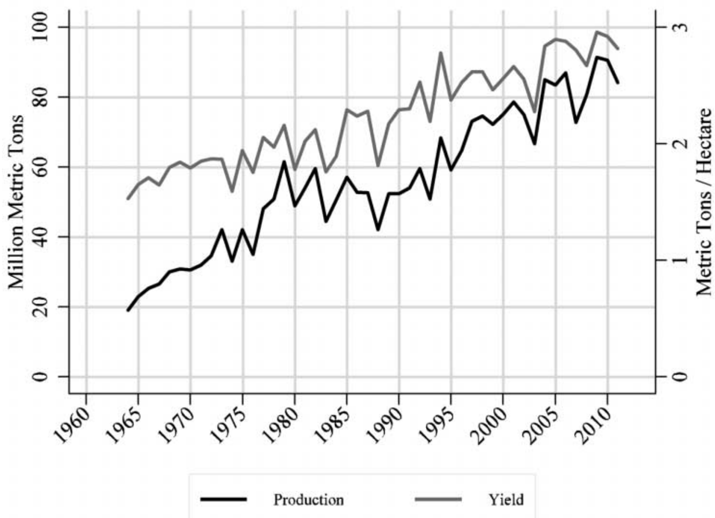

Figure 4. U.S. production and yields: soybeans

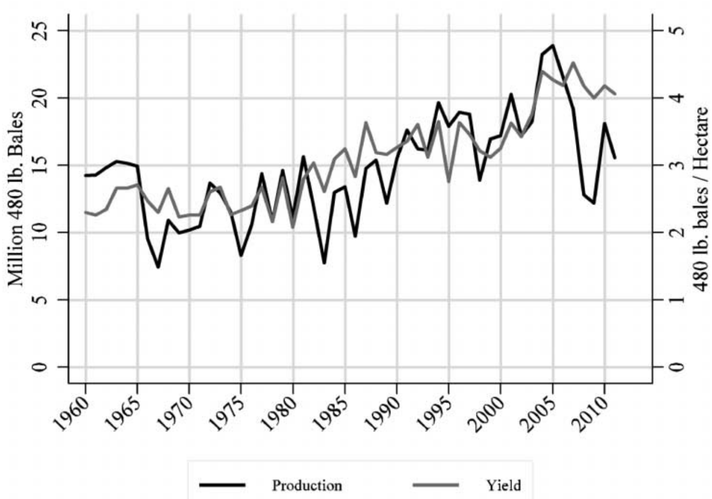

Figure 5. U.S. production and yields: cotton

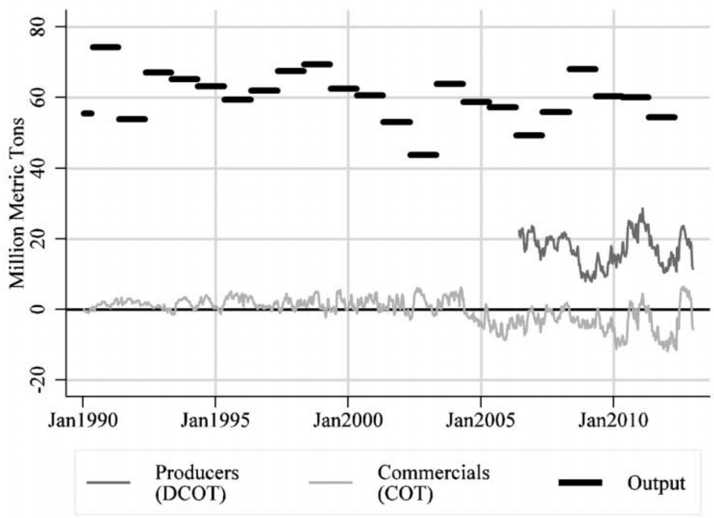

Figure 6. Commodity output and hedgers' futures positions: wheat

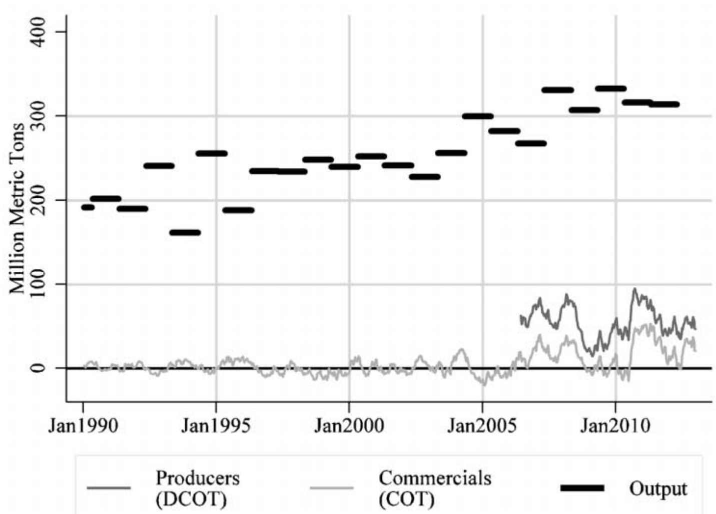

Figure 7. Commodity output and hedgers' futures positions: corn

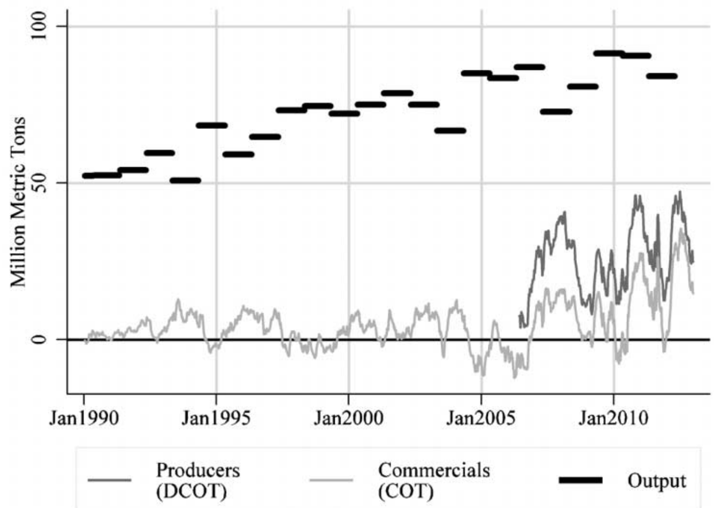

Figure 8. Commodity output and hedgers' futures positions: soybeans

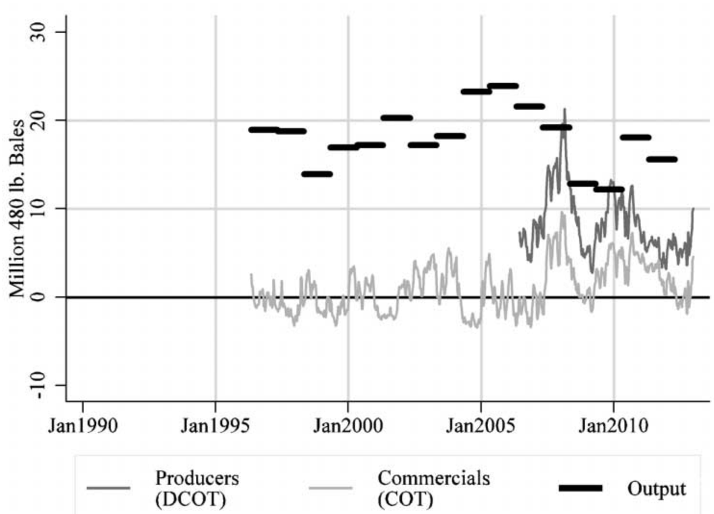

Figure 9. Commodity output and hedgers' futures positions: cotton

Table 1. Hedge Ratios, 2007–11

	Mean	SD	SD/Mean
Wheat	.28	.08	.29
Corn	.17	.04	.27
Soybeans	.32	.10	.32
Cotton	.57	.19	.34

ducers' positions that plagues the original COT report (Cheng, Kirilenko, and Xiong 2013). For the rest of the analysis, we therefore rely on the DCOT data from 2006 onward and refer to producers/merchants/processors/users as producers given their consistently net short positions.

Table 1 shows means and standard deviations of these data in terms of hedge ratios, defined as the short position of producers in commodity futures divided by expected output. Consistent with Rolfo (1980), hedge ratios are far less than 1, although this may be partially attributable to comingling of users' and producers' positions. The average hedge ratio is roughly 28 percent in wheat, 32 percent in soybeans, 17 percent in corn, and 57 percent in cotton over this period. Notably, hedge ratios fluctuated significantly over these years, as the standard deviations of hedge ratios are roughly 30 percent of the mean for the four commodities.[9]

Figure 10 formalizes this notion by displaying the volatility of annual percentage changes in producers' futures position, output, and yield for each of the commodities over the 5 years from 2007 to 2011, from the first year we can compute such changes using DCOT data through the last year in which we have finalized ex post output.[10] If producers were maintaining fixed hedge ratios, these volatilities should be equal. However, the volatility of producers' futures position ranges from .5 to .7 across the commodities, while the volatility of the actual yield changes stays in a narrow range around .07.

Next we examine patterns of changes in monthly futures positions and expected output by month of the harvest. Although the USDA begins

9. To compute average hedge ratios across harvests, we first average hedge ratios across the 52 weeks of each year and then compute averages and standard deviations of these averages over the harvests.

10. Annual changes in futures position were calculated by first computing the average 52-week percentage change in futures position across each week of a year and then computing the volatility of this average across harvest years. Flipping the order of operations and computing the 52 separate volatilities of 52-week futures changes (one for each week) and then averaging these volatilities produces even more striking results.

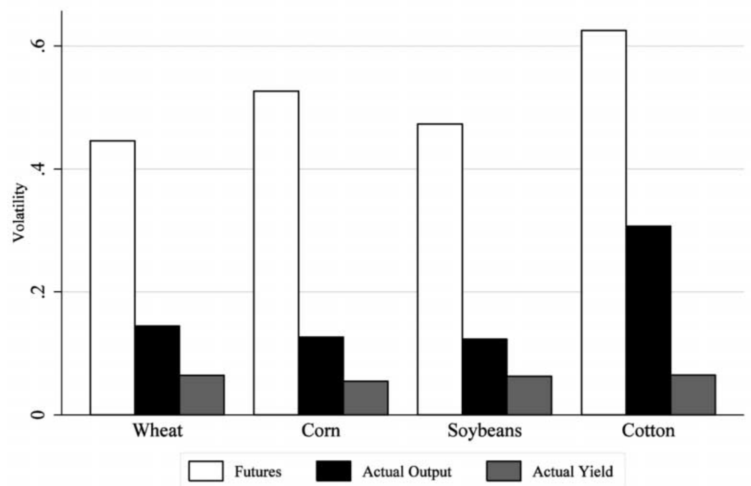

Figure 10. Volatility of annual percentage changes in hedgers' futures positions, output, and yield

issuing forecasts in May based on trends, the harvest for spring crops begins in August for wheat and cotton and September for corn and soybeans.[11] As discussed in Section 1, each month's report contains more information about aggregate supply for the year than the previous month's report. These forecasts tend to be very informative about the coming year's crops. Figure 11 plots the root-mean-squared error (RMSE) of the forecast for 20 years by month from harvest, scaled by the unconditional average of the actual harvest for each commodity. The figure shows that the uncertainty declines monotonically as the forecasts converge to the actual harvest. Even in the noisiest first forecast, the average RMSE is between 6 and 13 percent of the harvest.

Figures 12–15 plot the volatility of percentage changes in producers' futures position and the volatility of percentage changes in the monthly forecast, again by month from harvest. Two salient observations are common across commodities. First, the volatility of change in the producers' futures positions is several times larger than the volatility of the changes in forecast. Second, the volatility of change in the producers' futures positions is large throughout the year. This volatility appears to

11. Beginning-of-harvest dates can vary by region in the United States (USDA 2010), but these months are the standardized months used by the USDA in its WASDE reports to determine the so-called marketing year.

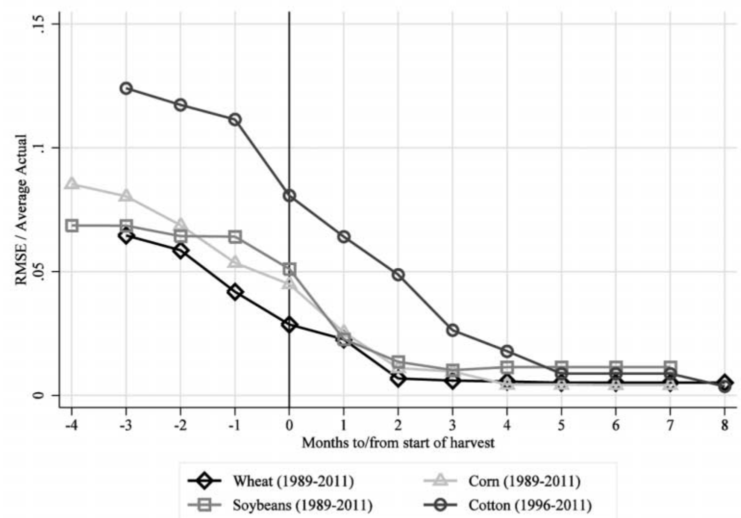

Figure 11. Uncertainty in output forecasts

increase during the planting season (the 2 months furthest from the harvest, just prior to the first issuance of forecasts for the next harvest, represented by the right-most two points on the graphs), as uncertainty presumably increases with the next planting. Nonetheless, it is high before then, even as output uncertainty is declining.

Figure 16 repeats these results using hedge ratios. Figure 16*A* shows that the average hedge ratio across harvests is remarkably stable throughout the harvest year. In contrast, Figure 16*B* shows that there can be large percentage changes in hedge ratios from month to month, as the volatility of these changes across harvests is quite high—between 10 and 50 percent.

In summary, producers' futures positions in the four commodities are several times more volatile than the output uncertainty. However, the comingling of producers' and users' positions can pose difficulties for interpreting the relative volatility of changes in positions and forecasts. This leads to our next question: what cause hedgers to trade?

4. PRICE CHANGES AND HEDGING POSITION

We next focus on analyzing the correlation between changes in producers' futures positions and prices. Figures 17–20 plots the producers'

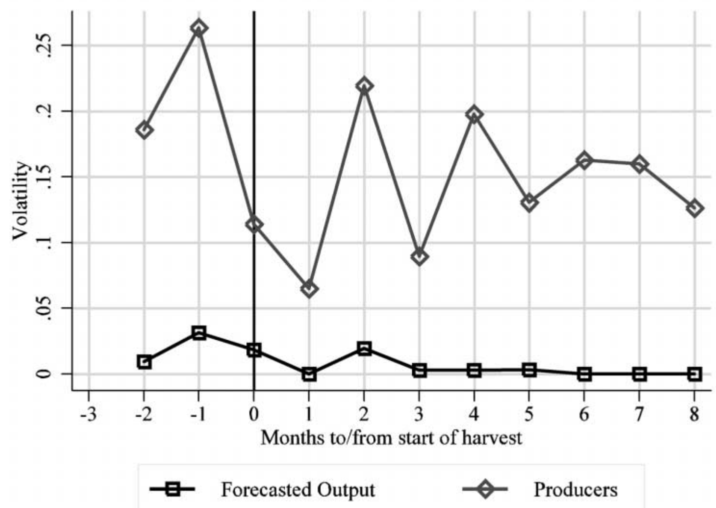

Figure 12. Volatility of hedgers' positions and output forecasts, 2006–11: wheat

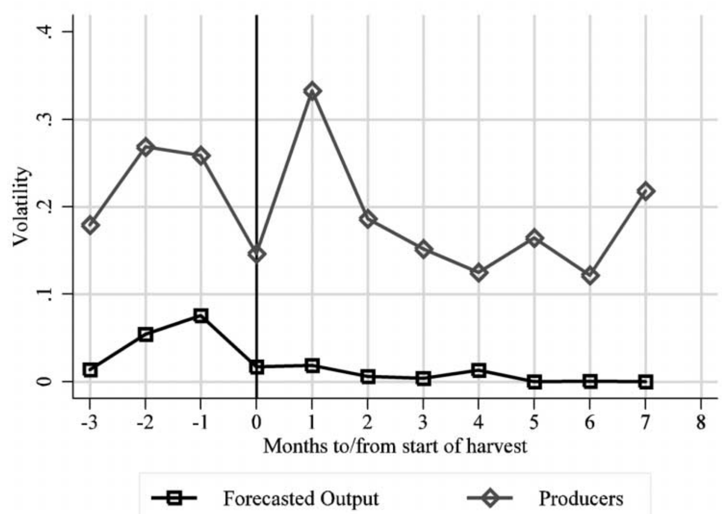

Figure 13. Volatility of hedgers' positions and output forecasts, 2006–11: corn

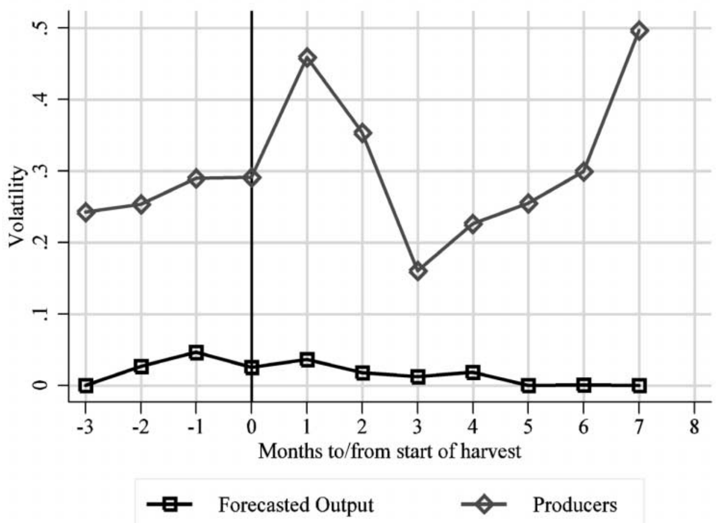

Figure 14. Volatility of hedgers' positions and output forecasts, 2006–11: soybeans

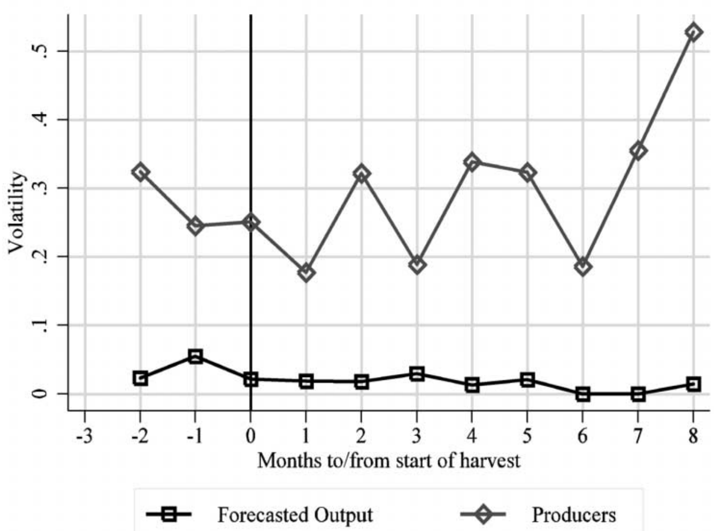

Figure 15. Volatility of hedgers' positions and output forecasts, 2006–11: cotton

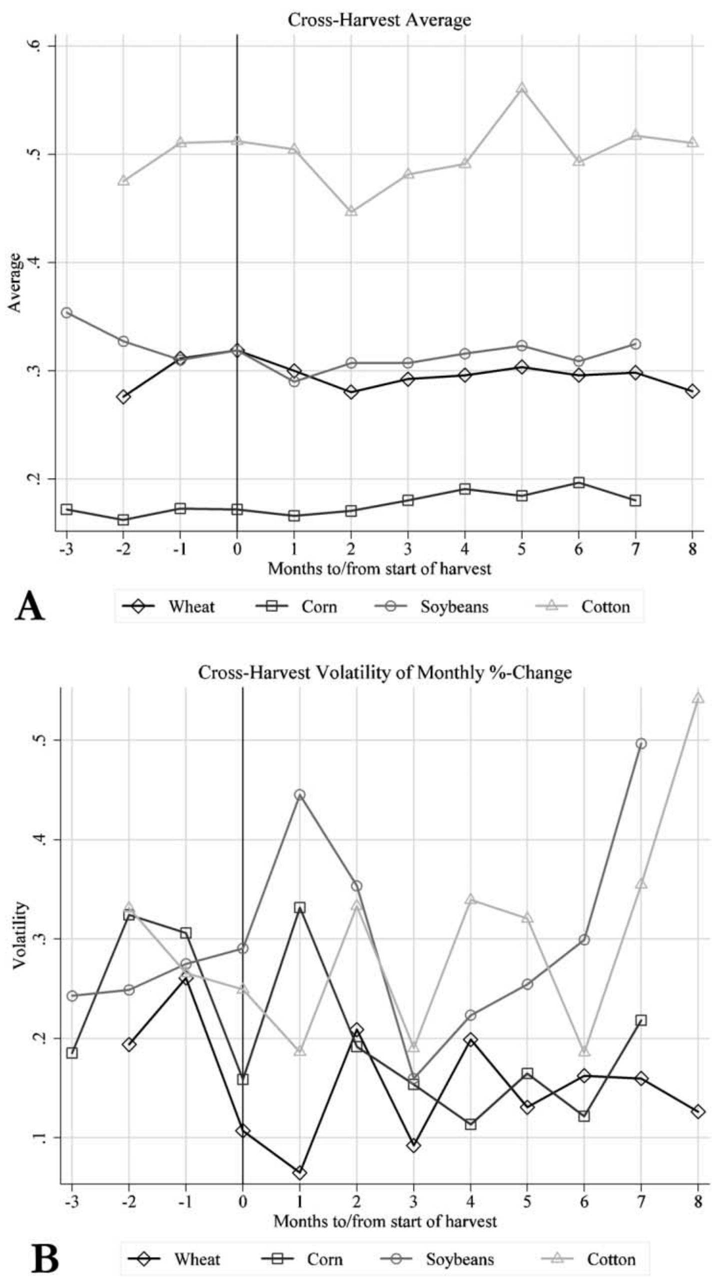

Figure 16. Hedge ratios

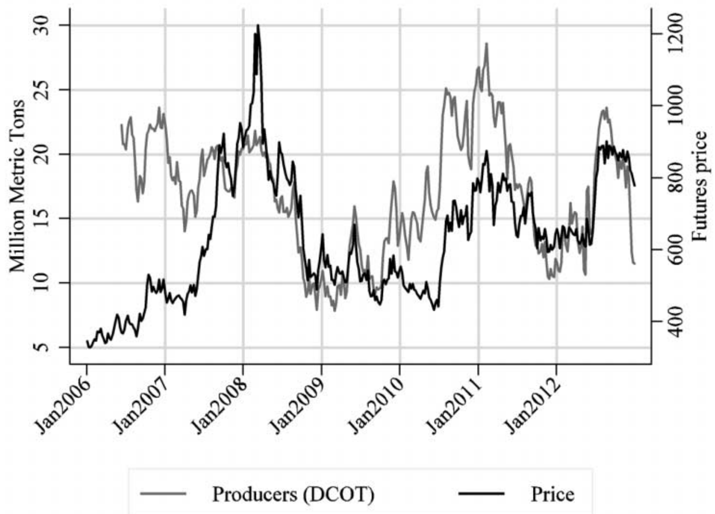

Figure 17. Hedgers' position and commodity futures prices: wheat

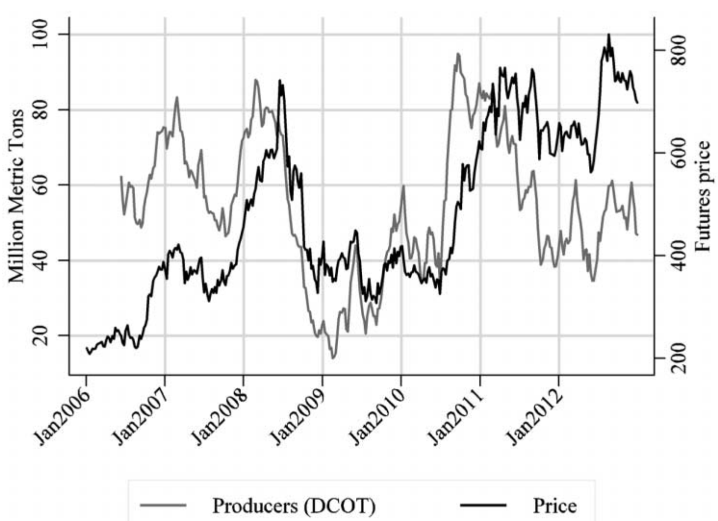

Figure 18. Hedgers' position and commodity futures prices: corn

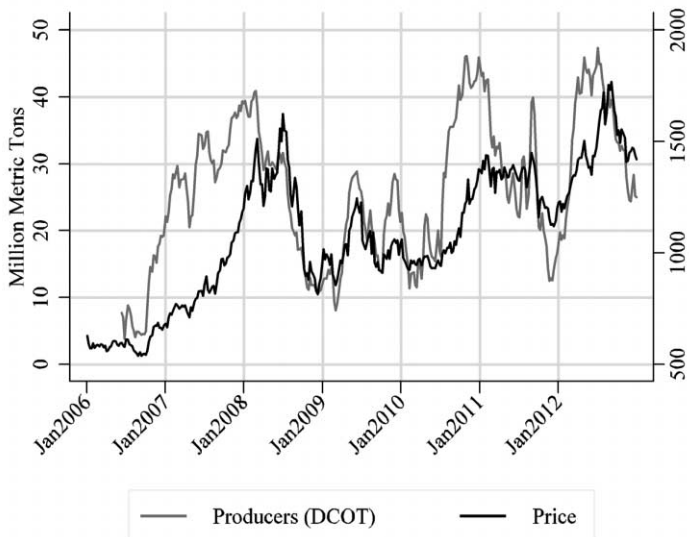

Figure 19. Hedgers' position and commodity futures prices: soybeans

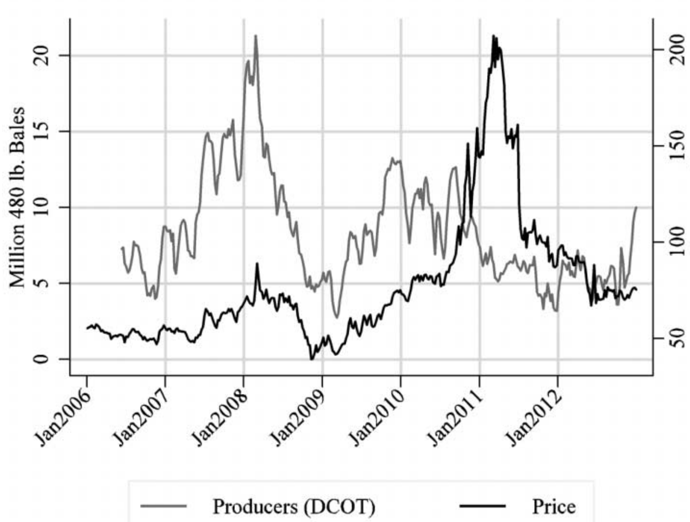

Figure 20. Hedgers' position and commodity futures prices: cotton

short position in each of the four commodity futures together with the futures price from January 2006 to December 2012. There is a salient pattern—producers' short positions move in sync with the price. That is, as the price rises, producers increase their short position, while as the price falls, they reduce their short position. Indeed, in contrast to the annual volatility of changes in output, the volatility of changes in price is on the same order of magnitude as the volatility of changes in position, as shown in Figures 2–5.

Table 2 provides results from a regression of monthly percentage changes in producers' short positions on the 12-month and 1-month percentage changes in output forecasts and the percentage change in monthly futures price. We include a turn-of-harvest effect to control for how output forecasts roll over to the next harvest in May and fully interact this effect with the main effects of interest. We use the Newey and West (1987) construction of the covariance matrix in computing our standard errors to allow for serial correlation. Coefficients are reported as standard deviations of percentage changes in positions per 1 standard deviation of the right-hand-side variable.

From Table 2, we observe that, first, there is little consistent correlation between the monthly change of producers' short positions and the 12-month or 1-month change in forecasted output. Second, the monthly change in position is positively and significantly correlated with the monthly change in futures price across all commodities. Third, the bulk of the variation in change in position is explained by changes in price, as adding the price change term to the forecast output terms increases the R^2-value for each commodity significantly (ninefold for wheat, threefold for corn, 20-fold for soybeans, and 10-fold for cotton).

Can we explain the positive correlation between producers' change in short positions and price changes on the basis of a pure hedging strategy? It is difficult to reconcile such trading behavior purely on the basis of hedging strategies of risk-averse producers seeking to hedge price and output uncertainty. To fix intuition, consider a representative producer who faces uncertainty in both price and output. Consider an increase in the price, which may arise because of a negative aggregate supply shock or positive aggregate demand shock. In the former case, all else equal, less output needs to be hedged, yet our data suggest that hedgers increase their short positions in response to a higher price. In the latter case, all else equal, there is no change in the quantity of expected output, yet our data suggest that producers' short positions increase with the price increase.

Table 2. Hedgers' Futures Position Changes and Futures Price Changes

	Wheat			Corn			Soybeans			Cotton		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
12-Month % change in output forecast	.014		−.022	.156		.015	.009		.122	−.054		−.243
	(.13)		(−.29)	(1.61)		(.20)	(.08)		(1.31)	(−.53)		(−2.05)*
1-Month % change in output forecast	.312		.262	−.502		−.011	.205		.384	−.271		−.056
	(.54)		(.78)	(−5.23)**		(−.06)	(1.22)		(3.19)**	(−1.17)		(−.26)
1-Month % change in futures price		.530	.529		.628	.632		.632	.701		.461	.549
		(4.39)**	(4.35)**		(6.49)**	(4.55)**		(5.22)**	(5.30)**		(2.53)*	(3.21)**
Constant	.005	−.055	−.066	−.005	−.049	−.052	.184	.062	.066	.114	.070	.028
	(.05)	(−.70)	(−.77)	(−.04)	(−.63)	(−.58)	(1.46)	(.70)	(.81)	(1.19)	(.84)	(.33)
R^2	.041	.370	.379	.144	.418	.423	.023	.412	.491	.019	.185	.241

Note. Values are the results of a time-series regression at the monthly frequency of the 1-month percentage change in futures position as the dependent variable on percentage changes in output forecasts and percentage changes in futures positions. A turn-of-harvest effect for the month in which output forecasts for the new harvest year are first issued is included and fully interacted with all other terms; these coefficients are omitted for brevity. Standard errors, in parentheses, are computed using the Newey and West (1987) construction of the covariance matrix with three lags. $t = 78$.

*Significant at the 5% level.

**Significant at the 1% level.

Certain aspects of different hedging models may explain away a portion of this behavior. Negative aggregate supply shocks may put producers closer to financial distress (despite higher prices) so that they need to actively increase their hedge ratio more than that implied by the natural passive increase following the negative quantity shock, as might be suggested by models of hedging such as Smith and Stulz (1985) and Froot, Scharfstein, and Stein (1993). Whether this explains the average relationship between price and hedging could be tested in principle by examining whether the price reaction of trading is related to the supply or demand component of price movements through a careful instrumental variables analysis. Notably, however, Rampini, Sufi, and Viswanathan (2014) provide evidence that airline fuel hedging decreases, rather than increases, with financial distress, as hedging requires costly collateral.

This costly collateral mechanism may induce a positive correlation between changes in position and prices. For example, producers may increase hedges in response to positive demand shocks that raise the price and thus their net worth. An interesting question for these models is whether they can simultaneously generate the high degree of trading that we observe.

5. CONCLUSION AND DISCUSSION

Overall, it is problematic to categorically classify trading by hedgers as hedging and trading by speculators as speculation. Although hedgers tend to take short positions that hedge risk in their commercial business, on the margin, they engage in significant non-output-related trading.

One possibility is that hedgers take a view on prices just as speculators do. As noted in Stulz (1996), commercial hedgers may attempt to exploit informational advantages by trading against speculators. For example, agricultural firms may have better knowledge of local physical market conditions across the country, as the opacity of physical markets may induce significant informational frictions. However, it is well known that information asymmetry alone prevents, rather than leads to, trading, as in the no-trade theorem of Milgrom and Stockey (1982). Odean (1998) and Scheinkman and Xiong (2003) show that overconfidence or a belief by each trader in an informational advantage over others helps generate excessive trading between groups of traders. In other words, heterogeneous beliefs induced by overconfidence in an informational advantage leads to excessive trading. Consistent with this notion of speculative trading, another possibility is that by hedging away some of their risk, hedgers are able to speculate more heavily on the basis of their disagreements against speculators regarding future price movements, as in Simsek (2013).[12] Finally, participants in futures markets are not producers themselves but are market makers who trade in futures markets to hedge forward contracts written with ultimate commodity producers such as farmers, although our analysis implies that these producers are themselves speculating on the price.

Any of the above possibilities raise complex questions, as market making, speculation based on heterogeneous beliefs, and active trading based on informational advantages are at odds with the canonical notion of hedging behavior. Anecdotal evidence suggests that commercial hedgers speculate on prices using their position both in spot and futures markets. Pleven (2012) relates stories of farmers speculating on rising corn prices using a combination of storage and options contracts. Agricultural firms such as Cargill exploit complex trading strategies that profit from the spread between futures and spot prices and may tilt their exposure on the basis of information about coming shortages or oversupply in certain areas (Davis 2009). Archer-Daniels-Midland Company, a large grain processor, notes in its 2012 annual report that it "uses exchange-traded futures and exchange-traded and over-the-counter options contracts as components of merchandising strategies designed to enhance margins" (Archer-Daniels-Midland Company 2012, p. 45). Although at odds with the canonical notion of hedging behavior, such trading may contribute to price discovery if it is based on genuine informational advantages or may lead to excessive price volatility if it is induced by overconfidence. Further research on this issue is required.

Our analysis offers implications for benefit-cost analysis of financial regulation in two ways. First, from a conceptual point of view, our findings suggest the need to expand the scope of the benefit-cost analysis from the usual emphasis on costs brought by reckless speculation of financial speculators to cover potential reckless speculation by market participants, including hedgers with established commercial interests. Second, our findings caution against overweighting the identity of the trader as a factor in classifying trades and instead emphasize the motive of the trade, which may be difficult to ascertain. This caution echoes

12. The presence of heterogeneous beliefs raises challenges to welfare analysis of futures market trading. See Brunnermeier, Simsek, and Xiong (2012) and Gilboa, Samuelson, and Schmeidler (2012) for recently proposed welfare criteria to analyze welfare in economic models with heterogeneous beliefs.

the concern raised by Cochrane (2013) and Duffie (2013) that policy distinctions based on trading motives may be more challenging than ever to construct.

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