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"Economic Uncertainty and Commodity Futures Volatility"

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This paper investigates the dynamics of commodity futures volatility. I derive the variance decomposition for the commodity futures basis to show how unexpected excess returns result from new information about the expected future interest rates, convenience yields, and risk premia. This motivates my empirical analysis of the volatility impact of economic and inflation regimes and commodity supply-demand shocks. Using data on major commodity futures markets and global bilateral commodity trade, I analyze the extent to which commodity volatility is related to fundamental uncertainty from increased emerging market demand and macroeconomic forecast uncertainty, while controlling for the potential impact of financial frictions introduced by changing market structure and commodity index trading. Higher concentration in emerging market importers of a commodity is associated with higher futures volatility. I find commodity futures volatility is significantly predictable using variables capturing macroeconomic uncertainty, and how this relates to the futures basis and sensitivity to consumer and producer shocks.

"Biofuels Supply Risk and Price Volatility"

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Biofuels have been evaluated based on their greenhouse gas emissions, costs, and potential scale of production. Here we propose that feedstock supply risks should be added to the list of key metrics for evaluating the performance and scalability potential of transportation biofuels. Biofuels rely on agricultural production as their primary input, which is subject to yield shocks. A risky feedstock supply in conjunction with a highly inelastic demand for transportation fuels can cause substantial fuel price fluctuations, cost volatility, and quantitative shortages if left
unmanaged, which could negatively impact biofuels firms, consumers, and society, particularly as biofuels grow to meet policy mandates. We show that the historical yields and prices of major crops used as feedstock are volatile, with a volatility roughly comparable to that of crude oil. We outline the determinants of biofuels supply risks, and discuss how the magnitude of these risks may change with production scale and technological specifications. Finally, we discuss various policy-level and firm-level strategies for reducing the supply risks of biofuels, including geographical and crop diversification. Our analysis focuses on biofuels, but the general framework could be applied to analyze the expected price volatility and scalability potential of other technologies as well.

"Effects of Index-Fund Investing on Commodity Futures Prices"

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We develop a simple model of futures arbitrage that implies that if purchases by commodity index funds influence futures prices, then the notional positions of the index investors should help predict excess returns in these contracts. We find no evidence that the positions of index traders in agricultural contracts as identified by the Commodity Futures Trading Commission can help predict returns on the near futures contracts. Although there is some support that these positions might help predict changes in oil futures prices over 2006–2009, the relation breaks down out of sample.

"Geographic Barriers to Commodity Price Integration: Evidence from US Cities and Swedish Towns, 1732–1860"
CAMA Working Paper 75/2014

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We study the role of distance and time in statistically explaining price dispersion for 14 commodities from 1732 to 1860. The prices are reported for US cities and Swedish market towns, so we can compare international and intranational dispersion. Distance and commodity-specific fixed effects explain a large share - roughly 60% - of the variability in a panel of more than 230,000 relative prices over these 128 years. There was a negative “ocean effect”: international dispersion was less than would be predicted using distance, narrowing the effective ocean by more than 3000 km. Price dispersion declined over time beginning in the 18th century. This process of convergence was broad-based, across commodities and locations (both national and international). But there was a major interruption in convergence in the late 18th and early 19th centuries, at the time of the Napoleonic Wars, stopping the process by two or three decades on average.

"Limits to Financialization of a Production Firm"

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Should commodity producers that engage in trading keep production and trading operations together or divide them into separate entities? A joint firm can substitute production with trading
when switching capacity is expensive, and use the shared balance sheet to exploit trading opportunities. However, a joint firm unable to ring-fence a profitable operation, and is vulnerable to shocks in one operation that contaminates the other. Trading to support and hedge production adds value. Trading to expand the profits of the company must be limited below a threshold. Excessive trading is characterized by its scope in the joint firm.

"Analogy Based Valuation of Commodity Options"

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Typically, three types of implied volatility smiles are seen in commodity options: the reverse skew, the smile, and the forward skew. I put forward an economic explanation for all three types of implied volatility smiles based on the idea that a commodity call option is valued in analogy with its underlying futures contract, where the underlying futures price follows geometric Brownian motion. Closed form solutions for commodity calls and puts exist in the presence of transaction costs. Analogy based jump diffusion model is also developed. The smiles are steeper with jump diffusion when compared with smiles with geometric Brownian motion.

"Energy Technology Expert Elicitations for Policy: Workshops, Modeling, and Meta-Analysis"

HKS Working Paper No. RWP14-054

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Characterizing the future performance of energy technologies can improve the development of energy policies that have net benefits under a broad set of future conditions. In particular, decisions about public investments in research, development, and demonstration (RD&D) that promote technological change can benefit from (1) an explicit consideration of the uncertainty inherent in the innovation process and (2) a systematic evaluation of the tradeoffs in investment allocations across different technologies. To shed light on these questions, over the past five years several groups in the United States and Europe have conducted expert elicitions and modeled the resulting societal benefits. In this paper, we discuss the lessons learned from the design and implementation of these initiatives in four respects. First, we discuss lessons from the development of ten energy-technology expert elicitation protocols, highlighting the challenge of matching elicitation design with a particular modeling tool. Second, we report insights from the use of expert elicitations to optimize RD&D investment portfolios. These include a discussion of the rate of decreasing marginal returns to research, the optimal level of overall investments, and the sensitivity of results to policy scenarios and selected metrics for evaluation. Third, we discuss the effect of combining online elicitation tools with in-person group discussions on the usefulness of the results. Fourth, we summarize the results of a meta-analysis of elicited data across research groups to identify the association between expert characteristics and elicitation results.