Limits to Arbitrage and Hedging: Evidence from Commodity Markets

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Contributions

- Rationalizes commodity futures and spot price pressure and risk premia induced by
  - Hedging demand of commodity-based producers
  - Capital constraints of speculators
- Commodity–credit connection is new
- Integrated model
  - Inventory management
  - Default risk and hedging demand
  - Speculation and capital constraints
- Accommodates
  - Theory of backwardation
  - Theory of storage
Why does Default Risk Increase Hedging Demand?

- At default
  - Proceeds from short futures positions go to debt holders
  - Managers lose their job anyway
- Managers rather want to keep default rates low by hedging?
  - Financing becomes more costly for default risky firms
  - Human capital more expensive for default risky firms
- Credit–futures/spot risk premium is not obvious from partial equilibrium model
- General equilibrium model (in Online Appendix) shows that supply disruptions at default may decrease futures risk premium
Why is Variance of Interest?

- Why are managers afraid of upside earnings?
  - Since they maximize the value of the firm, a downside penalty may induce much more extreme results
  - If credit risk is an issue they should rather consider VaR
  - GE model much more intuitive by modeling hedging demand through default cost

- Clearly speculators are not afraid of upside earnings
  - Paper mentions VaR constraints
  - With only one Gaussian risk factor switch to semi-variance VaR should be ok computationally

- Why do both agents trade in futures?
Why Trade in Futures (In the Model)?

- If default risk drives managers decisions, are futures optimal hedging instrument?
- Why do speculators trade futures?
- Are not put options, variance or skew swaps more suitable?
- Also empirically
  - If futures were used as default insurance a long position should be **negative on average**
  - Data shows positive excess returns. Other premia more important?
  - Table 1 shows that 81% use options and only 47% futures and forwards
Friewald, Wagner, and Zechner (2013) make connection between corporate credit risk and equity risk. The key observation is that the equity premium should be related to credit risk premia rather than implied credit risk measures. Is it the case here as well? Look at it numerically through GE model. Related: Why use EDF measure rather than CDX index?
Tradeable Implications

- If there is a connection between credit and commodity **how can I trade on it?**
- Are the data available in real time?
  - **Yes:** For example I can trade CDX and oil futures at least on daily basis
  - Model-free analysis of unconditional excess returns
- Can I trade against hedging demand induced through inventory
  - If inventories are high (low) futures price should be too low (high)
  - Cheap stat arb
- Crude oil can only be traded in USD. Is there also a connection to sovereign default risk?
Conclusions

- Very interesting topic: Commodities are becoming ever more important
- General equilibrium model explains most of empirical observations (referee wanted it in Appendix?)
- There are many interesting open questions
  - Is the connection of credit to commodity options even stronger?
  - What about portfolios of options, replicating variance or skew swaps?
  - For commodity currencies, is there a connection between sovereign default risk, the exchange rate, and commodity prices?