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 loose 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

Credit and Commodity

- 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 trough 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?