

FIN 7536: SEMINAR IN FUTURES MARKETS AND MICROSTRUCTURE

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10 am until 9:30 pm only!

Course Orientation

Your Ph.D. program is oriented toward research. This course will be oriented toward reading, understanding, and doing research. Microstructure and futures (derivative) markets are two important areas in Finance. I will also emphasize volatility issues. They should help you get a job. Articles on these topics are also easier to publish than say new theoretical models.

Purpose of course:

- 1) learn how to critically read research articles and understand them
- 2) learn how to use articles to help in research
- 3) learn how to do research

We should stick to topics and types of research that we can feasibly do and have a relative advantage with. I believe that doing empirical research in microstructure (probably within futures markets) with specialized data provides that advantage.

Grades

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|---|---|
| Masters Futures Exam (pass/fail) | 10% |
| Presentations | 35% (five presentations) |
| Includes the presentation, outline, and the difficulty of the article | |
| Class participation | 8% |
| Writeups, quizzes, reading articles, etc. | 10-15% |
| Takehome exam | 5-15% (can vary by student) |
| Research Project | 35% for A; 25% for B; 15% for C (see later) |
| OR two smaller "quick" research projects | |

Adds to 103% to 118% for an A; 93% to 108% for a B; 83% to 98% for a C
95% is an A, 90% = A-, 87% = B+, 84% = B, 80% = B-

Articles

This course will use articles to correspond to our research orientation.

Journals: we will use articles from the "big ones" such as Journal of Finance, Journal of Financial Economics, etc. Our main journal for futures articles is The Journal of Futures Markets; generally it has articles that are less difficult or involved than JF. The main journal for microstructure is The Journal of Financial Markets; it is relatively new but is well respected (perhaps except for FIU that is), but since we are emphasizing futures and futures microstructure we only take a couple of articles from there.

Writeups

By Tuesday before class I will send an e-mail if there is an article for you to summarize (you will have choices, you do not need to do every summary during the semester; do NOT do a summary for an article you are presenting.) The summary will be no more than one page, doublespaced. It will be graded for content and writing ability. Put it in your own words (you should know the rules concerning when you should use double and single quotes when using the wording from the original article).

Presentations

When you make your presentations concentrate on the following (note that everyone should have read the article already but they typically will not have the same understanding that you do):

- * What is the paper doing and what issues does it address
- * BRIEFLY discuss the theories in the article (financial concepts that the article is testing; you should not spend much if any time on the literature review)
- * What is the data used
- * What is the methodology and what do we need to know about it (are there any problems with it?)
- * What are the important results, why are they important, how do they confirm or deny the financial concepts being tested.
- * What questions, comments or criticisms do you have of the methodology, data or results?
Do you have any "issues" with the conclusions from these results?
- * What can we learn from this paper?
- * How could you extend or expand on the paper or results?
How can the ideas you obtained from this paper be applied to data you have access to?

In preparing/making the presentation:

- * Do not spend an excessive amount of time on the past literature.
- * Models (and theories) discussed in the paper are important to the extent they actually directly relate to the empirical aspects of the paper. Give them less time if they are only theoretical and are not directly related to the empirics. Do NOT develop or derive models.
- * The results are important, spend time on the key results, what the tables mean, and the implications (how the authors say they relate to the literature).

An outline of key aspects of the paper/your presentation is important. Provide a copy to everyone! Do not go overboard in detail, but provide a sufficient summary that everyone will have for future reference.

Betting on the Presentations!

You now have 10,000 futures points. For each set of 7 articles you will get to "bet" as many points (or as few) as you want for one (or more) articles. (RULE: if you bet on a second and/or third choice then the bet must be at least 1,000 points less than the first choice.) You will email me your bet before the time limit (otherwise there is a penalty of 1,000 points!). I will assign articles based on the highest bets for each article; if you do not get one of your choices (due to a low number of points on your bets) then you will be assigned whatever is "left over." Points are deducted from your total only for the articles that you will present.

You may bet as many of your points as you want. But once you use most/all of your points then you may be assigned an article that is less desirable to you later in the term.

Journals on Line

If you want to obtain the articles on-line from the library to print them then sign in to the library using your student number. Search for the journal then click on the link for the electronic version. If you are at home then you first need to use the link on the left "connect from home." OR you could "pass around" the responsibility of obtaining articles. Articles not online are physically in the library.

Statement Regarding Research Component of Grade

All topics approved for this course's research component must involve futures and/or microstructure data.

Two people may work together on one research Project.

You may work on two shorter, more basic, research projects or one more typical involved project that has appropriate statistical methodology.

You need to talk to me concerning using the project for another course or with another professor (typically neither of these are all out).

The research component of the course can be met in one of three ways:

1. To attempt an A for the course:

Complete a **first** draft of a viable paper that can feasibility soon be submitted to a FIU high quality journal on a topic related to this course in conjunction with a faculty member approved by the professor of the course.**

This choice will include an approved research topic, appropriate statistical and/or computer analysis, generation of (all) appropriate tables that would be in the paper, and a first draft of the paper (the first draft includes all relevant parts of a paper suitable for publication).*

Worth 35% of grade

2. To attempt a B range grade for the course:

Complete the aspects of a viable paper listed in the paragraph below. As above the quality must correspond to a FIU high quality journal on a topic related to this course in conjunction with a faculty member approved by the professor of the course.**

This choice will include an acceptable research topic, appropriate statistical and/or computer analysis, generation of (all) appropriate tables that would be in the paper, and an outline of the methodology.*

Worth 25% of grade

3. To attempt a C range grade for the course:

Complete the appropriate statistical and/or computer analysis related to a potential paper for a FIU high quality journal on a topic related to this course in conjunction with a faculty member approved by the professor of the course.**

This choice will include an acceptable research topic and appropriate statistical and/or computer analysis.* The output must be sufficiently informative to be able to generate relevant and complete tables for an article, and the methodology must be clear.

Worth 15% of grade

* As pointed out in class, and consistent with common educational tenets, you may not turn in material that has been or will be used for another course, unless the professors provide an exception. Ignoring this rule can have dire consequences.

** Based on long-held academic tradition at Florida international and many other institutions, all submissions of a project for this course explicitly affirm the combined research efforts of the student(s) and the faculty member(s) approved to work on the project for this course. Consequently, any resultant paper from this effort typically will be a joint research paper co-authored by the student(s) and faculty member(s).

Some Other Stuff

There are many futures web sites. You can look at my homepage www.fiu.edu/~daiglerr. (Some of my homepage sites are out of date, but LOOK AT “student and research sites”, especially the first few.)

Books: there are some books that may be of some use when working in this area.

An Introduction to High-Frequency Finance by Dacorogna, Gencay, Muller, Olsen, Pictet.

This book has sections that are useful in general. They use foreign currency high frequency data for their analysis. Parts of the book are pretty sophisticated. **I will be providing some pages of this book for you.** I intend to cover these topics in class.

Market Microstructure Theory by Maureen O’Hara.

This is the theory book on microstructure. Maureen O’Hara is probably known as “the” microstructure person; she also was editor of *The Review of Financial Studies*. Probably should make you read this, but her interests are different than what we will do. But if she is covering a topic you are interested in then I would definitely read that chapter.

I’ll keep a copy in my office if you want to borrow it for a day or two!

Note: look on Amazon to see table of contents.

Trading and Exchanges: Market Microstructure for Practitioners by Larry Harris.

Larry Harris is one of the first microstructure researchers. He was head economist at the SEC. I use this book as half of the master’s course in Behavioral Finance/Market Microstructure. It is not a book that summarizes the literature or discusses research techniques. But it is a great book for telling you about the players in the market and factors affecting the microstructure of prices. The book is expensive, but it should be read at some point *IF* you are going to concentrate in microstructure or want to know about real life aspects of the market. (For now though it is not that important. If a chapter in this book is important to your research then I may have a summary of that chapter.) His side stories are very interesting. (My copy of the book has many important notes; and I have it at home anyway!)

ARTICLES FOR SEMINAR IN FUTURES MARKETS AND MICROSTRUCTURE

Articles to be presented in class are identified two ways: (1) they are numbered at the left before the article; and (2) they are set to the left margin. Reference articles (for your information and possible research endeavors) are indented and not numbered. Articles with a letter at the left are ones that I will present.

(Note: the @ signs are for my reference.)

Volume and its Effects

Blume, Easley and O'Hara, "Market Statistics and Technical Analysis: The Role of Volume," *Journal of Finance*, 1994, vol 49 no. 1, 153-181.

A classic article on the importance of volume. Shows that volume provides information that prices do not. Theoretical; important observations on volume and volume/absolute return patterns. Seriously considered taking this for class.

Kawaller, Koch, and Peterson, "Volume and Volatility Surrounding Quarterly Redesignation of the Lead S&P500 Futures Contract," *Journal of Futures Markets*, Dec 2001, 1119-1149. Volume around expiration; volatility; expected and unexpected volume.

Wiley and Daigler, "Volume Relationships Among Types of Traders in the Financial Futures," *Journal of Futures Markets*, Feb 1998, 91-113.

This article does not add a lot of important info to the JF paper.

Lee and Radhakrishna, "Inferring Investor Behavior: Evidence from TORQ Data," *Journal of Financial Markets*, May 2000, 83-111.

Method from data to infer buy/sell of transactions.

Chng, "A Model of Price Discovery and Market Design: Theory and Empirical Evidence," *Journal of Futures Markets*, December 2004, Volume 24 Number 12, 1107-1146.

Shows that the size of trades improves Price discovery.

Wang and Yu, "Trading Activity and Price Reversals in Futures Markets," *Journal of Banking and Finance*, 2004, volume 28 number 6, 1137-1361.

Short run return predictability. Looks at past returns and lags in trading activity.

Trading Activity and Trading Models

1. Hartzmark, "Luck Versus Forecast Ability: Determinants of Trader Performance in Futures Markets," *Journal of Business*, 1991, vol. 64 no. 1, 49-74. @3

Who wins and who loses; CFTC audit data.

Hartzmark, "Returns to Individual Traders of Futures: Aggregate Results," *Journal of Political Economy*, 1987, vol 95 no. 6, 1292-1306.

Could these results be opposite his other article?

2. Locke and Sarajoti, "Interdealer Trading in Futures Markets," *Journal of Futures Markets*, October 2004, volume 24 number 10, 923-944.

Dealer trading and profits. CFTC data. Inventory vs. price.

Leuthold, Garcia, and Lu "The Returns and Forecasting Ability of Large Traders in the Frozen Port Bellies Futures Market," *Journal of Business*, 1994, vol 67 no. 3, 459-473.

Similar to Hartzmark in that it look at winners and losers, but in one commodity that a few players seem to dominate; uses COT data; profitability.

Roberts, "Technical Analysis in Genetic Programming: Constructing and Testing a Commodity Portfolio," *Journal of Futures Markets*, July 2003, Volume 25 Number 7, 643-660.

Technical analysis; forecasting and profits.

3. Wang, "Futures Trading Activity and Predictable Foreign Exchange Market Movements," *Journal of Banking and Finance*, May 2003, volume 28 number 5, 1023-1041. @3

Uses Commitment of Traders data to examine speculator and hedger returns. Results are interesting (somewhat different than much of the literature) in that backwardation works! That is, speculators earn profits from futures positions. Speculators sentiment is positively related to futures returns while hedgers sentiment covaries negatively with future returns.

Wang, "The Behavior and Performance of Major Types of Futures Traders," *Journal of Futures Markets*, January 2003, 1-32.

Similar to JBF 2003 article; Commitment of traders; behavior of speculators and hedgers trading. R squared often below 10%.

Chatrath, Liang, and Song, "Commitment of Traders, Basis Behavior, and the Issue of Risk Premia in Futures Markets," *Journal of Futures Markets*, Sept 1997, 707-731.

Risk premia; commitments of traders; daily data; backwardation

4. Massa and Simonov, "Reputation and Interdealer Trading: A Microstructure Analysis of the Treasury Bond Market," *Journal of Financial Markets*, April 2003, Vol. 6 no. 2, 99-141. @3

Information about the traders: reputation; how do traders react; causes different volume and volatility patterns.

Naik and Yakav, "Risk Management with Derivatives by Dealers and Market Quality in Government Bond Markets," *Journal of Finance*, October 2003, Volume 58 Number 5, 1873-1904.

Trading by Bond dealers. Dealers take directional bets in hedge changes in spot exposure.

Behavioral Finance

5. Coval and Shumway, "Do Behavioral Biases Affect Prices?" *Journal of Finance*, 2005, Volume 60 Number 1, 1-34.

Provides evidence for behavioral biases among futures traders. Traders loss averse in trading is affected by time of day. CFTC data.

Frino, Johnstone, and Zheng, "The Propensity for Local Traders in Futures Markets to Ride Losers: Evidence of Irrational or Rational Behavior?" *Journal of Banking and Finance*, 2004, Volume 28, 353-372.

An example of behavioral finance. Local traders keep losers. The "disposition effect."

Haigh and List, "Do Professional Traders Exhibit Myopic Loss Aversion? An Experimental Analysis," *Journal of Finance*, 2005, Volume 60 Number 1, 523-534.

Examines loss aversion and mental accounting.

Issues with Intraday Data: Information

A. (**Professor will do.**) Goodhart and O'Hara, "High Frequency Data in Financial Markets: Issues and Applications," *Journal of Empirical Finance*, June 1997, 73-114. @

This is a review article that both covers topics in microstructure and discusses data issues.

Copeland, Lam, and Jones, "The Index Futures Markets: Is Screen Trading More Efficient?" *The Journal of Futures Markets*, April 2004, Volume 24 Number 4, 337-358.
The timing of daily highs and lows.

Webb and Smith, "The Effect of Market Opening and Closing on the Volatility of Eurodollar Futures Prices," *Journal of Futures Markets*, 1994, Vol 14 no. 1, 51-78.
Open; closing prices.

@ Ito, Lyons, and Melvin, "Is there Private Information in the FX Market? The Tokyo Experiment," *Journal of Finance* June 1998, 1111-1130.
Examines the question of whether prices reflect private or public information (French and Roll famous for this). Then looks at private information vs mispricing. A good discussion at the beginning of information and prices.

@ Cushing and Madhavan, "Stock Returns at the Close," *Journal of Financial Markets*, Feb 2000, 45-67.
Returns at the close for Russell 1000, and has all market on close order imbalances. Institutional trading; variance; liquidity.

Docking and Kawaller, "Mid-Day Spikes in U.S. Futures Markets," *Journal of Futures Markets*, April 1999, vol 19 no. 2, 195-216.
Examines the volatility spike due to the London close.

Elyasiani and Kocagil "Interdependence and Dynamics in Currency Futures Markets: A Multivariate Analysis of Intraday Data," *J. of Banking and Finance*, June 2001, 1161-1186.

Daigler, "Intraday Futures Volatility and Theories of Market Behavior," *Journal of Futures Markets*, Feb 1997, 45-74.
Examines the U-shaped for Stock Index futures.

Harris, Sofianos, and Shapiro, "Program Trading and Intraday Volatility," *Review of Financial Studies*, 1994, vol 7 no. 4, 654-656.
Looks at the effect of program trades on prices; lead-lags.

Gwilym, Ap, Clare, and Thomas, "Extreme Price Clustering in the London Equity Index Futures and Options Markets," *Journal of Banking and Finance*, Sept 1998, 1193-1206.
Clustering; tenths, etc.

Schwartz, Van Ness, and Van Ness, "Clustering in the Futures Market: Evidence from S&P Futures Contracts," *The Journal of Futures Markets*, May 2004, Volume 24 Number 5, 413-428.
Price Clustering by decimal.

Mitchell, "Clustering and Psychological Barriers: The Importance of Numbers," Journal of Futures Markets," May 2001, 395-428.

Clustering of prices; psychological aspects only.

@ Hasbrouck and Sosebee, "Orders, Trades, Reports and Quotes at the NYSE," working paper, 1992.

Provides information on how the reporting system works for trades and quotes.

Electronic Exchanges

Tse and Zobotina, "Transaction Costs and Market Quality: Open Outcry versus Electronic Trading," Journal of Futures Markets, August 2001, 713-735. @3

Electronic vs pit trading.

Pirrong, "Market Liquidity and Depth on Computerized and Open Outcry Trading Systems: A Comparison of DTB and LIFFE Bond Contracts," Journal of Futures Markets, Aug 1996, 519-543.

Electronic vs pit trading; liquidity.

Chow, Lee, and Shyy, "Trading Mechanisms and Trading Preferences on a 24-Hour Futures Market: A Cases Study of the Floor/Globex Switch on Matif," Journal of Banking and Finance, Dec 1996, 1695-1713.

Compares volume on electronic vs pit for Matif.

Daigler, "Changes in the Structure of the Currency Futures Market: Who Trades and Where They Trade," working paper, 2005.

Examines the change in currency futures from pit traded to electronically traded.

Trading Intensity and Duration between Trades

6. Taylor, "Trading Intensity, Volatility, and Arbitrage Activity," Journal of Banking and Finance, 2004, volume 28 number 5, 1137-1162. @3

They determine its trading intensity. A new approach: looking at the time between transactions, volume, arbitrage opportunities, bid-ask spread as a measure of the inverse of conditional volatility. A Garch type formation.

Holder, Qi, Sinha, "The Impact of Time Duration between Trades on the Price of Treasury Note Futures Contracts," Journal of Futures Markets, October 2004, Volume 24 Number 10, 965-980.

Time duration between trades, T-notes.

Furfine, "When is Inter-Transaction Time Informative?" working paper, Federal Reserve Bank of Chicago.

Inter-transaction time varies across stocks and across time. Transaction time is informative when there is liquidity. Volume and price moves.

Chung, Li, and McInish, "Information Based Trading, Price Impact of Trades, and Trade Autocorrelation," Journal of Banking and Finance, 2005, Volume 29, 1645-1669.

The Price impact of volume, effect of time interval.

Lead-Lag Relationships; Basis and Index Effects

7. Chatrath, Christie-David, Dhanda, and Koch, "Index Futures Leadership, Basis Behavior, and Trader Selectivity," *Journal of Futures Markets*, 2002, vol 22 no. 7, 649-677. @3
Lead-lag; VAR; commitment of traders

8. Wu, Li, and Zhang, "Intradaily Periodicity and Volatility Spillovers between International Stock Index Futures Markets," *Journal of Futures Markets*, June 2005, Volume 25 Number 6, 533-586.
Volatility spillovers; U-shaped.

Pizzi, Economopoulos, and O'Neill, "An Examination of the Relationship between Stock Index Cash and Futures Markets: A Cointegration Approach," *Journal of Futures Markets*, May 1998, 297-305.
A short article! Lead-lag; cointegration; short and long-run components; minute data.

Chatrath, Ramahander, and Song, "The Role of Futures Trading Activity in Exchange Rate Volatility," *Journal of Futures Markets*, August 1996.
Lead-lag for volume and volatility; commitment of traders; causality.

Chan, "A Further Analysis of the Lead-Lag Relationship between the Cash Market and Stock Index Futures Market," *Review of Financial Studies*, 1992, vol. 5 no. 1, 123-151.
Lead-lag; futures to cash.

Abhyankar, "Linear and Nonlinear Granger Causality: Evidence from the U.K. Stock Index Futures Market," *Journal of Futures Markets*, August 1998, 519-540.
Lead-lag; nonlinear, U.K.

9. He and Wu, "Further Evidence on Mean Reversion Index Basis Changes," *Financial Review*, Feb 2001, 95-124. @03
Examination of the cash-futures basis and effects of index composition. Note the "old" nature of the cash index due to non-trading.

Monoyious and Sarno, "Mean Revision in Stock Index Futures Markets: A Nonlinear Analysis," *Journal of Futures Markets*, 2002, vol 22 no. 4, 285-314.
Mean reversion basis; linear and nonlinear; daily.

Issues in Microstructure: Macroeconomic Announcement Effects

Coughenour and Shastri, "Symposium on Market Microstructure: A Review of Empirical Research," *Financial Review*, November 1999, 1-28.
This is a review article, but not futures. Detailed discussion.

Madhavan, "Market Microstructure: A Survey," *Journal of Financial Markets*, 2000, 205-258.
This is a review article. Concentrates on theory and models.

Ederington and Lee, "How Markets Process Information: News Releases and Volatility," *Journal of Finance*, 1993, vol 48, no. 4, 1161-1192.

Simpson and Ramchander, "An Examination of the Impact of Macroeconomic News on the Spot and Futures Treasury Markets," Journal of Futures Markets, May 2004, Volume 24 Number 5, 453-478.

Macroeconomic news effect on prices. Daily data; GARCH.

Hess, "Determinants of the Relative Price Impact of Unanticipated Information on US Macroeconomic Releases," Journal of Futures Markets, July 2004, Volume 24 Number 7, 609-630.

Unanticipated macro announcement's effects on price changes for T-bond futures. Uses five-minute data.

Frino, Walter, and West "The Lead-Lag Relationship between Equities and Stock Index Futures Markets Around Information Releases," Journal of Futures Markets, May 2000, 467-487.

Lead-lag around macroeconomic announcements.

Ait-Sahalia, Mykland, and Zhang, "How Often to Sample a Continuous-time Process in the Presence of Market Microstructure Noise," Review of Financial Studies, 2005, Volume 18 Number 2.

Very interesting article. Examines the tradeoff between sampling frequency and noise effects. Finds that noise means you sample less, but then they model noise and find that more frequent sampling is beneficial with the modeling of noise. **May become an important article in microstructure research.**

Liquidity and Depth; Pit/Floor Trading

10. Engle and Lange, "Predicting VNET: A Model of the Dynamics of Market Depth," Journal of Financial Markets, April 2001, 113-142. @3

Engle is well known for GARCH. Gives a new intraday measure of market liquidity, which measures the depth of the market, using volume.

11. Hasbrouck, "Liquidity in the Futures Pits: Inferring Market Dynamics from Incomplete Data," Journal of Financial and Quantitative Analysis, June 2004, 305-326.

Estimates liquidity for futures transaction data from the pits; to deal with a lack of bids and asks the paper develops new Markov chain Monte Carlo estimations. Model decomposes long-run volatility into trade and non-trade components.

This paper may be useful for anyone using the futures volume and trade database. It has a short discussion, and then some results on price impact. (But it only uses one month of data on four commodities.)

Polymenis, "A Realistic Model of Market Liquidity and Depth," Journal of Futures Markets, May 2005, Volume 25 Number Five, 443-464.

Liquidity and Depth Measure.

@ Hong and Rady, "Strategic Trading and Learning about Liquidity," Journal of Financial Markets, Oct 2002, 419-450.

Noise trades; model where learn about liquidity from past prices and volume

12. Coval and Shumway, "Is Sound Just Noise?" Journal of Finance, Oct 2001, 1887-1910. "Different"; interesting. Would you have thought to do this? @3

Manaster and Mann, "Sources of Market Making Profits: Man Does Not Live by Spread Alone," working paper 1999. (Go to subfaculty.tcu.edu/mann)

Would use this paper if we had time. Important paper for anyone looking at pit traders or profitability of pit traders. Finds that the scalpers make money from position taking as well as the bid-ask spread (providing liquidity). Uses CFTC audit trail data (broken into the CTI traders); some info on CTI4 the general public.

Manaster and Mann, "Life in the Pits: Competitive Market Making and Inventory Control," Review of Financial Studies, Fall 1996, 953-975.

Has all trades of all participants (CFTC audit data); examines inventory control by scalpers.

Chakravarty and Li, "An Examination of Own Account Trading by Dual Traders in Futures Markets," Journal of Financial Economics, August 2003, 375-397.

Activity and inventory issues of floor traders. CFTC audit trail data.

@ Sofianos and Werner, "The Trades of NYSE Floor Brokers," Journal of Financial Markets, 2000, 139-176.

Floor brokers trades and how it depends on liquidity, block volume, competition, volatility, and order flow. Good info on FAQ and floor trading, but has specialized data.

Stock Index Futures: Price Discovery; Arbitrage and Pricing

13. Tse, "Price Discovery and Volatility Spillovers in the DJIA Index and Futures Markets," Journal of Futures Markets, Dec 1999, 911-930. @3

Minute by minute for price discovery and volatility spillover; EGARCH

14. Chu and Hsieh, "Pricing Efficiency of The S&P500 Index Market: Evidence from the Standard and Poor's Depository Receipts," Journal of Futures Markets, 2002, vol 22 no. 9, 877-900. @3
Arbitrage; S&P cash and futures; SPDRs

Switzer, Varson, and Zghidi, "Standard and Poor's Depository Receipts and the Performance of the S&P500 Index Futures Market, Journal of Futures Markets, Sept 2000, 705-716.

Pricing when SPDR started.

15. Kurov and Lasser, "Price Dynamics in the Regular and the E-mini Futures Markets," Journal of Financial and Quantitative Analysis, June 2004, volume 39 number 2, 365-384.

Examines the Price dynamics in the S&P 500 and NASDAQ futures markets. Uses transactions data with type of trader to determine where Price discovery is initiated.

16. Hasbrouck, "Intraday Price Formation in the US Equity Index Markets," Journal of Finance, December 2003, Volume 58 Number 6, 2375-2400.

Examines which market provides Price leadership: four traded futures, electronic traded futures, exchange traded funds.

Ates and Wang, "Information Transmission in Electronic Versus Opened – Outcry Trading Systems: and Analysis of US Equity Index Futures Markets," Journal of Futures Markets, July 2003, Volume 25 Number 7, 679-715.

Which market leads for price discovery purposes.

17. Dwyer, Locke and Yu, "Index Arbitrage and Nonlinear Dynamics between the S&P500 Futures and Cash," Review of Financial Studies, Spring 1996, 301-332. @3

Looks at arbitrage on a non-linear basis. Is this what others may be missing?

Frino, Harris, McInish, Tomas, "Price Discovery in the Pits: the Role of Market Makers on the CBOT And the Sydney Futures Exchange," Journal of Futures Markets, August 2004, Volume 24 Number 8, 785-804.

Price discovery for bond futures, uses trade prices. VAR.

Bae, Chan, and Cheung, "The Profitability of Index Futures Arbitrage: Evidence from Bid-Ask Quotes," Journal of Futures Markets, October 1998, 743-763.

Bid-ask; Hong Kong; options and futures.

T-bond and Eurodollar Futures Pricing and Arbitrage

Daigler, "The Integrated Nature of T-bond Delivery Options," Review of Futures Markets, 2005.

Examines the many interrelated factors affecting the delivery options; more like a review (no empirical evidence).

Chance and Hemler, "The Impact of Delivery Options on Futures Prices: A Review," The Journal of Futures Markets, 1993, Vol. 13 No. 2, 127-156..

Hemler, "The Quality Delivery Option in Treasury Bond Futures Contracts," Journal of Finance, Dec 1990, 1565-1586.

Much of the mode/math he presents is not needed (he has a PhD in math as well as one in Finance).

Hegde, "An Empirical Analysis of Implicit Delivery Options in the Treasury Bond Futures Contract," Journal of Banking and Finance, 1988, vol 12, 469-492.

Hegde, "An Ex-post Valuation of the Quality Option Implicit in the Treasury Bond Futures Contract," Journal of Banking and Finance, 1990, vol. 14, 741-760.

One of the better examinations of the value of T-bond delivery options.

18. Grinblatt and Jegadeesh, "The Relative Price of Eurodollar Futures and Forward Contracts," Journal of Finance, Sept 1996, 1499-1522. @3

Eurodollar pricing and arbitrage.

Risk Premia for Futures

19. Christie-David and Chaudhry, "Coskewness and Cokurtosis in Futures Markets," Journal of Empirical Finance, March 2001, volume 8 number 1, 55-81.

Examines whether skewness in kurtosis are priced in futures markets.

Bessembinder "Systematic Risk, Hedging Pressure, and Risk Premiums in Futures Markets," Review of Financial Studies, 1992, vol 5 no 4, 637-668.

Systematic risk; returns vs hedgers.

@ Siddique, "Common Asset Pricing Factors in Volatilities and Returns in Futures Markets," Journal of Banking and Finance, 2003, 2347-2368.

Uses means and volatilities to explain common factor; S&P500 volatility correlated with implied volatility. Prediction of volatility.

Volatility Measurement; Persistence (Long Memory)

Anderson, Bollerslev, Diebold, and Ebens, "The Distribution of Realized Stock Return Volatility," Journal of Financial Economics, 2001, Vol. 61, 43-76. @03

"Discovers" that using 5 minute data is a better estimate of daily volatility than daily close to close. Not a shock but they provide all kinds of analysis and are getting credit for their discovery. IMPORTANT paper on the measurement of volatility. Many aspects to study.

Fleming, Kirby and Ostadiak, "The Economic Value of Volatility Timing Using "Realized" Volatility," Journal of Financial Economics, March 2003, 473-511.

Uses the 5 min data for daily volatility and then shows how portfolio timing strategies using the 5 min vs daily data perform substantially better. A good part of the paper relates to the intraday data.

Crato and Ray, "Memory in Returns and Volatilities of Futures Contracts," Journal of Futures Markets, July 2000, Vol 20 No. 6, 525-543. @03

Returns, volatility, persistence, techniques. Long-memory basic tests.

Chen, Daigler, and Parhizgari, "Persistence of Volatility in Futures Markets," Journal of Futures Markets, 2006.

Examines how different measures of volatility have different degrees of persistence. Examines persistence in some detail.

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20. Speight, McMillan, and Gwilym, "Intra-Day Volatility Components in FTSE-100 Stock Index Futures," Journal of Futures Markets, May 2000, 425-444. @3

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The Volume-Volatility Relation, including the Effect of Types of Traders

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21. Luu and Martens, "Testing the Mixture-of-Distributions Hypothesis Using "Realized" Volatility," *Journal of Futures Markets*, July 2003, 661-680. @3

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Chen and Daigler, "Linear and Nonlinear Interaction among Futures Volatility, Institutional Traders, and the General Public," Working Paper, 2005.

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Girma, Berhanu, and Mougoue, "An Empirical Examination of the Relation between Futures Volatility, Volume, and Open Interest," *Journal of Futures Markets*, 2002, Vol 22 no. 11, 1083-1102.

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The Effect of Volume on Prices; Smiles in Implied Volatilities

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A well written paper that examines the effect of buying pressure on the shape of the implied volatility function. Relates to our interest in that it covers volume and volatility.

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Alexander, " Normal Mixture Diffusion with Uncertain Volatility: Modeling Short and Long-term Smile Effects," *Journal of Banking and Finance*, 2004, Volume 28, 2957-2980.

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Asymmetry of Volatility; The Tail

24. Meneu and Torro, "Asymmetric Covariance in Spot – Futures Markets," Journal of Futures Markets, November 2003, volume 23 number 11, 1019-1046.

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Bali and Weinbaum, "A Comparative Study of Alternative Extreme Value Volatility Estimators," Journal of Futures Markets, September 2005, Volume 25 Number 9, 873-892.
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Werner and Upper, "Time Variation in the Tail Behavior of Bund Future Returns," Journal of Futures Markets, April 2004, Volume 24 Number 4, 387-398.

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Implied Volatility (Options) and the VIX; Volatility's Derivatives

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Frechette and Weaver, "Heterogeneous Expectations of Traders in Speculative Futures Markets," Journal of Futures Markets, May 2001, 429-446.
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Portfolios, Futures, and CTA Performance

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