Topics in Market Microstructure, Empirical Asset Pricing and Market Efficiency

Research Proposal for 2016-2017 Academic Year

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The great advances in computing technology, which have occurred over the last 50 years, have allowed researchers to bridge the gap between the formally distinct fields of macro and micro economics. Nowhere is this better seen than in the study of asset pricing, which has an economy-wide focus akin to macroeconomics, and market microstructure, which focuses on the details of how and why investors make specific trades. While there are many advances still to be made in each of these fields separately, the marriage of these two formally distinct topics is one of the great frontiers of finance barely touched by current research.

In this workshop we provide you the opportunity to study in greater depth the full range of market related phenomena, whether related to more micro-level market microstructure phenomena, more macro-level asset-pricing phenomena, or the intersection between the two.

MARKET MICROSTRUCTURE

Like option pricing and fixed income, market microstructure has rapidly moved from the research domain of finance professors into the real world, where competition among exchanges, development of trading algorithms, and design of robust market places all require combining the theory of market microstructure with an understanding of institutional detail of how financial markets work in practice. Liquidity, transaction costs, trading strategies, market fragmentation, high frequency trading, market design, and market crashes are topics of great interest to finance professors, market participants, policy makers, and often even to general public.

In the coming decade, market microstructure has potential to become one of the fastest growing fields of financial economics. Indeed, all ingredients are in place: There are numerous topical questions with no answers yet, theorists are well equipped with game theoretic modeling tools for developing theories to answer those questions, and the financial markets generate vast amount of data which present an excellent opportunity for empiricists to test those ideas.
Market microstructure invariance is one of the recently proposed frameworks for thinking about financial markets, see Kyle and Obizhaeva (2016). The invariance hypothesis is based on the intuition that trading in securities markets can be modeled as games played at different speeds or over different horizons for different securities. In actively traded securities, trading takes place at fast speeds over short horizons, perhaps only a few minutes. In inactively traded securities, trading takes place slowly over longer horizons, perhaps a few months. Invariance hypothesis generates precise quantitative predictions of how various market microstructure variables such bid-ask spread, price impact, order sizes, price resiliency, and market efficiency are related to volume and volatility, measured in calendar time. Several empirical studies found strong evidence in favor of invariance hypothesis using the data on portfolio transitions by U.S. institutional investors, the Trades and Quotes (TAQ) data for U.S. equity market, and Thomson/Reutres data on news articles, see Kyle and Obizhaeva (2013), Kyle, Obizhaeva, Tuzun (2012), and Kyle, Obizhaeva, Sinha, Tuzun (2012). However, there are many other applications that can be explored.

Students with interests in empirical and theoretical market microstructure are invited to participate in the project. It takes students directly to the frontier of research in finance and may result in high-quality work publishable in international journals. Research in this area is also a lot of fun.

This is also an area in which the Central Bank of Russia and several other organizations are interested in, especially, for example, in topics related to financial stability and liquidity management, so students will have the opportunity to get involved into specific projects that are currently of interest for policy makers.

ASSET PRICING

Asset pricing is the study of the macroeconomic forces that explain the differences in the returns we investors expect to receive from individual stocks and from markets as a whole. Understanding the nature of the risks for which investors are compensated has important implications for optimal investment decision-making, capital budgeting and the management of risk. As Cochrane (2005) points out, “the program of understanding the real, macroeconomic risks that drive asset prices (or the proof that they do not do so at all) is not some weird branch of finance; it is the trunk of the tree. As frustratingly slow as progress is, this is the only way to answer the central questions of financial economics, and a crucial and unavoidable set of uncomfortable measurements and predictions for macroeconomics.”

LINKING ASSET PRICING AND MARKET MICROSTRUCTURE

Some of the more recent advances in empirical asset pricing attempt to link market microstructure concepts of liquidity and asymmetric information to macro-level asset pricing phenomena. Notable work in this area includes research by Easley, Hvidkjaer, and O’Hara (2002) that link microstructure measures of asymmetric information to undiversifiable risk, which is priced in the market. Other recent work, such as Pastor and Stambaugh (2003) uses measures of stock liquidity and provides evidence that liquidity is an undiversifiable risk priced at the market level.
Examples of research topics in market microstructure, asset pricing and the link between asset pricing and market microstructure are listed below.

1. *Empirical study of invariance relationships in the Russian financial data.* The project presents an excellent opportunity to learn about the market microstructure of the financial market in Russia and develop skills necessary for working with large financial datasets. Different markets can be studied: currency, commodities, equities, etc. This project is also of a broader interest, as it will provide the evidence on whether invariance hypotheses hold outside of the U.S. market.

2. *Empirical study of bid-ask spreads of U.S. equities in the context of market microstructure invariance.* Many important papers have studied bid-ask spreads in the past, for example, see Hans Stoll's presidential address at the AFA Meetings in 2002. However, the invariance framework provides a new perspective for analyzing the data. The project presents an excellent opportunity to learning about the market microstructure of the U.S. financial markets and develop skills necessary for working with large financial datasets. The project is expected to provide valuable insights on some long-standing questions in market microstructure such as, for example, transaction costs at NYSE versus Nasdaq and the effects of reduction in tick size. These questions are especially important nowadays. For example, under a big pressure from the U.S. Congress, the U.S. Securities and Exchange Commission has just announced its plans to implement a pilot test program to trade stocks in wider increments, like nickels instead of pennies, to determine whether such a change would make it easier for investors to trade some securities.

3. *Market Microstructure Analysis of Russian Currency Market on 15-16 December 2014.* Mid December 2014 was an unusually volatile period for the Russian currency. It first sharply depreciated by 40 percent and then quickly came back to the prior level within a couple of days. It is interesting to analyze in detail how the market microstructure of the currency market evolved during that episode. The relevant examples are papers on Flash crash that happened in the U.S. markets on 6 May 2010.

4. *Sources of Risk in Asset pricing.* Our understanding of the sources of risk in the Russian market is very limited. Various theories predict difference sources of risk: market, macro economic, illiquidity, default, etc. Few of these theories have been tested in the Russian market and a thesis that has a well-formed hypothesis about the sources of risk in the Russian market and well-formed tests of these theories could make for an excellent topic.

Studies of the sources of risk do not need to be limited to studies of the Russian market. In addition to extending existing research linking liquidity and information asymmetry to asset prices, there
may be work to be done examining the implications of market microstructure invariance for the manifestation of risk in asset prices.

One possible topic in the “Sources of Risk in Asset Pricing” is to analyze on a firm by firm basis the source of risk exposure. For example, Industrial Production has been used as a measure of macroeconomic risk; but we do not know precisely what this captures. Which firms are more sensitive to this risk and which less? Are their cash flows affects or discount rates? There are many similar topics one could study in which the main object is to simply better understand a well-documented fact. We expect that such studies could lead to some truly interesting insights about the nature of risk.

5. **Ambiguity aversion and asset prices.** A growing literature looks at the situation where investors are ambiguity averse, and examine how this impacts asset prices. Roughly speaking, ambiguity aversion means that investors have multiple, rather than single, priors about some pertinent parameter (-s), and they act so as to maximize their well-being in the worst-case scenario. From existing models, we know that accounting for ambiguity aversion can explain findings that are hard to explain otherwise. Epstein and Schneider (2010) provide an overview of recent developments and models. Empirical research in this area is challenged by developing good measures of ambiguity. As such the literature is nacent and just starting to take off.

6. **Market efficiency.** Studies of market efficiency and anomalies have largely avoided looking at the Russian market because of limited data availability. A detailed study of the weak and semi-strong efficiency of the Russian stock market would be an important addition to our knowledge of the Russian markets. An example of research in this area is Griffin, Kelly and Nardari (2010). Projects in this area would involve examining the profits (or costs) involved in exploiting week for inefficiencies.

Looking beyond mere studies of the Russian market, an unexplored area of research may be to link notions of market microstructure invariance to notations of efficient pricing and the speed with which information is incorporated in prices.

7. **Asset Pricing + Market efficiency.** Recent work research has tried to more closely tie changes in investor expectations to changes in returns. Two ways of doing this are through surveys of investor expectations (Bergbrant and Kelly, 2016 is an example) and by inferring expectations from options prices (see Buss, Shlag and Vikov, 2012 and Hollstein and Prokopczuk, 2014). Research in this area reanalyzes existing research using (hopefully) improved measures of expectations.

8. **Hedge funds and peso-problems.** By their nature hedge funds are secretive. Recent work by Agarwal, Jiang, Tang and Yang (2013) and Aragon, Hertzel and Shi (2013) suggest that more secretive funds use this secrecy to earn higher returns for their investors. Recent research by Goroviy, Kelly and Kuzmina (2016) finds evidence which suggests that the earlier research might be due to hedge funds loading up on unrealized risk. One potential area of research is to reexamine the early research to see whether it loading on unrealized risk explain such returns. This would be an excellent topic for someone interested in the hedge fund industry – but you probably would need to start over summer.
This list is not restrictive and other projects can be suggested. Students may also choose to develop their own ideas as long as they fall within the broad area of market microstructure or asset pricing.

**References**


Intraday Trading Invariance in the E-mini S&P 500 Futures Market, 2015, Torben Andersen, Oleg Bondarenko, Albert S. Kyle, and Anna Obizhaeva

Anatomy of the Flash crash, 2015, Albert J. Menkveld and Bart Zhou Yueshen

Анализ события на российском валютном рынке 15-16 декабря 2014 года, 2015, Анна Обижаева

Most of the papers above can be found on [http://pages.nes.ru/aobizhaeva/research.html](http://pages.nes.ru/aobizhaeva/research.html)


"Macroeconomic Expectations and the Size, Value and Momentum Factors" 2016 by Patrick Kelly and Mikael Bergbrant.

“Fooling the Savvy Investor: Secrecy and Hedge Fund Performance” Patrick Kelly and Olga Kuzmina at the New Economic School with Sergiy Gorovyy at Ellington Management Group.
To get a better idea of the types of research Anna and Patrick can advise you on, please look at their websites: [http://pages.nes.ru/aobizhaeva/research.html](http://pages.nes.ru/aobizhaeva/research.html) and [http://www.patrickjkelly.info](http://www.patrickjkelly.info)