2001 conference

Financial Market Structure and Dynamics

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Introduction

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The topic for this conference, "Financial Market Structure and Dynamics," was selected to highlight some current research on financial markets.[1] Most of the papers presented at the conference could be considered to be within the "market microstructure" literature. Market microstructure is a relatively new branch of financial economics that seeks to explain how latent supply and demand for financial assets are transformed into transactions, and how this process drives asset-price dynamics. Market microstructure research investigates the institutional structure of financial markets, including information distribution patterns and the resulting incentives structure faced by market participants. This, in turn, helps to explain the behaviour of the participants, the markets, and the resulting asset-price discovery process. The study of market microstructure can make important contributions to central banking, which suggests that it should be a core area of central bank research.

In the implementation of monetary policy, it is often very useful for a central bank to be aware of the market's expectations of upcoming policy developments. Consequently, the first way in which market microstructure research can support central banks is by creating a deeper understanding of how markets operate and how they react to and impound economic news and shocks.

Many central banks have long considered issues related to the stability of the components of the financial system (financial markets, financial institutions, and clearing and settlement systems). Recently, a number of central banks have taken a more integrated and focused interest in financial stability.[2] This interest arises from the importance of the financial system in a modern economy, the recognition of the high degree of interrelatedness of the components of the financial system, and the role of central banks in supporting a well-functioning financial system, for example, through short-term lending to solvent financial institutions with temporary liquidity problems. Given the growing importance of financial markets, a deep understanding of how these markets operate, particularly in times of stress, is of fundamental importance to financial stability.

Central banks engage in certain financial market operations to implement monetary policy, to reinforce financial stability, and in some cases, to conduct other business lines. These operations could benefit from a more structured analysis of the relevant markets. For many central banks, financial market operations include managing foreign exchange (FX) reserves and FX market intervention. Thus, for example, while it is known that FX intervention generally has appeared to have had little effect, market microstructure research has yielded suggestions that could improve its effectiveness. Moreover, for central banks operating as their government's fiscal agent, there is an active interest to improve the functioning and liquidity of government securities markets. With falling levels of government debt, many central banks are contemplating the holding of alternative asset classes, which carries implications for the degree of liquidity and credit risk that they bear. These activities could benefit from the insights that market microstructure research could yield on the determinants and dynamics of market liquidity.

The market microstructure research program at the Bank of Canada has arisen, in part, in recognition of some of the contributions that this line of research could make. In addition, it has developed as a response to the rapid rate of change in financial markets as a consequence of technological innovations and regulatory reform. It is important for the Bank of Canada to have a profound grasp of the requirements for well-functioning financial markets as market structures evolve.

While the goal of this conference was to examine issues related to market structure and the dynamics of markets, the panellists highlighted the fact that at least two leitmotifs were at play throughout. As noted by John Chant, at the heart of all of the papers and discussions was the role of *information* in the market—the way in which market structure influences how information is impounded into prices, during normal and stressful times; how market design is influenced by informational issues; and the impact of technological change on information processing and the institutional evolution of the market. Many of Richard Lyons' comments focused on order-flow information. He pointed out the property rights issues associated with it and the value of these data (which drive business decisions). He asked how transparent markets should be with respect to these data and suggested significant research questions regarding the role of this information in asset-price dynamics. Dino Kos explored the theme of *liquidity*, particularly why central banks should care about it, its challenges at this time, and what, if anything, central banks could do to enhance it.

In this volume, we present the research under the two broad themes: financial market structure and asset-price dynamics. Here, we discuss the papers presented at the conference within the context of these two perspectives and draw the key lessons. We conclude with several important questions that arose out of the discussions.

1 Financial Market Structure

The structural characteristics of a market affect its efficiency, stability, and capacity to function well in the event of increased stress. Markets that are liquid, efficient, and that feature good price discovery (in short, markets that exhibit "good operating characteristics") will be relatively resilient and robust in the face of shocks. Financial stability characteristics can be enhanced through policies that promote appropriate (or, at least, not inappropriate) market structures.

One aspect of market structure that is thought to be important to liquidity is the extent to which markets are centralized. Network economics tells us that a market with the maximum number of potential counterparties will be the most liquid. Where there is potential for a large, liquid market to be broken up into smaller pieces (through competition, for instance), this is referred to as fragmentation. On the other hand, in relatively decentralized markets such as most fixed-income markets, network economics may not be the primary factor determining liquidity, and sweeping regulatory measures to limit market fragmentation may be inappropriate.

Similarly, the flow of information in markets is another structural characteristic that is thought to have important implications for liquidity. A high level of transparency is often seen as a key component in achieving fair, efficient, and liquid markets. Transparency seems to play a different role in different markets, however, and certain types of transparency in markets that are characterized by infrequent and "lumpy" order flow may actually introduce perverse, trade-limiting incentives for participants.

1.1 "Optimal" market structure

The wide variety of market structures confronts policy-makers with a significant challenge in trying to determine which structures may be optimal from a societal perspective. In particular, regulation that attempts to generalize across markets, implicitly assuming that differences in market structure can be explained as evidence of market failure in one case or the other, can be problematic.

Toni Gravelle compares and contrasts market structures and practices in multiple-dealer equity markets with those in government securities markets and demonstrates that there are subtle and important differences between the two (at first glance, quite similar) types of dealership markets. Intrinsic differences in the two types of securities, the nature of the investors, the degree of centralization, and transparency regimes are highlighted. The author suggests that these structural differences are likely to significantly affect the activities of market-makers and therefore the amount of liquidity that they provide.

Nicolas Audet, **Toni Gravelle**, and **Jing Yang** approach the question of optimal market structure by developing a model in which customers choose to trade in either a dealership or a limit-order-book market. Their findings suggest that a dealership market will be preferred by investors in an environment where customer trading is relatively thin and "lumpy," and by investors who are subject to relatively large liquidity shocks. This is consistent with the observation that markets dominated by a relatively small number of institutional investors tend to be organized as dealership markets.

Market structures develop to meet the (often idiosyncratic) needs of market participants. This suggests that there is no one structural form that is optimal for every market or for every participant in a given market.

1.2 The impact of changes in market structure on market quality

Market structure, which describes the behaviours of participants and the trading architectures or protocols in a market, has an important effect on the quality of markets. Given the observation that different structures may be appropriate for different markets in a static setting, the following papers investigate the impact of a change in structure. The first paper studies an actual change with respect to transparency requirements, and the second examines the potential effect of consolidation.

Ananth Madhavan, **David Porter**, and **Daniel Weaver** investigate the effect on market liquidity of an increase in pre-trade transparency on the Toronto Stock Exchange that occurred in April 1990. Contrary to the assumption that higher transparency would lead to higher quality markets, the authors find evidence that market liquidity suffered as a result of the change.

Chris D'Souza and **Alexandra Lai** examine another potential source of change to market structure: consolidation among market-makers. The authors demonstrate that if the merged entity has a greater risk-bearing capacity than the original pre-merger entities (through a greater degree of diversification among its business lines), consolidation may lead to a net increase in the amount of risk capital allocated to market-making activities, improving market liquidity and investor welfare.

The potential effects on market quality of a change in market structure may be counterintuitive. Such questions require careful analysis.

1.3 Technology and the evolution of market structure

Far from being static, market structure is in a constant state of flux. For example, improvements in information technology, particularly the advent of electronic trading, are having a dramatic impact on market structure. It is important to understand these changes and their implications for market quality.

Ian Domowitz examines the relationship between trading costs, technology, and the role of intermediaries in financial markets. He shows that the pursuit of lower trading costs has led to the introduction of new, automated trading mechanisms and venues, resulting in potential disintermediation for some intermediaries (traditional retail brokers and stock exchanges, for instance). The move towards limit-order-book markets is discussed. The paper suggests, however, that this new landscape brings with it a fresh set

of challenges, such as liquidity management for participants, which create opportunities for disintermediated entities to reinvent or "reintermediate" themselves.

Allison Holland describes the phenomenon of electronic trading in the U.K. debt markets. She outlines the Debt Management Office's (DMO) policy response to the challenges raised. The DMO's decision to introduce a central, committed interdealer market, while leaving the customer market and the overall level of transparency in the gilt market essentially unchanged, was taken on the basis of an assessment of the fundamental differences between the various market segments.

Technological innovation is fundamentally changing financial markets and the roles of participants, raising potential issues regarding competition, fragmentation, and transparency. If a policy response is considered necessary, it must also address the differential impact that these forces will have on various markets and market segments.

2 Asset-Price Dynamics

Policy-makers are interested in discovering how and why financial market crises originate and propagate across markets. An understanding of how market participants interact with each other, and the incentives that they face, will illuminate these issues. In this context, market-price dynamics are seen as the aggregate effect of the multitude of path-dependent trading decisions made by individual market participants during every minute of the trading day. Seemingly inconsequential details of how markets are structured and how participants interact may, therefore, have important implications for the behaviour of market prices. High-frequency, even tick-by-tick, trading data are often necessary to test market microstructure hypotheses. With the advent of electronic trading, this level of detailed data is becoming increasingly available.

2.1 Understanding dynamics in light of market microstructure

Martin Evans and **Richard Lyons** estimate the price impact of wholesale trades in foreign exchange markets, and they find strong evidence of temporary and (economically significant) persistent price effects from portfolio rebalancing. They also find that these effects are greater when the flow of macroeconomic news is strong. With respect to intervention in currency markets, these findings imply that intervention trades will have a significant price impact if they are sterilized, secret, and provide no policy signal, and that this intervention will have the strongest impact when markets are reacting to macroeconomic news. Within this specialized model, the paper presents a methodology for estimating the impact of such action.

2.2 Price dynamics in markets under stress

Focusing on the interdealer U.S. Treasury market during the Long-Term Capital Management crisis in the autumn of 1998, **Craig Furfine** and **Eli Remolona** examine how different price discovery is in a market under stress. They find that trade flows have an increased impact on prices during periods of heightened trading activity and when market depth is asymmetric. Their findings also suggest that trading had a greater price impact during the crisis, even after controlling for the effects of heightened activity and asymmetric depth.

Toni Gravelle, **Maral Kichian**, and **James Morley** develop a model-based technique for identifying periods of high and low variance by the study of "shift contagion," where correlations between market prices systematically increase during crisis periods. Their methodology has the added advantage that the source of a crisis need not be known. The authors find evidence of shift contagion in the currency markets of developed countries, but not in the bond markets of emerging-market economies.

Markets may behave in a significantly different way when under stress than they do during normal times. Research and policy must take account of the "state-dependent" nature of price dynamics and market behaviour.

Some Continuing Questions

While the research presented led to a number of conclusions, the discussions stimulated several important questions that point to possible directions for future research.

- Are there public-good aspects to market liquidity? If so, what are the implications?
- While markets generally evolve towards good and workable structures, can the existence of multiple equilibria impede the development of first-best solutions? How can first-best solutions be identified? Can policy-makers move markets to first-best optima? Should they?
- What drives market stress? Are there different types of stress, and if so, how are they characterized? Can and should central banks act to alleviate stress? If so, when and how?
- Where are technological developments taking financial markets? Will they make financial markets more efficient? more stable? more resilient? If so, to what degree? Are there costs? And if so, what are they? How far will consolidation go? What are the implications?

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1. In this volume, we have chosen to present, on an experimental basis, non-technical summaries of all of the papers presented. This decision was taken to allow our presenters to publish their conference papers in refereed journals. Where possible, references to the full-text versions of the paper are found on the first page of each of the summaries. The volume also contains the remarks of the

discussants, summaries of the floor discussions, and the panel discussions. Great care was taken to ensure that the volume contains all of the insights generated by the conference.

2. Here we define financial stability as a situation in which there is no meaningful risk that financial system failure would result in significant macroeconomic costs.

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