

Discussion 3

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I enjoyed the conference immensely, and for me it has highlighted the idea that two gestalts were brought together, one micro and the other macro. In a broader context, there remains a micro/macro disconnect, which is evident even in my own thinking. For example, because I come from a macro tradition, when I hear terms like “microstructure effects,” I still think “short-lived,” not resource-relevant—not things that macro people need to think about. And I think this way despite having worked in microstructure a long time.

One thing that is shifting focus away from microstructure “effects” and towards a notion of microstructure as “tools” is that we are thinking a little differently about information economics. Macro people are beginning to appreciate that there is a different way of approaching certain issues that may be relevant at both the macro and micro policy levels. Bridging that disconnect is, for me, one of the most enriching things in a program like this.

Consider the literature on the 1987 stock market crash. Most macro-economists believe that was a significant event. If you look at research done on the crash, at the work of someone like David Romer, a macroeconomist, and of people like Hayne Leland and Sandy Grossman, the models they used were microstructure models. That is, the literature chose microstructure models as vehicles for understanding a very large macro event. The contagion models in our discussion here were also addressing macro events with microstructure tools.

An important conclusion from this is that microstructure models can help us re-evaluate the nature of underlying information environments. Is it an environment of dispersed information, or can we rely on common knowledge paradigms and feel comfortable about them? I believe that these tools are helpful for that sort of thing.

I have split the remainder of my remarks into two parts. The first focuses on policy issues and the second portion concerns research suggested by some of the conference discussions.

Policy point one: Electronic trading has facilitated the collection and integration of data. This should be encouraged.

During the conference, we heard about the concept of reintermediation. I think that was very helpful. Beyond reintermediation, electronic trading has given us access to data. Many of the stories that were told today about order flow driving price and so forth have been going on a long time. But now, because many of these electronic platforms have given us complete archives of what is transpiring inside the black box, we can capture much of the essence. We can measure and evaluate the phenomenon at its source. Consequently, policy-makers might begin to recognize that these types of data exist, and although we haven't traditionally thought about capturing them, policy-makers might start encouraging institutions to do so and to share that data when the incentives are right. More importantly, they might encourage the integration of different types of data. In the foreign exchange market, I have said that the order-flow pie has three pieces (customer-dealer trades, direct interdealer trades, and brokered interdealer trades). Today I discussed one of those pieces. It's as though we are groping at the elephant but we have only identified a small part of it. Therefore, data collection and integration are things that official institutions might help with considerably.

Policy point two: Who owns price?

Who owns order flow? This is not the way we used to think about quantities and prices. Traditionally, quantity and price are not intellectual property. Yet they are very much so in the sense that property rights can be maintained and legislated. I'm not saying that these rights should necessarily be legislated. But who owns price and order-flow information is a legitimate question. Let me give you an analogy. Some of my faculty colleagues who do research in marketing say, "Hey, you should have seen what happened to us on the empirical side when we got hold of scanner data." When you go to the grocery store, scanner data can reveal what you bought, what you bought it with, whether you have kids, how you paid for it, what time of day you shop, and so on. Who owns that information? Lots of institutions collect that information and sell it. Do we think twice about that? Do you say, "Wait, there is value here—shouldn't I own a piece of it, or do they own it?" When a customer trades with a financial institution, who owns the order-flow

information? This is an important property rights question, and I don't think that people have given it enough thought.

Policy point three: Information is an important and growing driver in business.

The intellectual property perspective is changing the way industries are aligned and how they do business. For example, we recently taught an executive program at Berkeley, and I was talking about order flow and how order-flow information is valuable. A fellow who works for Goldman Sachs came up to me and said, "We just bought a company called Spear, Leeds, not because we wanted to be in the transaction business [Spear, Leeds & Kellogg is a market-making company], but because we wanted their order-flow information." That is a remarkable way of thinking about why a merger might create synergy: one institution has price or order-flow information that another institution can exploit. Though this is changing consolidation patterns within the industry, it is not the way we have traditionally thought about consolidation. This issue arose in a number of papers, and I think that the "informational" driver is significant now, more so than it ever has been.

Policy point four: The role of transparency

Transparency has been a big issue at this conference and rightly so. It has many dimensions. Ananth Madhavan's paper (with co-authors Porter and Weaver) focused on pre- and post-trade price information. That is, do I get to see the price before we trade? Why Goldman Sachs might buy Spear, Leeds is related to quantity information post-trade—who owns it and who sees it. One point that was made with respect to the order-handling rules in the equity markets, in particular the over-the-counter equity markets in the United States, was that the big change in order-handling rules in 1997 that Ian Domowitz spoke about was a watershed for the ECNs (electronic communication networks). That rule essentially said that when a broker receives a limit order from a customer, it must show that limit order to the market. The broker can't simply hold the order and use discretion as to what constitutes best execution.

As for foreign exchange (and bond markets), one can think about transparency in these markets in two different ways. First, when a bank has seen all of its order flow and the consummated trades that it has done with its customers, it might be able to use that information to forecast market movements. The second way involves pre-trade information: in any bank's trading room, the spot traders have all the customer limit orders on screen. If you could take all those limit orders that are waiting to be traded and aggregate

them across the market, you would have an aggregated limit-order book (pre-trade quantity information). That is precisely the kind of information that the order-handling rules were designed to address on the over-the-counter equity markets, and few people have thought very much about whether order-handling rules would be a good idea in foreign exchange. There are many sound arguments why full transparency might not be a good idea. But let us also consider dimensions of the transparency question that we haven't addressed yet, for example, the pre-trade quantity information in foreign exchange markets. It's not even on the policy radar screen yet. And again, I don't want to propose that it should be regulated or disclosed. I am simply saying that there is an issue here that hasn't been considered to any great extent.

Policy point five: Market microstructure can be useful for market design purposes.

A number of the papers touched on this point. Official institutions such as the IMF often go to countries where the questions are, "Should I have a forward market in foreign exchange? Would it be stabilizing?" Microstructure theory can help us resolve such questions. If a policy-maker argues that introducing forwards and futures would be destabilizing, microstructure offers a disciplined way of saying, "here is what the theory says." If these conditions hold, then introducing the market might indeed be destabilizing. If these conditions do not hold, then it is not likely to be destabilizing. There is a strong literature for thinking about these issues. The market design dimension (particularly in emerging markets) of much of what was discussed is rife with policy implications and potential applications.

Research point one: What are market-making services?

When we talk about institution design from a traditional microstructure perspective, we typically think about asymmetric information or sharing of market risk and how the two mix. That is largely what microstructure theory is about. One of the things that arose yesterday was that one reason we might have a dealer market in foreign exchange or fixed income is because, for example, IBM does not want to take direct counterparty credit risk with GM. They do not want to consummate a trade directly with GM because they are worried about the settlement or default risk in that direct transaction. So when one asks why we have intermediaries rather than an open, electronic limit-order book where the GMs and IBMs can trade together, the answer that seemed to come out of that discussion is that the service being provided by the market-maker is not a transactional one.

Instead, it is an ability to be the middle person in a transaction that has default risk. If you gave IBM and GM an opportunity to trade directly with one another, they would choose not to do so. That suggests that we have a dealer market structure, not because of market risk-sharing properties or asymmetric information properties, but because of credit-risk management. Microstructure theory has never really considered this, and it is an interesting way of thinking about how we unbundle what dealer markets (or any other type of market) provide. We begin to distinguish features—and they may be the driving features—that were not in our traditional theory.

Research point two: What is the information?

The term “order-flow information” is not particularly clear or helpful. Every microstructure model would say that order flow is the vehicle that conveys information. But what is the information that motivates those orders? Much of the empirical research on fixed income, equity, and foreign exchange markets says that order flow is indeed a proximate driver of price. But what drives the order flow? One could argue, “You haven’t taught me anything because order flow is so close to price that I haven’t really learned anything. You have to tell me what precedes order flow.”

One of the strategies for answering this question starts with the fact that order flow can be disaggregated. Does the flow of non-financial corporations and financial corporations have the same price impact, dollar for dollar? The answer is that in foreign exchange these order flows do *not* have the same price impact. That tells us that the underlying information structure is not just homogenous, undifferentiated demand. There is different information potency in different orders, which reveals something about the underlying information structure that we didn’t know before. It does not pin down the information precisely, but it does help us understand where it is located, and it may establish a new starting point from which we can understand more fully.

Another strategy for pinning down the information in order flow is to think about price at time t as being a function of fundamentals at time t plus expected future fundamentals at time $t + 1$. If one is considering an equity, one could think of these fundamentals as current earnings and expected future earnings, respectively, or, in foreign exchange, as the current interest rate (or current monetary fundamentals) and expected future interest rates. Order flow may be communicating in real time the way the market learns about variations in market expectations of future fundamentals. After all, in asset pricing, expected future fundamentals are the name of the game, and variations in these fundamentals are obviously not common knowledge.

Research point three: What is the role of order flow in impounding information into prices?

If you are thinking about equities, consider earnings announcements, or in foreign exchange, consider macro news announcements. We might ask whether announcement information is going directly into prices, in which case you don't need order flow to move prices. Or perhaps order flow is helping us to reconcile differential interpretations of common data. I believe the answer is the latter. Preliminary results suggest that order flow is even more important to price determination when public data are being thrown at the market, because people interpret that data differently. This suggests that they are using different models. In any event, this is the kind of thing that this type of analysis can help us understand.

Research point four: Are there market failures in informational investment?

We often think about transparency in a context where there is a given amount of information. But does that information get into price more quickly if markets are more transparent? The informational investment perspective says, "No, wait a minute. There is a previous decision that had to be made." If I need to invest in gathering information and the market is so transparent that I cannot execute a trade before price reflects my information, then I am not going to make the initial information investment. In that case, the highly transparent trading process may impound *less* information in price because people are doing less information investment upstream. This is a very important idea, and when we think about transparency and information gathering, we need to consider the informational investment decision.

Research point five: Are there multiple equilibria in liquidity?

I want to talk about liquidity and some of the ideas that have emerged in many of the papers. We had a discussion at lunch, for example, that may be far-fetched, but the basic notion did come out of the ideas of the conference. The Canadian government issues index-linked bonds, which are purchased at auction, but there is very little secondary market trading. The suggestion was that maybe the price that these bonds are issued at is lower than it should be because they are not very liquid (because people aren't trading them). If it were a more liquid market, who would benefit? Certainly the

Canadian government would: it could issue paper at higher prices and thereby lower its borrowing costs.

Here's a simple model. Suppose there are two customer segments. One segment is buy-and-hold and it wants index-linked bonds for a portfolio. The second is a trading segment that may not want to become involved in auctions of index-linked bonds because liquidity in the after-market (the secondary market) is too low. We are caught in an equilibrium where only one of the segments is bidding. If we wanted to shift to a different equilibrium in which both are participating, the central bank could provide liquidity in the after-market to draw in the second customer segment. That second customer segment would then obviously start bidding more at auctions and so forth, which would increase prices.

Why wouldn't a private market participant provide that liquidity? Where is the market failure? The market failure is that the government can internalize the benefit of higher bond prices. It is willing to do the market-making operation because it internalizes the externality of higher bond prices. A private sector market-maker would not be willing to provide that liquidity; only the first of those two customer segments would show up at the auction. I offer this liquidity story as a means of understanding why liquidity might have multiple sticky states. This is a topic that is relevant and that warrants further examination.

