Liquidity and Market Structure: Discussion

David K. Whitcomb

The Journal of Finance, Vol. 43, No. 3, Papers and Proceedings of the Forty-Seventh Annual Meeting of the American Finance Association, Chicago, Illinois, December 28-30, 1987 (Jul., 1988), 634-637.

Stable URL:
http://links.jstor.org/sici?sici=0022-1082%28198807%2943%3A3%3C634%3ALAMSD%3E2.0.CO%3B2-N

The Journal of Finance is currently published by American Finance Association.

DISCUSSION

DAVID K. WHITCOMB*: It is a privilege to be asked to discuss any paper by Miller and Grossman. It also represents a coming of age for market microstructure that such eminent mainstream financial economists should be contributing to it.

Like at least half of the significant theoretical papers in microstructure, the Grossman and Miller paper seeks to model the activities of market makers. The authors' interest is in liquidity, but they rightly point out that we can't understand liquidity, much less measure it, until we have a better understanding of market making, which is the sale of liquidity.

If there have been so many papers on market making, why don't we understand it better? One reason may be that there are so many competing models with no attempt so far at a general synthesis. One set of papers (including Stoll [14], Ho and Stoll [9, 10, 11], Amihud and Mendelson [1], and Mildenstein and Schleef [12])[1] models the pricing and inventory behavior of risk-averse dealers, usually assuming either monopolistic dealers or ignoring the interactions among dealers' quotes. A second set of models (including Bagehot [2], Copeland and Galai [5] and Glosten and Milgrom [6]) allows for risk-neutral dealers who charge a price for liquidity to compensate for losses to traders possessing superior information whose activities are camouflaged by "noise traders".[2] A third model (Cohen, Maier, Schwartz, and Whitcomb, hereinafter CMSW, [3]) treats the price of liquidity as a natural property of markets—even markets without dealers. Transaction costs and a finite number of investors keep price generation from behaving as a continuous-time Weiner process, and the "gravitational pull" of counterpart limit orders results in a positive price of liquidity.

Although Grossman and Miller do not seek "... to expand [the] ... class of inventory models," their model shares the risk-averse market-maker assumption with "inventory models". This leads to some disturbing implications. By equation (15), we have that the expected return of market makers would be zero if "a", the risk-aversion parameter, were zero. This is not a problem in a timeless framework like Grossman and Miller's, except that it implies that market making will be dominated by the least risk-averse individuals. Indeed, it would require some agency-theoretic handwaving[3] to avoid the implication that market making would be the province of corporations in equilibrium and that it would therefore be free. Further, because the Grossman and Miller model does not explore the interactions among market makers in price setting, it does not make it possible to see what would happen to price if market makers did not all have the same risk-aversion parameter. Among all the risk-aversion models of market making, only Ho and Stoll [9, 11], adopting the CMSW model of interaction, explore the effect of differing market-maker prices.

One of the subtle consequences of a model that does not consider pricing interactions among traders is that it leads to policy conclusions such as that "...

* Rutgers University.

[1] Mildensteen and Schleef [12] do not explicitly assume risk aversion, but their Assumptions D.2: (b) and D.3 imply risk aversion.

[2] Grossman and Stiglitz [7] first modeled the activities of noise traders and information traders, though their focus is on market efficiency rather than market making.

[3] See, for example, Stoll [14], footnote 3.

in highly active markets . . . where many separate buy and sell orders are entering the trading pit virtually simultaneously. . . . it might seem that quoted bid-ask spreads and market-makers' profits . . . would be driven towards zero by the competitive entry of new market makers. The market, of course, would then collapse. . . ." The use of the subjunctive made me believe that Grossman and Miller were going to refute this conclusion. However, they then went on to say "To keep markets viable, therefore, exchanges limit the number of 'seats' available to market makers. . . . Exchanges also typically define a minimum price-unit (called a 'tick') which, in highly active markets, serves also to set a minimum on the quoted bid-ask spread and the profits a 'scalper' makes from a quick turnaround." I must say I am shocked to hear from a Chicago Professor and a Chicago Ph.D. that unrestrained competition is a threat to the viability of the market.

Fortunately, this is not so; CMSW [3] show, in a model where there is no minimum "tick" size, that free entry and exit of market makers does not detract from market "viability". Indeed, formal market makers are not needed at all for market viability; individuals provide liquidity to each other when some choose to (*and are allowed to*) trade via limit order. If "outside customers" do not post enough limit orders, market makers will come into existence to sell liquidity. The CMSW model does show that as the flow of orders increases without bound, the spread goes to zero, but that is a cause for rejoicing, not a cause for alarm.[4]

Grossman and Miller defer until after their formal model any mention of the bid-ask spread, because they feel, quite correctly, that the spread is an inappropriate measure of market liquidity. However, the spread is the *eminence gris* of their model. In drawing empirical implications from their model, Grossman and Miller focus on serial correlation. Their equation (24) gives the initially surprising implication that price changes will exhibit negative serial correlation in a world with market makers and that, *ceteris paribus*, assets with higher variability of expected price changes will have higher negative serial correlation.

This implication becomes less surprising when it is realized that it would appear to be built in. First, the authors assume that positive immediacy demand of outside customers at time 1 is exactly offset by new customers with the opposite imbalance at time 2. This enables market makers to buy low (at time 1) and sell high (at time 2), giving them market-making profits and creating *the appearance* of negative serial correlation of price changes. What we really have is just the well-known bouncing of the transaction price back and forth between the bid and the ask, except that, in the Grossman and Miller model, the bid-ask spread is "in the closet".

Negative serial correlation observed in tick-to-tick price change data is purely an artifact of two things: (1) the way we conventionally measure price changes and (2) the minimum "tick" sizes Grossman and Miller appear to favor.[5] There

[4] Clearly, with the large fixed costs of market making posited by Grossman and Miller, the number of traders willing to "make markets" would be limited. Given 1988 technology, however, it is mainly institutional impediments to public limit-order trading in futures exchanges and the OTC market that inhibit competition in market making. See Schwartz and Whitcomb [13] on the role of institutional investors using automated trading systems in providing competition to conventional market makers in equities.

[5] A formal model is given in CMSW [4], Chapter 6. See especially the discussion following Proposition 1.

is no way a trader, however low his or her transaction costs, can profit from the apparent future price predictions. It we could measure price changes *from bid price to bid price* (or from ask price to ask price) and eliminate or control for the price-rounding effect of minimum "tick" sizes, this artifactual negative serial correlation would be eliminated.[6]

Greater price variance will be empirically associated with greater negative serial correlation of returns as Grossman and Miller predict, but for a different reason. Higher variance is associated with higher spreads in both the "inventory" models and the adverse-selection models; and a greater spread means greater artifactual negative serial correlation.

Despite my carping comments, which are exactly what you would expect from a competing market maker in the market-microstructure literature, I welcome the Grossman and Miller model of market making. It is time the big guns of finance were brought to bear on the question of liquidity and on the implications of the demand for liquidity on the relevance of the way we conventionally measure returns. The proliferation of models of market making and the failure of any one model to completely capture all the determinants of the price of liquidity also mandate that we turn our efforts toward a synthesis of the models of market making.

[6] A test of this prediction is possible in equities markets or options markets, where both transaction prices and bid-ask prices are disseminated; but owing to the "crowd" or "open outcry" nature of trading in futures markets (where no limit order "book" is maintained and bilateral trades occur nearly continuously), only transaction prices are observed in commodities and futures markets. Empirical evidence in support of this prediction is given by Hasbrouck and Ho [8], who find that common stock tick-to-tick transaction-price returns are negatively serially correlated, whereas quotation-price returns have much smaller negative correlation on average and the 75th percentile shows positive correlation.

REFERENCES

1. Y. Amihud and H. Mendelson. "Dealership Markets: Market-Making With Inventory." *Journal of Financial Economics* 8 (1980), 31–53.
2. W. Bagehot. "The Only Game in Town," *Financial Analysts' Journal* 27 (1971), 12–14, 22.
3. K. J. Cohen, S. F. Maier, R. A. Schwartz and D. K. Whitcomb. "Transaction Costs, Order Placement Strategy, and the Existence of the Bid-Ask Spread." *Journal of Political Economy* 89 (April 1981), 287–305.
4. ———. *The Microstructure of Securities Markets*. New York: Prentice-Hall, 1986.
5. T. Copeland and D. Galai. "Information Effects on the Bid-Ask Spread." *Journal of Finance* 38 (1983), 1457–69.
6. L. Glosten and P. Milgrom. "Bid, Ask and Transaction Prices in a Specialist Market With Heterogeneously Informed Traders." *Journal of Financial Economics* 14 (March 1985), 71–100.
7. S. Grossman and J. Stiglitz. "On the Impossibility of Informationally Efficient Markets." *American Economic Review* 70 (1980), 393–407.
8. J. Hasbrouck and T. Ho. "Order Arrival, Quote Behavior, and the Return-Generating Process." *Journal of Finance* 42 (1987), 1035–48.
9. T. Ho and H. R. Stoll. "On Dealer Markets Under Competition." *Journal of Finance* 35 (1980), 259–67.
10. ———. "Optimal Dealer Pricing Under Transactions and Return Uncertainty." *Journal of Financial Economics* 9 (1981), 47–73.
11. ———. "The Dynamics of Dealer Markets Under Competition." *Journal of Finance* 38 (1983), 1053–74.

12. E. Mildenstein and H. J. Schleef. "The Optimal Pricing Policy of a Monopolistic Marketmaker in the Equity Market." *Journal of Finance* 38 (1983), 218–31.
13. R. A. Schwartz and D. K. Whitcomb. *Transaction Costs and Institutional Investor Trading Strategies.* New York: Salomon Brothers Center for the Study of Financial Institutions Monograph Series, forthcoming, 1988.
14. H. R. Stoll. "The Supply of Dealer Services in Security Markets." *Journal of Finance* 33 (1978), 1133–51.