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William E. Mitchell

Robert L. Sorensen
sorensen@umsl.edu

Center for International Studies UMSL

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The Economics of Information,
Market Structure, and Pricing
in the Securities Industry.

by

William E. Mitchell

and

Robert L. Sorensen

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I. Introduction

Traditional microeconomic theory explains the process by which markets determine prices, output, and product variety under the simplifying assumption that all market participants possess perfect (costless) information. While it is recognized that, in fact, information is neither perfect nor costless, it is commonly assumed that the other properties of the model do not depend in any important way on this condition. This model predicts that there will be a single market price for identical goods in a perfectly competitive market.

Beginning with the seminal article by Stigler (1961), a theoretical literature began to emerge in the 1970s concerning the economics of market information, which is the study of the microeconomics of producing, obtaining, and using information about the potential terms of trade in a market context. Economics of information models seek to provide explanations of the adjustment to equilibrium that are lacking in traditional models. Hirshleifer (1973) provides a good description of this field of study: In these models, it is assumed that buyers and sellers are uncertain about the market terms of trade of price and quality characteristics of goods and services. They are assumed to have perfect information about their own resources and opportunities, but are uncertain (imperfectly informed) about the demand-supply offers of each other. Information, which reduces uncertainty, is produced basically by buyer search and seller advertising. These activities by buyers and sellers, collectively termed "search," provide a theoretical explanation of how markets adjust to equilibrium. Models of market information

can be divided into three different types: information about price, information about quality, and social welfare implications of market information.

The traditional microeconomic model assumes that prices will be established and will change in predictable ways regardless of the existence or extent of imperfect information. Any exogenous shock, such as a change in the cost of information or entry of new firms into the industry, sets in motion equilibrating forces that lead toward the competitive equilibrium price. In contrast, the economics of information models suggest that the existence of costly information may fundamentally change the expected outcomes of a competitive market. For example, the monopoly price may prevail even in markets with large numbers of small firms (e.g., Diamond, 1971; Scitovsky, 1950)

and prices may be higher in markets with a large number of sellers than in markets with fewer sellers (e.g., Salop, 1976; Stiglitz, 1979; Satterthwaite, 1979).

Moreover, some economics of information models predict that the predominant equilibrium characteristic of competitive markets is price dispersion, not a unique price. By introducing an adjustment mechanism, however, the existence of an equilibrium price dispersion can be explained by the traditional theoretical framework in the following way: Although the competitive pressures of search and advertising would lead toward a single price equilibrium, as price differentials narrowed, the gains from search and advertising would decline. Since it is never profitable to become perfectly informed in a world of costly information, an equilibrium price distribution for a homogeneous good would obtain at the point where the net gains from additional information are zero. Since this equilibrium could be consistent with small or large price dispersion, however, this is an issue of some importance. One observer posed the

question this way: Does imperfect information and the friction of disequilibrium make a substantial difference in market outcomes or does it merely account "for variations in the numbers we observe at the fifth or sixth decimal place" (Rothschild, 1973, p. 1283). By assuming specific behavioral characteristics of buyers and sellers as they search, some economics of information models predict that, for a variety of reasons, price dispersion in competitive markets may be large and persistent (e.g., Salop, 1973; Butters, 1977; Salop and Stiglitz, 1977).

This paper concentrates on several aspects of the impact of information on market price in the retail discount commission brokerage industry. In section II, we describe the characteristics of the industry and the product and, in section III, we examine the data set and the extent of price dispersion in this market. In section IV, we test several hypotheses about the effect of market structure on pricing behavior by discount brokerage firms.

II. Industry and Product Characteristics

There are two reasons why the discount brokerage industry provides an interesting case and a good set of data for studying the impact of informationally imperfect markets on prices. First, this industry offers a relatively homogeneous product, which reduces the problem of adjusting the data for quality differences. Second, since its raison être is to offer efficient, low-cost transactions services, discount brokerage firms publish detailed price information on their services, which provides a good data set.

This segment of the securities industry evolved as a result of legislation that abolished the cartel pricing system in 1975. Most

retail discount brokerage firms offer a single, relatively standardized product called title transfer, which is just one part of total transactions services.¹ In the theoretical model of transacting, Demsetz (1968)

¹ Full service brokers, such as Merrill Lynch, Bache, and E.F. Hutton, also provide a variety of investment advisory services at no additional charge. Thus, their "brokerage" commissions, which are substantially higher than the discounters, are actually a combination of fees for title transfer services and fees for investment advisory services.

divides transacting into two steps: a liquidity function, provided by dealers, and a title transfer function, provided by brokers. The price of liquidity, which is the premium paid by persons for "predictable immediacy of exchange in organized markets" (Demsetz, pp. 35-36), is measured by the bid-ask spread. The price of title transfer is measured by brokerage commissions.² There may be particular trades in which

² There are also minor miscellaneous charges, such as transfer taxes and certificate delivery fees.

a securities firm assumes both dealer and brokerage activities, but they are functions that can be priced separately.

Although brokerage is usually defined as bringing buyer and seller together, it is more accurate to say that generally the broker brings buyer and dealer or seller and dealer together. Thus, brokerage can be defined as an interface service between clients who wish to obtain title transfer services and dealers who perform the execution function. Brokers also function as the interface between their clients and transfer agents, who handle the actual physical transfer of title.

In this study, we assume that brokers are price takers with respect to dealer services, so that variations in the quality of execution services is not an explanation for variations in brokerage commissions.

The price-taker assumption is certainly true for all limit orders that are placed away from the current market price. And for market orders, the alternative is to assume that brokers either fulfill the dealer function themselves, so they have some control over quality, or they are particularly adept at negotiating or searching among dealers for the best bid-ask prices. If a firm was able to offer a title transfer service that included access to better execution, and if buyers recognized this fact, that firm could charge a premium for this higher quality product.¹ Some brokers claim that they can obtain the best price for

¹We are ignoring the potentially more difficult issues of quality perception by buyers, which may be influenced by advertising.

clients, presumably by searching for dealers with the most favorable bid-ask spread. But this fact is virtually impossible for the client to verify. Moreover, it is questionable whether, in fact, brokers search.

The brokerage function itself is limited to a few relatively standardized items:

1. receive, transmit, and confirm title transfer orders;
2. provide supporting documentation, such as confirmation and monthly statements;
3. handle the payment and dispersal of money related to trades;
4. collect and deliver securities certificates;
5. manage margin accounts and free credit balances;
6. provide custodial services.

Item 1 represents the brokerage function that facilitates execution of the trade. Items 2, 3, and 4 are known collectively as the "clearing" function. Money and certificates change hands between buyers and sellers

through their brokers.¹ Items 5 and 6 are ancillary services.

¹The selling broker delivers the security to the buying broker. (This is accomplished on a net trading basis by specialized clearing institutions.) The buying broker sends the certificate to the appropriate transfer agent (usually a commercial bank), who issues a certificate in the name of the new owner. The certificate is then delivered to the new owner through the buying broker.

Discounters and small full service brokers often contract out one or more of items 2-6 to firms that have excess capacity to handle these routine chores. For example, the most specialized type of discount broker is the so-called "introducing broker," who actually performs only one phase of the first function listed above. This type of firm receives and transmits orders to another broker who, in turn, directs them to dealers. Confirmation is then relayed back through the introducing broker to the client. One or more of the remaining functions are performed by another firm, often a large full service broker like Merrill Lynch who, in effect, participates indirectly in the discount brokerage business.

In summary, there is no reason to believe that there are significant or systematic differences in the quality of title transfer services offered by firms in the retail discount commission brokerage industry. Indeed, the smallest firm could contract with a highly efficient clearing broker for many of its functions and provide a service equal to or better in quality than a competitor who is much better capitalized. The product is rendered more homogeneous by the protection against fraud or mismanagement afforded by SIPC insurance, which is often supplemented by individual firms with private insurance.

III. Pricing Characteristics

In this section, we examine the pricing characteristics of a sample of discount firms. The firms in the sample were identified through a process of searching advertisements in Barron's, Wall Street Journal, yellow pages of telephone directories, and local newspapers. We obtained price data and the characteristics of services offered by 68 firms that advertised discount commission rates during 1979. These firms had home offices or branches in 26 different cities that were geographically separated enough to be considered independent local market areas. These markets were located throughout the United States.

Table 1 provides information on mean price, maximum and minimum

TABLE 1
Selected Statistics for Discount Brokers

Trade	Mean	Minimum	Maximum	Coefficient of Variation	Adj. Coefficient of Variation*
200 shrs. @ \$20	\$ 45	\$ 30	\$ 70	19.5%	18.5%
300 shrs. @ 30	78	37	135	25.4	22.7
400 shrs. @ 40	113	50	224	29.7	26.1
500 shrs. @ 50	146	62	290	31.3	28.2

* see text for details of adjustment procedures

price, coefficient of variation, and adjusted coefficient of variation (discussed below), that were computed from our sample of discount brokers for selected trades. It is evident that a good deal of variation exists in the commissions charged for the same trade by discount brokers. The coefficients of variation range from 19.5% to 31.3% and the maximum price exceeds the minimum price by a factor of 2.5 to 4.5 times.

To gain perspective on the significant price dispersion among discount brokers, Table 2 presents similar information for a sample of

TABLE 2
Selected Statistics for Full Service Brokers*

Trade	Mean	Minimum	Maximum	Coefficient of Variation
100 shrs. @ \$ 31	\$ 63	\$ 60	\$ 66	2.9%
1000 shrs. @ 8	208	200	225	4.1
3000 shrs. @ 17	650	606	679	3.0

* source: Survey by Kennedy, Cabot Co. 1979

full service brokerage firms drawn from a different source. As demonstrated by a comparison of the data in Tables 1 and 2, price dispersion among discount brokers is 4 to 7 times higher than for full service brokers. Full service brokers apparently choose to engage in nonprice competition through the provision of investment advisory services, which are bundled with title transfer services.¹

¹ Although it is beyond the scope of this paper to examine why the pricing structure is dramatically different for these two segments of the securities industry, there is one point worth noting. The market structure of the discount brokerage industry is more competitive than the full service segment of the industry. The pricing structures of these two industries are consistent with Stigler's (1961) proposition regarding market structure and price dispersion: Since price dispersion engenders search, and search cost is a cost of goods sold, which reduces quantity demanded, firms in industries with monopoly power will find it in their collective interest to have less price dispersion.

The data in Table 1, however, may only represent "apparent" rather than "real" price dispersion if the amount of services (i.e., cost of operations) differs among firms. Since the firms in our sample differ

to some extent with respect to services offered in addition to title transfer, these data constitute an upward boundary to the amount of actual price dispersion within the industry. In order to obtain a tighter fix on the amount of actual price dispersion, we estimated how much of the variation in commission charges could be accounted for by variation in the range of ancillary services offered among firms.

We identified three important services that differed among firms:

(a) Investment Advisory Services. Some firms that advertised discount brokerage commissions also offered investment advisory services, such as individual security and portfolio analysis, buy and sell recommendations, and investment newsletters. This service should raise their cost of operations above those firms in the industry that offer only title transfer services. Therefore, we expect commission rates will be higher for firms that offer investment advisory services.

(b) Interest Paid on Free Credit Balances. Some firms pay interest on idle account balances. These arrangements usually involve the use of overnight repurchase agreements with banks or money market mutual funds. Since this is a level of service beyond title transfer, we expect that firms offering this arrangement would have higher commission rates.¹

(c) Branch Offices. Most of the firms in our sample operate from a single location, but some of them have established branch offices in other cities. This service provides clients with more convenient access to the firm, but raises the fixed cost of operations. We expect that firms with branch offices will have higher commission rates.

Equation (1) represents the form of the regression estimated to

¹It is not clear that providing this service will actually raise the cost of operations to the firm, since the firm may receive services in kind or fees for directing customers balances to a particular bank or mutual fund.

account for the foregoing factors:

$$(1) \text{COM}_i = a_0 + a_1\text{ADV} + a_2\text{INT} + a_3\text{BR} + e$$

where:

COM_i = commission charged by firms for trades in Table 1 ($i = 1,4$);

ADV = a dummy variable with value of 1 if firm offers investment advisory service, otherwise 0;

INT = a dummy variable with value of 1 if firms provide for interest on free credit balances, otherwise 0;

BR = a dummy variable with value of 1 if firm operates branch offices, otherwise 0.

The results of the regressions are reported in Table 3. In general,

TABLE 3

Regressions Explaining Commission Levels
(t values in parentheses)

	INTERCEPT	ADV	INT	BR	R ² **
COM2	45.0 (28.3)*	5.57 (1.99)*	-2.16 (0.99)	4.26 (1.05)	.10
COM3	75.4 (22.5)*	19.95 (3.23)*	-4.23 (0.92)	17.73 (2.08)*	.20
COM4	109.7 (19.7)*	38.5 (3.75)*	-9.60 (1.20)	20.15 (1.82)*	.23
COM5	142.8 (18.5)*	48.15 (3.37)*	-13.19 (1.23)	17.29 (0.98)	.20

* significant at .05 level or better

** adjusted for degrees of freedom

the coefficients on the variables are of the expected sign, and many are statistically significant at the 5% level or better. The coefficient for the advisory service variable is positive, as expected, and significant.

in all of the equations. The coefficients for the branching variable also have the expected positive signs and are significant in two of the four equations. Finally, the coefficient for the interest rate variable is negative, but is not significant in any of the equations.

Most important for present purposes is the amount of observed price dispersion that can be accounted for by the differences in firm characteristics. The residual variance left unexplained by the regression is given by $(1 - R^2)$, where R^2 is the coefficient of determination of the regression equation. Thus, the percentage reduction in the standard error due to the regression can be calculated as $1 - \sqrt{1 - R^2}$. Applying this adjustment factor to each of the trades listed in Table 1 yielded the adjusted coefficients of variation given in column 5 of that Table. While specific firm characteristics account for some of the variation in prices among discount brokers, substantial price dispersion remains even after adjustment.

The preceding analysis implicitly assumed that the market for discount brokerage services is national in scope. But if the relevant market is local, then some of the observed price dispersion may reflect differences in spatially separated markets that are not arbitrated away. While, in principle, there is nothing to prevent a client from dealing with a broker in any area of the country (most firms offer free WATS service), there are reasons to believe that, to some extent, the relevant market for brokerage services is local. First, the existence of branching by some discount brokers suggests that these firms believe it is important to have offices close to the potential customer base. Second, clients may prefer to deal with local brokers to take advantage of such facilities as stock quotation machines and library materials that are provided in the broker's office. Finally, clients may feel that dealing with a local broker will expedite the solution to any problems that arise,

such as incorrect execution or errors on monthly statements.

In order to investigate the impact of geographical differences on the observed level of price dispersion, the firms and branch offices were sorted by location of the city in which they operated. Since the firms that offer investment advisory services were found to have significantly different prices from those that do not, they were dropped from the sample. Then, for each city location, the mean price and coefficient of variation were calculated within the city for various trades. The results of these calculations are presented in Table 4. It is evident that, even within individual cities, substantial variation still remains for commissions charged for the same transaction. We conclude that the price dispersion observed for the complete sample is not simply a statistical artifact of spatially separated markets.

IV. Information, Competition, and Prices

The analysis so far has indicated that a substantial amount of price dispersion exists for commission charges of discount brokers. Since "price dispersion is a manifestation--and, indeed, it is the measure--of ignorance in the market (Stigler, 1961, p. 214), we conclude that the discount brokerage industry is characterized by imperfect buyer information. We now turn to a test of some of the hypotheses about the role of competition under conditions of imperfect information.

Standard microeconomic theory generally associates price competition with the number of firms in an industry. Increases in the number of firms through entry is expected to lower the industry equilibrium price. Under conditions of costly or imperfect information, however, this conclusion does not necessarily obtain; increases in the number of

TABLE 4

	Coefficient of Variation				Mean Price			
	COM2	COM3	COM4	COM5	COM2	COM3	COM4	COM5
New York	19.1	27.8	30.9	32.2	\$42	\$70	\$102	\$128
Boston	17.8	31.1	43.3	53.5	43	65	91	125
Philadelphia	6.0	13.3	15.0	18.7	51	88	130	175
Washington D.C.	8.3	6.0	17.1	24.2	51	94	136	181
Houston	0.0	0.8	18.7	17.5	48	89	106	133
Rochester	3.0	4.9	5.3	5.9	54	101	159	203
Chicago	12.3	15.3	22.2	27.3	44	79	106	140
St Louis	1.4	0.9	0.7	0.6	50	75	100	110
Cleveland	24.6	23.6	23.5	12.6	46	90	141	179
Cincinnati	10.2	3.2	18.5	29.5	62	110	156	202
Miami	16.4	11.7	16.0	27.7	47	82	120	150
Memphis	13.5	7.2	0.0	0.0	42	79	118	163
Atlanta	24.6	18.8	18.3	18.5	46	86	135	187
San Francisco	13.5	12.3	21.6	19.3	48	91	127	157
Los Angeles	7.5	9.9	14.2	16.5	46	87	110	143
Phoenix	6.9	9.5	29.3	25.4	50	95	126	154
Dallas	0.0	0.8	18.7	17.5	48	89	106	133

firms within the industry may act to raise rather than lower the equilibrium price.

This seemingly paradoxical conclusion arises because of the interaction between the number of firms and the efficiency of search (Salop, 1976; Satterthwaite, 1979). More specifically, an increase in the number of firms acts to increase the effective search cost of buyers. If buyers search in an optimal fashion, then an increase in the cost of search will result in a reduction in the amount of search undertaken. The effect of less buyer search is to reduce the elasticity of demand facing the individual firm, which implies a higher equilibrium price. Thus, increases in the number of firms has two countervailing effects: the usual effect of increasing consumer choice and reducing prices, and the effect of reduced information on the elasticity of firm demand. Therefore, "the net effect of increased competition may be either to raise or lower prices" (Salop, 1976, p. 245).

An empirical test of these propositions can be made within the context of pricing in the discount brokerage industry. If increases in the number of firms increases effective search cost and reduces the intensity of search, then markets with larger numbers of firms should exhibit greater amounts of price dispersion. In addition, if the effects of increased search cost outweigh the normal effects of entry, then mean prices should be higher in markets that have greater numbers of firms.

In order to test these propositions, we examine the relationship between the number of firms within each city in our sample and the resulting coefficient of variation of prices and mean price. The coefficient of variation is taken to measure the intensity of search, since greater amounts of search should reduce the allowable dispersion

of prices.¹ The mean price is taken to measure the equilibrium price

¹It is important to note that we are working with quoted prices rather than transaction prices. While, as Rothschild (1974, p. 692) notes, "It should turn out in most sensible models that increased search activity will decrease price dispersion," our statement is not on as theoretically solid grounds as the proposition that increased search from an unchanging distribution of prices lowers the mean and variation of transaction prices.

within each city.

Table 5 presents the results for regression equations across cities

TABLE 5

Regressions for Price Dispersion Across Cities
(t values in parentheses)

	INTERCEPT	NFR	SIMBR	R ² **
CVCOM2	16.8 (5.87)*	.46 (1.99)*	-.13 (3.69)*	.46
CVCOM3	14.8 (4.60)	.87 (3.28)*	-.11 (2.99)*	.48
CVCOM4	17.8 ⁱⁱⁱ (3.59)*	.76 (1.80)*	-.04 (0.73)	.10
CVCOM5	18.6 (3.04)*	.84 (1.67)	-.03 (0.45)	.06

*significant at .05 level or better

**adjusted for degrees of freedom

in which the dependent variable is the city's coefficient of variation of prices (CVCOM). The equation contains two independent variables. The first is the number of firms operating within the city (NFR). If increases in the number of firms does result in higher search cost and less intensity of search, then the coefficient for this variable ought to be positive. The second variable is an index to reflect the similarity

of firms within each city with respect to the branching characteristic (SIMBR). Since firms with branch offices were previously found to typically charge higher prices, some of the variation in prices within cities could be attributable to differing mixes of branch and non-branching firms. The index is designed to vary between zero and one hundred. It reaches its maximum value when all the firms within a city are identical with respect to the branching characteristic (i.e., none of the firms are branch firms or all of the firms are branch firms). It reaches a value of zero when there is maximum dis-similarity of firms with respect to branching (i.e., 50% of the firms are branch firms and 50% are not). Since the greater the similarity of firms with respect to branching the less dispersion we expect, the coefficient for this variable should be negative.¹

¹Specifically, this variable is calculated as two times the absolute value of 50 minus the percentage of firms that are branches.

The results shown in Table 5 conform to the theoretical expectations of some economics of information models. The coefficient for the number of firms variable is positive and significant at the 5% level or better in three of the four equations. The coefficient for the similarity of branching is always negative, as expected, and is significant in two of the four equations. These results are consistent with the notion that increases in the number of firms raises effective search cost and reduces the intensity of search.

Does this imply that the net effect of increasing competition is to raise mean prices? Table 6 presents regression equations across

cities in which the city's mean price is the dependent variable (MCOM).

TABLE 6

Regressions for Mean Prices Across Cities
(t values in parentheses)

	INTERCEPT	NFR	PERBR	R ² **
MCOM2	48.6 (25.7)*	-.287 (1.76)*	.017 (0.80)	.10
MCOM3	81.8 (23.5)*	-.525 (1.85)*	.123 (2.98)*	.38
MCOM4	118.6 (15.1)*	-.877 (1.27)	.141 (1.52)	.15
MCOM5	151.9 (12.0)*	-1.172 (0.97)	.207 (1.39)	.10

* significant at .05 level or better

**adjusted for degrees of freedom

Each equation contains two independent variables. The first variable is the number of firms operating within each city. If price competition is actually impaired by large numbers of firms, then the coefficient for this variable ought to be positive. The second variable is the percentage of firms within each city that are branching firms (PERBR). Since branching firms have higher prices in general, it is expected that the greater the percentage of firms in a city that are branches, the higher will be that city's mean prices.

The results shown in Table 6 give no indication that the net effect of increased competition is to raise rather than lower prices. The coefficients on the number of firms variable are consistently negative and significant in two of the four equations. The effects of competition

predicted by standard microeconomic theory seem to obtain. The branching variable is positive, as expected, but is significant in only one of the four equations.

V. Summary and Conclusions

This paper has investigated the pricing behavior of discount brokerage firms. One striking characteristic of this industry is the significant amount of price dispersion that exists for commissions charged for identical transactions. The fact that this cannot be explained by differences in the service offerings of firms or imperfectly arbitrated spatial markets suggests that this is an information based phenomenon. Using the observed price dispersion within cities as a measure of the degree of consumer ignorance several hypotheses about the interaction of information and competition were examined. The results obtained are consistent with the theoretical notion that competition (as measured by numbers of firms) increases effective search cost and reduces the intensity of search. Nonetheless, the net effect of increased competition was found to lower rather than raise prices.

The results of this study of course must be considered tentative. Not all aspects of the consumer information acquisition process were taken into account nor the behavior of sellers in providing information (e.g., advertising). Despite these shortcomings, the results presented here suggest that information does play a quantitatively important role in influencing pricing outcomes within the discount brokerage industry.

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