

INVESTOR RELATIONS, LIQUIDITY, AND STOCK PRICES

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"It is fully as important to the stockholders that they be able to obtain a fair price for their shares as it is that dividends, earnings and assets be conserved or increased. It follows that the responsibility of management... includes the obligation to prevent... the establishment of either absurdly high or unduly low prices for their securities."

—Graham and Dodd, *Security Analysis*, 1951

The investor relations profession is concerned with the interface between the firm and its management, on the one hand, and the firm's shareholders on the other. Although the first investor relations department was established by General Electric as long ago as 1952, and although the National Institute of Investor Relations, set up in 1969, now has over 4,200 members, the role of investor relations is one that has largely escaped scientific analysis and academic scrutiny. This lack of attention is due in part no doubt to the intellectual supremacy of the efficient markets paradigm, which has lasted from the beginnings of rigorous empirical research in finance in the late 1960s until recently. In the idealized setting of the efficient market, a firm's stock price is set taking proper account of all available information, and there is little that the firm or its professional advisors can do about the price beyond pursuing appropriate real investment and financial policies. Sufficient conditions for the validity of the efficient markets hypothesis are that information about firms is costless, available to all, and, most important, can be easily understood by all potential investors. These condi-

tions are clearly not satisfied in practice, so it is an empirical matter whether prices are in fact set as if they were satisfied. There are reasons to suspect that prices might not conform to the predictions of the idealized market theory and, as we shall see, considerable evidence to that effect.

Firms are complex institutions with strategies, plans, commitments, personnel policies, competitive threats, and managerial succession problems, as well as patents, research programs, and products that are often technically sophisticated. All of these aspects of the firm can have a major effect on the value of its shares, yet none of them can be assessed adequately by reading traditional corporate financial statements, or even the footnotes and commentary that accompany them; and in many cases considerable technical (as well as financial) expertise is required to understand the issues that are important for determining firm value. Interpretation and communication of this information to financial markets are effected largely through the intermediation of financial analysts, of whom there are about 2,400 in the U.S.¹ These analysts are often highly paid, in some cases earning as much as \$10 million a year²—

¹We are grateful to Alberto Bertoni, Maurizio Dalocchio, Carla Hayn, and Marilyn Johnson for helpful conversations and suggestions.

²*New York Times*, July 18, 1999. One way in which firms respond to the inadequacy of financial statements is by direct contact with analysts. Quarterly telephone conference calls between firms and analysts have become common in

the past five years. They are especially common in growth industries where traditional financial statements are least informative. See Sarah H. Tasker, 1998, Bridging the Information Gap: Quarterly Conference Calls as a Medium for Voluntary Disclosure, *Review of Accounting Studies*, 3, 157-167.

³*Ibid.*

a fact that seems to contradict the predictions of the most extreme (known as "strong form") efficient markets proponents that such analysis is largely redundant. It is not surprising therefore that, after a long period in which academics have been skeptical of the value of investment analysis, there are now several studies attesting to the informational content of analyst reports.³

In making their decisions about the companies on which to concentrate their efforts, analysts will be influenced by the relative costs and benefits of acquiring information about the different firms. From an analyst's point of view, the benefits will depend mainly⁴ on the size of the firm and the number of potential investors who will be interested in the analyst's conclusions.⁵ Other important considerations include the liquidity of the market for the firm's shares, which will determine the extent to which the information can be exploited before the price moves to reflect it, and the likelihood of discovering valuable new private information by diligent analysis of the firm. The costs to the analyst of acquiring information about a firm will depend on the size and complexity of the firm and its operations, but also on the steps that the firm takes to make information easily available to its investors. This suggests that firms will be able to influence the extent to which they are followed by analysts by their policies with respect to disclosure of information.

A firm's disclosure policy is perhaps the most significant aspect of its investor relations management. We shall show first that a firm's attention to investor relations tends to increase the number of investment analysts who follow the firm and publish earnings forecasts for it. Second, we will review evidence from academic studies—most of them fairly recent—that suggests that the number of analysts who follow a firm affects the liquidity of the trading in the firm's shares. Third and last, we will present evidence that increases in liquidity, by reducing the cost to investors of transacting in the firm's shares, reduce the firm's cost of capital and thereby increase its stock price. In short, the article demonstrates the link between a firm's investor relations policy and its stock price.

Properly conceived, investor relations management is a considerably broader undertaking than simply disclosing information to investors and analysts. For example, a systematic program of investor relations can increase the credibility of a firm's investment or product strategy—and such credibility can prove invaluable when a firm is approaching the capital market for additional finance, attempting to take over another firm, or warding off an unwanted suitor that is soliciting support for a merger proposal or a proxy contest. A particularly good example of bad investor relations is illustrated in the case of Olivetti (see box on the next page). The experience of the Italian telecommunications firm illustrates that no amount of cosmetic investor relations work can substitute for a lack of trust between a company's management and its shareholders.

In this paper, however, it is the first, narrower role of investor relations as information disclosure that is our primary concern. Before turning to the empirical evidence on the effect of investor relations efforts on the size of a firm's analyst following, we shall briefly summarize the development of professional investor relations management in the U.S.

THE DEVELOPMENT OF INVESTOR RELATIONS MANAGEMENT⁶

Recognition of the importance of dealing with a company's shareholders seems to have emerged first in the early 1950s, as the post-war prosperity and stock market boom attracted large numbers of individual shareholders back into the market. Between 1952 and 1965, the proportion of the American population owning stock directly rose from 4% to 15%. In 1954 institutions held less than 24% of total U.S. equities, as compared with over 50% today. As the official history of the National Investor Relations Institute notes: "the small size and relative inactivity of institutional investors in the period 1950-70 stands in sharp contrast to the rapid growth and rising activism of individual owners. It is they who fostered investor relations at the outset." Individual corporate gadflies such as Lewis Gilbert peppered directors at annual general meetings with

3. See Womack, K. L., 1996, Do Brokerage Analysts' Recommendations Have Investment Value?, *Journal of Finance*, 51, 137-167 and the papers cited therein.

4. An increasingly important aspect of investment analysis is its role in attracting underwriting business to an investment bank.

5. Since most large institutional investors are precluded from selling short, the main target of analysts is the current owners of the stock who may either buy more

shares or sell, as well as non-owners - the latter will generally only be interested in buy recommendations. This helps to create a bias towards positive reports, and also leads analysts to concentrate on large firms in which the number of current owners who are potential sellers is greatest.

6. This section draws heavily on *The Origins of NRI* by DeWitt C. Merrill, which is available on the National Investor Relations Institute website (<http://www.niri.org>).

AN ANNUS HORRIBILIS FOR INVESTOR RELATIONS AT OLIVETTI

- January 6, 1996. "Olivetti rights fully subscribed" \$1.42 billion.
- January 30, 1996. "Olivetti shareholders should be spitting blood. Only last month they were induced to stump up \$1.4 billion in new equity. Now it turns out that losses...are likely to be worse than investors were led to believe... Olivetti says the full picture emerged only after the rights issue, but it is hard to believe... Olivetti also denies leaking details of the profits plunge to analysts...The latest rights issue was supposed to mark an end to Olivetti's record of failing to deliver on promises..."
- September 25, 1996. "The imbroglia at Olivetti ...has raised serious questions for international fund managers. In Italy, the most important business is still conducted behind closed doors, with small shareholders and fund managers on the outside.

The number of European companies quoted on the NYSE has risen sharply...to qualify they must be much more open...complying with American regulations on disclosure of information to shareholders."

- October 23, 1996. "Olivetti alleges Mr Francesconi caused serious damage to the company by calling into question the accuracy of the group's accounts—statements that forced its shares to be temporarily suspended...both Mr Benedetti and Mr Caio, another former chief executive are under investigation for alleged false reporting of company accounts."
- November 6, 1996. "Mr Carlo De Benedetti was under investigation for alleged insider dealing in shares..."
- November 29, 1996. "De Benedetti told parliamentary deputies that clients and investors were distancing themselves from the company because of the distrust, the investigations, and the denigration."

Financial Times

pointed questions about their devotion to shareholder interests,⁷ while corporate managers discussed what it was that shareholders wanted — liberal dividends, frank disclosure, and a striving to increase the stock price, as one manager claimed.⁸ It is not surprising that, in this atmosphere, companies or, more precisely, corporate managements fought back with public relations campaigns. In 1953 General Electric Co. became the first company to create a specific department in charge of investor relations, although other companies had recognized the potential of small shareholders as purchasers of company products.⁹ Further impetus came from the rapidly growing new profession of investment analysts and their demand for increasingly detailed financial information about the corporation, which exceeded the capabilities of the traditional public relations firms on which managements had traditionally relied. The media also were skeptical of reports issued by the public relations departments of firms, and it was increasingly necessary to devise specialized channels for communicating with the burgeoning army of

sophisticated analysts and financial journalists. By 1958 the American Management Association was holding conferences on Investor Relations. Further conferences and meetings gradually gave birth to the Investor Relations Association, which in 1969 metamorphosed into the National Investor Relations Institute. In 1980 a similar society was formed in London.

The 1980s saw increasing importance for investor relations as the active market for corporate control made it more imperative than ever for corporate managements to be concerned about their stock prices and to communicate to the investing public the credibility of their vision and strategy lest they lose the loyalty of their shareholder base in a takeover contest. The increasing activism of institutional investors, following the example of public pension funds like CalPERS, and the formation of individual shareholder rights groups such as The United Shareholders Association (which was founded in 1986 and disbanded in 1993) has made the profession of investor relations management more important than ever. This can be seen not only in the

⁷ In 1950 Gilbert and his brother were attending over 100 meetings a year. The concerns they raised are not dissimilar to the concerns of stockholders today. See Lewis D. Gilbert, "Management and the Public Stockholder, 1950" *Harvard Business Review*, 38, 73-83. A sign of the times was the 1955-56 movie, "*The Solid Gold Cadillac*" in which the heroine bested a cold-hearted management at the annual general meeting.

⁸ W. F. Stanley, 1950, "A Key to Good Stockholder Relations," *Harvard Business Review*, 38, 66-72.

⁹ In 1950 Ford Motor Company's stock issue was targeted at holders of 200 shares or less in a conscious effort to create a body of loyal customers.

In making their decisions about the companies on which to concentrate their efforts, analysts will be influenced by the relative costs and benefits of acquiring information about the different firms. One important consideration is the liquidity of the market for the firm's shares, which will determine the extent to which the information can be exploited before the price moves to reflect it.

number of members of the National Investor Relations Institute, but also in their compensation. A recent poll found that senior investor relations officers earned an average of \$263,000 in 1997, with the elite earning over half a million dollars.¹⁰

A potentially dark side to investor relations activities has arisen among smaller firms, which generally lack the resources to employ their own professional investor relations people. Certain investment banks make it a practice to approach such firms, offering to produce a research report to be circulated among investors in return for payment in options or warrants. But if such arrangements clearly smack of conflicts of interest,¹¹ their existence attests to the perceived importance of investor relations activities for maintaining the stock price.

INVESTOR RELATIONS, INVESTMENT ANALYSTS, AND INFORMATION

In a 1989 investigation of how investment analysts choose which firms to follow, Ravi Bhushan¹² of MIT found that analysts were more inclined to cover the following types of firms:

(1) *large* companies. Because such firms typically have the largest number of shareholders, it is in these cases that analyst reports are most useful to existing shareholders, since they can react to negative reports by selling part of their holdings and to positive reports by buying more shares. Since "sell-side" analysts are rewarded by the trading commissions they generate for the brokerage firms that employ them, they have an obvious incentive to concentrate their efforts on firms with many shareholders.

(2) companies with *few lines of business*. Such firms tend to be more transparent and easier for the analyst to understand, so that the cost of analysis is lower.

(3) companies with *low insider holdings* and *large institutional holdings*. Heavy insider ownership is generally associated with lower trading volume, and insiders are unlikely to be significant users of analyst information. Institutional investors, by contrast, often require documented analyses by analysts and other third parties to justify their portfolio decisions.

Bhushan's study also reported—and keep in mind this is a study of the 1980s—that analysts prefer

to follow firms in the following industries (and in this order of preference): mining, utilities, financial institutions, services, construction and manufacturing, wholesale and retail trade. The first three of these industries are ones in which the analyst's expertise is likely to be of most value. For mining firms the volatility in the price of a single homogeneous output can be easily translated into information about earnings; and for both utilities and financial services, regulation dictates that a plethora of information be available to assist the analyst in transforming information about input and output prices and demand growth into information about earnings. By comparison, firms in services and manufacturing are typically much less transparent, so that the analyst's primary task of forecasting earnings is correspondingly more difficult. Bushan's investigation confirms what we might expect—namely, that analyst decisions about which firms to follow are governed in large part by a simple cost-benefit calculus.

The ability of this simple cost-benefit model to explain analyst decisions suggests that investor relations activities that reduce the cost of information to analysts would also stimulate analyst coverage, and such indeed seems to be the case. While there is perhaps only limited credibility in a National Investor Relations Institute study that finds that the number of analysts following a company is influenced by investor relations activities, these findings are confirmed by a number of independent academic studies.

For example, a 1997 study by Francis, Hanner, and Philbrick¹³ examined the reactions of investment analysts to firms' presentations to the prestigious New York Society of Financial Analysts. These presentations give firms an opportunity to "tell their story" to the analyst community. The authors find a significant increase in the number of analysts who are active in forecasting the earnings of firms after they made such presentations. And this effect is most pronounced for smaller firms; whereas the increase in the number of analysts is only 9% for large firms (whose many shareholders already create a large demand for analyst coverage), the increase in the number of active analysts is an impressive 21% for small firms—those companies for which the costs

10. "When it Comes to IR, the Rich get Richer", *Investor Relations Business*, January 4, 1998, 1-11.

11. "Starred for Attention, Small Companies 'Buy' Wall Street Coverage", *Wall Street Journal*, July 14, 1998.

12. Ravi Bhushan, 1989, Firm Characteristics and Analyst Following, *Journal of Accounting & Economics*, 11, 255-274.

13. Jennifer Francis, J. Douglas Hanner, and Donna R. Philbrick, Management Communication with Securities Analysts, *Journal of Accounting and Economics*, 24 (December, 1997), 303-334.

TABLE 1 ■ DETERMINANTS OF ANALYST COVERAGE (LANG AND LUNDHOLM, 1996)^a

	Sign	Coefficient	Variable	t-statistic
Number of Analysts Following Firm =		0.17	Constant	(0.20)
	Plus	0.02*	FAF Annual Report Score ^d	(0.80)
	Plus	0.07*	FAF Other Publications Score ^d	(2.30)
	Plus	0.10*	FAF Investor Relations Score ^d	(3.50)
	Plus	0.59*	Firm Market Value	(23.0)
	Minus	0.05*	Sigma (ROE)	(1.80)
	Minus	0.06*	Return-Earnings Correlation	(2.70)

*N = 998, R² = .45

a. The FAF scores are developed by the Financial Analysts Federation and are based on the assessments of committees of analysts on the firm's disclosure performance in their *Annual Statements*, *Other Publications*, and general *Investor Relations*. The data relate to the fiscal years 1985-89.

and benefits of investment analysis are likely to be more closely balanced.

Also of interest in this context, a 1996 study by Lang and Lundholm¹⁴ reports that the higher is the quality of the information provided to analysts by a firm (as assessed by the Financial Analysts Federation Corporate Information Committee), the more accurate are analysts' earnings forecasts for the firm, the greater is the agreement among the forecasts of different analysts, and the greater is the number of analysts following the firm. The improved accuracy is, of course, consistent with the improvement in disclosure. The greater agreement among analysts is consistent with their greater reliance on the common body of information that is disclosed by the firm. Finally, the larger analyst following is consistent with the cost of information to the analysts being reduced by the firm's disclosure.

Table 1 reveals the strong relation between the number of analysts following the firm and both firm size and the Financial Analysts' scores for "Investor Relations" and for "Other Publications" (i.e., other than the annual report) as well.¹⁵ The Investor Relations score is based on perceived responsiveness to analyst questions, accessibility, and candor of management, as well as the frequency and content of presentations to analysts.

There is also an abundance of anecdotal evidence that analysts prefer to follow firms that provide

them with adequate and timely information. For example, one analyst was quoted as saying:

*"I don't follow Pullman because they won't tell you enough about their business to allow you to get a handle on it... If they change and become more open with the Street, there is no doubt I'd take more interest in Pullman."*¹⁶

Another analyst describes his relationships with the investor relations officer and senior executives as "essential and critical":

*"I want to know if there is anything new when I call... I expect a call when there is something new, good or bad... realistically I can give few second chances, so give us signals. Hell has no fury like an analyst surprised."*¹⁷

The preferences of analysts for firms that provide extensive information is shared by the institutional investors who are analysts' primary clients. A 1996 study by Falkenstein¹⁸ finds that mutual funds tend to invest more in companies that are in the news, as well as older and larger companies with more established track records. This preference for larger firms is especially true of foreign investors. For example, a 1997 study by Kang and Stulz reports that foreign investors own 11.9% of the firms in the largest

14. Mark H. Lang and Russell J. Lundholm, "Corporate Disclosure Policy and Analyst Behavior," *Accounting Review*, 71 (October 1996): 407-492; see also Edward J. Farragher, Robert Kleiman, and Mohammed S. Bazaz, "Do Investor Relations Make a Difference?", *The Quarterly Review of Economics and Finance*, 34 (Winter, 1994): 405-412.

15. The lack of significance of the "Annual Report" score is most likely attributable to multi-collinearity between the different scores.

16. Robert Dunlap of Irving Trust, quoted by D. Nichols, *The Handbook of Investor Relations*, HarperBusiness, New York, 1989.

17. Dan LeMaire, who has been rated number one by *Institutional Investor Magazine*, quoted in *IR Update*, National Investor Relations Institute, February 1997.

18. Eric G. Falkenstein, 1996, "Preferences for Stock Characteristics as Revealed by Mutual Fund Portfolio Holdings," *Journal of Finance*, 51: 111-136.

A 1996 study by Lang and Lundholm reports that the higher is the quality of the information provided to analysts by a firm, the more accurate are analysts' earnings forecasts for the firm, the greater is the agreement among the forecasts of different analysts, and the greater is the number of analysts following the firm.

size decile in Korea, but only 3.2% of the firms in the smallest decile.¹⁹ Because information is more available about larger firms, foreigners are less likely to be at an informational disadvantage in trading these firms, and the markets in such firms' stocks tend to be more liquid. Although foreigners' share of trading is only 40% of their share of the holdings for the smallest decile firms, it is 108% of their share of holdings for the largest decile firms.

In summary, it appears that activities that reduce the cost of information to analysts lead to a greater analyst following, more agreement among analysts, and greater accuracy of analyst forecasts. As we shall see in the next section, such analyst activity is associated with greater liquidity in a firm's shares.

ANALYSTS, INFORMATION, AND LIQUIDITY

We have seen that a firm can influence the number of analysts who follow it by its disclosure and investor relations activities. Before looking at the evidence on the effect of a firm's analyst following on the liquidity of its shares, we must consider carefully what we mean by liquidity.

Liquidity is a slippery concept. We might try defining it as the ability to buy or sell an asset at short notice without granting a price concession. This would be consistent with the notion that specialized physical assets such as houses are relatively illiquid, airlines are somewhat less liquid, and Treasury Bills are highly liquid. However, there are two things wrong with this simple definition of liquidity. We have not defined "short notice," and we have not said how much of the asset we are buying or selling—the latter is important for stock market investments for which there is no natural trade size as there is for houses. If we define "short notice" as meaning "no notice," then an asset's illiquidity, for a given trade size, is measured by the price concession that is necessary to buy or sell it immediately. This suggests using the asset's quoted bid-ask spread as a measure of illiquidity, and some researchers have used the quoted bid-ask spread as such.

However, many of the transactions on the New York Stock Exchange, for example, do not take place at the quoted spread. For some transactions, there is

price improvement as floor traders step up to beat the specialist's quote. But, in the case of other, larger transactions, the transaction price often lies outside the quoted spread, which therefore understates the price concession required to execute a trade. Indeed, the stock exchange specialists who report the bid and ask prices that constitute the spread frequently fail to report limit orders that would better the quoted spread. As a result, the effective spread that is paid by retail investors averages only 52-63% of the quoted spread, and the correlation between effective and quoted spreads is only around 0.10.²⁰

For this reason, since the pioneering study by Albert Kyle (published in 1985),²¹ it has become common to measure the illiquidity of the market in a firm's shares by the *marginal impact* of a trade on the price of the shares. This measure corresponds to the slope of the regression line relating the price change to the trade size—a coefficient that is known as the Kyle *lambda*:

$$\text{Price Change} = \pm \Delta + \lambda \text{ number of shares traded} \quad (1)$$

In this equation, the fixed component of the price change depends only whether the order is a buy or a sell, while *lambda* measures the price impact per share of the trade. Equation (1) is illustrated in Figure 1 for a liquid and an illiquid stock. The illiquid stock is the one with the steeper price impact line, implying that the price concession for a given size trade is larger than for the liquid stock.

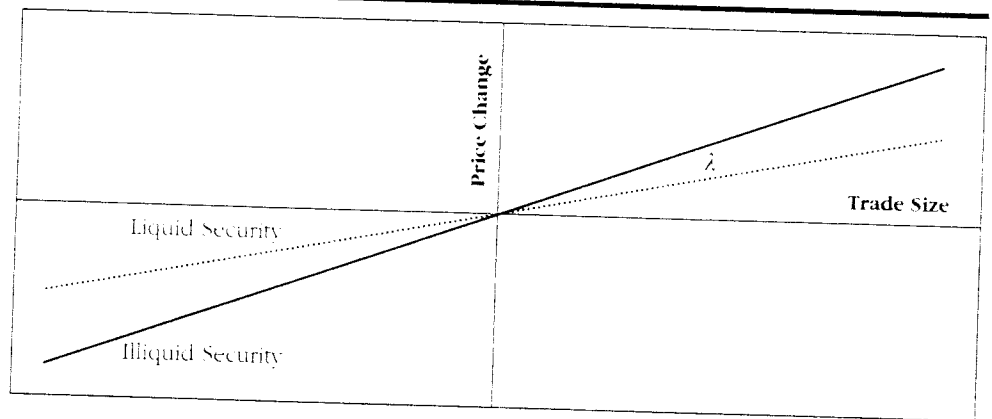
Kyle theorized that the illiquidity of a stock depended on the degree of *asymmetry of information* about the intrinsic value of the stock. Informational asymmetry is said to exist to the extent that some investors enjoy an informational advantage over others. For example, an investor who has a better forecast of a forthcoming earnings announcement will have an informational advantage over other investors until the earnings are announced, and may attempt to use this information to trade profitably. Under conditions of informational asymmetry, a buyer (seller) who places an order is immediately suspected of having superior information about the stock that would suggest that it is currently underpriced (overvalued). As a result, his

19. Jun-Koo Kang and Rene Stulz, 1997, "Why Is There a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan," *Journal of Financial Economics* 40, 8-28.

20. Mitchell A. Petersen and David Fudikowski, 1994, "Posted versus Effective Spreads: Good Prices or Bad Quotes?" *Journal of Financial Economics* 35, 219-292.

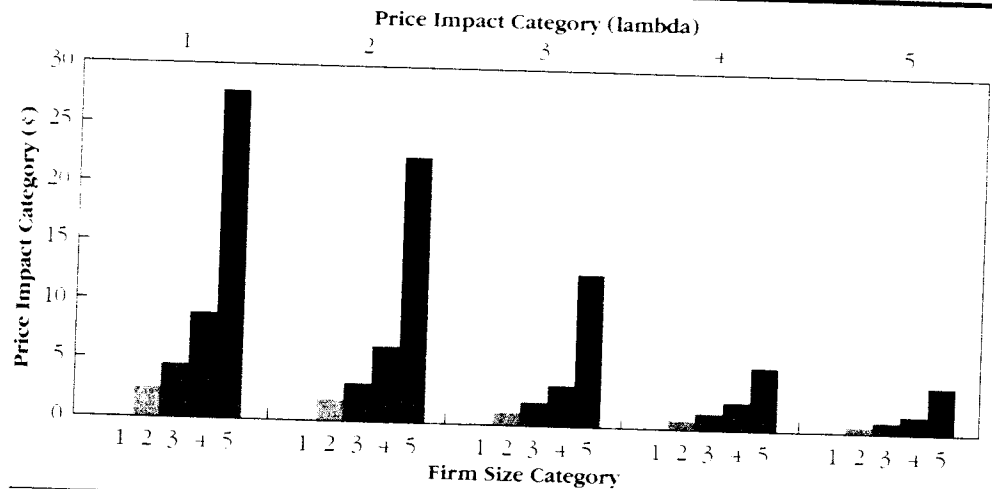
21. Albert S. Kyle, 1985, "Continuous Auctions and Insider Trading," *Econometrica* 53, 1315-1335.

FIGURE 1
THE KYLF LAMBDA*



*Illiquidity or trading cost is measured by the slope of the line

FIGURE 2
PRICE IMPACT AND FIRM SIZE*



*The figure shows the estimated price impact in cents per share for a 100 share trade for NYSE securities grouped by firm size and price impact category. Average values for 1984-1991. (Brennan and Subrahmanyam, 1996)

order reveals information to the market, which causes the market price to adjust against him. If there were an informational level playing field, we would not expect there to be any information in a buy or sell order and the price concession would be limited to $\pm \Delta$, which is the amount needed to compensate the market maker for his costs.

Figure 2, which is derived from a study by one of the present authors (Brennan) and Avandhar Subrahmanyam,²² shows the estimated price impact in cents per share for a 100-share trade where the companies are grouped into 25 different groups, first

by size of firm and then by the estimated Kyle lambda. This measure of informational price impact can range from much less than 1 cent per share to over 30 cents a share for a 100 share trade. Clearly some shares are much more liquid than others and, as we would expect, smaller firms (those in the S5 category) are much less liquid than large firms (S1). Since the number of shares traded will depend on the price per share, it is convenient to define the "dollar lambda," $\$ \lambda$, as the Kyle lambda divided by the share price:

$$\$ \lambda = \lambda \cdot P$$

²² M.J. Brennan and A. Subrahmanyam, 1996, Market Microstructure and Asset Pricing: On the Compensation for Illiquidity in Stock Returns, *Journal of Financial Economics*, 41, 441-464.

Our regression results show a strong negative relation between the number of analysts following the firm and the dollar lambda, suggesting that analysts do indeed increase a stock's liquidity. But our results also reveal that an even better indicator of liquidity than number of analysts is the share trading volume.

TABLE 2 ■ TRADING COSTS AND ANALYST COVERAGE*

PANEL A: INVESTMENT ANALYSTS REDUCE THE COST OF TRADING DIRECTLY^a

	Sign	Coefficient	Variable	t-statistic
log(Price) =		2.30	Constant	(5.51)
	Minus	0.169×	log(1 + # ANALYSTS)	(3.13)
	Minus	0.888×	log(average trading volume in shares)	(26.05)
	Plus	0.275×	log(average daily price)	(6.42)
	Plus	0.638×	log(daily return variance)	(18.40)

PANEL B: ANALYSTS ALSO CREATE TRADING VOLUME^b

	Sign	Coefficient	Variable	t-statistic
log(average trading volume) =		4.133	Constant	(9.64)
	Plus	0.897×	log(1 + # ANALYSTS)	(13.31)
	Minus	0.907×	log(average daily price)	(15.80)
	Plus	0.615×	log(market value)	(12.49)

PANEL C: ESTIMATED TOTAL EFFECT OF ANALYST FOLLOWING ON TRADING COSTS

Number of Analysts	λ /Price (Holding Trading Volume Constant)	Trading Volume	λ /Price (Allowing for Change in Trading Volume)
0	100	100	100
1	89	186	51
2	83	268	35
3	79	347	26
4	76	424	21
5	74	499	18
6	72	573	15

*The table shows the relation between trading costs as measured by the scaled Kyle *lambda* (λ /Price) and the number of analysts following the stock after taking account of the effect of the number of analysts on trading volume. The data on the number of analysts is for the year end 1987. Other data relate to the year 1988. The sample consists of 1421 stocks listed on the NYSE.

^a N = 1441; R² = 750%.

^b N = 1441; R² = 68%.

where $S\lambda$ measures the price impact per dollar of transaction size. We would expect the $S\lambda$ to be zero if there is an informational level playing field. We might expect that investment analysts would help to level the playing field by making their company analyses available to a broader circle of investors.

To test this hypothesis, we regressed the logarithm of the dollar lambda on the logarithm of (1 + the number of investment analysts following the firm) and some other variables for a sample of 1421 NYSE stocks in 1988. As reported in Table 2a, our regression results show a strong negative relation between the number of analysts following the firm and the dollar lambda, suggesting that analysts do indeed increase a stock's liquidity. But our results also reveal that an even better indicator of liquidity

than number of analysts is the share trading volume; that is, stocks with heavier trading volume are more liquid. Finally, the regression results also suggest that riskier stocks, as measured by the variance of the daily market return, are less liquid and that low price stocks (probably reflecting the fact that they tend to be riskier) are also less liquid.

So far, then, we have seen that analysts increase liquidity directly, but that the most important determinant of liquidity is trading volume. Is it possible that analysts also increase trading volume? Some suggestion that this must be so is implicit in the fact that the services of most analysts are not paid for directly, but indirectly in the form of trading commissions. Table 2b confirms that the number of analysts following a stock has a major impact on trading

volume; the other main determinants are the market value of the firm and the share price (high price firms trade fewer shares). Table 2c combines the direct and indirect effects of analyst following on the dollar lambda, using the parameter estimates from Tables 2a and 2b. For example, from the results reported in Table 2a we can infer that coverage by six additional analysts would reduce the dollar lambda by about 28%, holding volume constant. But when the indirect effect of increased analyst coverage through expanded volume is taken into account, the reduction in trading costs rises to around 85%. Thus, the volume effect turns out to be the most important.

If these changes in trading costs seem very large, it is worth bearing in mind that a simple rule change on NASDAQ reduced the *quoted spreads* of the average stock by 33%, and of the least liquid stocks by 43%.²³ Similarly, a 1999 study by Amihud, Mendelson and Uno²⁴ (described in the immediately preceding article) reports that a simple reduction in the minimum trade size of a stock listed on the Tokyo Stock Exchange increased their measure of its liquidity by 36%.

The finding that analysts improve stock liquidity is consistent with their role as disseminators of information, whose reports reduce the asymmetry of information among investors about the future earnings of the firm. Further evidence on the effectiveness of analysts in speeding the dissemination of information about firms is available from three studies. First, Dempsey²⁵ shows that the more analysts who follow a firm, the less likely is the market to be surprised by the firm's quarterly earnings announcement. This means that when more analysts follow a firm, there is less potential for profitable informed trading ahead of earnings announcements—in other words, the more level is the informational playing field. Second, Brennan, Jegadeesh, and Swaminathan²⁶ show that stock prices adjust more quickly to macroeconomic news the greater the number of analysts following the firm. Similarly, Hong, Lim, and Stein²⁷ report that stock prices adjust to bad firm-specific information much more slowly

when there are few analysts following the firm. These studies also imply that there is less scope for profitable informed trading when there are more analysts following the firm.

Since illiquidity is primarily a function of asymmetric information, these studies also provide further evidence of the role of analysts in improving liquidity, and support the case for a causal link between investor relations activities and liquidity. Weaker, though more direct, evidence of this link is provided by Welker,²⁸ who shows that there is a negative relation between the quality of a firm's disclosure (as assessed by the Financial Analysts Federation) and the bid-ask spread, after controlling for other variables that affect the spread. We now consider the link between liquidity and a firm's cost of capital and stock price.

LIQUIDITY, DISCLOSURE, AND THE COST OF CAPITAL

The most direct evidence that liquidity can affect stock prices comes in a simple study by Yakov Amihud, Haim Mendelson, and Beni Lauterbach.²⁹ As also discussed in the preceding article, these authors examined what happened to the prices of 120 stocks whose trading was switched by the Tel Aviv Stock Exchange in Israel from a once a day "call auction" to "continuous trading." Continuous trading means there are a series of sequential trading sessions throughout the day in which bilateral trades take place in a trading pit similar to that on North American futures markets. These trading switches took place during the period 1987 to 1994.

What is important about this study, first of all, is that it showed a significant increase in the liquidity of the stocks selected for continuous trading. The trading volume in selected stocks as a proportion of total market volume rose by 0.492% (t-stat = 7.27). And, when liquidity was measured in terms of the volume associated with a 1% change in stock price, liquidity increased by 0.87% (t-stat = 10.90).

23. Michael J. Barclay, William G. Christie, Jeffrey H. Harris, Eugene Kandel, and Paul H. Schultz, Effects of Market Reform on the Trading Costs and Depths of NASDAQ Stocks, 1999, *Journal of Finance*, 54, 1-51. The authors study the effect of new rules allowing the public to compete with dealers by submitting binding limit orders.

24. Y. Amihud, M. Mendelson, and J. Uno, 1999, Number of Shareholders and Stock Prices: Evidence from Japan, *Journal of Finance*, 54, 1169-1184.

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26. M. J. Brennan, N. Jegadeesh, and B. Swaminathan, 1993, Investment Analysis and the Adjustment of Stock Prices to Common Information, *Review of Financial Studies*, 6, 799-824.

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28. Michael Welker, 1995, Disclosure Policy, Information Asymmetry, and Liquidity in Equity Markets, *Contemporary Accounting Research*, 11, 801-828.

29. Y. Amihud, M. Mendelson, and B. Lauterbach, 1997, Market Microstructure and Securities Values: Evidence from the Tel Aviv Stock Exchange, *Journal of Financial Economics*, 45, 365-390.

The most direct evidence that liquidity can affect stock prices comes in a simple study that examined what happened to the prices of 120 stocks whose trading was switched by the Tel Aviv Stock Exchange from a once a day "call auction" to "continuous trading." The increase in liquidity caused by this minor technical change in trading protocols was associated with an average 5.5% increase in stock prices.

Even more important was the finding that the increase in liquidity caused by this minor technical change in trading protocols was associated with an average 5.5% increase in stock prices. Moreover, as the authors point out, this number probably *underestimates* the true effect of the increase in liquidity on stock prices since the market was likely to anticipate which stocks would eventually be selected for continuous trading. When the exchange announced in 1991 that it was building new capacity that would allow continuous trading in another 40 stocks, 8 stocks were identified by the press as likely candidates and were selected by the exchange for continuous trading two months later. The total abnormal price change in these stocks from the newspaper story day to the day after they were selected was 12.25%, which is probably a more reliable estimate of the effect of the improved liquidity on the stock price.

This study can leave little doubt about the fact that increases in liquidity reduce investors' required rates of return and so increase stock prices. Most other studies have examined the association between risk adjusted required rates of return and various measures of (il)liquidity. They have all found results that are consistent with this study: the greater is a stock's measured illiquidity, the higher is the market's required rate of return.

In their pioneering 1986 study, Amihud and Mendelson⁵⁰ measured illiquidity by the quoted bid-ask spread expressed as a proportion of the stock price. First they formed 49 portfolios of NYSE stocks for each of the 20 years from 1961-1980 based on the estimated betas and relative bid-ask spread variable. When they did a simple ordinary least squares regression of monthly portfolio returns on beta, spread, and a dummy variable for each year, they found that the coefficient of the spread variable was 0.211 ($t = 6.83$). This finding implies that a 1% increase in the spread was associated with an increase in the expected return of 0.211% *per month*, or 2.53% *per year*. The proportional spreads of their portfolios ranged from 0.49% to 3.21%—a difference in spreads that translates into a difference in expected returns of 6.89% *per year*.

To put this return difference into perspective, consider a stock that falls into the *most* liquid

category, pays a dividend of \$1 per year that is expected to grow at 5% per year, and has a required return of 10%. Standard calculations imply that the stock price would be $\$1 / (0.10 - 0.05) = \20 . Now suppose instead that it fell into the *least* liquid category, so that its required return was $0.10 + 0.0689 = 16.89\%$ per year. In this case, the stock price would be only $\$1 / (0.1689 - 0.05) = \8.41 !

These results have been confirmed in the 1996 study by Brennan and Subrahmanyam mentioned earlier.⁵¹ We formed 25 portfolios of New York Stock Exchange firms each year from 1984 to 1991 classified by size and the Kyle *lambda* measure of (il)liquidity, and use the Fama-French three factor model to calculate risk-adjusted returns on the portfolios. The Fama-French model adjusts not only for market risk but also for the effects of firm size and the value bias that is apparent in historical returns.

The results of this study are shown graphically in Figure 3, which plots the annualized risk-adjusted returns for each of the five lambda categories.⁵² The estimated required returns or costs of capital increase uniformly as we move from the most liquid to the least liquid quintile, and the difference between the most and least liquid quintile is a striking 662 basis points per year—a finding that is strikingly similar to Amihud and Mendelsohn's study ten years earlier. These results confirm that liquidity is a major determinant of a firm's cost of capital and therefore the firm's share price.

The studies we have cited in this article thus establish a clear chain of causation between the following:

- (1) investor relations activities that reduce the cost of information to analysts, on the one hand, and the number of analysts who follow the firm and the quality of their forecasts, on the other;
- (2) the number of analysts who follow the firm and the liquidity of trading in the firm's shares;
- (3) the liquidity of trading in the firm's shares and the market's required return and therefore the share price.

This chain implies that investor relations activities will have a positive effect on the price of a firm's shares. A 1997 study by Christine Botosan⁵³ (described in a later article in this issue) offers more

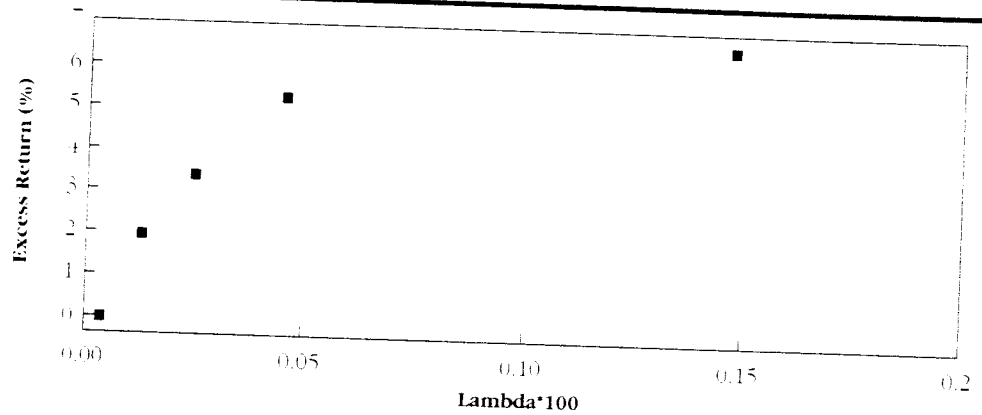
50. Y. Amihud and M. Mendelson, 1986, "Asset Pricing and Bid-Ask Spread," *Journal of Financial Economics*, 17, 223-249.

51. M.J. Brennan and A. Subrahmanyam, 1996, "Market Microstructure and Asset Pricing: On the Compensation for Illiquidity in Stock Returns," *Journal of Financial Economics*, 41, 411-464.

52. See Brennan and Subrahmanyam (1996), Table 4. The risk-adjusted return on the most liquid portfolio is 0% by construction.

53. Christine Botosan, 1997, "Disclosure Level and the Cost of Equity Capital," *Accounting Review*, 72, 823-850.

FIGURE 3
RISK ADJUSTED EXCESS
RETURNS AND
ILLIQUIDITY NYSE
1984-1991*



*The chart shows the risk-adjusted excess returns associated with five different values of the Kyle lambda (λ) estimated from the returns on 25 size and lambda sorted portfolios of NYSE stocks during the period 1984-1991.

TABLE 3 ■ THE EFFECT OF DISCLOSURE QUALITY ON EXPECTED RETURNS FOR FIRMS WITH HIGH AND LOW ANALYST FOLLOWING (BOTOSAN, 1997)*

	High Analyst Firms				Low Analyst Firms			
	Sign	Coefficient	Variable	t-statistic	Sign	Coefficient	Variable	t-statistic
Expected Return =		14.0%	Constant	(2.06)		20.9%	Constant	(6.06)
	Plus	0.082	Beta	(3.13)	Plus	0.082	Beta	(3.13)
	Plus	0.035x	DQR	(0.99)	Minus	0.097x	DQR	(1.81)
	Minus	0.012x	Firm Value	(1.73)	Minus	0.012x	Firm Value	(1.73)

*N = 122, $R^2 = 16.5\%$. DQR is the firm's Disclosure Quality Rank. Firms are assigned to the High/Low analyst group according to their analyst coverage relative to that of the median firm. The data relate to 1990-1991. Original dummy variable regression has been restated as separate regressions for clarity.

direct evidence of the link between a firm's investor relations activities and its stock price. Botosan examines the relation between the *ex-ante* cost of equity capital and level of financial disclosure for 122 firms in the metals and machinery industries in 1991. The cost of equity capital is estimated by combining the current stock price with *Value Line* forecasts of future earnings and dividends to arrive at the expected long-run return on each stock.³⁴ The disclosure score is a subjective measure of how much discretionary information each firm discloses in its annual report. Botosan relies on the fact that firms that disclose more information in their annual report generally rank highly on other measures of information disclosure and investor relations.

The expected return is regressed on the firm's beta, its market value, and its *Disclosure Quality*

Rank—a ranking from 1 to 10 that is constructed from the disclosure score.

$$\text{Cost of Equity} = a_0 + a_1 \text{Beta} + a_2 \text{Disclosure Quality Rank} + a_3 \text{Firm Value}$$

The results of this regression, reported in Table 3, show that the cost of equity increases with increases in the firm's beta, as the CAPM predicts, and that it is also a slightly decreasing function of the firm's size, as measured by the market value of its equity. But the effect of disclosure quality on the firm's cost of equity depends on whether or not the firm is followed by many analysts. For firms that are followed by many analysts (more than the median number), disclosure quality appears to have no effect on the cost of equity. But for firms that are

³⁴ Botosan uses the Edwards-Bell-Ohlson formula which uses information about payout ratios, returns on equity, and book values to forecast future returns.

The estimated required returns increase uniformly as we move from the most liquid to the least liquid quintile, and the difference between the most and least liquid quintile is a striking 662 basis points per year—a finding that is strikingly similar to that of Amihud and Mendelsohn's study ten years earlier.

followed by fewer than the median number of analysts, improved disclosure quality significantly reduces the firm's cost of equity capital. Botosan concludes from these results that, for the firms with low analyst following, those with higher quality disclosure experience an almost 10% reduction in their cost of equity capital.

We suspect that, if anything, Botosan's study *underestimates* the effects of disclosure by ignoring the effect of disclosure on the number of analysts who follow the firm. Nevertheless, the study is important for providing direct corroborative evidence of our thesis that investor relations activities that reduce the cost of information acquisition for analysts also reduce a firm's cost of capital and its stock price.⁵⁵

CONCLUSION

In this paper we have established the importance of a firm's investor relations activities for its stock price. The link between investor relations activities and the stock price is an indirect one. First, we established that investor relations activities, in the form of high levels of disclosure and presentations to investment analysts, increase the number of

investment analysts who follow the firm and publish earnings forecasts for the firm by reducing the analysts' cost of information. Such activities also tend to improve the accuracy of analyst forecasts and the degree of agreement across analysts. Second, we showed that the number of analysts who follow a firm has a positive effect on the liquidity of trading in the firm's shares by reducing informational asymmetry. Finally, we showed that there is good evidence that, as one would expect, the market's required rate of return on a stock depends on the liquidity of the market for the stock. Hence, a firm may be able to reduce its cost of capital and increase its stock price by investor relations activities that reduce the cost of information to the market and to investment analysts in particular.

But this is not the only function of investor relations activities. We have also suggested that by presenting a coherent and credible description of a firm's opportunities and strategies, an investor relations program may enhance the credibility of a firm's management, and that this may be particularly valuable when that credibility is called into question by another management group in the course of a takeover attempt.

⁵⁵ There is also evidence suggesting that firms whose Financial Analysts' Federation disclosure score is high enjoy a lower cost of debt as well. See Partha

Sengupta, 1998, "Corporate Disclosure Quality and the Cost of Debt," *The Accounting Review*, 73, 459-474.

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