The Market for Securities: Substitution Versus Price Pressure and the Effects of Information on Share Prices

Author(s): Myron S. Scholes

Source: *The Journal of Business*, Apr., 1972, Vol. 45, No. 2 (Apr., 1972), pp. 179-211

Published by: The University of Chicago Press

Stable URL: http://www.jstor.com/stable/2352030

*Myron S. Scholes**

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INTRODUCTION

Many authors in the theoretical literature in finance assume that a firm can regard the price of its shares, given its investment policies, as essentially independent of the number of shares it, or any shareholder, chooses to sell. The shares a firm sells are not unique works of art but abstract rights to an uncertain income stream for which close counterparts exist either directly or indirectly via combinations of assets of various kinds. Hence, if the firm expands and increases the amount of its shares outstanding, the additional shares can be sold at the going market price for similar income streams.

But, although perfect substitution is one view, it is by no means the only one. A substantial body of opinion implies that the firm's share price will be affected by new sales of securities. It is argued that this fact must be taken into account by managers in carrying out investment and financial policies on behalf of shareholders, by regulatory authorities in utility commission hearings, by judges in considering the effects of divestiture in antitrust suits, and by shareholders when selling quantities of a company's stock.

They would argue that securities in the capital market are not closely related and that the uniqueness or characteristics particular to an individual asset make each asset stand apart from other assets in the market. Hence, when the firm increases the amount of its shares outstanding, the additional shares will have to be sold at a discount from existing market prices in order to attract new buyers to this particular issue. The magnitude of the discount is an increasing function of the size of the issue.

Although the price effects of share sales have been debated at length, the elasticity of demand for a firm's shares can be determined only by empirical tests. This paper presents empirical tests of the predictions of each hypothesis. In the following sections we will discuss

* Assistant professor of finance, Massachusetts Institute of Technology.

† This paper is adapted from my Ph.D. thesis at the University of Chicago. I would like to acknowledge a large debt to my dissertation committee—Eugene Fama, Merton Miller, Harry Roberts, and Joel Segall—who took great pains to suggest how to improve the research and its presentation. I would also like to thank Larry Fisher for his many helpful comments, as well as members of the Finance Workshop at the University of Chicago for many stimulating and helpful discussions, especially M. Blume, P. Brown, D. Duvel, M. Jensen, and R. Roll.

the predictions of each hypothesis, the data used, the methodology of the testing procedure, and the empirical findings.

The Price-Pressure Hypothesis

Few people will quarrel with the idea that buyers and sellers of shares on an organized exchange such as the New York Stock Exchange can buy and sell small quantities of stock at approximately the prevailing market price. But when the size of the trade is large relative to these small trades, there is a belief that the price of the stock must fall to induce investors to purchase these additional shares. This inducement or "sweetener," as it is called, results from an increase in the quantity of shares that must be held by market participants. If the excess-demand curve for shares is downward sloping, the additional shares will only be held at lower prices. The direct consequence of buying shares at lower prices to purchasers is a subsequent extra profit or sweetener.

To illustrate that the implied price effects of sales or purchases of stock are very large, we can quote from testimony and theoretical discussions on the issue. In the rate regulation literature, a key issue is a discussion of allowances to rate of return for the necessary "underpricing" of new issues. Bonbright, in a standard textbook discussion, states: "But there must be a step up in the allowed rate of earnings to provide for underpricing and stock flotation expense. . . . A 10 percent discount for these named items is not infrequently held to be reasonable."[1] More to the issue itself, Gordon, in a recent utility case, testified: "Probably the most important reason for the high rate of return investors require on A. T. & T. is its extraordinary reliance on stock financing. Whatever rate investors require to hold the outstanding stock of a company, they will require a higher rate of return to more or less continuously absorb increasing amounts of its stock."[2]

In antitrust cases, the courts have frequently been concerned with the effects of divestiture on the price of the divested company's stock. The duPont–General Motors divestiture suit is the classic example of both the issue itself and the judicial view that selling pressure is enormous.[3] In the court's summation of the case I found evidence from experts in the securities business that the price of General Motors stock could fall by 50 percent. Irwin Friend presented evidence of the effects of issues, in general, on the price of a company's shares. In the summation of the case the court stated: "Dr. Friend agreed that there

1. James C. Bonbright, *Principles of Public Utility Rates* (New York: Columbia University Press, 1961).

2. Federal Communications Commission, "In the Matter of American Telephone and Telegraph Company and the Associated Bell System Companies, et al.," *Docket No. 16258*, 1968.

3. "United States v. E. I. duPont de Nemours and Company, General Motors Corporation, et al.," *Trade Cases* (Chicago: Commerce Clearing House, 1959), par. 69,461.

had never been anything in the past comparable to the sales contemplated by the Government plan. He also testified that an increase in supply of stock of 10 percent had in the past brought about a decline in price of 5 percent, that an increase of 20 percent had been associated with price declines of between 10 percent and 15 percent."

There are numerous other examples of implied price effects of additional share issues. In the theoretical literature of finance, authors have used the price-pressure arguments to determine optimum capital structures for firms. Durand used the uniqueness argument and institutional restrictions to dispute the common assumption that firms can issue shares or shareholders can sell shares at existing market prices.[4] Vickers uses essentially the same argument.[5] In both cases, imperfection in the capital markets, a less than perfectly elastic demand curve for shares or bonds, leads to a kind of monopolistic price discrimination approach to using bond or share financing for capital projects. Given the relative elasticities of demand for these two instruments, an optimal debt-to-equity mix for the firm can be determined. Still another case is dividend policy, where Lintner has argued that the downward-sloping demand curve for a firm's shares gives advantage to the retention of earnings, and therefore dividend reductions, in lieu of external stock issues to finance investment.[6]

Lintner argues that even if shareholder expectations of terminal share values are unchanged by the new share issues, the market price of the shares must fall to induce old shareholders to purchase additional shares and to attract new shareholders to the issue. To turn the argument around, a price discount with unchanged expectations of terminal value implies that investors who purchase these new shares expect to receive higher returns subsequent to their purchase; otherwise there is no real inducement or "sweetener." The selling-pressure hypotheses would predict that the larger the sale of securities, the larger the price effect and consequently the larger the expected rate of return subsequent to the sale.

The Substitution Hypothesis

An alternative hypothesis to the price-pressure hypothesis can be called the substitution hypothesis. The purchase of risky assets provides the investor with future consumption streams. To obtain a desired consumption-investment program, investors can buy various combinations of assets. Each security is a potential candidate for inclusion into in-

4. David Durand, "The Cost of Capital, Corporation Finance, and the Theory of Investment: Comment," *American Economic Review* 49 (September 1959): 639–55.

5. Douglas Vickers, *The Theory of the Firm: Production, Capital, and Finance* (New York: McGraw-Hill Book Co., 1968).

6. John Lintner, "Dividends, Earnings, Leverage, Stock Prices and the Supply of Capital to Corporations," *Review of Economics and Statistics* 44 (August 1962): 243–69.

vestor portfolios. When trying to measure the market for a security, one must define it in a broader context than the security itself or its particular industry grouping. A risky asset is a small percentage of all assets that investors may hold in their portfolios. As a result, the demand curve facing individual shareholders is essentially horizontal.

Similarly, the corporation, which issues additional claims to finance investment, adds to the stock of assets that must be held; but this addition is assumed to be a small percentage of such assets. At the time of a new issue there should be no effect on the market price of the firm's existing shares. This is not to say that the price of the shares will not change to reflect in the quality of the uncertain income streams that the firm will produce with the additional assets, or that the price of the shares will not adjust to reflect noncompetitive opportunities that these additional assets will provide. However, these adjustments would occur even in the absence of new share issues to finance investment. They will occur to equate prices of similar income streams of market assets which are close substitutes. The adjustments (tax considerations aside) are not the result of the firm's use of one particular method of financing as opposed to any other method of financing.[7]

The market will price assets such that the expected rates of return on assets of similar risk are equal. If any particular asset should be selling to yield a higher expected return due solely to the increase in the quantity of shares outstanding, this would indicate that investors expect to realize abnormal returns on this asset. This would imply that profit opportunities exist in the market. But investors seeing these profit opportunities would soon arbitrage them away. The substitution hypothesis implies that there cannot be profit opportunities that result from the increase in the quantity of shares that must be held. Since assets are substitutes in investor portfolios, the pure price effects of corporate new issues or investor purchases and sales must be very small. The substitution hypothesis would imply that the inducement necessary to sell large quantities of stock would be close to zero.

A Resolution of Some of the Differences: The Information Hypothesis

In recent years there has been considerable discussion and testing of the "efficient"-market model. Fama has defined an efficient market as a market in which security prices reflect all available information.[8] A market that is efficient prevents traders with no special information

7. For a detailed discussion of these issues, see: Merton H. Miller and Franco Modigliani, "Dividend Policy, Growth, and the Valuation of Shares," *Journal of Business* 34 (October 1961): 411–33; Franco Modigliani and Merton Miller, "The Cost of Capital, Corporation Finance, and the Theory of Investment," *American Economic Review* 48 (June 1958): 261–97.

8. Eugene Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Journal of Finance* 25 (May 1970): 383–417; and "The Behavior of Stock Market Prices," *Journal of Business* 37 (January 1965): 34–105.

from making abnormal profits. New information that becomes available is quickly reflected in a security's price. As a consequence of the almost immediate adjustment of stock prices to new information, prices will follow a random walk. There has been considerable testing of the random-walk model[9] and the adjustment of stock prices to new information. Fama presents an excellent discussion of both the theory and the empirical findings.[10] Most evidence suggests that the "efficient"-market model is an accurate description of price behavior in the securities market.

When investors sell quantities of a company's stock, they sell for various reasons. In some cases, investors liquidate positions for consumption needs or for portfolio rebalancing considerations; in other cases they may feel that they possess adverse information about the company's prospects that, if known, would cause an immediate downward adjustment in the price of the company's stock. The same arguments apply to purchases of shares. If some investors desire shares for wealth allocation or portfolio rebalancing purposes, other investors purchase shares because they feel that they possess information that, if known, would cause an upward adjustment in the company's share price.

The efficient-market model would predict that the average value of this information would be small. Since so many investors are competing for information, it is unlikely that investors who possess it have information of sufficient value to cause a large rise or fall in the market price of the shares in which they trade.

If a sale of securities is an indication that the seller possesses information, the price of the shares will fall in the market to reflect the expected value of the information in each trade. In other words, a buyer of shares who purchased only to rebalance his portfolio may expect to pay not only the regular exchange commissions but also the value of the information possessed by the seller.

There are substantial costs to finding information of value, and one would suspect that the sellers of a large block of stock possess more information of value than sellers of small quantities of stock. The small trades on the exchange are likely to contain many more portfolio adjustment trades than information trades. The large-block trades are likely to contain more information trades than portfolio-adjustment trades. Therefore, small trades may be effected at very little information discount from the previous trade, while large trades could only be sold at a lower price to reflect the expected value of information in these trades.[11]

9. Paul H. Cootner, ed., *The Random Character of Stock Market Prices* (Cambridge, Mass.: M.I.T. Press, 1964); Fama, "The Behavior of Stock Market Prices"; Eugene Fama and Marshall Blume, "Filter Rules and Stock Market Trading," *Journal of Business* 39 (January 1966): 226–41.

10. Fama, "Efficient Capital Markets."

11. There is no argument here pertaining to the most efficient size of trade for investors who hold a large quantity of a company's stock. It may or may not

The information hypothesis states that when a large block of stock is sold in the market, we should expect to see a downward price adjustment in the price of the stock. This fall is the expected value of information contained in large-block trades. It is a permanent adjustment in the stock price and not an inducement followed by abnormal returns in the future, as the price-pressure hypothesis suggests. Whether the value of information is an increasing function of the size of the trade or is relatively constant once a trade is deemed large is an empirical question. But casual observation of trading in markets has led the price-pressure adherents to conclude that the price adjustments are due to downward-sloping demand curves for shares and not to a change in the equilibrium value of the firm. Also, it is not possible to determine from casual observation whether observed price effects are a competitive return to the intermediary who purchases the shares immediately for resale or a noncompetitive return to new shareholders who purchase shares from the intermediary.

The efficient-market model would imply that the value of information in trades would be much smaller than the implied effects suggested by the price-pressure adherents. In our discussions we have devised testable implications of each hypothesis. The substitution-information hypothesis would predict that, on average, share prices would fully adjust to the expected value of information in trades, and that on average this adjustment would be a permanent adjustment and would not imply an inducement in the form of subsequent abnormal profits for share purchasers.

For the corporation issuing additional shares, the separation of the value of information from the sale of additional shares is necessitated by the requisite registration statements and the announcement of an impending new issue prior to actual sale. Market participants will have ample time to assess the planned use of the funds and will reflect the value of this information in the share price prior to issue. At the time of issue, firms will be able to sell shares at the new equilibrium price irrespective of whether the price adjusted upward or downward to the value of the information.

DATA AND TEST METHODOLOGY

The particular set of quantity changes that will be used to test the various hypotheses with respect to the degree of market imperfection are those large-block sales of stock called secondary distributions.[12] These dis-

be economical for mutual funds to trade in larger quantities than the regular 100-share lots. However, if a fund, for example, disposes of a large quantity of shares quickly, when it could adjust its portfolio by using many different issues, this evidence might suggest that the fund possessed adverse information.

12. Sales rather than purchases of shares were chosen for two reasons. First, the main focus of the relevant controversies in finance has been on the price effects of the issuance of new shares, so that sales of shares would be the counterpart in the secondary market. Second, large-block purchases of securities often

tributions, unlike primary distributions, are initiated not by the company but by one or more shareholders to whom the future proceeds from the sale of the secondary distribution will accrue. The distributions are typically underwritten on a principal or agency basis by an investment banking group that buys the entire block of stock from the selling shareholder. The shares are then sold to subscribers after normal trading hours at a price known as the "subscription price," typically set at or near the closing price of the shares in the open market on the day of the sale. The subscriber to shares in a secondary distribution pays only the subscription price and not the regular stock exchange or other brokerage commissions on the transaction. The selling shareholder does pay a specific commission to the selling group (normally twice the round-lot commission), and this fee is subtracted from the proceeds of the sale before the funds are turned over to the selling shareholder.[13]

There are two types of secondary distributions—registered and unregistered. The Securities and Exchange Commission requires that a distribution be registered if the shares involved in the sale represent "a control relationship" to the issuer.[14] If a distribution is registered, registration statements, including a prospectus, must be prepared, and the vendor must wait twenty days after the registration before the actual sale can take place. An unregistered distribution, however, may take place without a waiting period after approval by the exchange is obtained. The unregistered secondary is publicly announced by the underwriters on the ticker tape or the broad tape on the day of the sale, and the Securities and Exchange Commission is formally notified by the exchange only after the sale has occurred.

No very specific rules have been issued by the Securities and Exchange Commission with respect to registration requirements for secondaries. Registration is left for the most part to the discretion of the vendors, who in some cases protect themselves by obtaining a "no-action letter" from the Commission's Division of Corporation Finance. This letter, as the name implies, binds the Division not to recommend to the Commission that any action be taken under the Securities Act if the securities are sold without registration. Economically, the only importance of the distinction between the two types of distributions is that the presumed price impact of the sale may well tend to be concentrated at different points of time—the actual day of the sale for an unregistered distribution and twenty or so days previous to the distribution for a registered issue.

Secondary distributions were chosen in lieu of primary distribu-

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reflect attempts to acquire control of the firm rather than the more normal kind of investment demand that is our main concern here.

13. For a more extensive discussion of the legal and institutional background, see U.S., Congress, House, *Report of Special Study of Securities Markets of the Securities and Exchange Commission,* 88th Cong., 1st sess., 1963, H. Document 95, pt. 1.

14. Ibid.

tions because new issues are often associated with important events such as expansion programs, changes in capital structure, and the like. These events and what they mean to managements' views and intentions have not always been completely anticipated and discounted by the market, so that price adjustments, sometimes of fairly substantial size, accompany the announcement of a new issue by the firm. In many cases, where the news happens to be particularly good, there may well be a sizeable price increase on the announcement. In other cases, there may be a substantial fall, and these differing and variable announcement effects will inevitably complicate the task of isolating the pure price-pressure effects, if any. By contrast, secondary distributions—basically events taking place outside the company—are the result of decisions that are presumably independent of the factors affecting company operations. To this extent, we are more nearly in a position of holding "all other things constant" when we look at secondaries rather than primaries.

For the secondary distributions, also, there may well be information or announcement effects that make the offering an occasion for revaluing the firm. The vendor of the distribution may, for example, possess information, which, if it became generally known, would cause a downward adjustment in the market price of the security. The sale of a secondary may then provide the impetus for other market traders to commit resources to the reevaluation of the company's prospects. Nevertheless, the prospects of controlling for this kind of information effect in secondaries are much more favorable than in primaries for several reasons.

We shall see that it is possible to identify the seller of the secondary distribution. If it is possible to determine whether the seller is likely to possess information, this may permit us to determine the average value of information and the market's adjustment to the value of this information. Also, since no one is likely to sell if he has good information, we only have to worry about information effects in one direction.

In any attempt to measure the slope of a demand curve, it is, of course, essential to specify the relevant time span. In the very shortest of short runs, all demand curves will be almost perfectly inelastic. Yet, by waiting perhaps only a trivial length of time until news of a proposed sale had spread throughout the market, the sale might be effected without price-pressure effects. How much time is to be regarded as a "reasonable" interval over which to measure price pressure can only be determined by reference to the technology of the market in question. The secondary distributions provide a unique advantage in that investment bankers inform potential buyers that a large block is for sale. In recent years, the secondary distribution has been overshadowed to some extent by the addition of third and fourth market positioning of large blocks, and the introduction of computer technology to store information on block trade interest.

In this paper, the relevant time unit for analysis will be taken as

one trading day. Short as this may seem, it is actually a substantial overestimate in many cases. A tabulation undertaken for the Special Study of Securities Markets showed that of the eighty secondary distributions in 1961, nine took less than fifteen minutes to complete, twenty-two took less than one hour, twelve took one to four hours, thirty-two were completed by the close of the following day, and only five remained open for a longer period.[15] The one-day time unit (which is also the most convenient in terms of data availability) would thus seem to be a reasonable starting point and one that can hardly be accused of loading the dice against the traditional selling-pressure view. We will also be able to extend the interval by measuring the effect of the trade over the following trading days and also over an extended period of months to measure whether traders received an inducement to buy the shares of a secondary distribution.

The Actual Sample

A complete list of all secondary distributions for listed New York Stock Exchange firms was compiled for the period January 1947–December 1965 from the *Investment Dealers' Digest*.[16] From this source we obtained the company name, the date of the distribution, the subscription price, and whether the secondary was registered. The SEC *Statistical Bulletin* was used to check the validity of the reported information in the *Digest* and to obtain information on the vendor of the secondary.[17]

Since daily price data were available from July 1961 to December 1965, most of the analysis will be concentrated over this time period, a period in which there were 345 secondary distributions. Monthly data on prices were available for the period 1947–65.[18] The longer period will be used to confirm the analysis of the daily data sample. Over the 1947–65 period 1,207 secondary distributions were recorded.

Table 1 gives the deciles of the frequency distributions of the dollar value of the secondary distribution and the percentage of the firm's shares involved in the trade. These summary statistics indicate that a secondary usually represents a nontrivial percentage of the firm traded and also represents considerable market value. Over 5 percent of the firm's shares were traded in 10 percent of the cases. The largest percentage of the firm traded was 37 percent. This range contains the largest blocks of securities traded. It is also representative of the range

15. Ibid.

16. "Corporate Financing" section, *Investment Dealers' Digest* (January and July, 1947–66).

17. *U.S. Securities and Exchange Commission Statistical Bulletin* (February, May, August, and November 1953–66). The vendors are classified in five general categories: investment companies, insurance companies and banks, individuals, corporations or corporate officers, and estates and trusts. More will be said about these vendor categories and their relevance for the test design in a later section.

18. For a discussion of the construction and composition of the monthly price file, see Lawrence Fisher and James H. Lorie, "Rates of Return on Investments in Common Stocks," *Journal of Business* 37 (January 1964): 1-21.

Table 1
Deciles of the Distributions of Summary Statistics of the Secondary Distributions

Fractile*	Dollar Value of Issue ($000)	Proportion of Firm Traded
0.1	456	0.0018
0.2	714	0.0032
0.3	1,045	0.0050
0.4	1,353	0.0071
0.5	1,606	0.0099
0.6	2,451	0.0135
0.7	3,200	0.0191
0.8	4,538	0.0286
0.9	7,987	0.0494
Mean	4,721	0.0216

* Each frequency distribution is a marginal distribution for the variable in question; e.g., $456,000 does not correspond to .0018, etc.

of corporate new security issues. Some distributions had market values of over $100 million.

The Methodology

Movements in security prices are associated with market-wide information that differentially affects the value of securities. To isolate the effects of the sales of a large block of securities on the price of the security, it is necessary to control for the differential effects of market-wide information on individual security returns. The market model proposed by Sharpe and tested by Blume provides a particularly simple and effective way to do so.[19] The model assumes that individual security returns, $\tilde{R}_{i,t}$ are linearly related to the returns on a market portfolio, $\tilde{R}_{m,t}$, and that the usual assumptions of the regression model are satisfied.[20] The market model asserts that

19. See William F. Sharpe, "A Simplified Model for Portfolio Analysis," *Management Science* (January 1963), pp. 277–93; Marshall Blume, "The Assessment of Portfolio Performance" (Ph.D. diss., University of Chicago, 1968). The methodology used in the present study is an adaptation of the methodology used by Eugene Fama, Lawrence Fisher, Michael C. Jensen, and Richard Roll in "The Adjustment of Stock Prices to New Information," *International Economic Review* 10 (February 1969): 1–21; Fama et al. used this methodology to analyze the price effects of stock splits.

20. Extensive tests of this model by Blume and by Fama et al. indicate that the assumptions of linearity, stationarity, and serial independence of the residuals are not violated. The estimated residuals, however, appear to be more closely approximated by a member of the stable class of distributions with a characteristic exponent of less than two. However, experimental sampling by Fama and Roll (Eugene Fama and Richard Roll, "Some Properties of Symmetric Stable Distributions," *Journal of the American Statistical Association* [September 1968]) and simultations by Fama and Babiak (Eugene Fama and Harvey Babiak, "Dividend Policy: An Empirical Analysis," ibid. 63 [December 1968]: 1132–61) and Blattberg and Sargent (Robert Blattberg and Thomas Sargent, "Regression with Non-Gaussian Stable Disturbances: Some Sampling Results," *Econometrica* 39 [May 1971]: 501–10) indicate that for securities the mean is almost as efficient an estimator of the location parameter of the distribution as the median or nonlinear

$$\tilde{R}_{i,t} = \alpha_i + \beta_i \tilde{R}_{m,t} + \tilde{u}_{i,t}, \quad (1)$$

where $\tilde{R}_{i,t}$ = return for period t on the ith security (dividends plus capital gains divided by initial price), $\tilde{R}_{m,t}$ = average return on a market portfolio of all assets on the exchange or a representative sample of all securities such as the return on the Standard and Poor 500 Composite Index, α_i, β_i = parameters that are to be estimated by least squares, and $\tilde{u}_{i,t}$ = the disturbance term for period t.

The systematic part of a security's return is presumed to be captured by its normal relationship to the returns on the market portfolio. Any returns not accounted for by a security's normal relationship to the market will be impounded in the disturbance, $\tilde{u}_{i,t}$, which thus presumably captures the effects of company-specific influences. One such company-specific event, of course, is a secondary distribution.

A secondary distribution is an infrequent event for any particular company. But the main concern of this study is not with the experience of any particular security at the time of a secondary distribution but with the effects of secondaries in general on security prices. The econometric problem is to find an efficient method of combining the time series returns of all firms in the sample so as to estimate the average effect of a secondary distribution on the prices of the securities involved.[21]

The parameters of the market model were estimated using 100 days of return data on each security in the sample around the day of the secondary but excluding the six observations prior to the secondary and seven observations including and subsequent to the day of the secondary.[22] An estimated prediction error, $\hat{E}_{i,t}$, was computed for a period of twenty-five days prior to the secondary and for fourteen days subsequent to the distribution. The prediction error is defined as

$$\hat{E}_{i,t} = R_{i,t} - [\hat{a}_i + \hat{b}_i R_{m,t}], \quad (2)$$

where $R_{i,t}$ is the actual return for security i on day t, $R_{m,t}$ is the return on the Standard and Poor Composite Index for day t, and $\hat{a}_i$ and $\hat{b}_i$ are the estimated coefficients of the market model.[23]

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estimators such as truncated means. Thus, the use of the regression model, a generalization of estimation by means, appears to be appropriate.

21. Fama et al. used a similar approach in their study but used the logarithmic or continuously compounded rate of return on securities. Since we are using daily data, the arithmetic one-day return is approximately equal to the continuously compounded rate of return; and when this alternative specification was tried, the results to be presented below were the same in all essential respects.

22. The returns for these days were deleted in forming the estimates because if there are price effects of a secondary distribution, the expected value of the disturbance for the day of the distribution and possibly for days around the distribution is nonzero. The inclusion of these days in forming the regression estimates would lead to a specification error in the regression model and would bias the coefficient estimates. As we will see, the data are informative in indicating how many days to exclude, and for this reason I left out these thirteen days.

23. The prediction error is not the same as the residual, since observations

Each security's prediction errors can be used to compute an average prediction error for each day relative to the day of the sale. The day of the sale is defined as day 0. The prediction errors for each day relative to the distribution day were cross-sectionally averaged over all securities. That is, the average error, $\bar{E}_d$, for day d, relative to the distribution day $d = 0$, is

$$\bar{E}_d = \frac{1}{N} \sum_{i=1}^{N} \hat{E}_{i,d}, \tag{3}$$

where $i = 1, \ldots, N$, the number of securities in the sample. The average error is the average estimated percentage deviation of the returns of the securities in the sample from their normal relationship to the market. Using the average error and its standard error, we can estimate the significance of the effects of secondaries on market prices.

Another informative statistic, which we called an abnormal performance index (API), was constructed to answer the question: What abnormal return would an investor achieve over time if at the start of day d he bought a portfolio of all securities that subsequently experienced a secondary and if he held this portfolio from day d until sometime after the distribution? This index is defined as:

$$\text{API}_D = \frac{1}{\text{N}} \sum_{i=1}^{N} \left[\prod_{\tau=d}^{D} (1 + \hat{E}_{i\tau}) \right]. \tag{4}$$

The index traces out the value of \$1.00 invested in equal amounts in each of the N securities in the sample at time τ and held until the end of period D, after abstracting from general market effects on returns. An equivalent but perhaps more intuitively appealing interpretation is as follows:

Suppose two individuals A and B agree on the following proposition. Individual B is to construct a portfolio consisting of \$1.00 invested in equal amounts in the N securities that had experienced a secondary distribution. The securities will be purchased at the beginning of period τ and held as a portfolio to the end of period D. Individual B contracts with A to take only the normal gains and losses as described by the market model, and to return to A, at the end of period D, \$1.00 plus or minus any nonmarket gains or losses. The expected value of the return to B is the expectation of the API_D of (4) above, namely,

$$E(\text{API}_D) = E\left\{ \frac{1}{N} \sum_{i=1}^{N} \left[\prod_{\tau=d}^{D} (1 + \hat{E}_{i\tau}) \right] \right\}$$

$$\approx \frac{1}{N} \sum_{i=1}^{N} \prod_{\tau=d}^{D} [1 + E(\hat{E}_{i\tau})], \tag{5}$$

to be predicted were not included in the estimation procedure. Thus, the mean values of the prediction errors are usually nonzero.

which, in the absence of any abnormal returns, would be approximately equal to 1.0.[24]

From the abnormal performance index, it is possible to find the marginal rate of return from holding this portfolio from period D to period $D + \tau$. This marginal rate of return is simply

$$\frac{\text{API}_{D+\tau}}{\text{API}_D} - 1. \tag{6}$$

This will allow us to calculate the returns on this portfolio for various holding periods.

The methodology described in this section will provide a means of estimating the average effects of the sale of large-block distributions on security prices. The estimated prediction errors are abnormal returns, returns not accounted for by the security's normal relationship to the market as described by the market model. By taking averages of the prediction errors for each day relative to the distribution day, we will be able to estimate the average abnormal return on each day associated with the sale of the large-block distributions. The abnormal performance index will be used to estimate the cumulative abnormal performance through time of a portfolio of secondaries purchased at the start of the period of interest and held through the end of the period of interest.

THE EMPIRICAL RESULTS

The implications of the competing hypotheses—the price-pressure hypothesis and the substitution hypothesis—will be tested in this section. The first test will simply be to calculate the average errors and the value of the abnormal performance index for each day relative to the distribution day. The price-pressure hypothesis predicts that we will observe negative average abnormal returns at the time of the distribution. If there are price declines, we can then test to see (1) if the amount of the price decline relative to the market is a function of the supply of shares sold in the large-block distribution and (2) if new shareholders receive abnormal returns after they purchase the shares of the secondary. The price-pressure hypothesis implies that the larger the secondary distribution, the greater the necessary inducement. We can then test to see if the abnormal return subsequent to the distribution is also a function of the size of the sale.

In contrast, the substitution hypothesis implies that the pure price-

24. This is only approximate, since

$$E\left[\prod_{t=1}^{T}(1+u_t)\right] \neq \prod_{t=1}^{T}[(1+E(u_t)]$$

if there is any serial correlation in the u_t. All evidence (Blume; Fama et al.) indicate that for individual securities the serial correlation is small enough to be ignored.

pressure effects should be virtually zero and not a function of the supply of additional shares sold through a secondary distribution. Also, the substitution hypothesis implies that on average there should be no observable inducements necessary to sell large blocks of shares.

We will now turn to the results of the analysis. We will use the daily sample in the first tests and then use the monthly sample to confirm the results found in the daily analysis.

Table 2
Summary Results of Total Daily Sample Analysis (Sample Size 345)

Day	Average Error (%)	Performance Index	S.D.	Fraction Negative
−25	0.113	1.001	0.0170	0.50
−24	0.054	1.002	0.0163	0.54
−23	−0.053	1.001	0.0153	0.53
−22	−0.053	1.001	0.0155	0.54
−21	0.035	1.001	0.0174	0.54
−20	−0.092	1.000	0.0143	0.56
−19	−0.069	0.999	0.0150	0.53
−18	0.055	1.000	0.0144	0.51
−17	−0.076	0.999	0.0150	0.50
−16	0.007	0.999	0.0161	0.54
−15	0.010	0.999	0.0146	0.54
−14	−0.092	0.998	0.0153	0.53
−13	−0.057	0.997	0.0147	0.54
−12	0.023	0.998	0.0150	0.48
−11	−0.121	0.996	0.0152	0.51
−10	0.082	0.997	0.0152	0.49
− 9	0.121	0.998	0.0167	0.49
− 8	0.026	0.998	0.0144	0.53
− 7	−0.156	0.997	0.0143	0.54
− 6	−0.095	0.996	0.0139	0.54
− 5	−0.115	0.995	0.0144	0.55
− 4	0.038	0.995	0.0158	0.53
− 3	−0.020	0.995	0.0151	0.54
− 2	0.025	0.995	0.0153	0.52
− 1	−0.035	0.995	0.0152	0.54
0	−0.552	0.989	0.0166	0.63
1	−0.252	0.987	0.0133	0.55
2	−0.229	0.984	0.0150	0.56
3	−0.191	0.983	0.0129	0.55
4	−0.168	0.981	0.0134	0.57
5	−0.189	0.979	0.0139	0.54
6	−0.068	0.978	0.0185	0.53
7	−0.039	0.978	0.0138	0.52
8	0.017	0.978	0.0141	0.51
9	−0.011	0.978	0.0166	0.51
10	0.019	0.978	0.0144	0.53
11	0.034	0.978	0.0135	0.48
12	0.085	0.979	0.0139	0.50
13	−0.089	0.978	0.0164	0.53
14	−0.044	0.977	0.0149	0.51

A First Look at the Total Sample Results

The methodology described in the previous chapter was applied to the total daily sample of 345 secondary distributions. Table 2 gives the standard table summarizing the results of the analysis. The first column, entitled "Day," references the days relative to the day of the distribution, $d = 0$. The next two columns give for each day the average error, $\bar{E}_d$, and then the value of the abnormal performance index, assuming that \$1.00 was invested in the portfolio of secondaries twenty-five days prior to the distribution day. The fourth column contains for each day, d, the standard deviation of the prediction errors, $\hat{E}_{id}$.[25] The last column gives the fraction of negative prediction errors for each day. Figure 1 presents the abnormal performance index for the total daily sample.

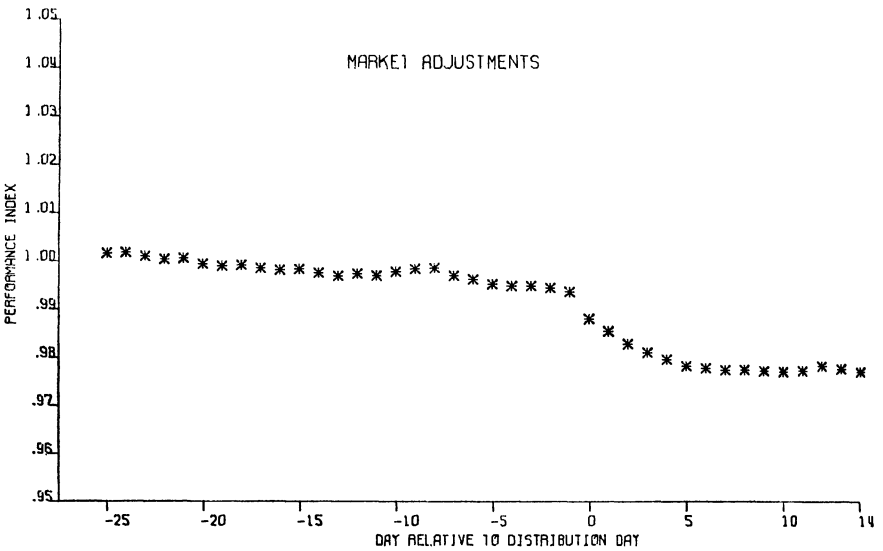

FIG. 1.—Secondary distributions daily data

The abnormal performance index falls from an initial level of 1.0 to a final value of 0.977, fourteen days subsequent to the distribution, a decline of 2.2 percent. The absolute value of the average error is greater on each of the six days including and subsequent to day 0 than on any single day not in this period. On the day of the secondary the average error was —0.5 percent. This initial evidence is in some respect consistent and in some respects inconsistent with selling pressure. Since the

25. The standard deviation of the prediction errors, S_d, will be used as a descriptive statistic and is defined as

$$S_d = \left(\frac{1}{N-1} \sum_{i=1}^{N} (\hat{E}_{id} - \bar{E}_d)^2 \right)^{\frac{1}{2}}.$$

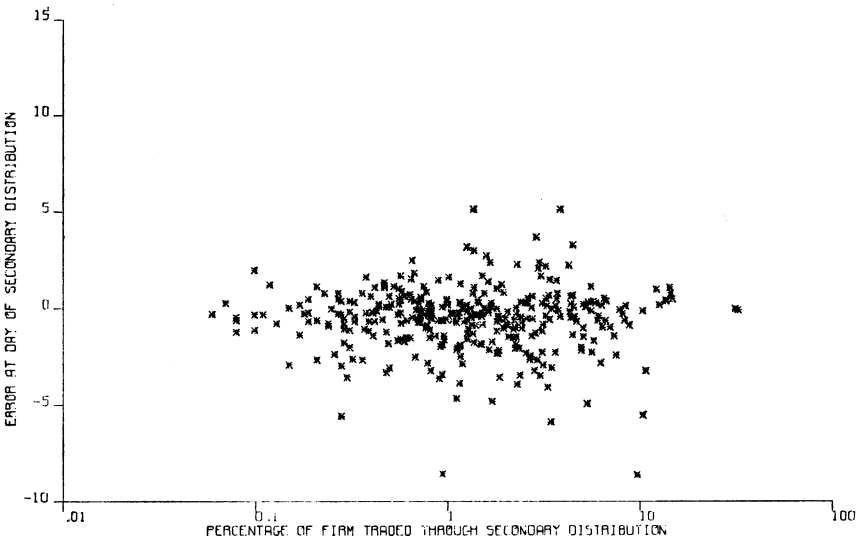

FIG. 2.—Prediction error at day of secondary versus percentage of firm traded.

mean percentage of the firm traded was 2 percent and the mean price effect appears to be 2 percent, the elasticity of demand would appear to be —1. But the price effect appears to be permanent, for by the end of the fourteenth day after the distribution the abnormal performance index has not returned to its initial level of 1.0. Over this period there is no inducement for buyers of shares of a secondary. This evidence is contrary to the predictions of the price-pressure adherents.

Although price-pressure adherents may believe that the evidence

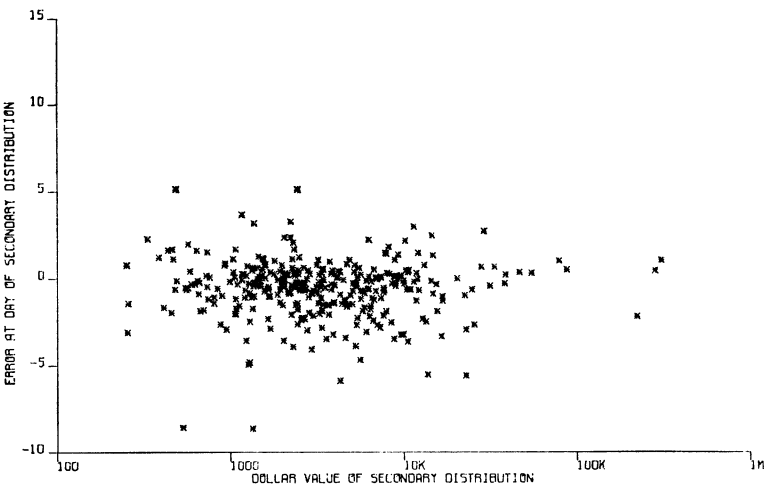

FIG. 3.—Prediction error at day of secondary versus dollar value of secondary.

is consistent with price pressure, we can also test to see whether the adverse returns are a function of the size of the distribution. We used two measures of size, the percentage of the firm traded in the distribution, which appears to be the natural size variable, and the dollar value of the distribution, which can be considered another measure of increased supply.

In figures 2 and 3 the prediction errors for the day of the distribution, $\hat{E}_{i0}$, are plotted against the logarithm of the percentage of the firm traded and the logarithm of the dollar value of the issue, respectively.[26] As can readily be seen from these scatters, there appears to be no association between the prediction error at the day of the distribution and the size of the distribution as measured either in relative or absolute terms. For what it may be worth, least squares regressions were fitted to obtain numerical approximations to the implied elasticities of demand.[27] They turned out to be approximately —3,000 for the relative case and —2,500 for the absolute case. To help put these numbers in perspective, we may note that an estimated elasticity of —3,000 would imply that if the percentage of the firm traded were to increase from 1.0 to 20.0, the abnormal return would decline an additional 0.0063 percent or less than 1 cent on a security priced at $50 a share. This evidence, in sum, is inconsistent with the prediction of the price-pressure hypothesis and implies that we cannot assume that the size of the large-block sale is the cause of the observed abnormal return experience. Some evidence as to the likely source of this adjustment will be introduced in the next section.

Abnormal Return Experience of the Buyer of Secondary Distributions

The buyer of shares sold through a secondary distribution pays only the subscription price. The selling-pressure hypothesis implies that an inducement, which takes the form of a price discount followed by an abnormally positive return, is necessary to find buyers for the shares of the large-block sale. The substitution hypothesis predicts that the total abnormal return subsequent to the distribution should be the same as the purchase of shares of any other security. Since investors will be

26. The logarithm of the size variable was used as the independent variable for purposes of presentation, since the distributions of the size variable have long right tails. The regressions were also run using the percentages and dollar values. The results were exactly the same in all essential respects.

27. The fitted equations were

$$\hat{E}_{i0} = -.0069 - \underset{(.00078)}{.00029} \log P \qquad R^2 = .0004$$

and

$$\hat{E}_{i0} = -.0022 - \underset{(.00080)}{.00042} \log V \qquad R^2 = .0009,$$

where P is percentage of firm traded and V is dollar value of the issue.

aware of any opportunities for abnormal returns and compete for them, the net result of this competition will be the elimination of opportunities for abnormal returns and the absence of pure price pressure.

A test of these alternative predictions involves merely substitution of the subscription price for the actual closing market price on the day of the secondary for each of the securities in the sample. Two returns change: the return on the day of the secondary, which can be called

Table 3

Summary Results of Daily Data Analysis—Substitution of Subscription Price at Day of Secondary (Sample Size 337)

Day	Average Error (%)	Performance Index	S.D.	Fraction Negative
−25	0.102	1.001	0.0171	0.50
−24	0.027	1.001	0.0161	0.54
−23	−0.076	1.000	0.0152	0.54
−22	−0.044	1.000	0.0156	0.53
−21	0.030	1.000	0.0175	0.54
−20	−0.090	0.999	0.0144	0.56
−19	−0.086	0.998	0.0151	0.54
−18	0.055	0.999	0.0146	0.51
−17	−0.065	0.998	0.0151	0.50
−16	0.019	0.998	0.0163	0.53
−15	0.017	0.998	0.0147	0.54
−14	−0.090	0.998	0.0154	0.53
−13	−0.056	0.997	0.0148	0.54
−12	0.027	0.997	0.0149	0.48
−11	−0.141	0.996	0.0148	0.53
−10	0.083	0.997	0.0153	0.50
− 9	0.121	0.998	0.0168	0.49
− 8	0.030	0.998	0.0144	0.53
− 7	−0.172	0.996	0.0143	0.55
− 6	−0.099	0.995	0.0139	0.54
− 5	−0.116	0.994	0.0145	0.55
− 4	0.032	0.994	0.0158	0.53
− 3	−0.010	0.994	0.0150	0.55
− 2	0.015	0.994	0.0152	0.51
− 1	−0.033	0.994	0.0152	0.54
0	−0.744	0.986	0.0151	0.72
1	−0.019	0.986	0.0175	0.49
2	−0.235	0.984	0.0152	0.56
3	−0.203	0.982	0.0130	0.55
4	−0.149	0.980	0.0134	0.57
5	−0.199	0.978	0.0140	0.55
6	−0.062	0.977	0.0186	0.53
7	−0.052	0.977	0.0139	0.53
8	0.025	0.977	0.0141	0.50
9	0.030	0.977	0.0146	0.51
10	0.018	0.977	0.0145	0.54
11	0.039	0.978	0.0135	0.48
12	0.085	0.978	0.0139	0.49
13	−0.093	0.977	0.0164	0.53
14	−0.043	0.977	0.0150	0.50

the vendor's gross last-day return, and the return for the day following the secondary, which could be called the buyer's first-day return.[28]

Since these two days were left out in computing the estimated coefficients of the market model, the coefficients used to estimate the prediction errors for each day, $\hat{E}_{i,d}$, will be the same. The estimated prediction errors, however, might be different for the day of the distribution and the day subsequent to the distribution. The average errors or average abnormal returns for each day relative to the distribution day and the abnormal performance index were recomputed using the new estimated prediction errors. Table 3 is the standard table for this analysis.[29] The abnormal performance index is presented in figure 4.

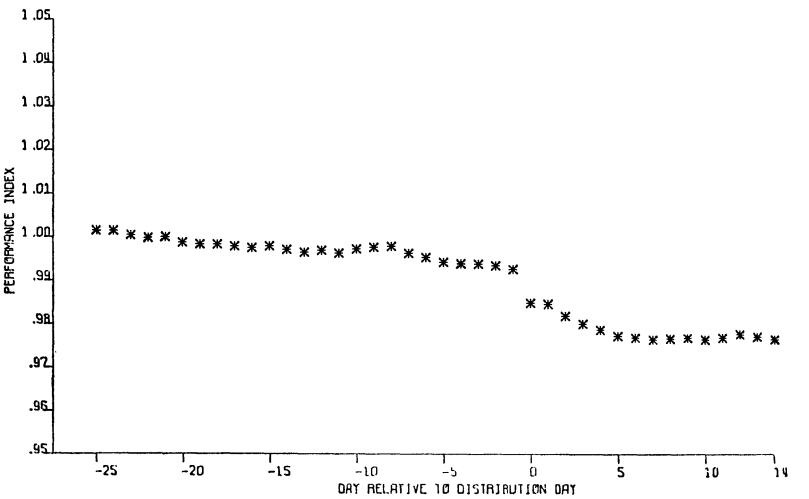

FIG. 4.—Seller-buyer adjustments

The performance index has a value of 0.986 on day 0. If the portfolio of all secondaries was purchased on day 0 at the subscription price, this is equivalent to purchasing the abnormal performance index for 98.6 cents. If this portfolio was held until the end of day 14, the abnormal performance index has a value of 0.977. This indicates that the purchaser of the portfolio of all secondaries would lose approximately 1.0 percent on his purchase by the end of day 14. In fact, the value of the abnormal performance index reaches 0.977 by the end of day 6. The loss of 1.0 percent after the purchase of shares of the distribution at the subscription price indicates that, contrary to the predictions of the price-pressure hypothesis, positive abnormal returns subsequent to

28. Two returns change when one price changes simply because the same price is used as the terminal price on the day of the price change and the base price for the following day.

29. Eight securities were dropped in this substitution because the subscription price of the secondary was not available.

the purchase of the secondary distribution do not materialize over this period.

When the secondary is purchased at the subscription price, the buyer does not pay any commissions for the shares. But, in effect, the purchaser does pay a commission of 1.0 percent in the form of a subsequent negative abnormal return experience. This commission is approximately equal to the regular commissions paid to brokers on a round-lot purchase of shares on the New York Stock Exchange.

This is a powerful piece of evidence in support of the substitution hypothesis. On average, the results of the analysis indicate that the buyers of all secondaries pay the regular round-lot commissions on their purchase even if they buy on a supposedly commission-free basis. There was no subsequent price recovery in the market over this period that served as inducement to purchase the shares of the secondary. The purchaser receives, on average, the same normal returns as if he had bought a round lot of 100 shares of any other security, after paying the regular transactions costs for the purchase. The large-block sales are sold not at a reduced price but at the market price adjusted for the commissions. However, an investor who purchases the shares in the open market in the six-day period after the distribution will pay the 1.0 percent commission but will still lose an additional amount in subsequent price adjustments in the market. There is, however, no incentive for traders to sell short after the announcement of the distribution and buy back after the six-day period, for transactions costs would eliminate the gross profits from using such a scheme.

Abnormal Return Experience and Size of Sale

Although the prediction errors at day 0 were not associated with the size variable, and although, on average, the abnormal return experience subsequent to the distribution was negative, it is still necessary to check that the larger distributions did not have positive abnormal returns subsequent to the distribution while the smaller distributions had negative abnormal returns.

The 345 secondary distributions in the daily sample were partitioned into subsamples according to the size variables. For the percentage of the firm traded, 169 distributions that represented less than 1.2 percent of the firm traded were included in subsample $P1$, and 176 distributions that represented more than 1.2 percent of the firm traded were placed in subsample $P2$. For the dollar-value subsamples, 164 distributions that represented sales of less than \$2.7 million were included in subsample $V1$, while the remaining 181 secondaries were included in subsample $V2$.

The average errors and the value of the performance index for each day, d, were computed for each of the subsamples. Table 4 summarizes, for each of the subsamples, the average error at the day of the distribution, the performance index return for day 0, and the value of the performance index at strategic days relative to the distribution day.

Table 4
The Effect of Size of the Secondary on Market Performance

Subsample	Average Error at Day 0	Performance Index Return Day 0	Value of Performance Index at Day				
			−10	−2	0	+6	+10
P1	−0.006	−0.006	1.002	1.000	0.993	0.980	0.980
P2	−0.004	−0.004	0.992	0.990	0.986	0.976	0.976
V1	−0.003	−0.003	0.999	0.995	0.992	0.979	0.978
V2	−0.007	−0.007	0.995	0.995	0.987	0.977	0.978

Consistent with the previous results, we see that the average errors at day 0 are approximately the same for each subsample. Of more importance is the fact that the value of the abnormal performance index for each of the subsamples is lower on day 10 than on day 0. It falls approximately 1.3 percent for subsample *P*1 and approximately 1.0 percent for subsample *P*2. This evidence is again inconsistent with the implications of the price-pressure hypothesis. The larger distributions do not experience a larger abnormal return than the smaller distributions subsequent to the day of the sale. Over this period, at least, there appears to have been no inducement in the form of an abnormal return as a function of the size of the distribution.

A Check on the Results with Monthly Data

Although the evidence appears to be more consistent with the assumption of the substitution hypothesis, monthly data were used to confirm the daily sample findings. The period covered included 1947–64, a much longer time period than the daily sample period, and over 1,200 secondary distributions were analyzed. With the monthly data we will be able to measure the abnormal return experience over many more months than in the daily sample period.

The analysis was repeated using the monthly data sample. The average prediction error was −2.15 percent in the month of the secondary. This confirms the evidence presented in the daily sample analysis. The value of the abnormal performance index was 1.01 at the end of the month of the secondary, 1.01 at the end of month 1, 1.01 at the end of month 5, and 1.00 at the end of month 18 after the secondary. No inducement in the form of an abnormal return was realized over the eighteen-month period subsequent to the distribution. This is a substantial period of time in which to realize the increased rate of return implied by the selling-pressure hypothesis.

The abnormal performance index was computed for four portfolios constructed according to the size of the distribution. The first portfolio contained the 25 percent of the secondary distributions that represented the largest percentage of the firm traded. Once again there was no apparent relationship between the change in the index and the size of the distribution in the month of issue or in the months subsequent to the distribution.

In conclusion, the examination of abnormal returns on both a daily and a monthly basis shows a permanent average 2 percent loss associated with the sale of a secondary distribution. Contrary to the selling-pressure hypothesis, however, this decline does not seem to be associated with the crucial size variables. Nor are there, on the average, excess returns earned for those who buy shares of a large-block distribution of securities. We will now see what additional light the data throw on the source and significance of the once-and-for-all 2 percent price decline.

INFORMATION AND SECONDARY DISTRIBUTIONS

We have already stated that one possible explanation for the 2 percent price decline may be that the secondary distribution is associated with adverse information about the firm. That is, the seller may possess information that, if generally known, would cause an immediate downward adjustment in the market price of the security. An investor investigating the operations of the firm may conclude from an analysis of information not readily available to others that the shares are overvalued in the market. He therefore sells, and his sale may well act in turn as a signal to others to commit resources to the reexamination of the firm's prospects. If there was indeed information of value in this sale, the price of the shares should adjust by the value of this information.

Secondary distributions, however, are sold for other than informational reasons. The classic example would be that of an investor who has held a particular stock in his portfolio for a considerable period of time and who now feels it represents a larger proportion of his wealth than he desires to hold in this form. Such an investor need have no information about the firm of any value to other traders. Although he has the option to sell his securities over time in smaller quantities on the exchange, he may feel that it is more efficient to sell them in a single offering.

The vendors of the secondary are classified into five general categories in the SEC *Statistical Bulletin* (n. 17 above). These categories are: (1) investment companies, (2) banks and insurance companies, (3) individuals, (4) corporations or corporate officers, and (5) estates and trusts. The likelihood that a sale contained adverse information is very different among these categories, although, of course, no absolutely hard and fast classification can be made along these lines.

On the one hand are estates, trusts, individuals, banks, and insurance companies, who are typically furthest from the day-to-day operations of the firm and who may have motives to sell other than for informational reasons: an estate, to meet tax obligations, to make philanthropic donations or other distributions to legatees; an individual, to adjust a portfolio imbalance or for consumption needs; and so on. Though some vendors in these categories undoubtedly sell for informa-

tional reasons or because they feel they possess adverse information, the vast majority probably sell for reasons having nothing to do with the prospects of the firm.

At the other extreme is the category of corporations and officers. A corporation which holds a large proportion of another company's stock is almost certainly in close contact with the operations of the firm it sells, and the same is obviously true for corporation officers. In their study of insider trading and stock prices, for example, Lorie and Neiderhoffer found strong evidence that the information available to officers did have substantial value.[30] They also found that by the time the information was publicly available that an "insider" had made a purchase or a sale, there were no further profits to be made from acting on the published data. Thus, not only do insiders close to the operations of the firm possess information, but a secondary distribution might be an indication to other market traders that the sellers possess adverse information. Similarly, investment companies and mutual funds have large "research" staffs, and their close contacts with brokers and underwriters make it at least plausible that some part of their sales may reflect adverse inside information.[31]

On the day of the secondary, the vendor is not generally known. If the announcement of a secondary distribution conveys information to the market, we should thus expect that on the day of the sale all the average errors will be negative and of about the same order of magnitude. Thereafter the company's prospects are being actively reevaluated, and if no adverse information is discovered, the price of the shares should return to the predistribution price. If the value of the information exceeded the expected value of information contained in secondaries, then the price will fall to the new equilibrium price.

The abnormal performance index and the average prediction errors were computed for each of the five vendor categories. These results are summarized in tables 5 and 6. As can be seen in table 5, the average errors at day 0 are indeed of approximately the same order of magnitude for all groups with the exception of the corporation category. Though the sample size for that group may be too small for any firm judgment, assuming that it is a real difference, the obvious explanation would be that some information as to the vendor and cause of the sale leaks to

30. James H. Lorie and Victor Niederhoffer, "Predictive and Statistical Properties of Insider Trading," *Journal of Law and Economics* 11 (April 1968): 35–54. They conclude: "When insiders accumulate a stock intensively, the stock can be expected to outperform the market during the next six months. Insiders tend to buy more often than usual before large price increases and to sell more than usual before price decreases. We have been unable to find companies in which the insiders are consistently more successful in predicting price movements than are insiders in general" (pp. 52–53).

31. To quote the *Report of Special Study of Securities Markets* (n. 13 above): "An official of a large mutual fund selling organization stated to the study that the funds sponsored by it sometimes used secondary distributions to dispose of 'sick' situations rapidly."

Table 5
Vendor Classification and Daily Sample

Subsample	Average Error at Day 0	No. of Observations	Value of Performance Index at Day −10	−2	0	+6	+10
Investment company and mutual funds ..	−0.0042	192	1.000	0.994	0.989	0.974	0.975
Banks and insurance companies	−0.0053	31	0.998	1.003	0.995	0.991	0.995
Individuals	−0.0045	36	0.986	0.983	0.982	0.977	0.975
Corporations and officers	−0.0113	23	0.992	0.992	0.984	0.964	0.963
Estates and trusts ...	−0.0071	50	0.991	0.996	0.989	0.986	0.984

the market prior to the sale. After the distribution, as can be seen from table 6, the absolute magnitude of the postdistribution abnormal return is largest for corporations, followed by mutual funds, and smallest for banks, estates, and individuals, which is what one would have expected on the basis of our earlier a priori classification by likelihood of adverse information.

Table 7 indicates how a buyer would have fared on purchasing each category of secondary at the subscription price. If he had bought insurance company, individual, or estate secondaries, he would effectively have paid less than 1.0 percent in commissions. However, if he had bought investment company or corporation distributions, he would effectively have paid more than a 1.0 percent commission.

As noted earlier, the distributions are initiated and concluded so quickly that the vendor is not generally known on the day of the distribution. Insiders do not have to report purchases and sales for a period of up to six days, and by that time the market has adjusted to announcement effects contained in the distribution. Since the buyer of any particular secondary does not yet know the vendor, he also does not yet know the effective commission he is paying. If he was unfortunate and bought the corporation secondary, he paid twice the normal commission. If he was fortunate and bought the insurance company

Table 6
Abnormal Return on Performance Index by Vendor Classification

Subsample	Abnormal Return on Performance (%) −10 to +10	0 to +10
Investment companies and mutual funds	−2.5	−1.4
Banks and insurance companies	−0.3	−0.0
Individuals	−1.1	−0.7
Corporations and officers	−2.9	−2.1
Estates	−0.7	−0.5

Table 7
Return Experience of Seller and Return Experience of Buyer of Secondary

Subsample	Average Error at Day 0	Abnormal Return Performance Index (%)	
		Seller: Day −10 to 0	Buyer: Day 0 to +10
Investment companies	−0.0067	−1.5	−1.2
Insurance companies	−0.0077	−0.5	+0.2
Individuals	−0.0058	−0.5	−0.6
Corporations	−0.0100	−0.8	−2.0
Estates	−0.0089	−0.5	−0.1

secondary, he in effect paid no commission. On the average he would pay the normal round-lot commission.

The monthly data sample was used to confirm the data sample evidence. The results of the analysis are summarized in table 8.

For the category of individuals, the abnormal performance index has risen substantially prior to the sale and remains flat subsequent to the sale. This is consistent with the proposition that individuals tend to sell when a security has experienced positive returns to correct portfolio imbalances. Once again, the most striking evidence in favor of the information hypothesis is the experience of the category of corporations and corporate officers. Their sale does contain information of significant value. They sell when the security has experienced positive abnormal returns and is considered to be overvalued in the market, and the post-distribution experience of the security confirms their analysis.

Other tests of the significance of the information effect versus the price-pressure effect were also run. A two-way analysis of variance was conducted. The prediction errors at the month of secondary conditional on the size variables and the vendor showed that the F-statistic for the vendor classification was highly significant, while the F-statistic for each of the size variables was insignificant. Also of interest was the finding that the possible interaction between vendor and size variable was also insignificant. Even though the cross-sectional tests overstate the signifi-

Table 8
Summary of Monthly Runs by Vendor

Vendor	$\bar{E}_0$	Return on API for Various Periods (%)		Size
		Month −18 to −1	Month +1 to +18	
Investment companies	−0.031	−1.0	−1.0	361
Bank and investment	−0.018	1.5	−1.5	220
Individuals	−0.009	6.0	0.0	181
Corporations and officers	−0.031	8.0	−6.0	128
Estates and trusts	−0.013	2.0	3.0	195
Unknown*	−0.022	...	...	112

* It was not possible to obtain the vendor for these 112 distributions. The average error at the month of the secondary was approximately the same as the total sample.

cance of the relationships, the price-pressure variables are not significant.

The evidence in this section is more consistent with the substitution cum information hypotheses than with the selling-pressure hypothesis. There do appear to be significant differences by vendor and thus information, but no evidence of price pressure or inducements for purchasers of secondary distributions.

Registration of Secondary and Price Effects

Since the evidence in the last section indicated that the selling-pressure hypothesis could not account for the abnormal returns observed at the sale of a secondary distribution, it is possible to give additional evidence that the observed price effects of a secondary distribution are the result of adverse economic information about the firm. If the seller of shares in a secondary distribution has a "control relationship" to the firm, the Securities and Exchange Commission requires registration and a twenty-day waiting period before the shares of the secondary can be sold.

Since registration occurs twenty days prior to the actual sale, market traders have time to reexamine the prospects of the firm prior to the sale date. If there was information of value in the sale, the price of the shares would adjust to the value of the information prior to this sale date. On the actual day of the sale there should be no price adjustment.

For those secondary distributions that were not registered, the market did not have time to reexamine the prospects for the firm prior to the sale, and therefore, if there is, on average, adverse formation contained in the sale of a secondary distribution, the price effects should be observed on the day of the sale and the days following, as market traders confirm that there was information of value in the sale.

In the daily data seventy-three distributions were registered out of the total sample of 345. The average errors for each day relative to the distribution day and the value of the abnormal performance index for each day relative to the distribution day were computed for both registered and nonregistered distributions. Table 9 summarizes the results of the analysis.

For the nonregistered secondaries the average abnormal return on the day of the distribution was —.6 percent, slightly lower than the

Table 9

Abnormal Return over Different Subperiods

Period: Day Relative to Distribution Day	Performance Index Return	
	Registered Secondary	Nonregistered Secondary
−20 to −1	−1.3	−0.4
0	−0.099	−0.6
0 to 10	−0.4	−1.4
−20 to +14	−1.7	−2.4

figure for the total sample of —.5 percent. The performance index falls from a level of 0.989 on the day of the secondary to 0.975 ten days subsequent to day 0, a return of —1.4 percent. For the registered secondaries the average error on the day of the secondary was —0.099 percent. The performance index falls from a level of 0.992 on day 0 to 0.988 on day 10, a return of —.4 percent. Of interest is the average error of —0.26 percent on day —20, and the error of —0.41 percent on day —19. This is the announcement date of the registered secondary. From twenty days to one day prior to the secondary the performance index drops from a level of 1.005 to 0.99, a return of —1.3 percent. For the same period for the nonregistered secondaries the performance index falls —0.4 percent.

It appears that the registered secondaries have less total effect on market prices than the nonregistered secondaries. Since registration is left partially to the discretion of the vendor, the distributions that did not contain information might tend to be registered, since the need for an immediate sale is not as pressing for these vendors and they would wish to let other traders have time to confirm that there was no informational content in the distributions. However, registration of a distribution is more costly than nonregistration for three reasons. First, the necessary registration statements are expensive to prepare. Second, the underwriting group, which becomes a formal organization when registration occurs, charges a higher price for its services, which include distribution of a prospectus, meeting of Securities and Exchange Commission requirements, and expensive advisory meetings. Third, the vendor must wait twenty days, and this waiting time is also a potential cost to the vendor, since the market conditions could change during the waiting period.

Therefore, distributions that occur simply to change a portfolio holding are not always registered. On the other hand, some vendors who feel they possess adverse information may be forced to register because they are close to the operations of the firm; but since only 21 percent of the distributions were registered, this does not appear to be a great constraint.

For the registered distributions the magnitude of the price effects was quite small on the day of the sale and the days subsequent to the sale, while for the nonregistered distributions the price effects were much larger on the day of the sale and days subsequent to the sale. This evidence is consistent with the hypothesis that the secondary distribution may signal adverse economic information about a firm's prospects.

In conclusion to this section, it is of interest to state the recommendations of the Securities and Exchange Commission's Special Study of Securities Markets (n. 13 above) in reference to unregistered secondary distributions: "The speed with which these distributions occur is evidence of the efficiency of the marketing facility of the financial

community, but rapid distribution may not be conducive to an unhurried, informed, and careful consideration of the investment factors applicable to the securities involved" (p. 567). Further: "From the point of view of public customers they are often indistinguishable from registered distributions in respect to disclosure needs. Yet they occur, for the most part, without even the minimum disclosure protections that would seem practical and with a speed that does not permit careful consideration of the merits of the security being distributed" (p. 569). The study then recommended that more disclosure of information and a waiting time be instituted. The evidence presented here indicates that neither are necessary. New shareholders do not suffer dire consequences when they buy the shares of an unregistered distribution. On the contrary they, in effect, pay approximately the regular exchange commissions as on any other market trade. Also, the dispersion of the distribution of prediction errors on day 0 for both registered and nonregistered distributions is approximately the same as on the other days in the sample period. The requirement of registration of any secondary, with its increased direct expense, does not seem to be warranted.

CONCLUSION

The purpose of this paper has been to test empirically two alternative hypotheses concerning the operations of the securities markets. The substitution hypothesis defines the market for securities as all securities that the investor considers for investment. Securities or combinations of securities provide him with potential income streams of essentially similar characteristics. Since securities provide similar potential consumption streams, they are close substitutes. The substitution hypothesis implies that individuals as well as corporations can alter their holdings in securities at approximately the prevailing market price.

The alternative hypothesis, the selling-pressure hypothesis, assumes that investors consider a security to be a unique commodity with a low cross-elasticity of demand with other securities. It is argued that lack of information, institutional constraints, and investor speculation dominate trading in the securities markets. Keynes likened the security markets to a game of Old Maid or Snap in which market traders buy and sell securities without regard to economic values but in expectation of outguessing other market traders.[32] It is also argued that individuals have differing expectations concerning the terminal values of particular securities and, as a result, will only hold increasing amounts of a security if they expect to achieve higher rates of return. Large-block sales of securities would cause price declines as a function of the size of the trade, as an inducement to investors to purchase the shares.

The competing hypotheses could only be resolved through em-

32. John M. Keynes, *The General Theory of Employment, Interest and Money* (London: Macmillan & Co., 1936).

pirically testing the predictions of each model. A sample of the largest block distributions of securities, secondary distributions, were considered to be the best data available to test the alternative hypotheses. The data gave consistent and strong support to the assumptions of the substitution hypothesis. The testing procedure allowed for the differential effects of changing economic conditions on security prices. Once the effects of market-wide movements in security prices had been accounted for, it was possible to estimate prediction errors. The prediction errors for each security are defined as the security's abnormal returns, not associated with market-wide movements. Regressions of the prediction error of each security in the sample on two supply variables—the percentage of the firm traded and the dollar value of the distribution—indicated that estimated elasticities of demand were very large and negative. This evidence could only be interpreted as strong support for the substitution hypothesis. The range of the percentage of the firm traded was from less than 1.0 percent of the firm to more than 35.0 percent. If selling pressure was not found in this range, there most likely will not be selling pressure for trades of greater amounts. In every phase of the analysis, whether the daily sample or the monthly sample was used, the size or supply variables were not associated with the abnormal return experience of securities at the time of the large-block distributions of securities.

Market Adjustments to Information

Secondary distributions were chosen in lieu of primary distributions because it was felt that many of the variables that affect the firm's prospects would be held constant. However, even for secondary distributions it was not possible to "hold all other things constant."

Certainly some sellers of a large block of stock wish to alter their portfolio holdings to effect a better balance between the expected return on their portfolios and the riskiness of their holdings. Some sales occur after the market price of a security has adjusted to some "unfavorable news" about a company's prospects. But it is also possible that sellers of a block of stock possess information that has economic value. The sale of a secondary distribution may be a signal to other market traders to incur the costs of reanalysis of the firm's prospects. For some firms this reevaluation may take only one day; for other firms the task may take longer. But, once the reevaluation takes place, the market price should adjust immediately to the value of the information. It appears that the total adjustment to the sale of a secondary distribution takes approximately six days, from day 0 through day 5. We saw in table 2 that the average errors from day —25 to day —1 are very close to zero. There are twelve positive average errors and thirteen negative average errors with no apparent clustering of the signs of the average errors through time. Also, from day 6 through day 14, there are four positive and five negative average errors. The adjustment period does not imply that prices of securities adjust slowly to new equilibrium

values. On the contrary, the percentage of negative prediction errors on any one day 1 through day 5 indicates that there is only a slight excess of negative prediction errors on any particular day. Though the average errors are negative in this period, a considerable proportion of securities experienced positive prediction errors on each of the six days.

It must also be remembered that the vendor of the distribution is not generally known at the time of the distribution, though there certainly are leaks in the system, since brokers and investment bankers know the vendor. Officially, corporate insiders must report their transactions in their own company's stock to the Securities and Exchange Commission within six days after the distribution. By the time official reporting is necessary, the market has fully adjusted for the value of the information.

Though this six-day period could be an adjustment period to the value of the information, it can be disputed on two counts: (1) All distributions are not initiated and completed on a single day but may take several days to conclude. The distribution may be "hanging" over the market, and this continued selling pressure could be the cause of the observed decline subsequent to the distribution. (2) The second objection to the adjustment period is the assertion that the investment banking group "eases" the price adjustment in the market by engaging in price stabilization.

To test these propositions, 226 secondaries were examined in the period 1961–63 to find the closing date on the investment banker's books.[33] Of the 226 secondaries in these years, 51.0 percent of the distributions were initiated and completed on day 0, while 42.0 percent of the distributions were closed out the next day and only 7.0 percent of distributions took longer than one day to complete. This evidence indicates that the sale period is too short to account for the entire length of the adjustment period in the market. Also, if the books are closed quickly, there is no need for further buying or selling by the selling group.

Of extreme interest is the fact that approximately 93.0 percent of the distributions are initiated and completed within one day. In a very short period of time, large holdings of securities can be sold without the price pressure to induce traders to purchase the shares.

Although it was possible to determine a vendor effect—strongest for corporations and officers and weakest for individuals—of more interest was the finding that the average errors were approximately the same on the day of the sale, and as the vendor, or, more important, the value of his information became known, the market price adjusted to the new equilibrium price. Also, there was no apparent association be-

33. A distribution ends when the investment banker closes his books after matching all orders with available shares. This may take longer than the actual period involved in the sale, especially for large distributions.

tween the size of the sale and the value of information contained in the secondary distribution.

Inducements: Reality or Myth?

There are various interested parties in a secondary distribution. These interested parties include (1) the buyer of shares of the secondary, (2) the vendor of the secondary, (3) the current holders of the shares, and (4) other market traders.

1. The buyer of shares of a secondary distribution pays only the subscription price and does not pay commissions for the purchase. The imperfect-market hypothesis implies that the buyer must receive an inducement to purchase the shares of a secondary distribution. This inducement could come in the form of a price discount and subsequent price recovery. On the surface it appears that the buyer of shares of a secondary distribution does receive an inducement in the form of a commission saving of approximately 1.0 percent. However, subsequent to his purchase at the subscription price, the investor, on average, lost 1.0 percent in market price adjustment. This loss was a permanent loss in that, on the average, over an eighteen-month period subsequent to the sale there were no observed abnormal returns. Also, the 1.0 percent adjustment in the market price was independent of the size of the sale. In effect, as the substitution hypothesis implies, the buyer of shares of a secondary distribution pays the same commissions on his purchase as he would if he purchased 100 shares of any other security on the exchange.

But the buyer of shares does not have to buy at the subscription price. He can always wait the five days after the secondary and then purchase the shares after the adjustment period has been completed. The buyer saves the 1.0 percent price adjustment in the market subsequent to the secondary, but he must pay a commission of 1.0 percent on his purchase. The buyer is then indifferent to the purchase of a secondary at the subscription price or the shares in the open market at the end of the period. This is a powerful piece of evidence in support of the substitution hypothesis and the workings of competitive markets.

2. The vendor of a secondary may possess information that, on the average, is worth approximately 2.0 percent. If the vendor uses a secondary distribution, he incurs the following costs. First, the market price adjustment was approximately −0.3 percent before the sale. Second, he sells at the subscription price and pays an additional 0.7 percent. Third, he pays for the services of the investment banker, an additional 2.0 percent.[34] The vendor then pays 3.0 percent to sell his shares.

34. The transaction costs for each secondary were obtained from *Investment Dealer's Digest*. The 2 percent was computed as the average of the ratio of this cost to the subscription price of the secondary. For registered secondaries the ratio

If he waited until the market had adjusted to the value of his information, he would lose 2.0 percent, on the average, but have to pay an additional 1.0 percent in commissions. For this strategy his total cost would be 3.0 percent.

3. The present holder of the shares on average suffers a 2.0 percent loss. If he sells after the announcement of a secondary and can sell at the closing market price on the day of the secondary, he loses 0.9 percent on the sale and pays an additional cost of 1.0 percent in brokerage. If he holds the securities and does not sell, he also pays approximately 2.0 percent. Once the secondary is announced, it is no longer necessary for the present shareholder to trade. This is also a direct implication of an efficient market.

4. Other market traders can buy and sell shares at any time. After a secondary is announced, there is no incentive to use a mechanical trading scheme to increase profits, for the price fall after the announcement is well within transactions costs on a two-way trade. Even knowledge of an impending secondary distribution just prior to the announcement could not result in abnormal profits. The market price falls approximately 1.6 percent from day −1 to day +6. There is no incentive to sell short and buy back the shares in the market to mechanically increase profits.

However, shareholders who do buy shares of secondary distributions in the open market within the six-day period subsequent to the sale pay effectively more than 1.0 percent in commissions. The adjustment to information in the sale seems to fall on these investors.

Sales of Other Assets—Stocks and Bonds

Though the analysis in this paper was carried out on a sample of large-block distributions of already outstanding shares, the implications of this analysis carry over to new issues of common stock as well as bonds. The only reason a sample of new issues was not chosen was the problem of market adjustments to factors not specifically related to the issue itself, such as new investment, mergers, and recapitalizations. There is no reason to believe that new issues should be any different from secondary distributions in terms of price pressure. To support this contention, a sample of 696 rights issues was also collected for the period 1926–66. The standard analysis was applied to this sample as well. The average error at the month of the rights issue of common stock was −0.3 percent. Though the securities in the rights issue sample experienced abnormally positive returns prior to the issue, at the month of the rights issue there was no appreciable effect on market price of the increased quantity of securities. After the issue there appeared, on average, to be no further abnormal gains or losses. When the rights issue sample was classified into subsamples according to the ratio of the

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was approximately 4.5 percent. These costs are marketing costs and are not incurred by the buyer of shares of the secondary. Therefore, they are completely separate from price pressure, which is the main interest of this study.

value of the new capital to the total market value of the outstanding shares, there also was no appreciable change in the average errors at the month of the rights issue for different stratifications by this classification. This evidence is consistent with the findings of the effects of secondary distributions on market price. Corporations, like individuals, can sell shares at existing market prices.

Implications of the Results

These findings have positive implications for financial managers of corporations. Since the empirical evidence suggests that price discounts are not necessary to sell new issues, managers can concentrate on the investment worth of projects, without committing energies to evaluating the effects of selling quantities of stock on share prices. In reference to dividend policy versus new issues of securities, the effects of the increased quantity of stock on security prices is not a relevant variable.

Utility rate commissions can also consider the present market price as reflecting potential sale prices for new issues of utility shares without allowing higher rates of return to cover the hypothetical selling pressure associated with new issues.

To the individual shareholder, these results also give assurance that his holding, though a relatively large percentage of the outstanding shares of the firm, can be sold at approximately the prevailing market price without suffering financial loss in the event of a necessary sale. When considering an individual shareholder, it is possible to include mutual funds of other large financial institutions in this class as well. It has been argued that funds have an increasing and large percentage of the value of outstanding shares. It is asserted that they contain the financial power to make markets in certain securities by their buying and selling activities. All funds are not buying the same security; they compete against each other and hold many different assets in their portfolios. The size of their holdings should not be measured as a percentage of market value of only New York Stock Exchange securities but of all market wealth. The proportion of total market wealth of any one mutual fund is very small. Massachusets Investors Trust, a $1 billion fund, still holds less than 0.1 percent of the value of all New York Stock Exchange firms.

There has been considerable discussion connected with antitrust divestiture suits as to the long-run depressing effects on the price of the shares of the firm to be divested. It is apparent from the analysis that the distribution of a large block of a corporation's stock by a holding company will not have a long-run depressing effect on share prices. If there were monopoly returns associated with the holdings, they would have been reflected in the price of the two companies at the time the decision was handed down. A recommendation to the courts would be to terminate testimony on this point and concentrate on more substantive issues.