

## Do Demand Curves for Stocks Slope Down?

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### ABSTRACT

Since September, 1976, stocks newly included into the Standard and Poor's 500 Index have earned a significant positive abnormal return at the announcement of the inclusion. This return does not disappear for at least ten days after the inclusion. The returns are positively related to measures of buying by index funds, consistent with the hypothesis that demand curves for stocks slope down. The returns are not related to S & P's bond ratings, which is inconsistent with a plausible version of the hypothesis that inclusion is a certification of the quality of the stock.

SEVERAL IMPORTANT PROPOSITIONS in finance rely on the ability of investors to buy and sell any amount of the firm's equity without significantly affecting the price. For example, the home leverage idea behind the Modigliani-Miller theorem [13] and simple cost of capital rules obtain under the maintained assumption of horizontal demand curves for the firm's equity. In addition, most of the common elaborations of the efficient markets hypothesis (such as CAPM or APT) predict horizontal or nearly horizontal demand curves for stocks. In these models, the stock price is an unbiased predictor of underlying value, maintained through the workings of arbitrage. To the extent that stocks have close substitutes, that underlying value is not significantly dependent on supply. Thus the (excess) demand curve for a security is (nearly) horizontal.

Recognizing the importance of the assumption of horizontal demand curves for stocks, financial economists have long been interested in testing it directly. Traditionally, they have done so by examining stock price reactions to buyer- and seller-initiated large block trades. Negative price reactions to large block sales (and converse for purchases) have been found by Scholes [19], Holthausen, Leftwich and Mayers [7] and Mikkelsen and Partch [11]. This evidence, however, is also consistent with the information hypothesis, stating that an offer to buy a large block may signal good news about the stock, thus entailing a price increase. Large block trade studies are therefore inconclusive on the hypothesis that demand curves for stocks slope down (the DS hypothesis).

This paper examines stock inclusions into the S & P 500 Index (hereafter, the Index) to examine the DS hypothesis in a context where information effects probably play no role. Every year since 1966, between 5 and 35 firms have been

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removed from the Index, usually as the result of takeovers.<sup>1</sup> When S & P takes a stock out of the Index, it simultaneously includes a new firm. Neubert [15] states the following six criteria for inclusion: size, industry classification, capitalization, trading volume/turnover, emerging companies/industries, and responsiveness of the movements of stock price to changes in industry affairs. All of these criteria are public information, and none of them is concerned with the future performance of the firm.

Subsequent to the announcement of the inclusion, a substantial portion of the firm's shares is bought by index funds, which are funds attempting to mimic the return on the S & P 500 for institutional clients.<sup>2</sup> Though these funds do not necessarily replicate the S & P 500 exactly, and may spread out their buying of a newly included stock over several days, they usually buy what in recent years could have been up to 3% of the newly included firm's equity. Such buying represents an outward shift of the demand curve for the firm's equity, and more importantly, one resulting from demand by buyers whose interest is not prompted by good information. If the demand curve is horizontal, inclusion of a stock into the S & P 500 should not be accompanied by a share price increase. In contrast, if the demand curve slopes down, we should observe a share price increase at the announcement of the inclusion.

Section I of this paper presents the description and the results of an event study of stock inclusions into the S & P 500. Section II discusses several explanations for the observed results, and attempts to discriminate between these explanations empirically. Section III concludes that the DS hypothesis is probably an important part of the observed share price behavior at the inclusion of a stock into the S & P 500.

## **I. The Event Study**

To perform the event study of stock inclusions into the S & P 500 Index, it is necessary to identify the dates at which the market learns about the inclusion of each stock, the so-called announcement dates (ADs). Revisions of the Index are made effective on weekdays (lately it has always been on Wednesdays) after the market closes. Since September of 1976, S & P has been running an early notification service, subscribers to which are notified about the changes in the composition of the Index within minutes after these changes are made (but again, after the market closes). Thus the day after the inclusion is the appropriate

<sup>1</sup> In 1984, which is a high turnover year, of the thirty companies dropped, one was removed due to bankruptcy, one due to liquidation, one due to financial insolvency, one because it became unrepresentative of any S & P industry group, and the rest because of mergers, acquisitions or leveraged buyouts.

<sup>2</sup> In addition to index funds, there are several pension funds, such as CREF, that do their own indexing, and whose holdings or time of buying could not be readily documented. Ring [16] has suggested that self-indexing pension funds may have had as much as 50 billion dollars linked in 1984 to various market indices, primarily the S & P 500. Mrs. Ring also told me that the number may be as low as 20 billion. For earlier years, the numbers are not known at all.

announcement date to examine price changes in the period after September, 1976.

Prior to September, 1976, changes in the Index were recorded in a monthly Cumulative Index to Standard and Poor's Outlook (CISPO), which published a complete listing of stocks in the S & P 500 every month. The announcements of changes did not include the actual dates on which they were made; in fact this information was not available then and is not available now for that period. I assume that the announcement date for this period is the day on which subscribers received the CISPO containing the relevant change in the S & P 500. Since CISPO is mailed out ahead of its official publication date, this announcement date actually coincides with the publication date.

The sample includes firms added to the S & P 500 Index between 1966 and 1983. I started with 331 firms. Of those, 34 firms were removed from the sample because CRSP had no data on them (e.g., OTC stocks), 13 firms were removed because their inclusion was perfectly anticipated (e.g., regional telephone companies in 1983 or companies that were already part of S & P 500 and were reincluded after they changed their name subsequent to a merger). Because of the difficulty of identifying the announcement date, I also excluded 17 firms that were included into the Index on June 30, 1976, when the Index underwent a major revision.<sup>3</sup> Finally, I excluded 21 firms in the earlier period because I could not ascertain the announcement dates, and data provided by the S & P Corporation were faulty.<sup>4</sup> After these exclusions, the sample was reduced to 246 firms, or 74% of the initial sample. Share prices were obtained from CRSP files.

To examine share price behavior surrounding inclusion into the S & P 500, I performed a daily event study following Fama, Fisher, Jensen and Roll [5] as implemented by Ruback [18]. Specifically, the market model is applied to describe the behavior of asset returns, using the value weighted market portfolio from CRSP files. To account for possible risk changes due to inclusion into the S & P 500, stock return equations were estimated separately on the observations before and after the inclusion.<sup>5</sup> Residuals from these equations, called prediction errors, were then averaged across observations for a given day  $\tau$  relative to the announcement date (AD) to get the Average Prediction Error ( $APE_\tau$ ). The  $APE_\tau$  measures the mean abnormal performance for a given day relative to the announcement of the inclusion into the S & P 500. The sum of these  $APE_\tau$  over event days  $\tau_1$  through  $\tau_2$  yields the Cumulative Average Prediction Error ( $CAPE_{\tau_1, \tau_2}$ ), which measures abnormal performance over an interval of event

<sup>3</sup> CISPO published a story about the revision of the Index on July 7, but listed the newly included stocks only on July 14. Since secrecy was not a big issue then, people working at S & P suspect that anyone who wanted to know about these changes could find out before July 14.

<sup>4</sup> The data I received contained no inclusion dates for the period prior to January 1976, but only the dates on which changes in the Index were specifically noted. These written announcements give inappropriate announcement dates, since CISPO often printed revised lists of the S & P 500 before the change was actually brought to the readers' attention. Using the written announcements to define announcement dates had no impact on results for the early period.

<sup>5</sup> The results were not materially different when returns were not corrected for market movements. Similarly, combining the before and after estimation periods did not make much difference. These results are, therefore, not presented.

**Table I**  
**Average Abnormal Returns Surrounding Inclusion of**  
**Stocks into the S&P 500 Index**

| Days relative to the<br>Announcement Date (AD) | Average Cumulative Prediction<br>Error             |                                                         |
|------------------------------------------------|----------------------------------------------------|---------------------------------------------------------|
|                                                | 1966–1975<br>(before the early<br>warning service) | Sept, 1976–1983<br>(after the early<br>warning service) |
|                                                | N = 144                                            | N = 102                                                 |
| AD – 20 through AD – 1                         | –2.86<br>(–2.85)                                   | –1.49<br>(–1.25)                                        |
| AD                                             | –0.192<br>(–0.918)                                 | 2.79<br>(12.4)                                          |
| AD + 1 through AD + 10                         | –0.065<br>(–0.091)                                 | –0.859<br>(–1.03)                                       |
| AD + 11 through AD + 20                        | 1.12<br>(1.57)                                     | –0.154<br>(–0.184)                                      |

Notes:

1. *t*-statistics are included in parentheses
2. details of calculations are provided in the text

time. Ruback [18] describes the procedure for obtaining consistent estimates of variances of CAPEs, accounting for possible first order serial correlation in prediction errors that is common to event studies.

The basic results of the event study are presented in the top panel of Table I. To account for the change in the definition of the announcement date, the results for the periods before and after September, 1976 are presented separately. The results reveal that prior to September, 1976, there was, on average, no significant price increase on the announcement date. In contrast, since September, 1976, there has been a 2.79 percent AD abnormal return, which is statistically significant at any reasonable confidence level. For over 95% of individual observations, the AD abnormal return is positive in this period. Both statistically and substantively, the inclusion of stocks into the S & P 500 has been accompanied by large abnormal announcement date returns.

In either period there is no evidence of prices starting to rise prior to the announcement date; if anything, the cumulative abnormal returns are negative in the twenty days prior to the AD. In the earlier period, a price increase ahead of the AD would be evidence of the market's learning about the forthcoming inclusion before publication of CISPO and incorporating this information into the price. Absence of such price increases for that period suggests that the choice of the AD is not responsible for the result. For the period after September, 1976, a price increase starting early would be evidence of the market predicting the inclusion of the stock, and revaluing the shares ahead of time. But even on the day prior to the AD, the one day average excess return is not statistically different from zero, confirming that inclusion into the Index is not anticipated.

The last two rows of Table I examine share price behavior subsequent to the AD. Though point estimates show share price declines, these declines are not statistically significant (this result holds for individual days after the AD also). In addition, the magnitude of point estimates of declines is much smaller than

**Table II**  
**Tests of Persistence of Abnormal Returns Subsequent to**  
**Inclusion into S&P 500**

| Days over which the<br>abnormal return is<br>cumulated | Average Cumulative Prediction Error |                                    |                              |
|--------------------------------------------------------|-------------------------------------|------------------------------------|------------------------------|
|                                                        | Full Sample<br>Sept, 1976–1983      | Early Subsample<br>Sept, 1976–1980 | Later Subsample<br>1981–1983 |
| AD                                                     | 2.79<br>(12.4)                      | 2.27<br>(7.63)                     | 3.19<br>(10.1)               |
| AD through AD + 5                                      | 2.22<br>(3.46)                      | 1.58<br>(1.88)                     | 2.70<br>(3.10)               |
| AD through AD + 10                                     | 1.94<br>(2.20)                      | 1.09<br>(0.946)                    | 2.58<br>(2.17)               |
| AD through AD + 20                                     | 1.78<br>(1.46)                      | −0.807<br>(−0.505)                 | 3.77<br>(2.28)               |
| AD through AD + 60                                     | 1.71<br>(0.819)                     | −1.05<br>(−0.383)                  | 3.85<br>(1.36)               |

Notes:

1. *t*-statistics in parentheses
2. details of calculation of abnormal returns are provided in the text

that of the AD abnormal return. Thus in the period since September, 1976, prices do not fall significantly in the twenty days after the AD.

To examine the total return from inclusion into the S & P 500, we must look at the cumulative abnormal return starting with the AD. The test of this is a *t*-test of Cumulative Abnormal Prediction Errors (CAPEs) defined above, starting with the AD. Because these tests determine not only whether stock prices fall after the AD, but also whether the decline offsets the gains on the AD, they are appropriate tests of permanence of the abnormal return from inclusion. The first column of Table II presents these tests for the post September, 1976 period.

The tests support the hypothesis that positive AD price effects last for at least a month. The cumulative returns for the first six and for the first eleven days are significant at very high confidence level, though, as discussed earlier, point estimates indicate some share price declines. As we look further ahead starting from the AD, the standard error of the cumulative return rises. As a result, the twenty-one day cumulative return is not statistically significant, although there is *no* evidence of prices continuing to fall after eleven days judging from point estimates. Even after twenty-one days, the cumulative return is significant at the 85% level, and is only one percent below the AD return.

We conclude from these results that since September, 1976, inclusion of a stock into the S & P 500 Index earned its shareholders a close to 3% announcement date capital gain, most of which has persisted for at least 10 to 20 trading days. The data cannot tell if the duration of this gain is even longer.

## II. Analysis of the Results

In this section, the results of the event study are discussed in greater detail. I first examine additional evidence that may bear on the DS hypothesis, and then evaluate several other possible explanations of the results.

*A. Further Tests of the DS Hypothesis*

An important implication of the DS hypothesis is that the share price increase on the announcement date should be positively related to the shift of the demand curve.<sup>6</sup> Index funds have grown dramatically over time. Though precise time series data are not available, calculations based on surveys of index funds by Pensions and Investment Age [3, 16] suggest that index funds owned less than 0.5% of the S & P 500 in 1975, 1.4% in 1979 and 3.1% in 1983. The results of the event study suggest that, indeed, the average abnormal AD return cannot be found before 1976, and rose dramatically after that. Unfortunately, this may be due to inaccurate choice of the announcement date in the earlier period (although there is no evidence of abnormal returns prior to publication of CISPO). Alternatively, I split the later sample into the September, 1976 to 1980 subperiod with 44 observations and the 1981 to 1983 subperiod with 58 observations. The last two columns of Table II present the results of the event study for the two subperiods. The average abnormal AD return was 2.27% with a *t*-statistic of 7.63 in the first subperiod, and 3.19% with a *t*-statistic of 10.1 in the second subperiod. A one-sided *t*-test of the equality of abnormal returns across subperiods rejected the null hypothesis at a 98% confidence level (with a value of 2.2). Consistent with the growth of index funds over the post September, 1976 period, the abnormal announcement date returns have also grown, providing some evidence for the DS hypothesis.

Another interesting result emerging from Table II is that, although in the earlier subperiods we cannot reject the hypothesis that the abnormal AD return disappears within six days with 95% confidence (we still can reject it for four days), for the later subperiod, even the twenty-one day cumulative abnormal return is statistically significantly different from zero. In the later subperiod, not only does the abnormal return remain for a long time, but there is also some evidence that it increases as time passes. However we look at it, the abnormal returns from stock inclusion into the S & P 500 seem to have grown over time, parallel to the growth of index funds.

An alternative measure of buying by index funds is the excess announcement date volume. Representatives of Vanguard Index Trust and Wells Fargo Index Fund have suggested to me that these funds buy the necessary shares within a few days of the inclusion. To gauge the amount of each stock bought by index funds and self-indexing investors, we look at abnormal daily volume on the announcement date, defined as the difference between the AD volume and the average daily volume in the previous six months, both expressed as a fraction of the number of shares outstanding. We also look at abnormal announcement week (AW) volume defined similarly. While the latter measure of buying by index funds probably includes more of the relevant transactions, it is also much noisier.

<sup>6</sup> One question arising in this context is what the relevant shift of the demand curve is. The discussion that follows presumes that the relevant shift is due to current needs of index funds. Alternatively, one might imagine that all the future needs of index funds, arising from future cash inflows, are relevant for this shift. In that case, current assets in index funds might only be a very crude measure of future demand, and relying on current assets or current volume as proxies for shifts in demand curves is inappropriate.

Abnormal volumes, just like abnormal returns, show *no* tendency to be positive prior to September, 1976; therefore I restrict the analysis to post September, 1976 data.<sup>7</sup> Since September, 1976, the average abnormal AD volume has been .340%, while the average abnormal AW volume has been 1.012%.<sup>8</sup> Both of these numbers are substantially smaller than the fraction of the S & P 500 held by index funds, which may be explained either by slow buying by index funds, or by withdrawal of other investors from the market as index funds are buying. Volume measures are clearly very noisy indicators of index fund buying.

To examine the association between abnormal volumes and abnormal returns, we run a cross-sectional regression of abnormal AD return (RETURN) on abnormal AD volume (ABADVOL):

$$\text{RETURN} = 2.41 + 1.22 \cdot \text{ABADVOL} \quad \bar{R}^2 = .04, N = 84. \\ (7.55) \quad (2.13) \quad t\text{-statistics in parentheses} \quad (1)$$

To the extent that ABADVOL measures the buying by index funds, the significant positive slope estimate is consistent with downward sloping demand curves for stocks. The true coefficient is probably even larger, since ABADVOL measures abnormal buying with error, and therefore, by a standard errors-in-variables argument, the coefficient is biased toward zero. An alternative test is to regress abnormal returns on the announcement date volume (ADVOL). In this case, usual volume (USVOL) should be included independently into the regression, since we expect that the price should be smaller for more widely traded stocks. The results are:

$$\text{RETURN} = 2.77 + .982 \cdot \text{ADVOL} - 1.59 \cdot \text{USVOL} \\ (6.73) \quad (1.64) \quad (-2.51) \quad (2) \\ \bar{R}^2 = .05, N = 84. \\ t\text{-statistics in parentheses}$$

The coefficient on the ADVOL is positive and significant at the 90% level, while the coefficient on usual volume is negative and significant at the 95% level. Both of these results, as well as earlier results based on assets in index funds, are consistent with downward sloping demand curves. Thus the data on "quantities", though imprecise, broadly support the DS hypothesis.

### *B. The Information Hypothesis*

Every observation that I produced so far can be explained by some version of the information hypothesis, stating that S & P's inclusion of a stock into the Index certifies the quality of the company, and thus entails a price increase. If this hypothesis is supplemented by the notion that S & P responded to growth of index funds by improving the quality of its process of selecting new companies for the Index, the information hypothesis can explain the growth of abnormal AD returns as index funds grew. It can also explain the positive relationship

<sup>7</sup> Including these observations into the regressions below will only strengthen the result, but for spurious reasons.

<sup>8</sup> The volume data were obtained from Data Resources Incorporated and are available for only a subsample of observations.

between volume and return, if we believe that larger surprises are associated with greater turnover of the stock. Similarly, one can say that inclusion means more for thinly traded stocks, thus explaining the negative coefficient on usual volume in regression (2).

Although these rationalizations are quite contrived, the argument that inclusion into the S & P 500 certifies quality has some appeal. To make the S & P 500 a convenient way to hold the market, S & P should avoid excessive turnover in its Index. When S & P replaces a stock in the S & P 500, index funds have to change their portfolios and to incur transaction costs along the way. Since they have to pay a higher price for the stock than the previous day's close, they also lose some of the return on the Index (in 1983, this loss may have been as high as 0.25%). If holding the S & P 500 is costly and inconvenient, index funds may decide to hold some other index. When this happens, S & P loses profits it earns from selling information about its Index.

For these reasons, S & P might be worried about the longevity of firms it includes into the Index. In fact, Neubert [14] expresses S & P's concern about excessive turnover in the S & P 500. If S & P knows the likelihood of financial distress for different firms, inclusion should be good news about the firm's prospects. S & P's experience with rating bonds makes it plausible that it has the necessary expertise, even though S & P is unlikely to have any truly inside information.

Several considerations suggest that the informational value of the inclusion of a stock into the S & P 500 should not be too great. First, the purpose of the S & P 500 Index is to be a proxy for the market, not a listing of future "winners". Even if some industries are riskier than others, S & P must include firms from these industries in the Index in order to keep it a veritable proxy for the market. Danger of bankruptcy is a second-order concern. More importantly, the information communicated by the inclusion must be above and beyond all the other information the market has, and in particular, it must add to the information the market has about S & P's own bond ratings for newly included firms.

The last observation can be used to test a version of the information hypothesis. This test examines the relationship between the abnormal AD return and S & P's own bond ratings of firms included into the S & P 500 Index. Presumably, if S & P rated the bonds of a particular firm as unsafe, inclusion should result in a greater upward revaluation of the shares than inclusion of a firm with a good bond rating. If longevity really is what S & P cares and knows about, the certification value of including a firm, the bonds of which S & P has already rated to be safe cannot be too great. This hypothesis points to a negative correlation between the abnormal AD return and the quality of bonds.

To test this prediction, I ran a cross-section regression of abnormal AD returns on a dummy equal to 1 if rating is A or better (DUM1, 26 cases out of 84), and a dummy equal to 1 if S & P did not have a rating for the firm's bonds (DUM2, 48 cases).<sup>9</sup> In the remaining 10 cases the rating is below A. We get:

<sup>9</sup> Surprisingly, only 42% of firms had S & P-rated bonds at the time they were included into the S & P 500. This may be because the majority of bonds are privately placed and hence are not rated, because S & P does not rate all publicly traded bonds, or because many newly included firms do not have bonds at all.

$$\text{RETURN} = 2.34 + 0.356 \cdot \text{DUM1} + 0.660 \cdot \text{DUM2} \quad (3)$$

(3.07)      (0.397)                      (0.837)

$$\bar{R}^2 = -0.02, N = 84.$$

*t*-statistics in parentheses

There is no statistically significant evidence that stocks without S & P bond ratings earned a higher return. Nor is there any evidence that stocks with high bond ratings earned lower excess returns from the inclusion than did the stocks with low bond ratings. Though this is by no means a rejection of the information hypothesis as a whole, this result sheds doubt on a plausible theory that S & P has special information about firms' longevities.

### *C. Other Explanations*

Several alternative explanations of the results in this paper will be briefly discussed below. The first is transactions costs. Scholes [19] noted that if sellers of large blocks of securities must bear costs of rebalancing their portfolios, the buyers who initiate the transaction must compensate the sellers for these costs. As a result, buyer-initiated trades should take place at a premium. Although this consideration is undoubtedly important in other contexts, it is of limited use in explaining the findings of this paper (although it might explain some part of them). In the early 80's, the trading costs of institutions have fallen to around 50 basis points per share, some of which is the price impact of trades (as opposed to the brokerage fees or the bid-ask spread). Assuming that the sellers to index funds are also institutions, they should demand at most 1% to sell their shares if demand curves are horizontal.<sup>10</sup> While the transaction costs of institutions have fallen in the early 80's, the price effects we observe have increased to over 3%, which is significantly higher than what compensation for transactions costs ought to be. This suggests that transaction costs are at most a part of the complete story.

Another possible explanation for the observed effects is market segmentation. It states that certain kinds of investors are only interested in stocks that are part of the S & P 500, and that inclusion of a stock into the Index invites buying by these investors. Note that this theory explains price increases only if the demand curves by initial holders of the shares of the newly included stock are downward sloping. Its predictions are similar to those of the general DS hypothesis, except that market segmentation predicts additional volume in the aftermath of the inclusion. Because I cannot ascertain the time at which investors interested only in S & P 500 shares buy them, I treat this theory as a special case of the DS hypothesis.

A final possibility is the liquidity hypothesis. On this view, inclusion may be

<sup>10</sup> As long as there are some institutional holders of the security, the marginal investor in the horizontal demand curves story can always be taken to be an institution. This observation addresses one objection to my results, namely that sellers to index funds must be compensated for the necessity to realize their capital gains immediately. For institutions, this is not an issue. If the sellers to index funds are Exchange members (who indeed own significant amounts of shares), the transaction costs premium should be even smaller.

followed by a closer scrutiny of the company by analysts and investors, by a greater institutional interest in the stock, and therefore by an increase in public information about it. As a result, the stock will be traded more widely, become more liquid, and the bid-ask spread on the stock will fall.<sup>11</sup> This lowers the required rate of return on the stock and thus leads to a price increase immediately after the inclusion. Consistent with this view, Arbel, Carvell and Strebel [1] document that “neglected” firms earn higher returns than do firms widely held by institutions even after correcting for size.

The liquidity view implies that inclusion into the Index should lead to higher excess returns for lesser known stocks. As a test of this implication I calculated separately abnormal returns on stocks that at the time of their inclusion into the S & P 500 either were or were not already part of Fortune 500. The idea is that Fortune 500 stocks are on average larger, relatively better known and more closely scrutinized than other new entries into the Index. I did not find any difference in excess returns for Fortune 500 and non-Fortune 500 stocks. Since membership in Fortune 500 signifies size, while membership in the S & P 500 signifies only representativeness, being part of the former should be more important in attracting institutional investors. Furthermore, new entries into the S & P 500 Index are often very large firms that were not initially needed to produce a representative basket. It is hard to imagine that they receive additional attention as a result of the inclusion.<sup>12</sup>

### **III. Conclusion: Other Evidence and Implications**

A variety of other evidence on transactions involving substantial amounts of stock is consistent with the DS hypothesis. Recent analyses of large block trades (Holthausen, Leftwich and Mayers [7]) found price responses lasting for at least several hours, which the authors interpreted to be “permanent.” New share issues are commonly found to be accompanied by share price declines (Hess and Frost [6]), although the usual explanation of this effect is that the market learns from a new share issue that the stock is overpriced. In conflict with the latter explanation, Loderer and Zimmerman [10] find that when a firm has several classes of common stock with different voting rights but identical dividend streams, and issues new stock of only one class, there is a negative volume effect on the price of shares of that class, while there is no such effect on the price of shares of other classes. This finding suggests that there is a downward sloping demand curve for individual securities. Parallel to the new issues effect, share buybacks by firms are accompanied by price increases, again in line with the DS hypothesis. The DS hypothesis is also strongly corroborated by tax-loss selling explanations of the January effect, which were recently given new life in the work of Schultz [20] and Rozeff [17]. Finally, though more ambiguously, the DS

<sup>11</sup> Kyle [9] and Vishny [22] present models in which better information about an asset makes the market in it thicker and lowers the bid-ask spread. This increase in liquidity might lower the required return.

<sup>12</sup> Many very large firms are not in the S & P 500, as they are not needed for the representative basket, while many small firms are. Newly included firms are often much better followed by analysts than many firms already in the Index.

hypothesis may be part of the reason for large takeover premia (Jensen and Ruback [8]).

A plausible reason for downward sloping demand curves for stocks is disagreement among investors over the value of the securities that is not resolved through the observation of price. There is strong direct evidence on the prevalence of such disagreement, and on its importance in security price determination (Cragg and Malkiel [4]). Specifically, the divergence of opinions among analysts turns out to be a good measure of the riskiness of the security and therefore of the required rate of return on it. Miller [12] and Varian [21] explain how such disagreement yields downward sloping demand curves.

If the DS hypothesis is an important feature of financial markets, the empirical relevance of several propositions in corporate finance requires reexamination. For example, the assumptions underlying the Modigliani-Miller theorem are violated, which means, importantly, that tests of sources of deviation from this theorem that rely on its holding absent these deviations may be inappropriate. More generally, the variant of the efficient markets hypothesis that states that the price of a security equals its fundamental value that is agreed upon by all investors is violated if disagreements affect share prices (Black [2]). The importance of these issues for financial economics suggests a clear need for additional theoretical and empirical work.

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