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## The Relative Signalling Power of Dutch-Auction and Fixed-Price Self-Tender Offers and Open-Market Share Repurchases

ROBERT COMMENT and GREGG A. JARRELL\*

### ABSTRACT

We compare three forms of common stock repurchases. Dutch-auction self-tender offers and open-market share repurchase programs are weaker signals of stock undervaluation than fixed-price self-tender offers. The price increase from buyback announcements is greater when insider wealth is at risk, greater following negative net-of-market stock returns, and unrelated to prior market returns. Buyback announcement returns are also increasing in the fraction of shares sought, which is consistent with both signalling and an upward-sloping supply curve for stock.

AKERLOF (1970) SHOWED THAT market failure from adverse selection bias can result from asymmetric information. The failure can be mitigated if informed parties have a vehicle they can use to signal their information. The use of financial decisions as vehicles for signalling firm value was proposed by Ross (1977), Leland and Pyle (1977), and Bhattacharya (1979) in adaptations of the Spence (1973) signalling model. In models such as Miller and Rock (1985), John and Williams (1985), Williams (1988), and Giammarino and Lewis (1988), financial decisions convey information about firm value. In each instance it must be prohibitively costly for low-value firms to mimic the financial decisions of high-value firms. If investors cannot distinguish low- from high-value firms, Akerlof's (1970) lemons model shows that the average price response to a financial decision or signal cannot be positive. The credibility of a financial signal, therefore, depends on whether false signalling is costly to those signalling.

In their studies of corporate common stock repurchases, Dann (1981) and Vermaelen (1981) identified *information signalling* as the main motivation for premium self-tender offers. Since then, this signalling explanation has

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been accepted among academics.<sup>1</sup> Premium-price self-tender offers are relatively rare compared with open-market share repurchase programs, so there is reason to doubt that signalling explains most corporate buyback activity. Brennan and Thakor (1990) argue that stock buybacks are simply a more efficient way for management to pay out cash to shareholders than paying a cash dividend, but their model does not predict empirical regularities such as a positive announcement effect and a positive relation between announcement effects and offer prices in self-tender offers.

Research on equity offerings deals with the same questions as does research on equity buybacks. Asquith and Mullins (1986) find that average announcement returns are negative and decreasing in the fractional size of the offering, and they conclude that equity issues release negative information and/or there is a downward sloping demand for a firm's shares. This is the mirror image of what is found for repurchases in this paper and by Vermaelen (1981), where average returns are positive and increasing in the fractional size of a buyback.

Choe, Masulis, and Nanda (1989) and Lucas and McDonald (1990) model managers' timing decisions for stock offerings given asymmetric information. Managers of undervalued firms wait for their stock prices to rise before issuing equity so that, on average, equity issues should be preceded by positive abnormal returns. Returns are generally positive before equity offerings. Correspondingly, returns are generally negative before open-market repurchase authorizations (but not before self-tender offers).<sup>2</sup> Finally, for both equity buybacks and seasoned-equity offerings, announcement-period stock returns are inversely related to prior-period returns when the prior return is measured over a relatively short period.<sup>3</sup>

<sup>1</sup> Bagwell (1989) uses data on individual tendering responses from a sample of 26 dutch-auction self-tender offers between 1981–1988 to calculate an average slope of a supply curve for shares and finds that a buyback of 15% of shares is consistent with a price increase of 9.5%, indicating that only a portion of the price change associated with dutch-auction offers is due to signalling.

<sup>2</sup> Lakonishok and Vermaelen (1990) find a negative average return during a 40-month period before fixed-price self-tender offers of 35% in the quintile of smallest firms compared to a positive return of 10% for the quintile of large firms, suggesting that smaller firms use buybacks as signals of undervaluation while larger firms have other motivations for buying back their stock. Conversely, Asquith and Mullins (1986) find a positive abnormal return of more than 30% over 500 days before equity offerings.

<sup>3</sup> For announcements of seasoned equity issues, Asquith and Mullins (1986) find a positive correlation between announcement-period excess returns and prior excess returns (months – 12 to – 1 before announcements). Over a relatively short period, however, Masulis and Korwar (1986) find a negative correlation between announcement returns and prior nominal returns (days – 60 to  $p - 1$ ) and a positive correlation with prior returns on the market (CRSP equally-weighted index over days – 60 to – 1). Similarly, Korajczyk, Lucas, and McDonald (1989) find a negative correlation between announcement returns and 100-day excess returns (days – 100 to – 2). For announcements of equity buybacks, we find a negative correlation between announcement returns and 40-day prior excess returns but no significant association between announcement returns and either the return on the market or longer-period prior returns.

Assuming managers do not tender their own shares and are not threatened by a takeover, the effectiveness of a repurchase as a signal would be greater i) the greater the stockholdings of inside managers, ii) the greater the offer's premium over the pre-offer market price, and iii) the greater the fraction of outstanding stock sought in the offer. Assuming semistrong efficiency of the capital market, managers can possess superior information about the future prospects of their firm. Stock buybacks allow owner-managers to bet on these prospects. The most convincing bets, by this reasoning, are those where managers have the most financial risk of false signalling.

False signalling occurs when the insiders announce a premium that significantly exceeds the degree to which their stock is currently undervalued. This unsuccessful signalling is costly to a non-tendering owner-manager because, to the extent that the market price falls short of the self-tender offer price after the announcement, the offer premium represents a dividend that benefits tendering shareholders at the expense of nontendering shareholders. Since owner-managers generally pre-commit to refrain from tendering, in order to strengthen their offer's signalling potential, unsuccessful signalling via premium self-tender offers reduces their wealth. The managerial gamble associated with failing to tender into a premium self-tender offer persists even when managers know that the true or full-information value of a share exceeds the offer price and expect the market price eventually to reflect full information. Were they to tender, they could use the proceeds immediately to purchase additional shares.

U.S. firms have greatly accelerated their use of stock buyback programs during the 1980s. The fraction of total cash payout (dividends and repurchases) to equity holders from all stock repurchases has risen from 25% during 1983–1986 to 34% during 1987–1988.<sup>4</sup> Buyback transactions take the form of open-market repurchase programs or premium-price self-tender offers. Repurchase programs, in which the firm buys back at market prices while spreading the repurchases over many months or years, are by far the more common, outnumbering self-tender offers ten to one.

Our purpose here is to provide a comparative study of three forms of repurchases using data from 165 dutch-auction and fixed-price self-tender offers during 1984–1989 and 1,197 common stock repurchase authorizations during 1985–1988. The development of the dutch auction self-tender offer (from 2 offers in 1984 to 24 in 1989) adds a novel problem for signalling theory. We also consider the signalling argument in light of the preponderance of stock repurchase programs, particularly after the October 1987 market crash.

In the fourth quarter of 1987, 473 exchange-listed firms announced open-

<sup>4</sup> The early data are from Barclay and Smith (1988). Using data from Compustat, Bagwell and Shoven (1989) report an abrupt increase in 1984, with share repurchases rising from 12% in 1983, comparable to earlier years, to 31% in 1984, comparable to subsequent years. These results may reflect a survivor bias because they are based on current firms and exclude (delisted and acquired) firms that are without current data.

market buyback programs, compared with an average of 48 for the other quarters during 1985–1988. Most of these 473 came during the week following the crash. These post-crash repurchase announcements are too numerous to be viewed as an exception to a rule, so such mass signalling challenges the generality of signalling theory.

We find that repurchases announced during the 9 weeks following the crash are associated with positive returns that are not significantly different from the average return outside this period. We confirm Netter and Mitchell's finding that post-crash repurchase announcements were concentrated among firms with abnormally negative prior returns.<sup>5</sup> We also present evidence that, consistent with signalling theory, investors treat signals of undervaluation based on superior macro-economic information with less credibility than they do signals based on superior firm-specific information.

Dutch-auction offers specify a range of prices at which holders can tender. The minimum of this price range defines the maximum implied dividend that nontendering shareholders might forego if the buyback fails as a signal, and hence the maximum *potential* loss to the owner-manager's wealth from false signalling. So, dutch-auction offers with low minimum offer prices should not be as convincing as signals of undervaluation to knowledgeable market participants. Because the minimum premiums seen in dutch auctions tend to be substantially lower than the (single) purchase premiums seen in fixed-price offers, we predict that dutch auctions are weaker signals of undervaluation, generally causing less pronounced stock-price adjustments than do fixed-price offers. While this is but one factor determining the announcement returns observed with buybacks, the empirical results do support this hypothesis in that dutch auctions have an average announcement return of 7.7% compared with 11.9% for fixed-price offers.

In order to test directly the importance of managerial risk in signalling, we introduce in our empirical test a measure of the financial exposure of manager-owners.<sup>6</sup> With self-tender offers, unlike other forms of financial signalling, one can measure the risk *ex ante* to insiders' wealth from signalling. The dutch-auction cases add considerable variance to this explanatory variable, allowing for a more powerful test of the signalling theory than was possible prior to the introduction of the dutch-auction form of offer. We document a significant and robust positive association across offers between the stock-price effect of self-tender offers and the degree of owner-manager exposure to wealth loss from false or unsuccessful signalling.

In Section I below we describe the differences between fixed-price and dutch-auction self-tender offers. Section II is a discussion of hypotheses including a discussion of the role of insider risk in repurchases. Section III

<sup>5</sup> Netter and Mitchell (1989) examine stock-price movements of firms that announced repurchases in the 2-week period immediately after the crash. They find that prices had declined abnormally during the crash period and then rebounded in the period following the announcement.

<sup>6</sup> In Vermaelen (1984), lower inside holding also imply lower costs of false signalling and therefore lower credibility.

describes our samples of announcements of self-tender offers and share repurchase programs. Section IV presents descriptive statistics and regression results. Finally, we present our conclusions in Section V.

### I. Comparing Fixed-Price to Dutch-Auction Self-Tender Offers

A traditional, fixed-price offer specifies a single purchase price in advance, a number of shares sought, and an expiration date. If the offer is over-subscribed, the firm may purchase a number of shares bounded by the stated number sought. The dutch-auction offer also specifies a number of shares sought.<sup>7</sup> Instead of a single offer price, however, the dutch auction specifies a range of prices within which each tendering shareholder chooses his or her minimum acceptable selling price.

In a dutch auctions, each shareholder informs the offering firm of the number of shares he or she is willing to sell and his minimum acceptable selling price (within the range offered). The offering firm assembles all of these response, ordering them by the shareholders' minimum acceptable prices, and determine the lowest price that will fetch the number of shares sought (which was pre-specified in the offer). This price is then paid to all shareholders who tendered shares at an ask-price equal to, or lower than, this endogenously determined price. If the number of shares tendered at the minimum of the stated price range exceeds the number of shares sought, the dutch auction operates as an over-subscribed fixed-price offer.

In a typical dutch auction, the minimum price is a few percent above the market price while the maximum price represents a premium similar to the average for fixed-price offers. Hence, in the event of oversubscription, the purchase price in a dutch auction is generally less than the purchase price in a fixed-price offer. Because a dutch-auction offer allows owner-managers to guarantee a relatively low (minimum) offer price, it follows that dutch auctions should provide a less-credible signal than would an otherwise-equivalent fixed-price offer. It lowers the stakes in management's visible gamble that their stock is undervalued.<sup>8</sup>

In addition to being generally less credible because of relatively low minimum offer prices, dutch auctions appear to be less informative than fixed-price offers as signals of undervaluation. For a financial decision to be an effective signal, its characteristics must reflect the choices of informed

<sup>7</sup> Prior to a rule change by the SEC during 1987, about half of all self-tender offers specified the number of shares sought as a range rather than a set number. All of our 1988 cases specify a single number of shares sought, and we use the maximum for our empirical work in those earlier cases which specified a range.

<sup>8</sup> Persons (1990) models the arrival of news about the value of the firm *during* the offer period and argues that (nontendering) managers can reduce their exposure to the risk associated with information arrivals by using dutch auctions rather than fixed-price offers. Hence, more positive revaluations should be seen when managers nevertheless choose fixed-price offers. Otherwise, the dutch-auction form would strictly dominate managers' (mean/variance) choices. We argue that a direct reason for such higher valuations is that fixed-price offers are more credible as signals of undervaluation.



insiders. In a fixed-price offer, inside managers establish the terms of trade, and outsiders react to these terms by accepting or rejecting the offer. In a dutch auction, however, outsiders have an active role in establishing the terms of trade by choosing their tendering prices. To the extent that it is the outsiders' reservation prices that are discovered in a dutch auction, it seems a curious vehicle for the signalling of inside information. Dutch auctions do reveal more to insiders about the shape of the supply curve, but the only part of this potentially valuable information that inside managers disclose is the closing (market-clearing) price and the number of shares tendered at or below this price.

If share repurchases are primarily signals and if dutch auctions are less credible and less informative than fixed-price offers as vehicles for signalling stock value, then what accounts for their growing popularity? After all, dutch auctions account for fully 61% of the partial self-tender offers announced during 1988–1989. Since firms using dutch auctions tend to be large, these offers comprise an even greater percentage of the dollar value of tender offer repurchases. Of course, signalling stock undervaluation is not the only motivation for stock buybacks, even if it is the traditional focus when explaining self-tender offers. It might be more informative to compare the dutch auction with the hugely popular open-market repurchase program, which does not offer a premium and is carried out over several months (even years in many cases). Open-market repurchases are excellent vehicles for paying cash to shareholders but are not the most effective vehicles for signalling significant stock undervaluation. Dutch auctions might be described as a financial hybrid, combining some features of the open-market repurchase with others of traditional self-tender offers.

Similar to the open-market repurchase, dutch auctions can be significantly less risky to managers than a fixed-price offer. The dutch auction combines this risk-reduction feature with two features of traditional self-tender offers—rapid accumulation of shares and at least some potential to signal undervalued stock. This hybrid perspective of the dutch auction suggest two characterizations. A dutch auction might be viewed as a low risk self-tender offer with comparatively low signalling value, or alternatively, as a rapid-accumulation open-market program with comparatively high signalling value.

Another oft-stated reason for stock buybacks is that, by eliminating those shareholders who assign a relatively low personal valuation to the stock, they make takeovers more expensive by increasing the price that a raider must pay to obtain any given level of ownership. Dutch-auction self tender offers and open-market repurchase programs domain are often over-subscribed, and over-subscription forces prorated purchases from all tendering shareholders so that shareholders with low reservations prices get some shares back.

With an upward-sloping supply curve for stock, an entire segment of the curve below the purchase price is typically repurchased (and eliminated from outside holders) under the dutch auction. This difference accounts for the

common Wall Street claim that dutch auctions are more likely than fixed-price offers to buy out completely the outside shareholders who place the lowest valuations on the firm's stock. This difference is likely to be only temporary, however. Investors who assigned the stock a personal valuation that is below the post-offer market price, who would have been eliminated directly by a dutch-auction offer or through open-market repurchases, will simply sell into the market following a fixed-price offer. The only lasting advantage of one form of buyback over another in deterring corporate raiding would have to come from a differential ability to shift the supply curve for stock by conveying information about firm value.

## **II. Insider Nonparticipation and the Cost of False Signalling**

Ex ante, managers can arrange to bear a disproportionate cost of false signalling by committing not to tender. In effect, if the market price falls short of the offer price just after the announcement (a false signal), the buying firm ends up paying a dividend to tendering shareholders. Any premium paid above the post-announcement market price constitutes an immediate wealth transfer from non-tendering shareholders to tendering shareholders, so by committing in advance not to tender, owner-managers run the risk that the offer will constitute an effective dividend resulting in a loss of personal wealth. (It remains a gamble for managers to withhold their shares even when they know that the true or full-information value of a share exceeds the purchase price, because they can use the cash proceeds from tendering to purchase shares at the post-offer market price.) The existence of this risk to insiders lends credibility to the self-tender offer as a signal.

Vermaelen (1981) checked his sample and concluded that insiders do not tender into self-tender offers. While insiders often pre-commit not to tender and often decline to tender even without such advance commitments, we find in our sample (which includes OTC-listed firms) that some offers coincide with the repurchase of substantial stakes from officers and directors. Indeed, we discovered a few cases where the self-tender offer was apparently made to enable management to repurchase a large block of stock from an important insider at an attractive premium without incurring the wrath of outside shareholders. Signalling theory indicates that such circumstances of direct or indirect insider participation should reduce the effectiveness of the undervaluation signal provided by the self-tender offer. We inspected all 165 announcements of self-tender offers to determine whether officers and directors did, in fact, plan to sell shares back to the firm and discovered nine cases where insiders announced plans to tender into the offer and another ten cases where insiders planned to sell shares back to the firm outside of the offer.

We use this information along with the minimum offer price to determine whether officers and directors are exposed to a personal wealth loss from unsuccessful signalling. We treat officers and directors as being *at risk* if two conditions hold. First, their collective proportionate ownership interest in



their company's stock must increase as a result of the offer (nonparticipation condition). Second, the minimum price that the company can pay in the offer is more than 2% above the closing market price 4 days before the offer is announced (premium-offer condition).

This second condition is primarily responsible for our judging many dutch-auction offers to involve no risk exposure to insiders. Our logic is governed by signalling theory; if a dutch-auction self-tender offer provides that, in the event the signal of undervaluation fails, the purchase price can be lowered to a level representing almost no premium, it follows that there is no risk of personal wealth loss to nontendering manager-owners from false or unsuccessful signalling.<sup>9</sup> By this two-part measure, insiders are at risk in 79 (84%) of 94 fixed-price offers and in 33 (46%) of 72 dutch-auction offers.

A competing explanation of the effects of insider nonparticipation in self-tender offers is provided by agency theory. Jensen and Meckling (1976) argue that managerial equity ownership helps to align the incentives of managers with those of outside shareholders because the managers bear direct wealth consequences of their decisions. When insiders decline to participate in corporate stock repurchases, their proportionate interest in the firm's post-execution equity and voting rights increases. This increase in managers' residual claims should reduce their nonpecuniary consumption and increase the market value of the firm. This prediction receives some support from our cross-sectional, tender offer regressions.

An additional prediction comes from Bagwell (1988) and Stulz (1988) who argue that increased fractional managerial ownership has antitakeover implications because the premium received in a takeover is an increasing function of the fraction of voting rights controlled by target management. This positive effect of increased insider share is offset to some degree, however, by the reduction in the probability of takeover as insider holdings increase. Presumably, the net effect is positive at low initial levels of managerial proportions. These predictions also receive some support.

### III. Sample Description

We identified public announcements of corporate stock buybacks by conducting a variety of key-word searches of the Dow Jones New/Retrieval database which stores the text of news-wire transmissions. One search used Dow Jones' own buyback identifying tag, but we did not rely solely on this. By taking advantage of the rather stylized language associated with their announcements, we are confident that we identified all self-tender offers. Unfortunately, the language used in announcements of stock repurchase programs is not as standardized, but so few cases were added in our last few

<sup>9</sup> Our principle empirical results (reported below in Table IV) using this at-risk dummy variable are virtually the same if the premium-offer condition is set slightly higher at 3% rather than 2%.

searches that we believe it likely that almost all of these were identified as well.<sup>10</sup>

The key-word searches resulted in 166 cash, partial tender offers by exchange-listed and OTC-traded firms that were announced between January 1, 1984 and December 31, 1989. It also yielded 1,197 common stock repurchase authorizations by exchange-listed firms that were announced between January 1, 1985 and December 31, 1988. For self-tender offers, we broaden the sample to include OTC-traded firms and 2 additional years (1984 and 1989) because they occur far less frequently than repurchase announcements. We were able to collect the data we needed for all but one of these 166 offers, leaving 165 self-tender offers for our empirical tests.<sup>11</sup>

Like both Dann (1981) and Vermaelen (1981) we exclude offers that were only open to odd-lot holders. Also, we exclude twelve offers that were for all shares or were part of a liquidation plan or going-private plan. Three others offered a mix of cash and debt and one offered a fraction of book value at expiration. The most intriguing exclusion was one case (Gillette in 1988) which Dow Jones labeled as a self-tender offer but which turned out to be a distribution of one *transferable repurchase right* dividend per seven shares owned. Each right amounted to a 1-month, deep-in-the-money put option which was freely transferable.<sup>12</sup>

Some announcements of self-tender offers coincide with the release of significant other news, especially when the offer is aimed at repelling a hostile takeover attempt. In such cases the self-tender offer can be associated with negative stock returns around its announcement because it blocks a third-party premium offer. Williams (1988) finds joint announcements integral to a plausible signalling equilibrium and therefore questions the common practice of using subsamples comprised of single-item announcements. We run most of statistical tests on the complete sample as well as on a clean subset that excludes the 33 cases having significant coincident confounding news, notably pending takeover attempts and coincident announcements of asset restructurings.<sup>13</sup> By and large, our conclusions do not depend on this confounding-news distinction, although statistical significance is generally higher in the subset without coincident confounding news.

<sup>10</sup> Stock repurchase program announcements made on October 20 and 21 were among the last to be identified in our sequence of searches. These stories occurred with such frequency that they were abbreviated by Dow Jones and reported in batch rather than as individual stories. They were composed of unusual language and often failed to use the "BBK" tag that Dow Jones normally inserts into corporate buyback stories.

<sup>11</sup> We have no announcement data for one OTC-traded firm (Optic Coating Lab) which announced a large-dividend restructuring plan and subsequently (and apparently quietly) changed it to a self-tender offer.

<sup>12</sup> The declaration of repurchase rights coincided with a standstill agreement with Coniston Partners, which had lost a proxy contest. Coniston exercised all of its 1 million rights received from Gillette as well as 1.5 million additional rights that it purchased on the NYSE where the rights traded. See Kale, Noe, and Gay (1990) for a detailed analysis of this case.

<sup>13</sup> Denis (1990) studies the type of buyback that we characterize as confounded. The sample listing of self-tender offers in our Appendix indicates which offers were treated as being confounded.

Stock repurchase programs were included without exception for exchange-listed firms. Besides announcements of new repurchase programs, this category includes expansions of ongoing authorizations to increase the number of shares to be acquired. While these expansions typically also extend the time allowed to complete the program, a time extension alone does not qualify as an announcement for inclusion. The authorization announcement normally discloses the number of shares to be repurchased, which we record in our data base. When an authorization is expressed in dollar terms rather than as a number of shares, we convert into a number of shares using the closing stock price 4 days before the announcement. The number authorized for repurchase was left open-ended in 40 of the 1,197 repurchase announcements. This leaves 1,157 repurchase authorizations with complete data available for our empirical test. We never exclude any repurchase announcement due to coincident confounding-news releases.

Daily returns were taken from the CRSP data tapes. For self-tender offers, we obtained data on the stockholdings of Officers and Directors as a Group from the proxy statement preceding the offer. Also, the terms of the offer disclose the number of shares sought and the tender price, or the range of acceptable prices, for dutch auctions.<sup>14</sup> The number of shares tendered and the number purchased for the 154 executed self-tender offers were obtained from press reports associated with the buyer's required post-offer SEC filings.

Table I reports the quarterly and annual time series frequency of our complete buyback sample. Stock repurchase programs occur at the rate of about 200 annually except for the fourth quarter of 1987 when 473 were announced. Far less common are self-tender offers, which number 23 of 1984 and rise to 37 in 1989. Of the total 166 self-tender offers, 72 are dutch-auction offers, with the number of dutch auctions increasing from only 2 in 1985 to 24 in 1989, more than half that year's total.<sup>15</sup> As we will see, the dutch

<sup>14</sup> The terms of an offer can be revised before its execution if the buyer can satisfy the SEC that the change represents an *improvement* for shareholders, an ambiguous criterion in the case of self-tender offers. With revision, the execution date is extended by 2 weeks. The only other revisions involved relatively small changes in the number of shares sought. While midoffer or expiration-day revisions are basically rare, the two cases in which prices were revised seem instructive. Far West Financial increased its minimum premium shortly after the start of its dutch-auction offer from -31% to -8%, still below that of any other offer in our sample, and eventually paid the maximum premium of +20% for about half the tendering shares. It is consistent with signalling theory that the minimum price seemed to matter here even though the buyer did not use it. Sage Energy drew 2% of its shares by the expiration date of its dutch auction at prices at or below \$8 per share, intermediate in its range, and then extended it as a fixed-price offer at \$8 per share and drew 3.6% of all shares. It is interesting that more shares tendered into the fixed-price version of this offer than into the initial dutch-auction version, holding the offer price constant and suggesting that some holders may have originally tendered at prices above their reservation prices, consistent with the model in Gay, Kale, and Noe, (1990).

<sup>15</sup> Regarding offers made prior to our sample period, Dann (1981) identified four offers made in the early 1960s that would be called dutch-auction offers today but none in the later portion of his 1962-1976 sample period. These four offers occurred prior to federal regulation of tender offers (1968 Williams Act) when shares could be purchased at differing prices, i.e., in ascending order of tendering price. Now during a tender offer, shares can only be purchased at one and the same price. Gay, Kale, and Noe (1990) identify six dutch auctions between 1981 and 1983, before our sample period, and their subsequent annual totals match ours.

**Table I**

**Number of Stock Buybacks Announced from 1984 to 1989**

The sample includes announcements of authorizations of share repurchase programs by exchange-listed firms during 1985–1988 and announcements of cash-only, partial self-tender offers during 1984–1989 by exchange-listed firms and firms traded over-the-counter. A share repurchase program is a vote by the board of directors to authorize management to acquire up to a specified number of shares in open-market or privately-negotiated transactions. A fixed-price self-tender offer specifies a single purchase price while a dutch-auction offer specifies a price range within which holders can tender.

| Year  | Share<br>repurchase<br>programs | Self-tender offers |                |                  |
|-------|---------------------------------|--------------------|----------------|------------------|
|       |                                 | All                | Fixed<br>price | Dutch<br>auction |
| 1984  | –                               | 23                 | 21             | 2                |
| 1985  | 183                             | 17                 | 11             | 6                |
| 1986  | 203                             | 22                 | 12             | 10               |
| 1987  | 604                             | 30                 | 21             | 9                |
| 1988  | 207                             | 37                 | 16             | 21               |
| 1989  | –                               | 37                 | 13             | 24               |
| Total | 1,197                           | 166                | 97             | 72               |

auctions are concentrated among relatively large NYSE firms that have comparatively low proportionate shareholdings by management.

## IV. Empirical Results

### *A. Excess Stock Returns on Announcement of Stock Buybacks*

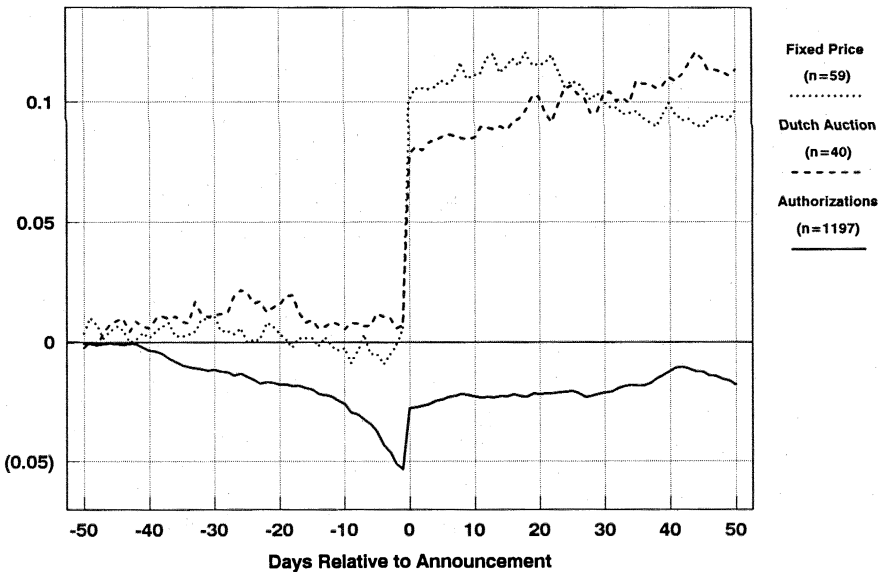
Figure 1 plots cumulative average excess returns centered on the public announcement dates for three samples of stock buybacks—open-market repurchase authorizations, fixed-price self-tender offers, and dutch-auction self-tender offers. A firm's daily excess return is its daily return less a CRSP equally-weight market return (either the OTC index or the Exchange-listed index, depending on the firm). The two self-tender offer samples shown here exclude coincident confounding-news cases. The plots of cumulative average excess returns start 50 trading days before each offer's initial public announcement and continue until 50 trading days after. Most self-tender offers are executed after a minimum offer period of 20 days.

Dutch-auction self-tender offers have lower excess stock returns upon announcement than do the conventional self-tender offers. This difference in announcement returns shows that dutch auctions are generally less effective than conventional offers as signals of stock undervaluation. Table II provides significance tests of the differences between fixed-price and dutch-auction announcement returns using 3-day and 7-day centered announcement windows. Excluding the confounding-news cases, dutch auctions have significantly lower excess stock returns around announcement than do conventional

self-tender offers (averaging 8% versus 11%).<sup>16</sup> The difference persists with the confounding-news cases included but is not significant.

Another result in Figure 1 is the pattern of under-performance preceding announcements of open-market repurchases. We will show that the magnitude of the (generally positive) stock returns on announcement of open-market buybacks is inversely related to the firm's pre-announcement stock performance relative to the market. This result also obtains for self-tender offers.

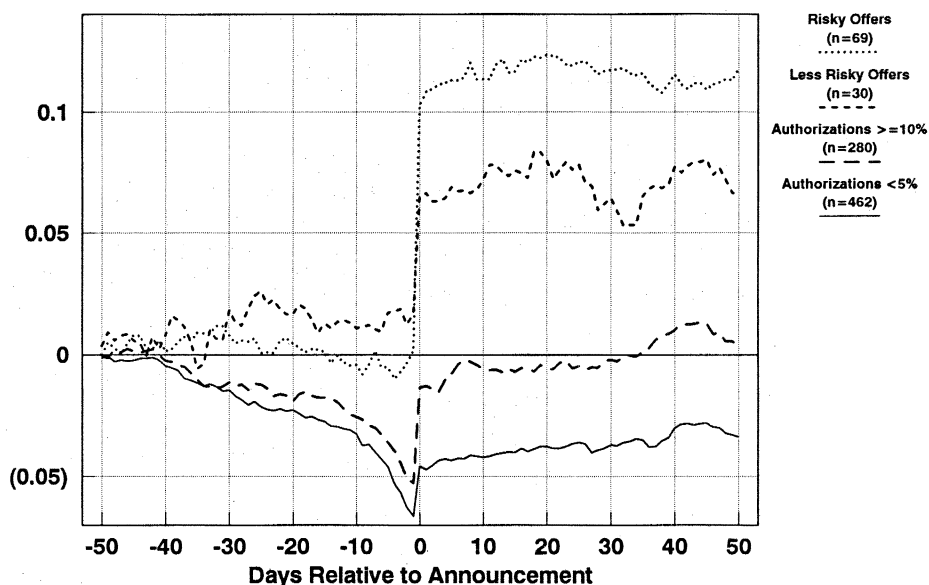
Figure 2 illustrates at a glance our signalling-based explanation for why the dutch auctions elicit lower positive excess announcement returns than do the conventional offers. Figure 2 contains the same self-tender offers as does Figure 1, but here they are split according to whether or not the owner-managers of the announcing firms are at risk. Recall that we define owner-managers to be at risk if two conditions hold; their proportionate ownership



**Figure 1. Cumulative average net-of-market returns for dutch-auction and fixed-price self-tender offers compared with share repurchase authorizations.** Daily excess returns are daily returns less a CRSP equally-weighted market return. Daily average excess returns are cumulated over a period from 50 days before announcement to 50 days after. The sample includes 1,197 announcements of authorizations of share repurchase programs by exchange-listed firms during 1985–1988 and 99 announcements of cash-only, partial self-tender offers during 1984–1989 by exchange-listed firms and firms traded over-the-counter (40 dutch-auction and 59 fixed-price offers). The tender-offers sample excludes coincident confounding-news cases.

<sup>16</sup> There is an upward drift in the cumulative net-of-market returns for dutch auctions of 3.5% on days +1 to +50 following the announcement. Based on the standard error of excess returns for this portfolio calculated over days –100 to –51, the 3.5% drift is not significantly different from zero (*t*-statistic of 1.47). The corresponding downward drift in the portfolio of fixed-price offers is not surprising because it occurs between days 20 and 30 when these offers expire.





**Figure 2.** Cumulative average net-of-market returns for self-tender offers segmented by whether officers and directors are at risk and for share repurchase authorizations in which the fraction of shares sought is less than 5% or is 10% or more. Daily excess returns are daily returns less a CRSP equally-weighted market return. Daily average excess returns are cumulated over a period from 50 days before announcement to 50 days after. The sample includes announcements of authorizations of share repurchase programs by exchange-listed firms during 1985–1988 (280 seeking 10% or more and 462 seeking less than 5%) and announcements of cash-only, partial self-tender offers during 1984–1989 by exchange-listed firms and firms traded over-the-counter. The tender-offers sample excludes coincident confounding-news cases. We treat officers and directors as being *at risk* if their collective proportionate ownership interest in their company's stock must increase as a result of the offer, and the minimum price that the company can pay in the offer is more than 2% above the closing market price 4 days before the offer is announced. The at-risk portfolio includes 69 offers while 30 offers are classified as having officers and directors who are not at risk.

interest in the firm must increase with execution (nonparticipation condition), and the minimum purchase premium is at least 2% above the stock's closing price 4 days before the offer (premium-offer condition). This zero-one dummy variable averages 85% for the conventional offers and 41% for the dutch-auction offers shown in Figures 1 and 2.

The results in Figure 2 and Table II show that the at-risk offers have excess returns of about 12% compared with about 5% for the no-risk offers, excluding confounding-news cases. These differences are greater than the differences in excess returns between dutch-auction and fixed-price offers reported in Figure 1 and in Table II. We argue that the signalling effectiveness of premium self-tender offers depends on whether or not the owner-managers have a personal stake in the success of the signal. Correspondingly, splitting all self-tender offers by the at-risk dummy variable as in Figure 2 shows a more dramatic difference in announcement returns than is



**Table II**  
**Average Percentage Stock Returns around Announcements of Self-Tender Offers from 1984 to 1989**

Return periods are centered on announcement days, and returns are calculated net of the CRSP equally-weighted market return for the period. Defensive self-tender offers, those which complete with an interfirm offer, are treated as being confounded by the release of other news. The appendix lists confounded offers. We treat officers and directors (O.&D.) as being at risk if two conditions hold: if their proportionate ownership interest in their company's common stock would increase as a result of the offer being executed (i.e., if they sell back less than a pro rata fraction of their shares, usually zero), and if the minimum price that the company can pay in the offer is more than 2% above the closing market price 4 days before the offer (i.e., if they risk foregoing a meaningful premium).

|                            | All self-tender offers |              |              | Offers without coincident confounding news |              |              |
|----------------------------|------------------------|--------------|--------------|--|--------------|--------------|
|                            | N <sup>a</sup>         | 3-day return | 7-day return | N  | 3-day return | 7-day return |
| Fixed-price offers         | 93                     | 8.3          | 9.3          | 68   | 11.0         | 11.9         |
| Dutch-auction offers       | 72                     | 7.5          | 7.2          | 64   | 7.9          | 7.7          |
| T-Statistic for difference |                        | 0.50         | 1.39         |  | 1.99         | 2.65         |
| Probability                |                        | 0.620        | 0.166        |  | 0.49         | 0.009        |
| O&D at risk <sup>b</sup>   | 112                    | 9.5          | 10.5         | 84   | 11.7         | 12.7         |
| O&D not at risk            | 53                     | 4.7          | 4.0          | 48   | 5.6          | 4.9          |
| T-Statistic for difference |                        | 3.11         | 4.18         |  | 3.88         | 4.94         |
| Probability                |                        | 0.002        | 0.000        |  | 0.000        | 0.000        |
| Total                      | 165                    | 7.9          | 8.4          | 132  | 9.5          | 9.9          |

<sup>a</sup> N is sample size.

<sup>b</sup> Officers and directors.

seen in Figure 1, so the more important economic distinction would appear to be managerial risk. We test and confirm this hypothesis in a multivariate regression in Tables IV and V.

### *B. Comparing the Characteristics of Dutch Auctions with Fixed-Price Self-Tender Offers*

Table III provides detailed data comparing the terms and other key characteristics of dutch-auction with fixed-price offers for the 128 offers that were announced without coincident confounding news and then actually executed. Results for all 165 offers and for the 153 executed offers are quite similar. The average maximum offer premium is significantly higher for fixed-price offers (20.6%) than for dutch auctions (15.7%), although the corresponding medians are closer (16.0 and 14.3%, respectively).

The minimum offer premium for dutch auctions averages 2.0%, with a median of 1.2%. This indicates that firms offering dutch auctions take full advantage of price flexibility, allowing the potential repurchase price (in the event of very low market revaluations) to be quite close to, and in many cases below, the pre-announcement market price. This low average minimum price

**Table III**

**Comparison of Dutch-Auction and Fixed-Price Offers**

This table gives a breakdown of the means, medians, and standard deviations of a variety of descriptive statistics for the two subgroups. The two columns on the right give the statistical significance of differences between subgroup means or standard deviations. The sample includes all offers that were announced without confounding coincident news and then subsequently executed. Premiums are percentages of the market price 3 days before announcement, and shares are stated as percentages of shares outstanding.

|  |         | All<br>offers | Fixed<br>price | Dutch<br>auction | $T$ or<br>$\chi^2$ -stat. | Prob. |
|--|---------|---------------|----------------|------------------|---------------------------|-------|
| Number of offers                                   |         | 128           | 65             | 63               |                           |       |
| 7-day announcement stock<br>Return in percent      | Mean    | 10.4          | 12.3           | 8.3              | 2.39                      | 0.018 |
|  | Median  | 8.7           | 10.6           | 7.5              |                           |       |
|  | Std Dev | 9.7           | 11.2           | 7.4              | 10.7                      | 0.001 |
| Maximum offer premium                              | Mean    | 18.2          | 20.6           | 15.7             | 2.09                      | 0.039 |
|  | Median  | 15.0          | 16.0           | 14.3             |                           |       |
|  | Std Dev | 13.5          | 16.9           | 8.1              | 30.7                      | 0.000 |
| Minimum offer premium                              | Mean    |               |                | 2.0              |                           |       |
|  | Median  |               |                | 1.2              |                           |       |
|  | Std Dev |               |                | 6.2              |                           |       |
| Premium paid                                       | Mean    | 16.8          | 20.6           | 12.8             | 3.25                      | 0.001 |
|  | Median  | 14.1          | 16.0           | 12.5             |                           |       |
|  | Std Dev | 14.1          | 16.9           | 9.0              | 16.7                      | 0.000 |
| Shares sought                                      | Mean    | 17.3          | 18.8           | 15.6             | 1.75                      | 0.83  |
|  | Median  | 15.0          | 16.6           | 14.7             |                           |       |
|  | Std Dev | 10.4          | 11.9           | 8.4              | 7.72                      | 0.005 |
| Shares tendered                                    | Mean    | 20.4          | 25.0           | 15.7             | 3.13                      | 0.002 |
|  | Median  | 15.9          | 19.9           | 12.5             |                           |       |
|  | Std Dev | 17.5          | 19.0           | 14.4             | 20.4                      | 0.030 |
| Shares purchased                                   | Mean    | 14.9          | 16.6           | 13.1             | 1.94                      | 0.054 |
|  | Median  | 12.6          | 13.6           | 12.5             |                           |       |
|  | Std Dev | 10.3          | 12.2           | 7.5              | 14.4                      | 0.000 |
| Dummy = 1 if officers &<br>directors are at risk   | Mean    | 0.65          | 0.88           | 0.41             | 6.24                      | 0.000 |
| $\alpha$ (shares held by officers &<br>directors)  | Mean    | 22.8          | 31.6           | 13.8             | 5.12                      | 0.000 |
|  | Median  | 16.9          | 28.6           | 6.6              |                           |       |
|  | Std Dev | 21.5          | 22.6           | 16.0             | 7.21                      | 0.007 |
| $\Delta \alpha$ (implied change in $\alpha$ )      | Mean    | 4.5           | 6.2            | 2.6              | 3.69                      | 0.000 |
|  | Median  | 2.2           | 4.8            | 0.5              |                           |       |
|  | Std Dev | 5.9           | 6.9            | 3.8              | 21.3                      | 0.000 |
| Pre-offer market value of<br>equity in \$ millions | Mean    | 1357          | 723            | 2013             | 3.11                      | 0.002 |
|  | Median  | 257           | 96             | 1035             |                           |       |

indicates that the risk-reduction, or hedging, potential provided by dutch auctions is fully utilized in practice.

The premium paid is necessarily equal to that offered (20.6%) in fixed-price offers, but for dutch auctions the mean premium paid (12.8%) is about

three-fourths of the maximum premium offered. The result is that dutch auctions pay significantly lower premiums than do fixed-price offers (*t*-statistic of the difference of 7.8% is 3.25). Dutch auctions apparently allow firms to repurchase their stock a great deal more cheaply than do fixed-price offers, with savings of about one-third off the total repurchase price. This is a likely reason for the observed increase in the relative frequency of dutch-auction offers.

The number of shares sought is slightly higher for fixed-price offers than for dutch auctions (18.8% versus 15.6%), and the same comment applies to the percentage of shares repurchased (16.6% versus 13.1%) as well as to the number tendered (at or below the purchase price) in response to these two types of offers. Fixed-price offers, with their higher premiums offered and paid, attract 25.0% compared with just 15.7% for the lower-priced dutch auctions. The similarity in the magnitudes of premiums and shares tendered (20.6 and 25.0% for fixed price and 12.8 and 15.7% for dutch auction) contradicts the notion of a perfectly elastic supply curve, suggesting instead that the typical supply curve for these firms is rising with elasticity of roughly unity.<sup>17</sup>

Officers and director's wealth is at risk in 88% of the fixed-price offers compared with just 41% of the dutch auctions. The direct measure of percentage insider holdings shows an average for fixed-price offers of 31.6% (median of 28.6%), which is significantly higher than the average of 13.8% (median of only 6.6%) for the dutch auctions. The average implied change in insider holdings as a percentage of shares outstanding, which shows the *ex ante* effects of a fully subscribed repurchase on the percentage of stock held by nontendering insiders, tells the same story as does the *at-risk* variable. *Ex ante*, insider's holdings rise by 6.2 percentage points on average for fixed-price offers, which is more than double the 2.6-percentage point rise for the dutch auctions. The difference in the median increases in percentage insider holdings is even more pronounced, 4.8 versus 0.5 percentage points.

This difference in fractional insider holdings is at least partly due to the fact that the market value of common stock of firms using dutch auctions is much greater than that of firms using fixed-price offers. The median market capitalization for dutch-auction users is ten times as large as the median capitalization for fixed-price users (\$1.035 billion versus \$96 million, respectively), while the average market value of the dutch-auction firms is almost three times that of the fixed-price firms (\$2.01 billion versus \$723 million, respectively).

Taken together, this evidence provides some support for the view that managers choose between dutch-auction and fixed-price offers for reasons consistent with signalling theory. Dutch auctions are favored by large,

<sup>17</sup> Capital gains taxation is one reason for an upward sloping supply curve. Kadapakkam and Seth (1991) find that tendering premiums in dutch-auction offers, measured by expiration-day price declines, tend to increase with a proxy for the capital gains of the marginal tenderer but only for firms in which institutional holdings are relatively low.

presumably widely-followed firms in which managements own relatively low percentages of stock. These firms should have a relatively low demand for signaling significant stock undervaluation—their stock is widely followed and the low management stakes leave them ill-suited to send strongly credible signals via premium repurchase offers. This reasoning implies that the emergence of dutch auctions probably reflects modest (a few dozen firms) substitution away from open-market repurchase, in that if it weren't for dutch auctions, most of the firms using them would probably switch to open-market programs rather than to fixed-price offers.

### *C. Regression Tests for Premium Self-Tender Offers*

Table IV presents the results of regressing both the maximum premium offered in self-tender offers and the excess stock return on announcement for self-tender offers on several independent variable. These regressions provide our basic test of (i) whether dutch-auction offers are inherently less informative than fixed-price offers because outsiders determine the purchase price in dutch auctions and insiders choose the purchase price in fixed-price offers, (ii) whether dutch auctions provide weaker signals of stock undervaluation because they expose manager-owners to less personal financial risk than do fixed-price offers, (iii) whether self-tender offers are essentially antitakeover devices as seen from the importance of the implied change in their percentage ownership, and (iv) whether the market response to a self-tender offer announcement depends on prior excess returns or prior market-wide returns. In these regressions we control for the signalling variables (maximum premium offered and percentage of shares sought) and for the size of the firm (measured as the log of the market value of equity in millions of dollars before the offer announcement).

We use a two-stage approach. As a first step, we regress the maximum premium (only premium in the case of fixed-price offers) on five explanatory variables in recognition of the fact that it is an endogenous *choice* variable. Models 4a and 4b in Table IV explain management's choice of maximum premium as dependent on whether the offer is (i) a dutch auction, (ii) on the shares sought, (iii) on the size of the firm, (iv) on the 40-day excess return to the buying firm prior to the buyback announcement, and (v) on the 40-day prior return on the general market (measured using a CRSP equally weighted portfolio), where excess return is the buyer's stock return minus the return on the market. In contrast to the univariate result given in Table III, the maximum premium offered is not significantly related to whether the offer is a dutch auction. It is also unrelated to the percentage of shares sought in the offer. But managers of larger firms choose significantly smaller premiums, and there is some evidence that they choose the magnitude of the premium offered so as to offset the prior excess return of their firm and, surprisingly, to offset the prior return on the market.

In the second stage, we use this estimated relation (Model 4b, using just the exogenous variables—size, excess return, and market return) to calculate

**Table IV**  
**The Dependence of Offer Premium on Firm Size and Prior**  
**Stock Performance and the Dependence of Announcement**  
**Stock Returns on Signalling Variables**

The sample is 132 self-tender offers without coincident confounding news. The reported results are OLS regression coefficients with *t*-values in parentheses. The 7-day % announcement return is centered on the announcement day. The maximum offer premium is a percentage over the closing market price 4 days before the offer. The adjusted premium is the maximum premium minus the premium predicted by Model 4b.  $\alpha$  is the percentage of shares outstanding owned by officers and directors as a group, and  $\Delta\alpha$  is the implied change in  $\alpha$  given management's tendering intentions and assuming that everyone else tenders. Officers and directors are *at risk* if they sell-back less than a pro rata fraction of their shares and the minimum offer premium exceeds 2% (they risk foregoing a meaningful premium).

| Dependent variable                                | Maximum offer premium |                  | 7-Day % announcement return |                    |                  |                  |
|---|-----------------------|------------------|-----------------------------|--------------------|------------------|------------------|
|   | Model 4a              | Model 4b         | Model 4c                    | Model 4d           | Model 4e         | Model 4f         |
| Constant  | 32.76<br>(7.83)       | 34.34<br>(11.3)  | -2.65<br>(-1.09)            | 17.35<br>(8.30)    | 18.41<br>(10.6)  | 5.57<br>(3.02)   |
| Dummy = 1 if<br>O&D at risk <sup>a</sup>          | -                     | -                | 2.71<br>(2.50)              | 2.71<br>(2.50)     | 3.27<br>(3.15)   | 7.11<br>(3.91)   |
| Dummy = 1 if<br>Dutch auction                     | 1.07<br>(0.48)        | -                | 0.60<br>(0.58)              | 0.60<br>(0.58)     | 0.70<br>(0.68)   | -1.27<br>(-0.75) |
| Maximum offer<br>premium                          | -                     | -                | 0.58<br>(14.8)              | -                  | -                | -                |
| Adjusted maximum<br>offer premium                 | -                     | -                | -                           | 0.58<br>(14.8)     | 0.58<br>(15.2)   | -                |
| Maximum % of<br>shares sought                     | 0.6<br>(0.59)         | -                | -0.03<br>(-0.57)            | -0.03<br>(-0.57)   | -                | -                |
| Implied change in<br>O&D holdings, $\Delta\alpha$ | -                     | -                | 0.26<br>(1.72)              | 0.26<br>(1.73)     | -                | -                |
| $\Delta\alpha$ if $\alpha \geq 50$ ,<br>else zero | -                     | -                | -0.15<br>(-1.14)            | -0.15<br>(-1.14)   | -                | -                |
| Log of firm size<br>(\$ millions)                 | -2.96<br>(-4.99)      | -2.97<br>(-5.81) | -0.03<br>(-0.09)            | -1.76<br>(-6.33)   | -1.96<br>(-7.97) | -                |
| Prior 40-day<br>excess return (%)                 | -0.17<br>(-1.52)      | -0.17<br>(-1.54) | -0.04<br>(-0.85)            | -0.14<br>(-2.97)   | -0.14<br>(-2.98) | -                |
| Prior 40-day<br>market return (%)                 | -0.20<br>(-1.86)      | -0.20<br>(-1.84) | 0.13<br>(2.82)              | 0.02<br>(0.36)     | 0.02<br>(0.41)   | -                |
| R-square <sup>b</sup>                             | 0.283                 | 0.280            | 0.758                       | 0.758 <sup>b</sup> | 0.751            | 0.193            |

<sup>a</sup> Officers and directors.

<sup>b</sup> The *F*-statistic indicating whether the explanatory power of Regression 4e is significantly reduced compared to that of Regression 4d is 1.18 (probability 0.32).

predicted maximum offer premiums, which we then subtract from actual offer premiums to get *adjusted* offer premiums. We regress announcement-period stock returns on this adjusted premium (Model 4d) for our tests and inference (and on the nominal maximum offer premium in Model 4c for comparison purposes). In Model 4d, the adjusted offering premium is no longer correlated with firm size or the two prior-period stock return vari-

ables, so the endogenous nature of the maximum premium variable does not interfere with our attempt to measure the underlying relations between the announcement returns and the two prior-return variables.

We control for a size effect because Lakonishok and Vermaelen (1990) find that 2-month announcement returns for fixed-price self-tender offers between 1962 and 1986 average 24.3% for the companies in the bottom size quintile (small firms) versus 8.3% for the companies in the top quintile. The corresponding difference in offer premiums is 35.6% versus 16.6%. We use the log of size, measured as the aggregate market value of common stock 4 days before the buyback. In our sample, announcement returns are decreasing in firm size (*t*-statistic of  $-6.33$  in Model 4d) and offer premiums are also decreasing in firm size (*t*-statistic of  $-5.81$  in Model 4b).<sup>18</sup>

The at-risk dummy variable provides significant explanatory power and the dutch-auction dummy does not, consistent with our explanation in comparing Figures 1 and 2. All else the same, having managers who are at risk will provide an additional two or three percentage points to the average excess stock return on announcement.

The maximum premium offered is the most important single determinant of stock returns (*t*-statistic exceeding 12); offering a 10% premium results in a 5.8% excess stock return on announcement (given values for the other independent variables). Here we confirm Vermaelen (1981), who reports corresponding estimates between 5.8 and 6.8% depending on model specification.

We do not confirm Vermaelen's finding that the percentage of shares sought and the fraction of shares owned by management generally add significant explanatory power to regression models that also use the offer premium to explain announcement returns. The sign of the coefficient for the implied change in insider stockholdings is positive and significant (*t*-statistic of 1.73) and less positive when the beginning level of insider holdings exceeds 50%, which is consistent with the agency and antitakeover hypotheses. Collectively, however, these two management holdings variables and the shares-sought variable do not add significant explanatory power (as indicated by an *F*-statistic of 1.18 for the comparison of Models 4e and 4d), and the percentage of shares sought is individually unimportant.

Model 4d also shows that the market reaction to self-tender offers is significantly inversely related to the prior excess (or net-of-market) performance but is not significantly related to the market return in the prior period. While managers curiously choose higher offer premiums the worse the prior market return has been, our results indicate that the market response to a premium self-tender offer largely ignores the prior market-wide return, except insofar as it influences managers' choice of offer premium.

<sup>18</sup> Assuming zero prior excess and market returns, a firm with a market value of equity of \$100 million would have a predicted maximum offer premium of 20.7% compared to 11.8% for a \$2 billion firm. All else equal, the larger firm's announcement return would be five percentage points lower.



This suggests that managers can not credibly signal market-wide undervaluation. Self-tender offers do have greater announcement effects, however, the more negative has been the offering firm's prior excess return, when suggest that managers can credibly signal firm-specific undervaluation.

#### *D. Empirical Results for Open-Market Repurchase Programs*

Figure 1 shows two important results for the entire sample of 1,197 repurchase authorization announcements—they are preceded by negative net-of-market stock performance, and they elicit a positive excess stock return which reverses about half of the prior-period underperformance. Open-market repurchases involve only one choice variable, the percentage of shares sought through the program.

Figure 2 shows the importance of the percentage of shares sought in signalling stock undervaluation using open-market repurchases. The lower two lines on Figure 2 plot the cumulative excess returns for two subsamples of open-market repurchases—those seeking greater than 10% of the outstanding stock, and those seeking less than 5%. This comparison shows that the high-fraction repurchases have substantially greater excess returns on announcement than do the low-fraction repurchases.

We estimate the relation between the fraction sought and announcement returns by regression and report this in Table V. The dependent variable is the gross stock return, and we include the concurrent (CRSP equally weighted) market return as an independent variable. The coefficient for this variable is positive, generally near unity, and significant in every regression. The percentage of shares sought is a significant positive determinant of returns in every regression. Its coefficient estimate of about 0.2 implies that increasing the percentage of stock sought in a typical repurchase program by 10 percentage points is associated with an increase of 2 percentage points in the announcement stock return.

The average return for open-market repurchases is 2.3%, and the average returns for both types of self-tender offer are significantly higher than this. After holding constant the fraction of shares sought and controlling for whether officers and directors are at risk, the averages for dutch-auction offers and for fixed-price offers are still somewhat greater than for open-market repurchase authorizations but not significantly so. (While not shown in Table V, we find that, in the extreme cases, excess returns average about 6% for the open-market repurchases seeking more than 20% of their stock, which is close to the average announcement returns for dutch auctions of less than 8%.) Open-market repurchase programs are nearly as effective at boosting stock prices as are self-tender offers (when managers are similarly free from risk and when similar fractions of stock are sought), despite the positive premiums generally paid in self-tender offers. Alternatively, we find that self-tender offers tend to have a greater effect on stock prices largely because these repurchases tend to retire relatively greater fractions of stock and because managers can more credibly signal undervaluation when they put their own wealth at risk.

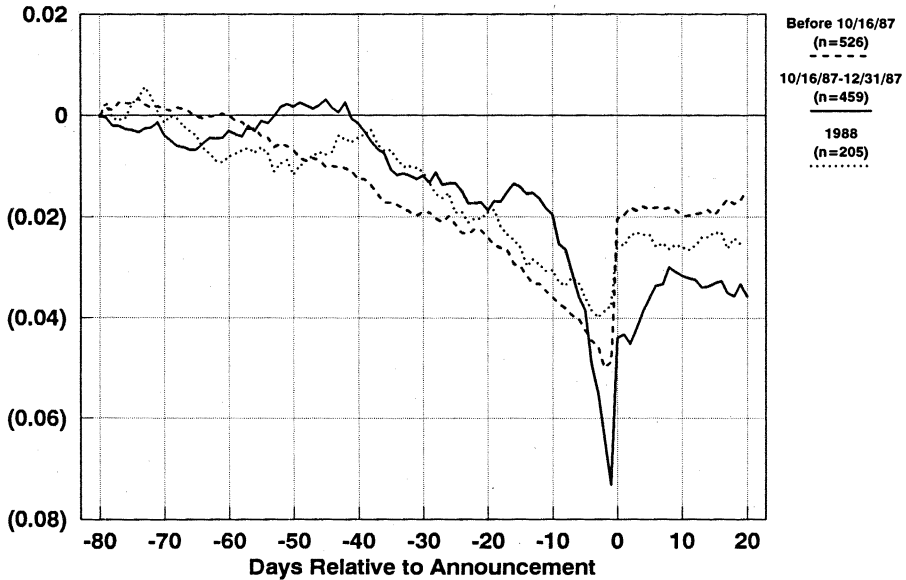
**Table V**  
**Announcement Returns for Self-Tender Offers Compared with**  
**Open-Market Programs and for Open-Market Programs**  
**by Subperiod**

These OLS regressions pool observations from the tender offer and open-market repurchase samples and include dummy variables to allow for differential announcement returns for the two types of tender offer after controlling for the fraction of shares sought and for prior-period market and excess returns. *T*-statistics are in parentheses. The dependent variable is the 3-day return centered on the announcement day. The coincident 3-day market return uses the CRSP equally-weighted market return. The 40-day prior excess return is the stock return from 43 to 4 days before the announcement, minus the compound return on the CRSP equally-weighted portfolio. Tender offers with coincident confounding news are excluded

|   | Combined<br>tender offers and<br>open-market programs |                |                  | Open-market programs only |                       |                  |
|---|---|----------------|------------------|---------------------------|-----------------------|------------------|
|   |   |                |                  | Before<br>10/16/87        | 10/22/87–<br>12/31/87 | After<br>1/1/88  |
| Constant                                  | 2.33<br>(11.5)  | 0.99<br>(3.28) | 0.68<br>(2.15)   | 0.90<br>(2.44)            | 2.27<br>(1.33)        | –0.47<br>(–0.70) |
| Dummy = 1 for<br>Dutch auction            | 5.46<br>(6.18)  | 1.63<br>(1.59) | 1.77<br>(1.67)   | –                         | –                     | –                |
| Dummy = 1 for<br>fixed price              | 8.71<br>(10.1)  | 2.00<br>(1.35) | 2.18<br>(1.49)   | –                         | –                     | –                |
| Dummy = 1 for<br>O&D at risk <sup>a</sup> | –   | 5.13<br>(3.69) | 5.03<br>(3.64)   | –                         | –                     | –                |
| Maximum % of<br>shares sought             | –   | 0.20<br>(6.29) | 0.20<br>(6.48)   | 0.25<br>(7.04)            | 0.20<br>(5.60)        | 0.21<br>(2.83)   |
| Prior 40-day<br>excess return             | –   | –              | –0.09<br>(–5.04) | –0.10<br>(–5.39)          | –0.04<br>(–0.96)      | –0.05<br>(–1.47) |
| Prior 40-day<br>market return             | –   | –              | 0.02<br>(1.20)   | –0.01<br>(–0.24)          | 0.06<br>(1.01)        | 0.06<br>(0.92)   |
| Concurrent 3-day<br>market return         | 1.15<br>(27.2)  | 1.16<br>(27.6) | 1.15<br>(27.2)   | 0.90<br>(4.80)            | 1.19<br>(18.8)        | 1.21<br>(4.22)   |
| R-square                                  | 0.410   | 0.437          | 0.448            | 0.163                     | 0.529                 | 0.132            |
| Number of<br>Announcements                | 1,322   | 1,284          | 1,284            | 508                       | 334                   | 195              |

<sup>a</sup> Officers and directors.

Figure 3 begins to investigate the unique qualities of the open-market repurchase authorizations that were apparently inspired by the market crash of October 19, 1987. We separate the 1987 post-crash cases (10/22/87 through 12/31/87) and also break out pre-crash (1985 through 10/15/87) and post-crash (1988) announcements. Beginning 80 trading days before the repurchase announcements, Figure 3 shows that each of the three subsamples show positive announcement excess returns and net-of-market underperformance prior to announcing. The 1988 cases involve both lower announcement returns and less pre-announcement underperformance than do the other two subsamples. The immediate post-crash cases are unique in that they show the greatest degree of underperformance, with most of this underperformance occurring as a result of the market crash. This result confirms Netter and



**Figure 3. Cumulative average net-of-market returns for share repurchase authorizations segmented by date of announcement.** Daily excess returns are daily returns less a CRSP equally-weighted market return. Daily average excess returns are cumulated over a period from 80 days before announcement to 20 days after. The sample includes announcements of authorizations of share repurchase programs by exchange-listed firms during 1985–1988. Of these, 526 are before 10/16/87, 459 are between 10/16/87 and 12/31/87, 205 are in 1988.

Mitchell (1989) who find that firms making repurchase announcements in the wake of the 1987 crash experienced negative excess returns during the crash.

Regressing announcement returns on measures of prior firm-specific and general-market performance provides more refined tests of the relations suggested by Figures 1 and 2. Table V also reports the results of these regressions for the three subsamples through time, calculating returns over a 40-day prior period (days  $-43$  to  $-4$  before announcements).

The 40-day excess return variable has a negative sign and is significant at conventional levels in the pre-crash period. The announcement return, therefore, is more positive the greater is the recent underperformance of the firm's stock relative to the general market. The 40-day market performance is not significantly negative and is unstable over time, implying that individual firms are unable to credibly signal mispricing when the prior price decline is based on just the recent behavior of a general market index. (While not shown in Table V, the prior return variables for the period from 241 to 41 days before announcement are insignificant when added to this regression, which indicates that it is only relatively recent (2-month) underperformance that tends to be offset by buyback announcements, not longer-run underperformance 3–12 months before buybacks.) Therefore, these regressions sup-

port the view that repurchase programs have some impact as signals of firm undervaluation as demonstrated by the fact that the market treats these signals as more credible the greater has been the degree to which the firm has underperformed the general market in the preceding few months.

## V. Conclusion

This is an empirical study of three types of common stock repurchases announced by U.S. corporations between 1984 and 1989. Specifically examined here are 165 self-tender offers, including 72 that use a dutch-auction procedure to determine their repurchase prices. This is an exhaustive collection of partial self-tender offers announced by exchange-listed and over-the-counter firms from 1984 to 1989, inclusive. Also studied here are 1,197 open market repurchase programs, which is an exhaustive collection of such announcements made by exchange-listed firms between 1985 and 1988, inclusive. The significant rise in buyback activity starting in 1984, the emergence and rapid acceptance of the dutch-auction offer, and the explosion of buyback announcements in the immediate aftermath of the October 1987 market crash are among the motivations for this empirical revisit of corporate stock buybacks.

Each of these three kinds of stock buyback are associated on average with significant, positive excess stock returns on their announcement. Fixed-price self-tender offers result in an average excess return of about 11%, compared with under 8% for dutch auctions, while open-market repurchase programs induce an average excess return of about 2%. The finding that dutch auctions elicit a lower positive stock return than do fixed-price offers is consistent with the signalling-based hypothesis that dutch auctions are less effective than fixed-price offers and signals of stock undervaluation. We present evidence showing that dutch auctions are less effective as signals of stock undervaluation because they typically expose the personal wealth of managers to less risk than fixed-price offers. Also, dutch auctions reduce the repurchase premium actually paid by about one-third when compared with a typical fixed-price offer. Consistent with the theory of rational choice, dutch auctions are used more frequently by large (widely followed) firms, compared with fixed-priced offers, suggesting that dutch-auction users have a relatively lower demand for signalling stock undervaluation.

We also show some evidence that managers set self-tender offer premiums higher the worse recent firm-specific stock performance has been and recent general market performance has been. We conjecture that signalling effectiveness is plausibly related to recent firm-specific performance, but not to recent general market performance, since it is unlikely that the market would perceive that firm managers possess private information regarding the performance of the stock market. This hypothesis is supported by further regressions showing that announcement stock returns are related to recent firm-specific returns but not to recent general market performance. We interpret this evidence as supporting the theory of signalling.

Open-market repurchases are associated with the lowest returns of the three kinds of stock buybacks, on average about 3%. But, the subsample offering to repurchase more than 20% of the outstanding shares show an announcement excess return of about 6%, which is close to the average of dutch-auction offers. Therefore, announcements of large open-market repurchase programs, which offer no premium over market price, can signal stock undervaluation almost as effectively as premium dutch auctions. Regressions are used to show further that open-market repurchase announcements, like premium self-tender offers, also induce a higher stock return the worse the firm's recent stock returns have been relative to the general market. We interpret this evidence as supporting the signalling theory.

Studies of antitakeover devices, such as poison pills, super-majority amendments, and dual-vote recapitalizations, have generally reported small and even negative returns. This evidence on the effects of antitakeover devices contrasts with the larger, positive returns associated with self-tender offers, suggesting to us that the antitakeover implications of corporate buybacks contribute marginally to the positive announcement returns we observe. Our evidence is consistent with this supposition. While announcement returns are increasing in the implied change in insider holdings due to the offer (and less so for large initial levels of insider holdings), the variables related to insider holdings and the percentage of shares sought in the offer do not collectively add significant explanatory power to our regressions.

Overall, this study provides broad support for the theory that buybacks increase stock prices because they are credible managerial signals that the offering firm's stock is undervalued. By and large, we replicate the results of the previous academic studies that focused on buybacks prior to 1980 and first presented the signalling theory of stock undervaluation as an explanation of positive stock returns. In addition, this study shows that signalling theory provides a unique explanation for some of the observed economic effects of stock buybacks, as reflected in the significance of our at-risk measure of managers' personal wealth exposure.

While our focus here is to demonstrate the significant empirical support behind the signalling theory, we wish to emphasize that our results do not rule out an important role being played by other theories in explaining the motivation for and effects of stock buybacks. It is apparent from our results, for example, that offering firms generally have upward-sloping supply curves of shares during the offering period, as reflected by the significantly less-than-complete tendering response into premium offers. Moreover, our study and others show that the bulk of buyback activity is conducted through open-market repurchase programs and dutch-auction self-tender offers, methods which have less signalling effectiveness than the conventional fixed-price offer. This suggests that most stock buyback activity may be principally motivated by objectives other than (or in addition to) signalling stock undervaluation, such as distribution excess cash to shareholders in a tax-efficient manner, reducing the threat of hostile stock acquisitions, or other firm-specific explanations. Nevertheless, the signalling theory enjoys the greatest success

to date at explaining differences in the typical stock-price response to various methods of corporate stock repurchase.

## Appendix

### Self-Tender Offer CUSIPs, Dates, Types, and Company Names

The three-digit number before the company name indicates the type of offer: the first digit equals one for dutch auctions, the second digit equals one when officers and directors are at risk, and the third digit equals one when there is coincident confounding news. The date is the announcement date.

|          |          |     |                        |
|----------|----------|-----|------------------------|
| 01378810 | 12/08/88 | 100 | Alco Standard          |
| 02910310 | 10/17/88 | 100 | American President     |
| 03050610 | 06/30/89 | 010 | American Woodmark      |
| 03335210 | 06/06/84 | 010 | Andal                  |
| 03335210 | 08/12/87 | 010 | Andal                  |
| 03335210 | 07/26/88 | 011 | Andal                  |
| 03360920 | 07/21/86 | 011 | Anderson Clayton       |
| 03522910 | 05/16/89 | 100 | Anheuser Busch         |
| 05090310 | 12/15/88 | 001 | Audio Video Affiliates |
| 05634520 | 11/18/86 | 010 | Bacardi                |
| 06780610 | 11/21/85 | 110 | Barnes Group           |
| 07390210 | 01/12/89 | 100 | Bear Stearns Cos       |
| 09077510 | 05/02/89 | 110 | Bird Inc               |
| 09738310 | 06/05/89 | 100 | Boise Cascade          |
| 11563720 | 02/26/88 | 110 | Brown-Forman           |
| 12169110 | 05/11/87 | 011 | Burlington Inds        |
| 12507110 | 08/13/84 | 010 | CDI Corp               |
| 12640810 | 09/19/88 | 111 | CSX Corp               |
| 12705510 | 10/16/85 | 111 | Cabot Corp             |
| 12769510 | 09/08/87 | 101 | Caesars World          |
| 16326710 | 11/04/86 | 100 | Chelsea Inds           |
| 16374910 | 08/04/87 | 010 | Chemical Leaman        |
| 16776310 | 02/06/89 | 100 | Chicago Milwaukee      |
| 16787210 | 11/11/86 | 110 | Chicago Pacific        |
| 17216710 | 12/18/87 | 000 | Cincinnati Microwave   |
| 17290910 | 01/13/88 | 000 | Circus Circus Entprs   |
| 18589610 | 03/15/88 | 011 | Cleveland Cliffs       |
| 19416210 | 07/31/85 | 010 | Colgate Palmolive      |
| 20453810 | 11/16/87 | 010 | Component Technology   |
| 20462010 | 12/10/86 | 010 | Comprehensive Care     |
| 23278710 | 06/21/89 | 011 | Cypress Fund           |
| 23810820 | 03/27/84 | 010 | Dataram Corp           |
| 23810820 | 12/15/89 | 010 | Dataram                |
| 23975310 | 09/19/89 | 100 | Dayton Hudson          |
| 25243510 | 01/19/88 | 011 | Di Giorgio             |
| 25279010 | 12/10/84 | 010 | F/H Inds (Diana Corp)  |
| 25444810 | 11/18/86 | 011 | Dinner Bell Foods      |
| 25819810 | 02/06/84 | 011 | Dorchester Gas         |
| 26845710 | 07/06/84 | 010 | EG&G Inc               |
| 29765910 | 10/29/84 | 010 | Ethyl Corp             |
| 30058710 | 07/01/86 | 110 | Ex-Cell-O              |
| 30065710 | 08/19/86 | 011 | Excel Inds             |



|          |          |     |                          |
|----------|----------|-----|--------------------------|
| 30242610 | 11/24/87 | 100 | FHP International        |
| 30249130 | 07/02/84 | 110 | FMC Corp                 |
| 30735110 | 12/07/87 | 100 | Far West Financial       |
| 30738710 | 04/16/84 | 010 | Farah Mfg                |
| 31682850 | 08/01/89 | 110 | Figgie Intl (B)          |
| 31682860 | 08/01/89 | 110 | Figgie Intl (A)          |
| 33781910 | 06/24/85 | 010 | Fisher Foods             |
| 34385610 | 04/20/89 | 110 | Fluke John Mfg           |
| 35671410 | 04/13/89 | 110 | Freeport-McMoran         |
| 35728810 | 11/21/88 | 110 | Fremont General          |
| 36158210 | 03/02/88 | 110 | GEICO Corp               |
| 36868210 | 04/06/87 | 011 | Gencorp Inc              |
| 37011810 | 06/29/89 | 100 | General Instrument       |
| 37083810 | 11/17/88 | 100 | General Signal           |
| 37320010 | 09/29/88 | 010 | Georgia Gulf             |
| 38113610 | 09/04/87 | 010 | Golden Nugget            |
| 38255010 | 11/20/86 | 011 | Goodyear Tire            |
| 38274810 | 11/13/87 | 010 | Gordon Jewelry           |
| 38410910 | 07/27/87 | 110 | Graco Inc                |
| 40835910 | 05/23/89 | 100 | Hammond Co               |
| 41313610 | 06/18/85 | 001 | SAB Harmon Inds          |
| 43507110 | 01/08/85 | 110 | Holiday Inns             |
| 44106510 | 09/17/87 | 100 | Hospital Corp Amer       |
| 44181510 | 01/15/86 | 100 | Household International  |
| 45662610 | 12/09/87 | 000 | Infinity Broadcasting    |
| 46334910 | 10/25/84 | 010 | Iroquois Brands Ltd      |
| 46334910 | 11/26/86 | 010 | Iroquois Brands Ltd      |
| 47720510 | 04/03/85 | 110 | Jewelcor                 |
| 48108810 | 08/06/86 | 100 | Jostens                  |
| 48483610 | 11/01/88 | 100 | Kansas City Life         |
| 48563610 | 07/07/88 | 110 | Carl Karcher             |
| 49566710 | 06/12/87 | 000 | King World Productions   |
| 49915810 | 12/02/87 | 110 | Knogo Corp               |
| 50558810 | 09/30/85 | 010 | Laclede Gas              |
| 50573910 | 06/01/89 | 001 | Ladd Furniture           |
| 52728810 | 12/01/89 | 010 | Leucadia National        |
| 52736410 | 01/30/84 | 011 | Levi Strauss             |
| 53037010 | 11/16/87 | 000 | Liberty Corp             |
| 53517110 | 05/15/86 | 010 | Lindberg Corp            |
| 54625810 | 05/15/89 | 100 | Louisiana Gen Svcs       |
| 54955710 | 11/07/86 | 011 | Lucky Stores             |
| 55308810 | 11/23/87 | 010 | MMI Medical              |
| 57460110 | 09/01/88 | 100 | Masco Inds               |
| 57773010 | 02/02/87 | 011 | Maxus (Diamond Shamrock) |
| 57777810 | 09/01/88 | 100 | May Dept Stores          |
| 57777810 | 03/02/89 | 100 | May Dept Stores          |
| 57844410 | 12/10/87 | 010 | Maynard Oil              |
| 57990510 | 08/11/89 | 010 | McCormick Capital        |
| 58004710 | 01/31/89 | 010 | McDonald & Co Invt       |
| 58587100 | 05/11/84 | 110 | Mem Co                   |
| 59283510 | 03/30/87 | 000 | Mexico Fund              |
| 62915640 | 04/14/86 | 111 | NL Inds                  |
| 63512810 | 02/22/85 | 001 | National Can             |
| 65142610 | 02/27/89 | 100 | Newhall Land & Farm      |
| 65653510 | 08/29/88 | 010 | Norstan Inc              |

67136510 09/22/88 010 Oak Hill Sportswear  
68382910 01/05/88 001 Optical Coating Lab  
69452910 09/13/84 010 Pacific Lumber  
70334310 08/02/85 011 Patrick Inds  
70727110 06/25/84 010 Penn Central Corp  
70931710 10/21/88 100 Pennwalt  
70975210 02/15/89 110 Penwest Ltd  
71880310 16/06/86 010 Phoenix American  
71880310 10/09/87 010 Phoenix American  
71880310 07/10/89 010 Phoenix American  
72811710 06/29/84 010 Playboy Enterprises  
73109510 02/21/89 011 Polaroid  
74331510 06/07/88 100 Progressive Corp  
74763310 03/07/88 100 Quantum Chemical  
74790610 10/20/88 110 Quantum Corp  
74960L10 10/29/84 010 Reynolds R J  
74960L10 03/29/88 100 RJR Nabisco  
75127710 12/12/88 100 Ralston Purina  
75127710 12/09/89 100 Ralston Purina  
75218510 05/29/85 010 Rand Capital  
75280010 10/24/86 000 Rangaire  
75865710 05/19/88 011 Reflectone  
76089810 10/13/88 011 Research Inc.  
76119510 09/12/85 010 Resource Exploration  
76657010 10/24/88 010 Riggs National  
77578410 02/21/84 010 Rolm Corp  
78348310 05/19/88 010 Ryan Beck & Co  
78662910 09/24/85 110 Sage Energy  
80685710 09/20/88 100 Schlumberger Ltd  
80916310 01/25/89 100 Scope Industries  
81137110 10/31/89 011 Sea Containers Ltd  
83237710 11/26/86 100 Smithkline Beckman  
85315610 11/11/87 111 Standard Brands Paint  
85373410 07/26/84 010 Standard Oil Ohio  
85566810 11/07/84 010 Starrett L S  
85858610 07/09/84 010 Stepan Co  
85954710 02/19/88 111 Sterling Software  
86016310 09/24/86 100 Stevens J P  
86277010 05/04/88 010 Strategic Planning  
86426110 10/27/87 010 Suave Shoe  
86835810 11/03/88 100 Superior Surgical  
87264910 09/20/85 111 TRW Inc  
87538210 04/02/84 010 Tandy Corp  
87850410 09/28/87 010 Technical Tape  
87913110 06/09/87 110 Tektronix  
87933510 05/09/84 010 Teledyne  
88037010 10/26/88 100 Tenneco  
88484210 04/24/87 010 Thompson Medical  
88736010 07/01/85 010 Times Mirror  
88826610 01/03/89 110 Titan Corp  
89102710 12/17/87 110 Torchmark  
89533410 01/11/84 010 Tri-Chem Inc  
90254910 12/09/87 011 UAL (Allegis)  
90264810 07/17/89 010 UDC-Universal Dev  
90319210 09/08/89 100 UNUM Corp

|          |          |     |                        |
|----------|----------|-----|------------------------|
| 90467710 | 01/27/89 | 100 | Unifi Inc              |
| 90781810 | 04/27/89 | 100 | Union Pacific          |
| 90969510 | 04/30/85 | 010 | United Cable TV        |
| 91036510 | 08/12/86 | 010 | United Foods           |
| 91820410 | 07/18/89 | 110 | VF Corp                |
| 92916010 | 10/31/86 | 110 | Vulcan Materials       |
| 92929810 | 02/23/88 | 011 | WNS Inc                |
| 93964010 | 03/18/85 | 010 | Washington Post        |
| 94790010 | 02/07/89 | 000 | Wedco Technology       |
| 94790010 | 06/02/89 | 000 | Wedco Technology       |
| 96290120 | 07/21/87 | 000 | Wheelabrator/Henley Gp |
| 96668010 | 08/11/86 | 111 | Whittaker              |
| 98412110 | 07/11/89 | 100 | Xerox                  |
| 98950610 | 08/19/88 | 010 | Ziegler Co             |

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