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Dutch Auction versus Fixed-Price Self-Tender Offers for Common Stock*

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This paper studies distinctions between fixed-price and Dutch auction self-tenders for common stock. We find that fixed-price tenders pay higher premiums to retire greater equity fractions than Dutch offers yet generate similar total returns to stockholders. Accordingly, total returns are significantly higher in Dutch auctions after controlling for tender and firm characteristics. In addition, wealth transfers to owners of repurchased shares are significantly higher in fixed-price offers. The Dutch mechanism thus appears to induce increases in firm value with smaller disbursals of cash. These cost savings to investors who maintain their ownership may explain the popularity of the new technique. *Journal of Economic Literature* Classification Numbers: G35, G14, D44. © 1992 Academic Press, Inc.

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1. INTRODUCTION

Self-tenders for common stock have traditionally been fixed-price offers. In recent years, however, the Dutch auction approach has become increasingly popular. Although accounting for about three-fourths of completed tenders in 1989, Dutch offers were virtually nonexistent prior to the early 1980s. This study examines the reasons for the increased popularity of Dutch auctions.

In a conventional fixed-price offer, a firm announces the number of shares it seeks, as well as conditions under which it may buy more or less, and the price it will pay. The key innovation introduced by Dutch offers is that *investors* set the tender price. Rather than specifying a single price, the firm announces minimum and maximum prices and invites stockholders to tender at any price with the range.[1] Upon expiration, the lowest price that enables the firm to acquire the announced number of shares is determined from stockholders' bids and is paid to *all* bids at and below that clearing price. If the clearing price elicits more shares than are sought (because of a mass of bids at that price) then a pro rata fraction of all qualifying shares is accepted.

This unique price-setting feature of the Dutch auction allows the firm to exploit heterogeneity among shareholder bids by retiring shares held by those investors willing to part with them most cheaply. Such heterogeneity could arise because of differential tax bases or information (Gay *et al.*, 1991a; Brown and Ryngaert, 1992; Bagwell, 1992a,b). Alternatively, as argued by Bamber (1987), Morse *et al.* (1990), and Kim and Verrechia (1991), the tender announcement itself could induce a dispersion in investor beliefs. If shareholders bid their true reservation prices, the Dutch mechanism allows the firm to buy any given number of shares at the lowest price possible. In contrast, fixed-price offers set the tender price without knowledge of investors' valuations, and oversubscription is common. While managers optimally select the price and may view a large amount of tendering as desirable (if, for instance, a raider is seeking control), in many fixed-price tenders it is likely that the tender price is set higher than would be necessary if reservation values were known. Oversubscription also may result from the put-option aspect of a fixed-price offer. If the share price drops during the tender period, investors will submit more shares and rationing will ensue.[2] These distinctions between the two tender techniques suggest they may induce different stock-price

[1] Due to an SEC ruling in June 1987, Dutch auction tenders are no longer permitted to specify a range of shares to be repurchased. However, a standard 2% overallotment is still allowed.

[2] We are grateful to an anonymous referee for this explanation.

reactions, thus motivating our use of contemporaneous samples of fixed-price and Dutch auction self-tenders.

Extant empirical work provides little evidence comparing the two techniques. Bagwell (1992a), Gay *et al.* (1991b), and Kadapakkam and Seth (1991) examine various aspects of Dutch tenders, but do not include fixed-price offers in their samples. Kamma *et al.* (1992) examine several cash disbursement methods including self-tenders, but do not distinguish between the fixed-price and Dutch auction. Peterson and Peterson (1992) examine differences in tender premiums and expiration returns between the two approaches. Only Comment and Jarrell (1991) (henceforth CJ), to our knowledge, compare the gains from both tender methods. Focusing on announcement returns, they find support for their hypothesis that fixed-price tenders are more effective than Dutch auctions as signals of undervaluation.

Our comparison of Dutch and fixed-price self-tenders differs from that of CJ (1991) by focusing on the total (abnormal) returns to *all* shareholders over the *full* tender period and on the gains achieved by nontendering shareholders *relative* to those who sell. These total returns, or revaluations, are defined as an average of the tender premium and the abnormal return (over the tender period) to shares not repurchased, weighted respectively by the fractions retired and remaining. The examination therefore recognizes distinctions in the way that the two techniques determine the purchase price and ration oversubscribed offers. As shown by Vermaelen (1981), announcement returns may overstate the information conveyed by self-tenders when rationing exists.[3] This caveat has particular bearing on a comparison of tender methods since the degree of rationing is greater in fixed-price offers. Moreover, because the implementation of offers is different in the two techniques, the behavior of returns during the tender period may differ as well. Since we examine total returns, expiration day behavior, and wealth transfers for contemporaneous samples of both tender methods, we provide results which have not previously been reported.

Our findings indicate that the sample of Dutch self-tenders has total returns significantly larger than those of the sample of fixed-price offers after controlling for firm-specific and tender-offer characteristics. However, unconditional total returns do not differ significantly between tech-

[3] To see this, note that the possibility of arbitrage during the tender period should equate the market price to a weighted average of the tender price and the postexpiration price, with the weights based on the proportion of tendered shares expected to receive the tender price. If not all shares are tendered, that proportion will be higher than the fraction of outstanding shares repurchased. The announcement return, which is computed from the price before expiration, should therefore overstate the total return which is based on the lower fraction of outstanding shares repurchased.

niques. Given this result and the tendency of fixed-price offers to repurchase (significantly) larger equity fractions and pay higher premiums, it is not surprising that wealth transfers from owners who retain their holdings to those who receive the tender price are found to be significantly smaller in Dutch auctions. The evidence thus suggests that the Dutch auction requires a smaller disbursal of cash than the fixed-price method to attain any particular revaluation. To the extent that these differences derive from the tender mechanisms (rather than from factors which influence the choice of tender method), they provide a natural incentive for nontendering insiders who maximize their own wealth to adopt the Dutch auction approach.[4]

Importantly, we find no evidence that the smaller reported wealth transfers in Dutch tenders result in lower information content measured by total returns, as signaling models of share repurchases would suggest. These models, examples of which appear in Dann (1981), Masulis (1980), Ofer and Thakor (1987), and Vermaelen (1981), identify wealth transfers as a signaling cost borne by insiders who set the tender price above the true value and retain their own shares. However, since beliefs and valuations of outside investors influence the realization of the clearing price, models in which only inside information is conveyed may not be fully appropriate for Dutch tenders. For example, using a model of two-sided information asymmetry, Hausch and Seward (1992) show that either of the two tender methods may provide the stronger signal, depending on the firm's technology. While their model does not suggest any proxies for this unobserved technology, the preponderance of large firms using the Dutch method and small firms using the fixed-price method suggests that these may be related to size.[5]

Since the choice of repurchase mechanism depends on firms' characteristics, the differing market responses that we report may be due to distinctions between firms rather than tender methods. Alternatively, the Dutch tender process itself may be a more efficient repurchase mechanism. In either case, the principal contribution of this research is the documentation that wealth transfers to retired shares are larger in the fixed-price

[4] If instead insiders take into account the welfare of all stockholders, the potential pricing advantage of the Dutch approach is mitigated. Still, however, the Dutch method would yield smaller tax payments since rationed fixed-price tenders would not efficiently buy shares tendered by investors with low tax liabilities and reservation values. Insiders could also prefer tender methods with greater wealth transfers as a deterrent to takeovers.

[5] A different perspective is offered by Bagwell (1992a), who argues that revaluations in part arise from upward movements along the supply curve for a firm's shares. The price response may therefore consist of two components: one part due to information released by the tender and the second part caused by removal of low-valuation shareholders. Our findings are consistent with both the information and the supply curve hypotheses and do not distinguish between these two potential components of responses to self-tenders.

sample, and that ceteris paribus the total revaluation in terms of market responses is larger in our sample of Dutch tenders.

In the next section we describe our sample and examine the tender-offer and firm-specific variables used in the analysis. Section 3 presents evidence on unconditional abnormal returns, total wealth revaluations, and wealth transfers. Section 4 relates these revaluations to tender- and firm-specific characteristics. In a final section, we interpret these findings and offer conclusions.

2. TENDER-OFFER- AND FIRM-SPECIFIC CHARACTERISTICS

Our sample consists of 63 fixed-price tenders and 57 Dutch offers completed between January 1985 and July 1989. Data are compiled from the Wall Street Journal Index, the Dow Jones News Retrieval Service, and a listing of SEC filings provided by Bechtel Corp.[6] This search resulted in 172 self-tenders with CRSP data, of which 52 were discarded for various reasons.[7] Table I provides characteristics of the firms which conducted the 120 completed offers in our sample. Most apparent in Table IA is the greater frequency of the Dutch technique in 1988–1989 and its lesser use by firms listed on NASDAQ.

In order to reveal differences between the tender methods, our cross-sectional analysis controls for firm-specific (as well as tender-offer-specific) characteristics which might affect market reactions. Because self-tenders may complement or substitute for other forms of cash disbursement, the period from one year before to one year after each tender announcement is examined for news of open market repurchases as well as unusual dividends such as stock dividends, special or extra dividends, or changes in the regular dividend. Similarly, restructuring activity involving changes in asset or financial structure is considered. Since stock repurchases may be used as a takeover defense, we also search for signs of hostile takeover activity. Such activity is inferred from reports of explicit defensive comments by management, from hostile comments or share positions by outsiders, or from proxy contests. The results of this search are reported in Table IB. While hostile takeover activity, stock repurchases, corporate restructuring, and unusual divi-

[6] Bechtel provides a listing of all firms filing 13E-4 statements, which are required by the SEC prior to any type of intrafirm tender offer.

[7] Thirty tenders were discarded for the following reasons: the offer was not a pure cash offer, the offer price was based on a mutual fund's subsequent net asset value, or the offer was part of a merger, buyout, or shareholder suit. The remaining 22 offers were eliminated because they were rumors, were canceled, or did not provide adequate information.

TABLE I
BREAKDOWN OF THE SAMPLE OF COMPLETED OFFERS BY YEAR, EXCHANGE, AND CONFOUNDING NEWS

A. Number of Dutch and fixed-price self-tenders, by year and exchange listing

120 completed offers

Type	Exchange	Year (No.) 1985	1986	1987	1988	1989	Total No.
Dutch	NY or AM	6	8	6	15	13	48
	NASDAQ	—	1	1	4	3	9
Fixed price	NY or AM	7	5	12	7	3	34
	NASDAQ	4	7	6	10	2	29
Total		17	21	25	36	21	120

B. Number of firms that exhibited specified valuation-relevant factors from one year before to one year after the tender announcement date[a]

Number of firms in which	Dutch $N = 57$	Fixed price $N = 63$	χ^2 test
Hostile takeover activity	7	11	0.630
Repurchase activity	30	35	0.103
Restructuring activity	17	19	0.002
Unusual dividend news	29	28	0.497

[a] Hostile takeover activity is assumed to be present if explicit defensive comments by management, hostile comments or share positions by outsiders, or proxy contests are reported. Repurchase activity refers to open market or targeted repurchases of stock. Restructuring activity is present if major changes in asset or financial structure are being undertaken. Dividend news is considered unusual if there is any change in the regular ordinary dividend or if a stock dividend, special dividend, or extra cash dividend has been announced.

dend news are common, we find their presence to be unrelated to the mechanism choice. Since the latter three factors also exhibit no empirical relation to tender-period returns in our sample, the subsequent analysis reports only the influence of takeover activity.

Characteristics of the offer design and tendering behavior of shareholders as well as firm size are presented in Table II. Fixed-price offers seek larger percentages of the shares outstanding and pay higher premiums than Dutch offers. For instance, the mean fraction purchased is 22% in fixed-price offers versus 15.1% in Dutch tenders, and the mean premium

TABLE II

CHARACTERISTICS OF THE SELF-TENDERS AND FIRM SIZE FOR THE SAMPLE OF 120 COMPLETED OFFERS, BY TYPE OF OFFER[a]

	Dutch				Fixed price				*t* test on difference	
	Mean	Med	Min	Max	Mean	Med	Min	Max	Mean	Med
Maximum percentage of shares sought	0.174	0.159	0.044	0.533	0.248	0.208	0.037	0.679	−3.1***	−1.3
Minimum percentage of shares sought	0.147	0.122	0.008	0.533	0.234	0.192	0.037	0.611	−3.8***	−2.7***
Actual percentage purchased	0.151	0.137	0.001	0.533	0.220	0.191	0.014	0.611	−2.9***	−2.0**
Pro rata fraction	0.939	1	0.160	1	0.739	0.843	0.250	1	5.0***	3.6***
Maximum premium offered	0.167	0.157	0.041	0.412	—	—	—	—	—	—
Minimum premium offered	0.029	0.019	−0.111	0.180	—	—	—	—	—	—
Premium paid[b]	0.132	0.130	−0.086	0.412	0.192	0.176	−0.092	0.500	−3.0***	−1.3
Percentage of maximum premium paid	0.748	0.929	0	1	—	—	—	—	—	—
Prior market value of equity ($ billion)	2.112	1.023	0.020	12.740	0.576	0.061	0.005	5.171	3.8***	4.6***
Percentage of prior value purchased	0.171	0.150	0.001	0.623	0.267	0.240	0.014	0.814	−3.3***	−1.6

[a] Shares sought are the maximum or minimum sought as a percentage of outstanding shares. Share quantity ranges have not been permitted in Dutch offers since 1987 but overallotment privileges remain. Pro rata fraction is the number of shares purchased divided by the number of shares tendered in total (at or below the purchase price) for fixed-price (Dutch) offers. Premium is defined as $(P_T/P_0) - 1$, where P_T is the maximum, minimum, or final tender price and P_0 is the market price five days before the announcement of the offer. Percentage of maximum premium paid is (actual premium paid *minus minimum premium offered) divided by (maximum minus minimum premium) offered.* Percentage of prior value repurchased is defined as the dollar amount of the repurchase divided by the prior market value of equity.

[b] Nineteen Dutch tenders have negative minimum premiums. For one fixed price and two Dutch offers, the premium paid is negative.

** Significant at the 5% level.

*** Significant at the 1% level.

paid is 19.2% versus 13.2%.[8] These figures are consistent with the findings of Brown and Ryngaert (1992) that repurchases of larger fractions are associated with higher premiums. Although fixed-price offers repurchase a significantly greater proportion of the firm's total equity value, Dutch tenders distribute greater amounts of cash to shareholders. This follows from the larger size of the firms that have used Dutch offers—their median equity value is $1 billion versus $61 million for the fixed-price sample.

Dutch tenders should differ from fixed-price tenders with respect to rationing and purchase-price determination. Pro rata fractions, defined for fixed-price offers as shares repurchased as a percentage of tendered shares and for Dutch offers as shares repurchased as a percentage of shares submitted at or below the clearing price, are reported in Table II. Whereas the mean fraction in fixed-price offers is 74%, in Dutch tenders it is 94% with no rationing required in over half the cases.

Because firms using Dutch tenders do not report the number of shares tendered above the final purchase price, the pro rata factor in a Dutch auction does not reflect tendering activity in a manner comparable to that in fixed-price offers. Since the Dutch tender price should be inversely related to the volume of tendering, we use the location of that price relative to the announced range in order to gauge investor response to the tender. As the measure denoted percentage of maximum premium paid indicates, the clearing price is on average about three-fourths of the maximum, relative to the minimum.[9] These findings suggest that the Dutch method results in reduced rationing and an actual tender price that is sensitive to investor behavior.

Signaling models imply that insiders' ownership and their agreement to retain their shares impart credibility to information conveyed by self-tenders. In addition, heterogeneity of ownership may influence the choice of self-tender method or market reactions. We therefore consider insider and institutional holdings and search for public statements by managers as to whether they plan to tender their stock. Table IIIA shows that ownership structures are significantly related to the tender method selected.[10]

[8] In earlier fixed-price studies, Masulis (1980), Dann (1981), and Vermaelen (1981) report tender premiums and repurchase fractions of approximately 23 and 15%, respectively, while over the 1980–1986 period, Lakonishok and Vermaelen (1990) find analogous figures of 18.5 and 16.8%. With respect to Dutch tenders, our figures are essentially the same as those reported in Bagwell (1992a), CJ (1991), and Gay *et al.* (1991b).

[9] We scale by the announced range (rather than by, say, the prior stock price) in order to form a measure of investor sentiment, which is between 0 and 1, and which can be commonly interpreted across all Dutch offers.

[10] Data on insider (institutional) ownership were gathered from various issues of *Spectrum*, a publication of C.D.A. Investment Technologies. *Spectrum 3* provides quarterly information on institutional ownership and *Spectrum 6* provides semiannual data on insider holdings as reported to the SEC. We measure ownership "before" and "after" a self-tender from the data published closest to the announcement and expiration dates, taking into account lags in the reporting of changes in insiders' positions.

TABLE III

SHARE OWNERSHIP AND INSIDER ACTIVITY FOR THE TOTAL SAMPLE OF COMPLETED SELF-TENDER OFFERS AND FOR A RANDOM SUBSAMPLE MATCHED BY MARKET VALUE OF EQUITY AND EXCHANGE LISTING[a]

A. Median share ownership before and after the tender period for both tender firms and a matched set of firms (N)

	Before			*After*		
	Dutch	Fixed	t test	Dutch	Fixed	t test
Insider ownership	0.050	0.110	−2.1**	0.053	0.227	−2.9***
	(57)	(57)		(47)	(56)	
Insider ownership of matched firms	0.025	0.121	−2.7***	0.034	0.101	−2.5***
	(57)	(57)		(47)	(56)	
Institutional ownership	0.493	0.180	4.9***	0.484	0.177	4.9***
	(57)	(63)		(57)	(63)	
Institutional ownership of matched firms	0.390	0.200	3.1***	0.390	0.210	3.8***
	(57)	(63)		(57)	(63)	

B. Change in insider ownership before and after the self-tender for the subsample of firms with available data[b]

	Dutch (N)	Fixed price (N)	χ^2
Relative change in insider ownership (median)	−0.0004(47)	0.0000(53)	−0.591
Number of firms in which insiders bought	19(47)	25(53)	0.460
Number of firms in which insiders sold	25(47)	19(53)	3.041*
Number of firms in which insiders said they will not sell	5(57)	15(63)	4.872**
Number of firms in which insiders said they will sell	3(57)	7(63)	1.340

[a] Insider (or institutional) ownership is measured on the semiannual (or quarterly) calendar period ending before the initial announcement date of the tender and on the earliest semiannual (or quarterly) period after the expiration of the tender. The sample sizes vary because of incomplete data in *Spectrum*, a publication of C.D.A. Investment Technologies containing information on institutional and insider holdings as reported to the SEC.

[b] Relative change in insider ownership is defined as the change in the number of shares held by insiders divided by the total number of shares outstanding after the culmination of the tender.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Firms using fixed-price offers have about twice the insider holdings before the repurchase as those using Dutch offers but only a third of the institutional ownership. This may be due to the smaller size of firms using fixed-price offers. To remove this confounding effect, we pair each tender firm in our sample with another randomly selected firm of similar size and

exchange listing. Dutch (fixed-price) firms have institutional holdings larger (smaller) than those of their matched samples. Interestingly, insiders in firms using Dutch offers own twice as much of their firms before the tender as their counterparts in the matched sample while insiders in fixed-price firms own about the same as their matched counterparts. The large holdings by insiders of firms using the Dutch technique suggest that wealth transfers may be an important consideration in the choice of tender method.

After tender completion, the proportional holdings of insiders in fixed-price firms double, in part because of the large amount of stock retired. The effect of the size of the repurchase is controlled for in Table IIIB. "Relative change in insider ownership," which measures the change in shares owned scaled by the post-tender number of shares outstanding, is similar across tender methods.[11] However, simple reductions in insider positions are more frequent in Dutch offers. In addition, statements of insiders' intentions not to sell shares during the tender process are significantly more common in fixed-price tenders. Table III suggests that fixed-price tenders should generate larger revaluations if the degree of undervaluation conveyed by self-tenders is related to (changes in) insider holdings.

3. ABNORMAL RETURNS AND WEALTH TRANSFERS

In this section we examine abnormal stock price reactions, weighted returns to all owners, and wealth transfers to shares that are repurchased. We find no significant differences between the unconditional returns associated with the two tender methods. However, returns to owners of retired shares relative to those of remaining shareholders are significantly larger in our sample of fixed-price tenders even after recognizing that these offers pay higher premiums to retire larger equity fractions. Consistent with this apparent advantage of Dutch offers to nonselling owners, we find that rationing and tendering activity (which are typically greater in fixed-price offers) are negatively related to expiration day returns.

3.1. *Market Response during Tender Period*

We use standard event-study methodology to estimate the effects of the two types of tender offers on shareholder wealth. For each firm, we

[11] This scaling prevents any bias related to the magnitude of the repurchase that would be associated with a simple change in fractional ownership. The measures in Table IIIB which consider actual changes in holdings are based on 100 firms because both before and after data are required and information for many firms is missing from *Spectrum*.

estimate a market model with continuously compounded daily returns over a 120-day window ending 140 days before the initial tender announcement date, T_1.[12] Using the estimated parameters, we then compute daily abnormal residuals from 140 days before the initial announcement to 60 days after the terminal or final announcement date T_2, which is typically 1 or 2 days after the offer's expiration.[13] For each day in this event window, we average the abnormal returns over the firms in each tender subsample. To capture the impact on share prices of information released at various times during this process, we cumulate these average residuals over event days. The overall cumulative average residual, CAR, from $T_1 - 1$ to $T_2 + 1$ encompasses an offer's initial and final announcements and measures the total wealth effect to nontendering shareholders. Since the average time between these two dates is about a month, the power of our statistical tests is not reduced by including all days in the interval from T_1 to T_2.[14]

Figure 1 illustrates the pattern of excess returns over the 140 trading days before and 60 days after self-tender announcements. For both tender methods, a 2% gain is realized preceding the offer, while the abnormal response on the day of the initial announcement is slightly larger for the

[12] The S&P Composite Index was used as the proxy for the market portfolio. Results using exchange-dependent indices are qualitatively indistinguishable.

[13] T_2 is the last date on which important news concerning shares repurchased, pro rata fraction, shares tendered, or price paid is released. In four events, the final public comment precedes expiration, in which case T_2 is the ex-day. Often the last public comment simply refines terminal details (e.g., the pro rata fraction) already well-specified publicly—in such cases T_2 is the release date of the well-specified details. The mean (median) number of trading days from T_1 to T_2 is 26.7 (24) for Dutch and 32.1 (31) for fixed-price tenders.

[14] To test for statistical significance, we follow Patell (1976) and standardize the daily residuals by the residual variance, s_i, computed from a 200-day period ending 60 days before the initial announcement (T_1): $se_{it} = e_{it}/s_i$. These standardized prediction errors are cumulated over the relevant window, $T_1 - L$ to $T_2 + K$, and normalized,

$$W_i = \sum_{t=T_1-L}^{T_2+K} se_{it}/M, \tag{1}$$

where M is the number of trading days from $T_1 - L$ to $T_2 + K$. Each W_i has a t distribution, and under the assumption that they are independent, a normalized sum over all firms can be formed as

$$Z_{LK} = \sum_{i=1}^{N_{LK}} W_i \Big/ \left[\sum_{i=1}^{N_{LK}} \mathrm{Var}(W_i)\right]^{1/2}, \tag{2}$$

where N_{LK} is the number of firms with cumulative returns from $T_1 - L$ to $T_2 + K$. The Z_{LK} statistic is distributed as $N(0, 1)$ and permits a test of whether abnormal performance over the event period is statistically significant.

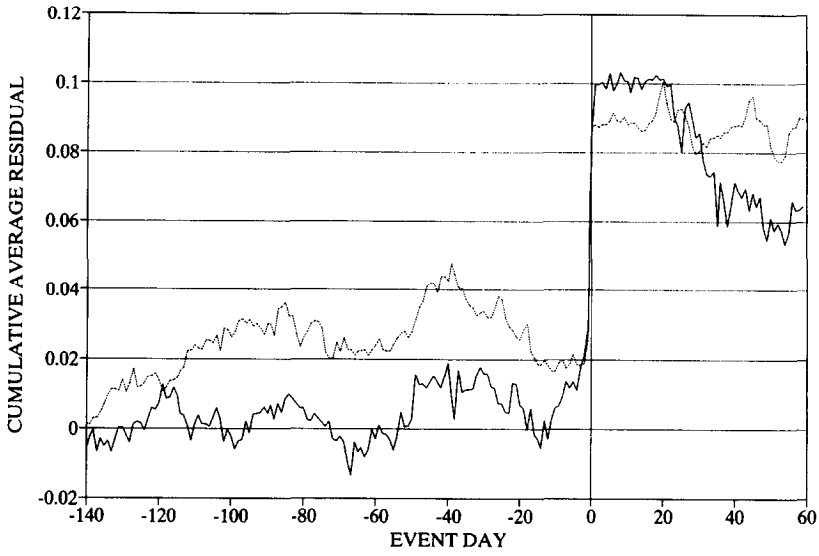

FIG. 1. *CAR*s for Dutch (dotted lines) and fixed-price offers (solid lines) −140 to +60 around initial announcement.

fixed-price subsample. Interestingly, while the CAR for the Dutch firms remains flat over the subsequent 60 days, the CAR for the fixed-price firms declines 4%. Although the figure suggests different subperiod price movements for the two techniques, Table IV shows that these unconditional distinctions are insignificant. Fixed-price tenders induce announcement reactions that are about 1% larger than those for Dutch offers, but they are also associated with smaller returns before, after, and on expiration dates.[15] Thus, when the full tender period is considered, the return to owners who maintain their holdings is 6.55% for Dutch auctions and 4.82% for fixed-price offers, but the difference is not statistically significant.

This reversal between announcement and overall returns may be due to the larger equity fractions sought by fixed-price offers and the need to set

[15] The returns for the Dutch sample are similar to those reported in Bagwell (1992a) and CJ (1991). The returns for the fixed-price sample are smaller than those in previous studies. For example, the corresponding three-day announcement return is 15.22% in Vermaelen's (1981) study. Lakonishok and Vermaelen (1990) report an overall return of 14.6% (9.8%) for tenders conducted in the period 1962–1979 (1980–1986). They suggest that recent tenders induce smaller revaluations because they are more commonly used and less unexpected, because they act as takeover defenses, or because the signal is weaker due to lower insider holdings.

TABLE IV

ANALYSIS OF ABNORMAL RETURNS FROM MARKET MODEL FOR 120 COMPLETED OFFERS OVER VARIOUS INTERVALS RELATIVE TO INITIAL ANNOUNCEMENT, EXPIRATION, AND FINAL ANNOUNCEMENT OF TENDER OFFERS[a]

Days relative to announcement	CAR (Z − Score) Dutch $N = 57$	CAR (Z − Score) Fixed $N = 63$	t test on difference
−1 of initial announcement to +1 of final announcement	0.0655 (5.993)	0.0482 (3.046)	0.677
−1 to +1 of initial announcement	0.0690 (17.959)	0.0786 (15.355)	−0.726
+2 of initial announcement to −1 of expiration	0.0161 (1.131)	0.0136 (0.435)	0.283
Expiration day	−0.0133 (−4.887)	−0.0275 (−7.992)	1.516
+1 of expiration to +1 of final announcement	−0.0059 (−1.362)	−0.0167 (−2.751)	1.509
−140 to −2 of initial announcement	0.0206 (−0.025)	0.0151 (0.564)	−0.036

[a] The final announcement is the last important announcement associated with the tender process. It can be the expiration date, the release of tender results, or both.

the repurchase price without knowledge of shareholder reservation values. Consequently fixed-price offers should be expected to pay larger premiums than Dutch auctions, relative to the post-tender price, and to suffer greater price declines at expiration of the offers. The pattern in Fig. 1 is therefore consistent with differences in the two techniques and suggests that a focus on announcement returns alone is insufficient.

3.2. *Rationing, Tendering Activity, and Expiration-Day Returns*

Earlier studies of fixed-price tenders found that price declines at expiration are greater when the pro rata repurchase fraction is smaller. Bagwell (1992a) reports a similar result for Dutch tenders. Unlike fixed-price offers, where excessive tendering results in a low pro rata repurchase fraction, the clearing aspect of the actual tender price in Dutch auctions severs the connection between the volume of tendering and the amount of rationing. Rationing occurs only if bidding by investors results in a mass point at the clearing price. In general, the amount of rationing need not be

closely related to overall tendering activity, which, when heavy, should lead to a lower realization of the tender price. Thus, while we examine the announced pro rata fraction, PRATA, for both tender methods, for Dutch offers we also employ the location of the clearing price within the announced price range as a measure of tendering activity.[16] This variable, PLOCA, is defined as the purchase price less the minimum offer price, scaled by the difference between the announced maximum and minimum prices.[17] In fixed-price tenders, a smaller pro rata fraction should indicate both inefficiency (since shares held by investors with low valuations remain outstanding) and limited investor optimism. In Dutch offers, when PLOCA and PRATA are much below one, oversubscription and inefficiency are separately indicated and price declines should be greater.

Our results are presented in Table V. The presence of rationing in Dutch offers causes mean expiration-day returns to decrease from −0.13 to −3.50% (Table VA). However, information concerning investor sentiment, as reflected in PLOCA, also affects price responses at expiration. The mean return is 0.14% for offers in which the clearing price equals the announced maximum versus −2.70% when the clearing price is below the maximum. This effect is observed whether or not rationing occurs. Table VB shows that fixed-price expiration returns are positively related to PRATA. The mean reaction is −1% when an offer is undersubscribed and −4.6% when it is heavily oversubscribed.

The fixed-price expiration-day pattern is predicted by Brennan and Thakor (1990) and is consistent with the findings of Masulis (1980), Dann (1981), Vermaelen (1981), and Lakonishok and Vermaelen (1990). For Dutch tenders, Bagwell (1992a) presents evidence similar to that in Table VA for both the overall tender period and the expiration returns.[18] Her findings (as well as Table V) are consistent with the idea that the marginal shareholder does not change in a rationed offer and that therefore little or no stock-price increase should be observed over the tender period. How-

[16] Note that, in Dutch offers, firms are not required to reveal the total amount tendered, and that the pro rata fraction considers only those shares submitted at or below the clearing price. This is often cited as an advantage of the Dutch auction method over the fixed-price offer, in which the announcement of the total number of shares tendered may improve a potential bidder's estimate of the premium required for a successful takeover. See Piper *et al.* (1989).

[17] Sample statistics for PLOCA and PRATA appear in Table II in the rows labeled "percentage of maximum premium paid" and "pro rata fraction." In a heavily over (under)-subscribed Dutch offer we would expect the clearing price to be at the minimum (maximum). Thus, PLOCA varies between 0 and 1 and indicates the response of investors to the tender offer.

[18] Table VA differs from Bagwell's analysis by examining a much larger sample of rationed offers and by separating cases in which the maximum premium is paid.

TABLE V
EFFECT OF PLOCA, PRATA, OVERSUBSCRIPTION, AND UNDERSUBSCRIPTION ON EXPIRATION-DAY RETURNS[a]

A. Expiration-day returns for Dutch offers: Mean, median, N

	PRATA		
PLOCA	=1	<1	Row totals
=1	0.0025	−0.0050	0.0014
	0.0003	−0.0189	−0.0014
	23	4	27
<1	−0.0081	−0.0424[b]	−0.0270
	−0.0113	−0.0323	−0.0197
	13	17	30
			Anova F[c]
Column totals	−0.0013	−0.0350	PLOCA: 10.11***
	−0.0022	−0.0240	PRATA: 13.03***
	36	21	Both: 5.96***

B. Expiration-day returns for fixed-price offers: Mean, median, N

PRATA	N	Mean	Median	Anova F[c]
PRATA = 1	27	−0.0103	−0.0053	1.98[d]
0.5 ≤ PRATA < 1	17	−0.0343	−0.0168	
PRATA < 0.5	19	−0.0460	−0.0429	

[a] PRATA, the pro rata fraction, is defined as the number of shares repurchased divided by the total number of shares tendered in fixed-price offers or by the number tendered at or below the clearing price in Dutch offers. PLOCA, the percentage of maximum premium paid reported in Table II, is defined as $(P_T - P_{min})/(P_{max} - P_{min})$.

[b] In 5 offers, the actual tender price equals the minimum and PLOCA = 0. In all, PRATA < 1 and their mean (median) return is −0.0750 (−0.0497). The remaining 12 cases in this cell have a mean (median) return of −0.0277 (−0.0198).

[c] Analysis of variance test for difference in means across PRATA categories and across PLOCA categories and interaction effects between PRATA and PLOCA.

[d] The undersubscribed category is significantly different from either of the other two groups.

*** Significant at the 1% level.

ever, the results in Table VA (and a similar pattern displayed by our sample of overall returns) may also be explained as market responses to news about investor opinions conveyed by the amount of tendering. Moreover, the inverse relation between returns and rationing is heavily

influenced by cases in which the minimum premium is paid.[19] Those are also the cases in which one would expect news to be negative and in which the Dutch auction becomes, in effect, a fixed-price offer due to the binding minimum-price constraint.[20]

The role of news conveyed at Dutch offer expirations may also account for the (untabulated) significant positive correlation of 0.233 between expiration return and realized tender price since a higher premium should indicate less tendering activity and more favorable investor sentiment. This positive relation appears to be independent of rationing because the correlations are 0.178 and 0.115 for nonrationed and rationed Dutch subsamples, respectively.[21] In contrast, the fixed-price sample exhibits an insignificant correlation of −0.198. Because of the *a priori* setting of the tender price in fixed-price offers, this negative correlation may reflect greater rationing or larger differences between the tender and postexpiration stock prices when premiums are higher.[22] The close relation among tender premiums, rationing, and news conveyed by tendering behavior precludes a differentiation between news and marginal shareholder effects. However, the differing correlations found in Dutch and fixed-price tenders (along with Fig. 1) indicate that returns to retired and remaining shares may be more similar in Dutch offers.

3.3. *Total Weighted Returns and Wealth Transfers*

When examining self-tenders, overall tender-period returns to all owners provide a more complete indication of wealth effects than announcement returns or price reactions. Moreover, the relative gains to owners who sell or retain their positions appear to differ in the two offer methods. To address these issues, we denote the average price per share attained by all initial owners by P^*, which is the average of the purchase price and

[19] For expiration returns, this effect is seen in Table V, where we report a mean return of −7.50% for the 5 tenders in which the minimum premium is paid and there is rationing. Mean overall Dutch stock returns are 9.33% (or 1.78%) when PRATA equals (or is less than) 1, confirming Bagwell's (1992a) finding that returns are insignificant when there is rationing. However, excluding these same 5 cases (which exhibit a mean overall return of −7.54%), the remaining 16 rationed offers in our sample have a significantly positive overall return of 4.69%.

[20] We thank an anonymous referee for this insight.

[21] Bagwell (1992a) reports a similar figure for nonrationed tenders but a significant negative relation for her smaller sample of rationed offers.

[22] The correlations for the (full) Dutch and fixed-price samples are significantly different at the 5% level. For the fixed-price sample, the correlation is −0.405 for rationed offers and +0.222 for nonrationed offers.

the post-tender market price (adjusted for market movements and risk) weighted by the equity fractions which are retired or remain outstanding. Thus, an offer's total weighted return is given by P^* less the preannouncement price, divided by the preannouncement price. This return (which is equivalent to that used by Vermaelen, 1981) equals the weighted average of the tender premium and the overall abnormal return to shares not repurchased.

The total returns presented in Table VI indicate that fixed-price tenders induce insignificantly larger revaluations than their Dutch counterparts with means of 8.63 and 7.92%, respectively. This is in contrast to the result that the overall CAR realized by nontendering shareholders (Table IV) in Dutch auctions is 1.73% higher than the comparable return for fixed-price offers. This reversal in the relative sizes of the return to nontendering shareholders and the weighted return to all shareholders offers a clue to the popularity of the Dutch technique. To examine this issue, we compute a per share wealth transfer defined as $P_T - P_E$, the difference between the price received for a repurchased share and the postexpiration price. These statistics are presented in the second and third rows of Table VI. Wealth transfers, whether scaled by the preoffer price or the postexpiration price, are significantly larger for the fixed-price subsample than for the Dutch subsample. For instance, when scaling $P_T - P_E$ by P_0, owners of nonrepurchased shares pay 10.7% in order to retire shares in a typical fixed-price offer, whereas Dutch counterparts pay only 4.8%. A large wealth transfer may be desirable if it is accompanied by a commensurate increase in firm value, as posited by signaling models of fixed-price tenders. However, the 5.9% differential in wealth transfers is almost four times as large as the difference in median total returns induced by the two techniques. Given the modest additional total return and the smaller overall CAR, the larger wealth transfers in fixed-price tenders appear to provide little financial benefit to nonrepurchased shares.

The above finding may result simply because fixed-price offers seek larger equity fractions, on average, than Dutch offers. Peterson and Peterson (1992), for example, find that once the fraction sought and firm size are controlled for, there is no difference in actual tender premiums (or expiration returns) between Dutch and fixed-price tenders. The finding of Brown and Ryngaert (1992) that shareholders are more likely to tender the larger P_T is relative to P_E suggests that the larger wealth transfer observed in fixed-price offers may result from the desire to repurchase larger fractions. To address this issue, we regress the wealth transfer, $(P_T - P_E)/P_0$, on a fixed-price dummy, the fraction sought, and firm size. The results show that the wealth transfer is significantly related to the fraction sought

TABLE VI

ANALYSIS OF TOTAL WEIGHTED RETURNS TO REPURCHASED AND NONREPURCHASED SHARES AND WEALTH TRANSFERS TO REPURCHASED SHARES FROM NONREPURCHASED SHARES FOR THE SAMPLE OF 57 COMPLETED DUTCH OFFERS AND 63 COMPLETED FIXED-PRICE OFFERS

Measure	Definition[a]	Mean Median		
		Dutch	Fixed	*t*-test
Total weighted return	$(P^* - P_0)/P_0$	0.0792	0.0863	−0.342
		0.0632	0.0781	−0.910
Wealth transfer as a percentage of prior share price	$(P_T - P_E)/P_0$	0.0664	0.1438	−2.959***
		0.0478	0.1072	−3.0947***
Wealth transfer as a percentage of post offer price	$(P_T - P_E)/P_E$	0.0686	0.1680	−2.970***
		0.0442	0.0934	−3.0947***
		Median[b]		Median test
		Dutch	Fixed	
Excess of tender price over average price	$(P_T - P^*)/P^*$	0.0352	0.0793	−2.731***
Total revaluation divided by total excess cash payment	$N_0(P^* - P_0)/N_P(P_T - P^*)$	8.1617	1.9596	2.002**

[a] P^* (the average price per share attained by all initial owners) is defined as $P_T(N_P/N_0) + P_E(1 - N_P/N_0)$, where P_0 is the market price five days before the announcement of the tender offer, P_E is the ex post price prevailing one day after the final announcement of the tender offer adjusted in accord with the market model, N_P is the number of shares repurchased, and N_0 is the number of shares outstanding five days before the tender. Note that total weighted return is identical to the measure described in Table VIII. Wealth transfer is defined as the excess of the tender price, P_T, over P_E.

[b] Medians are reported because in five Dutch offers P_T and P^* are approximately equal. With or without these five firms, the means test gives the same implications as the median test.

(in support of Brown and Ryngaert, 1992) and is unrelated to firm size.[23] In addition, the fixed-price dummy is significantly positive, indicating that these tenders exhibit larger wealth transfers, even after controlling for fraction sought.[24]

The measure $P_T - P_E$ may overstate the wealth transfer because it includes the share of the revaluation from P_0 to P^* to which tendering owners are entitled. Indeed, Vermaelen's (1984) signaling model considers the cost to nontendering shareholders of each share repurchased to be $P_T - P^*$, the excess of the tender price over the true price that would prevail if all investors could costlessly observe the new information. Wealth transfers based on this measure are presented in row 4 of Table VI. The results again indicate that nonselling shareholders in Dutch tenders fare better than their counterparts in fixed-price tenders. This distinction is even more dramatic when the ratio of the total dollar change in firm value to the total wealth transfer is examined, as in the last row of Table VI. A \$1 transfer induces an increase in firm value of about \$2 in fixed-price tenders and \$8 in Dutch offers. Although a positive relation between revaluations and wealth transfers may hold for both tender methods individually, Table VI indicates that the relationship is different in the two subsamples.

Given the smaller average size of firms that select the fixed-price tender, the preceding results and the choice of tender method might simply be size-related. As Table VII demonstrates, however, that is not the case. Although few small firms conducted Dutch tenders, 16 of the smallest 60 did, while 19 of the largest 60 firms chose the fixed-price method. In addition, the two approaches have a substantial degree of overlap in premiums paid, equity retired, and insider holdings. As in Vermaelen (1981) and in Lakonishok and Vermaelen (1990), the total weighted return, TOTR, decreases monotonically with firm size for both tender methods. In addition, within each quartile, returns are larger or about the same for the Dutch subsample. More importantly the wealth transfer measure,

[23] The estimated regression is

Variable	Constant	Fixed-price dummy	Fraction sought	Log of market value of equity	Adjusted R^2
Coefficient	0.009	0.062	0.220	0.001	0.075
Standard error	(0.166)	(0.030)	(0.122)	(0.008)	

Standard errors are corrected for heteroscedasticity.

[24] We do not use the actual premium as the dependent variable because the wealth transfer is based not on the magnitude of the actual premium but on its size relative to the gain achieved by nonselling owners. Interaction terms between the fixed-price dummy and fraction sought or firm size had no explanatory power.

TABLE VII

TOTAL WEIGHTED RETURN AND OFFER CHARACTERISTICS BY FIRM SIZE AND TYPE OF TENDER OFFER[a]

Size quartile	TYPE	N	LMVE	TOTR (%)	TRANS (%)	PRACT (%)	FACT (%)	OWN (%)[b]	
								Mean	Median
Smallest	D	3	17.12	13.38	24.70	32.60	19.43	16.67	15.77
	FP	27	16.80	13.08	11.28	21.78	22.50	21.89	11.67
2	D	13	18.59	9.99	8.90	16.13	17.77	22.57	13.52
	FP	17	18.38	10.10	17.19	21.85	24.10	30.66	29.29
3	D	20	20.41	7.59	4.11	11.15	15.35	13.79	10.63
	FP	10	20.19	3.54	12.51	13.43	11.78	23.21	11.03
Largest	D	21	22.10	6.17	5.08	10.55	12.52	4.94	1.04
	FP	9	21.76	−1.85	20.46	12.92	27.69	7.75	0.76

[a] TYPE is type of tender offer, N is the number of firms, LMVE is the log of pretender market value of equity, TOTR is the total weighted return to repurchased and nonrepurchased shares, TRANS is the wealth transfer or difference between tender price and postexpiration price scaled by P_0, PRACT is the tender premium, FACT is the fraction of equity repurchased, and OWN is the pretender percentage ownership of equity by insiders. Mean figures are reported for all variables. Medians are also reported for the OWN variable because they differ materially from the means.

[b] The fixed-price statistics for the OWN variable are based on 26 firms in quartile 1, 14 firms in quartile 2, 9 firms in quartile 3, and 8 firms in quartile 4.

which is not monotonic for either tender method, is almost always higher for the fixed-price firms. The sole exception is the smallest quartile, which contains only three Dutch firms. The comparisons in Table VII indicate that smaller firms achieve greater tender-period returns and pay higher premiums, while Dutch auctions induce larger revaluations with smaller wealth transfers than fixed-price tenders after controlling for firm size.

4. CROSS-SECTIONAL ANALYSIS

We have found that average unconditional returns in Dutch and fixed-price tenders are not significantly different. Here we examine the influence of the repurchase technique on revaluations using a multivariate regression. A dummy variable for the tender method captures residual differences in firm revaluations and allows us to examine the conditional returns observed in the two tender subsamples.

4.1. *Model*

Our conditioning variables capture economic aspects of tender offers and of firms conducting them. The most obvious explanatory variables are the tender price and the number of shares repurchased. Both are expected to be positively related to market reactions since they determine the offer's total payment and, in signaling models, reflect the cost borne by nontendering insiders. Because we examine overall tender-period returns, we employ the actual premium paid, PRACT, and equity fraction repurchased, FACT, rather than their announced counterparts. Thus, we control for the observed disbursal of cash.

The market's response to a tender announcement also may be influenced by firm size and by the possibility that some repurchases are control-related.[25] We control for these potentially confounding effects by including a variable for firm size, LMVE, the log of market value of equity five days prior to the tender announcement, and a dummy variable, HOSTILE, which takes the value of 1 for the 15% of the sample that may be subject to hostile takeover activity.

The inferences that outsiders draw from a tender announcement should depend on whether insiders participate in the offer. This participation is examined in two ways. We define a dummy variable, NOSELL, which

[25] Both Vermaelen (1981) and Lakonishok and Vermaelen (1990) report an inverse relation between size and abnormal returns in their studies of fixed-price self-tenders. Denis (1990) provides evidence on the use of repurchases to deter takeovers. Our hostile takeover measure, described in Table I, indicates no difference across self-tender methods.

takes the value of 1 if insiders state (at the time of the tender announcement) that they will not tender their shares. We also consider actual changes in shares held by insiders. This variable, CHANGE, is scaled by the post-tender number of shares outstanding to avoid any bias from the magnitude of the repurchase. Tender-period returns are expected to be higher when insiders state that they will not sell their shares, or when they actually increase their holdings.[26]

Because fixed-price and Dutch offers are consummated differently, we control for the impact of information (released at expiration) concerning investor sentiment and repurchase efficiency. These factors, represented by PLOCA and PRATA, were shown in Table V to influence expiration returns. However, the simultaneous use of both measures (for Dutch tenders) in a regression is problematic since they are correlated, while the use of either one alone would omit an underlying influence. A natural solution in which the two variables are combined follows from noting that for Dutch auctions, expiration news is positive when the maximum feasible price is paid and there is no rationing, while it is most negative when there is rationing and the purchase price is below the maximum.

We construct two dichotomous variables which capture the influence of tendering behavior symmetrically for both offer techniques. We set UNDER equal to 1 (indicating a clearly undersubscribed offer) for the 27 fixed-price and 23 Dutch tenders that are not rationed (and also in which the maximum price is paid). Similarly, OVER equals 1 for fixed-price offers if the pro rata fraction is below 0.50 or for Dutch auctions if the maximum feasible price is not paid and any rationing is observed.[27] The regression coefficient of UNDER is hypothesized to be positive, reflecting favorable sentiment and an efficient retirement of shares, while that of OVER should be negative. As Table V showed, these two composite measures appear to capture the impact of tendering activity; when UNDER equals 1, mean expiration returns are 0.25% for Dutch and -1.03% for fixed-price tenders, while the corresponding returns are -4.24 and -4.60% when OVER equals 1.

Once we hold the above tender-offer and firm-specific characteristics fixed, we examine the difference between Dutch and fixed-price offers by

[26] Table III provides statistics for NOSELL and CHANGE ("relative change in insider ownership"). Other ownership measures, including pretender institutional or insider holdings, have no impact on returns.

[27] The number of tenders in each category (and their rationale) is apparent from Table V. OVER equals 1 for the 17 Dutch offers in which both PRATA and PLOCA are below 1 and for the 19 most heavily oversubscribed fixed-price tenders. A third, implicitly defined, category is composed of the 17 moderately rationed fixed-price offers and the 17 Dutch tenders exhibiting either rationing or a purchase price below the maximum (but not both). This is the "omitted category" in our regressions.

employing an intercept dummy.[28] The basic model we test is therefore given by

$$\begin{aligned} \text{TOTR} = {} & \beta_0 + \beta_1\text{DUTCH} + \beta_2\text{PRACT} + \beta_3\text{FACT} \\ & + \beta_4\text{OVER} + \beta_5\text{UNDER} \\ & + \beta_6\text{HOSTILE} + \beta_7\text{NOSELL} + \beta_8\text{LMVE} \\ & + \beta_9\text{CHANGE} + u. \end{aligned} \tag{3}$$

We estimate this relationship using weighted least squares and the total weighted return to repurchased and nonrepurchased shares as the dependent variable. The weights used are the standard error of the CAR over the full tender period. Results for this regression are presented in Tables VIII and IX. The results obtained using the three-day price response around the initial announcement as the dependent variable are similar to those of CJ (1991) and are not reported.[29]

4.2. *Total Weighted Returns*

We estimate four models in order to examine the sensitivity of our results to our proxies for investor sentiment and efficiency of the repurchase and to the inclusion of insider data. The effect of our measures of tendering activity (UNDER and OVER) can be seen by comparing Models 1 and 2, both of which are estimated using the entire sample of 120 firms. Model 4 illustrates the influence of changes in insider ownership for a restricted subsample of 78 firms with available data. For comparison, Model 3 shows the effect of this reduction in sample size.

Table VIII shows that after controlling for tender- and firm-specific characteristics, Dutch offers exhibit a larger total revaluation than fixed-price tenders. The DUTCH dummy is always positive and significant. Since both groups of firms appear to be equally undervalued (from the unconditional return results of the previous section), Table VIII, in conjunction with the earlier findings, appears to indicate that revaluations are accomplished with a smaller disbursal of cash by firms adopting the Dutch mode of tender.

The premium paid exerts a strong positive influence on the total weighted return as expected. Surprisingly, the fraction of outstanding

[28] We also allowed the price response for a given premium, fraction repurchased, or level of hostile activity to vary across tender methods by employing slope dummies, but failed to find a differential reaction.

[29] CJ focus on seven-day announcement returns and a sample which excludes firms which may be involved in corporate control contests. They also consider preannouncement market- and firm-specific excess returns and several measures of changes in insider ownership. Using total returns, we find that the Dutch dummy remains significant when such alterations are jointly examined.

shares repurchased does not seem to be material when the full sample is used.[30] The HOSTILE variable has a highly significant negative coefficient. If the tender offer serves a defensive purpose, as is likely for firms subject to hostile takeover, the market apparently discounts the normal information content associated with the tender premium. Statements that insiders will not tender, and firm size, are significant only in Model 1 and appear to be capturing the effect of variables included in the other models.[31]

Model 2 demonstrates that our measures of tendering activity are significant and influence total returns as hypothesized. As should be expected, offers in which investors are reluctant to tender (UNDER = 1) are associated with larger revaluations. Conversely, returns are smaller when OVER equals 1 since rationing and oversubscription (which imply an inefficient repurchase and limited investor optimism) are jointly apparent. Note that the coefficient of the Dutch indicator in Model 2 is slightly smaller than that in Model 1. If the sensitivity to tendering activity is an advantage of the Dutch technique, then its explicit consideration can be expected to cause such a reduction.

The relation between total returns and changes in insider ownership is examined in Model 4 for a reduced sample of 78 firms for which insider data are available and uncontaminated by the 1987 Crash, while Model 3 provides a benchmark for this smaller sample. Surprisingly, CHANGE is *negatively*, but not significantly, related to the revaluation (although the effect is significant in our unreported analysis of announcement returns). That is, increases in firm value are associated with decreases in insider holdings. Since insider holdings are not measured at the exact starting and ending points of the tender, this relation may appear because insiders more actively diversify their portfolios (possibly after the information conveyed by the tender has been substantiated) when increases in share prices are larger. Alternatively, the accumulation of shares by managers could imply an increased ability to entrench themselves and thus depress share prices for firms that are likely takeover targets.

Some of our results differ from those of previous work. The smaller price response to fixed-price tenders from that found in earlier studies has

[30] Vermaelen (1981) finds that the fraction sought and the ratio of the fraction repurchased to that sought for tenders during the period 1967–1977 have significantly positive regression coefficients. CJ find the fraction sought to be unrelated to announcement returns. Our results are invariant to the use of fraction sought, fraction repurchased, or their ratio.

[31] Although Tables II and VII indicate that both groups of firms overlap in terms of size and tender characteristics, the large average disparity in size suggests a possible nonlinear effect. We explored this issue by specifying three dummy variables associated with the first, second, and fourth size quartiles. The results were essentially the same as those in Model 2 of Table VIII, although the effect of undersubscribed offers was no longer marginally significant.

TABLE VIII

WEIGHTED LEAST-SQUARES REGRESSION OF THE TOTAL WEIGHTED RETURN ON TENDER AND FIRM CHARACTERISTICS FOR THE FULL SAMPLE AND FOR THE SUBSAMPLE WITH UNCONTAMINATED INSIDER OWNERSHIP DATA[a]

	All tenders (N = 120)		Insider data (N = 78)	
	Model 1	Model 2	Model 3	Model 4
Constant	0.140	0.022	−0.078	−0.071
	(0.090)	(0.092)	(0.105)	(0.104)
Dutch dummy	0.040**	0.032**	0.038**	0.036*
	(0.016)	(0.015)	(0.018)	(0.018)
Premium	0.546***	0.564***	0.692***	0.711***
	(0.081)	(0.076)	(0.094)	(0.095)
Fraction repurchased	0.047	0.077	0.148**	0.160**
	(0.065)	(0.063)	(0.073)	(0.074)
UNDER		0.028*	0.037*	0.038*
		(0.016)	(0.020)	(0.020)
OVER		−0.039**	−0.047*	−0.041*
		(0.017)	(0.021)	(0.022)
Hostile activity	−0.056**	−0.050**	−0.060**	−0.062**
	(0.024)	(0.023)	(0.024)	(0.024)
NOSELL	0.032*	0.026	0.022	0.023
	(0.018)	(0.017)	(0.019)	(0.019)
Firm size	−0.009**	−0.003	0.001	−0.001
	(0.004)	(0.004)	(0.005)	(0.005)
CHANGE				−0.118
				(0.089)
Adjusted R^2	0.428	0.489	0.600	0.605

[a] Total weighted return is the weighted average of the premium to repurchased shares and the overall CAR to nonrepurchased shares. Dutch dummy has the value 1 if the offer is Dutch. Premium is $(P_T/P_0) - 1$, where P_T is the actual tender price paid and P_0 is the market price five days before the tender. Fraction repurchased is the actual number of shares repurchased as a fraction of shares outstanding five days before the tender. UNDER and OVER, described in Section 4.1, are dummy variables with values of 1 if an offer is heavily under- or oversubscribed, respectively. Hostile has the value 1 if the tender firm may be subject to a hostile control contest. NOSELL has the value 1 if insiders state, in published sources, that they will not sell. Firm size is the log of market value of equity five days before the tender. CHANGE is the change in insider holdings scaled by the postoffer total shares outstanding.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

already been noted. In addition, Vermaelen (1981) finds that the coefficients of insider ownership and the ratio of equity fraction purchased to that sought for tenders during 1967–1977 are significantly positive. For our later sample, these two variables have no impact on returns, even if

each tender subsample is analyzed separately. Thus, chronological distinctions in samples appear to be material and highlight the importance of using contemporaneous samples when comparing Dutch and fixed-price tenders.[32]

The main finding from cross-sectional analysis of total returns is that after controlling for factors such as tender premium, insider trading, takeover activity, and shares repurchased, the Dutch subsample exhibits revaluations greater than those of the fixed-price sample. This may be a manifestation of upward-sloping supply curves since the change in the marginal investor in Dutch offers should be larger than that in rationed fixed-price offers. Alternatively, unobservable differences between firms which influence the selection of tender method may be responsible for our findings. The evidence in this and earlier sections also jointly supports another hypothesis: for some firms the Dutch auction, which by design lets the market rather than the firm select the tender price, conveys the same information as fixed-price tenders, but permits a lower purchase price and less rationing.

4.3. *Alternate Measures of the Tender Premium*

Thus far we have employed the actual tender premium for Dutch offers rather than the specified maximum or minimum premium. If investors react primarily to an offer's expected or actual purchase price, using either of the announced premiums would result in an inaccurate assessment of the Dutch technique. To see this, assume that the market observes a premium in a fixed-price offer and a maximum Dutch premium which are equal; also assume that the anticipated and realized Dutch premium is smaller than this maximum. In such a case, one should expect ceteris paribus the revaluation for the Dutch to be smaller than that for the fixed-price offer. This argument implies that in a regression analysis, the use of the maximum premium would bias downward the estimate of the impact of the Dutch technique, given the prices that are observed in practice.[33] Conversely, using the minimum announced premium would increase the coefficient of the Dutch dummy variable.

This hypothesized relation between the Dutch regression coefficient and premium is indeed observed in Table IX. When the minimum pre-

[32] This is in keeping with the findings of Lakonishok and Vermaelen (1990), who report very different abnormal returns for fixed-price tenders in 1962–1979 and 1980–1986. To determine if a simple time variable explains our results, we incorporate dummies for the years in which tenders are conducted. The only effect is a notable increase in the coefficient of the Dutch dummy.

[33] In the sample of 57 Dutch offers, 5 were executed at the minimum price and 27 at the maximum. As shown in Table II, the mean and median values of PLOCA (percentages of maximum premium paid) are 0.748 and 0.929%, respectively.

TABLE IX

EFFECT OF THE ANNOUNCED MAXIMUM, MINIMUM, AND ADJUSTED PREMIUMS ON THE TOTAL WEIGHTED RETURN FOR THE FULL SAMPLE[a]

	All tenders $N = 120$		
Constant	0.061	−0.018	0.037
	(0.095)	(0.093)	(0.095)
Dutch dummy	0.088***	0.012	0.032**
	(0.019)	(0.015)	(0.016)
Minimum premium	0.564***		
	(0.086)		
Maximum premium		0.605***	
		(0.079)	
Adjusted premium			0.541***
			(0.080)
Fraction repurchased	0.064	0.059	0.072
	(0.066)	(0.063)	(0.065)
UNDER	0.035*	0.046***	0.027
	(0.018)	(0.017)	(0.017)
OVER	−0.037**	−0.040**	−0.039**
	(0.018)	(0.017)	(0.018)
Hostile activity	−0.058**	−0.051**	−0.052**
	(0.023)	(0.022)	(0.023)
NOSELL	0.019	0.029*	0.025
	(0.018)	(0.017)	(0.018)
Firm size	−0.005	−0.001	−0.003
	(0.004)	(0.004)	(0.004)
Adjusted R^2	0.452	0.504	0.462

[a] Total weighted return is the weighted average of the premium to repurchased shares and the overall *CAR* to nonrepurchased shares. Dutch dummy has the value 1 if the offer is Dutch. Premium, minimum premium, and maximum premium are defined as $(P_T/P_0) - 1$, where P_T is the actual tender price paid, the maximum announced price, and the minimum announced price, respectively, and P_0 is the market price five days before the tender. Adjusted premium adjusts premium for excess returns within the tender period. For fixed price offers, all four premiums are identical. Fraction repurchased is the actual number of shares repurchased as a fraction of shares outstanding five days before the tender. UNDER and OVER, described in Section 4.1, are dummy variables with values of 1 if an offer is heavily under- or oversubscribed, respectively. Hostile has the value 1 if the tender firm may be subject to a hostile control contest. NOSELL has the value 1 if insiders state, in published sources, that they will not sell. Firm size is the log of market value of equity five days before the tender. CHANGE is the change in insider holdings scaled by the postoffer total shares outstanding.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

mium is used, the coefficient of the Dutch dummy is more than twice as large as that in corresponding regressions of earlier tables. Conversely, the coefficient becomes much smaller when the maximum premium is used. The influence of the remaining variables, however, is insensitive to the premium specified. Note that we do not employ the difference between the maximum and minimum premiums since it exhibits little variation in our sample.

Using the actual premium for Dutch tenders may, however, induce a bias of its own. Since the final tender price in Dutch offers is fixed only upon termination of the offer, the actual premium used in the regressions may be influenced by information releases occurring during the tender period that are unrelated to the tender itself. This contamination, which is absent in the premiums for fixed-price tenders, may impart a bias to the coefficient of PRACT and hence to the Dutch dummy.

To check for such a bias, we compute an adjusted premium which is purged of all information released between the important dates of the tender. Since T_1 is the initial announcement of the tender and $T_{\min}$ is the earlier of the expiration day or the date that results of the tender offer are announced, the CAR from $T_1 + 2$ to $T_{\min} - 2$ should capture all such tender-unrelated information affecting the value of the firm.[34] In the first step we regress the actual premium for Dutch offers on this CAR.[35] In the second step we compute an adjusted premium (PRACT $- 0.3368 *$ CAR) for use in the cross-sectional regressions. The representative results of this procedure are reported in the last column of Table IX. The coefficients and the standard errors change very little, suggesting that the information content during the intraperiod is not only mean zero, but is not systematically related to any variable. Since the adjusted and actual premiums have a correlation of 0.984, using the actual premium does not seem to be inappropriate.

5. CONCLUSION

We have examined market responses to Dutch auction and fixed-price self-tenders. Since the tender price is the key variable in signaling models of intrafirm stock repurchases as well as in recent models based on share-

[34] From Table IV, the average CAR from two days after the initial announcement to one day before expiration is an insignificant 0.0161. We use $T_{min} - 2$ rather than $T_{min} - 1$ in the adjustment procedure because significant preliminary results are sometimes announced just before expiration.

[35] The coefficient on the CAR variable is 0.3368 with a standard error of 0.2489. The adjusted R^2 is 0.01.

holder heterogeneity, we expect the changes introduced by the Dutch auction method to have important implications for shareholder wealth.

We find that total weighted returns in the Dutch are significantly larger than those in the fixed-price sample, after controlling for tender and firm characteristics, while wealth transfers to retired shares are significantly larger in fixed-price tenders. Unconditionally, total returns tend to be (insignificantly) higher in fixed-price offers while average expiration day and tender-period stock returns are larger in the Dutch sample. Our examination of market responses to Dutch auctions supports Bagwell's (1992a) result that returns are smaller in rationed offers. However, we also show that expiration-day returns are positively related to the purchase price. The market thus appears to respond to news about investor opinion and tendering behavior reflected in the clearing price.

The sensitivity of Dutch auctions to such tendering behavior is central to our results. Since firms are uncertain about the tendering responses of shareholders, they appear to set the purchase price in fixed-price offers high enough to be reasonably confident that the desired repurchase is accomplished. Because such pricing commonly induces oversubscription and rationing, the tender price can be viewed, ex post, as higher than needed to attract the number of shares sought. Dutch auctions mitigate such outcomes by allowing the purchase price to be influenced by investor tendering responses. This design innovation suggests that Dutch auctions should be able to repurchase shares with a smaller cash disbursal than fixed-price tenders. Our evidence is consistent with this hypothesis.

The observed increase in market valuations may be due to information conveyed by the tender. Signaling models of fixed-price tenders suggest that information should be more favorable when premiums, equity fractions repurchased, wealth transfers to retired shares, and insider ownership are larger and when insiders refrain from selling their stock. Each of these factors is significantly greater or more common for our sample of fixed-price offers than for the Dutch sample; total weighted returns are however quite similar in both cases. Given a signaling interpretation, it therefore appears that the Dutch technique is able to convey favorable news more efficiently than fixed-price tenders.

The evidence is also consistent with the presence of an upward-sloping supply curve for the firm's shares. Given this hypothesis, market prices rise when shares are repurchased because the new marginal investor has a higher valuation. Market revaluations would tend to be larger in Dutch tenders because of less rationing and the more efficient removal of owners with low reservation values. This lesser rationing would also provide a tax advantage if investors with smaller capital gains are willing to tender shares at lower prices.

Although our analysis suggests that the Dutch auction may provide

advantages over fixed-price tenders, the firms in each tender sample presumably have optimally selected the repurchase technique. Our findings may therefore derive from unobserved differences between firms in the two samples rather than from distinctions in tender methods. Thus, our analysis should not be viewed as implying that firms using fixed-price tenders could have achieved the results documented for our Dutch sample by switching techniques. Furthermore, even if the observed distinctions are due to the tender method, some firms may not view the Dutch outcomes as advantageous. For instance, if goals of insiders and outsiders are closely aligned, wealth transfer distinctions may be immaterial. Alternatively, managers wishing to deter a hostile takeover may prefer larger wealth transfers and cash disbursals. These and other differences among firms, such as investor heterogeneity or ex ante uncertainty concerning tendering responses, may influence market responses and the choice of tender method and remain important issues for further study.

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