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COMMON STOCK REPURCHASES AND MARKET SIGNALLING

An Empirical Study*

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This paper examines the pricing behavior of securities of firms which repurchase their own shares. The results are consistent with a market in which investors price securities such that expected arbitrage profits are precluded. The results are also consistent with the hypothesis that firms offer premia for their own shares mainly in order to signal positive information, and that the market uses the premium, the target fraction and the fraction of insider holdings as signals in order to price securities around the announcement date. The observation that repurchases via tender offer are followed by abnormal increases in earnings per share and that mainly small firms engage in repurchase tender offers, provides further support for the signalling hypothesis.

1. Introduction

The purpose of this study is to examine the price behavior of securities of firms which buy back their own shares in the open market or via a tender offer and announce the repurchase decision in the *Wall Street Journal*.

The U.S. is one of the few countries in the world which allows firms to make tender offers for their own shares at a price above the market price. The rather negative attitude of legislators of other countries is generally motivated by a stated desire to protect non-insider investors. The argument is that insiders could manipulate prices by giving false 'signals' to the market or they could expropriate bondholders by reducing the size of their claims on the assets of the firm. In spite of some outcries for legislation,[1] repurchases in the U.S. have been left largely untouched by the S.E.C.

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[1]For example, to quote Guthart (1965, p. 53): 'At the present time, the SEC has no specific requirements concerning share repurchases, and the body of corporate law concerning this particular activity is not clear regarding the potential conflict of interest that may exist. Conclusive definitions of responsibility in this area are urgently needed.'

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One of the objectives of this study is to investigate whether an argument could be made for increased regulation on the basis of observed effects of a repurchase on the wealth of the different classes of security holders. Previous research is inconclusive and contradictory with respect to the motivation and effects of common stock repurchases. Several studies [e.g. Young (1967), Stewart (1976), Marks (1976), and Lane (1976)] suggest 'weak-form' market inefficiencies[2] and/or suffer from methodological weaknesses. Two more recent studies are those of Dann (1981) and Masulis (1980a). They both report abnormal price increases after a repurchase announcement but they provide different explanations for the observed returns.

With regard to the explanation for any observed changes in stock prices, we test the following most often mentioned reasons for repurchasing:

(1) *Information or signalling hypothesis*

When a company purchases its stock, management gives an information signal to investors. The direction of this signal is ambiguous. It may be that the company perceives no profitable use for internally generated funds because of a lack of growth opportunities. On the other hand, especially when a company offers to buy its shares at a substantial premium above the market price, management may believe that their company is undervalued. The tender offer then represents an attempt to pass on the value of this inside information to the current shareholders.

(2) *Dividend or personal taxation hypothesis*

Firms repurchase stock in order to let the shareholders benefit from the preferential tax treatment of repurchases relative to dividends; the tax advantage may be weakened to a certain extent by the provisions of Section 302 of the Internal Revenue Code, which treats redemption of stock as a capital gain only if one of the following cases applies:

> (i) the redemption is 'substantially disproportionate' to the extent that after the repurchase, the percentage ownership of the shareholder must be less than 80% of the percentage ownership he had before the repurchase;
> (ii) the stock is issued by railroad companies in certain reorganizations, defined by section 77(c) of the Bankruptcy Act;
> (iii) the distribution is 'essentially not equivalent' to paying a dividend.

It is not clear whether stock prices should reflect personal tax effects.

[2]For an extensive discussion of the various degrees of market efficiency, see Fama (1976).

Black and Scholes (1974) do not find evidence that the expected returns on high-yield securities are significantly different from the expected returns on low yield securities, other things being equal, and Miller and Scholes (1978) illustrate various ways to offset personal tax liabilities on dividends. More recently, however, Litzenberger and Ramaswamy (1979) have obtained results which are consistent with the existence of a statistically significant tax effect.

(3) *Leverage hypothesis*

The repurchase may be financed by a subsequent (or previous) issue of debt. Because of the tax-subsidy connected with the deductibility of interest payments and to the extent that this subsidy is passed on to the shareholders, the price of the stock will increase.

The existence of a tax-subsidy to debt as originally proposed by Modigliani and Miller (1958, 1963) is still a highly controversial issue; Miller (1977), who assumes that common stock returns are tax free but interest payments are taxable, argues that issuing more debt necessitates attracting investors in the higher personal tax brackets up to the point where the corporate tax rate equals the personal income tax rate of the marginal bondholder. As a consequence, it is shown that there exists no optimal debt-equity ratio for an individual firm.

Considering the theoretical controversy, the relevance of a tax effect is mainly an empirical issue. Mikkelson (1980) reports negative abnormal stock returns when a firm calls its convertible bonds, which is consistent with a tax shield effect. The most extensive and methodologically sophisticated empirical study to date is the one by Masulis (1978, 1980b), who investigates intrafirm debt-equity exchanges and finds evidence on the existence of a tax effect. When stock repurchases are financed with debt, they are practically identical to debt-equity exchanges. But because repurchases can also be financed with cash, it becomes possible to separate tax effects from other effects.

(4) *Bondholder expropriation hypothesis*

Repurchasing stock reduces the assets of the company and therefore the value of the claims of the bondholders. To the extent that this expropriation has not been anticipated in pricing the bond issues, wealth will be transferred to stockholders from bondholders. [The effect is similar to a spin-off, analysed in Galai and Masulis (1976).]

The plausibility of this hypothesis is weakened by the existence of laws in many states which restrict repurchases to those made out of surplus or earned surplus accounts. Moreover, most bond covenants put limits on repurchases in the same way as they put restrictions on dividend payments.

Two final comments should be noted: first, some of these alternative hypotheses are not mutually exclusive. Therefore, we argue that our investigation can only be conclusive with respect to the *predominant* effects behind common stock repurchases among a sample of repurchasing companies. Finding that one of the effects seems to dominate the others does not imply that this effect (and dominance) is relevant for every individual firm in our sample; second, our sample includes only repurchases which are *announced* in the *Wall Street Journal* and the conclusions of this paper do not necessarily apply to other repurchases. Every year hundreds of firms repurchase shares for a variety of reasons and the annual dollar volume of repurchases has been fluctuating between 3.5 and 13 billion dollars in the last seven years. Only a small percentage of these are announced in the *Wall Street Journal*, however.

In section 2, below, we describe the institutional environment of common stock repurchases and the data base used in our empirical analysis. In section 3 a theoretical framework similar to the one developed by Bradley (1979) is presented.

In section 4 we analyse the pricing behavior of tender offers and open market purchases. It is found that repurchase announcements are followed by permanent increases in stock price. The results are consistent with the joint hypothesis that the market is efficient (in the semi-strong form sense) and that the pricing model (developed in section 3) is correct.

In section 5, we try to find an explanation, consistent with our working hypotheses, for the abnormal returns observed around the announcement date. The results suggest that the signalling hypothesis is the most plausible predominant explanation for the abnormal returns. For tender offers, this conclusion is based on four pieces of empirical evidence: first, it is shown theoretically and empirically, that tender offers can be put in a framework consistent with the existing signalling literature, pioneered by Spence (1973). Second, it is found that predominantly small firms, held by a lot of insiders, engage in repurchases via tender offer, something we can expect on the basis of the signalling hypothesis (for reasons described below). Third, on the basis of two independent earnings per share forecast models, it is concluded that repurchase announcements are followed by highly significant positive forecast errors and fourth, a signalling explanation is provided for the observed boom in repurchasing activity during 1973 and 1974. For open market purchases, our results are less conclusive, but nevertheless strongly suggestive in support of an information hypothesis. Finally, in section 6, we relate our results to previous research. It is argued that the evidence reported by Masulis (1978) in support of a tax-effect is probably spurious because of the strong similarity between repurchases and exchange offers.

Section 7 summarizes our major findings and implications for further research.

2. Methods of repurchase and description of data

2.1. Methods of repurchase

A company can repurchase equity via a tender offer, a purchase in the open market or a private purchase.

In a tender offer, the company offers to buy a specified amount of stock at a given price (typically above the market price) until the expiration date (generally three weeks to one month after the offer). The company generally reserves the right to buy more than the amount specified, to extend the offer or to purchase the shares pro rata. It can set maximum or minimum limits on the amount sought. Minimum constraints are typically designed for control purposes (often to stop an outsider from gaining control): if fewer shares are tendered than desired by the firm, the firm may withdraw the offer. The vast majority of tender offers are 'maximum limit' offers: management agrees to buy all the shares tendered if fewer than the amount specified are tendered. A peculiar type of limit is set in tender offers designed to eliminate small stockholdings in order to reduce shareholder servicing costs. Because these offers are executed at the market price and extended over a long time-period, they are very similar to open market purchases.

Open market purchases involve a gradual process of buying back small quantities of stock from day to day in the open market through a broker. The firm pays the normal commission rates and the seller of the stock is not aware that he is selling to the corporation. It is not uncommon that repurchase plans take place over several years and the amounts repurchased are generally smaller than via tender offers.

The least common method of repurchase occurs via direct or private repurchase. This method entails buying a block of shares from a large holder by direct negotiation. Either the shareholder or the company can take the initiative.

2.2. Sample design

Our empirical analysis is limited to open market purchases, and tender offers mainly because little data on private purchases are available.

Data on tender offers for the years 1962–1977 were compiled from the *Financial Daily Card Service* (Financial Information, Inc., NJ), *Corporations in Conflict: The Tender Offer* (Masterco Press, Inc., Ann Arbor, MI, 1966), and the *Standard & Poors Corporation Called Bond Record.* These publications give the effective date (generally a few days after the announcement date), the expiration date and the terms of the offer. The announcement date was found in the *Wall Street Journal* and the *Wall Street Journal Index.* In selecting our sample, the following rules were observed:

(i) no other event was reported in the three days surrounding the announcement day; (ii) tender offers which were not stated in maximum limit form, or were not directed to all shareholders were deleted; (iii) offers announced with the intention to become a private company or which resulted in a delisting from the exchange in the month after the expiration date were not included. The number of shares outstanding were obtained from the *Standard & Poors Corporation Security Owners Stock Guide.*

Data on open market purchases were collected from 1970 until April, 1978. Open market purchases on the NYSE were detected from the *NYSE Report on Changes in Treasury Stock*, which summarizes on the basis of reports supplied at the end of each fiscal quarter the repurchase activity of all companies listed on the NYSE. These repurchases were then traced back to their announcement in the *Wall Street Journal*, if such announcement actually had been made.

This screening process resulted in 131 tender offers made by 111 firms and 243 open market purchases made by 198 firms. On the average, 5.01 percent of the shares outstanding are repurchased in our open market sample while the corresponding percentage for tender offers is 14.79 percent. In the tender offer sample, the tender price, on the average, is set 22.76 percent above the prevailing market price five days before the announcement. The largest premium equals 84.6 percent and some premia are negative: some offers are organized to allow a large shareholder to unload his shares (and are therefore similar to private tender offers); by following the tender offer route, shareholders can avoid price uncertainty (and liquidity problems) connected with selling a large block of shares in the open market and are willing to pay a premium for this privilege. This explanation, of course, is not consistent with any of our four working hypotheses, but again, it should be emphasized that we are not trying to provide an explanation for each individual offer in the sample.

3. Equilibrium pricing of securities: Theory

In the analysis below which applies to repurchase via tender offer, we make the following assumptions: (1) the market is efficient in the sense that at any time market prices reflect all publicly available information relevant for the pricing of securities; (2) after the announcement date, shareholders have homogeneous expectations with respect to the change in value (I), the fraction of shares tendered (F_T) and the fraction of shares purchased by the company (F_p); (3) individual investors are price-takers and cannot influence the outcome of an offer; (4) offers are 'maximum limit' offers: if the offer is undersubscribed the firm will buy all shares tendered (if any). If the offer is oversubscribed, the company will buy all shares tendered ($F_p = F_T$) or will allocate the shares pro rata (the company buys back a fraction $F_p/F_T < 1$ of

the shares from every tendering shareholder); (5) undersubscribed offers are not expected to be extended; (6) in making their decisions, shareholders maximize the value of their wealth, after personal taxes and transaction costs; (7) the expected or realized price change caused by marketwide events during the tender offer period can be ignored.

After the announcement of the tender offer, but before the expiration, arbitrage will guarantee that (expected) abnormal gains (net of taxes and transactions costs for the marginal shareholder) are precluded.

First, assume that the tender offer price, P_T, *is greater than or equal to the expected price after the expiration,* $\bar{P}_E$. If this is true, then the only price, P_A, which excludes expected arbitrage profits (ignoring the value of the put option) is

$$P_A = P_T\alpha + (1-\alpha)\bar{P}_E, \tag{1}$$

where α equals the ratio of the expected fraction purchased, $\bar{F}_p$, to the expected fraction tendered, $\bar{F}_T$. This is because, when the offer is oversubscribed, the firm will allocate the shares pro rata, which implies that the firm pays a price P_T for a fraction F_p/F_T of all the shares tendered. When the offer is undersubscribed, the firm commits itself to repurchase all shares tendered or $\alpha = 1$ and $P_A = P_T$. At a higher price P_A, the buyer expected a certain loss, either from holding or from tendering to the firm (recall that we assume $P_T \geqq \bar{P}_E$). At a lower price, the buyer could tender his shares and obtain an expected arbitrage profit.

It is important to note that in a world with taxes and transaction costs, it is possible to observe undersubscribed offers when $P_T > \bar{P}_E$; the outcome of the offer does not solely depend on the value of P_T relative to $\bar{P}_E$: capital gains taxes and portfolio rebalancing costs (which may be different for different shareholders) reduce the benefit of receiving the tender price.

After the expiration, the price change equals

$$P_E - P_A = \alpha[P_E - P_T] \leqq 0,$$

because $P_T \geqq P_E$ by assumption. P_E itself depends on F_p and the change in the dollar value of the shares (as a result of the offer), I. To see this, note that in an efficient capital market, the value of the remaining N_E shares after the expiration of the repurchase should equal the value of the N_0 shares before the announcement minus the value of the shares retired at the tender price plus the change in the value of the shares, or

$$P_E N_E = P_0 N_0 - P_T(N_0 - N_E) + I, \tag{2}$$

where P_0 is the price per share before the announcement. Note that,

according to our respective working hypotheses, I represents the market value of the corporate tax savings, the wealth expropriated from the bondholders, the market value of the personal tax savings and/or the reassessment of the firm's earnings prospects. Dividing by N_0 and substituting for the definition of the fraction purchased, we obtain

$$P_E = \frac{P_0}{1-F_p} - P_T \frac{F_p}{1-F_p} + \frac{I}{N_0(1-F_p)}. \tag{3}$$

Rearranging (3) leads to

$$P_0 + I/N_0 = P_T F_p + (1-F_p)P_E. \tag{4}$$

Comparing (4) with (1) (ignoring the expectation sign) reveals that, in general, it will be incorrect to use the price per share increase $(P_A - P_0)$ after the announcement (but before the expiration) as a measure of the value change per share resulting from the tender offer $(=I/N_0)$. E.g. for undersubscribed offers, we expect (always assuming $P_E \leqq P_T$) that $P_A = P_T$, *independent of the expected price after the expiration.* Only when $F_T = 1$ (a case never observed empirically), or when the offer premium is 'fair' in the sense that tendering and non-tendering shareholders are equally well off (such that $P_T = P_E$), (4) and (1) are equivalent. Intuitively, because some shareholders are locked in because of capital gains and portfolio rebalancing costs, the firm is expected to repurchase a fraction F_p/F_T (rather than the smaller value F_p) from the *marginal* shareholder. As long as $P_T > \bar{P}_E$, this effect will cause the market price after the announcement, but before the expiration, to overstate the 'true' value of the shares. Therefore, contrary to previous research, we do not use announcement returns as a measure of the value change resulting from the offer.

Note that the above analysis is only valid when $P_T \geqq \bar{P}_E$. When $P_T < \bar{P}_E$ shareholders will have no incentive to tender their shares to the firm. P_A will equal $\bar{P}_E$ and the offer is expected to be entirely undersubscribed. And, of course, after the expiration, the price is expected to remain constant at its pre-expiration level.

4. Common stock repurchases and market performance

4.1. Methodology

4.1.1. Computation of abnormal returns

The basic methodology used in this section involves computing the daily excess returns of the repurchasing firms, around the event date. The excess returns series has been taken from a data file compiled at the Center for

Research in Security Prices and the excess returns are calculated as follows: betas of securities are computed on the basis of the methodology described in Scholes and Williams (1977), using daily data. Securities are ranked according to their betas. On the basis of this ranking, securities are grouped in ten equal portfolios for the next year. The excess return is the return of the security minus the return on the control portfolio to which the security is allocated on the basis of its beta.

When a firm redeems part of its shares, it increases its debt-equity ratio and therefore the beta of the equity. As betas are computed every calendar year, one would expect that this would introduce an upward bias in the estimates of the excess returns after the repurchase, especially in the case of tender offers where approximately 15 percent of the shares is repurchased. However, the stock price increase turns out to be large enough to compensate for the decrease in the number of shares outstanding, so that, on the average, the value of the equity declines with a mere 1.65 percent.

The average daily excess return on a portfolio of repurchasing stocks at any time t relative to the event date equals

$$AR_t = \sum_{i=1}^{n} \frac{1}{n} e_{i,t},$$

where n is the number of securities in the portfolio and $e_{i,t}$ the excess return on security i on day t. The cumulative average excess daily return at time T relative to time t_0 is computed as $\sum_{t_0}^{T} AR_t = CAR_{t_0}^{T}$.

4.1.2. *Significance tests*

Assuming that security daily abnormal returns are independently distributed in event time, portfolio daily abnormal returns approach normal distributions for large samples under the Central Limit Theorem.

To test whether the abnormal portfolio return on event day t, AR_t, is statistically different from 0, we compute the t-statistic

$$t = AR_t / \hat{\sigma}(AR_t),$$

where $\hat{\sigma}(AR_t)$ is the sample standard deviation of the portfolio returns during a 'control' period, defined as the period from 60 days before the announcement until 60 days after the announcement, excluding the period from 10 days before the announcement until 10 days after.[3]

[3]Note that this approach assumes that the variance of the daily abnormal portfolio returns is constant. The choice of the control period may seem arbitrary, but does not affect our conclusions significantly. This is especially true for the tender offer sample where the announcement effects are huge (see infra).

To test whether the cumulative abnormal return from t until $t+n$, CAR_t^{t+n}, is significantly different from 0, we compute the t-statistic

$$t = CAR_t^{t+n} / \hat{\sigma}(CAR_t^{t+n}),$$

where $\hat{\sigma}(CAR_t^{t+n}) = \sqrt{n} \cdot \hat{\sigma}(AR_t)$ and $\hat{\sigma}(AR_t)$ is the sample standard deviation of the portfolio abnormal returns computed as before. Note that the computation of $\hat{\sigma}(CAR_t^{t+n})$ assumes that the abnormal portfolio returns are independent and identically distributed.

4.2. *Results for open market purchases*

Using the information on the CRSP daily excess return file, the average

Table 1

Average (AR) and cumulative average (CAR) abnormal return 60 days before the announcement until 60 days after the announcement of 243 open market purchases.

Day	AR	CAR	Day	AR	CAR
−60	0.0009	0.0009	1	0.0030	−0.0341
−50	−0.0004	−0.0123	2	0.0016	−0.0325
−40	−0.0018	−0.0183	3	0.0014	−0.0311
−30	−0.0031	−0.0350	4	−0.0021	−0.0332
			5	−0.0003	−0.0335
−25	−0.0019	−0.0346	6	−0.0006	−0.0341
−24	−0.0001	−0.0347	7	−0.0025	−0.0367
−23	−0.0026	−0.0373	8	0.0001	−0.0366
−22	−0.0020	−0.0393	9	0.0015	−0.0351
−21	−0.0028	−0.0421	10	−0.0022	−0.0373
−20	−0.0017	−0.0438	11	0.0004	−0.0369
−19	0.0012	−0.0426	12	−0.0025	−0.0394
−18	−0.0005	−0.0431	13	0.0030	−0.0364
−17	−0.0008	−0.0439	14	0.0010	−0.0354
−16	0.0009	−0.0431	15	−0.0022	−0.0376
−15	−0.0028	−0.0459	16	−0.0022	−0.0398
−14	−0.0044	−0.0503	17	−0.0003	−0.0401
−13	0.0005	−0.0498	18	0.0026	−0.0375
−12	−0.0027	−0.0525	19	0.0008	−0.0367
−11	−0.0019	−0.0544	20	0.0007	−0.0360
−10	−0.0005	−0.0549	21	−0.0019	−0.0379
−9	−0.0011	−0.0560	22	0.0006	−0.0373
−8	0.0003	−0.0557	23	−0.0021	−0.0393
−7	−0.0010	−0.0567	24	0.0005	−0.0388
−6	−0.0047	−0.0614	25	−0.0001	−0.0389
−5	−0.0052	−0.0666			
−4	−0.0038	−0.0703	30	0.0006	−0.0370
−3	0.0004	−0.0700	40	−0.0008	−0.0447
−2	−0.0009	−0.0708	50	0.0020	−0.0453
−1	0.0237	−0.0471	60	−0.0007	−0.0442
0	0.0100	−0.0371			

excess return and the cumulative average excess return (henceforth CAR) is computed for the period 60 trading days before the announcement date (day 0) until 60 days after the announcement day (which corresponds roughly to a 6-month observation period).

Table 1 and fig. 1 show that open market purchases are preceded by a period of abnormal negative market performance: over a 3-month period the CAR declines 7% ($t = -5.42$). The negative abnormal return during the pre-announcement period suggests that it is not a good 'control' period. Therefore, we re-estimated $\hat{\sigma}(AR_t)$ using portfolio returns from day +3 until +60. Since the standard deviation of the portfolio daily abnormal returns in the control period equals 0.00162, the portfolio abnormal return is significant (at the 5% significance level) on days −1 and 0, when the t-values equal 14.62 and 6.17, respectively.

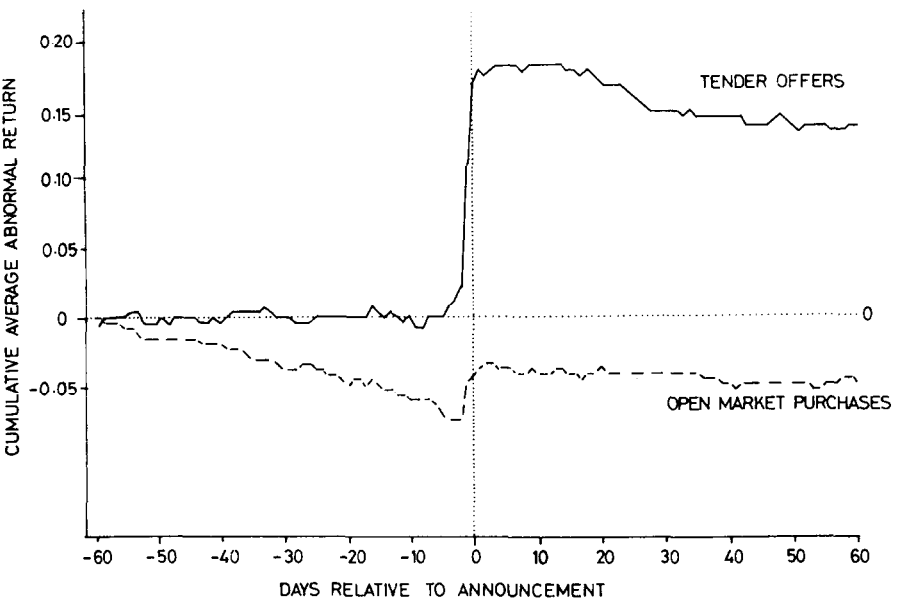

Fig. 1. Cumulative average abnormal return 60 days before the announcement until 60 days after the announcement of a sample of 131 repurchases via tender offer and 243 open market purchases.

The CAR reaches a −3.11% maximum and declines to reach a −4.42% value 60 days after the announcement. The 1.31% negative cumulative abnormal return from day +3 until day +60 is not statistically significant ($t = -1.06$), however. The typical pattern of the CAR cannot be entirely explained by the concentration of 161 out of 243 announcements in the 1973–1974 years, although, for this subsample, the pattern is more

pronounced: the *CAR* declines 8.36% (versus 7.0% in the overall sample) in the period before the announcement; on days −1 and 0 the two-day abnormal portfolio return equals 3.62% (versus 3.37% in the overall sample) and the subsequent *CAR* decline from day +3 until day +60 equals −1.43% (versus −1.31% in the overall sample).

4.3. Results for tender offers

4.3.1. Pricing around the announcement date[4]

Fig. 1 and table 2 show that, as opposed to open market purchases, tender offers are not preceded by a significant negative (or positive) market performance. The standard deviation of the abnormal portfolio returns in the control period equals 0.002314. This implies that the portfolio abnormal return is significant on days −4, −2, −1, 0, and +1, when the *t*-values equal 3.32, 3.37, 38.4, 22.68, and 4.66, respectively. While significant abnormal returns before the announcement can always be explained on the basis of information leakages or prior insider trading, the significant 1.08% return one day after the announcement in the *Wall Street Journal* is not expected in a semi-strong efficient market. Dann (1981) reports results almost identical to the ones reported here and explains the post-announcement effect on the basis of trading suspension of some firms in his sample. Because the abnormal return is too small to be profitable after transaction cost, we did not pursue this issue any further. The most significant effect is again observed in the day before and the day of the announcement. This should not be surprising: the news itself generally becomes available on the day before the announcement in the *Wall Street Journal*.

After the announcement date, the *CAR* stays approximately constant at a 17.5% value for the next 15 trading days, after which a significant number of offers start expiring: as discussed in section 3, to the extent that the tender offer price overstates the expected price after the expiration, the post-expiration price will be below the pre-expiration price. This decline in the *CAR* continues until 29 days after the announcement date; thereafter the *CAR* experiences an insignificant decrease ($t = -0.95$) of approximately 1.2% in 30 trading days to reach a 13.34% level 60 days after the announcement.[5] This *CAR* pattern is similar to the one observed by Bradley (1979) in a sample of inter-firm tender offers.

[4]It was argued before that, for tender offers, announcement returns are not a correct measure of the increase in value. In spite of this, it seems still worthwhile to analyse these effects in order to address some more 'traditional' issues such as market efficiency.

[5]In Vermaelen (1980), it is shown that the value increase is 'permanent' in the sense that the *CAR* does not decline below its level 60 days after the announcement (at least until 1 year after the announcement). Moreover, no evidence of weak-form market efficiency [as reported in Lane (1976)] is found.

Table 2

Average (AR) and cumulative average (CAR) abnormal return 60 days before until 60 days after the announcement of 131 tender offers.

Day	AR	CAR	Day	AR	CAR
−60	0.0021	0.0021	1	0.0108	0.1736
−50	0.0014	−0.0018	2	−0.0018	0.1719
−40	−0.0004	−0.0007	3	0.0013	0.1732
−30	0.0027	0.0024	4	0.0045	0.1776
			5	0.0016	0.1793
−25	0.0022	0.0009	6	−0.0030	0.1762
−24	−0.0003	0.0006	7	0.0017	0.1779
−23	0.0004	0.0010	8	−0.0026	0.1753
−22	0.0009	0.0020	9	0.0022	0.1775
−21	0.0010	0.0009	10	0.0000	0.1775
−20	0.0001	0.0010	11	0.0004	0.1780
−19	−0.0012	−0.0002	12	−0.0007	0.1773
−18	0.0024	0.0022	13	−0.0009	0.1764
−17	0.0004	0.0026	14	0.0029	0.1792
−16	0.0043	0.0069	15	−0.0043	0.1749
−15	−0.0016	0.0053	16	−0.0023	0.1726
−14	−0.0045	0.0008	17	−0.0010	0.1716
−13	0.0026	0.0033	18	0.0010	0.1727
−12	−0.0003	0.0031	19	−0.0024	0.1702
−11	−0.0059	−0.0028	20	−0.0018	0.1685
−10	0.0031	0.0003	21	−0.0037	0.1648
−9	−0.0051	−0.0048	22	−0.0023	0.1624
−8	0.0007	−0.0041	23	0.0027	0.1651
−7	0.0037	−0.0003	24	−0.0039	0.1612
−6	0.0014	0.0011	25	−0.0044	0.1568
−5	0.0005	0.0015			
−4	0.0077	0.0092	30	−0.0000	0.1454
−3	0.0043	0.0136	40	−0.0010	0.1422
−2	0.0078	0.0214	50	−0.0022	0.1361
−1	0.0889	0.1103	60	−0.0017	0.1334
0	0.0525	0.1628			

4.3.2. *Pricing around the expiration date*

Table 4a shows that the abnormal portfolio returns and the CAR 5 days before the expiration until 20 days after. The day after the expiration, we observe a −1.57% portfolio abnormal return which is statistically significant ($t = -6.78$). Interesting is the subsequent 1.61% decline in the following 9 trading days, caused by 8 consecutive negative abnormal portfolio returns. Two of these, on day +4 and day +7, are significant with t-values of −2.07 and −2.03, respectively. In order to provide an economic explanation, consistent with market efficiency, we split up the sample in oversubscribed and undersubscribed offers.

Table 3 summarizes the main characteristics of each subsample. Twenty-two out of 51 undersubscribed offers were extended (some of them several

Table 3

Summary statistics on undersubscribed and oversubscribed stock repurchase offers occurring in the time interval 1962–1977.

	Number before extension (1)	Number after extension (2)	Average premium[a] (3)	Average F^{*}[b] (4)	Average F_p[c] (5)	CAR'[d] (6)	$TOTALR$[e] (7)
Oversubscribed	80	86	0.2395	0.1327	0.1619	0.1283	0.1463
Undersubscribed	51	45	0.2047	0.1842	0.1211	0.1377	0.1457
Total	131	131	0.2276	0.1504	0.1479	0.1319	0.1461

[a]Premium is computed as the tender price divided by the price 5 days before the announcement minus one.
[b]Target fraction.
[c]Fraction purchased.
[d]Cumulative average excess return to remaining shareholders from -5 until day $+60$.
[e]Average abnormal return to tendering and non-tendering shareholders $= (3)\times(5)+(6)\times[1-(5)]$.

Table 4

Average (AR) and cumulative average (CAR) abnormal return 5 days before the expiration day until 20 days after the expiration day.

(a) Total sample			(b) Oversubscribed sample			(c) Undersubscribed sample		
Day	AR	CAR	Day	AR	CAR	Day	AR	CAR
−5	−0.0000	−0.0000	−5	−0.0014	−0.0014	−5	0.0026	0.0026
−4	−0.0001	−0.0001	−4	−0.0020	−0.0034	−4	0.0035	0.0061
−3	−0.0050	−0.0051	−3	−0.0060	−0.0094	−3	−0.0030	0.0031
−2	−0.0015	−0.0066	−2	0.0006	−0.0088	−2	−0.0056	−0.0025
−1	−0.0021	−0.0087	−1	−0.0033	−0.0121	−1	0.0003	−0.0022
0	−0.0009	−0.0096	0	−0.0008	−0.0129	0	−0.0011	−0.0033
1	−0.0158	−0.0254	1	−0.0219	−0.0348	1	−0.0043	−0.0076
2	0.0019	−0.0236	2	0.0042	−0.0306	2	−0.0026	−0.0102
3	−0.0019	−0.0254	3	−0.0011	−0.0316	3	−0.0035	−0.0137
4	−0.0048	−0.0303	4	−0.0032	−0.0349	4	−0.0079	−0.0217
5	−0.0019	−0.0322	5	−0.0009	−0.0358	5	−0.0037	−0.0254
6	−0.0004	−0.0326	6	−0.0006	−0.0364	6	−0.0001	−0.0254
7	−0.0047	−0.0374	7	−0.0052	−0.0416	7	−0.0038	−0.0293
8	−0.0011	−0.0385	8	0.0019	−0.0397	8	−0.0069	−0.0362
9	−0.0003	−0.0388	9	0.0009	−0.0388	9	−0.0026	−0.0387
10	−0.0037	−0.0425	10	−0.0033	−0.0421	10	−0.0046	−0.0434
11	0.0021	−0.0405	11	0.0015	−0.0406	11	0.0032	−0.0402
12	−0.0017	−0.0422	12	−0.0020	−0.0426	12	−0.0012	−0.0414
13	0.0012	−0.0411	13	0.0014	−0.0413	13	0.0007	−0.0407
14	0.0020	−0.0392	14	−0.0002	−0.0415	14	0.0061	−0.0347
15	−0.0026	−0.0417	15	−0.0003	−0.0418	15	−0.0069	−0.0416
16	−0.0028	−0.0445	16	−0.0016	−0.0434	16	−0.0051	−0.0467
17	0.0034	−0.0410	17	0.0034	−0.0399	17	0.0034	−0.0432
18	−0.0021	−0.0431	18	0.0005	−0.0394	18	−0.0069	−0.0501
19	0.0018	−0.0414	19	0.0017	−0.0378	19	0.0019	−0.0482
20	−0.0017	−0.0431	20	−0.0021	−0.0399	20	−0.0010	−0.0492

times) and six of them became oversubscribed after extension. The oversubscribed subsample is characterized by higher premia, lower fractions sought and higher fractions purchased, relative to the undersubscribed sample. Oversubscribed offers are followed by lower abnormal returns to the non-tendering shareholders (*CAR*), but the tendering shareholders receive higher premia, so that the weighted average of the two (*TOTALR*) is not significantly different for oversubscribed and undersubscribed offers (14.63 and 14.57%, respectively).

Define CAR^o as the cumulative average excess return computed for the sample of oversubscribed tender offers, and CAR^u as the CAR^o for the undersubscribed subsample.

Table 4 shows that after the expiration date of the oversubscribed offers, the CAR^o declines 2.19%, which is the only significant decline ($t = -8.35$) in the post-expiration period.[6] The CAR^o remains relatively stable from there on.

The CAR^u declines after the expiration date, but there is no evidence of a one-day significant drop: after the expiration the portfolio excess returns are negative for ten consecutive trading days, until the CAR^u reaches its post-expiration equilibrium level. The 4% gradual decline is not expected in an efficient market in which securities are priced according to our theoretical model (section 3). We argue that this is not due to market inefficiency but can be explained by relaxing assumption 5 in our theoretical discussion: undersubscribed offers may be expected to be extended (in our sample 22 out of 51 or 43% of the initially undersubscribed offers were extended), so that the price prevailing after the expiration date will reflect the probability of extension. Additional support for this hypothesis was provided by the behaviour of the *CAR* around the original expiration date of the 22 extended offers: one day after the extension stock prices experience a significant 1.31% increase ($t = 2.47$),[7] and the abnormal portfolio returns in the next four days are all positive.

Note that the gradual decline of the CAR^u does not necessarily imply profit opportunities via shortselling around the expiration date: by construction, offers are considered undersubscribed if they are undersubscribed after the last extension (if any); the last effective day of the last extension period is defined as the expiration date, so that all offers in our undersubscribed sample are *known* not to be extended. Therefore, the ex ante expected profit of selling short an offer which is expected to be undersubscribed will be less than the values shown in table 4. After the firm decides not to extend the offer, the price returns to its equilibrium level. This implies that shortsellers will have to compensate investors for this expected

[6]For the oversubscribed sample, the standard deviation of the portfolio abnormal return equals 0.00262, while the corresponding value for the undersubscribed sample equals 0.00401.

[7]The standard deviation of the portfolio return in the control period equals 0.0053.

decline. This argument holds also, of course, for the oversubscribed offers, where the decline is expected immediately after the expiration day.

The most important inference from our analysis is the strong similarity in price behaviour between oversubscribed and undersubscribed offers. After the expiration date, prices fall because the tender offer price overstates the expected value of information.[8] The fact that the market adjusts almost instantaneously to its equilibrium level implies that this result is not due to market inefficiency: the decline is expected, but it does not seem to be the only consideration investors take into account when they decide to tender or hold their shares. The results are therefore consistent with our theoretical analysis which predicts that some shareholders will not tender, even if P_T is higher than P_E, because they are 'locked in' by taxes and transaction costs. Shareholders with low transaction costs are the ones who reap the largest benefit at the cost of the non-tendering shareholders. The non-tendering shareholders may still be better off, however, than if the company had not announced the tender offer: the post-expiration price stays significantly above the pre-announcement price. So if the tender offer was the most efficient way to obtain this price increase, non-tendering shareholders are better off.

4.4. *Predicted versus actual prices*

To verify some more specific predictions of our equilibrium pricing model, it was tested whether prices on the day before the expiration differ significantly from the predicted values.

According to eq. (1), for *oversubscribed* offers we expect a price equal to $P_A = P_T(\bar{F}_p/\bar{F}_T) + [1-(\bar{F}_p/\bar{F}_T)]P_E$. Replacing the expected values of F_p, F_T and P_E by their realized values,[9] it is found that, on the average, the observed price exceeds the predicted value by 2.3%. This is not significantly different (at the 5% significance level) ($t=1.71$) from 1%, the difference one would expect on the basis of transaction costs (recall that the price predictions in section 3 are made net of transaction costs). Note that the price reflects estimates of the outcome of the offer, the response of the firm and the value of information, all of which may be different from the realized values.

Additional support for our pricing model is provided by the observation

[8]This is true on the average but also for 75.6% of the 131 tender offers. Vermaelen (1980) finds that 8 of the 16 offers for which the abnormal return to the non-tendering shareholders is more than 5% above the premium are 'extremely' oversubscribed: on the average, almost twice as many shares as sought were tendered and all the shares were purchased by the firm. Recall that the decision by firms to repurchase more shares than they committed to is expected to have a positive impact on the value of the shares. This is true under (almost) all of the working hypotheses considered.

[9]P_E is estimated as the price 5 days after the expiration.

that for 83 out of 86 oversubscribed offers, the market price on the day before expiration is lower than (or equal to) the tender offer price. For two of the three offers for which the market price is above the tender offer price, the difference is smaller than 3%. One outlier remains: In December 1976, Kay Co. offered to buy back 1,750,000 shares at $3.50 while the market price before and during the tender offer was $4.00. The offer was clearly motivated by a major shareholder who tendered 1,740,000 shares, and is therefore similar to a private purchase.

According to eq. (1), for *undersubscribed* offers we generally expect a price equal to the tender offer price. On the average, the market price is 1.3% higher than the tender offer price which, again, is not statistically significantly different ($t=0.3$) from 1%. The positive value is caused by five outliers. Two of these outliers are 'extremely' undersubscribed (fewer than 10% of the number of shares sought were tendered). All of them are undersubscribed after extension: it may well be that the investors tendered their shares at the original expiration date (because they believed that the offer would not be extended) and that subsequently the price increased above the tender offer price (because of market-wide events), so that nobody tendered at the 'last' expiration date. This explanation is consistent with the result that for two of the three 'moderately' undersubscribed offers, the *abnormal* return to the non-tendering shareholders was lower than the premium, *and* the pre-expiration 'normal' return was higher.[10]

Given this abnormal price increase we will next test for an economic explanation consistent with our working hypotheses.

5. Economic explanation of the results

5.1. Consistency with the hypotheses: Some preliminary findings

Solving eq. (4) for I/N_0 and dividing by P_0 (and interpreting P_E as the 'abnormal', market adjusted price $=P'_E$), we compute the abnormal return to the shareholders (henceforth *INFO*) as

$$I/N_0P_0=(1-F_p)(P'_E-P_0)/P_0+F_p(P_T-P_0)/P_0. \tag{5}$$

The abnormal return equals the weighted average of the return to the F_pN_0 tendered shares and the return to the $(1-F_p)N_0$ non-tendered shares. As before, the premium is computed relative to the price 5 days before the

[10]After the announcement day the CAR^o stays significantly below the value implied by the premium, while 10 days after the announcement the CAR^u is not statistically significantly different from the value implied by the premium. If we could ignore market-wide events, then these results would also be consistent with our theoretical predictions. For more details and a discussion of the effect of market-wide events, see Vermaelen (1980).

announcement day and $(P'_E - P_0)/P_0$ is computed as the cumulative excess return from 5 days before the announcement until 10 days after the expiration. The average value of *INFO*, as estimated by the market, has a mean equal to 15.7%, a median equal to 15.3%, and ranges from −16.3 to 62.4%. Only 14 offers (or 10.7%) are not regarded as containing positive information.

5.1.1. *Dividend hypothesis*

From the size of the value increase of the shares (especially considering the fact that the *non-tendering* shares experience a 14.2% price increase, on the average, and that in 85% of the offers the price stays above the pre-announcement level), it follows immediately that the hypothesis that firms merely want to pay a 'dividend' cannot explain the observed abnormal returns after the announcement. Even if stock prices would reflect personal tax effects, the expected impact of these effects seems trivial relative to the 15.70% abnormal (± daily) return. E.g. assume (as in our sample) that the firm repurchases 15 percent of the value of the shares outstanding as an alternative to a dividend payment. If the 'representative' marginal investor has a 30 percent tax rate on ordinary income, then we expect to observe a 2.25 percent abnormal return, hardly enough to cover brokerage fees and administrative costs connected with the tender offer.

An interesting side result is that, at least on a theoretical basis (i.e., if every tendering shareholder tenders all his shares), in only a trivial number of cases, the outcome of the offer and the repurchase decision of the firm were such that under Section 302(i) of the Internal Revenue Code the repurchase would be treated as a dividend for tax purposes. This result was obtained as follows. Assume that before the repurchase a shareholder owns n_0 shares, which represent a fraction n_0/N_0 of the N_0 shares outstanding. If the shareholder tenders all n_0 shares, the firm will repurchase $F_p n_0/F_T$ of them, so that the shareholder now owns a fraction $(n_0 - n_0(F_p/F_T))/N_1$ of the N_1 remaining shares. Section 302(i) (see the description in the introduction of this paper) states that the shareholder will be taxed as a capital gain if

$$(n_0 - n_0(F_p/F_T))/N_1 < 0.8(n_0/N_0), \tag{6}$$

or, after substituting $N_1/N_0 = 1 - F_p$, if

$$0.2 < F_p/F_T - 0.8F_p. \tag{7}$$

This condition was violated in only 3 out of the 105 tender offers (for which

data on the fraction tendered were available), suggesting that, at least for the firms in our sample, Section 302(i) did not prevent shareholders from realizing a capital gain for tax purposes. The other restriction [Section 302(iii)] which requires that the distribution is 'essentially not equivalent' to paying a dividend is also a paper-tiger: In a survey of 609 firms repurchasing their own shares, Austin (1969) reports that managers were able to come up with not less than 29 different reasons to repurchase shares (none of them related to personal or corporate tax savings).

5.1.2. *Leverage hypothesis*

The leverage hypothesis or tax-subsidy hypothesis predicts that only when the repurchase is financed with borrowed funds, the value of the shares should increase with the present value of the tax-savings which accrue to them. Data were collected on the financing method, using the offering circulars. For our 131 firm sample not all offering circulars were available and only 62 of them contained information on the source of funds. From these 62 offers, 13 were financed with debt and 49 with cash. We realize that this is not a very 'clean' procedure in separating possible tax-effects: after all, the firm may have obtained the cash from previous borrowing and the tender offer may provide the market with information that the change in capital structure is permanent. On the other hand, the financing mode was obtained from specific company announcements in the offering circular. If firms wanted to move to a higher target leverage ratio and if related moral hazard problems (i.e., trouble with the IRS) are small, it is not clear why they would be hesitant to state this in the offering circular. Also, it seems that, although improper for individual firms, the separating procedure seems reasonable to determine the financing mode *on the average.*

Table 5 summarizes the characteristics of the cash-financed, debt-financed and total (131 events) sample. On the average, the abnormal return (*INFO*) in the cash-financed sample is lower than the abnormal return in the debt-financed sample, but higher than in the total sample. This result implies that, while it is, at this stage, impossible to outright reject the existence of tax effects, it is possible to reject the hypothesis that tax effects are the *predominant* explanation for the abnormal returns following the 'average' tender offer. Ideally, we would like to test whether offers financed with cash are different from offers financed with borrowed funds, *ceteris paribus.* Without developing a specific signalling model, we cannot guarantee that everything else is held constant when we compare the two subsamples. Therefore, the observation that the abnormal returns are higher when the offer is financed with debt [a result which is also reported by Masulis (1980a)] warrants further investigation, but is not in itself evidence on the existence of a tax effect.

Table 5

Characteristics of the total sample, the sample financed by debt and the sample financed with cash (average values with standard deviations in parentheses).

	Total sample	Debt-financed	Cash-financed
Observations	131	13	49
INFO[a]	0.157	0.236	0.178
	(0.154)	(0.122)	(0.163)
Premium[b]	0.227	0.283	0.268
	(0.179)	(0.139)	(0.214)
*F**[c]	0.151	0.202	0.146
	(0.108)	(0.134)	(0.098)

[a]Total abnormal return to non-tendering and tendering shareholders computed by expression (5).
[b]Tender price ÷ the price 5 days before the announcement − 1.
[c]Target fraction.

5.1.3. *Bondholder expropriation hypothesis*

The bondholder expropriation hypothesis predicts that stock prices should rise at the expense of bond prices. In order to evaluate this hypothesis data on publicly traded bonds (before the tender offer announcement) were collected. Only 24 firms were found to have publicly traded bonds outstanding, possibly reflecting the fact that bond covenants or state regulations are likely to prevent firms from making tender offers for substantial fractions of their own shares when the firm has debt outstanding.

Data on bond ratings were collected before and one year after the repurchase. None of the bond ratings decreased in the year after the repurchase. Of course, bond ratings are a rough measure of bond 'quality', but if the expropriation hypothesis was the *predominant* explanation for the (almost daily) 15.7% abnormal return then it seems reasonable that we would observe some decline in bond ratings. This is particularly true for the sample of 49 offers financed with cash, where it seems impossible to explain a 17.8% abnormal return on the basis of the expropriation of the 7 publicly traded bonds in the sample.

An analysis of bond ratings in itself does not preclude the possibility that some expropriation effects may be present. Dann (1981), however, examines bond *returns* around the announcement date of a sample of 143 repurchases by tender offer and finds no significant expropriation effect, on the average. His study covers approximately the same sample period (1962–1976) and the characteristics of his sample are very similar to ours (e.g. he reports an average premium and target fraction of 22.46% and 15.29%, respectively,

which is quite similar to the corresponding 22.76% and 15.04% found in our study). Therefore, it seems reasonable to assume that his results apply to our study as well. On the basis of this evidence, it is probably safe to conclude that expropriation effects cannot explain the abnormal returns after the announcement or, if expropriation effects occur, the negative impact on bond prices is offset by positive information effects, so that the value of the bonds does not decline.

Summarizing, the results presented so far make it impossible to tell a convincing story on the basis of tax or expropriation effects. Following the well known dictum of Stigler (1966) that 'it takes a theory to beat a theory' the remainder of this section is devoted to the development of the signalling hypothesis.

5.2. *Stock repurchases in a signalling framework*

5.2.1. *Theory*

Assume that managers–insiders have an incentive to increase the stock price of the firm by announcing a tender offer. For example, they may own stock options or receive sidepayments from tendering shareholders. If the managers have no positive inside information, repurchasing shares at a premium above their true value will hurt the non-tendering shareholders, or better, the shareholders who are holding the shares when the 'true' value of information becomes publicly available (e.g. via annual reports). To the extent of their holdings on the day of 'truth' (hereafter time T), insiders have to carry the burden of the expropriation and, *ceteris paribus*, the size of the expropriation will be larger, the higher the premium offered and the higher the fraction of shares repurchased. The higher the value of information, however, the lower the marginal cost to insiders of buying back larger fractions, offering higher premia and holding more shares in the firm. As Spence (1973) has shown in a different context (job market signalling), this is exactly the sufficient condition for the fraction purchased, the premium and the fraction of insider holdings at time T to be considered as positive signals by the market, *provided* that managerial incentives to signal (i.e., compensation schemes around the announcement) are identical across firms. Without this assumption, increasing, say, the premium, may affect managerial signalling benefits differently across firms, for a given value of information. For empirical purposes (i.e., to find a statistically significant effect), however, it is sufficient to assume that the signals are not correlated with any omitted 'compensation variable'.

Immediately after the announcement (henceforth time 0), the premium is known to the investors–outsiders, but the fraction purchased and the fraction of insider holdings at time T are not.

The fraction purchased depends on the outcome of the offer and the post-expiration purchase decision of the firm (when the offer is oversubscribed). But, because the firm always commits itself to repurchase all the shares tendered below the target fraction F^*, the larger F^*, the larger the *expected* fraction repurchased. So, indirectly, we predict that F^* will be perceived as a positive signal by the market.

The fraction of insider holdings at time T is not known to the market around the announcement either, but we argue that the fraction of insider holdings at time 0 is expected to be positively correlated with the fraction of insider holdings at time T. This argument entails that insiders do not sell out before the market knows the true value of information. We justify this assumption on the basis of the following observations: (i) Insiders generally commit themselves not to tender their shares and they often make this commitment known in the offering circular. To verify this commitment, the *Official Summary* was checked for the extent of insider participation. In the 18 cases (out of 131) that shares were tendered by insiders, the amount was trivial (less than 1% of the target fraction).[11] Note that there are no legal restrictions on insider participation; insiders–managers voluntarily commit themselves not to tender. (ii) The two most extensive surveys on the reasons for repurchasing stock [Austin (1969) and Marks (1976)] mention executive stock compensation plans as by far the most important purpose. Also, Austin (1969) reports that 57% of the shares repurchased during 1961–1967 were re-issued during the same period. This implies that at least part of the repurchased shares represent a transfer from outsiders to insiders. Finally, even if the possibility to unload stock after the expiration date cannot be excluded, the larger the fraction of insider holdings at time 0, the more difficult it will become to engage in 'excessive' unloading of shares.

Note that the above signalling model is similar to the one developed by Ross (1977) who argues that financial leverage is a positive signal. In his case, the signalling costs are the expected bankruptcy costs (borne by the managers) which, at a given level of leverage, are higher for managers who possess less positive information. Bhattacharya (1979) points out that Ross' model may break down because of the incentive of shareholders to make sidepayments (which could be large, relative to the rather trivial bankruptcy costs). In our model, the penalties to managers are non-trivial relative to the sidepayments which could be received from shareholders: the larger the insider holdings, tender price, and fraction purchased, the more the managers become expropriated (if they don't possess inside information). In the extreme case when the fraction repurchased equals the fraction of non-insider shareholders, managers carry the total burden of the expropriation.

[11]Two exceptions: (i) Valle's Steak House: Valle himself died during the tender offer and all his holdings were tendered to the company; (ii) a large stockholder of Kay Corporation tendered his 1,740,000 shares to the firm at a price below the pre-announcement price.

5.2.2. Results

For our 131 firm sample, data on insider holdings were obtained from 3 sources: The annual proxy statement lists the amount of insider holdings in the firm. Proxy statements were not available (to us) prior to 1973, however. The missing data were obtained either via a questionnaire or by going through the Official Summary (which reports all insider transactions) in the 3 years preceding the announcement. The last method is likely to understate the total amount of insider holdings because only the holdings of the individuals who engage in a transaction are reported.

The fraction of insider holdings in our sample has a mean equal to 17.5%, a median equal to 8.8%, and ranges from 0.1 to 87%.

Table 6 shows the results of regressing the value of information per share on the different signalling variables, for different model specifications.

Eqs. 6.1 through 6.3 seem to imply that each of the signalling variables explains a substantial fraction of the variance of the value of information; adding the target fraction and the fraction of insider holdings to eq. 6.1 demonstrates, however, that, although the target fraction is significant at the 5% level, the premium is the signal which explains practically all of the variance of the value of information: adding the target fraction and the fraction of insider holdings to the relationship increases the explained variance with less than 2%. This result is probably due to the significant (at the 1% significance level) positive correlation between the premium and the two other signals.[12]

It is important to note that by computing *INFO* via eq. (5), we have not introduced spurious correlation: true, the second term in (5) increases as the premium increases, but, P'_E and the tender price are not independent [see eq. (3)]: if the premium is not a positive signal, then the remaining shareholders have to carry the burden via a lower price P'_E, so that (5) is independent of the value of the premium. Arguing that (5) will induce spurious correlation is equivalent to arguing that stock returns should be positively correlated with dividends because dividends are included in stock returns.

When the functional form of the relationship is changed by assuming a marginally declining effect of the number of insider holdings, eqs. 6.5 and 6.6. show that the t-value on the insider signal increases from 1.14 to 2.30, and the explained variance increases from 0.596 to 0.608. A marginally declining effect of the insider holdings variable should be expected on the basis of the 'rules' of tender offers: insiders generally do not tender their shares and the firm offers to repurchase all shares tendered below the target fraction. As some non-insider shareholders don't tender because of taxes and transaction costs, at high levels of insider holdings, the expected fraction (of the *total*

[12]The correlation coefficients of the premium with the target fraction and the fraction of insider holdings equal 0.2446 and 0.2292, respectively.

Table 6

Regression coefficients (with t-values in parentheses[a]) of value of information on the signalling variables[b] (131 observations).

	Signalling variables[c]								
Regression	Constant	Premium	F^*	FI_0	$\sqrt{FI_0}$	$\ln(FI_0)$	F_p/F^*	R^{2d}	F^e
6.1	0.003 (0.23)	0.675 (13.38)**						0.579	177.91
6.2	0.094 (4.22)**		0.419 (3.48)**					0.086	12.14
6.3	0.017 (7.10)**			0.066 (2.74)**				0.055	7.56
6.4	−0.021 (−1.19)	0.637 (12.03)**	0.164 (2.00)**	0.051 (1.14)				0.596	62.45
6.5	−0.033 (−1.63)	0.627 (11.78)**	0.166 (2.01)**		0.064 (1.65)*			0.600	63.62
6.6	0.023 (0.96)	0.614 (11.56)**	0.177 (2.15)**			0.0119 (2.30)**		0.608	65.74
6.7	−0.052 (−2.39)**	0.603 (11.23)**	0.225 (2.63)**	0.059 (1.34)			0.025 (2.41)**	0.614	50.07
6.8	−0.065 (−2.73)**	0.593 (10.98)**	0.227 (2.68)**		0.070 (1.84)*		0.025 (2.45)**	0.618	51.10
6.9	0.005 (−0.20)	0.581 (10.80)**	0.239 (2.83)**			0.013 (2.47)**	0.025 (2.47)**	0.626	52.74

[a]Significance at the 10% and the 5% significance level indicated by single and double asterisks, respectively.

[b]Dependent variable, value of information measured by eq. (5).

[c]F^* = target fraction; FI_0 = fraction of insider holdings; F_p = fraction purchased; Premium = tender price ÷ price per share 5 days before the announcement − 1.

[d]Multiple correlation coefficient.

[e]F-statistic.

number of shares outstanding) tendered (and purchased) will be smaller, *ceteris paribus* (that is, adjusting for the positive effect that the insider holdings variable has on the value of information because of the reasons described above). In other words: at higher levels of insider holdings, insiders are committing themselves to take a larger part of the expropriation risk of all the shares tendered up to the target number, but after a 'sufficiently' high fraction of insider holdings, it becomes less likely that the target number will be tendered.

Because of the problems with the use of announcement returns (see section 3), the value of information (or at least the excess return to the remaining shareholders) is computed 5 days before the announcement date until 10 days after the expiration date. By that time, the outcome of the offer and the subsequent purchase decision of the firm is known to the investors. The impact of the repurchase decision can be measured by including F_p/F^* as an explanatory variable in our analysis. Regressions 6.7 through 6.9 show that including this variable increases the explained variance by approximately 2% for each of the three model specifications. It also increases the significance of F^*, but this is most likely due to the negative correlation between F_p/F^* and F^* (-0.2388). Note that when we regress $INFO$ on FI_0 or $\sqrt{FI_0}$ the values of the constant are significantly different from zero. The logarithmic relationship, however, reduces the value of the constant dramatically, indicating the superiority, from a statistical point of view, of the log-specification. For this reason, and the other reasons mentioned above, we decided to ignore the two other specifications for the remainder of our analysis.[13]

5.3. Signalling and firm size

Market values of equity are compiled using the price per share five days before announcement date. Table 7 shows the resulting distribution of market values.

Using Reinganum's (1979) overall market size classification,[14] it is concluded that approximately 50% of the firms in our sample fall in the two lowest market value deciles. The distribution is highly skewed to the right, mainly because our sample includes IBM, the largest firm on the NYSE. The fact that the majority of firms in our sample are small firms may explain why the fraction of insider holdings has a relatively small explanatory power: small firms are perceived as being more controlled by insiders than large

[13]Vermaelen (1980) performs some diagnostic checks for normality of the residuals, heteroscedasticity and multicollinearity, but does not find any strong violations of the assumptions underlying the ordinary least squares procedure.

[14]The classification is based on the market values of a random sample of 566 NYSE and AMEX firms, and covers the period 1962–1975. For more details see Reinganum (1979).

Table 7

Distribution of market values of 131 firms repurchasing their shares in the period 1962–1977 (in thousands of dollars).

Minimum		3,124
Decile	0.1	6,966
	0.2	8,680
	0.3	12,658
	0.4	19,173
	0.5	29,380
	0.6	59,051
	0.7	80,584
	0.8	174,300
	0.9	395,578
Maximum		36,316,000
Mean		458,540

firms. Because most firms which repurchase their own shares via a tender offer are small, the additional information provided by the percentage insider ownership may be of little value in estimating the information content of the offer.

Table 8 describes the characteristics of the value of information and the signals, within each of the five market value quintiles. The lowest two quintiles seem to have, compared to the other quintiles, higher values for the average value of information, premium, target fraction and insider holdings. The general impression of table 8 is confirmed by the values of the Spearman rank-correlation coefficients of the market values with all the variables in our signalling model (table 9). All the coefficients are negative and significantly (at the 1% significance level) different from 0. This result is consistent with the joint hypothesis that small firms are expected to signal more information when they repurchase their shares and that they set the premium and target fraction according to the predictions made by our model.

The observation that predominantly small firms engage in repurchase via tender offer is probably the strongest evidence in support of the signalling hypothesis. Indeed, there are several reasons why one would expect small firms to signal information: (i) from going to the *Wall Street Journal Index*, it becomes clear that the *Wall Street Journal* discriminates against small firms as far as the extent of news coverage is concerned. For many firms in our sample, besides the tender offer only quarterly earnings announcements were reported. As a profit maximizer, it does not pay for the *Wall Street Journal* (or any other inexpensive publication for that matter) to produce information on small firms, held by insiders who already possess most information the *Journal* might report. (ii) Because many institutional

Table 8

Firm size versus mean value of dependent and independent variables (standard deviations in parentheses).

Market size	Firm size (in $1000)	*INFO*[a]	Premium[b]	F^*[c]	FI_0[d]
Fractile 1 (smallest)	6618	0.258	0.359	0.208	0.228
	(1623)	(0.193)	(0.207)	(0.116)	(0.21)
2	12724	0.190	0.304	0.163	0.270
	(2952)	(0.155)	(0.176)	(0.123)	(0.240)
3	35641	0.116	0.161	0.159	0.168
	(13526)	(0.100)	(0.114)	(0.081)	(0.169)
4	94588	0.119	0.155	0.130	0.133
	(30633)	(0.134)	(0.127)	(0.113)	(0.169)
5 (largest)	2080340	0.098	0.153	0.089	0.076
	(6930273)	(0.119)	(0.113)	(0.059)	(0.145)
Total sample	458540	0.157	0.228	0.150	0.175
	(3210623)	(0.155)	(0.175)	(0.108)	(0.199)

[a]Total abnormal return per share.
[b]Tender price ÷ price per share 5 days before the announcement − 1.
[c]Target fraction.
[d]Fraction of insider holdings.

Table 9

Spearman rank-correlations of firm size and various signals.[a]

Signals[b]				
INFO	Premium	F^*	$\ln(FI_0)$	F_p/F^*
−0.3719	−0.4946	−0.4306	−0.3559	−0.2519

[a]All correlations are significantly negative at the 1% significance level.
[b]*INFO* = total abnormal return per share; F^* = target fraction; FI_0 = fraction of insider holdings; F_p = fraction purchased; Premium = tender price ÷ price per share 5 days before the announcement − 1.

investors are not allowed to invest in small firms, it seems plausible that small firms are less scrutinized by financial analysts. (iii) Most important, the fraction of insider holdings has to be significantly high in order to make the (false) signalling cost an economically significant variable. Because the number of insider holdings cannot readily be manipulated (compared to F^* and the premium), only small firms, which are held predominantly by insiders, are able to use the repurchase tender offer 'mechanism' to convince the market that their shares are underpriced.

It is also important to note that the predominance of small firms in the

sample is clearly unexpected on the basis of any of our alternative working hypotheses.

5.4. Signalling and abnormal earnings changes

The signalling hypothesis implies that firms want to correct mispricing of their securities on the basis of favourable inside information. As the value of the firm equals the present value of all future net cash-flows, this favourable information should be reflected in 'abnormal' cash-flow increases subsequent to the repurchase announcement. In this section, we will assume that earnings per share numbers are a reasonable proxy for net cash-flows per share and test the hypothesis that issuer tender offers are followed by abnormal earnings per share increases.

Two alternative earnings per share forecast models are used to test the hypothesis that repurchase announcements are followed by statistically significant standardized (in the way described below) forecast errors. It should be noted that there exists no rigorous theoretical justification for the presumption that abnormal returns to shareholders should be related to earnings per share numbers. The procedure described below is motivated, however, by results reported by others and is generally in line with the path adopted by previous research.

5.4.1. The models

Define

$EpS_{i,t}$ = earnings per share for firm i in year t relative to the announcement year (e.g. $t=+3$ refers to the third year after the announcement).

$f(EpS_{i,t})$ = a forecast of earnings per share for firm i in year t.

$f(\Delta EpS_{i,t})$ = a forecast of first differences in earnings per share for firm i in year t.

$EpS_{m,t}$ = average earnings per share for year t using an equally weighted average of EpS numbers of all COMPUSTAT (1960–1979 version) firms available in year t.

$\Delta EpS_{m,t}$ = $EpS_{m,t}-EpS_{m,t-1}$.

Two forecast models are used. The first one (henceforth model A) is equivalent to a Martingale process with drift:

$$f(EpS_{i,t})=EpS_{i,t-1}+\frac{1}{K_i}\sum_{k=1}^{K_i}\Delta EpS_{i,t-k}, \tag{8}$$

where K_i is the number of EpS changes available for firm i before year t, and

$$f(\Delta EpS_{i,t}) = \frac{1}{K_i} \sum_{k=1}^{K_i} \Delta EpS_{i,t-k}. \tag{9}$$

Therefore, forecast errors, conditional on model A, are

$$e_{i,t}^{A} = \Delta EpS_{i,t} - \frac{1}{K_i} \sum_{k=1}^{K_i} \Delta EpS_{i,t-k}. \tag{10}$$

Forecast errors are computed in all the years from year $t=-5$ until $t=+5$. Because of reasons described below, firms which had less than 5 years of ΔEpS data available before the announcement were excluded from the analysis.

The second model (henceforth model B) postulates that $\Delta EpS_{i,t}$ is a function of $\Delta EpS_{m,t}$ and time,

$$f(EpS_{i,t}) = EpS_{i,t-1} + \beta_{0,i} + \beta_{1,i}\Delta EpS_{m,t} + \beta_{2,i}t, \tag{11}$$

$$f(\Delta EpS_{i,t}) = \beta_{0,i} + \beta_{1,i}\Delta EpS_{m,t} + \beta_{2,i}t. \tag{12}$$

The forecast errors, conditional on model B are

$$e_{i,t}^{B} = \Delta EpS_{i,t} - \beta_{0,i} - \beta_{1,i}\Delta EpS_{m,t} - \beta_{2,i}t. \tag{13}$$

The estimates $\beta_{0,i}$, $\beta_{1,i}$, and $\beta_{2,i}$ are obtained by regressing $\Delta EpS_{i,t}$ on $\Delta EpS_{m,t}$ and t, using all information available before the announcement year and excluding firms for which less than 5 observations were available. The choice of this minimum requirement is rather arbitrary but is motivated by the need to preserve a sufficient number of observations. E.g., for only 71 out of the 131 firms data on earnings per share changes are available up to 5 years before the announcement year. In addition, for only 31 of these, ΔEpS data are available in the 5 years after the announcement. In the same way as for model A, forecast errors are computed for all the years from $t=-5$ until $t=+5$ (when available). Note that for both models we end up using the same subsample. This allows us to test for the robustness of our conclusion with respect to the specific forecast model used.

5.4.2. *Test for significance*

Assume that for a given firm i, e_{it} is normally and independently distributed. Define the standardized forecast error SFE_{it} as $e_{it}/\hat{\sigma}(e_{it})$ with

$$\hat{\sigma}(e_{it}) = \frac{1}{N_i - 1} \sum_{t=-5}^{N_i} [e_{it} - \bar{e}_i]^2,$$

where

$$\bar{e}_i = \frac{1}{N_i} \sum_{t=-5}^{N_i} e_{it},$$

and where N_i is the number of forecast errors available for firm i from $t = -5$ on.

Under the stated assumptions, it follows that SFE_{it} has a mean equal to 0 and a variance equal to 1. Because for all firms the SFE_{it} are identically and independently distributed, a cross-sectional t-test becomes possible. Define the average standardized forecast error as

$$ASFE_t = \frac{1}{n_t} \sum_{i=1}^{n_t} SFE_{it},$$

where n_t equals the number of firms available in year t, relative to the announcement year. For each forecast year a t-value can be estimated by

$$\hat{t}_t = ASFE_t / \hat{\sigma}(ASFE_t),$$

where

$$\hat{\sigma}(ASFE_t) = \sqrt{\sum_{i=1}^{n_t} \frac{1}{n_t^2} \sigma^2(SFE_{it})}$$

$$= \sqrt{\sum_{t=1}^{n_t} \frac{1}{n_t^2} \cdot 1} = 1/\sqrt{n_t}.$$

Before moving on to the results, the following points should be made:

(1) Both forecast models were not chosen randomly. Ball and Watts (1972), Albrecht, Lookabill and McKeown (1977) and Watts and Leftwich (1977) provide evidence that model A compares favourably with other annual earnings forecast models. Moreover, in a recent study, Beaver, Clarke and Wright (1979) report significant rank correlations between abnormal security returns and forecast errors of model A and a model very similar to model B (without the trend variable).

(2) For both models, to the extent that the cash used to finance the repurchase was not expected to be reinvested in the firm, the decline in

the number of shares outstanding is expected to introduce a spurious positive forecast error in the year of the announcement.

(3) For model A, this 'mechanical' effect will also introduce a (small) spurious positive *EpS* forecast error in the years after the announcement, to the extent earnings per share changes are proportional to the *level* of earnings per share: remember that for model A forecast errors are a function of the weighted average of all (available) past *EpS* changes.

(4) For model B, the term forecast error is not entirely appropriate for the errors in the 5 years before the announcement since the data during these years are used to estimate the parameters of the forecast model.

5.4.3. Results

The results in table 10 show that the average standardized prediction error is significantly positive in the announcement year, year +1, year +3, and year +5. In the 5 years before the repurchase no abnormal performance is found. Fig. 2 shows that this conclusion is independent of the model specification and seems therefore quite robust. The robustness of the results is a very important observation: our methodology can be criticized in numerous ways (see the points made above), but if specification and other estimation problems are substantial, it would be impossible to obtain this almost one-to-one correspondence between the forecasts of two (independent) models. While the earnings per share increase in the announcement year can be explained on the basis of the mechanical effects of reducing the number of shares outstanding, the finding that forecast errors are significantly positive in three of the five post-announcement years (and 0 in the other years) is supportive for the signalling hypothesis. Finally, note that, with the exception of year −5 for model A, the measures of kurtosis and skewness are close to the values implied by a normal distribution (3 and 0, respectively), so that the positive mean values are not caused by a couple of outliers.

One could criticize the preceding analysis on the basis of the previously mentioned observation that 34% of the tender offers are announced in 1973 and 1974, so that the assumption that the *SFE* are independently distributed is not likely to hold. In order to investigate this issue, the analysis was repeated for all offers not announced in 1973 and 1974.

The results in table 11 and fig. 2 show that (with the exception of years 4 and 5 for model A) the behaviour of forecast errors after the repurchase is similar to the one reported for the total sample: average forecast errors are larger in the announcement year, year +1, year +3, and year +5 than in the other years. For model A, the average forecast error in year 0, year +1 and year +3 is larger in the subsample than in the total sample. For model B, this is only true for the third year after the announcement, but the average forecast error in year 0 and year +1 is less than 10% below the value

Table 10

Average ($ASFE$) and cumulative average ($CASFE$) standardized earnings per share forecast errors 5 years before the announcement of repurchase offers until 5 years after (all observations).[a]

t	$ASFE_t$[b]	$CASFE_t$[c]	$\hat{t}_t$[d]	Skewness	Kurtosis	Number of observations
Model A						
−5	0.007	0.007	0.06	−0.11	6.81	71
−4	−0.171	−0.164	−1.44	−0.45	4.50	71
−3	−0.025	−0.189	−0.21	−0.40	3.41	71
−2	0.088	−0.101	0.74	−0.43	3.14	71
−1	0.141	0.040	1.18	−0.26	3.06	71
0	0.277	0.317	2.33**	−0.93	4.21	71
1	0.292	0.609	2.46**	−0.33	2.64	71
2	−0.003	0.606	−0.02	−0.54	2.65	61
3	0.569	1.175	4.02**	−0.69	2.87	50
4	0.009	1.184	0.06	0.08	3.06	46
5	0.537	1.721	3.00**	−0.62	3.02	31
Model B						
−5	0.030	0.030	0.25	−0.32	3.87	71
−4	−0.102	−0.072	−0.86	−0.26	3.73	71
−3	0.079	0.007	0.67	0.32	4.65	71
−2	−0.011	−0.004	−0.09	−0.32	3.96	71
−1	0.09	0.086	0.76	0.20	3.54	71
0	0.295	0.296	1.76*	−0.26	2.55	71
1	0.286	0.581	2.41**	−0.55	3.00	71
2	−0.014	0.567	−0.10	−0.26	2.32	61
3	0.520	1.087	3.67**	−0.54	2.21	50
4	0.152	1.239	1.03	−0.25	2.53	46
5	0.664	1.903	3.70**	−0.54	3.23	31

[a]Model A refers to the Martingale EpS forecast model [see eq. (10)], and model B refers to the EpS forecast model in eq. (13).

[b]Average standardized forecast error in year t relative to announcement.

[c]Cumulative average standardized forecast error from year −5 until year t.

[d]t-statistic; significance at the 10% and the 5% significance level indicated by single and double asterisks, respectively.

reported in table 10. Because the number of observations is much smaller than in the total sample, it is more difficult to conclude that the average forecast error is significantly different from 0, however. Fig. 2 shows that this time the predictions of models A and B are no longer consistent in the years +4 and +5. Note that model A does not adjust for market-wide earnings changes. This may not be a problem when the number of observations is large, because these effects may 'wash out'. In years +4 and +5, with less than 17 observations, model A and model B are likely to lead to different portfolio forecast errors, however.[15]

[15]Attempts to find significant rank correlations between the value of information (as reflected in stock returns after the announcement) and standardized forecast errors turned out to be

Table 11

Average ($ASFE$) and cumulative average ($CASFE$) standardized earnings per share forecast errors 5 years before the announcement until 5 years after (excluding 1973–74 offers).[a]

t	$ASFE_t$[b]	$CASFE_t$[c]	$\hat{t}_t$[d]	Skewness	Kurtosis	Number of observations
Model A						
−5	−0.012	−0.012	−0.07	0.74	6.56	41
−4	−0.063	−0.075	−0.40	−0.84	4.71	41
−3	0.097	0.022	0.62	−0.74	3.51	41
−2	0.240	0.262	1.54	−0.34	2.54	41
−1	0.095	0.357	0.61	−0.26	2.40	41
0	0.390	0.747	2.50**	−0.14	2.67	41
1	0.431	1.178	2.75**	−0.51	2.47	41
2	0.066	1.244	0.37	−0.09	2.86	31
3	0.637	1.881	2.84**	−0.62	2.79	20
4	−0.599	1.282	−2.39**	0.39	2.45	16
5	0.040	1.322	0.160	−0.26	1.80	15
Model B						
−5	−0.098	−0.098	−0.62	−0.39	3.22	41
−4	−0.142	−0.240	−0.90	−0.11	3.15	41
−3	0.039	−0.201	0.25	−0.19	3.68	41
−2	−0.062	−0.139	0.40	0.17	3.15	41
−1	0.038	−0.101	0.24	−0.05	3.70	41
0	0.226	0.125	1.45	0.05	2.14	41
1	0.256	0.381	1.65*	−0.39	2.39	41
2	0.018	0.399	0.10	−0.44	2.44	31
3	0.683	1.082	3.05**	−0.51	2.05	20
4	−0.096	0.986	−0.38	−0.09	1.65	16
5	0.411	1.397	1.65	−0.95	3.06	15

[a]Model A refers to the Martingale EpS forecast model [see eq. (10)], and model B refers to the EpS forecast model in eq. (13).

[b]Average standardized forecast error in year t relative to announcement.

[c]Cumulative average standardized forecast error from year −5 until year t.

[d]t-statistic; significance at the 10% and the 5% significance level indicated by single and double asterisks, respectively.

5.5. *Signalling and regulation*

In the summer of 1971 the Nixon Administration imposed a 'voluntary' 4% limit on dividend increases. One of the striking observations in our study is the dramatic increase in repurchasing activity during the period of

unsuccessful, and are therefore not reported here. It was mentioned before that Beaver et al. (1979) report significant rank correlations between annual forecast errors (computed on the basis of model A and a model similar to model B) and abnormal stock returns in the year of an earnings announcement. In our case, however, we are trying to relate abnormal returns to *future* forecast errors. Because for different firms the 'good news' is likely to become available in different years after the repurchase, there is no reason why announcement returns should be positively correlated with forecast errors in a specific year after the announcement.

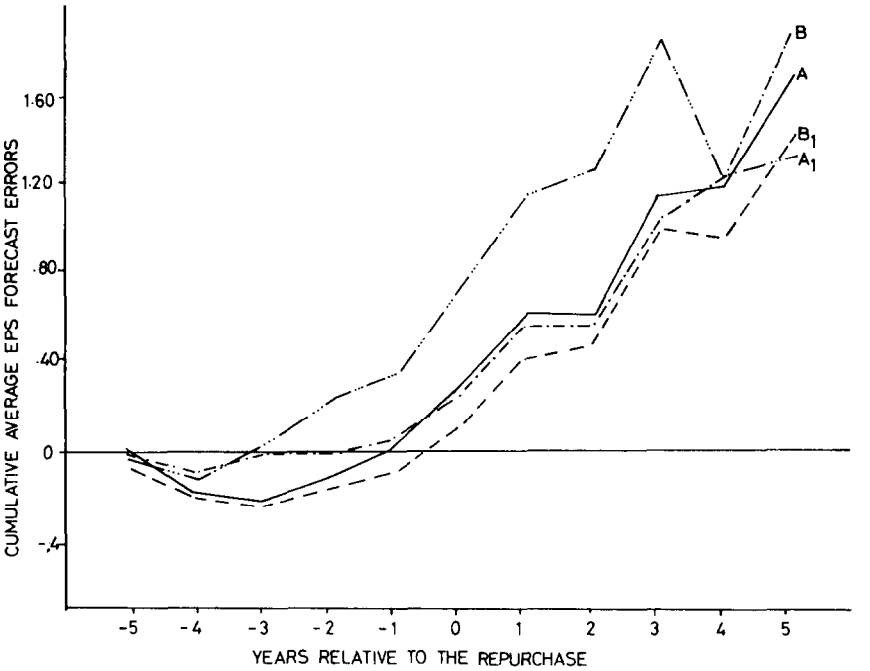

Fig. 2. Cumulative average standardized earnings per share forecast errors (*CASFE*) 5 years before the repurchase tender offer until 5 years after; *A* refers to the *CASFE* computed on the basis of a Martingale *EPS* forecast model [model A in eq. (10)]; *B* refers to the *CASFE* computed on the basis of an *EPS* forecast model which incorporates contemporary market effects and a trend variable [model B in eq. (13)]. A_1 and B_1 refer to the *CASFE* computed on the basis of models A and B, excluding offers announced in 1973 and 1974.

controls (August 1971 to June 1974). In the preceding 10 years from 1962 until July 1971 only 32 offers were found. This period was also characterized by, to quote Ellis (1965), an 'unfavorable aura' surrounding stock regression 13.1 in table 13 shows that the signalling model explains only the 'dangers'[16] of repurchasing (bondholder expropriation, tax-evasion on dividends and buying out the uninformed shareholder at a price below the true market value of the securities). Table 12 shows that during this period, the premium, the fraction of insider holdings and the value of information were lower, on the average, than during the period of controls. In addition, regression 13.1 in table 13 shows that the signalling model explains only 22.3% of the variance of the abnormal returns and all the independent variables, except F_p/F^*, are statistically insignificant. The lack of significance could, of course, be explained by the lack of a sufficient number of observations, but it is remarkable that the premium is extremely insignificant (e.g. the simple correlation coefficient of the premium and the value of

[16]Quote from Hunt, Williams and Donaldson (1971, p. 485).

Table 12

Sample characteristics of tender offers in three subperiods: before, during and after the controls on dividend increases (median values in parentheses).

Subperiod	Number of observations	Mean (and median) values of:[a] *INFO*	Premium	F^*	FI_0	Median market value (÷1,000)
Jan. 1962 to July 1971	32	0.056 (0.052)	0.116 (0.106)	0.135 (0.090)	0.109 (0.034)	59051
Aug. 1971 to June 1974	52	0.193 (0.184)	0.264 (0.224)	0.140 (0.11)	0.175 (0.078)	21883
July 1974 to Dec. 1977	47	0.186 (0.168)	0.263 (0.231)	0.172 (0.14)	0.220 (0.161)	23572

[a]*INFO* = total abnormal return per share; F^* = target fraction; FI_0 = fraction of insider holdings; Premium = tender price ÷ price per share 5 days before the announcement − 1.

information equals 0.026 compared to 0.760 for the total sample; interestingly, this result demonstrates that our methodology to compute *INFO* does not induce spurious correlation with the premium). These results are consistent with the hypothesis that during the 'negative climate' years, few firms announced repurchases via tender offer and many of these repurchased stock for non-signalling type reasons (without having a significant impact on stock prices).

When controls were imposed, premia increased from 11.61 to 26.41%, on the average (see table 12), and the average value of information almost quadrupled from 5.61 to 19.3%. In addition, the median firm size fell from 59 to 21.9 million dollars. While an increase in repurchasing activity, in itself, is expected because firms want to supplement their dividend payments with a stock repurchase, the increase in the premiums and the value of information and the decrease in the size of the repurchasing firms is not. If anything, one would expect exactly the opposite to happen if more firms merely wanted to get rid of 'excess' cash. A more plausible explanation, which is consistent with the hypothesis that dividends are signals, is that when the government prohibited (or increased the cost of) dividend signalling, small firms were able to get around the restriction by using stock repurchases as an alternative signal. The second regression in table 13 is consistent with this story: the signalling model explains 65.52% of the variance of the abnormal returns and this time the premium, and the target fraction, are statistically significant.[17]

[17]The insider holdings variable is not significant, however. This may be due to the fact that proxy statements were not available to us prior to 1973, so that for many offers the fraction of insider holdings had to be estimated via the 'indirect method' (see above). Other explanations (e.g., correlation with an omitted compensation variable) are of course possible.

Table 13

Regression coefficients of the value of information on signalling variables[a] for three subperiods (t-values in parentheses[b]).

Subperiod	Number of observations	Signalling variables[c]					R^{2d}	F^e
		Constant	Premium	F^*	$\ln(FI_0)$	F_p/F^*		
Jan. 1962 to July 1971	32	0.018	0.012	0.159	0.008	0.044	0.223	1.94
		(0.55)	(0.01)	(1.46)	(1.11)	(2.55)*		
Aug. 1971 to June 1974	52	−0.080	0.625	0.382	−0.011	0.021	0.655	22.33
		(−1.39)	(8.08)*	(2.50)*	(−1.08)	(0.89)		
July 1974 to Dec. 1977	47	−0.001	0.543	0.342	0.021	0.027	0.650	19.52
		(−0.03)	(5.17)*	(2.14)*	(2.37)*	(2.00)*		

[a]Dependent variable, value of information measured by eq. (5).

[b]Significance at the 5% significance level indicated by asterisks.

[c]F^* = target fraction; FI_0 = fraction of insider holdings; F_p = fraction purchased; Premium = tender price ÷ price per share 5 days before the announcement − 1.

[d]Multiple correlation coefficient.

[e]F-statistic.

Another intriguing observation is that, while during 1972, the first year of the controls, seven offers were found (which is more than in any previous year), the real boom in repurchasing activity started in 1973 when 32 tender offers and 112 open market purchase announcements were made, most of them in the first six months of 1973. Why did firms wait until 1973 to signal? We suggest two possible explanations. First, parallel with the 'voluntary' dividend controls, *mandatory* wage controls were imposed from August 1971 until January 1973. Controls on wages specifically included controls on all forms of managerial compensation: e.g. during Phase I (August 1971 to November 1971) managers were not allowed to exercise stock options and the compliance with the restrictions was enforced by the Pay Board. On January 12, 1973, Nixon abolished the Pay Board and the mandatory wage controls (substituting a quasi-'voluntary' Phase III system) and allowed larger wage increases 'to reflect qualified fringe benefits'.[18] Restrictions on dividend increases remained unchanged because, to quote Nixon,[19] 'the present voluntary program is highly successful'. In the next six months, 21 tender offers and 83 open market purchases were announced (see also table 1). So one possible explanation is that, by restricting wages and other forms of executive compensation (e.g. stock options), the government reduced the incentives for managers to act in the best interest of the non-insider shareholders.[20] An alternative explanation is provided by the findings reported by Bradley (1979) in a study of *interfirm* cash tender offers. Bradley reports that 29 percent of the tender offers in his sample (which covers the period 1962 to 1977) occur during 1973 and 1974. So, it seems likely that during merger and takeover waves, managerial signalling incentives increase, because managers want to prevent the firm from being taken over at a value below the 'true' value of the shares.

After the dividend controls were lifted, premia and abnormal returns are very similar in magnitude to the ones during the control years, on the average (see table 12). The average number of tender offers per month fell from 1.48 to 1.11, but not to the pre-control level (0.31). Several explanations for the apparent prevailing 'popularity' of repurchase signalling are possible. First, because no repurchases resulted in lawsuits (something which might

[18] *Wall Street Journal*, January 15, 1973, p. 3. For a discussion of the impact of the controls on managerial compensation, see Dooskin (1973) and Hirschtick (1973).

[19] *Wall Street Journal*, January 15, 1973, p. 4.

[20] Why did some firms obey the 'voluntary' dividend controls and not the 'voluntary' wage controls? First, dividend restrictions were much easier to monitor than the quite complicated controls on executive compensation. Second, during Phase III some incentive compensation plans were specifically exempted from Phase II regulation: new incentive plans could now be adopted without specific Government approval. This change in regulation (together with other rules on managerial compensation) was first made public in March 1973, which is also the 'hottest' open market purchase month in our entire observation period when 34 announcements were made.

have been expected during the 'negative aura') the expected costs of signalling via repurchases decreased relative to the cost of alternative signalling mechanisms. Another explanation may be that managerial incentives to signal (in small firms) increased over time. E.g. the prevailing popularity of takeover bids [reported by Bradley (1979)] may have kept signalling incentives alive during the post-1974 period. Note from table 13 that after the lifting of controls, and with only 47 observations, the signalling model explains 65% of the variance and all the signals are significant at the 5% significance level.

5.6. *Open market purchases and market signalling*

All the signalling arguments so far apply to tender offers only. With regard to open market purchases, our results are less conclusive, but nevertheless suggest that the signalling hypothesis is the most plausible explanation for the abnormal returns.

Considering the small size of the fraction purchased and the long period over which they are executed, it seems unlikely that open market purchases represent a shift in the target leverage ratio (as implied by the leverage hypothesis) or an attempt to expropriate the bondholders. Also, results reported in other studies [e.g. Lane (1976)] indicate that open market purchases are predominantly financed with cash. With regard to the dividend hypothesis, if managers could decrease the personal tax bill of the shareholders (including their own) by repurchasing stock as an alternative to paying a dividend, then it is not clear why they first felt the need to do this via a public announcement during the period of dividend controls (and not thereafter), when 63% of the open market purchases were announced. The explanation that more firms merely wanted to get ride of 'excess' cash in this period is not very satisfactory: as shown before, the announcement abnormal return was higher in 1973 and 1974 than in the overall period. Moreover, a personal tax effect by itself cannot explain a 3.37% abnormal *daily* return.

Because firms do not pay premia in this case, however, we cannot apply the same signalling model as in the tender offer case. An alternative explanation, which is based on the unanimous results reported by all the company surveys we found, can be formulated as follows: because firms predominantly reissue the shares to insiders via stock option and deferred stock compensation plans, the repurchase will generally be perceived as a transfer of stock from outsiders to insiders. The finding that stock repurchases convey positive information is therefore consistent with the extensively documented results [e.g. see Jaffe (1974), Scholes (1972), Downes and Heinkel (1979), and Ritter (1980), among others], that increased insider buying is a good signal (and selling is a bad signal). Further research is needed but is beyond the scope of this paper.

6. Relationship to other research

The thesis that the abnormal returns are explained by the signalling hypothesis, rather than by corporate tax effects, is consistent with the conclusions of Dann (1981) but competes directly and indirectly with the arguments made by Ron Masulis in two recent studies on repurchases and exchange offers. The purpose of this section is to review his evidence and relate it to the findings reported in our study.

6.1. Repurchases

Masulis (1980a) claims to find evidence on the existence of tax effects by splitting up a sample of 199 repurchases via tender offers. In a subsample of offers with more than 50% debt-financing he reports a 21.9% (announcement) return compared to a 17.1% abnormal return in the subsample less than 50% debt-financing. However, he also reports an average premium (the most significant variable in our signalling model) for these two samples of 27 and 23%, respectively. On the basis of our signalling model and on the basis of the difference in premia (assuming a regression coefficient on the premium of 0.6 and ignoring the difference in the method to compute the value of information), we could expect a difference of 0.6(27 $-23)=2.4\%$. Moreover, as shown before, premia, target fractions and insider holdings are significantly positively correlated, so that the significance of the 'financing' effect in order to explain the remaining 2.4% difference is further reduced. The finding that, when a firm offers a large premium, or equivalently, when the dollar value of the repurchase (relative to the market value of the shares) is higher, firms have to borrow in order to finance the repurchase is, of course, not surprising.

A counterargument could be that, because the premium is the most significant variable and repurchases financed with debt have higher premia, the tax or leverage hypothesis and the signalling hypothesis are empirically indistinguishable. However, Vermaelen (1980) finds that, adding a dummy variable (which equals 1 when the offer is financed with debt, and 0 otherwise) to our signalling model adds a mere 1% to the explained variance of the abnormal returns and the coefficient on the dummy variable is insignificant ($t=1.38$). This lack of significance may well be caused by the limited number of observations (only for 62 offers data on the financing mode are available), but the results suggest that the impact of the financing mode is trivial relative to the impact of the premium.

6.2. Exchange offers

Masulis (1978, 1980b) examines a sample of 117 debt-equity exchange offers and finds an abnormal two-day stock return of 6.9% for the day of the

announcement and the following day. Using a cross-sectional analysis, he reports a debt tax shield of about 19 cents per dollar exchanged, while the remaining abnormal return is explained on the basis of expropriation of incompletely protected 'old' debt and preferred stock.

It should be emphasized that leverage-increasing exchange offers are very similar to repurchases via tender offer: in both cases premia are offered to repurchase stock. During exchange offers the repurchase is financed with debt, while repurchase tender offers can also be financed with cash. In our signalling model, the financing mode was not considered as an additional explanatory variable, so that our analysis should apply to exchange offers as well. Another observation which makes exchange offers similar to repurchases is that 30.1% of the leverage-increasing exchange offers in Masulis' sample are announced during the period of dividend controls.

Taking a closer look at Masulis tax-variable, it turns out that it is correlated with two signals in our model: the premium and the target fraction. In order to see this, consider the two factors which he includes in this tax-variable:

(i) the difference between the face value and the market value of debt, which is a tax deductible expense;
(ii) the present value of tax deductions from interest payments on the new debt, which, under the assumption of a perpetuity, equals the corporate tax rate multiplied by the market value of the new debt issued.

Considering the relatively small magnitude of the first tax shield, the total tax benefit can essentially be approximated by the second factor which equals $T_c \cdot D$, where T_c = marginal tax rate on corporate income, and D = market value of the newly issued debt = $P_T F_p N_0$ where N_0, F_p and P_T are defined as in our signalling model.

Masulis then regresses the abnormal rate of return on equity on the 'tax' variable defined as $P_T F_p N_0 / P_0 N_0 = P_T F_p / P_0$. It is clear that this variable is expected to be positively correlated with the premium and the target fraction signal.

Using our 49 tender offers financed with *cash*, we replicated Masulis' relationship between the abnormal stock returns and the 'tax' variable $P_T F_p / P_0$. The resulting regression equation equals (with t-values in parentheses)

$$INFO = \underset{}{0.045} + \underset{(4.08)}{0.08}\ P_T F_P / P_0.$$
$$\qquad\quad (1.19)$$

The regression explains 26% of the variance and $P_T F_p / P_0$ is significant at the 0.1% significance level, a result which strongly suggests that the variable

should not be used as a proxy for the tax shield. Note that the signalling hypothesis applies to debt-equity exchange offers which result in a leverage *increase*. Masulis (1980b) finds that debt-equity exchange offers which result in a leverage *decrease* are followed by abnormal negative announcement returns, which is consistent with the leverage or tax hypotheses, but also with an information hypothesis: the fact that firms are buying bonds at a premium (or selling shares at a discount) may be perceived as a negative signal. In this case, however, the managerial incentives are not clear cut, but this criticism applies to the leverage hypothesis too.

It should be emphasized that the signalling and leverage hypotheses are not mutually exclusive, so the above discussion should not be interpreted as a 'proof' that no tax effects exist. Moreover, Masulis notes that some of the exchange offers are 'minimum' limit offers: management may cancel the offer if an insufficient number of shares is tendered. The existence of minimum limits is hard to explain in a signalling (or leverage) framework, so that exchange offers are similar but not identical to repurchase tender offers. We believe the similarity to be strong enough, however, to argue for a re-examination of exchange offers in a framework which includes the signalling hypothesis, and this is the main purpose of relating our evidence to Masulis' results.

7. Conclusions

Firms which repurchase their own shares experience a permanent increase in stock price, on the average.

Although it is impossible to exclude the existence of small tax or expropriation effects, the information hypothesis seems to explain to a large extent (or at least more than any alternative hypothesis) the abnormal returns observed after a *tender offer*: on the average, firms offer to repurchase part of their shares at a premium when they have positive information about future earnings. In particular, the signalling hypothesis is consistent with the following four independent findings:

(1) The market sets prices around the announcement date according to the predictions of a Spence (1973)-type signalling model which includes the premium, the target fraction and the fraction of insider holdings as signals. The model explains more than 60% of the variance of the abnormal returns and all the signals are significant at the 5% significance level.

(2) Most of the repurchasing firms are small firms, predominantly held by insiders, who commit themselves not to tender their shares. Therefore, managers are able to convince the market that they will carry a significant part of the burden if the firm repurchases part of the shares at a premium above their true value.

(3) Firms started offering large premia for their own shares in the period of controls on dividend increases. The average offer information content during this period is approximately four times as large as during the preceding period. This is consistent with the joint hypothesis that dividends are signals [as argued by Bhattacharya (1979, 1980), among others], and that small firms were able to get around the restrictions by signalling via an alternative signalling mechanism. This result is also consistent with the arguments made by Scholes (1973) in order to explain the 'fuss' which the dividend controls created.
(4) Finally, repurchases via tender offer are followed by significant earnings per share forecast errors. This result is based on the prediction of two independent forecast models.

When they signal the information, firms generally offer to repurchase at a price above the value of information per share. This policy is most likely motivated by the need to comply with the anti-manipulation and anti-fraud provisions of the Securities and Exchange Act of 1934: Setting the offer price below the value of information may result in lawsuits by the shareholders who tendered their shares. To avoid lawsuits from the shareholders who don't tender their shares, the insiders commit themselves not to participate in the offer: insiders have not expropriated them for their own advantage, and, moreover, the non-tendering shareholders may be better off than if the tender offer had not been made.

The market realizes this and expects the price of the shares to decrease after the expiration of the offer, but not below its pre-announcement level. This is true regardless of the outcome of the offer, implying that when investors are deciding whether they will tender their shares to the company, they consider other factors besides the market value (before taxes and transaction costs) of their holdings: transaction costs to rebalance portfolios or to offset personal tax liabilities as a result of realizing a capital gain reduce the advantage of receiving the tender offer price.

For *open market purchases*, the results are less conclusive but are consistent with an information hypothesis if repurchases can be perceived as an indirect form of insider buying via executive stock compensation plans.

7.1. Implications for regulation

(i) The evidence suggests that repurchase announcements make the market more efficient by allowing firms to correct mispricing of their securities. In this respect, it seems quite ironic that, while a large body of theoretical literature argues for government regulation as a solution to asymmetric information problems, at the same time (non-American)

government intervention has been depriving firms from an important signalling tool by denouncing repurchases as an illegal activity.

(ii) All our results are only valid for repurchases announced in the *Wall Street Journal*. Firms repurchase shares for many other, non-signalling type reasons. If the S.E.C. would respond to outcries for increased disclosure, it may well reduce the information content of repurchases by making it more difficult for shareholders to distinguish signalling firms and firms which repurchase shares for other reasons.

(iii) No evidence is found that tendering shareholders or bondholders are expropriated by insiders or other non-tendering shareholders. Non-tendering shareholders are worse off than tendering shareholders (before taxes and transactions costs) but they may well be better off than if the offer had not been announced, provided the repurchase was the most effective signalling mechanism. Finally, without data on executive compensation and/or side payments, it is impossible to determine whether insider-managers are benefiting more than the other shareholders. In any case, similar to egalitarian arguments for a 'fair' income distribution, the preoccupation of the legislature with trying to ensure a 'fair' premium[21] ignores that the tender offer is not a zero-sum game: some degree of 'unfairness' may be necessary to induce managers to produce publicly available information.

7.2. *Implications for previous and future research*

The main contribution of this paper is the empirical finding that firms engage in signalling activities. This finding has important implications for previous studies which do not consider signalling as an alternative hypothesis when explaining company-specific events; specifically, it is suggested that Masulis' (1978) analysis of exchange offers may not be able to distinguish between the leverage and signalling hypotheses because of the strong similarity between exchange offers and repurchases. Further research is needed to resolve the issue. Finally, it should be re-emphasized that our signalling model implicitly assumes that managerial incentives to signal are equal across firms. Further research is needed [e.g. within a Miller and Scholes (1980) framework] to investigate the impact of executive compensation schemes on (i) the value of information, as assessed by the market after the repurchase, and (ii) the managerial decisions with respect to the value of the premium, and the fraction repurchased.

[21]E.g. in February 1978, the Supreme Court of British Columbia ruled that companies making share-repurchase offers must prove the offering price is 'fair and equitable'.

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