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THE EFFECT OF SHARE REPURCHASE ON THE VALUE OF THE FIRM*

EDWIN ELTON AND MARTIN GRUBER†

Corporate repurchase of their own common stock has become an increasingly important phenomena. Some idea of its importance can be seen from the statistics gathered by Guthard [4]. He found that from 1963 to 1965 the number of shares repurchased grew from 26.6 million to 37.2 million. He also found that in 1965 the dollar volume of share repurchase exceeded the funds raised through the issuance of common stock by one third.

As share repurchase has become an increasingly important phenomena, it has received increasing attention in the financial literature. Most of the articles have stressed the magnitude of share repurchase and employed a combination of speculation and management survey in an attempt to explain the increasing use of share repurchase. The one exception is a recent article in the Journal of Finance by Bierman and West [1]. They examined the effect of share repurchase vis-à-vis cash dividend payments on the value of the firm, and found a tax advantage to be the only motivation for the use of share repurchase as a method of cash disbursement.

This paper will also examine the effect of share repurchase, as a method of cash disbursement, on the value of the firm. However, by taking the analysis well beyond the artificial world of Bierman and West we find that there are other reasons that account for the use of share repurchase as a method of cash disbursements, as well as many factors that tend to cause cash dividends to be the superior form of cash disbursement. In the course of this paper, we will also show that there are several fundamental errors in the analysis of Bierman and West that significantly change the magnitude of the tax advantage of share repurchase even in their highly artificial world.

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1. See, for example, Brigham (2), Ellis (3), Guthard (4), Merjas (5), and Wood and Brigham (6).

2. We are holding the size of the cash disbursement constant. This paper only deals with the effect of a change in the form of cash disbursement on the value of the firm.

3. There are three errors in the analysis of Bierman and West that significantly affect the relative advantage of share repurchase. The error discussed in (a) causes an under estimation of the value of share repurchase, while the errors discussed in (b) and (c) cause an over estimation of the value of share repurchase.

(a) Bierman and West assert that the value of the firm is the present value of the return to the current stockholders (equation 1, page 691). However, within a maximum time of 1 period the after-tax return to the current stockholders of a firm that uses share repurchase will be less than the after-tax return to new stockholders. This is true because the tax saving of share repurchase
This paper is divided into three sections. In the first section, we present the effect of share repurchase on the value of the firm in the artificial world of no transaction costs and homogeneous stockholders. We first assume that stockholders sell their entire holdings and then we assume that they sell only enough stock so as to receive the same pre-tax cash disbursement under share repurchase as they would with a cash dividend. In the second section, we introduce transaction costs to see if our conclusions still hold. Finally, we analyze the effect of heterogeneous stockholders on the form of dividend payment.

I. THE ANALYSIS WITH HOMOGENEOUS STOCKHOLDERS AND NO TRANSACTION COSTS

In this section we will show the superiority of share repurchase compared to a cash dividend as a method of cash disbursement under the condition of homogeneous stockholders and in the absence of transaction costs. Stockholders are assumed to be homogeneous with respect to the initial price paid, the length of time they wish to hold the stock, tax rates, expectations, and their desire for current income. Initially, we will assume that the benefits from any plan can be measured by the after-tax liquidation value of the stockholders investment. Under this assumption we will compare stock repurchase with cash dividend payments and introduce a mechanism to allow all stockholders to retain their percentage ownership in the firm after share repurchase. We will then drop this assumption and compare differences in the timing of taxes on the value of the two forms of cash disbursement.

In order to illustrate the advantage of share repurchase, let us postulate a firm which can pursue either of two courses of action:

Plan A: Pay a cash dividend equal to D
Plan B: Purchase an amount of stock with an aggregate market value equal to D

The first question to answer is, if the company does repurchase stock what price must it pay in order to receive the amount of stock it wishes to repurchase. The minimum price it must offer to induce stockholders to sell is that price which leaves a seller of stock no worse off than a holder (the equilibrium price). Any lower price would mean a seller of stock would suffer a decrease in greatest to those who paid the most for their shares (see section III of our paper). Since this advantage increases as time passes, eventually new stockholders will find it worthwhile to take advantage of this increased return and will bid the price of the stock above the value to the current stockholders. The current stockholders will benefit from this increased price and their return will be above that forecasted by Bierman and West.

(b) Bierman and West assume that stockholders will hold their stock for an infinite amount of time. In reality, of course, long before infinity the stockholder will either sell the stock (we just presented one good reason for stock sales), give it away, or die. As we will show later (see section I of our paper) the fact that a stockholder will only hold stock for a finite period of time significantly affects the value of stock repurchase relative to cash dividends as a method of disbursing cash.

(c) Bierman and West assume that the stock is purchased at the price that will prevail immediately before the cash disbursement following the valuation date. The price of the stock at the moment at which they value it is lower than their assumed cost by the amount of cash disbursement per share. As we will show in our paper, the value of share repurchase is a function of the price paid for the stock (see sections I and III). Bierman and West have made an exceedingly favorable assumption increasing the value of share repurchase.
Share Repurchase and the Value of the Firm

in wealth and the firm would have difficulty repurchasing the desired number of shares. The firm could of course always offer a price above the equilibrium price. However, there is no reason for the firm to do so, and the result of such action would be an arbitrary redistribution of wealth in favor of sellers.\(^4\)

Let:

\[ D = \text{aggregate dividend the firm intends to pay}, \]
\[ E = \text{aggregate earnings of the firm}, \]
\[ M = \text{multiple of earnings at which stock will sell (ex dividend)}, \]
\[ Y = \text{number of shares before stock repurchase}, \]
\[ P_B = \text{the equilibrium price under Plan B}, \]
\[ P_A = \text{the price at which the stock sells under Plan A ex dividend} \left( \frac{EM}{Y} \right), \]
\[ X = \text{the number of shares bought by the company}. \]

The number of shares the company purchases is equal to the total cash disbursement it wishes to make \((D)\) divided by the price it pays for the shares.

\[ X = \frac{D}{P_B} \quad (1) \]

As explained above shares should be repurchased at the market price that will prevail after repurchase. This price will be equal to the earnings per share after repurchase times the price-earnings multiple (ex dividend).

\[ P_B = \frac{E}{Y} - \frac{D}{P_B} \cdot M \quad (2) \]

Solving for \(P_B\)\(^5\)

\[ P_B = \frac{EM + D}{Y} = P_A + \frac{D}{Y} \quad (3) \]

Thus from (3), any stock the firm repurchases should be bought at a price equal to the price at which a share of stock would have sold had a cash dividend been paid, plus the amount of the cash dividend that would have been paid per share.

Having arrived at the equilibrium price at which shares should be repurchased, we can now compare the effect on the value of the firm of both share

\(^4\) Because sellers will be in a favorable position vis-a-vis buyers when the firm offers a price above the equilibrium price the firm will be in the undesirable position of:

1. rewarding people who disassociate themselves from the firm at the expense of future stockholders;

2. having to devise an arbitrary allocative scheme to decide which stockholders should benefit from the share repurchase.

If the firm offers to repurchase the stock above the equilibrium price, the figures used in the latter sections of this paper would have to be modified slightly to take account of the effect of the allocative scheme the firm uses on transaction costs and taxes.

\(^5\) The number of shares to be repurchased can be seen by solving (3) for \(D\) and substituting this expression into 1. This yields:

\[ X = \frac{P_B - P_A}{P_B} \quad (11) \]
repurchase and a cash dividend. The results of this comparison are contained in Table 1. The after-tax wealth of the original stockholders under both methods of cash disbursements contains two components. The first component, composed of the two terms \((\text{ME} - C) \cdot (1 - G) + C\), represents the after-tax value of the firm to the stockholders after cash disbursement. In this example, we have assumed that the multiple of earnings (or dividends) at which the stock sells is the same after each course of action. If the stockholder expected stock repurchase to be the future form of cash disbursement, then the value of the firm and hence the price-earnings multiple would increase because his after-tax cash receipts in future years would increase. This would further increase the relative advantage of Plan B. In this example and in future examples, we will continue to make the conservative assumption that the method of cash disbursement does not affect the price-earnings ratio. If the wealth of the stockholders increases by stock repurchase under this conservative assumption, it will be further increased under a more realistic set of assumptions.\(^6\) The second component of the after-tax wealth of the original stockholders is the after-tax value of the cash disbursement, \(\text{D} \cdot (1 - I)\) in the case of Plan A and \(\text{D} \cdot (1 - G)\) in the case of Plan B.

Therefore, the difference in stockholder wealth between a firm following Plan B and one following Plan A will be \(\text{D} \cdot (I - G)\). Assuming that the stockholder recognizes the purchase of stock as a method of cash payment, a firm following Plan B will be worth more than one following Plan A by an amount equal to the difference between the income tax rate and the capital gains tax rate, times the amount of money that the corporation wishes to pay out.

At this point it is desirable to introduce a mechanism that will allow the maintenance of proportional ownership under conditions of share repurchase. The problem is to come up with a mechanism that allows owners to collect the same payment they would have received with a cash dividend without being confronted with the impossibility of selling off fractional shares. This is a problem that will become more and more acute over time as the firm continues to repurchase its own stock.\(^7\)

The firm can accomplish this set of objectives by the payment of a stock dividend equal in market value to the amount of cash the company wished to disperse and the subsequent repurchase of an amount of stock equal to the stock dividend at a price equal to the price that would have prevailed after the payment of a cash dividend.\(^8\)

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6. The only circumstance that the multiplier under Plan B might be less than the multiplier under Plan A is if the stockholders did not recognize stock repurchase as a form of cash disbursement or if transaction costs were so large that Plan A was more favorable than Plan B.

7. Through Biteman and West suggest (as do we) a stock dividend equivalent in amount to the stock repurchased their model does not solve the problem of the sale of fractional shares since their stock dividend takes place after the repurchase of shares.

8. This result can be shown in the following manner. The hardest case to satisfy is that of the owner of one share of stock. The owner of one share will be left with a whole number of shares if the company issues an amount of stock equal to the amount it buys back. Consequently, \(X = Z\), where:

- \(Z\) = the number of shares issued in the stock dividend.
- \(X\) = the number of shares the company buys back.
- \(P_D\) = the price after the stock dividend and share repurchase.
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<td><strong>After tax wealth of original stockholders</strong></td>
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\[
\begin{align*}
D &= \frac{D}{ME + D} = \frac{D}{PB \cdot Y} \\
\frac{E}{Y} &= \frac{E}{Y \left(1 - \frac{D}{ME + D}\right)} \\
PB &= \frac{ME + D}{Y} \\
V_D &= \frac{VD}{ME + D} \\
\left(\frac{VD}{ME + D}\right) \left(\frac{ME + D}{Y}\right) &= D \\
\left(\frac{D}{ME + D}\right) \left(\frac{1}{Y}\right) &= \frac{ME}{Y \left(1 - \frac{D}{ME + D}\right)} \\
(\text{ME} - C)(1 - G) + C + D(1 - I) &= (\text{ME} - C)(1 - G) + C + D(1 - G)
\end{align*}

*This entry is explained in detail in the text.*

Where

- \(I\) = marginal income tax rate of the firm's investors
- \(G\) = marginal capital gains tax rate of the firm's investors
- \(M\) = multiple of earnings at which a share of stock will sell
- \(C\) = original cost of the stock
Modification Because of the Timing and Incidence of Taxes--Up to this point, we have demonstrated that the value of a firm will increase by an amount equal to $D (1 - G)$, if the firm disburses funds through the repurchase of stock rather than through the payment of a cash dividend. In calculating this differential, we have neglected certain revenue and cost elements which should be incorporated to bring the analysis closer to reality.

First of all, the differential advantage of Plan B over Plan A was calculated on the assumption that the stockholder would liquidate his holdings in the corporation immediately after the cash disbursement was made. It is much more realistic to assume that stockholders in the aggregate will only sell an amount of stock under Plan B equal in market price to the dividend they would have received under Plan A. Under this assumption if the firm issued a cash dividend the stockholder would still pay taxes equal to $ID$. On the other hand, if the firm used share repurchase the stockholder would no longer pay taxes of $GD$ since he could allocate part of his initial cost to the stock sold. Because the stockholder has used up part of the tax shield associated with his initial cost, his taxes will be increased in the year $(t)$, in which he sells his entire holdings (relative to the tax if either a dividend had not been paid or a cash dividend had been paid). The increase in taxes in year $t$ will be exactly equal to the decrease in the current period so that the total affect is a tax postponement rather than a tax saving. The reduction of taxes in the initial period is equal to the stockholders initial cost $(C)$ times the fraction of stock sold $\frac{D}{ME + D}$ times the capital gains tax $(G)$ or $\frac{GDC}{ME + D}$. If $r$ is the marginal value of money to the investors, then the present value of the additional tax $\frac{GDC}{(1 + r)^t}$ in year $(t)$ will be $\frac{ME + D}{(1 + r)^t}$.

Consequently, the tax associated with Plan B is:

$$\left[ GD \left( 1 - \frac{C}{ME + D} + \frac{C}{(ME + D)(1 + r)^t} \right) \right]$$

We also know that the price after the stock split and subsequent repurchase must be equal to the earnings per share times the ex dividend multiplier:

$$P_D = \frac{E}{Y + Z - X} M$$

Substituting $X$ for $Z$ and simplifying we get:

$$P_D = \frac{EM}{Y} = P_A$$

Thus the price after the split and repurchase must equal the market price that would have prevailed had Plan A been followed.

9. If a larger number of shares were sold, it would not affect the analysis, for it would not be incremental to the value of Plans A and B. The stockholders might well sell fewer shares than above since the amount of post-tax income received by the stockholders for any amount of pre-tax disbursement by the corporation is larger under B. If the stockholders did in fact sell fewer shares, the value of Plan B relative to Plan A would again be increased.
and the differential value of Plan B becomes:

$$D \left[ I - G \left( 1 - \frac{C}{ME + D} + \frac{C}{(1 + r)^t} \right) \right]$$

(5)

Thus the value of Plan B has been further increased by the value of an interest-free loan in the amount of \( \frac{CDG}{ME + D} \) for a period of \( t \) years.

It is evident from equation (4) that Plan B allows capital gains taxes to be postponed but not avoided.\(^{10}\) Nevertheless, as \( t \) takes on very large values, the cost of repayment approaches 0. But even this model is an over-simplification, for it is possible to avoid the repayment of the postponed element of the capital gains tax by:

1. **Dying** (the stock becomes part of the stockholder's estate valued at the market price at the time of death).

2. **Giving the stock away** (the stockholder is given credit for a contribution equal to the market price of the stock at the time of donation if the stock is given to a legally recognized charitable organization or school).

Assuming that the utility of a gift is equivalent to that derived from the same number of dollars of wealth, the incremental value of Plan B is increased by:

$$\frac{CGD}{ME + D} \frac{1}{(1 + r)^t}$$

10. In the absence of taxes Plan A and Plan B would be equivalent, Bierman and West \([1]\) reached a similar conclusion. They asserted that in the absence of taxes the value of the firm is independent of the form of cash disbursement and is equal to \(-\). But their final evaluation equation (13) does not lead to these conclusions. Instead, equation 13 leads to the expression:

$$V_0 = \frac{D}{2r} \left[ \alpha - r (1 - \alpha) - \left( r(1 - \alpha - \alpha)^2 + 4(1 - \alpha) (1 + r) \right) \right]$$

and the value of the firm is clearly a function of \( \alpha \) (the fraction of the total cash disbursement made in the form of a cash dividend). The fact that their final valuation equation (equation 13) is inconsistent with both the initial model from which it was derived (equation 1) and their conclusions, is a result of an error in its derivation. In footnote 24, they assert that a firm with a constant stream of cash disbursements will decline in value, immediately after a cash disbursement, by an amount equal to that portion of the cash disbursement that is in the form of share repurchase. Furthermore, the value of the firm will have risen to its former level before the next disbursement \( V = V_0 + D(1 - \alpha) \). However, it is well known that the value of the firm also declines after a cash dividend. Consequently, between disbursements the value of the firm should rise the anticipated amount of the total cash disbursement (not just the amount of share repurchase) and the equation should be \( V = V_0 + D \). Using the corrected expression, their fundamental valuation equation (equation 13) becomes:

$$V = \frac{D}{2r} \left[ \alpha(1 - t_o) + \left( r - \alpha(1 - t_o) \right)^2 \right.$$

$$- 4 \left( t_o (1 - \alpha)^2 + (-1 + r - \alpha + r \alpha (1 - \alpha + r)) \right)^{1/2}$$

Bierman and West's conclusions hold using the corrected form of equation 13 and operating in their highly artificial world.
Similarly, if the stockholder is as content with an increment of value being added to his estate as he is with an increment in wealth while he is alive, the differential value of Plan B is increased to

\[
D \left[ I - G \left( I - \frac{C}{ME + D + \frac{C}{(1+r)^t} \cdot P_t} \right) \right]
\]

(6)

Where \( P_t \) represents the probability that the stockholder will live through year \( t \) at which time he intends to sell the stock.\(^{11}\)

Thus, the fact that man is mortal and occasionally philanthropic increases the value of Plan B relative to Plan A.

II. Modifications Because of Transaction Costs

We have just shown that if there are no transaction costs and the stockholders' marginal income tax rate exceeds their capital gains rate, the value of share repurchase exceeds the value of a cash dividend. The presence of transaction costs may at times favor the payment of a cash dividend while the combined influence of transaction costs and taxes might at times favor the use of stock repurchase and at times a cash dividend.

There are three relevant types of transaction costs: the cost of paying a cash dividend, the cost of repurchasing shares, and the cost of a stock dividend.

Let:

\( T_s \) = transaction costs of paying a cash dividend per holder of record.
\( T_h \) = transaction costs of paying a stock dividend per holder of record.
\( T_a \) = transaction costs associated with repurchase per letter of transmittal.
\( H \) = number of holders of record.
\( L \) = letters of transmittal received.

The firm has \( D \) dollars available for distribution to the stockholders. If the firm uses a cash dividend, it must pay transaction costs of \((T_sH)\). This reduces the actual cash distributed to the stockholders to \( D - T_sH \). The after-tax value of this distribution is equal to: \((D - T_sH) (1 - I)\). (7)

If the firm uses share repurchase, it must pay transaction costs of \((T_h + T_aL)\). This reduces the dollars available for share repurchase to \( D - (T_sH + T_aL) \). Substituting the new amount available for share repurchase into equation (4) yields:

\[
[D - (T_sH + T_aL)] \cdot
\]

\[
I - G \left( I - \frac{C}{ME + D - (T_sH + T_aL)} + \frac{C}{ME + D - (T_sH + T_aL)} \cdot P_t \right)
\]

(8)

This equation represents the after-tax and after-transaction costs value of share repurchase. Which of these forms of cash disbursement is most favorable

\(^{11}\) \( P_t \) could easily be computed with the aid of mortality table.
to stockholders depends on the values of equation 7 and 8 or whether the tax advantage of share repurchase is sufficient to compensate for the differences in transaction costs.

For the stockholders to be indifferent between Plan A and Plan B equation 7 must equal equation 8.

Solving this equality for the income tax rate that would make a stockholder indifferent between Plan A and Plan B we get:

$$I = \frac{T_nL + T_sH - T_sH}{(D - T_sH) - \frac{1}{2} [D - (T_sH + T_nL)] \left( I - B + \frac{B}{(1 + r)^t} \right)}$$

if $I \leq 0.50$ \hspace{1cm} (9)

$$I = 1 - \frac{(D - T_nL - T_sH)}{(D - T_sH)} \left[ 1 - \frac{1}{2} \left( I - B + \frac{B}{(1 + r)^t} \right) \right]$$

if $I > 0.50$ \hspace{1cm} (10)

where

$$B = \frac{C}{ME + D - (T_sH + T_nL)}$$

Before applying this equation to an actual firm it is necessary to discuss the magnitude of the transaction costs. The cost of paying a cash dividend depends on the number of dividend checks that must be written. A typical cost schedule appears in Table 2.\textsuperscript{12}

<table>
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<th>TABLE 2</th>
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<tr>
<td><strong>Cost per Cash Dividend Check Issued</strong></td>
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<td>Next</td>
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* The number of checks issued is approximately the same as the number of stockholders except for that stock held in street names.

There are two ways a firm can repurchase its shares: an open market purchase or a tender offer. The cost of repurchasing shares in the open market depends on commission charges and state taxes. The commission charges and the transaction taxes depend on the number of shares sold and the price at which they are sold.\textsuperscript{13} A company that chooses to use a tender offer to repurchase its shares will usually employ a bank or brokerage firm as its agent.

12. In order to construct this table we interviewed a number of large New York banks. This table is a composite of their charges and is not identical to the schedule of any bank that supplied us with data.

13. Note that both the company and the stockholder pay a commission charge. Since any individual stockholder might be selling a small amount of stock (while the company is buying back a large amount) the rate of commission on the sellers' side might be quite large compared with that on the buyers' side. On very small sales, the commissions paid by the sellers can be a very large proportion of the value of the security.
If it chooses to use a bank, the normal charges will range from $3.00 to $6.00 per letter of transmittal depending on the conditions of the offer and firm's relationship with the bank. Brokerage charges generally range from 1½ to 2½ times the normal New York Stock Exchange commission.¹⁴

The total cost of paying a stock dividend depends on the number of stock dividends being paid. The typical charges vary between $1.00 and $2.00 per certificate issued. The number of stock dividends issued is approximately the same as the number of shareholders except for stock held in the street name.

In order to illustrate the effect of transaction costs on the appropriate form of cash disbursement we will examine two representative companies, A.T.&T. and R.C.A., for the year 1965. As we will show, the additional transaction costs of share repurchase for A.T.&T. are small enough so that any stockholder in a marginal tax bracket on ordinary income greater than 15% would prefer share repurchase to a cash dividend. The transaction costs of share repurchase for R.C.A. are considerably larger making share repurchase a far less promising alternative.¹⁵

If stockholders were in fact homogeneous with respect to their desire for current income, each stockholder would sell the same fraction of his holdings. However, the transaction costs remain unchanged under the more general assumption that each stockholder sells some fraction of his holdings. This is the assumption we will make throughout this section. In the following section we will discuss the affect on transaction costs of considering non-homogeneous stockholders. The tax rate on ordinary income that would make a stockholder of R.C.A. indifferent as to the method of cash disbursement is shown in Table 3. This rate is shown for various assumptions about the ratio of cost to current market price (B).¹⁶ Table 3 is computed as if a stockholder expects to hold the stock indefinitely. For example, a stockholder who initially purchased the stock at one-half its current market price would be indifferent as to the form of cash disbursement if his marginal tax bracket on ordinary income were between 17% and 35% depending on the exact transaction costs. These data are shown in Figure 1, for different assumptions as to how long the stockholder expects to hold the stock (t) ranging from zero to infinity.¹⁷ If the stockholder expected to hold the stock less than an infinite amount of time, then the relative advantage of a cash dividend is decreased. As can be seen from Figure 1, most stockholders of R.C.A. would prefer a cash dividend to share repurchase.

This conclusion does not hold for A.T.&T. The indifference tax bracket for A.T.&T. is shown in Figure 1 and Table 4 for various assumptions as to

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¹⁴ For a normal tender offer this would well be less than the total charges (of both buyer and seller) incurred with repurchase in the open market because the additional charges of selling a small lot are not incurred. However, if a brokerage firm expected most stockholders to tender small amounts of stock the charges would probably be increased significantly.

¹⁵ Our conclusion, that some stockholders might prefer a cash dividend, is different from the conclusion reached by Bierman and West.

¹⁶ This description of (B) is a good approximation of the true B shown in equations 9 and 10.

¹⁷ Figure 1 is based on equations 9 and 10, using the maximum transaction costs discussed earlier.
the length of time the stockholder expects to hold the stock. By examining Figure 1 it is obvious that for stockholders in almost all tax brackets share repurchase is the preferred form of cash disbursement.

As pointed out earlier, the corporation has the option of employing a broker as its agent rather than a bank when making a tender offer. If the broker were to charge his normal fee of two times the New York Stock Exchange commission for this service, transaction charges would be considerably lower than they were with the bank. However, we do not believe that these transaction charges are relevant for the situation we are now discussing. They are based on the results of a normal tender offer in which only a small percentage of the firm’s stockholders submit stock. Therefore, the brokerage house would

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**Table 3—R.C.A.**

<table>
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<tr>
<th>H</th>
<th>Market Price</th>
<th>Indifference tax bracket</th>
<th>Cost $4</th>
<th>Cost $8</th>
</tr>
</thead>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>.9</td>
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<tr>
<td>.8</td>
<td>.1437</td>
<td>.2956</td>
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<tr>
<td>.7</td>
<td>.1521</td>
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<tr>
<td>0</td>
<td>.2586</td>
<td>.521</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1

18. For a stockholder who had purchased the stock at 50% of its current market price and expected to hold the stock forever the indifference tax bracket would be 3.6% for A.T.&T. and 8.7% for R.C.A.
handle many more transactions than with a normal tender offer of the same size. This would increase their costs per share of stock purchased and they would no doubt increase their fees well above the normal level. Consequently, we feel that the costs which serve as the basis for Figure 1 are a more realistic approximation of the costs that would be incurred, were stock repurchase to be substituted for cash dividends.

We have demonstrated the effect of transaction costs under the assumption that each stockholder will sell part of his holdings. In this case the transaction costs from stock repurchase will always exceed the transaction costs from cash dividend payments. Thus the relative attractiveness of stock repurchase depends on whether the tax benefits that accrue to stockholders exceed the difference in transaction costs. Consequently, stock repurchase is a superior form of cash disbursement for some corporations while the payment of cash dividends is superior for others. We will now introduce heterogeneous stockholders and different assumptions as to the pattern of stock sales in response to tender offers in order to see if this conclusion still holds.

III. MODIFICATIONS BECAUSE OF NON-HOMOGENEOUS STOCKHOLDERS

Up to this point, the analysis has assumed that all stockholders were homogeneous with respect to the tax rates to which they were subject, the initial price they paid for their stock, the length of time they wish to hold the stock, and their desire for current income. The introduction of heterogeneous stockholders complicates the analysis. On the following pages, we will introduce heterogeneity in each of these factors and show its effect on the conclusions reached earlier.

Investors are subject to different tax rates. Some institutions (e.g., educational institutions and pension funds) are not subject to taxes on capital gains or ordinary income and will prefer the plan with the lowest transaction costs. Corporations are the one type of investor that may have a preference for cash dividend payments because of the tax structure. Transaction costs reinforce this preference.19

19. The corporate tax rate on capital gains is 25%. However, the corporation only pays taxes on 15% of the dividend income received from common stock held in other corporations, yielding
Because individuals pay a lower tax on capital gains than on ordinary income, share repurchase is the most desirable form of cash disbursement in the absence of transaction costs.\textsuperscript{20} As shown in the last section the addition of transaction costs means that share repurchase would have a relative advantage to some stockholders and a relative disadvantage to others. Because investors in mutual funds are taxed at their personal rates depending on the form in which income is received by the mutual funds, the form of cash disbursement that is preferred by these institutions should be similar to that of individual investors.\textsuperscript{21}

Because of the heterogeneous tax treatment of stockholders, no general statement can be made about the relative advantage of share repurchase compared to a cash dividend as a method of cash disbursement. The preferred form of disbursement for any corporation depends on the composition of its stockholders.

Differences in the initial purchase price and the length of time stockholders wish to hold their stock can cause the relative advantage of stock repurchase to differ among institutions or individuals who are in the same tax bracket. By examining Equation 10 (and noting the effect of an increase in C) it can be seen that the higher the average cost per share of a stockholder’s holdings the smaller the capital gains tax on the shares sold. Examining the effect of an increase in \( t \) in Equation 10 shows that the longer the time before a shareholder expects to sell his stock, the longer the stockholder postpones the payment of the increased capital gains taxes and the more favorable is share repurchase.\textsuperscript{25}

We have just discussed several reasons stockholders may well place a different value on the return (after-tax and after-transaction costs) which they expect to receive from the corporation. In addition, differences could arise because of different expectations of the performance of the firm, and a different time value of money. The fact that stockholders value the firm differently should have almost no effect on the best form of the dividend payment.\textsuperscript{23} The amount of purchases and sales that arise from different expectations as opposed to those that arise from cash preferences should remain constant regardless of the form of cash disbursement.

The final way in which stockholders differ is in their preference for current

\textsuperscript{20} If the tax rates to which an investor is subject cause him to favor ordinary income over capital gains the effects mentioned above are reversed. This could occur with investors that hold a small amount of common stock (the first $100 of cash dividends are tax exempt).

\textsuperscript{21} Mutual funds have the ability to modify their taxes by the way they attribute their costs to revenues. This increases somewhat their preference for cash dividends.

\textsuperscript{22} See footnote 29.

\textsuperscript{23} The only exception is if the increased volume of transactions that results from share repurchase facilitates the trading of stockholders (who wish to change their percentage ownership of the firm) by decreasing the spread between the bid and ask.
income. If stockholders have different desires for current income, it is impossible for the firm to pay a cash dividend which meets the needs of all of the stockholders. However, share repurchase allows each stockholder to set his own current income and the firm is able to set a dividend policy that is correct for each stockholder. Hence, management only has to be concerned with the size of the aggregate dividend preferences of its stockholder and does not have to decide between their conflicting dividend desires. The ability of the stockholder to set his own dividend is a major factor in favor of share repurchase.

The fact that stockholders have different needs for cash income increases the transaction costs associated with cash dividend payments and decreases those associated with share repurchase. If a firm issues a cash dividend some stockholders will find the amount of this dividend too small while others will find it too large. Both of these groups will have to incur transfer costs in order to obtain their desired cash flow. These costs are the transaction costs associated with the sale of the firm's stock (by those stockholders for whom the cash dividend is too small) and with the repurchase of stock (by those stockholders for whom the cash dividend is too large). The varying desires for current income by stockholders will reduce the number who sell their shares in a tender offer and will increase the average number of shares tendered per stockholder. This will reduce the transaction costs associated with share repurchase. The increase in transaction costs associated with a cash dividend, together with the decrease associated with stock repurchase, should be an added factor in favor of stock repurchase.

IV. CONCLUSIONS

The purpose of this article was to discuss the affect of the form of cash disbursement (stock repurchase or cash dividend) on the value of the firm. We have demonstrated that the advantage of stock repurchase relative to the payment of cash dividends is a more complex issue than has previously been recognized. There is a tax advantage associated with share repurchase for most but not all investors. However, this tax advantage may be more than offset by an increase in transaction costs for the stockholders in certain corporations. This can be seen by examining Equations 14 and 15. These equations also demonstrate how the relative advantage of share repurchase varies with a change in the length of time investors hold their stock and the original price at which they purchased their stock. The introduction of heterogeneous stockholders modifies the analysis in three ways. First, heterogeneity decreases the transaction costs associated with share repurchase and increases the transaction costs associated with a cash dividend. Second, even though stockholders are heterogeneous with respect to their desire for current income, we show that the firm need only be concerned with its aggregate dividend policy when share repurchase is used as the method of cash disbursement. Finally, heter-

24. In addition, there is a change in the timing of the capital gains taxes because the stockholders who sell their shares incur capital gains taxes on the stock they sell in addition to the income tax on the cash dividend.
ogeneity means that for any corporation there will usually be some stockholders
who will prefer cash dividends and some who will prefer stock repurchase as a
method of cash disbursement.

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