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An analysis of the possible effects of a rights issue on the issuing company's share price

A study of the effects of a rights issue of new ordinary shares on the price of the issuing company's existing ordinary shares should span at least the period from shortly before *announcement* of the issue to shortly after the shares switch from a cum rights to an ex rights basis on the stock exchange. This is because the market price of the old shares might react to the announcement and because the shares ex rights should normally be priced lower than they were cum rights, the drop being calculated in terms of the well-known 'parity price formula'.[1]

It is possible that insider trading or leakage of information will cause price to react before announcement. It is also possible that the inability of the market to forecast the longer term effects of an issue will result in the immediate ex rights price not fully reflecting these effects.

The aims of this paper are briefly to outline the main price-influencing factors of a rights issue and to illustrate in symbolic form the combined effects of these factors plus the ex rights drop-off in price. Throughout we assume that the issue is of the simple variety, i.e. a sale of new ordinary shares *pro rata* to the ordinary shareholders in the issuing company, where the new shares rank *pari passu* with the old and where their issue price is below the current market price of the old for the duration of the issue.

It seems to us that all of the main price-influencing factors of a rights issue are subsumed under the following four headings:

1 The rate at which the marginal sector of the market discounts the entire stream of future expected dividends per share, or the factor which it applies to the next expected dividend or earnings per share in order to determine share value. Such a factor, which acts as a surrogate for the market rate of discount but which does not 'discount' the entire stream of future dividends, would be the minimum acceptable dividend yield or earnings yield, or the maximum acceptable price/earnings ratio. It is assumed in this analysis that share price is determined via the minimum dividend yield (or the 'required dividend yield') acceptable to the marginal sector of the market.

   As this first factor required some explanation we return to it in the next section of the paper.

2 The issuing company's dividend payout ratio. If a change in this is announced simultaneously with a rights issue, share price might react to the change as well as to the rights issue. Strictly speaking, a change in the payout ratio is largely, if not entirely, exogenous to a rights issue,[2] but we list it here because such a change is sometimes associated with a rights issue.

   If no change occurs in the minimum acceptable dividend yield, an increased payout ratio will tend to bring about an increase in share price, and conversely for a decreased payout ratio. If no price reaction occurs when the payout ratio is altered, which would accord with Modigliani-Miller reasoning,[3] the explanation in terms of the model presented later is simply that the price effects of a higher (lower) dividend per share are exactly offset by a rise (fall) in the dividend yield required by the market.

3 The degree and direction of financial leverage in the issuing company. Any price-raising effects of upward leverage would tend to be reduced by a rights issue since the issue reduces the degree of capital gearing in the company, thus reducing the extent of upward leverage and future dividends per share. The converse would apply where leverage is downward.

   Thus, assuming no change in the minimum dividend yield acceptable to marginal investors, the price of the company's existing ordinary shares should tend to fall on the announcement of a rights issue when the company is experiencing upward financial leverage and rise where it is experiencing downward financial leverage.[4] However, the required dividend yield might react on announcement of the rights issue because of the implications arising from the effects of the issue on leverage — for instance, the implications for growth, the firm's financial risk complexion, etc. Such reaction would either reinforce or offset the effects of the reduction in leverage on future dividends and therefore on price.

4 The expected profitability of the new capital. Clearly, this is particularly important and the possible effects on share price are obvious. In the model presented below we split this aspect in two, viz: book profitability[5] and whether or not the market value of the existing shares equals their asset value (defined as book value).[6] This dichotomy is consistent with the practice of showing profits as a percentage of book values of share capital, total assets, etc., and also the practice of distinguishing between the market value of a share and the share's book value.

   For simplicity, we consider only *after-tax* profitability.

   It should be pointed out that it does not follow that if the new capital is expected to earn a lower (higher) accounting rate of return (whether based on book or market values of assets) in the early years, this necessarily means that a lower (higher) *true* return (i.e. internal rate of return, or DCF yield) is anticipated since the accounting rate might later

rise (fall), with the possible result that the new money might, in fact, earn a higher (lower) true return than the old. If this is a real and foreseeable possibility, an efficient stock market will take it into account in establishing a share price which is reasonably correct in terms of true DCF principles. In terms of our analysis, the adjustment (if any) to share price would be made via an adjustment to the required dividend yield in order to reinstate the expected true yield on the share to a competitive level.

MARKET RATE OF DISCOUNT

We define this as the minimum true yield (internal rate of return) acceptable to the marginal investor(s). It is r in[7]:

$$P = \sum_{n=1}^{\infty} \frac{D_n}{(1+r)^n} \qquad (1)$$

where P = ex div share price at the beginning of a dividend period;

D = expected value of the marginal investor's (or investors') subjective probability distribution(s) of dividends per share per period; and

n = the period.

However, the minimum dividend yield acceptable to the marginal investor(s) (which is sometimes referred to in this paper as the required dividend yield) is d in:

$$P = D_1/d \qquad (2)$$

where P is as defined above and D_1 is the marginal investor's (investors') subjective probability distribution of dividend per share at the end of the first period only.

It should be evident from (1) and (2) that provided $D_1 > 0$ and given the entire stream of expected dividends, there must be a unique value of d which corresponds to a given value of r. Thus d and r are connected.[8] Likewise, it can be shown that the required earnings yield or the required price/earnings ratio are related to r.

As stated earlier, we assume that share price is determined via the required dividend yield, as shown in (2). We adopt this approach instead of the direct DCF approach reflected in (1) because the latter is generally, though not always, avoided in practice[9] owing to the obvious problems entailed in forecasting dividends far into the future.

A change in d could result from a rights issue for a variety of reasons — e.g. altered total risk complexion of the firm, improved marketability of shares, etc.[10] As can be seen from (2), P is inversely related to d.

From (1) it can be seen that P varies inversely with r and directly with the average compound rate of growth in D (which rate we shall symbolise as g). Since dividend yield is defined as D_1/P, it follows that d varies directly with r and inversely with g (*cet. par.*). Thus the effects of a rights issue on d can be subdivided into its effects on r and g.[11]

In so far as the pricing implications of portfolio theory are concerned, whereby only a share's systematic risk is relevant (the unsystematic risk having been 'washed away' by Markowitz diversification),[12] these should be incorporated in the market rate of discount or its surrogate. In view of this, we do not henceforth explicitly mention the possible portfolio effects of a rights issue; they are subsumed under item (1) in the previous section of this paper.

TWO FOCAL POINTS

In an efficient market, any anticipated effects of the four categories of price-influencing factors should occur at the time of *announcement* of a rights issue or shortly thereafter, insider trading and leakage of information aside. Then some weeks, possibly months, later when the shares switch from a cum rights to an ex rights basis on the stock exchange, share price should fall (*cet. par.*) in accordance with the parity price formula.[13] These are the two focal points for the effects of a rights issue on the price of the issuing company's old shares.[14]

All too frequently, the text-books emphasise the second of these focal points while the price-effects of the first are either glossed over or ignored completely. If the first is ignored and if a short-term view is taken, it is easy to 'prove' that shareholders are no better or worse off after a rights issue than they were before, provided they do not ignore their rights. In fact, if price falls at the second focal point in accordance with the parity price formula (as it ought to, *cet. par.*) shareholders will, at least in the short-term, be worse off as a result of the issue if price fell on announcement, and better off if price rose on announcement. The reaction of share price to the *announcement* of a rights issue is therefore important in the context of the goal of maximising shareholder wealth.

As pointed out earlier, one aim of this paper is to illustrate in symbolic form the combined effects of the four categories of price-influencing factors plus the ex rights drop-off. However, while the formulae in our model are, we submit, useful for analytical and expositive purposes, we make no claim that they are of much practical use for the simple reason that the anticipated ex rights price can be estimated more quickly by attaching values to D_1 and d in equation (2) above.

In order to clarify the analysis and highlight the essentials, we make ten simplifying assumptions. These are listed in the appendix.

A PRICE-EFFECTS MODEL

The model presented below analyses the relationship between share price shortly before the announcement of a rights issue (P_1) and price shortly after the shares go ex rights on the stock exchange (P_3). Thus both the announcement effects and the ex rights drop-off are incorporated. As emphasised earlier, the implications for shareholder wealth depend not merely upon a comparison of the cum rights price (P_2) with P_3 but upon a comparison of P_1 and P_3.

The symbols used are as follows (note that assumptions 5 and 6 in the appendix are particularly relevant):

P_1 = share price immediately before the announcement of a rights issue;

P_2 = the cum rights price (i.e. post-announcement);

P_3^* = the unadjusted[15] ex rights price obtained by inserting P_1 instead of P_2 into the parity price formula[16];

P_3 = the adjusted value of P_3^* and therefore the expected ex rights price;

d_o = required dividend yield before announcement = $\frac{\text{dividend per share } (D_1) \text{ before announcement}}{P_1}$;

d_n = required dividend yield after the issue = $\frac{\text{dividend per share } (D_1) \text{ after the issue}}{P_3}$;

R_o = dividend payout ratio before announcement = $\frac{\text{dividend per share before announcement}}{\text{earnings per share before announcement}}$;

R_n = dividend payout ratio after the issue = $\frac{\text{dividend per share after the issue}}{\text{earnings per share after the issue}}$;

L_o = degree of leverage before announcement[17] = $\frac{\text{net ordinary profit (earnings) before announcement}}{\text{net ordinary assets before announcement}} \times \frac{\text{total assets before announcement}}{\text{net profit (before interest) before announcement}}$;

L_n = degree of leverage after the issue = $\frac{\text{net ordinary profit (earnings) after the issue}}{\text{net ordinary assets after the issue}} \times \frac{\text{total assets after the issue}}{\text{net profit (before interest) after the issue}}$;

N_o = average book rate of net profit (after tax, before interest) on total capital before announcement = $\frac{\text{net profit (before interest) before announcement}}{\text{total assets before announcement}}$;

N_n = average book rate of net profit (after tax, before interest) on total capital after the issue = $\frac{\text{net profit (before interest) after the issue}}{\text{total assets after the issue}}$;

A_o = asset value per ordinary share before announcement = $\frac{\text{net ordinary assets before announcement}}{\text{number of ordinary shares before announcement}}$;

A_n = asset value per ordinary share after the issue = $\frac{\text{net ordinary assets after the issue}}{\text{number of ordinary shares after the issue}}$

The following expression then holds:

$$P_3 = P_3^* \cdot \frac{d_o}{d_n} \cdot \frac{R_n}{R_o} \cdot \frac{L_n}{L_o} \cdot \frac{N_n}{N_o} \cdot \frac{A_n/P_3^*}{A_o/P_1} \qquad (3)$$

This shows how the unadjusted ex rights price (P_3^*) must be adjusted for the effects of the announcement of the issue in order to give the true ex rights price (P_3). The five adjusting factors (the last five terms of (3)) correspond to the four categories outlined in the first section of this paper, bearing in mind that the fourth category (expected profitability) is split in two and is represented by the last two terms of (3).

That formula (3) holds can be proved by looking to the definitions of the symbols. If we substitute these definitions for the relevant symbols in the formula and cancel identical terms, we are left with:

$$P_3 = P_3 \times \frac{\text{earnings per share before announcement}}{\text{earnings per share after the issue}} \times \frac{\text{net ordinary profit (earnings) after the issue}}{\text{net ordinary profit (earnings) before announcement}} \times \frac{\text{number of ordinary shares before announcement}}{\text{number of ordinary shares after the issue}}$$

Since the product of the third and fourth terms on the right-hand side equals the reciprocal of the second term, all three terms also cancel out. This leaves P_3 on the right-hand side, thus validating the formula.

Formula (3) simplifies to:

$$P_3 = \frac{d_o}{d_n} \cdot \frac{R_n}{R_o} \cdot \frac{L_n}{L_o} \cdot \frac{N_n}{N_o} \cdot \frac{A_n}{A_o} \cdot P_1 \qquad (4)$$

This is our main formula. In words, it states that the ex rights price (P_3) is obtainable by multiplying share price before announcement (P_1) by:

$$\frac{\text{dividend yield before announcement}}{\text{dividend yield after the issue}} \times \frac{\text{payout ratio after the issue}}{\text{payout ratio before announcement}} \times \frac{\text{leverage after the issue}}{\text{leverage before announcement}} \times \frac{\text{profitability after the issue}}{\text{profitability before announcement}} \times \frac{\text{asset value after the issue}}{\text{asset value before announcement}}.$$

A further abbreviation is possible because the last three terms of (3) can be replaced by $\frac{E_n/P_3^*}{E_o/P_1}$, where E_n is earnings per share after the issue and E_o

earnings per share before announcement. It can be proved that this is valid, i.e. that

$$\frac{E_n/P_3^*}{E_o/P_1} = \frac{L_n}{L_o} \cdot \frac{N_n}{N_o} \cdot \frac{A_n/P_3^*}{A_o/P_1} \qquad (5)$$

simply by substituting the definitions for the symbols on the right-hand side of (5) in the same manner as with formula (3). After cancelling identical terms we are left with (on the right-hand side):

$$\frac{P_1}{P_3^*} \times \frac{\text{net ordinary profit (earnings) after the issue}}{\text{number of ordinary shares after the issue}} \times \frac{\text{number of ordinary shares before announcement}}{\text{net ordinary profit (earnings) before announcement}}$$

Symbolically this reduces to $\frac{P_1}{P_3^*} \cdot \frac{E_n}{E_o}$, thus proving (5).

Formula (5) simplifies to:

$$\frac{E_n}{E_o} = \frac{L_n}{L_o} \cdot \frac{N_n}{N_o} \cdot \frac{A_n}{A_o} \qquad (6)$$

Substituting (6) in (4) we get:

$$P_3 = \frac{d_o}{d_n} \cdot \frac{R_n}{R_o} \cdot \frac{E_n}{E_o} \cdot P_1 \qquad (7)$$

Clearly, (7) is less analytical than (4), our main formula.

The second and third terms on the right-hand side of (3) can be replaced by E_{yo}/E_{yn} where E_{yo} is earnings yield before announcement and E_{yn} is earnings yield after the issue. Because

$d_o = D_o/P_1$, where D_o is dividend per share before announcement,
$d_o = D_n/P_3$, where D_n is dividend per share after the issue,
$R_n = D_n/E_n$, and
$R_o = D_o/E_o$,

it follows that:

$$\frac{d_o}{d_n} \cdot \frac{R_n}{R_o} = \frac{D_o}{P_1} \cdot \frac{P_3}{D_n} \cdot \frac{D_n}{E_n} \cdot \frac{E_o}{D_o} = \frac{E_o/P_1}{E_n/P_3} = \frac{E_{yo}}{E_{yn}} \qquad (8)$$

Substituting (8) in (4) we get:

$$P_3 = \frac{E_{yo}}{E_{yn}} \cdot \frac{L_n}{L_o} \cdot \frac{N_n}{N_o} \cdot \frac{A_n}{A_o} \cdot P_1 \qquad (9)$$

which gives us an earnings yield approach to finding the ex rights price from the price before announcement, provided that earnings yield is interpreted as the minimum acceptable to marginal investors. Formulae (3) and (4) give a dividend yield approach.

We can quite easily modify formula (9) to give a price/earnings approach. Since the price/earnings ratio is the reciprocal of the earnings yield,

$$\frac{E_{yo}}{E_{yn}} = \frac{P_3/E_n}{P_1/E_o}$$

Substituting this in (9):

$$P_3 = \frac{P_3}{E_n} \cdot \frac{L_n}{L_o} \cdot \frac{N_n}{N_o} \cdot \frac{A_n}{A_o} \cdot E_o \qquad (10)$$

Thus we see that there are several ways of illustrating the links in the chain leading to P_3. Our preference is for formula (4) in this respect as it shows the most detail.

OTHER FORMULAE

Other writers have published formulae concerning the price effects of rights issues.[18] Since space precludes a full examination of these formulae, we shall comment briefly only on the approach recommended by Merrett, Howe and Newbould.[19]

They propose the following formula for ascertaining the ex right prices:

$$\frac{\text{value of shares before new issue + new capital raised}}{\text{number of shares after new issue}} \times \frac{\text{return after new issue}}{\text{return before new issue}}$$

However, the formula is vague as it stands since its terms are not adequately explained — they can have several different meanings.[20]

Weston, using the Merrett, Howe and Newbould approach as a basis, selects the following version of their formula:[21]

$$\frac{\text{market value of shares pre-issue and new capital raised}}{\text{number of shares after issue}} \times \frac{\text{dividend paid post-issue}}{\text{dividend paid pre-issue}}$$

But he, too, does not clarify his terms.[22]

However, these formulae do seem to have practical relevance since, on average, the ex rights price apparently approximates the price as predicted by them.[23] We do not claim that our formulae as presented in the preceding section are superior in the applied sense. All we claim is that our formulae are superior theoretically since they show more clearly the main factors which might affect share price when a company makes a rights issue, and since they are validated *a priori.*

APPENDIX: THE SIMPLIFYING ASSUMPTIONS

1 The ex rights price of the issuing company's existing ordinary shares will be as shown by the parity price formula.[24]
2 There is only one announcement of the rights issue.
3 The effects on share price of the announcement of the issue occur at the time of announcement. There is no anticipation of such effects by the market, and there is no delay in the appearance of these effects once the announcement has been made. Moreover, the rights issue does not cause dealings in the shares, which would otherwise have occurred in the cum rights period, to be delayed until the shares are traded ex rights.
4 The proceeds of the rights issue are to be used entirely to finance expansion of the company, i.e. to increase its fixed and/or current assets, as distinct from repaying prior charge capital.
5 The estimates of what dividends, earnings, net profit, etc., will be after the issue are the expectations of the marginal sector of the market since it is this sector which determines share price. The corresponding estimates for before the issue are what the expectations of the marginal sector *would have been if no rights issue were made.*
6 Dividends are paid once per period (e.g. one year) by the company, the next one being due at the end of the period which starts from the closing date of the rights offer. This date is also the base for estimates of dividends, earnings and net profit; these estimates refer to the end of that period only and not to any future periods.
7 Share price is taken to be net of any cash dividend which is imminent and subsequent dividends are to be the same on each new share as on each old. Thus by price we mean the 'clean' price in that it is not necessarily the current market price but that price minus any imminent dividend (or portion thereof if shareholders' income tax is taken into account).[25]

8 There is no gradual rise in share price as the company makes profits day by day or week by week. Such a rise should occur, in theory at least, since the company's net worth increases as profits are made, or, to put it differently, the next dividend gets closer as time progresses. This means that we ignore the time value of money over the relatively short period of time involved in a rights issue.

9 No exogenous factors intrude at any stage, from immediately before the announcement of the issue until the company has received its new capital, unless otherwise stated. Thus, share price can be influenced only by the rights issue, unless otherwise stated.

10 Flotation expenses are zero.

If assumption no. 1 were relaxed, only the extent of the ex rights drop-off would be affected. There should be no effect at the time of announcement. The consequences of relaxing simplifying assumptions nos. 2, 3 and 4 — the 'condensation' assumptions — would simply and obviously be that the price effects might be spread over a longer, perhaps a very much longer, period of time than that assumed in our model. Simplifying assumption no. 5 is essential to any price analysis and cannot meaningfully be dropped. Simplifying assumptions nos. 6, 7, 8 and 9 enable us to consider the effects of the rights issue in isolation; one consequence of relaxing no. 8 would be that share price would be slightly lower on announcement than the level assumed in our analysis. Finally, the effects of relaxing simplifying assumption no. 10 would normally be small, and we do not comment further on them here.[26]

As a result of these simplifying assumptions, no change can occur in share price from the time the rights issue is announced until the company has received its new funds, unless a change is brought about by the rights issue itself. Price *might* react on the *announcement* of the issue and it *ought to* fall later *when the shares go ex rights* on the stock exchange, provided that the issue price of the new shares is below the market price of the old (which is usually, though not always, the case).

FOOTNOTES

1 The formula is:

$$P_3 = \frac{nP_2 + bI}{n + b}$$

where P_3 = first ex rights price;
P_2 = last cum rights price;
n = number of old shares that entitle the holder to buy b new shares;
b = number of new shares one may buy if n old shares are held;
I = issue price of each new share.

2 The change can be related, if only remotely, to a rights issue. For instance, the company might have to rely relatively more on retained earnings (i.e. reduce its payout ratio) as a source of future finance if the expansion resulting from the issue has to be continued and cannot be financed easily from other sources.

3 Miller, M. H. and Modigliani, F. 'Dividend Policy, Growth and the Valuation of Shares.' *The Journal of Business,* vol. XXXIV, No. 3, October 1961.

4 Woods, I. R.: *A Theoretical Study of Rights Issues and Capitalization Issues.* Unpublished PhD thesis. Durban: University of Natal, 1975, ch. 8.

5 The book profitability of the new funds is defined as the increase in net annual profit in relation to the increase in share capital and reserves. Book profitability before the issue is defined as the relationship of net annual profit (before deducting interest and assuming no rights issue) to the book value of total assets before the issue.

6 Asset value per share is defined as the book value of net ordinary assets (i.e. after subtracting prior charge capital) divided by the number of ordinary shares outstanding.

7 r is the anticipated true yield before deducting personal income tax, and ignoring trading costs.

8 This relationship is considered more fully in Woods, I. R. *op. cit.* chs. 3.1 and 3.2.

9 Bing, R. A. 'Survey of Practitioners' Stock Evaluation Methods.' *Financial Analysts Journal,* vol. 27, no. 3, May — June 1971.

10 These are listed and examined in Woods, I. R. *op cit.* ch. 3.3.

11 In the perpetual-growth valuation model, $r + D_1/P + g$. Here, while the direct relationship between dividend yield and r and the inverse relationship between dividend yield and g are also evident, these relationships are furthermore shown *explicitly* as $D_1/P = r - g$.

12 See, *inter alia,* Markowitz, H. *Portfolio Selection: Efficient Diversification of Investments.* New York: John Wiley and Sons, 1959; and Francis, J. C. *Investments: Analysis and Management.* 2nd edition. New York: McGraw-Hill, 1976, part 5.

13 See footnote 1.

14 Where a preliminary and then a more detailed announcement is made, the first focal point becomes blurred. Presumably the more detailed announcement should have greater effect.

15 I.e. not adjusted to allow for the *announcement* effects on price. P_3^* is what the ex rights price would be if there were no change in price on announcement.

16 See footnote 1.

17 This measure of leverage is:

$$\frac{\text{book rate of return on equity capital}}{\text{book rate of return on total capital}}$$

18 The main two are: (1) Evans, G. H. 'The Theoretical Value of a Stock Right.' *Journal of Finance,* vol. X, no. 1, March, 1955. (2) Merrett, A. J., Howe, M. and Newbould, G. D. *Equity Issues and the London Capital Market.* London: Longmans, Green and Co., 1967, p. 50.

19 See preceding footnote. For a fairly detailed examination of Evan's approach, see Woods, I. R. *op. cit.* ch. 11.4.

20 In the first term, is the 'value of shares before new issue' the pre-announcement or the post-announcement price, i.e. P_1 or P_2? With regard to the second term, is the return a rate or an absolute figure? Does it refer to earnings or dividends? Is it or is it not a true DCF return?

21 Weston, C. R. 'Adjustment to Future Dividend Rates in the Prediction of Ex-rights Prices.' *Journal of Business Finance and Accounting,* vol. 1, no. 3, Autumn 1974, p. 335.

22 With regard to the first term, Weston does not state whether the market value should be share price before or after announcement. He chooses the former for his empirical study without saying why (*op. cit.* p. 336).

He also states that 'no correction has neen made for any changes in the general trend of share prices . . . for the one day from the last day of cum-rights trading to the close of the first day ex-rights' (*ibid.*). This is puzzling since if a correction were made (and we believe it should) it should be for the *entire* period commencing with the date of the pre-announcement share price chosen for the first term of the formula, and not merely for the last day or so of that period.

Furthermore, the absence of any correction for general price moves makes Weston's finding that the formula overestimates the ex rights price in bear markets and underestimates it in bull markets, not at all surprising.

23 This is a conclusion which these four writers reach in their empirical studies. However, while Merrett, Howe and Newbould assumed that the second term in their formula is unity, Weston allowed for changes in dividend payments. He found that this increased the accuracy of the formula.

24 See footnote 1. This assumption condenses essentially to: all of the rights are taken up (even if partly by the underwriters). See Woods, I. R. *op. cit.* ch. 7.1.

25 For an examination of the possible tax effects on the dividend content of share price, see Woods, I. R. *op. cit.* ch. 15.1.

26 *Ibid.* ch. 6.2, considers flotation expenses in detail.

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