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Valuation of Underwriting Agreements for UK Rights Issues

PAUL MARSH*

I. Introduction

UK COMPANIES RAISE VIRTUALLY all of their new equity capital via the rights issue method. Companies can guarantee the subscription of their issues by having them underwritten (the equivalent of standby arrangements in the USA), and in recent years, this procedure has been adopted for over 90% of UK rights issues. Underwriting is usually carried out on a fixed fee basis representing at least 1¼% of the money raised, and hence it is clear that quite substantial sums of money are involved. Since underwriting is simply a put option giving the company the right to put a failed issue onto the underwriter, we can use option valuation models to determine whether this money is well spent.

In this paper, we describe an application of the Black and Scholes model to the valuation of rights issue underwriting agreements over the period 1962–1975. Model prices are compared with the fees charged in order to assess whether the latter represent competitive prices. In fact, over this period, companies appear to have overpaid for underwriting. We cannot conclude from this alone, however, that the underwriting market is inefficient, since there may well be hidden ‘side payments’ between participants in the market. This issue is addressed, at least in a qualitative sense, in the final section of this paper.

II. Institutional Background

When a company makes a rights issue, it is a London Stock Exchange requirement that at least three weeks should elapse between the ex-rights date and the date the offer expires.¹ If the share price falls below the issue price by the last acceptance date, shareholders will not take up their rights, since shares could be bought more cheaply in the market.² Since rights issue arrangements are costly,

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¹ In practice, the period of time between the date on which the terms are finalised and the last acceptance date is often much longer than three weeks, and can quite frequently be six weeks or more if an extraordinary general meeting is required to increase the authorised capital.

² This is not strictly true because of transactions costs. Since subscription to the issue involves no brokerage costs or stamp duty, and since the same is true of trading in the rights except that brokerage fees are payable on the value of the rights, cases will arise when shareholders will subscribe even if the share price has fallen below the issue price. Indeed holders should always exercise or sell their rights unless the issue price exceeds the share price by more than the transactions cost advantage.

companies will clearly wish to avoid issues failing in this way. This can be achieved by having the issue underwritten.

As an alternative to underwriting, companies can reduce the risk of a failed issue equally effectively by setting the issue price sufficiently low.³ This does not imply that underwriting is a waste of money, since if the issue is underwritten at a high enough price, there is a distinct possibility that the underwriters will be called upon to take up their commitments and buy shares from the company at a price above the ruling market price. The question is thus entirely one of whether or not companies pay a fair price for underwriting given the risks involved.

In fact, in recent years, nearly 90% of all UK rights issues have been underwritten. In the majority of cases the merchant bank or broker advising the company on the issue acts as the principal underwriter who then, in turn, passes on the major part of the risk to a syndicate of financial institutions known as subunderwriters. These will be selected by the broker to the issue in conjunction with the issuing house, since both institutions maintain their own lists of potential subunderwriters. These will include other merchant banks and brokers, insurance companies, and the larger investment trusts and pension funds. For a typical issue, there will be 100–200 subunderwriters, none of whom will be offered more than about 2–3% of the issue.

The underwriting agreement with the company will normally be signed on the evening before the issue announcement. The announcement itself occurs early on the following day, and simultaneously, subunderwriting offers will be sent out for acceptance by 3.00 pm. Strictly speaking, therefore, the principal underwriter is at risk for several hours longer than the subunderwriters and, in fact, bears the risk of any adverse price movements brought about by the issue announcement. In practice, however, subunderwriters have only a limited right of refusal, since over-selectivity might cause them to be removed from the underwriters' lists. This is regarded as a very real sanction, and subunderwriters have, in general, to accept the bad issues with the good.

The principal underwriter's fee is normally 2% of the money to be raised. Of this, ¼% is paid to the broker, and a further 1¼% goes to the subunderwriters. (If the period from the subunderwriting agreement to the last acceptance date exceeds thirty days, both the underwriting and subunderwriting fees are increased by ½% per week or part thereof). The remaining ½% represents the principal underwriter's remuneration for sponsoring the issue and for advice.⁴ Since these fees are fixed, pricing negotiations in underwriting necessarily have to focus on the terms of the issue rather than on the percentage fee itself. This is an important point to which we shall return later.

As is often the case with financial intermediation, all of these fees are subject to some ambiguity because of the problem of hidden 'side payments'. (See, for example, Ibbotson's [18] discussion of the new issue market, and Smith's [26]

³ Subject to the par value constraint. Under UK company law, companies are not permitted to issue shares below par value.

⁴ In addition, some part of this ½% fee may also represent payment for the underwriting risk assumed by the issuing house during the few hours which elapse between the underwriting and subunderwriting agreements.

comparison of rights issues with underwritten general cash offers in the USA). For example, the relationship between the company and the underwriter is seldom limited to the duration of the rights issue, but is usually ongoing, with the latter providing the company with a wide range of financial services and advice. Thus part of the reported underwriting fee of 1¼% may be a 'side payment' for advice or other services related to this or to some other time period. Conversely, it is not inconceivable that part of the ½% paid for advice could be a side payment to compensate for undercharging on underwriting. A similar side payment problem arises, in fact, with subunderwriting. Underwriters will often be on the subunderwriters' underwriting lists for other issues, and more importantly transactions between the underwriter and the subunderwriting institutions are not limited to the underwriting of equity rights issues. Thus, for example, it may be necessary to direct a certain amount of business to brokers who specialise in new issues as an informal fee for the privilege of remaining on their subunderwriting list. Because of all these factors, a certain amount of caution is required in interpreting underwriting fees, particularly when looked at in isolation.

Finally, it is worth noting that the British system of underwriting rights issues differs from the American system in several respects. Firstly, in the USA, the underwriting fee frequently consists of two parts: a flat fee known as a standby fee, and an additional take-up fee for each unsold share of stock that the underwriter has to buy, the latter fee often varying with the percentage of the issue taken up. Secondly, besides being a fee for underwriting, the standby fee in the USA also includes any remuneration which might be paid for advice associated with the issue, and for the legal obligations of the underwriting syndicate in connection with the prospectus.⁵ Thirdly, in the USA, the underwriting fees vary from issue to issue, rather than being fixed as in the UK. Pricing negotiations are therefore based on the fees as well as on the issue terms. Finally, the procedures for dealing with 'in the money' rights which expire unexercised are different. In the UK the normal practice is to protect entitled shareholders against loss by selling their unsubscribed shares in the market on their behalf and remitting the net proceeds to them. In the USA, shareholders have no such protection, since unsubscribed shares will either be distributed through an oversubscription privilege, or sold to the underwriters. Indeed most standby agreements include a profit sharing arrangement whereby any profit from the sale of unsubscribed shares is split between the underwriters and the firm according to some pre-agreed formula.

III. Ex-Post Returns to Underwriting

Historically, much of the debate on whether companies pay a fair price for underwriting has centered on the ex-post returns earned by underwriters. For example, Merrett, Howe and Newbould [23] argue that "underwriting serves little economically useful purpose whatever" and "underwriting charges in the case of rights issues seem somewhat excessive for the minimal risks actually borne by

⁵ Other legal expenses and all of the administrative costs of the issue are borne, however, by the issuing company.

the underwriters." This conclusion is based on an analysis of the ex-post returns to underwriters in the case of 16 rights issues underwritten for a fee in 1963. In none of these cases were the underwriters involved in any loss, and the mean ex-post return was thus equal to the mean fee charged of 1.8%.⁶

Quite apart from the question of sample size, however, this procedure does not establish that underwriters earn excess returns. Merely examining the ex-post returns ignores the important dimension of what constitutes a fair reward for the risks involved. Furthermore, this procedure relies upon an analysis of ex-post returns rather than employing an ex-ante valuation model. In spite of these strong reservations, however, it does seem worthwhile calculating the true mean ex-post returns to underwriting for a much larger sample of issues over a much longer time period. In addition to being an interesting descriptive statistic, this figure does have some economic significance since it provides us with an estimate of the upper bound on the true figure for the excess returns to underwriting.

The mean ex-post return (as a percentage of the exercise price) from a policy of subunderwriting an equal number of shares in each rights issue can be calculated as:

Mean Return

$$= (\text{Mean Fee Paid}) - (\text{Mean loss from taking up unsubscribed shares})$$

The standard fee paid for underwriting is, as noted above, 1¼% for the first 30 days plus ½% for each additional week. The loss from taking up unsubscribed shares is, of course, zero in the case of fully subscribed issues. In the case of 'failed' issues, where some proportion is left with the underwriters which cannot be sold for a premium in the market, the loss is taken as $\frac{(P - I)}{I} \times 100\%$, where

P is the price on the day after the last acceptance date, and I is the issue price.⁷

For the 671 rights issues made between July 1962 and December 1975 which were known to have been underwritten for a fee by a merchant bank or broker the mean loss from taking up unsubscribed shares came to 0.29% when calculated in this way. Only 35 of the 671 issues (5%) resulted in losses to underwriters, and the average loss in these cases was 4.2%. The maximum loss incurred by underwriters on any single issue over the entire period was 13%. The mean underwriting fee paid, however, was 1.40%.⁸ This implies a mean ex-post return to underwriting

⁶ Merrett, Howe and Newbould claimed the mean fee charged was 1.8% and that in four cases, the fees were as high as 2.4%, 2.7%, 2.9% and 2.9% respectively. These figures seem far too high and there is probably some confusion here between the total fee paid to the principal underwriter and the fee paid for subunderwriting.

⁷ This may result in a slight overestimate of the true loss, since even in the case of "failed" issues, some small proportion of shareholders typically take up their rights, so that underwriters are not obliged to take up their full commitment.

⁸ This figure was estimated from the standard subunderwriting pricing formula (1¼% for the first 30 days plus ½% per week thereafter) based on the assumption that the subunderwriting agreement commences on the announcement date. While this is the standard practice, issues are occasionally announced or foreshadowed some months in advance. Since we have no record of any subunderwriting arrangements which date back more than one month prior to the ex-date, any such issues were excluded for the purposes of calculating the mean underwriting fee paid. For 65 issues for which we did know the precise date of the underwriting arrangement, the mean fee paid was 1.33%.

of 1.11%. As we have already seen, however, we should resist the temptation to conclude that underwriters earn excess returns, since in order to comment on this issue, we require an ex-ante valuation model which takes account of risk.

IV. Option Pricing Models and the Valuation of Underwriting

The underwriting decision is quite simply a problem in option valuation. When a company makes a rights issue, the company is in effect selling (giving) a short-term call option to its shareholders (ie. to itself). The company's real objective however, is to sell new shares, and the only way in which the sale of a call can be converted into the sale of the underlying shares is for the company to simultaneously buy a put option, Kruizenga [20]. The latter is, of course, precisely what occurs when the company arranges for its issues to be underwritten—the company buys a put option giving it the right to put a failed issue onto the underwriters. The underwriters in turn reduce their exposure by buying put options from the subunderwriters giving them the right to pass a failed issue onto the subunderwriters.

Brealey [6] was one of the first to recognise this fact and exploit it empirically by using the market price of the rights as a guide to the value of underwriting. He argued that the latter should be equal to the premium paid for the rights on the first day of trading, since both the rights call option and the underwriting put options are 'written' on the same share and have the same exercise price and duration. Applying this logic to a small sample of some 50 UK rights issues made in 1969, Brealey concluded that the market value of the underwriting option was at most 0.35%.⁹ There are several problems, however, with this analysis. Firstly the method will underestimate the value of subunderwriting, since the options are valued on the ex-date and not the date of the subunderwriting agreement. On the other hand, however, it will overestimate subunderwriting values since a put is always worth less than the equivalent call.¹⁰ Unfortunately, within the framework of this methodology, it is very difficult to assess what the extent or net effect of these biases will be. In fact, the only way in which we can avoid these problems is to use an explicit option valuation model rather than valuing underwriting in terms of the market price of the rights.

The obvious choice here is the Black and Scholes model (hereafter B & S) [2] which is now widely accepted in both the academic and investment communities. B & S were the first to develop a theoretically complete, general equilibrium option valuation formula which was consistent with both rational option pricing and the Capital Asset Pricing Model. This model is attractive not only because of its rigorous theoretical basis, but also because it is relatively simple, incorporating only five variables, four of which are directly observable. Given these variables, namely the stock price (x), the time to maturity (t), the exercise price (c), the risk free interest rate (r), and the variance rate of the return on the share

⁹ When Brealey adjusted for the transactions cost advantage from buying the rights (see footnote 2 above) he found that investors appeared to be paying only 0.09% for the option element of the rights.

¹⁰ B & S [2] & Merton [24].

(v^2), B & S show that the value of a call option ($w(x, t)$) can be written as:

$$w(x, t) = x \cdot N(d_1) - c \cdot e^{-r \cdot t} N(d_2)$$

where

$$d_1 = \frac{\log_e(x/c) + \left(r + \frac{1}{2} v^2\right) \cdot t}{v \sqrt{t}}$$

and

$$d_2 = \frac{\log_e(x/c) + \left(r - \frac{1}{2} v^2\right) \cdot t}{v \sqrt{t}}$$

and $N(d)$ is the cumulative normal density function.

Since we are concerned here with valuing underwriting agreements, we are interested in the value of puts rather than calls. In fact, however, it is a simple matter to show, Stoll [28], B & S [2] and Merton [24] that to prevent arbitrage, the value of a put ($p(x, t)$) must be related to the value of a call in the following way:

$$p(x, t) = w(x, t) - x + c \cdot e^{-rt}$$

In deriving their model, B & S make the following assumptions: (1) Capital markets are perfect. There are no transactions costs or taxes, and information is freely available to all participants. Investors are price takers in the market. (2) The market operates continuously, price changes are continuous and assets are infinitely divisible. (3) Short selling is permitted and carries no penalties. (4) There is a constant risk free interest rate which is the same for borrowers and lenders. (5) The stock price follows a random walk in continuous time with a variance rate proportional to the square of the stock price. Thus the distribution of possible stock price changes at the end of any finite interval is lognormal. The variance rate of the return on the stock is constant. The aggregate supply of call options is zero. (6) The stock pays no dividends or other distributions (7) The option can only be exercised at maturity ie, it is "European".

While these assumptions are not strictly met in the context of the underwriting of rights issues, they nevertheless seem, for the most part, to be reasonable approximations. The underwriting option is European, and since it has such a short duration, the interest rate will effectively be known and constant. Similarly, since for underwritten rights issues, the aggregate supply of options is zero,¹¹ it seems reasonable to assume that the variance rate of the return on the shares is constant. In most instances, no dividends are paid during the life of the underwriting agreement. For issues where this is not the case, the dividend difference between the existing and the new shares is known with certainty and hence an appropriate adjustment can be made. While capital markets are not strictly

¹¹ In any event, Smith [26] has shown how the 'bucket shop' assumption can be relaxed, and has derived models for valuing rights in the case of non-underwritten issues and for valuing underwriting agreements for general cash offers to the public.

perfect, there is mounting evidence that the London Stock Exchange is efficient and that stock price movements fairly closely approximate a random walk (for reviews of the UK evidence see Henfrey, Albrecht and Richards [16] and Marsh [22]). Although there are frictions in the market in the form of dealing costs and taxes,¹² it is not clear that these will have any systematic effect on option prices.¹³ Finally, while in the UK, it is not possible to sell either the rights or the underwriting option short, it is possible to short the shares, at least within the Stock Exchange account.¹⁴

In any event, Merton [24] and many others have now shown that the B & S Model is quite robust with respect to the underlying assumptions. In addition, empirical tests, particularly those by Black and Scholes [1] and Galai [15] indicate that the model performs well in pricing call options, although its usefulness is to a large extent dependent on the quality of the variance estimates. Both the extensions to the B & S Model and the early empirical work are all very well summarised in Smith's [25] survey article on option pricing.

V. Population, Sample and Data

From July 1962 to the end of 1975, 1,145 primary equity rights issues were made by London quoted and registered companies.¹⁵ Of these, 148 issues involved more than one class of equity, or combined units of equity and other securities,¹⁶ and were therefore excluded from our sample. Of the remaining 997 issues, 671 were known to have been underwritten for a fee by a merchant bank or broker in the standard manner. For 132 of these, however, we were unable to establish the date of the underwriting agreement with any degree of confidence. These issues were therefore excluded, leaving us with a sample of 539 underwritten issues for the purposes of this study.

For each of these issues, the stock price was taken as the market price at the start of the subunderwriting agreement. Since the latter normally commences on the announcement date, the stock price was taken as the closing market price¹⁷ on the previous day. This price was adjusted by the implied rights issue capital change adjustment factor to take account of the 'scrip' element of the rights issue. It was then further adjusted by subtracting out the present value of any dividends

¹² Dealing costs not only exist in practice, but also differ for buying and selling (in the UK, stamp duty of 2% is payable on purchases but not on sales), and for the rights and the underlying shares (see footnote 2 above).

¹³ This may well, however, introduce a range of indeterminacy, the bounds of which are set by the magnitude of the dealing cost.

¹⁴ Shares typically go ex-rights on the first day of an account, and accounts last for two (sometimes three) weeks, so that the shares, at least, can be sold short over most of the effective life of the rights.

¹⁵ Data on the population of rights issues was collected from the Times/Extel publication 'Prospectuses' [11].

¹⁶ In addition, this group of 148 excluded issues included a few introductions by way of rights, and two issues by very rarely traded companies.

¹⁷ Share prices were collected from the jobbers mid-quote closing prices given in the Financial Times Share Information Service (FTSIS). For the 20–25% of companies not listed in the FTSIS, trading prices were collected from the stock Exchange Daily Official List (SEDOL).

for which the new shares did not rank,¹⁸ in order to place the rights and shares on a comparable basis. The exercise price was taken as the issue price, except in cases where payment was made in two or more installments.¹⁹ Here, the exercise price was taken as the present value of these payments as on the last acceptance date for the issue.²⁰ For the risk free interest rate, we used the 90 day Treasury Bill rate on the first day of the subunderwriting agreement. This was converted to continuously compounded form and expressed as a rate per trading day.²¹ The duration of the option was quite simply the period in trading days from the date of the subunderwriting agreement²² to the last acceptance date for the rights.

Up to this point, all of these four variables have been directly observable. This is not the case, however for the final variable required for the B & S model, namely the variance rate of return. This variable has to be estimated,²³ and as we have already noted, estimate errors can pose problems in applying the B & S model. Figure 1 shows just how sensitive underwriting values are to the variance estimates employed.

¹⁸ In general, new shares issued via rights qualify for all dividends relating to accounting periods subsequent to the issue but not for periods which are wholly or substantially past. Roughly two thirds of the issues ranked *pari passu* for all dividends, while the remaining third ranked for all but the next dividend (although occasionally more than one dividend was missed) which typically has an ex-dividend date within three months of the ex-rights date. Such dividends had almost invariably been declared, announced or at least firmly forecast at the time of the rights issue. Thus in subtracting out the value of such dividends from the share price, they were treated as certain future payments and discounted back to the valuation date at the risk free rate.

Given the very high marginal rates of tax on income in the UK, it is clearly unrealistic to subtract out the full value of the dividends since this implies that investors have a marginal tax rate of zero. Instead, only half of the value of the dividends was taken, since this corresponded to the marginal tax rate of 50% which Brealey [5] estimated from an examination of the price declines on ex-dividend dates for a sample of UK shares over the period 1968–1969.

¹⁹ Such cases represent less than 3% of the total rights issues made over this period.

²⁰ This is a debt on the shareholder's part and thus effectively represents a certain future payment.

²¹ Evidence by both Fama [12] for the USA and Brealey [5] for the UK seems to suggest that the variability of security returns is low when markets are closed, indicating that there is some merit in basing intervals on trading days. In practice however, our results are quite independent of whether we use trading days or total days.

²² Unfortunately, except for a minority of issues, we do not have definite information on the date of the subunderwriting arrangement. As noted above, however, for the vast majority of issues, subunderwriting commences on the announcement date. In the absence of any more precise information therefore, this is the assumption we have made, except in cases where issues have been announced more than one month before the ex-date. These have been excluded, since we have no record of any subunderwriting agreement dating back this far. As already noted, these exclusions led to a reduction in the size of our sample from 671 to 539 issues.

²³ During this period, there was no traded options market in the UK from which we could obtain implicit variance estimates from the market prices of the options, Latane and Rendleman [21]. One possibility, however, would be to estimate the variance implied by the market price of the rights. In practice, however, this presents two problems. Firstly, since the rights do not start trading until after the underwriting agreement, such estimates would not be available to the subunderwriters. Secondly, the premium for which the rights sell over their theoretical floor value is generally only a very small proportion of the total value of the rights. Thus any measurement errors in either the stock price or the right price can give rise to enormous differences in our estimates of the variance. This problem, in fact, makes it very difficult to estimate how good the B & S model is in valuing the rights or to test the efficiency of the market in the rights, Marsh [22].

SENSITIVITY OF PUT VALUES TO THE VARIABLES IN THE B & S FORMULA

FIGURE 1 (A) : DURATION

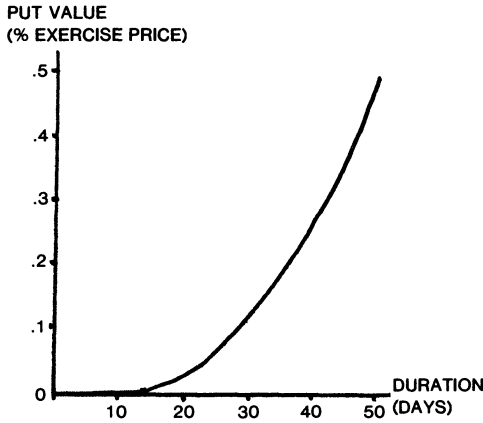


FIGURE 1 (B) : VARIANCE

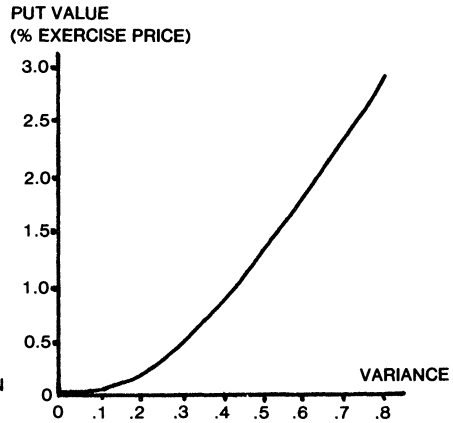


FIGURE 1 (C) : RISK-FREE RATE

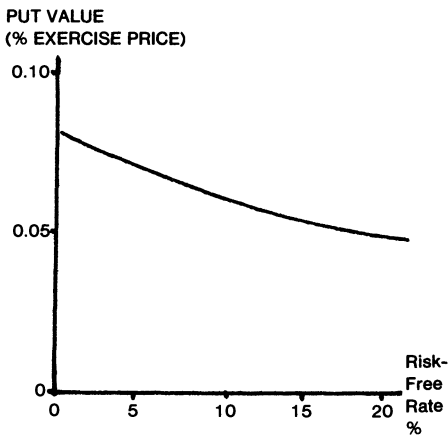


FIGURE 1 (D) : EXERCISE/STOCK PRICE

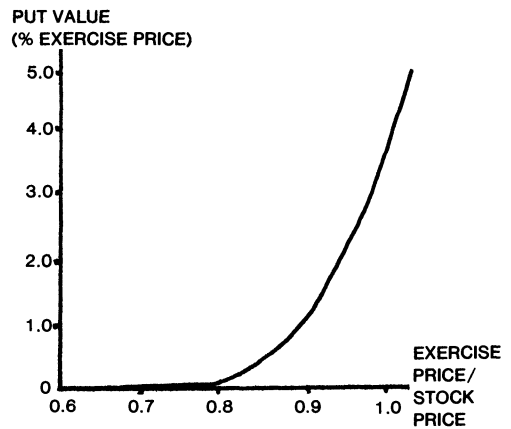


Figure 1. In each case, variables other than the one being plotted are set equal to their sample mean values (ie. duration = 24 days, variance = .15, risk-free-rate = 6.7 percent, ratio of exercise price to share price = 0.78)

The variance rates required for the B & S model are the time-series variances of continuously compounded returns for each individual share. For part of our sample, we were able to estimate these from monthly returns data from the London Share Price Database (LSPD), Smithers [27]. The latter is the only source of UK returns data suitable for research purposes. Unfortunately, however, it covers a random sample of only a third of all UK quoted companies. We were therefore able to estimate variances for only 174 of the 539 companies in our sample.

For these 174 companies, we estimated the variances over the four year pre-

issue period. Our estimation method was designed to minimise the problems arising from infrequent trading and from measurement errors. With respect to the former, Fisher [14] first pointed out that variances estimated from returns based on month end prices will be biased if there is thin trading and the prices refer to trades occurring before the month end. This will be particularly acute for the LSPD because of the large number of small companies quoted on the London Stock Exchange.²⁴ To overcome this problem, we estimated variances from returns for variable rather than fixed length periods, where each period was defined as the time between two adjacent recorded trades.²⁵ This was possible since the LSPD records the date on which the last trade of each month takes place.

These variances are, of course, subject to measurement error,²⁶ so that the spread in the distribution of the estimated variances is larger than the true dispersion of variances. As Black and Scholes [1] found, the use of such noisy variance estimates will lead to overestimates of option values for high variance shares and underestimates for low variance shares. To avoid the worst effects of this noise, we made Bayesian adjustments using a methodology described by Hodges [17].²⁷ This involved taking a weighted average of the unadjusted variance and the average variance for the shares in the sample. The weights sum to unity and depend on the estimation variance of the unadjusted variance, and the variance of the cross-sectional distribution of the variances of the shares in the

²⁴ For the 10% least actively traded companies on the London Stock Exchange, the recorded prices are on average, some two months out of date, Marsh [22].

²⁵ More precisely, we estimated the variance of $\log_e(1 + R_{jt})/\sqrt{t}$ where R_{jt} is the return on security j between two recorded trades and t is the length of time between the trades. For frequently traded shares, this gives an unbiased estimate of the variance of continuously compounded daily returns. For infrequently traded shares, we will still obtain reasonable estimates although in this case, we are dealing with the variance of the quotient of two random variables.

²⁶ Quite apart from normal estimate errors, our variance estimates may also tend to be upward biased because of certain specific measurement errors in the LSPD returns data. These arise from data errors, movements across the buy/sell spread and price rounding. Since it is impossible to distinguish between buys and sells from LSPD data, and since in the course of collecting the data, all prices were rounded to the nearest new penny, these measurement errors can lead to very serious overestimates of the variance for companies which have a low price per share. At first sight, it is tempting to exclude such companies from our calculations. However, since companies with low average share prices over the estimation period tend to be smaller companies, and since these tend to have higher true variances, such exclusions could lead to a bias in the opposite direction. In any event, it is possible that the upward bias from measurement errors may be partly offset, at least, by a downward bias arising from other factors discussed below.

²⁷ It is important to adjust for estimate errors since their existence could introduce bias into our estimate of the *mean* value of subunderwriting. This follows since put values are a non-linear function of the variance, so that the increase in value per unit increase in variance is greater than the fall in value per unit decrease (see Figure 1). If variances were symmetrically distributed, it is clear therefore that a failure to adjust for estimate errors would result in an upward biased estimate of the mean put value. However, the distribution of variances is highly positively skewed and hence it is difficult to assess on prior grounds what the direction or extent of any bias might be. In fact, empirically, there seems to be very little bias in the case in question. Our estimates of the mean excess return to subunderwriting were 0.78 and 0.83 percent using raw and Bayesian adjusted variances respectively.

sample.²⁸ This is analogous to the Vasicek adjustment (see Vasicek [30]) commonly made when estimating betas.

These historical estimates may overstate the true variance over the underwriting period since rights issues, by increasing the equity base should, *ceteris paribus*, bring about a reduction in risk.²⁹ On the other hand, there is some evidence that there may be an offsetting tendency for companies to use equity to finance their more risky new ventures, Donaldson [9], Bray [4] and Brealey, Hodges and Capron [7]. It is difficult, therefore, on prior grounds to say what the net effect might be. To examine whether there was any change in the variances, we reestimated them over the four year post-issue period. There was, if anything, a slight increase in the mean variance.³⁰ The figures, when annualised and expressed as percentage standard deviations were 39 and 40 percent respectively. However, using the non-parametric Mann Whitney U Test,³¹ we were unable, even at the 75 percent level, to reject the hypothesis that there was no change in variance. Finally, for quite a different reason, it could be argued that historical variances are underestimates, since we know that the cross-sectional variance of returns is significantly higher over the announcement date itself because of the accompanying information flow, Marsh [22]. However, since we are valuing the subunderwriting option, and since subunderwriting is not completed until after the announcement, we shall ignore this factor.³²

In the following sections where we report on our findings, we focus primarily on the 174 issues for which variance estimates were available. However, we also give figures for the remaining two thirds of our sample (365 issues) for which we had no individual variance estimates. For these issues, we used average figures based on the 174 estimates available. Rather than using a single average, we

²⁸ More precisely, our adjusted variance estimate is given by:

$$E = \frac{E_1^2 V_2 + E_2^2 V_1}{E_1 V_2 + E_2 V_1}$$

where E_1 is the raw variance estimate ($\hat{\sigma}^2$) for the security in question, V_1 is the estimation variance of $\hat{\sigma}^2$, and E_2 and V_2 are the mean and variance of our prior distribution. The latter is taken as being the cross-sectional distribution of the variances. E_2 is estimated as the mean of our sample variances while V_2 is the variance of our sample variances after adjusting for the variance of the estimation errors.

²⁹ While given the magnitude of a typical issue, this effect is likely to be relatively modest, it could be more marked if companies used the proceeds of their rights issues to reduce their gearing.

³⁰ We also estimated the variance of the market in both the pre and post issue period for each rights issue. It is interesting to note that the average market variance was virtually identical in both the pre and post-issue periods.

³¹ Standard parametric tests such as the *t*-test are inappropriate given the skewed nature of the distribution of variances.

³² Even if we were looking specifically at the principal underwriter's risk, however, it is not clear that historically measured time-series variances are inappropriate. Underwriters are in the position of 'insiders' before the announcement, and consequently their estimate of the post-announcement price of the shares will differ from the current market price by their estimate of how the market will react to the announcement. Thus if the principal underwriters were using the model to value their underwriting agreement, it would be the current share price which should be adjusted rather than the variance estimate.

varied the figure to take account of the year in which the issue was made, and whether or not the issuing company was an investment trust.³³

Clearly the use of average variances will give very poor estimates of the value of individual underwriting agreements. Ultimately, however, our aim is to make statements about the average value of underwriting for underwritten issues taken as a group. We are therefore less concerned with noise in the individual estimates than we are with whether this procedure gives unbiased estimates of the mean value of underwriting. On prior grounds, the latter is difficult to assess. Put values are a non-linear function of the variances, and the increase in value per unit increase in variance is greater than the fall in value per unit decrease (see Figure 1). Thus if variances were symmetrically distributed, we would obtain a downward biased estimate of the mean value of underwriting if we used the average rather than the individual variance estimates in our calculations. However, variances cannot be negative, and their distribution is highly positively skewed. Furthermore, because of the pricing procedure, the issues with the highest variances may also tend to have the lowest exercise to stock price ratios. Because of these factors, it is difficult to assess the magnitude of any bias introduced by using average variance figures.

One way of investigating this further, however, is to look at the sample of 174 issues for which variances were available. By comparing the mean underwriting values obtained using both the individual variance estimates and the average variances, we can see the likely bias introduced by using average figures. As can be seen from Table I, the difference is quite small. Using average variances seems to introduce little bias into our estimate of the mean option value. We will nevertheless adopt a cautious stance and base our conclusions on the sample of 174 issues. As will be seen, however, our general conclusions are the same whether we look at this subsample, or at the pooled results for all 539 issues.

Finally, as a further check on our variance estimates, we report the results of reversing the normal valuation procedure. Thus rather than estimating subunderwriting values given the variance, we use the model to calculate the mean implied variance. The latter is the value the variance would have to take for the subunderwriting fees paid to represent fair values.

VI. Empirical Results

The mean excess returns to subunderwriting were calculated by subtracting the underwriting values estimated from the B & S model from the actual fees paid. The results are summarised in Table I and Figure 2. Looking first at the results using individual variance estimates for the 174 issue subsample, our estimate of the mean excess return to subunderwriting was 0.83 percent. As can be seen from

³³ Different mean variance estimates were used for issues made in different years in order to reflect the marked apparent difference in variance estimates over time. The mean variances for investment trusts were estimated separately since these companies constitute a homogeneous group which typically hold highly diversified portfolios, and can therefore be expected to have significantly lower variances than other companies. In fact, from our LSPD estimates, the mean variance for investment trusts was only 43% of the mean variance for all other companies.

Table I
Estimated Excess Returns to Subunderwriting

Sample for which Variance Estimates	Variances used in B & S Formula	Sample Size	Mean Excess Return (% of EP)	Median Excess Return (% of EP)	% of Issues where Subunder- writing Value ≥ Fee Paid	Mean Implied Standard Deviation ^a (% Per Annum)
Available	Individual variance estimates Mean variances	174 ↓	0.83 0.77	1.21 1.11	12 15	63
Not available		365	0.60	1.03	15	→
All issues	Individual variance estimates where available—mean variances else- where	539	0.67	1.11	14	

^a Mean implied variance of continuously compounded annual returns converted to % standard deviation form.

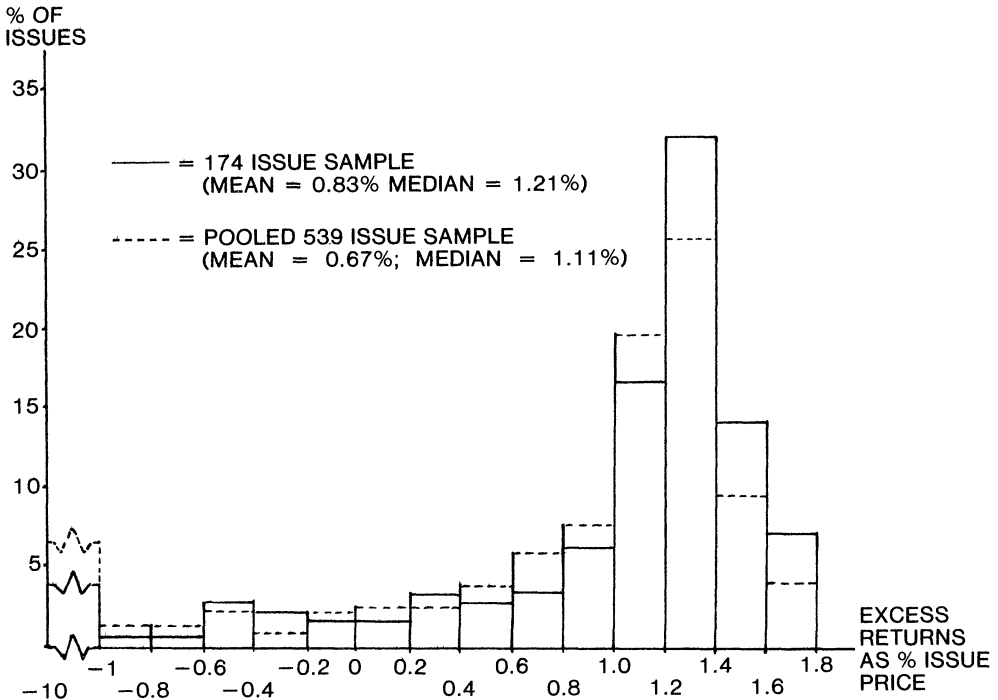


Figure 2. Distribution of excess returns to subunderwriting

Figure 2, the distribution of the excess returns was highly negatively skewed with a median value of 1.21 percent. For 88 percent of the issues, there were positive excess returns to subunderwriting. When the B & S formula was reversed, the mean annualised variance of continuously compounded returns implied by the subunderwriting fees actually paid was 0.40. This is equivalent to an annual standard deviation of continuously compounded returns of over 63 percent.

Table I also shows the mean excess returns calculated using average variance figures. For the 174 issue sample, the figures are very similar to those obtained using individual variance estimates. This suggests, as we pointed out in the previous section, that very little bias is introduced by the use of average variances. Furthermore, it serves to increase our confidence in the mean excess return estimate of 0.6 percent obtained using our second subsample of issues for which no individual variance estimates were available. Table I and Figure 2 also show the results for the pooled subsample of 539 issues. Quite clearly the overall picture is the same whether we look at the pooled sample or just at the original results for the 174 issue sample.

Clearly, subunderwriting appears to have been a very profitable activity over this period, with subunderwriting fees pitched, on average, at roughly twice the level required to ensure subunderwriters earn a "fair" reward for the risks involved. However, before concluding too rapidly that subunderwriters are overpaid, and that the subunderwriting market is inefficient, it is necessary to return to the question of side-payments. Before moving on to this issue though, it is of

interest to have a closer look at the pricing of underwriting and the conditions under which the subunderwriters appear to earn the highest excess returns.

In particular, it is interesting to know whether the degree of overpricing varies for issues made by different types of companies or under different market conditions. Any such differences could provide clues as to which factors are taken into account by the issuing company and the underwriters in pricing underwriting. Of course, since, by convention, underwriting is on a fixed fee basis, pricing negotiations are focussed not on the fee as such but instead on the terms of the issue and the issue price. In a competitive situation, we know that the only factors which should affect this choice of issue discount are the share's variance, the duration of the underwriting agreement and the risk free rate. If these factors are given their proper weighting in the pricing process there should be no tendency for them to be related to excess returns. Quite apart from these variables, however, it is often suggested that there are other factors which determine how good a deal the issuing company obtains from the underwriters. In particular, market conditions, company size, and industrial sector are all alleged to be determinants of the issue discount.

To examine these questions, we partitioned the sample into two on the basis of the several variables of interest and in each case, we compared the mean excess returns for the two subsamples. Significance tests for the difference in the subsample means were carried out using the Mann-Whitney U Test, since standard parametric tests such as the *t*-test were inappropriate given the skewed and 'peaked' nature of the distributions.³⁴ The results are summarised in Table II. The figures shown are for the pooled sample of 539 issues, with excess returns calculated using individual variance estimates where available and average variances elsewhere. Although not shown in the table, the results obtained using individual variance estimates for the 174 issue subsample for which these were available were virtually identical.

Looking first at the variables which do affect underwriting values, Table II shows that subunderwriters appear to earn higher excess returns on shorter-lived agreements and on low variance stocks. In addition, the excess returns were slightly higher at times of higher interest rates, although the difference here was not significant. These findings are consistent with the notion that in pricing negotiations, the importance of both the option's duration³⁵ and the share's variance is underestimated. However, with respect to the latter, a note of caution is required, since the direction of the difference is precisely what we would expect if we were using noisy estimates of the variance. Such measurement errors could lead us to overestimate the value of the option for high variance shares and vice-versa. Since we are using Bayesian adjusted variance estimates, this problem should not be too severe. However, it is at least conceivable that our Bayesian

³⁴ Because of the distribution, a simple comparison of means can be quite misleading since quite large apparent differences can arise from a relatively small number of observations from the left-hand tail of the distribution falling in one partition rather than the other.

³⁵ Possibly because subunderwriters erroneously believe that the standard formula for increasing the subunderwriting fee for agreements lasting for more than a month constitutes an adequate adjustment for the option's duration.

Table II
The Pricing of Underwriting

Variables which affect the value of underwriting	Partitioning on Basis of	Partition 1		Partition 2		Mann- Whitney U-test (Difference in Means) Significance Level (%)
		Sample Size	Mean Excess Return ^a (%)	Sample Size	Mean Excess Return (%)	
Variables which affect the value of underwriting	Partition 1 Contains					
	Duration	269	0.76	270	0.59	99.9
	Risk-free rate					
	Relative variances ^b (estimate/mean for year)	258	0.63	281	0.71	87
Other factors	Values ≤ 6.7%	89	1.21	85	0.44	>99.9
	Prior market returns	328	0.74	211	0.57	>99.9
	Company size	284	0.55	255	0.81	76
	Industry group	107	0.53	432	0.71	79
	Time period	259	0.98	280	0.39	>99.9
	Issue made in 1968 and before					

^a These excess returns are based on individual variance estimates where available, and mean estimates for all other issues.

^b Clearly when partitioning on the basis of variance estimates the size of our sample is restricted to the group of companies for which individual variance estimates were available.

adjustments are not pulling the variance estimates far enough back towards the mean, so that the effect we observe could be at least partly attributable to noise.

Table II also shows the results of partitioning on the basis of prior market returns, company size, industry group and time period. With respect to the first of these, it is often argued that companies have great difficulty in getting issues underwritten "in a bear market". The reasoning here appears to be based on a belief in market inefficiencies and in particular in the belief that market returns exhibit positive serial correlation so that market falls are expected to continue, thus putting underwriters at greater risk. While the empirical evidence clearly does not justify any such fears, Fama [13], it is nonetheless possible that companies and underwriters believe they are at greater risk and price underwriting accordingly. In fact Table II shows that the mean excess return to subunderwriting was indeed 0.17% higher for issues made following poor market performance, thus providing some confirmation that underwriting commands a higher price at such times.³⁶

Large companies may have greater bargaining power or be more financially sophisticated than small companies and thus obtain underwriting on more advantageous terms. Similarly, financial press commentaries on underwriting arrangements sometimes claim that the "City looks after its own", implying that underwriting for issues made by companies in the financial sector is on more favourable terms than for other companies. Table II shows that there is no statistically significant evidence to support either of these claims. Indeed, in the case of company size, the reverse is, if anything true, since the mean excess return for the smaller companies is 0.27% lower than the figure for their larger counterparts. Furthermore, this estimate of the difference is biased downwards since the excess returns for some two thirds of the sample were calculated using mean variances, whereas, in fact, the smaller companies are likely to have above average variances. When we repeated the test using only issues for which individual variance estimates were available, our estimate of the difference in excess returns increased to 0.39%. Once again, however, this figure was not statistically significant.³⁷

Finally, Table II shows that the excess returns for the 280 issues made after 1968 were 0.59% lower at 0.39% than the excess returns for the 259 issues made during the earlier period. This difference, which is significant at the 99.9% level, could be the result of the underwriting market becoming more efficient and competitive in more recent years. Alternatively this could once again be an indication that underwriters have failed to take proper account of the variance of returns for the issues which they underwrite, since over the later period, the mean variances were significantly higher.

Before moving on to consider the question of side payments and the overall

³⁶ Even if underwriting could not be obtained at any price at such times, this should not worry companies unduly, since they can always set the issue price so low that the risks of a failed issue are negligible.

³⁷ In making our Bayesian adjustments however, we should, of course, be using different priors for the large and small company samples.

efficiency of the underwriting market, it is interesting to have a very brief look at standby agreements in the USA.

VII. Valuing Underwriting for US Rights Issues

Underwriting and stock price data were obtained for a small sample of 47 rights issues made by US utilities over the period 1969 to 1973. From this data it was possible to identify the dates and duration of the underwriting agreement, the stock and issue prices and the standby and take-up fees. US Treasury Bill rates for the appropriate dates were taken as the risk-free rates, and variances of returns for the 26 NYSE quoted stocks were estimated using CRSP data over the period 1964 to 1968. The variances for the remaining 21 stocks (largely over-the-counter) were assumed to be equal to the mean of the variances for the 26 NYSE stocks. In using the B & S model to value the underwriting option for US rights issues, it is necessary to take account of the take-up fee. Since the effect of this fee is to reduce the exercise price which underwriters are obliged to pay, the simplest way of adjusting for it is to subtract it out from the exercise price.³⁸

A comparison of the standby fees with the Black and Scholes' underwriting values produced striking differences. While the standby fee ranged from 0.6% to 4.6% of the issue price with a mean of 1.09%, the underwriting value ranged from virtually zero to 0.1% with a mean of 0.01%. Thus the excess of the standby fee over the estimated underwriting value was 1.08%, or put another way 98.7% of the standby fee. Furthermore, the correlation between the estimated underwriting values and the standby fees was insignificantly different from zero, with an estimated value of -0.04 , thus lending little support to the perfectly reasonable and widely-held view that the greater the risks of a failed issue, the higher is the standby fee, Van Horne [29].

The excess return to underwriters is, of course, equal to the difference between the standby fee and the true values of underwriting, advice and legal services in connection with the prospectus. While the standby fee is known, and the underwriting value has been estimated, it is not possible from our data to estimate the value of advice, and thus strictly speaking, we cannot identify the excess returns. However, given this proviso, 1.08% seems, *a priori*, an excessive fee given the limited nature of possible advice in the case of rights issues, and it is therefore very tempting to interpret a large proportion of this figure as being excess returns to the underwriters. Furthermore, our figures are likely to underestimate the true returns to underwriters since, while for many of the 47 issues, underwriters were obliged to take up a part of the issue, in no case (as far as could be ascertained) was the stock price below the issue price on the expiry date. Thus in these cases, underwriters received not only the standby and take-

³⁸ For this procedure to be strictly correct, it is necessary to assume symmetric rationality on the part of shareholders as a group, so that they will all take up their rights on the expiry date if the stock price is above the adjusted exercise price, even if it is, in fact, below the stated exercise price. If shareholders did not behave in this way, there would be an unnecessary transfer of wealth from shareholders to the underwriters, and the Black and Scholes' formula would very slightly overstate the value of underwriting.

up fees, but also all of, or a share in, the profits from selling such unsubscribed stock in the market.

VIII. Side Payments and other Factors

In this section, we examine the question of side payments and other factors which may help to explain the observed excess returns to UK subunderwriters.

Looking first at the underwriting agreement, it is at least conceivable that underwriting fees include some side payment for advice or other services provided by the principal underwriter. Since the latter also acts as issue adviser, these services could well be connected with the rights issue itself. This need not be the case, however, since the issuing house has a continuing relationship with the company, providing it with a whole range of financial services and advice. Side payments therefore, could relate to any of these services, past, present or future.

Unfortunately, however, this argument seems rather unsatisfactory for several reasons. Firstly, it seems difficult to argue that the ½% fee paid for the issuing house's advice and services in connection with the issue is too low. Secondly, if the excess returns really do represent payment for services quite unconnected with the issue, this seems a curious commercial practice, particularly since the issuing house has no guarantee that the company will ever require its underwriting services.³⁹ Thirdly, any cross-subsidisation of consulting services by underwriting fees would not be tax-efficient from the company's point of view, since costs incurred in raising capital are not tax deductible.⁴⁰

The hidden side payments argument is perhaps easier to accept in the case of subunderwriting. Underwriters will often be on the subunderwriters' underwriting lists for other issues and more importantly, transactions between the institutions involved are not limited to the underwriting of equity rights issues. Thus, for example, it may be necessary to direct a certain amount of business to brokers who specialise in new issues, as an informal fee for the privilege of remaining on their subunderwriting list.

Quite apart from the question of side payments, it is possible that companies are prepared to pay high underwriting fees because the costs associated with non-underwritten issues exceed the overpayment for underwriting. If a non-underwritten issue fails, for example, the administrative costs of rearranging the issue can be quite substantial.⁴¹ But as we have already noted, the risk of failure, and hence the associated expected costs, can be made arbitrarily small by an appropriate choice of issue terms. However, "deep discount" rights issues may them-

³⁹ Rights issues are, after all, relatively rare events for individual companies. Only 30% of the companies quoted on the London Stock Exchange made equity rights issues during the period 1962-75 and only 7% made more than one issue.

⁴⁰ These expenditures are deducted from the capital account without affecting the profit and loss statement. Thus if managers are concerned with reported earnings rather than after tax cash flows, they might prefer to overpay for underwriting and underpay for other services not associated with the capital raising exercise.

⁴¹ The administrative costs of a rights issue can be as high as 10% of the money raised for issues by small companies, Marsh [22].

selves impose costs on shareholders. In particular shareholders who sell their rights incur transactions costs and capital gains tax liabilities, and these in turn will be affected by the issue discount.⁴² Looking first at capital gains tax, it is possible to establish the magnitude of the difference in the tax liability between a typical underwritten issue and an equivalent deep discount issue.⁴³ By postulating extreme values for the relevant parameters, we can then set an upper bound on the likely magnitude of this difference. Given such a set of extreme assumptions, it would seem highly unlikely that the differential tax cost could exceed 1% of the money raised. By similar reasoning, the transactions cost difference could be at most some ⅓%. In practice, the true costs are likely to be substantially less than this.⁴⁴ Furthermore, these costs are by definition avoidable, since shareholders can always take up their rights. If the necessary cash is unavailable, they can do this by borrowing or by selling off other holdings for which there is no capital gains tax liability. Finally, the fact that both dealing and tax costs increase with the issue discount should make shareholders even more anxious to ensure that the issue discount is minimised for underwritten issues.

Two other arguments are often put forward. The first is the assertion that the

⁴² When a shareholder sells his rights instead of taking up his shares, there is a part disposal for capital gains tax purposes. Furthermore, there is no way of offsetting this disposal against the purchase of additional shares in the company even if this is achieved by applying the disposal proceeds to the exercise of any remaining rights. The rights issue thus has the effect of converting any unrealised capital gain into a realised capital gain for shareholders who do not fully subscribe to the new issue. The larger the issue discount, the greater the value of the disposal required to maintain a constant money value holding in the company. Similarly, the greater the value of the disposal, the higher will be the brokerage costs involved. These arguments were first pointed out by Smith [26].

⁴³ The difference in the tax liability expressed as a proportion of the total money raised is simply:

$$(1 - p) \times g \times t \times (I_1/X_1 - I_2/X_2) \times (1 - (1/(1 + r)^N))$$

where p is the proportion of the new money raised which is subscribed by existing shareholders; g is the proportion of the value of the rights issue which represents a capital gain; t is the capital gains tax rate; I_1 , X_1 , I_2 and X_2 are the issue and ex-rights prices for the deep discount and typical underwritten rights issues respectively; r is the discount rate; and N is the time period when the capital gain would have been realised in the absence of the rights issue.

⁴⁴ In particular, we make the following assumptions; (1) the marginal capital gains tax rate is 30% for all shareholders, (2) in the absence of the rights issue, the taxes could have been postponed indefinitely, (3) the taxable gain is 50% of the disposal value of the rights, (4) only 50% of the issue is taken up by existing shareholders, (5) for the deep discount issue, the terms are selected so that the probability of failure is only one in a thousand. For a typical issue (see Figure 1), the latter implies an issue discount (on the ex-rights price) of 30%. For the underwritten issues in our sample, the mean discount was 16.4%. Given these assumptions, and using the formula given in the previous footnote, the increase in the tax liability will be $0.5 \times 0.5 \times 0.3 \times (0.836 - 0.7) \times 1 \times 100\% = 1.02\%$ of the value of the new money raised. Similarly, if we assume that dealing costs are as high as 10%, transactions costs would increase by, at most, some ⅓% by moving to the deep discount issue.

Clearly, however, these assumptions are quite extreme. Firstly, 30% is the maximum rate of capital gains tax payable in the UK, and many shareholders escape tax altogether because they are exempt (e.g., pension funds) or because they have off-settable losses or their total disposals fall below the minimum level for tax. Secondly, it is unlikely that in the absence of the issue, tax and dealing costs could be postponed for ever. Thirdly, Edge [10] has provided evidence that for a typical UK rights issue, two thirds of the issue is taken up by the original allottees. Finally, dealing costs will always be less than 10% except for the very smallest transactions.

deeper the issue discount, the more this will depress the company's share price.⁴⁵ The second argument is that public confidence is increased by underwriting so that the information effect of having an issue underwritten will cause an increase in the share price. Empirically however, there is no evidence whatsoever to support either of these views. At least for UK rights issues, the market's reaction to the issue announcement is quite independent of both the terms of the issue and whether the issue has been underwritten.⁴⁶

We are therefore faced with something of a puzzle. One or two factors, particularly dealing costs and tax, suggest that some shareholders should be prepared, if necessary, to pay a small premium for underwriting. This premium, however, should be less than the costs imposed on shareholders by moving to a deep discount issue.⁴⁷ Indeed, unless there are significant transactions costs involved in arranging underwriting, we would expect competition in the underwriting market to reduce any such premium to zero. In fact, underwriting is arranged very simply and cheaply and the costs involved would appear to be trivial. This leads us to the inescapable conclusion that, at least in some sense, the underwriting market is less than perfectly competitive. In addition, since on most plausible assumptions, the overpayment for underwriting exceeds the costs imposed by deep discount issues, it would appear that companies overpay for underwriting even when these imperfections in the underwriting market are taken into consideration.⁴⁸

Several comments, however, are worth making. Firstly, with some 50% of UK equities now owned by institutions, Briston and Dobbins [8], the companies' owners are to a large extent the subunderwriting institutions. In addition, the company's shareholders may well also hold shares in the subunderwriting institution. The net wealth transfer effect of excess returns to underwriting may thus be fairly small. Secondly, rights issues are very infrequent events for the individual

⁴⁵ For example, Alexander Scrimgeour, the senior partner in a large UK brokerage house, recently argued in a letter to the *Financial Times* (June 1976), "Unfortunately, shareholders never seem to behave in the way that theory demands. In practice the consequence of raising large sums by this method (deep discounts with no underwriting) is to drive down the market price of the shares in question for a significant period after the issue is made." For similar assertions, see Van Horne [29] and the interview results reported by Donaldson [9] and Bodenhammer [3].

⁴⁶ See Marsh [22]

⁴⁷ The costs of moving to a deep discount issue will be directly proportional to the pre-issue capital gain on the company's shares (see footnote 43 above). Therefore, if these costs are at all significant, we should expect the excess returns to underwriters to be highest for issues by companies which had enjoyed the greatest pre-issue capital gains. If anything, however, the reverse would appear to be the case.

⁴⁸ As Smith [26] has pointed out, since manager's interests may be different from those of shareholders, their financing decisions may not always be in the best interest of the owners. It is possible, therefore, that managers accept high underwriting fees because there are compensating benefits which flow to management rather than shareholders. Of course, if shareholders are acting rationally in an economic sense, they should allow this to happen only if the cost of monitoring management is greater than the costs imposed on them by the underwriting agreement, Jensen and Meckling [19]. In practice, however, it is difficult to see what the benefits to managers could be. Certainly, none of the side payments identified by Smith [26] in his comparison of US rights issues with underwritten general cash offers seem relevant in the context of UK rights issues.

company, and the company's finance director is thus likely to have had very little previous experience in this area. It is at least conceivable that under these circumstances, he may have insufficient understanding of the issues involved and be relatively ill-equipped for negotiating with the issuing house on the pricing of the issue. With open competition for underwriters' services this situation would not, of course, arise. In practice, however, companies do not attempt to seek out the cheapest underwriters since they are usually anxious to keep the news of an impending financing issue from the market until the underwriting agreement has been finalised. The company's existing advisers are thus in the privileged position of being the only ones to know that the company is in the market for underwriting services. In any event, companies tend to remain with the same merchant bank and broker for long periods of time, and to use them for a whole range of services of which underwriting is but one. Any attempts to change underwriters would thus involve a complete change of financial advisers, and since new advisers would be unfamiliar with the company, such switching could involve significant costs. The underwriters' monopolistic advantage would thus seem to stem from institutional factors, and from the nature of the relationship between company and financial adviser, rather than from any more explicit form of cartel.

IX. Summary and Conclusions

Underwriters perform an economically useful function by assuming the risks of a failed issue. Aside from questions of whether shareholders really wish to indulge in option trading with institutions, the question of whether underwriting has historically proved worthwhile is an empirical one. In fact, when we used the Black and Scholes Model to value UK underwriting agreements over the period 1962-75, the evidence strongly indicated that underwriting, taken alone, and ignoring side payments, was considerably overpriced. For issues made in the USA, the degree of overpricing was even more marked, although the sample of issues examined here was small. There was some evidence that underwriters earn higher excess returns following poor market performance, on short-lived options and on low variance shares, possibly as a result of the way in which they set the underwriting price.

When side payments and other factors are considered, it still appears that the underwriting market is less than perfectly competitive. Furthermore, even taking these imperfections into account, it appears that companies overpay for underwriting, since the costs imposed by the alternative to underwriting, namely deep discount issues, seem very small. The imperfections in the market appear to stem from institutional factors and the nature of the relationship between company and financial adviser rather than from any more explicit form of underwriting cartel.

Subunderwriting can therefore be regarded as a very profitable activity, unless the side payments required to remain on underwriters' lists more than outweigh these excess returns. It may even be possible for subunderwriters to increase their profits by applying the Black and Scholes Model to decide when to exercise their very limited right of refusal. Issuing companies, however, unless they believe

their losses on underwriting to be more than fully compensated for by gains on other transactions with the underwriting companies, should either play a more active role in the pricing of underwriting, or they should avoid underwriting altogether, and set the terms of the issue accordingly.

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