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Rights issues versus private placements: theory and UK evidence

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Abstract

UK companies and their shareholders have increasingly opted to have newly issued shares privately placed rather than selling them via a rights issue. We present a model of the choice between these two methods. We view a rights issue as similar to the type of issue envisaged by Myers and Majluf (1984), in which information asymmetry persists until after the shares are sold. In contrast, the placement process is assumed to enable potential placees to investigate the value of the issuer, and to reveal the true value via the placement price, as in Hertzel and Smith (1993). The model yields several testable predictions which are strongly supported by evidence from a large sample of seasoned equity offers.

1 Introduction

The nature of seasoned equity offers (SEOs) has changed in the UK. Before the late 1980s, almost all SEOs for cash by British companies were rights issues, but since then it has become common practice for some or all of the shares issued to be placed privately with investors. There is more than one framework in which a private placement can take place, the most important of which is known as an open offer. An open offer is a hybrid between a private placement and a rights issue; though the shares are privately placed with new investors, existing shareholders retain the right of first refusal on the new shares. If the existing shareholders do not wish to subscribe, the shares are allocated amongst the placees. The curious feature of the switch from rights issues to open offers and other forms of placement is that, on the face of it, a placement is a much more costly method of attracting capital than a rights issue. Most rights issues and open offers in the UK are made at a substantial discount to the market price. Whereas the rights to new shares can be sold in a rights issue, so a discount makes no difference to the wealth of non-subscribing shareholders, the rights can not be sold in an open offer, so a discount effects a transfer of wealth from non-subscribers to placees. Yet non-subscription is widespread in open offers; on average nearly half of the shares are not taken up by the shareholders entitled to them. There has never been any suggestion that companies choosing the open offer method have somehow tricked or coerced their own shareholders. On the contrary, non-subscribers are generally directors or large stakeholders in a powerful position to influence the choice of issue method.

We develop a model which can explain why a company acting in the interests of its existing shareholders would choose an open offer or other form of placement in preference to a rights issue. We view a rights issue as essentially the same as an SEO as modelled by Myers and Majluf (1984). We argue that buyers of rights in the market will not expend resources on becoming better informed, so that information asymmetry persists during the offer period. The key assumption we make about the placement process is that it enables would-be placees to buy large blocks of shares and to investigate, at a cost, the true value of the issuer, as in Hertzel and Smith (1993). We believe that investigation by potential placees is a normal part of the placing process in the issues involving placement which we study. We show that placees receive substantial rewards, of the order of 9% of the offer price, which we interpret as compensation for investigation and liquidity costs of buying blocks of shares. Hertzel and Smith's extension of the Myers-Majluf model shows that companies prefer placement if paying for investigation by placees increases the issue price of new shares, net of investigation costs. We supply a much fuller theory of the choice between a Myers-Majluf style SEO and a private placement, in which the choice is explained explicitly as a function of variables representing characteristics of issuing firms and of the concern of shareholders about market value in the short term. The theory does not exclude the possibility that placees provide other costly benefits, such as monitoring and managerial services to the issuer, as in Wruck (1989) and Cronqvist and Nillson (2000).

Our theory yields detailed predictions which we test using data from 933 UK SEOs. It predicts a market reaction to placements which is positive on average and more favourable than the reaction to rights issues, and this is borne out by the evidence. The positive reaction to placements reflects the fact that in equilibrium only 'high value' firms choose to place, and it helps explain why some shareholders choose to have their new shares placed at a discount and to sacrifice the potential value of their rights: the upward revaluation benefits existing shareholders who do not wish to subscribe to their entitlement of new shares and who may wish to sell their existing shares in the not-too-distant future. The evidence also supports predictions from the theory regarding the relation between rewards to placees and proxies for placees' investing costs, between announcement abnormal returns and firm characteristics, and between the probability that a placement is chosen and firm characteristics.

A recent empirical study of UK SEOs by Slovin, Sushka and Lai (2000) finds, as we do, a negative reaction to pure rights issues and a positive reaction to placements. There is, however, a crucial difference between the issues with placed shares in our sample and the stand-alone placements or bought deals studied by Slovin et al. The difference is that, in the placements in our sample, the placing process is complete or largely complete before the issue is announced, whereas Slovin et al state that, in their placements, the shares are bought by the underwriting bank and then placed with investors, so that the placing process happens after the announcement. They therefore suggest that the positive reaction to their placements is due to underwriter certification, which they argue is less reliable in pure rights issues. We do not study stand-alone placements but we believe that, in the issues with placed shares we study, certification is done by placees before the issue is announced rather than by the underwriting bank. We have found no evidence to suggest that there is any difference in underwriter certification (or lack of it) between pure rights issues and the issues with placed shares, so underwriter certification does not enter our theory. Furthermore, if the positive reaction to the placements in our sample were to be ascribed to certification by underwriting banks, it would be harder to explain the substantial rewards which we find that placees receive.

The paper is organised as follows. The next section describes SEO mechanisms current in the UK. Section 3 presents a model of binary choice between i) a placement and ii) a Myers-Majluf style SEO and argues that these issue methods closely correspond to i) UK open offers and rights issues involving placement of shares and ii) UK rights issues without any placement, respectively. Section 4 presents the empirical results. Section 5 concludes with brief comments on the relative demise of pure rights issues in favour of issues involving placement.

2 Types of SEO in the UK

2.1 Pure rights issues

In a rights issue, new shares are offered to existing shareholders in proportion to the number of shares they own.[1] In the UK, the prospectus is posted the day the offer is publicly announced and if no extraordinary general meeting (EGM) is needed to authorise the issue, the offer period of at least three weeks begins on the announcement day. If an EGM is necessary, there is a gap of two or three weeks between the announcement and the EGM, and the offer period starts the day after the EGM. The rights can be traded in the same way as shares during the offer period. The offer price is decided the evening before the issue is announced, whether or not there is an EGM, and is usually set at a discount to

[1] Our sources of information about types of SEO are prospectuses, interviews with seven investment bankers in 1996, and *Rights Issues and Private Placings for UK Companies: A Guide*, 1995, privately produced by SG Warburg.

the market price. The depth of discount does not matter to non-subscribing shareholders because they can sell their rights, and any rights not subscribed for by the close of the offer are automatically sold by the broker on behalf of the shareholders concerned. The only reason for a discount is to reduce the risk of the issuer's share price falling below the offer price. The existing shares go ex-rights the day after the announcement or after the EGM, if there is one. Buyers of the shares on or after the ex-date are not entitled to participate in the issue so that, other things equal, the market price falls on the ex-date to reflect the scrip element of the issue. The fair price of a right to one new share is the difference between the ex-rights share price and the offer price (ignoring the right's time value), and the actual price is kept close to this by the possibility of arbitrage between the shares and the rights.[2]

Open offers. A type of issue known as an open offer started to be used in the late 1980s, and rapidly became popular. An open offer is a cross between a private placement and a rights issue. The new shares are privately placed with investing institutions by verbal agreement before the offer is publicly announced; potential buyers agree to become insiders and not to trade the issuer's shares before the announcement. Legally binding contracts are signed on the announcement day, and it is rare for institutions to renege on their agreements. The shares are also offered pro rata to existing shareholders, who have priority, and the offer period is usually three weeks. But the rights can not be sold. This means that any discount implies a transfer of wealth from non-subscribing shareholders; the share price falls on the

[2]A study of the market for rights during 1995-97 by Credit Suisse First Boston, reproduced in MMC (1999, pp. 244-6), finds that rights trade at an average discount to their fair price of 0.5% of the ex-rights share price, using mid-point prices. The sample is restricted to large issues of £50m or more. The study notes that traders do arbitrage between the shares and the rights.

ex-day, as in a rights issue, and non-subscribers are not compensated for the fall in value of their existing shares.[3] The investors with whom the shares have been placed receive all the shares not subscribed for by the existing shareholders. Open offer terminology reflects the fact that the primary function of the placement is to sell the shares rather than to transfer underwriting risk. The investors are referred to as 'placees' and the new shares are said to be 'placed with clawback'; an institution acting as a placee agrees to buy a certain number of shares, some of which will be 'clawed back' to satisfy demand from existing shareholders wishing to subscribe.

Rights issues with pre-renounced shares. Rights issue and open offer prospectuses often record the intentions of directors and other shareholders who know about the issue before the public announcement to take up or, alternatively, to renounce their entitlements to new shares. In open offers at a discount the rights are worth nothing unless taken up, so it makes no difference whether a non-subscribing shareholder pre-renounces his rights or merely fails to exercise them. But a decision to pre-renounce rights in a rights issue means that the rights are privately placed before the announcement instead of being sold on the stock market. If the pre-renounce-and-place route is chosen, the shareholder receives from the placee 50% of an ex ante estimate of the value of each right to buy one new share, given by the difference between the theoretical ex-rights price (TERP) and the offer price. This is

[3]The ex-rights day in an open offer is usually the day after the announcement, otherwise it is the announcement day. If an EGM is necessary to authorise issue of the shares, it is held after the offer period, unlike in a rights issue. Although there is no market for the rights, buyers of the shares before the ex-day are entitled to participate in the open offer, and this entitlement has value if the offer is at a discount.

a rule of the London Stock Exchange (1997, 4.17(c)), and it is apparent from prospectuses that the rule is adhered to. The TERP is the price to which the existing shares will fall on the ex-rights day, assuming no change in the market price for any other reason. It is defined as $P_b[S/(S+N)] + P_o[N/(S+N)]$, where P_b is the mid-point market price at the close of the day before the announcement, P_o is the offer price, S is the number of existing shares and N is the number of new shares offered pro rata to existing shareholders.

Private placements are issues in which the new shares are placed with one or more investors and are not offered pro rata to existing shareholders. They are known in the UK as private placings or subscriptions or placings without clawback. A special resolution has to have been passed which disapplies shareholders' pre-emption rights for 12 months; there is no restriction on re-sale of the shares; and any discount is a cost to the issuer. Private placements can be made on a stand-alone basis or in conjunction with a rights issue or open offer, in which case two types of issue happen simultaneously. The placement is not part of the rights issue or open offer because the shares are not offered pro rata to existing shareholders. But the placement shares are issued on the same terms as the shares offered pro rata, and the placement is described in the rights or open offer prospectus. In many such cases the placee(s) has signed a contract and is named in the prospectus. Otherwise it is normal for the shares to have been placed by verbal agreement before the announcement, in the same way as are the shares in an open offer.

Acquisition placements. A special type of private placement is the issue of shares to the shareholders ('vendors') of a company being acquired, in exchange for the acquired company's shares. This is known as a 'vendor consideration' issue. To illustrate, suppose the shareholders of company Y agree to sell their shares to company X for £12m. The market price of X's shares is £1. X issues 15m new shares at a price of £0.80 to Y's shareholders in exchange for their shares in Y. The new shares in X are not offered to X's existing shareholders and the placees (Y's shareholders) benefit if the issue is at a discount to the market price, as in the example. If some of Y's shareholders do not wish to acquire shares in X, even at a discount, X's broker may organise a 'vendor placement' of the shares with other investors at the same issue price, and Y's shareholders will receive cash at a rate of £0.80 per new share in X. We refer to placements to, or on behalf of, shareholders of acquired companies as 'acquisition placements', to distinguish them from other private placements.

In the remainder of the paper, we refer to shares pre-renounced or not taken up ('clawed back') in open offers, shares pre-renounced in rights issues, and shares in private or acquisition placements as 'placed shares'. Other shares issued are either taken up by those entitled to them, or in a rights issue the rights to them are sold on the market.

3 A theory of the choice of issue method

3.1 Assumptions and overview

The model uses the notation of Myers and Majluf (1984) and shares many of that paper's basic assumptions and features. However, we study the choice of issue method rather than the choice between issuing and not issuing. We model a firm that acts in the interests of existing shareholders and has just discovered a new short-lived opportunity to invest in a project with positive NPV of b. The project requires new funds and the firm must raise at least some of these funds via a share issue. There are two periods; a pre-issue issue period and an announcement period. In the pre-issue period, the market value of the firm (P_0) is the expected value of the assets in place (a). In the announcement period, the firm announces the existence of a new project, the share issue and the method of issue.[4] The firm knows a and b whilst outsiders only know the probability distribution function (pdf) of a and b. Because we are concerned with the choice of issue method, we use our model to analyse firms who experience realisations of a and b that lead them to issue. There will be other firms with positive NPV projects who choose not to issue, but we do not concern ourselves with non issuing firms in this paper. We use our model to show how the characteristics of issuing firms determine the choice of issue method, the issue price and, in the case of placements, the discount to placees.

We assume that the private information about a and b is idiosyncratic in nature. Hence any risk in the market arising from this source is perfectly diversifiable and will not be priced in equilibrium. The proceeds required to fund the project (I) are assumed to be exogenous and in particular are independent of a and b.[5] The proceeds are raised either by a placement or by an SEO of a type which we call an 'MMS' (Myers-Majluf sale).[6] In a placement, the

[4] Myers and Majluf specify an additional intervening period when the arrival of an investment project is announced. Our choice of two periods is motivated by the institutional set-up in the UK where firms undertaking SEOs tend to announce the issue and the reason for it at the same time.

[5] In reality, scale effects would generate a correlation between I, a and b. In the empirical work below we normalise proceeds by firm size to remove scale effects.

[6] We do not model the role of debt or financial slack here. Issuing debt or using cash reserves (slack) to part-finance the project simply reduces the required proceeds (I) of the new issue. Similarly, shares bought by existing shareholders reduce I.

new sahres are sold at a discount to the post-announcement market price in large blocks purchased by a small number of investors, whereas in an MMS the shares are purchased by many investors at the market price. The market for shares, whether placed or sold in an MMS, is assumed to be competitive and shares are sold at a 'fair' price, i.e. a price equal to their expected value given public information. This accords with our earlier assumption that risk arising from inside information is diversifiable and will not be priced in competitive markets. We shall argue in Section 3.7 that a pure rights issue has essentially the same characteristics as our theoretical Myers-Majluf style SEO and that offers involving placed shares are mechanisms that closely approximate the placements of our theory.

Any investor may gain knowledge of a and b by incurring a fixed investigation cost c, and we assume in addition that buyers of large blocks suffer a liquidity cost determined by the bid-ask spread, λ, when they come to sell the block, for which they require compensation in advance. Underwriters are assumed not to certify value, or at least to certify with equal unreliability across all issues. The sum of investigation and liquidity costs across all placees (T) is referred to as the total costs of investing in the issuer, or total investing costs. Both proceeds (I) and investing costs (T) are assumed to be firm-specific (i.e. to vary across firms). Investing costs and the price that placees pay for the shares (P_p) are assumed to be publicly observed, and we elaborate the theory under the conjecture that in equilibrium placees always investigate. This conjecture is verified in Appendix 1. An implication is that a placement reveals the true value of the issuing firm to all market participants.

3.2 The discount in placements

If placements are to be made at a fair price then buyers must be fully compensated for incurring investing costs. This is achieved by offering shares at a discount to the full information market price, which in turn is revealed to placees via their investigations. In this section we expose the arithmetic of these placement discounts.

In a placement, the firm signals to a number (n) of investors that it wishes them to investigate the stock by offering them blocks of shares at a specified and common price. We discuss the determination of n in Section 3.3 below. The gain in fundamental (full information) value to outsiders in a placement is

$$\frac{x}{1+x}(a+b+I) - I - T \qquad [= \frac{x(a+b-P_p)}{1+x} - T] \tag{3.1}$$

where we have normalised the initial number of shares to unity, P_p is the value of the firm at the placement price and x $[= \frac{I}{P_p}]$ is the normalised number of new shares issued.

A fair price is determined by setting the expected outsider profit to zero. In an equilibrium where information is purchased by placees and where that information fully reveals a and b, expected placee profits are equal to their actual ex post profits. Hence the placement price is given as the solution to

$$\frac{x(a+b-P_p)}{1+x} = T \tag{3.2}$$

which may be rearranged to give

$$P_p = a + b - T\frac{1+x}{x} \tag{3.3}$$

Multiplying the top and bottom of the last fraction by P_p, using the fact that $I = P_p x$ and rearranging gives

$$P_p = \frac{I}{I+T}(a+b-T) \tag{3.4}$$

Price of the shares post placement (P_1) is

$$P_1 = \frac{a+b+I}{1+x} = \frac{a+b+P_p x}{1+x} \tag{3.5}$$

From (3.3) we have

$$I\ [= P_p x] = (a+b)x - T(1+x) \tag{3.6}$$

Using (3.6) in (3.5) gives

$$P_1 = \frac{a+b+(a+b)x - T(1+x)}{1+x} = a+b-T \tag{3.7}$$

so that

$$P_p = (\frac{I}{I+T})P_1 \tag{3.8}$$

This shows that the depth of discount in a placement is positively related to the total costs of investing in the issuer (investigation plus liquidity costs) and negatively related to the amount raised in the issue. This would appear to be consistent with the views of Hertzel and Smith who assert that there are economies of scale in investigation activities. However T in our model is total costs of investing in the issuer. To the extent that liquidity costs are an important component of T and to the extent that these costs rise faster than the proceeds I (see below) then the economies of scale in investigation may be offset by 'diseconomies of scale' associated with liquidity costs.

Finally we may rearrange (3.8) to get

$$\frac{T}{I} = \frac{P_1 - P_p}{P_p} \tag{3.9}$$

P_p and $P_1$are both measurable, at least for issues that involve placements, so that (3.9) gives us a direct measure of $\frac{T}{I}$ that may be used in the empirical analysis of issues involving placments.

3.3 A simple model of investing costs

Here we propose a simple scheme for investing costs. Whilst the rest of our model does not hinge on or even require an explicit formulation for investing costs, exploring a particular scheme helps to fix ideas and, later in the paper, helps to flesh out some of the subtle properties of rights issues.

Investing costs are assumed to be fixed (firm-specific) investigation costs (c) plus liquidity costs which we define as the cost of disposing of the entire block.[7] Suppose the number of placees approached by the firm is n. A reasonable form for total investing costs (T) might be

$$T = nc + n\lambda(\frac{I}{n})^2 = nc + \lambda\frac{I^2}{n} \tag{3.10a}$$

where λ is a firm specific constant equal to one half of the bid-ask spread associated with trading one unit of the stock. The second term in (3.10a) represents the costs to a placee of liquidating the entire holding following the take-up of an issue. It assumes that the effective bid-ask spread rises with the value of shares sold $\frac{I}{n}$ as predicted by many models of stock

[7]More generally specifying these costs in terms of disposal of some fixed proportion ($\frac{1}{k}$) of the block without does not raise any difficulties.

trading under asymmetric information (for example, Kyle, 1985). Of course the size of the bid-ask spread reflects the degree of asymmetric information and as placements fully reveal any such information, we would expect the spread to fall considerably following a successful placement. Despite this, there is an important reason why the spread remains a real cost to the placees. The arrival of shocks to firm value is an ongoing process, and the placees are likely to be, or to be seen as, insiders. Any attempt to sell their stake on the open market following a placement would signal, at least with some probability, the arrival of adverse private information and would reduce the price they obtain for their block. Such liquidity costs associated with the acquisition of large controlling stakes have been discussed extensively elsewhere.[8]

We show below that the investing costs T in a placement are borne entirely by the firm via the discount offered to placees. Therefore, if a firm is free to choose n, the optimal value will minimise T and be determined as

$$n = (\frac{\lambda I^2}{c})^{\frac{1}{2}} \tag{3.11}$$

making minimised investing costs of

$$T = 2(\lambda I^2 c)^{\frac{1}{2}} \tag{3.12}$$

[8]For example, Bolton and Von Thadden (1998) model the problem of a large financial institution that is subject to liquidity shocks but is considering acquiring a controlling stake in a poorly managed firm. In their model, if the institution proceeds with the acquisition it becomes an insider and suffers large costs when attempting to liquidate that stake. The returns to monitoring and performance-enhancing activities are therefore tempered by the liquidity costs associated with the acquisition of the necessary controlling stake. Whilst we do not consider agency and performance-enhancing issues here, the main thrust of the argument concerning the liquidity costs associated with large stakes is relevant.

Note that under the above scheme, T is linearly homogenous in I and positively related to c and λ. We test these predictions in the empirical section below. Without liquidity costs or under a fixed bid-ask spread, the optimal number of placees is one.

3.4 The choice between Myers-Majluf sale and placement

In what follows, we assume that in an MMS, the stock is so widely dispersed as to make total liquidity costs negligible.[9] Thus the (competitive) price of a unit of new stock is simply the market value of the existing shares conditional on the MMS having been announced.

We start with the objective function of the firm that has had an investment opportunity arrive and is considering its issue method. If it places, the gain in terms of fundamental value for its existing shareholders is

$$\pi_f^p = \frac{1}{1+x}(a+b+I) - a \tag{3.13}$$

The first term on the right of (3.13) is the proportion of shares owned by the initial shareholders after x new shares have been issued to finance the investment project and the term in brackets is the final fundamental value of the firm $(a+b+I)$. We may rewrite (3.13) in the more useful, equivalent form

[9] This implicitly assumes that liquidity costs rise with stock holdings at an increasing rate and that there are an infinite number of prospective outside purchasers in a competitive market for the new shares. In terms of the quadratic formulation given in Section 3.3, for example, as n goes to infinity, the total liquidity cost $(\lambda\frac{I^2}{n})$ goes to zero. Hence it is in no individual investor's interest to acquire any more than an infinitessimal unit of stock at the competitive price.

$$\pi_f^p = \frac{P_p}{P_p + I}[(P_p - a)x + b] \tag{3.14}$$

The objective in (3.14) implies that firms (or rather their existing shareholders) care only about fundamental values and this assumption underlies the thinking in both the Myers-Majluf and Hertzel-Smith models. However, it may be the case that at least some shareholders also care about market value. This would be particularly likely if they were liquidity-constrained or suffer liquidity shocks at the time of issue. An important generalisation of our objective relative to the objective in preceding models is to allow this type of stockholder to exist. To this end we add to (3.14) a term which reflects the capital gains made when a proportion of existing holdings are sold after the issue. Hence total gains under placement are specified as

$$\pi^p = \frac{P_p}{P_p + I}[(P_p - a)x + b] + \delta(P_1 - P_0) \tag{3.15}$$

where P_0 is the pre-issue price. The coefficient δ in (3.15) represents the relative weight of gain based on fundamentals to gain based on market price. One interpretation is that $\frac{\delta}{1+\delta}$ of the shareholders are 'short term investors' who for reasons of liquidity preference or liquidity constraints care only about the market value of their holdings and the remaining $\frac{1}{1+\delta}$ are long term investors who care only about fundamentals.[10] Of course, this set-up does not preclude the possibility that no such shareholders exist ($\delta = 0$) in which case the objective simplifies to the more familiar fundamentals-based definition. Substituting out for P_p in (3.15) using

[10] Strictly speaking, to be a genuine weighted average the two terms on the right of (3.15) should be premultiplied by $\frac{1}{1+\delta}$. Omitting this strictly positive factor has no consequences for the theoretical results given below and is made for notational convenience only.

(3.4) and noting that $\frac{P_p}{P_p+I}$ is equivalent to $\frac{1}{1+x}$ gives a simpler form for π^p as

$$\pi^p = b - T + \delta(P_1 - P_0) \qquad (3.16)$$

The term $(b-T)$ in (3.16) is the new project's NPV minus the investing costs; the second term is simply the (weighted) share revaluation arising from placement. We may specify an analagous objective function for a firm opting for a MMS as

$$\pi^m = \frac{P_m}{P_m + I}[(P_m - a)x + b] + \delta(P_m - P_0) \qquad (3.17)$$

where the pre-issue price is the same as in (3.15) but the post-issue price is just the MMS offer price P_m.

For a firm to choose MMS over placement, its realisations of a and b must be such that $\pi^p \leq \pi^m$ (so that it prefers an MMS) and $\pi^m \geq 0$ (so that it prefers issuance to non issuance). Using (3.16) and (3.17) we may via some minor manipulations rewrite this formally as

$$\begin{aligned} Firm\ \ chooses\ \ MMS\ \ \ iff \quad \pi^p &\leq \pi^m \geq 0 \\ i.e.\ iff\ \ \pi^m &\geq 0\ \ and \\ b - T &\leq \delta P_1 \frac{P_m}{P_m + I}[(P_m - a)x + b] + \delta P_m \end{aligned} \qquad (3.18)$$

Note that the initial pre-issue price washes out from the inequality in (3.18). Using $I = P_m x$, and (3.7) in (3.18) and rearranging gives

$$\pi^p \leq \pi^m \qquad => P_m \frac{I(1+\delta) + \delta P_m + T}{I(1+\delta) + \delta P_m} + T \geq a + b \qquad (3.19)$$

which we abbreviate to

$$\pi^m \geq \pi^p \qquad => q(P_m).P_m + T\ \geq y \quad \text{where} \quad q(P_m) = \frac{I(1+\delta) + \delta P_m + T}{I(1+\delta) + \delta P_m} \qquad (3.20)$$

and $y = a+b$. Henceforth for sake of brevity we refer to $q(P_m)$ as q. An interesting feature of (3.20) is that when it is in the firm's interests to place shares, the placement price obtained may be lower than the offer price had it chosen an MMS. To see this, note first that

$$P_p = r(y - T) \quad \text{where} \quad r = \frac{I}{I+T} \tag{3.21}$$

from (3.7) and (3.8). Firms will place when the inequality in (3.20) is reversed. Using this reversed inequality, (3.21) and rearranging gives the placement condition as

$$P_p \geq qrP_m \tag{3.22}$$

It is easy to show that a) $qr = 1$ when $\delta = 0$, b) $qr = r(< 1)$ when $\delta = \infty$ and c) $0 < qr < 1$ when $0 < \delta < \infty$. Hence if $\delta > 0$, it is always possible for the placement price to lie below the price that would have occurred had there been an MMS. By contrast, the post-announcement *market* price in a placement (P_1) must always *exceed* that in the equivalent MMS (P_m), because $P_1 = \frac{P_p}{r} \geq qP_m$, from (3.8) and (3.22), and $q > 1$ (for $\delta < \infty$).

If the market value of existing shares is not important to the firm (i.e. $\delta = 0$) then the offer price in a placement would always exceed the equivalent MMS price, as is verified by setting $\delta = 0, (qr = 1)$ in 3.22. Firms with shareholders who do care about market value ($\delta > 0$) may be prepared to place new shares even though the price they obtain is below the equivalent MMS price. This is because, given the revelation of true value in a placement, firms which choose a placement will have a higher market value post announcement than firms which choose an MMS. As a matter of fact, we do observe firms which choose to place shares at a price below the price they might have expected in a rights issue, which is the pre-announcement share price less approximately 3% loss of value on announcement (see Section 4.3.1).[11]

We now consider the determination of P_m in an MMS. P_m is the expected value of the firm per share conditional on (3.19) being true. It can be easily shown that this is the expected value of the existing firm, conditional on MMS issuance, plus its new project, i.e. $P_m = E(y|MMS)$.[12] P_m is given implicitly by

$$P_m[= E(y|MMS)] = \frac{\int_{y\min}^{qP_m+T} yf(y)dy}{\int_{y\min}^{qP_m+T} f(y)dy} \tag{3.23}$$

where $f(y)$ is the pdf of y and where $y\min$ is the smallest possible value of $a + b$. The problem with (3.23) as it stands is that it is analytically intractible. In particular, it cannot be used to establish unambiguous signs of first order effects of conditioning variables such as T and I on P_m. To proceed, we assume a simple form for the pdf of y, namely the uniform distribution, and derive first order effects under this regime. We check the robustness of the results with respect to changing the pdf via numerical simulations in Appendix 2.

[11]This genuine loss of value should be distinguished from the fall in share price on the ex-rights day due to the scrip element in a rights issue, which is irrelevant. The new shares in a pure rights issue are always sold at the same price as the existing shares, whatever the offer price discount, so long as the rights can be traded at a fair price.

[12]A fair price for a share would be the expectation of post-issue firm value divided by the post issue number of shares. Hence $P_m = E\left(\frac{a+b+I}{1+x}|MMS\right)$. Multiplying through by $1 + x$, substituting I for $P_m x$ and subtracting I from both sides (note:- I, P_m and x are in the information set) gives $P_m = E((a+b)|MMS)$.

We assume that y follows the uniform pdf.[13]

$$y\tilde{\ }U(\overline{y}-\varepsilon,\overline{y}+\varepsilon) \tag{3.24}$$

Note that $\varepsilon(>0)$ is proportional to the standard deviation of y and therefore represents outsiders' uncertainty about the company's private information. As a result, T and ε may be positively related via a positive association of λ and possibly c with ε but because we measure ε, λ and c separately in the empirical work, we do not have to model the relationship between the three to run and interpret regressions properly.[14] Under the pdf in (3.24) the price in an MMS (P_m) is the average of the lower and upper bounds for y implied by the MMS as specified in (3.23) i.e. the average of $\overline{y}-\varepsilon$ and qP_m+T. Hence

$$P_m=\frac{1}{2}(\overline{y}-\varepsilon+qP_m+T) \tag{3.25}$$

Rearranging (3.25) gives a more useful implicit form for P_m

$$P_m=\frac{z}{2-q} \qquad where \quad z=\overline{y}-\varepsilon+T \tag{3.26}$$

From (3.26) and the (assumed) positivity of z we see that for P_m to be positive, q (which we already know exceeds unity) must be less than two. If we assume investing costs are

[13]Because we analyse the choice between an MMS and a placement, we deal with a subset of firms whose realisations of a and b are such as to ensure that $\max[\pi^p,\pi^p]\geq 0$. This makes a and b conditional random variables and this conditionality places constraints on the support of $a+b$ that are in addition to those arising through limited liability ($a\geq 0$) and the positivity of the NPV of investment projects ($b\geq 0$). The chosen pdf for $y(=a+b)$ must have a support consistent with these constraints. Whilst we do not explore these constraints here, it is easy to show that under a uniform pdf for y there exists a positive value of $y_{\min}(=\overline{y}-\varepsilon)$, which will guarantee issuance, limited liability and positive NPV of investment projects.

[14]In what follows, when we refer to the effect of a change in c or λ on issue price we mean the effect via T only. Similarly, when we refer to the effect of a change in ε on issue price we mean its direct effect.

linear homogenous in proceeds and if we recall that they are also increasing functions of c and λ, it is easy to show that P_m is increasing in I, c, λ and $\overline{y}$ but decreasing in ε and δ.[15] The positive relation with respect to c and λ is explained by the fact that as investing costs increase, some relatively high value firms on the margin of placement will be forced to pool with the lower value firms in an MMS. Hence the average value of MMS firms rises as c and λ rise.[16] Increasing the standard deviation of post-issue value extends the left hand tail of the pdf for $a + b$ whilst the effect on the right is limited by the truncation arising from (3.20). Hence average (MMS) firm value declines with ε. Increasing δ tends to lower the MMS price. This is because as δ rises, market value becomes more important and placement more attractive. This in turn takes some high value firms out of an MMS and into placement and hence the average value of firms undertaking MMSs decreases. The positive effect of I on P_m arises because increased proceeds make for lower average investigation costs ($\frac{c}{I}$) which in turn increases the attractiveness of placing. Firms at the top end of the value spectrum in the MMS pool will switch from an MMS to a placement as I rises so the average quality of firms in the MMS pool is reduced.

3.5 Market reaction to announcement of type of issue

Myers and Majluf show that the market price unambiguously falls for issuing firms when moving from the announcement of the arrival of a new project to the announcement of the decision to issue. However, it is not possible to identify such a price change from our data

[15] Proof of this is simple but tedious. It is available on request.

[16] Note that c and λ could have an opposite effect on P_m via ε, but in the regression analysis below, this effect is captured directly by our proxy for ε.

because the project's arrival and the issuance decision are announced at the same time. In fact the data can only measure price changes between the initial pre-event period and the announcement-of-issue period, and the sign of this is not determined by the theory.[17]

To see this for our case, let us suppose that the issue prospectus contains no new information about the pre-issue value of the firm, P_0,[18]. The revaluation of the existing stock following the announcement of an MMS is then $P_m - P_0$ which using (3.26) can be written as

$$P_m - P_0 = \frac{\overline{y} - \varepsilon + T - P_0(2-q)}{2-q} \qquad (3.27)$$

The net result of news of the new project plus an MMS is ambiguous, as 3.27 shows.

In contrast to MMSs, the market reaction to placements is *on average* unambiguously positiveas we now show. The positivity of ex-post gain from a placement gives the condition that

$$\pi^p = b - T + \delta(P_1 - P_0) \geq 0 \qquad (3.28)$$

Now, either $b > T$ or $b \leq T$. In the latter case, it must be $\delta \geq 0$ and that post-issue price $P_1 \geq$ pre-issue price P_0. But what if b exceeds T? When a firm chooses to place we know that $P_1 = a + b - T$. If $b > T$, we must have

$$P_1 = a + b - T \geq a \qquad (3.29)$$

[17]There are two opposing effects: the arrival of a positive NPV project will raise the outsiders' view of firm value but the decision to undertake an MMS will lower it. The net effect is unclear.

[18]It is very often the case that the prospectus does reveal new information about the firm. However this would only affect regression-based explanations of market reaction if the news had a non-zero mean. There is no reason to believe that this is the case.

Taking expectations of all sides conditional on placement gives

$$E(P_1|placement) = E[(a + b - T)|placement] \geq E(a|placement) \tag{3.30}$$

Reversing (3.19) shows that a placement signals weak truncation of a from the left. Hence the change in the expected value of a moving from the pre-announcement period to the announcement of the placement must be weakly positive and we have

$$E_0(a) \leq E(a|placement) \tag{3.31}$$

where $E_0(a)$ is the expected value of a pre-announcement. Combining (3.30) with (3.31) and using the fact that $P_0 = E_0(a)$ gives

$$E(P_1|placement) \geq E(a|placement) \geq E_0(a) = P_0 \tag{3.32}$$

(3.32) shows that the average post issue price for placing firms exceeds their average pre-issue price. The intuition for the result is similar to that given by Hertzel and Smith (1993). The upward revaluation arising from the arrival of a positive NPV project is reinforced by the announcement of a placement which signals undervaluation of the assets in place. This contrasts to an MMS where the downward revaluation of assets in place works against the upward revaluation arising from the project's arrival. Hence we may also show that reaction to a placement is more favourable than to an MMS i.e. $\frac{P_1}{P_0} > \frac{P_m}{P_0}$.

The theory further predicts the sign of first order effects of a firm's characteristics on its abnormal return on announcement of a placement. If we define the point on the support of y that divides MMSs and placements (y^*) as

$$y^* = qP_m + T \tag{3.33}$$

then the average price of firms that place (for any given T) is

$$E(P_1|placement) = E[y|y \geq y^*] - T = E[(a+b-T)|\ a+b-T \geq qP_m] \tag{3.34}$$

An explicit form for the average price post issue follows from (3.34) and the uniform distribution for y

$$E(P_1) = \frac{1}{2}(qP_m + T + \overline{y} + \varepsilon) - T \tag{3.35}$$

Substituting for P_m in (3.35), using the expression given in (3.26) and rearranging gives

$$E(P_1) = P_m + \varepsilon - T \tag{3.36}$$

If, as before, we assume that T is linear homogenous in I and increasing in λ and c, we may use (3.36) to sign the partials of $E(P_1)$ wrt I, c, λ, δ and ε. It is easy to show that

$$\begin{aligned} a)\ E(P_1)^I &= P_m^I - T^I > 0,\ \ b)\ E(P_1)^c = P_m^c - T^c > 0,\ \ c)\ E(P_1)^\lambda = P_m^\lambda - T^\lambda > 0, \\ d)\ E(P_1)^\delta &= P_m^\delta < 0, \qquad e)\ E(P_1)^\varepsilon = P_m^\varepsilon + 1 < 0 \end{aligned} \tag{3.37}$$

where, as usual, the superscript indicates the direction of the partial derivative.[19] With the exception of e), (3.37) shows that the partials are the sum of a direct effect and an indirect effect operating through P_m (see Section 3.4), that these effects have opposite signs (3.37), and that under our assumed uniform pdf, the indirect effect always dominates. The signs of these partials are important because they form the focus of our empirical tests on placement abnormal returns. They also predict (the signs of) the effects of I, c, λ, δ and ε on the probability of placement (see Section 3.6 below) which we also subject to empirical

[19] Full derivations of these partials are available on request.

testing. It is important therefore that the signs of the partial derivatives in (3.37) are not an artefact of the simple uniform pdf chosen for y. In Appendix 2, we show via numerical simulation that the signs of the partials in (3.37) are robust under 'reasonable' alternatives to the uniform pdf, namely, under i) an exponential pdf for y and ii) a semi-normal pdf for y.

3.6 Determinants of the probability of placement

The above analysis can be used to get an explicit form for the probability of a placement. We only need to compute the probability of the inequality in (3.22) being satisfied. Hence

$$\Pr(placement) = \Pr(y \geq y^*) = \int_{y^*}^{\overline{y}+\varepsilon} \frac{1}{2\varepsilon} dy = \frac{\overline{y} + \varepsilon - y^*}{2\varepsilon} = \frac{\overline{y} + \varepsilon - qP_m - T}{2\varepsilon} \tag{3.38}$$

Using (3.25) on the far right of (3.38) and simplifying gives

$$\Pr(placement) = \frac{\overline{y} - P_m}{\varepsilon} \tag{3.39}$$

The effects of increases in I, λ, and c on the probability of placement all occur via their respective effects on $-P_m$. The intuition is that P_m is an opportunity cost of placement and the higher it is the less attractive is placement as an issue mechanism. I, λ, and c each have positive effects on P_m and hence have negative effects on the probability of placement. The partial with respect to ε is just

$$\Pr(placement)^{\varepsilon} = \frac{-\varepsilon P_m^{\varepsilon} - (\overline{y} - P_m)}{\varepsilon^2} = -\frac{1}{\varepsilon}[P_m^{\varepsilon} + \Pr(placement)] \tag{3.40}$$

It follows from (3.37) e) above that the term in braces on the far right of (3.40) is negative and hence the probability of placement increases with ε. The intuition here is that increasing ε lengthens both tails of the pdf of firm value. This lowers the average quality of MMS firms and hence P_m itself, because higher value firms choose placement.

3.7 Can placement be achieved via a rights issue?

According to the above theory, each of the issue mechanisms described in Section 2 which involves placed shares can be categorsied as a private placement, because the placement is a done deal when the issue is announced, which is assumed fully to reveal firm value to the market. In this section we suggest why a pure rights issue is not an optimal mechanism for placing shares, and therefore must be viewed as an MMS.

It is possible, prima facie, that a placement may be effected in the context of a pure rights issue. Large shareholders could sell large blocks of rights to outside investors at a discount to compensate the investors for costs of investing. If the placing of these blocks effects certification of (high) value so that the other shareholders reap the rewards of the high placement price without themselves having to compensate buyers for investing costs, then a rights issue could be a preferred placement mechanism over a placement proper, in which all placees investigate simultaneously. But a 'placement via rights issue' could be difficult to achieve in practice. In particular, time is limited by the fixed offer period for finding a buyer who is a credible certifier of value and for the buyer to investigate and there is no formal mechanism by which the selling price for the 'placed' block of rights may be credibly and instantly revealed to other market participants. Even if these problems could be overcome by changing the institutional arrangements there may still be first mover problems, as we now explain.

Suppose there are two (or more) blockholders, A and B, and for simplicity suppose that δ is zero.[20] Following the block sale of rights by A (say) to a placee, value is revealed and B and the small shareholders receive a price of $P_m = a + b$. In contrast, A only receives $P_p^* = r^*(a+b-T^*)$, where T^* is the total investment cost, borne by A, and P_p^* is the price A receives, which is strictly less than $a+b$ and could be substantially less if the block is small. There are now multiple equilibria:- two pure strategy equilibria (A sells first, B sells first) and a third mixed strategy symmetric equilibrium where A and B randomise their decision to sell. In the absence of compensatory contracts, there is first mover disadvantage. Hence there is some positive probability that the placement via rights issue may degenerate into an MMS which is suboptimal for the firm. One solution to this free rider problem would be to allow large shareholders to place their joint share allocation with investors at a common price. Interestingly enough, this is exactly what happens in practice via an open offer and through pre-renouncing rights in a rights issue.

4 Empirical results

4.1 Sample

Our initial sample consisted of 1,378 rights issues and open offers made between 1 January 1985 and 30 September 1996. Information about issues is from prospectuses, obtained from

[20]The argument is easily extended to cases where δ is non-zero.

Primark Extel. Extel aims to record all SEOs by UK listed companies. Scanned copies of prospectuses are avaliable for issues from 1 July 1991; earlier proposectuses are on microfiche and Extel's collection is incomplete. We included all rights issues and open offers during the sample period for which a prospectus was available, except for issues by foreign companies and investment trusts. Stand-alone private placements were excluded as they do not have a prospectus. Share price data for the event study are also from Extel. Unfortunately, we found no price data for 152 issues and the data are untrustworthy for a further 218. From the remaining 1,008 issues we excluded six which were not completed, 23 issues with placement for which we could not calculate a reward to the placees and 46 in which the placees apparently paid a premium. Many of these 46 are accompanied by a share consolidation which means the premium is illusory. Issues at a genuine premium are excluded because such a premium is likely to be payment for acquiring a controlling interest (Barclay & Holderness, 1989; Wruck, 1989), and the analysis of agency issues associated with changes in control are beyond the scope of this paper. The above exclusions leave a total of 933 issues which form the basic sample for the summary statistics given below. We should warn, however, that the regression analysis below requires us to measure several other variables which are not all available for each of the 933 issues. The number of observations for the regressions therefore varies.

Table 1 shows the number and average size of issues by year. There are 410 pure rights issues and 523 issues involving placement. The growth in the proportion of issues involving placement, particularly open offers, is apparent. The first open offer was in 1987 and by 1996 they accounted for nearly half of issues by number. Pure rights issues are considerably larger on average and are chosen by larger companies than are open offers and rights involving placement. Table 2 shows that, in the issues involving placement, placees typically buy a substantial proportion of the issue. An average of 37% of the total shares issued are bought by placees in rights issues involving placement, and 56% of the total shares issued in open offers. It is especially noteworthy that existing shareholders decline to take up 49% of the shares offered to them pro rata in open offers, even though they suffer loss unless they take up their entitlements.[21]

4.2 Rewards to buyers of placed shares

The reward to buyers of placed shares provided by a discount is not known for certain in advance. The actual reward obtained by the buyer is the difference between the market price and the offer price at the offer close, when the new shares are paid for. But since there is a gap of at least three weeks between announcement and close, the market price at close might be regarded as a rather noisy estimate of the price the company expected after the

[21]The take-up is normally reported by the broker at the close of rights issues and open offers. The reported take-up in open offers is entirely by existing shareholders, as there is no trading of the rights. We include pre-renounced shares as part of the open offer, since they were originally offered pro rata to existing shareholders. Usually both the percentage take-up and the actual number of shares taken up are reported, from which one can infer that the percentage is often overstated because the broker has excluded pre-renounced shares from the total of shares 'available in the offer' on announcement day. If an offer has pre-renounced shares and the take-up is reported as a percentage only, we record no figure for take-up as it is uncertain whether the percentage is of all the shares in the open offer or of shares not pre-renounced.

announcement. So we report the value of the discount measured against the market price both on the announcement day and at the offer close. The market price is the mid-point between the highest bid and the lowest offer from market-makers at the close of the day. If the share has not gone ex-rights on the announcement day, we adjust the market price for that day by a factor reflecting the scrip element of the issue. If the new shares are not entitled to the next dividend per share, we subtract the next DPS (net of advance corporation tax) from the market price of the existing shares. The rewards to buyers of pre-renounced shares in rights issues are calculated as above, except that we subtract half the difference between the TERP and the offer price because buyers pay the this amount on top of the offer price to the pre-renouncing shareholders, as explained in Section 2.2.

It is common for placees to receive from the issuer, via its investment bank, a cash payment in addition to a discount, except in acquisition placements. For shares in a private placement or which are placed having been pre-renounced, this fee is unambiguously a reward for buying the shares and is generally referred to as a 'firm placing' fee in propsectuses. For shares placed at the start of an open offer, the placees are acting as both buyers and underwriters, and the norm is for placees to receive the same fee for shares which they actually buy as for shares which they have agreed to buy, but which are 'clawed back' by existing shareholders. Shares actually bought rarely attract an extra 'take-up' fee. We take the view that the fee attaching to shares actually bought by placees is a reward for purchase, whilst the fee attaching to shares not bought is an underwriting fee which we ignore.

Table 3 shows estimates of the rewards to buyers of placed shares, expressed as a percentage of the offer price. The largest sub-sample is the 266 open offers, in which placees receive a mean discount of approximately 12% (median 8%) whether measured against the announcement day price or against the price at offer close. The mean reward provided by discounts to buyers of pre-renounced rights in rights issues is 9% (6%) against the announcement day price, slightly less against the price at offer close. The rewards in private placements and acquisition placements accompanying rights issues are larger. The mean discount against the announcement price is 54% (16%) of the offer price in private placements and 14% (12%) in acquisition placements, and the results using the offer close price are of the same order. The means are clearly affected by some very deep discounts. The cash placing fee is approximately 1% of the offer price. Overall, it appears that placees can typically expect a discount to the post-announcement price worth around 8% of the offer price, plus a cash fee of about 1%.[22]

The evidence we have presented shows that, since the late 1980s, UK companies and shareholders have increasingly used the placement process to sell shares to new investors. Over half of seasoned offers to existing shareholders in fact include a placement of shares with new investors, and the placees buy nearly half of the total issue on average. The

[22]Stock Exchange Listing Rule 4.8 states that discounts in open offers must not be deeper than 10% of the pre-announcement market price 'unless the Exchange is satisfied that the issuer is in severe financial difficulties or that there are other exceptional circumstances' (London Stock Exchange, 1997). In addition, the Investment Committees of the Association of British Insurers and the National Association of Pension Funds recommend that the discount in private placements for cash (ie excluding acquisition placements) be no deeper than 5%, including underwriting or placing fees (MMC, 1999, p. 239). These limits do not appear to be binding in practice. 30% of open offers in our sample are at a discount to the pre-announcement price deeper than 10% and 72% of the private placements for cash accompanying rights issues or open offers are at a discount deeper than 5% (88% if underwriting and placing fees are added).

placement process typically carries a substantial cost to non-subscribing shareholders, or to the company, mainly incurred by issuing at a discount, and the beneficiaries are the new investors. Similar levels of discount have been found in US private placements. But the US and UK evidence differs with regard to the proportion of companies using the placement method. The small sample sizes in US studies suggest that the number of private placements reported in the US is fewer than 30 per year (for example, Goh et al, 1999), so they are rare compared with firm commitment offers, of which there are over 300 per year. In contrast, our evidence shows that placements are common in the UK.

4.3 Testing the model

Our theory yields several predictions: i) the average abnormal return on announcement of placements is positive and exceeds the abnormal return on announcement of pure rights issues; ii) the reward to buyers of placed shares ($\frac{P_1 - P_p}{P_p}$ + cash fee) is a positive function of λ and c; iii) abnormal returns following placements are related to I, ε, λ and c with unambiguous signs, and iv) the probability of a placement is related to I, ε, λ and c with unambiguous signs. We test i) by simple comparison, ii) and iii) using linear regressions and iv) using a logit model of binary choice.

We measure abnormal returns by the method in Eckbo and Masulis (1992). For each offer a market model regression is run using daily data and dummy variables to distinguish event periods of interest. If a share goes ex-dividend during an event period, the dividend per share is added to the ex-day price to calculate the return on that day. The combined estimation and event period is from 85 days before the announcement to 100 days after the close of the offer. We run all the tests using conventional market model abnormal returns and the results are very similar to those reported.

The variables in the model that we need to measure are $I, \varepsilon, \lambda, c$ and δ. Unfortunately we do not have a sufficiently reliable or uncontroversial proxy for δ in our data set. In the context of any regression, we assume either that δ is constant or that any movement of δ across firms is not correlated with the measured regressors.[23] We measure ε in a scale-free way by using the idiosyncratic component of share returns (the standard error in a market model regression using daily returns). This does not fit exactly with the theory where ε is the volatility of private information and not idiosyncratic return volatility. Implicit in our measure, therefore, is the assumption that idiosyncratic events such as shocks specific to a product market are more associated with private information than are shocks affecting the market index. The theory assumes that proceeds (I) differ across firms in a way that is not correlated with the firm's value. In reality, proceeds and value (both for existing assets and the new project) are likely to be highly related through scale effects. We therefore normalise proceeds by firm size (market capitalisation). We are treating issues involving placement as pure placements, so proceeds here are from shares bought by placees only. We measure λ as the percentage spread for transactions of normal market size, that is, (offer price - bid price)/(offer price + bid price)/2, using the offer and bid prices reported in Datastream

[23]It is probable that undervalued firms whose owners have a strong desire to liquidate their holdings are small firms with few shareholders such as family-run firms. Such firms will have high values of δ. We experimented with proxies for ownership concentration such as the proportion owned by shareholders with a stake of at least 10% and found such proxies to be correctly signed although not always significant. Results from regressions including these proxies are available on request.

(they are not available in Extel). We proxy investigating costs c using market-book ratios (m/b) and market capitalisation ($mcap$) on the justification that high market-book firms have a greater proportion of intangible assets whose value is hard to ascertain and that large firms are easier to investigate than small firms. Regressions involving the m/b variable exclude firms with negative book values. We justify this on the basis that two firms with, respectively, small positive and small negative book values probably have a similar extent of intangible assets whilst their respective measured m/b ratios would be large and opposite signed. Dropping firms with negative book value from the sample reflects our view that the m/b ratio does not represent a meaningful proxy for intangibles in those cases.

4.3.1 Market reaction to the type of issue

The model predicts that the market reaction to placements should be positive, and that the reaction to pure rights issues should be less favourable. Table 4 presents cumulative average abnormal returns (AARs) for four event periods for pure rights issues and issues involving placement. The results show a clear difference between the AARs for two types of offers, in the direction predicted. The two day announcement AAR is -3.2% for pure rights issues and 1.5% for issues with placement, a difference which is highly significant ($t = 6.6$). Summing the AARs for the four event periods, we have -2.5% for rights compared with 2.5% for issues with placement.

Several previous studies across various stock markets have found abnormal returns close to zero on announcement of rights issues (for example, Bigelli, 1998). However, our announcement AAR is similar to the -3.1% reported by Slovin, Sushka and Lai (2000) for a sample of 220 UK rights issues made during 1986-94. The positive AAR for issues with placement echoes the positive AARs for stand-alone private placements reported by Cronqvist and Nillson (2000), Hertzel and Smith (1993), Slovin et al (2000) and Wruck (1989).

4.3.2 Relation between rewards in placements and proxies for investing costs

Equation (3.9) in Section 3.3 shows that the discount to the market price in placements expressed as a proportion of the offer price $(\frac{P_1 - P_p}{P_p})$, including any cash fee for placees, provides a direct estimate of total investing costs divided by proceeds, which we denote as $\frac{\widehat{T}}{I}$. If we take the view of investing costs put forward in Section 3.4, $\frac{\widehat{T}}{I}$ should be loglinearly and positively related to c and λ. If investing costs are linearly homogenous in proceeds then proceeds should not add explanatory power to the relationship. Assuming that $\ln c$ is linearly related to the proxies $\ln m/b, \ln\lambda$ and $\ln mcap$, we may examine the relationship between discounts and investing cost proxies by regressing $\frac{P_1 - P_p}{P_p}$ on $\ln m/b$, $\ln\lambda$ and $\ln mcap$. We then test the linear homegeneity hypothesis via a significance test on $\ln\frac{I}{mcap}$. After dropping firms with missing measurements and negative book values we are left with a sample of 363 placements. The regression results are given below with White-adjusted t-ratios in brackets

$$
\begin{aligned}
R^2 &= .043 \qquad N = 363 \\
\ln\frac{\widehat{T}}{I}\ [&= \ln(\frac{P_1 - P_p}{P_p})] = const. + .181\ln\lambda + .070\ln m/b + .001\ln mcap - .007\ln\frac{I}{mcap} \\
& \qquad\qquad\qquad\qquad (2.08) \qquad (1.70) \qquad\quad (.03) \qquad\qquad (.22)
\end{aligned}
$$

The spread and market-book variables have the right sign and are significant. The size variable is wholly insignificant as are normalised proceeds. The insignificance of proceeds supports the homegeneity hypothesis proposed in Section 3.3. These results are similar in essence to those in Hertzel and Smith (1993) and support to the hypothesis that discounts in placements are a device to compensate investors for investigation and liquidity costs.

4.3.3 Explaining abnormal returns in terms of firm characteristics

The theory predicts that the market reaction to placements is increasing in investing costs and proceeds (T and I) and decreasing in the standard deviation of value (ε). Rather than measure T indirectly via the proxies for c (namely m/b and $mcap$) and via the bid-ask spread (λ), we use the direct estimate of T obtained from the discount and cash fee data, $\widehat{\frac{T}{I}}$. We do this for two reasons. First, data on spreads and market-book ratios are severely incomplete in our sample. Using them as regressors would reduce the available observations from 523 to 363. Second, using indirect estimates of T is inefficient and this is especially important when the proxies explain so little of its variation.

Using the direct estimate does, however, raise a potential simultaneity problem. Although our theory assumes that placements reveal true firm value, the firm's market price at the announcement date may in practice differ from the price anticipated by the company when it set the placement price. If so, the discount (and hence $\widehat{\frac{T}{I}}$) and the abnormal return may contain a common component by construction rather than through the existence of a behavioural relationship. This common component would generate a spurious positive regression coefficient even if the true coefficient were zero. To handle this possibility, we explain announcement abnormal returns (AR) via an OLS regression on (inter alia) $\widehat{\frac{T}{I}}$. We then check the robustness of these results by means of a Hausman-Wu variable addition test by adding the instruments $\ln m/b$, $\ln mcap$ and $\ln \lambda$ to the equation explaining $\widehat{\frac{T}{I}}$. The OLS results are given below with White-corrected t-ratios in brackets.

$$\begin{aligned} N &= 523 \quad R^2 = .236 \\ AR &= const. + 050\frac{\widehat{T}}{I} + .005\ln\frac{I}{mcap} - .538\varepsilon \\ & \qquad\qquad (7.44) \qquad (1.86) \qquad\qquad (1.73) \end{aligned}$$

All coefficients have the predicted sign and are significant at the 5% level. Below we give the results for the Hausman-Wu regression where we add the instruments $\ln m/b$, $\ln mcap$ and $\ln\lambda$ to the equation. The need to measure these instruments for all firms compels us to employ the smaller sample of 363 firms used in section 4.3.2 above.

$$\begin{aligned} N &= 363 \quad R^2 = .191 \\ AR &= const. + 045\ln\frac{\widehat{T}}{I} + .005\ln\frac{I}{mcap} - .756\varepsilon - .005\ln\lambda - .000\ln\frac{m}{b} - .003\ln mcap \\ & \qquad\quad (8.93) \qquad\quad (1.51) \qquad\qquad (2.54) \quad (0.66) \qquad (.00) \qquad (.67) \end{aligned}$$

Two things stand out from the above. First, the Hausman test which is a χ^2_3 variate is wholly insignificant. Second, the coefficients on $\ln\frac{\widehat{T}}{I}, \ln\frac{I}{mcap}$ and ε show virtually no change from the full sample which, given that we have dropped 30% of the observations, demonstrates a remarkable degree of parameter stability.

4.3.4 Estimating the probability of placement

The theory predicts that the probability of placement increases in ε but decreases with c, λ and I. We test these predictions using a logit[24] regression with the explanatory variables

[24]Strictly speaking, the logit pdf is inconsistent with that assumed in the theory. However, logit is the 'industry standard' in this area and is a good vehicle for examining first order effects of a group of variates on probability.

$\ln \frac{I}{mcap}$,ε and a proxy for $\frac{T}{I}$. For the latter we may no longer use $\widehat{\frac{T}{I}}$ because it is constructed from placement discounts and these, of course, do not exist for pure rights issues. Instead, we construct and use the proxy $\widetilde{\frac{T}{I}}$ which uses discounts for placements as above, but uses the forecasted value of $\frac{T}{I}$ from the regression in section 4.3.2 for pure rights issues. Again this avoids the significant reductions in sample size and loss of efficiency that would result from the reduced form approach in which the proxies for $\frac{T}{I}$ ($\ln \lambda, \ln \frac{m}{b}$, and $\ln mcap$) are used directly as regressors. Finally, note that unlike the abnormal returns regression, there is no possibility of bias here through spurious correlation of the issue mechanism and $\widetilde{\frac{T}{I}}$ because the former is chosen well before the announcement date.

We have 523 placements and 236 pure rights issues in the sample. The logit results for this combined sample are

$$\begin{aligned} N &= 759 \quad Maddala\ R^2 = .63 \\ \Pr(placement) &= \frac{e^{\beta' x}}{1 - e^{\beta' x}} \quad \text{where} \quad \beta' x = const - \underset{(10.64)}{4.914}\widetilde{\frac{T}{I}} - \underset{(3.44)}{.72}\ln \frac{I}{mcap} + \underset{(6.92)}{101.6}\varepsilon \end{aligned}$$

All coefficients have the predicted sign and are highly significant.

4.3.5 The effect of agency problems

In the theory, it was assumed that managers act in existing shareholders' interests and that those interests are to maximise a weighted average of a market and a fundamental definition of value (3.17) and (3.15). However, Jung, Kim and Stulz (1996) present evidence that there is a strongly negative reaction to a minority of issuers which might have been expected to have raised capital by borrowing rather than via an SEO. They suggest that such issuers avoid the constraints of debt to finance growth which does not maximise value. It could be argued, similarly, that a management seeking growth rather than value would eschew placement since it implies investigation and relatively concentrated ownership, so that a rights issue could signal agency problems rather than a low 'draw' for firm value. Whilst this could be a reason for the more negative reaction to rights issues, it would be more of a challenge to provide an agency explanation for the regression results we report. Even so, we check whether agency factors are affecting our results by comparing the logit and abnormal return results obtained above with those obtained from subsamples of 93 pure rights issues and 101 placements by firms that have dispersed ownership, on the understanding that firms with dispersed ownership are more likely to suffer agency problems. We define ownership as dispersed if no shareholder owns 10% or more of the firm before the issue. The results from the dispersed ownership firms are essentially the same as those reported above and are available on request.

5 Concluding remarks

In the UK, rights issues are being usurped by placements as a means of raising new equity finance, and we have developed a theory of the choice between these two mechanisms. The theory suggests that the adverse selection and ensuing underinvestment problems identified by Myers and Majluf (1984) may be mitigated to some extent by a placement process whereby potential buyers carry out an investigation that reveals the seller's true value prior to purchasing a large stake in the firm. In equilibrium, the costs of investigation and liquidity costs associated with holding a large stake in the firm are met by the seller via a discount. This theory is strongly supported by data from a large sample of issues.

We have not attempted to explain the rapid growth of placements, but offer some brief comments in conclusion. Since the cost per share of investigation declines with the number of shares issued, and since it takes some effort to contact potential placees, placement becomes a more viable process with the growth of institutional investors seeking to buy large blocks of shares. However, institutional investment had been expanding rapidly in the UK since the early 1960s, and placements other than acquisition placements were rare until the mid 1980s (Marsh, 1977; Wolff, 1986). We suggest that the rapid growth in placements since the late 1980s is connected with the reforms on the London Stock Exchange in 1986 known as Big Bang. They included abolition of fixed brokerage commissions and abolition of the rule that member firms be independent partnerships. Following this, almost all the larger brokers and market-makers were bought by banks, which introduced more capital to support market-making. Both changes made it cheaper to trade in large blocks and this, according to our theory, would make placement more attractive through a fall in liquidity costs. The growth in the London operations of US investment banks, which Big Bang facilitated, may also help explain the rise in placements, particularly open offers which have a discrete bookbuilding stage before the offer is formally announced.

Indeed, US firm commitments have much in common with private placements; the shares are sold by negotiation with potential buyers during bookbuilding and placees are rewarded. They typically receive 60% of the underwriter's spread (Hansen and Torregrosa, 1992, p. 1546) and the average spread is 7.1% of the offer price (Lee et al, 1996). So placees buy shares at an appreciable discount to the post-announcement market price, just as they do in private placements. The main difference is that the issue has already been announced, but why should this imply that potential placees do not investigate? The parallels between firm commitments and private placements seem worth exploring further in connection with the question why of rights issues disappeared in the USA.

Appendix 1: Existence of equilibrium

In our model, investors incur investigation costs up-front and are compensated only when they have ascertained firm value and then purchased shares at a discount. However, if issuing firms always invite placement at a fair price, what incentive do investors have to investigate? In this section we add some reasonable assumptions to the behaviour of placees and issuing firms that guarantee the existence of an equilibrium where placees always investigate.[25]

In what follows we refer to firms whose draw of y satisfies (3.19) as 'MMS firms' and other firms as 'placement firms'. We assume that all firms may attempt a placement (i.e. invite a placee to purchase shares at the offer price) *once only*. Placees are assumed to have a binary choice:- either buy without investigation or investigate and buy conditional on the offer price turning out to be fair. We also assume that rejection of the offer by the investors on the grounds that the offer price is too high is costless to the issuing firm. Under these assumptions, the extra payoff to an MMS firm of opting for a placement rather than going directly to an MMS is either zero (the placee decides to investigate and not buy, or the offer price is fair), or positive (the offer price is above the firm's true value and the placee buys without investigation). Hence MMS firms will always try to act like placement firms:- doing so weakly dominates going directly to an MMS, regardless of the actions of the placees.

Knowing that all firms will opt for placement, placees will in equilibrium always investigate provided that the expected losses from buying uninvestigated firms exceed the costs of investigation.[26] Given that MMS firms have every incentive to set the highest possible

[25]There may be other (possibly even weaker) assumptions that will deliver the required result but we have chosen the current set-up because it broadly reflects what we believe to the case in the UK market for SEOs.

[26]Placees must be compensated for the risk of a failed investigation i.e. the risk that the firm offering

offer price (i.e. a price that indicates that value is on the extreme right of the support for y namely $P_p = rP_1 \max = r(\overline{y} + \varepsilon - T)$), then for the existence of an equilibrium in which placees always investigate it must be that the losses from purchasing an MMS firm always outweigh the savings on investigation costs, i.e. that

$$\frac{I}{I+T}(\overline{y} + \varepsilon - T) - (P_m + c) > 0 \tag{5.41}$$

It is easy to show that a sufficient condition for (5.41) to hold is $\varepsilon > \frac{T^2+1}{2} + c$ and we assume that this is so. Given that 2ε represents the entire range of possible values for the firm (plus its new investment opportunity) and that c is the investigating costs for one investigator, this assumption is quite reasonable. Finally, the equilibrium where placees always investigate keeps placing firms 'honest' because any placing firm that sets an offer price higher than that warranted by its value will be rejected. Such a firm would then be left with the suboptimal option of having to sell via an MMS.

Appendix 2: Robustness of results under different pdfs for y

Given the special nature of the pdf of y used in the above analysis, it is important to show that the effects of $\lambda, c, \varepsilon, I$ and δ on P_m, P_p and $\Pr(placement)$ are reasonably robust with respect to changing the pdf for y. Because we are interested in the effects of λ and c

itself for placing is really an MMS firm. This results in additional investigation costs equal to c times the probability that the firm will be an MMS firm, i.e. firms inviting a placement will have to offer to pay investigation costs of placees (via the discount) equal to $c + c.\Pr(y \leq qP_m + T)$ rather than just c. In the theory we treat this extra term as a constant on the grounds that doing otherwise would raise difficult analytical complexities and that the effects of movements in the probability of an MMS on investing costs are likely to be of second order importance and are extremely unlikely to overturn any of the theory's main results.

via their effect on T only rather than via their effect on ε which is analaysed as a separate entity, and because λ and c both have a positive effect on T, we ignore the effects of changes in λ and c and focus instead on the effect of changing T alone.

We consider two worlds. In the first, firm value (i.e. $a+b$, equivalently, y) is assumed to follow a semi normal pdf (where probability monotonically declines with value) and in the second, it follows an exponential pdf (where probability rises and then falls with value).

Using the technique of numerical integration, we computed P_m, P_p and $\Pr(placement)$ for the following 10,000 parameter constellations

$$\frac{T}{I} = .1i, \;\; \varepsilon = .5 + .05j, \; \delta = .1k \text{ and } I = .1l \;\; \text{for all integral values of } i, j, k \text{ and } l \; \in [1, 10] \tag{5.42}$$

In all experiments $\overline{y}$ was held at unity by shifting the pdf horizontally by the relevant amount. Then, the 10,000 observations on $\frac{T}{I}, \varepsilon, I$ and δ were treated as explanatory variable data in regressions explaining P_m, P_p and $\Pr(placement)$ (denoted Pr in the table below) respectively. The results of these regressions for the semi-normal and exponential pdfs are given below (t-ratios in brackets)

	Semi-Normal					Exponential				
	ε	$\frac{T}{I}$	I	δ	R^2	ε	$\frac{T}{I}$	I	δ	R^2
Pr	.437	-.747	-.534	.149	.878	.462	-.649	-.483	.106	.916
	(61.3)	(209.8)	(150.0)	(41.7)		(90.4)	(253.7)	(188.8)	(41.6)	
P_m	-.639	.460	.335	-.095	.903	-.948	.430	.329	-.075	.949
	(147.6)	(212.6)	(154.7)	(43.8)		(283.2)	(257.1)	(196.5)	(44.9)	
P_p	-.019	1.155	.876	-.283	.902	-.127	1.330	1.041	-.263	.905
	(2.0)	(237.5)	(180.1)	(58.1)		(11.5)	(240.1)	(187.3)	(47.4)	

All estimates are significant and have signs that agree with those of the theory given above. Further experimentation using the chi-square pdf and over more extreme values for the parameters produced similar results.[27] This is strong evidence that the theoretical results derived using the uniform distribution are robust over a reasonably wide range of 'sensible' pdfs for y.

[27] Exploring the parameter space to allow for more extreme values altered the signs in only one case, namely the coefficient on ε in the P_p regression:- In one or two cases this turned out to be positive albeit insignificantly so. Further analysis showed that this coefficient was unstable over small sub ranges for ε and that when it was estimated over these smaller sub ranges it always took the correct sign. The sensitivity of the coefficient to the level of ε is probably the reason why it is the least significant of all the estimates given in the table.

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