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Flotation Cost Allowance in Rate of Return Regulation: A Note

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THE COST OF EXTERNAL equity capital is higher than the investor-required rate of return because of flotation costs (underwriting expenses and underpricing). Recognizing this, regulatory agencies have generally included an allowance for flotation costs in the authorized cost of capital. The adjustment for flotation costs can have a significant effect on the firm and its consumers. For example, a change of 0.5 percent in the required return on equity of the entire Bell System would change its before-tax annual revenue requirements by about \$400 million.¹ In spite of its significance, flotation cost adjustments are usually made in an ad hoc fashion. In this paper we derive a flotation cost adjustment formula which is consistent with accepted principles of share valuation and the available empirical evidence on the nature of flotation costs. Our formula yields the adjustment to the utility's allowed return on equity which maintains unimpaired the value of the dividend stream corresponding to pre-issue stockholders. It depends on easily estimable parameters characterizing the financial policy of the utility and the magnitude of flotation costs. We also show the relationship between the results of this paper and Gordon's [2] approach to valuation. Gordon seems to be the only author who previously considered the problem of equity valuation under continuous equity financing and flotation costs, but he did not derive a flotation cost adjustment formula.

I. Valuation Framework

We adopt the framework of the constant growth valuation model, which is referred to in regulatory practice as the "discounted cash flow" model. This model is widely relied upon in rate of return proceedings in many jurisdictions. As it is standard in the valuation literature (Miller and Modigliani [5], Gordon [1, 2], and Gordon and Gould [3], for example), we assume that dividends have no information content and influence on the value of equity. In our model, the firm makes continuous use of retained earnings and external equity financing and is expected to maintain a constant debt-equity ratio.

Furthermore, we explicitly take account of the fact that underwriting expenses and underpricing apply only to the portion of equity which is externally financed and not to retained earnings. Finance theory and empirical evidence suggest that underpricing is only a transitory phenomenon which affects pre-issue stockholders

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¹ Cf. State of New Jersey [7], where Irwin Friend proposes a flotation cost allowance of 0.48 percent for New Jersey Bell. The equity of the consolidated Bell System was about \$40 billion in 1978.

only through the lower proceeds of the new issue (see Ibbotson [4] and Smith [6], for example). In order to compensate for this effect, an adjustment to the allowed return on equity is derived which maintains unimpaired the present value of the dividend stream corresponding to pre-issue stockholders. Under this condition, whatever the reasons for underpricing, the stock price should quickly return to its pre-issue level.

The following notation will be used:

k = The investors' required return on equity;

r = The utility's allowed return on equity base;

S = Value of equity in the absence of flotation costs;

S_f = Value of equity net of flotation costs;

K_t = Equity base at time t ;

E_t = Total earnings in year t ;

D_t = Total cash dividends at time t ;

$b = (E_t - D_t)/E_t$ = Retention rate, expressed as a fraction of earnings;

h = External equity financing rate, expressed as a fraction of earnings;

m = Equity investment rate, expressed as a fraction of earnings, $m = b + h < 1$; ² and

f = Flotation costs, expressed as a fraction of the value of the issue.

We first obtain the value of equity under continuous equity financing in the absence of flotation costs: let all equity investments be financed with internal funds. That is, let b increase to $b = m$. Then,

$$D_t = (1 - m)E_t = (1 - m)(1 + mr)^{t-1}rK_0$$

and

$$S = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k)^t} = \frac{(1 - m)rK_0}{k - mr} \quad (1)$$

This is a well known result first derived by Miller and Modigliani [5] and Gordon [1]. The latter used a different valuation approach to arrive to an expression which is equivalent to (1). In fact, Gordon obtained

$$S = \frac{(1 - b)rK_0}{k - br - vs} \quad (2)$$

$$v = \frac{r - k}{r - rb - s} \quad (3)$$

where s is external equity financing expressed as a fraction of existing equity and v is the fraction of external equity financing that accrues to existing stockholders. In order to show that (1) and (2) are equivalent, one first notes that $sK_{t-1} = hE_t$. Hence, $s = hE_t/K_{t-1} = hr$. Then, it is straightforward to obtain (2) from (1) and vice versa.³

² A similar use of the parameters m and h is made in Miller and Modigliani [5] and Gordon and Gould [3], for example.

³ $S = \frac{(1 - m)rK_0}{k - mr} = \frac{(1 - b - (s/r))rK_0}{k - br - s} = \frac{(1 - b)(1 - b - (s/r))rK_0}{(1 - b)(k - br - s) - k(s/r) + k(s/r)} = \frac{(1 - b)rK_0}{k - br - vs}$

II. Flotation Cost Adjustment

Incorporating flotation costs in (1) is a simple matter. Flotation costs are a loss experienced by pre-issue stockholders. In an efficient market, all future flotation costs produced by the financial policy of the firm are borne by the existing stockholders. New stockholders pay just the present value of their future cash flow. Because of flotation costs the firm needs to issue $hE_t/(1-f)$ in order to raise a required amount of external equity equal to hE_t . That is, each year the firm loses

$$\frac{hE_t}{1-f} - hE_t = \frac{f}{1-f} hE_t$$

The present value of all future flotation costs is

$$L = \sum_{t=1}^{\infty} \frac{fhE_t}{(1-f)(1+k)^t} = \frac{fh}{1-f} \frac{rK_0}{k-mr}$$

Hence, the value of the equity of initial stockholders, net of flotation costs is

$$S_f = S - L = \left[1 - \frac{fh}{(1-f)(1-m)} \right] \frac{(1-m)rK_0}{k-mr} \quad (4)$$

Dilution of the value of the initial stockholders' equity is avoided by letting the allowed return on equity (r) be such that the value of equity *net* of flotation costs equals the initial equity base ($S_f = K_0$). Substituting K_0 on the right-hand side of (4) and solving for r yields

$$r = \frac{k}{1 - \frac{fh}{1-f}} \quad (5)$$

(5) yields what one would expect from a flotation cost adjustment formula: $r > k$ only if $f > 0$ and $h > 0$. That is, r is adjusted upward only if flotation costs are positive *and* there is external equity financing.⁴ Moreover, r increases with both the magnitude of flotation costs and the size of external equity financing.

It is noteworthy that (5) can also be derived following Gordon's [2] approach to equity valuation. With flotation costs, (2) and (3) above become⁵

$$S_f = \frac{(1-b)rK_0}{k-br-vs} \quad (6)$$

where the last equality is obtained taking into account that

$$(1-b)(k-br-s) - k\frac{s}{r} + k\frac{s}{r} = \left(1-b-\frac{s}{r}\right)(k-br) - s + k\frac{s}{r}$$

⁴ This last point is sometimes ignored in rate of return proceedings where testimony recommending the adjustment of k by flotation costs without taking into account the stock-financing rate is not infrequent.

⁵ The total dividend expected at time $t+1$ by the new time t -stockholders is

$$(1-b)r(1-v)(1-f)sK_t$$

$$v = \frac{r\{1 - f(1 - b)\} - k}{r - br - s - fr(1 - b)} \quad (7)$$

Letting $S_f = K_0$ in (6), solving (6) and (7) for r , and taking into account that $s = hr$ yields (5).

Example: The effect of taking financial policy into account in calculating flotation cost adjustments cannot be dismissed as quantitatively insignificant. To illustrate, consider a utility with required return on equity $k = 0.12$, flotation costs $f = 0.1$, and external equity financing equivalent to 10 percent of earnings, i.e., $h = 0.1$. Substituting these values into (5) gives a return on equity adjusted for flotation costs equal to $r = 12.13\%$. On the other hand, for the same $k = 0.12$, $f = 0.1$ but an external equity financing rate $h = 0.4$, (5) yields $r = 12.56\%$. Such a difference in rates translates into a before-tax annual revenue difference of about \$4.3 million for a utility with an equity base of \$500 million.

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The firm receives $(1 - f)sK_t$, as in Gordon [2], p. 31, a fraction of which accrues to the stockholders at the start of t (note that Gordon omits the small term vf and writes $(1 - v - f)$ instead of $(1 - v)(1 - f)$). Since these dividends will grow at the rate $br + vs$ (see Gordon [2], pp. 31-32), their present value is

$$\frac{(1 - b)r(1 - v)(1 - f)sK_t}{k - vr - vs}$$

But this expression has to equal sK_t because the new stockholders do not pay for flotation costs. From this equality, one solves for v and obtains Expression (7). Note that we have not followed Gordon in capitalizing the dividends of new stockholders at the rate ηk , $\eta > 1$. In our formulation the effect of underpricing is included in f . Because of a temporary market imperfection, the new stockholders may receive an underpricing gain but they expect the firm to produce a return k on the higher postissue equilibrium price. f can always be defined to give the same result as Gordon's two-parameter characterization of flotation costs.