Dividend imputation and the corporate cost of capital

SUPPORTING MATERIAL

This note sets out two technical appendices that provide more detail on points raised in a paper that Stephen Gray of Frontier Economics prepared for JASSA, the journal of the professional organisation for the financial services industry, FINSIA. The paper examined the relationship between dividend imputation and the corporate cost of equity capital. That paper is available at http://finsia.com/news/news-article/2016/04/18/dividend-imputation-and-the-corporate-cost-of-capital.

OVERVIEW AND CONTEXT

Over the last five years, one of the most contentious issues in infrastructure regulation has been the estimation of the extent to which dividend imputation tax credits affect the corporate cost of equity capital. In a dividend imputation tax system, shareholders receive part of their return from the firm (as dividends and capital gains) and part from government (as imputation credits that they can use to reduce their personal tax obligations). For a given estimate of the total required return, a higher estimate of the value of imputation credits means a lower regulatory allowance for the firm, since shareholders are deemed to require lower dividends and capital gains. Consequently the regulatory estimate of gamma impacts directly on the firm’s allowed revenues.

The estimation of the value of imputation credits (i.e., the extent to which they reduce the return that shareholders would otherwise require from the firm) has proven to be controversial in the regulatory setting. Indeed, this issue has been the subject of two merits review cases heard by the Australian Competition Tribunal.
In the 2011 *Gamma* case, the Tribunal concluded that there was no reliable estimate of the value of imputation credits before it, and directed Stephen Gray and Jason Hall, now at Frontier Economics, to conduct what it called a state-of-the-art study. Stephen and Jason performed a study that infers the value of dividends and the associated imputation credits by observing how stock prices change over ex-dividend events. When the dividend and credit separate from the share, the price drops (on average) by the extent to which the market had capitalised them into the share price. This type of study is known as a dividend drop-off analysis. The Tribunal endorsed that study and adopted the recommended estimates from it in full.

In the 2016 Networks NSW case, the Tribunal considered the Australian Energy Regulator’s proposal to change the estimated value of imputation credits away from the estimate previously adopted by the Tribunal. Stephen Gray from Frontier Economics was the lead advisor on this point to the networks and their legal teams. He showed that an updated dividend drop-off analysis produced the same estimate as in the previous case and recommended that the estimate from the previous case should be maintained. The Tribunal agreed and ordered the AER to remake its decision accordingly.
APPENDIX 1: DERIVATION OF THE OFFICER FORMULA

The main article refers to the derivation of an important formula in the seminal paper on this topic, Officer (1994). Officer shows that the firm’s weighted-average cost of capital (WACC) in a dividend imputation tax system can be written as:

\[
WACC = \frac{E}{V} r_e \left( \frac{1-T}{1-T(1-\gamma)} \right) + \frac{D}{V} r_d [1-T]
\]

where:
- \( \frac{E}{V} \) and \( \frac{D}{V} \) represent the relative proportions of debt and equity finance, respectively;
- \( r_e \) and \( r_d \) represent the total required return on equity and debt, respectively;
- \( T \) is the relevant corporate tax rate; and
- \( \gamma \) represents the value of imputation tax credits.

In this formula, the term \( \left[ \frac{1-T}{1-T(1-\gamma)} \right] \) represents the proportion of the total return required by equity holders that must be provided by the firm – the balance being effectively provided by the government via the tax system in the form of imputation credits. For example, if the corporate tax rate is 30% and the value of imputation tax credits is 25% of the face amount of credits that are generated by the payment of corporate tax, the Officer formula suggests that the firm must contribute \( \left[ \frac{1-0.3}{1-0.3(1-0.25)} \right] = 90\% \) of the equity holders’ required return on equity via dividends and capital gains, with the other 10% being provided by government as imputation credits.

This appendix shows how the Officer (1994) formula is derived, via the following example:

- A firm generates a profit of $100, pays $30 of corporate tax in Australia, leaving $70 of net profit after tax.
• The firm pays a dividend of $49 (which represents a 70% payout rate) and re-invests the remaining $21. The re-invested funds are assumed to earn a normal return, and therefore have a net present value of $21.

• Imputation credits with a face amount of $21\(^2\) are attached to the $49 dividend, and those credits are valued by the market at 35% of the face amount.\(^3\) Thus, the credits have a value of 35% × $21 = $7.35.

This example is summarised in Table 1 below.

### Table 1: Imputation credit example

<table>
<thead>
<tr>
<th>Item</th>
<th>Cash flow example</th>
<th>Algebraic definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company profit</td>
<td>100.00</td>
<td>1</td>
</tr>
<tr>
<td>Corporate tax</td>
<td>30.00</td>
<td>T</td>
</tr>
<tr>
<td>Net profit after tax</td>
<td>70.00</td>
<td>1−T</td>
</tr>
<tr>
<td>Dividend paid</td>
<td>49.00</td>
<td>F(1−T)</td>
</tr>
<tr>
<td>Reinvested funds</td>
<td>21.00</td>
<td>(1−F)(1−T)</td>
</tr>
<tr>
<td>Imputation credits (face amount)</td>
<td>21.00</td>
<td>FT</td>
</tr>
<tr>
<td>Imputation credits (value)</td>
<td>7.35</td>
<td>(\theta FT = \gamma T)</td>
</tr>
<tr>
<td>Total value to shareholder</td>
<td>77.35</td>
<td>1−T+(\gamma T)</td>
</tr>
<tr>
<td>Proportion from firm</td>
<td>90.32%</td>
<td>(\frac{(1−T)}{(1−T+\gamma T)})</td>
</tr>
</tbody>
</table>

In this example, shareholders receive a total return of $77.35, being the sum of:

a) A cash dividend of $49.00;
b) Reinvested funds that have an NPV of $21.00; and

c) Imputation credits that have a value of $7.35.

The firm is responsible for generating the dividend and the re-invested funds and the government provides the imputation credits via the tax system. In this

\(^2\) Under the imputation system, every dollar of dividends will have \(\frac{T}{1−T}\) dollars of imputation credits attached to it. In this case, the credits will amount to \(49 \left[ \frac{0.3}{1−0.3} \right] = 21\).

\(^3\) We explain below why credits might be valued at less than the face amount. At this stage we simply assume a valuation to illustrate the derivation of the Officer formula.
example, the proportion of the total return that is provided by the firm is
\[
\frac{49 + 21}{49 + 21 + 7.35} = 90.32\%.
\]

Table 1 also sets out the algebraic definition of the Officer formula, as follows:

- For every $1 of profit, the company pays $T of corporate tax, and is left with $(1-T) of NPAT.

- If the dividend payout rate is F (70% in the above example), the dividend paid will be F(1-T). That is, a proportion F of the NPAT is paid out as a dividend.

- The remaining (1-F) proportion of the NPAT is reinvested. Because these funds are assumed to earn a normal return, they will have an NPV equal to the amount invested, being (1-F)(1-T).

- Since the dividend paid is F(1-T), the face amount of the imputation credits attached to it will be \( FT \).

- Every dollar of distributed imputation credits is assumed to be valued at a proportion \( \theta \) of the face amount (35% in the above example). Thus, the value of the distributed credits is \( \theta FT \). This is usually written as \( \gamma T \), where a new parameter \( \gamma \) is defined as the product of the distribution rate and the value of distributed credits: \( \gamma = F \times \theta \).

- The total return to equity holders is the sum of:
  - A dividend of F(1-T);
  - Reinvested funds with a value of (1-F)(1-T); and
  - Imputation credits with a value of \( \gamma T \).

- Consequently, the proportion of the total return provided by the firm is:

\[
\frac{\text{Dividend} + \text{Reinvested Funds}}{\text{Total return}} = \left[ \frac{F(1-T) + (1-F)(1-T) + \gamma T}{F(1-T) + (1-F)(1-T) + \gamma T} \right] = \left[ \frac{1-T}{1-T(1-\gamma)} \right].
\]
APPENDIX 2: THE EQUIVALENCE OF IMPLEMENTATION VIA AN ADJUSTMENT TO THE DISCOUNT RATE OR TO THE CASH FLOWS

Consider the case where equity holders have invested $1,000 of equity capital in the firm and where they require a total return of 10%, or $100. Appendix 1 shows that we can compute the regulatory allowance via the Officer formula by noting that (for a corporate tax rate of 30% and gamma of 0.25), 9.68% of the total return to equity is assumed to come in the form of imputation credits. Thus, the firm would need to provide a return to its shareholders of $90.32 = $90.32. In order to provide this return, the firm would need to generate a pre-tax profit of:

$$\frac{90.32}{(1-T)} = \frac{90.32}{1 - 0.3} = 129.03.$$ 

The same required pre-tax profit can be derived by making an adjustment to the cash flows, rather than by using the adjusted discount rate, as above. This cash flow approach is used by regulators. For example, the AER’s Post Tax Revenue Model (PTRM)\(^4\) begins with the (unadjusted) total required return to equity -- $100 in this case and then derives the corporate tax payment directly as:

$$\text{Corporate tax} = \left[ \frac{\text{Total required return to equity}}{\frac{T}{1-T}} \right] \times \frac{T}{1-T} = 100 \times \frac{0.3}{1 - 0.3(1 - 0.25)} = 38.71.$$ 

The required pre-tax profit is then:

$$\frac{38.71}{0.3} = 129.03.$$ 

However it is derived, the pre-tax profit is $129.03. The firm would then pay $38.71\(^5\) of corporate tax, creating the same amount of imputation credits.\(^6\) This leaves $90.32 to be returned to equity holders. The equity holders also receive some value in the form of imputation credits -- $38.71 of credits are created and each is estimated to have a value of 0.25, giving a total value of $9.68. Thus, the equity holders receive a return from the firm of $90.32 and credits valued at $9.68, giving them the total $100 return that they require.\(^7\)

\(^4\) Row 59 of the Analysis tab.
\(^5\) 30% of $129.
\(^6\) Every dollar of corporate tax paid in Australia creates a dollar of credits.
\(^7\) A more detailed explanation of the equivalence of the two approaches for reflecting the estimated value of imputation credits is set out in an appendix available at www.frontier-economics.com.au/publications/jassa-gamma.
This appendix shows that the same required pre-tax profit can be derived in two ways:

1. **Discount rate adjustment**: Adjust the required return on equity to account for the estimated value of imputation credits and then derive the profit that would be required to pay that (adjusted) return to shareholders; or

2. **Cash flow adjustment**: Determine the total dollar return that equity holders would require, subtract the estimated cash value of imputation credits, and then derive the profit that would be required to provide the net cash amount to shareholders.