The Interest Tax Deduction and the Calculation of Excess Earnings

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1. Introduction

In calculating Excess Earnings, the Commission follows standard practice in incorporating the interest tax deduction in WACC. Consequently, the tax expense appearing in the calculation of Excess Earnings is the tax expense in the absence of debt (unlevered tax). If the entity is in a tax loss situation, then certain complications arise. This paper explores these complications and offers recommendations.

2. Tax Losses

Following standard practice in corporate finance, the Commission incorporates the interest tax shield in the cost of capital, and therefore Excess Earnings are defined as

$$Excess\ Earnings = EBIT - TAX_u - WACC(A) \tag{1}$$

where $EBIT$ is the earnings before interest and tax, TAX_u is the unlevered tax (tax in the absence of debt), A is the regulatory asset base and

$$WACC = k_e(1-L) + k_d(1-T_c)L \tag{2}$$

where L is leverage, k_e is the cost of equity, k_d is the cost of debt and T_c is the corporate tax rate.

If the firm is in a tax loss situation then certain complications arise. To illustrate this, the following example is invoked. For each of years 1 and 2, the revenues and pre-tax operating costs of an entity are as indicated below (operating costs exclude interest). The operating costs are those recognised by the regulator and they equal the tax-deductible expenses. Subject to carry-forward of tax losses, the unlevered tax expense is 33% of the revenue less operating costs, and is shown in line 3.

		Yr 1	Yr 2
1.	Revenue	$2000	$2500
2.	Pre-tax Operating Costs	$2400	$1000
3.	TAX_u = .33(Rev – Operating Costs)	-$132	$495

For each year, the asset base is $10,000, 60% equity financed, with a cost of equity of 12%, and a cost of debt of 8% (before the effect of the tax deduction). Following equation (2), the WACC is then as follows.

$$WACC = .12(.60) + .08(1 - .33).40 = .093$$

In the presence of a tax loss, there are three possible approaches that could be adopted, as follows.

Method A: This method acts as if the effects of any tax losses are immediately realised, i.e., an immediate tax rebate arises. Consistent with this, *WACC* is defined in the usual way with the standard tax deduction for interest, i.e., the fact that the tax savings is deferred to some future year is simply ignored. In addition, consistency requires that past tax losses would be irrelevant to the calculations in any given year. In terms of the example, the value for TAX_u should be -$132, i.e., we act as if the firm receives an immediate tax rebate of $132. Also, the WACC for each year is .093 as calculated above. Following equation (1), the Excess Earnings for each year are then as follows.

$$Excess\ Earnings_1 = \$2000 - \$2400 + \$132 - .093(\$10{,}000) = -\$1198$$

$$Excess\ Earnings_2 = \$2500 - \$1000 - \$495 - .093(\$10{,}000) = \$75$$

Method B: This method matches Method A except that the values for TAX_u and the interest tax deduction term in the *WACC* are reduced to reflect the deferral of the tax benefit. Assuming that realisation of these tax benefits is certain then the appropriate discount rate is the risk free rate. Suppose this is 6% per year. In terms of the example,

and in respect of year 1, the present value of the unlevered tax benefit is then

$$\frac{-\$132}{(1.06)} = -\$125$$

and the company tax rate appearing in *WACC* for year 1 would be

$$\frac{.33}{(1.06)} = .29 \tag{3}$$

Substituting this new tax rate into the WACC calculation above would raise the WACC for year 1 from .093 to .094. The Excess Earnings for years 1 and 2 would then be as follows.

$$Excess\ Earnings_1 = \$2000 - \$2400 + \$125 - .094(\$10{,}000) = -\$1215$$

$$Excess\ Earnings_2 = \$2500 - \$1000 - \$495 - .093(\$10{,}000) = \$75$$

The calculation for year 2 matches that for Method A, because there is no tax loss in that year. As with Method A, past tax losses would be irrelevant to the calculations in any given year.

Method C: This method defines the unlevered tax expense consistent with the actual timing of the tax payments. This means that negative values for TAX_u are set to zero and the loss carried forward for offsetting against future taxable income. In formal terms, and using the subscript *u* to denote the unlevered situation, the definition is as follows.

$$TAX_u = \max[0, .33(Taxable\ Income_u - Accumulated\ Tax\ Losses_u)]$$

So, the values for TAX_u for years 1 and 2 would be as follows.

$$TAX_{u1} = \max[0, .33(\$2000 - \$2400)] = 0$$

$$TAX_{u2} = \max[0, .33(\$2500 - \$1000 - \$400)] = \$363$$

Consistent with this treatment of tax losses, the interest tax deduction term must be removed from *WACC* for year 1, whilst the tax deduction term in year 2 is doubled. The results are thus.

$$WACC_1 = .12(.60) + .08(.40) = .104 \quad (4a)$$

$$WACC_2 = .12(.60) + .08(1 - .33 - .33)(.40) = .0783 \quad (4b)$$

The Excess Earnings for years 1 and 2 would then be as follows.

$$Excess\ Earnings_1 = \$2000 - \$2400 - .104(\$10{,}000) = -\$1440$$

$$Excess\ Earnings_2 = \$2500 - \$1000 - \$363 - .0783(\$10{,}000) = \$354$$

The results for TAX_u and Excess Earnings from the three methods are now summarised.

Unlevered Tax and Excess Earnings from Methods A, B and C

	TAX_{u1}	TAX_{u2}	EE_1	EE_2
Method A	-\$132	\$495	-\$1198	\$75
Method B	-\$125	\$495	-\$1215	\$75
Method C	0	\$363	-\$1440	\$354

Methods B and C recognise the true timing of the tax benefits from debt, and therefore are conceptually superior to Method A, i.e., the present value of the excess earnings would align with the NPV of the company's activities. However Methods B and C are also much more complex, most particularly in respect of the interest tax deductions in the *WACC*. The potential complications here are even greater than illustrated above because only *part* of the interest tax deduction may be usable in the current year and part deferred. For example, suppose that the Revenue in year 1 is $2600 rather than $2000. The unlevered Taxable Income is then $200, but the interest is $320. So, $200 of the interest payment (5% of the interest rate of 8%) is immediately deductible and the remaining $120 (3%) is not usable until year 2. Under Method B, the appropriate tax rate on the interest is then 33% for the first 5% of the interest rate and 29% (see equation (3) above) on the remaining 3% of the interest rate. The calculation in equation (3) must then become

$$.33\left[\frac{5\%}{8\%}\right]+.29\left[\frac{3\%}{8\%}\right]=.315$$

This tax rate of .315 is then used in the WACC calculation. No present value adjustment for TAX_u is required because it is positive. Under Method C, similar complex corrections would be required to the WACC calculations in equations (4a) and (4b).

In addition to these computational difficulties with Methods B and C, Method C suffers from a further difficulty as follows. Under this method, the effect of the tax loss in year 1 is deferred to the point at which the accumulated tax loss disappears (year 2). Accordingly the Excess Earnings calculations for any year may not fully reflect the consequences of events in that year, and this is not desirable when the Commission assesses Excess Earnings part way through the life of the company, i.e., spurious conclusions may be drawn about excess profits.

In view of the last point, Method C must be rejected. This leaves the choice between A and B. Method A is much simpler but suffers from the fact that it mistakenly treats tax

losses as generating an immediate rather than a deferred tax benefit. The result is to *overstate* Excess Earnings. In the example used here the effect is slight because the tax benefit is deferred for only one year. If deferral is for a longer period then the effect will be greater. So, if deferral of the tax loss is for a short period, the simpler Method A is favoured. For situations in which deferral occurs for many years, the difference between methods A and B should be determined, and A should be favoured if the difference is not substantial.

3. An Alternative Approach

All of the approaches considered in the previous section involve computation of TAX_u by application of the statutory tax rate to taxable revenues net of tax-deductible expenses (possibly followed by some adjustment in the case of tax losses). By contrast, LECG (2004) suggests that the TAX_u should be determined by starting with the actual tax paid and then adding back the interest tax shield, i.e.,

$$TAX_u = TAX + .33INT \tag{5}$$

where *INT* is the interest expense. If the words "tax paid" are interpreted literally, then the value for *TAX* for year 1 would be zero and therefore the value for TAX_u in year 1 would be thus.

$$TAX_{u1} = 0 + .33(\$320) = \$106 \tag{6}$$

For year 2, the actual tax payment (inclusive of the carry-forward of the prior year's tax loss) would be

$$TAX_2 = .33(\$2500 - \$1000 - \$320 - \$400) = \$257$$

Following equation (5), the value for TAX_u for year 2 would be thus

$$TAX_{u2} = \$257 + .33(\$320) = \$363$$

In summary, the use of equation (5) along with a literal interpretation of the words "tax paid" yields values for TAX_u in years 1 and 2 of \$106 and \$363 respectively. However, following Method C, the actual values for TAX_u are zero and \$363. Nor do the outcomes from equation (5) of \$106 and \$363 correspond to those from Method A or B. So, the use of equation (5) along with a literal interpretation of the words "tax paid" produces an overstatement of TAX_u and therefore an understatement of Excess Earnings. The error lies in the year 1 calculation in equation (6), and is clearly wrong because the calculation here produces a value for TAX_u that depends upon the leverage of the entity; of course, TAX_u must be invariant to the leverage of the entity.

This problem could be avoided if *TAX* was defined as 33% of taxable income, which allows for a negative value. Adding the interest tax shield would then produce the following definition of TAX_u.

$$TAX_u = .33(Taxable\ Income) + .33INT$$

Since *INT* is included as a deduction in Taxable Income, this definition of TAX_u is equivalent to that of Method A. This outcome could then be corrected to yield results corresponding to Method B or C.

4. Further Complications

The calculations in the above example assume that regulatory depreciation matches that used for tax purposes. However differences are possible. If the difference is purely a matter of timing, Lally (2002) shows that regulatory depreciation should be reflected in *EBIT* in equation (1) whilst tax depreciation should be reflected in TAX_u in equation (1). If the divergence is in the total depreciation over the life of the asset, Lally (2004) shows that the same conclusion applies.

An example of this point in the context of Method A is as follows. The example differs from that earlier only in introducing a distinction between operating costs inclusive of regulatory depreciation and inclusive of tax depreciation. The values for TAX_u are shown in line 4.

		Yr 1	Yr 2
1.	Revenue	\$2000	\$2500
2.	Operating Costs (incl Regulatory Dep)	\$2400	\$1000
3.	Operating Costs (incl Tax Dep)	\$2350	\$950
4.	TAX_u = .33(Line 1 – Line 3)	-\$116	\$512

As before the Asset Base is \$10,000 and the WACC is 9.3% in each year. So, following equation (1), the Excess Earnings for these years are then as follows.

$$Excess\ Earnings_1 = \$2000 - \$2400 + \$116 - .093(\$10{,}000) = -\$1214$$

$$Excess\ Earnings_2 = \$2500 - \$1000 - \$512 - .093(\$10{,}000) = \$58$$

4. Conclusion

Tax loss situations introduce possible complications in the calculation of Excess Earnings. My recommendations are as follows. Firstly, the unlevered tax expense should be calculated by applying the statutory tax rate to the entity's taxable income for each year. Inter alia, this taxable income reflects tax depreciation. If the result of doing so is negative in a particular year, and this tax benefit is realised within a few years, then one should still employ this figure in the calculation of Excess Earnings for that year, i.e., one should act as if an immediate tax rebate was received. Consistent with this approach, the WACC should be defined in the usual way to incorporate the tax deduction for interest. In addition, past tax losses would be irrelevant to the calculation of the unlevered tax expense in any given year. This is Method A.

If the tax benefit is deferred for many years, alternatives that recognise the actual timing of the tax benefit must be considered. Method B involves present value corrections to both the unlevered tax expense and to WACC. Method C simply assigning the tax benefit of the tax loss in a particular year to the later year in which the tax benefit was realised. Both of these alternatives are complex and Method C leads to Excess Earnings calculations that do not reflect in a particular year all of the consequences of the events occurring within that year. In view of the latter feature, Method C is not recommended. However, if Method B produces materially different results to Method A, then it should be implemented.

Consideration is also given to a process for calculating the unlevered tax expense for a year, by adding back the interest tax shield to the actual tax payment. Depending upon the interpretation of certain words, this approach either coincides with Method A or it overstates the unlevered tax expense. Since it has no advantage over Method A, and some potential for error, it is not recommended.

REFERENCES

Lally, M. 2002, *Measuring Excess Earnings on Airfields*, paper prepared for the Commerce Commission.

_____ 2004, *The Treatment of Gains on the Sale of Assets*, paper prepared for the Commerce Commission.

LECG. 2004, 'Report on the Treatment of the Interest Tax Shield when Determining Excess Earnings in the Gas Control Inquiry.