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Discussion of: "On the Aggregation and Valuation of Deferred Taxes"

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Introduction

The proper accounting for deferred taxes has long been a source of regulatory debate, and has produced a steady stream of accounting pronouncements. Perhaps because of the inherent difficulty of accounting for deferred taxes, financial statement analysis texts frequently propose adjustments to the recorded amounts (see, for example, Bernstein and Wild 1997, p. 126). The Amir, Kirschenheiter and Willard (AKW) paper offers a welcome dose of structured thinking in this area by providing a formal evaluation of deferred tax accounting. They add deferred taxes to the Feltham-Ohlson (1996) valuation framework and examine how different ways to account for taxes give rise to different valuation expressions. In this discussion I will summarize their main results, re-writing some of them in a way that highlights the simplicity of the resulting valuation expression. I also suggest some paths for future research.

The Setup

I assume the reader is familiar with the notation and basic relationships in AKW. I will begin by comparing the AKW setup with the Feltham and Ohlson setup, and place the three alternative tax accounting methods in a more general setting. First, note that from a valuation perspective, any accounting method that includes net dividends and satisfies the clean surplus relation will yield the same value. Consider the clean surplus equation for income and book value,

$$d_t = ni_t - \Delta bv_t, \tag{1}$$

where d_t is net dividends to equity holders, ni_t is net income and Δbv_t is the change in shareholders' equity, all over the period ending at time t. Any accounting method of measuring ni_t and Δbv_t that satisfies this equation will yield the same valuation because d_t can be recovered from the accounting data. What is at issue is how neatly it recovers this value.

As in Feltham and Ohlson, AKW assume there are no financial assets, so d_t equals cash receipts cr_t less cash investments ci_t less taxes paid to the taxing authority τy_t, where τ

is the tax rate and y_t is the taxable income for the period. Taxable income and operating income ox_t differ because the tax authorities depreciate the operating asset at rate $(1-\delta_\tau)$ and the accounting books depreciate it at rate $(1-\delta_B)$. The difference between y_t and ox_t is the timing difference, so deferred tax expense dte_t equals $\tau(y_t - ox_t)$. Since the tax accounting is exogenous and doesn't affect the financial accounting for the operating asset, dte_t is exogenous; it is not affected by the accounting for deferred taxes.

To illustrate the incremental contribution of AKW relative to Feltham and Ohlson, let ni_t equal operating income ox_t less tax expense te_t, and let Δbv_t equal the change in operating assets oa_t less the change in deferred tax liabilities Δdtl_t. The accounting for taxes will determine exactly how te_t and Δdtl_t get measured. Substituting this into (1) gives

$$\overbrace{\underbrace{cr_t - ci_t}_{\text{FO96}} - \tau y_t}^{d_t} = \overbrace{\underbrace{ox_t}_{\text{FO96}} - te_t}^{ni_t} - \overbrace{\underbrace{\Delta oa_t}_{\text{FO96}} + \Delta dtl_t}^{\Delta bv_t} \tag{2}$$

If $\tau = 0$ all the tax-related terms are zero and we are back to the setup in Feltham and Ohlson (labeled FO96). Further, since the clean surplus relation holds in Feltham and Ohlson setup as well, we can cancel all the terms that don't involve taxes, leaving

$$\tau y_t = te_t + \Delta dtl_t. \tag{3}$$

The LHS of (3) is the cash tax payment for the period. Equation (3) says that we can account for taxes however we like and still satisfy the clean surplus relation as long as the tax payment is fully allocated between tax expense te_t on the income statement and the change in deferred tax liability Δdtl_t on the balance sheet.

We can use (3) to summarize the three cases considered by AKW. *Cash accounting* for taxes sets $te_t = \tau y_t$, so Δdtl_t must equal 0. This is the simplest accounting method: the expense is whatever the firm's tax bill is for the year (many students and a few professors have often wished for this treatment of taxes!). *GAAP accounting* for deferred taxes sets $te_t = \tau ox_t$, so, to satisfy (3), Δdtl_t must equal $\tau y_t - \tau ox_t$, or simply dte_t. As anyone who teaches financial accounting knows, the benefit of this approach is that it smoothes out the tax benefits associated with the accelerated deductions over the life of the operating asset (i.e., tax expense is τox_t regardless of the deduction schedule given by $(1-\delta_{\tau}.)$. Finally, *present value accounting* sets $te_t = \tau ox_t - \psi dte_t$, so $\Delta dtl_t = (1-\psi) dte_t$, where the coefficient $(1-\psi) = \frac{(1-\delta_\tau)}{(R-\delta_\tau)}$ is the present value adjustment. It is the present value factor for an infinite series of tax depreciation amounts, starting next period at $(1-\delta_\tau)$ and decaying at rate δ_τ thereafter.

The Results

Exactly What Is Present Value Accounting?

The present value method of accounting for deferred taxes will turn out to be the method that has all the desirable attributes, so it warrants the most discussion. Note that GAAP accounting simply adds the dte_t each period to the total deferred tax liability. The criticism of this approach is that it ignores the timing of the increased future tax payments when the deductions subside. While the present value method corrects for this, the exact correction is more complicated that it appears.

Under GAAP accounting, dte_t is added to the dtl_t each period, so that the balance at time t equals the sum of past and current dte_t. Further, because deferred taxes reverse, $-dtl_t$ also equals the sum of all future dte_t. That is, under GAAP accounting

$$-dtl_t = \sum_{s=1}^{\infty} dte_{t+s}. \tag{4}$$

The balance in the deferred tax liability account is the sum of all future deferred tax expenses. Given this, one might have expected that under present value accounting the amount booked, $dtl_t(1-\psi)$, would equal the present value of all future deferred tax expenses. That is,

$$-dtl_t(1-\psi) = \sum_{s=1}^{\infty} R^{-s} dte_{t+s}. \tag{5}$$

But the answer isn't this simple.

$$-dtl_t(1-\psi) = \sum_{s=1}^{\infty} R^{-s} dte_{t+s} - \tau\psi \frac{\gamma - \delta_\tau}{R-\gamma}\, oa_t. \tag{6}$$

Note that when $R = 1$ (i.e., money has no time value), $\psi = 0$ and we are back to GAAP accounting; the LHS of (6) equals $-dtl_t$ and the second term on the RHS is zero. The results of AKW show that, by booking the whole RHS of (6), not just the discounted sum of future deferred tax expenses, the residual income from future tax expense flows at exactly the same rate as future operating income. This is illustrated below.

What Is the "Best" Way to Account for Deferred Taxes?

The first issue that we must confront is, what do we mean by "best?" There is only one representative investor in these types of models, and all the accounting systems yield the same valuation, so clearly we cannot mean "best" in any social welfare sense. AKW argue that a good accounting system will preserve certain classic relations in sufficiently simple settings (a similar argument is found in Feltham and Ohlson). In particular, the market value of the firm should equal the accounting book value when

(1) all investments are zero net present value,

(2) the financial accounting system for operating assets is unbiased, and

(3) the is no uncertainty in the past or future (implying that residual income is zero in the past and in the future, with certainty)?

The AKW result is that present value accounting method passes this test, but I find the exercise rather hollow. Perhaps this should be listed as the lowest hurdle in the search for the "best" accounting, for any accounting treatment that didn't get this result in such a simple setting must surely be wrong.

But there is another notion of the "best" accounting system eluded to in AKW, but not fully explored. A good accounting system allows line items to aggregate, so that when computing value the user doesn't have to distinguish between tax expense and operating income, or between operating assets and deferred tax liabilities. Theorem 2 in AKW shows that GAAP accounting fails this test when the book or tax depreciation rates (δ_B or δ_t) differ from the economic rate at which the operating asset decays (γ). The value expression is

$$V_t = bv_t + \beta_1[ni_t - (R-1)bv_{t-1}] + \beta_2 ci_t + (1-\tau)\beta_3 oa_{t-1} + \tau\psi\beta_4 ta_{t-1}, \qquad (7)$$

where

$\beta_1 = \gamma/(R-\gamma)$ is the present value of a decaying perpetuity at rate γ,

$\beta_2 = (\lambda - 1)R/(R-\omega)$ is the present value of positive net present value growth

$\beta_3 = R(\gamma - \delta_B)/(R-\gamma)$ is the correction for biased accounting for operating assets oa_t, and

$\beta_4 = R(\gamma - \delta_\tau)/(R-\delta_\tau)$ is the correction for biased accounting for tax assets ta_t.

The first two terms are the book value of equity and the present value of a decaying perpetuity of residual income, respectively, where the decay rate γ is the decay in the operating asset's ability to generate cash receipts. If the value depended on only these two terms we would be back to the original model in Ohlson (1995). The third term adjusts for future positive net present value projects and the fourth term adjusts for bias in the accounting for operating assets; both were studied in Feltham and Ohlson. The last term corrects for the bias in the accounting for tax assets. In particular, if the rate of decay δ_τ on the tax assets differs from the economic decay in the underlying operating asset, this term must adjust for the difference. AKW conclude that, since it is generally not sufficient to know only book value and net income in the valuation, aggregation does not hold. Focusing only on the tax term, it is perhaps not surprising that aggregation fails, given the widely held view that GAAP overstates the dtl_t by failing to take into account the time value of money (recall that dtl_t is part of the bv_t term).

But the most interesting result in AKW is a more positive one, although it risks getting lost in the details. Part b of corollary 2 considers the special case of zero net present value future investments ($\lambda = 1$) and book depreciation that is unbiased ($\delta_B = \gamma$). Insofar as the value of future positive net present value investments will clearly not be captured by any of the accounting systems considered, this simplification is not unreasonable. Similarly, it is not unreasonable to eliminate the bias in the accounting for the operating assets in order to isolate the accounting issues surrounding deferred taxes. AKW examine this special case by writing the value expression as a linear combination of capitalized earnings and book value, showing how each must be adjusted for deferred taxes. But I believe a more intuitive way to examine this case is by setting $\lambda = 1$ and $\delta_B = \gamma$ in (7). This gives

$$V_t = bv_t + \beta_1[ni_t - (R-1)\,bv_{t-1}] + \tau\psi\beta_4 ta_{t-1}. \qquad (8)$$

Even in this special case, as long as the tax accounting depreciation rate doesn't match the economic decay rate ($\delta_\tau \neq \gamma$), aggregation will not hold for GAAP accounting. But here is the crucial question: what if we used present value accounting? In this case $bv_t^* = oa_t - (1-\psi)\, dtl_t$ and $ni_t^* = (1-\tau)ox_t + \psi dte_t$. Writing the value expression in terms of these values gives[1]

$$V_t = bv_t^* + \beta_1[ni_t^* - (R-1)bv_{t-1}^*]. \tag{9}$$

In sum, the present value accounting method is the "best" accounting choice—it allows for aggregation. If the accounting for deferred taxes is done correctly, the user doesn't have to distinguish between tax expense and operating income, or between operating assets and deferred tax liabilities. All the user needs to compute the value of the firm is the current period's book value and the residual income, just as in the original Ohlson model.

Written this way, the AKW exercise can be seen as a special case of Ohlson and Zhang (1998). That paper asks the generic question: how can we do the accounting so that the value expression relies only on the current book value and residual income? While Ohlson and Zhang answer this question, they do it at such a level of generality that it is difficult to gain much intuition for their answer. AKW provide a concrete example.

This result also has something to offer financial statement analysis. While admitting that all methods of accounting that satisfy the clean surplus requirement are informationally equivalent, it is not uncommon in practice for analysts to adjust the accounting numbers before plugging them into a valuation model. The AKW result shows that adjusting the tax amounts for the time value of money "cleans up" the accounting in such a way to make the subsequent valuation easier.

Future Work

This paper gives a clear answer to a long-standing question about deferred taxes. It shows that if the accounting takes into account the timing of the future deferred tax reversals, the resulting valuation expression allows for the aggregation of line items. But the paper also raises a number of unanswered questions. First, what will happen once we allow positive net present value projects and growth in operating assets? My intuition is that GAAP accountings' failure to take adjust for time value is most severe for growing companies. For these companies the dtl_t balance grows each period but has a much lower present value, so I would expect the correction to involve the growth parameter. Yet the growth parameter ω only affects the coefficient on investment in (7), so how will growth interact with the tax accounting to correct for the growing distortion in the GAAP accounting system?

Second, taxes are completely outside the stochastic structure of the model. We have an accounting question about how to account for the taxes, but we have no information issue. Yet, under SFAS 109 management is required to re-estimate the tax and book basis of their assets each year. So it would seem that the tax reporting could convey useful information about the future. Capturing this in the model would require that the tax variables become part of the stochastic system describing the evolution of the data. This modification would no doubt raise a whole new list of interesting issues.

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Note

1. To derive this expression, start with part b of Corollary 2 and note that bv_t^* and ni_t^* are both isolated already. Substitute bv_t^* and ni_t^* into the expression and simplify.

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