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Re: Comment on Technical Information Paper 1

We are the co-authors of *Cost of Capital: Applications and Examples* 4th ed. and have prepared comments based on materials contained in that work that directly pertain to issues covered in Technical Information Paper 1.

Question 5: Response (from Chapter 19):
"In the models discussed, we have developed nominal cost of capital estimates in that they reflect future expectations of inflation. Therefore, expected cash flow forecasts need to match; they need to reflect expected inflation.

"Some practitioners recommend using real cash flows (expected inflation removed) and discounting those cash flows using a cost of capital estimate with inflation removed. The consistency between cash flow forecasts and cost of capital estimates is not sufficient to get identical results (using nominal or real).[1] In many instances using real cash flow forecasts and real discount rates results in an error in the concluded value. For example, taxable income on which income taxes are calculated most often is based on historical capital expenditures (i.e., depreciation is not adjusted for inflation). Rarely is it correct to equate future depreciation with future capital expenditures.[2] Tax credits for investment often are based on the amount of original investment. However, in countries where there is rampant and predictable inflation, denominating both the cash flows and the discount rate in real terms may be the only reasonable alternative."

[1] Joseph Tham and Ignacio Velez-Pareja, "Top 9 (Unnecessary and Avoidable) Mistakes in Cash Flow Valuation," Working paper, January 29, 2004.
[2] Daniel L. McConaughy and Lorena Bordi, "The Long Term Relationships between Capital Expenditures and Depreciation across Industries: Important Data for Capitalized Income-Based Valuations," *Business Valuation Review* (March 2004); Brant Armentrout, "A Sanity Test When Estimating Capital Expenditures in Excess of Depreciation," *Business Valuation Review* (September 2003): 136–141.

Question 5: Response (from Chapter 33):

A common mistake made in converting an after-tax discount rate to its pre-tax equivalent is to simply divide the after-tax discount rate by 1 minus the assumed tax rate. This is wrong. The conversion is more difficult than many practitioners understand.

"The discount and/or capitalization rates as developed in this book using the Morningstar and/or Duff & Phelps data are applicable to *after-tax net cash flows*. To convert these rates to alternative rates appropriate for some other economic income measure, there must be some reasonable predictable relationship between net cash flow and the measure to which the rates will be applied. Otherwise, the conversion exercise will produce meaningless results.

"Having established the relationship between net cash flow and net income as an example, the conversion would be completed by dividing the expected net cash flow amount by the amount of the other economic income measure to get a typical ratio between the two. Then the conversion is completed by dividing the net cash flow discount rate by that ratio.

"To convert an after-tax capitalization rate to a pretax capitalization rate, one just divides the after-tax capitalization rate is divided by 1 minus the tax rate. Again, for this procedure to be valid, the tax rate must be expected to hold reasonable steady in the future.

"To convert an after-tax discount rate to a pretax discount rate, the expected growth rate must be added to the pretax capitalization rate. *This only produces valid results if two conditions are met*:

1. The relationship between after-tax cash flows and pretax cash flows is expected to remain reasonably constant over time, and
2. The growth rate is a long-term sustainable growth rate is expected to remain reasonably constant over time."

Paragraph 5: comment on Definitions of Free Cash Flows, Free Cash Flows to the Firm, and Free Cash Flows to Equity

We recommend that more explicit definitions be provided to eliminate confusion. For example (from Chapter 3):

"Net cash flow is generally defined as cash that a business or project does not have to retain and reinvest in it in order to generate the projected cash flows in future years. In other words, it is cash *available* to be paid out in any year to the owners of capital without jeopardizing the business's expected cash flow generating capability in future years.

"The net cash flow is available to be distributed to the investors *or* reinvested in some incremental project not reflected in the net cash flows that have been discounted. That reinvestment results in incremental value in future years.

"*Net cash flow* is sometimes called *free cash flow*. It is also sometimes called *net free cash flow*, although this phrase seems redundant. With finance terminology being as ambiguous as it is, minor variations in the definitions of these terms frequently arise, making it essential to clearly define the measure of income to be employed in the valuation.

"In valuing *equity capital* by discounting or capitalizing expected net cash flows, *net cash flow to equity* (NCF_e in our notation system) is defined as:

(Formula 3.1)

	Net income to common equity (after income taxes)
Plus:	Non-cash charges (e.g., depreciation, amortization, deferred revenues, and deferred income taxes)
Minus:	Capital expenditures (amount necessary to support projected revenues and expenses)
Minus:	Additions to net working capital (amount necessary to support projected revenues)
Minus:	Dividends on preferred equity capital
Plus:	Cash from increases in the preferred equity or debt components of the capital structure (amount necessary to support projected revenues)
Minus:	Repayments of any debt components or retirement of any components of preferred components of the capital structure
Equals:	Net cash flow to common equity capital

"Capital expenditures are those amounts needed to match the revenue and expense forecasts. That is, the capital expenditures are those amounts needed for replacement of plant and/or equipment that are retired in the normal course of business, those amounts needed for increases in capacity consistent with the projected revenue (e.g., increased number of machines, increased warehouse space, etc.), and those amounts needed for replacement of existing plant and/or equipment consistent with projected expenses (e.g., replacement of inefficient equipment with more efficient equipment).

"Net working capital excludes (1) any excess cash and investments that are not needed to support the level of business activity in the projected revenues and (2) any debt classified as short-term that is a component of the capital structure (e.g., the amount included in current liabilities for the current portion of long-term debt).

"Because we are only including amounts of investment in net working capital and capital expenditures needed for the projected revenues and expenses included in the projected net cash flows to be discounted, we can term these sustainable net cash flows.

Net cash flow to equity is also called *free cash flow to equity* (FCF_e).

"In valuing the entire *invested capital* of a business or project by discounting or capitalizing expected cash flows, *net cash flow to invested capital* or *net cash flow to the firm* (NCF_f in our notation system) is defined as:

(Formula 3.2)

	Net income to common equity (after income taxes)
Plus:	Non-cash charges (e.g., depreciation, amortization, deferred revenues, and deferred income taxes)
Minus:	Capital expenditures (amount necessary to support projected revenues and expenses)
Minus:	Additions to net working capital (amount necessary to support projected revenues)

Plus: Interest expense (net of the tax deduction resulting from interest as a tax-deductable expense)

Plus: Dividends on preferred equity capital

Equals: Net cash flow to invested capital

"The amounts of capital expenditures and additions to net working capital are consistent with the projections of revenues and expenses and the amounts defined above (in the net cash flow to common equity capital).

"In other words, NCF_f adds back interest (tax-affected because interest is a tax-deductible expense) because invested capital includes the debt on which the interest is paid. Interest is the payment to the debt component of the invested capital. It also adds back dividends on preferred stock for the same reason (i.e., invested capital includes the preferred capital on which the dividends is paid).

Net cash flow to invested capital is also called *free cash flow to the firm* (FCF_f).

"Occasionally an analyst treats earnings before interest, taxes, depreciation, and amortization (EBITDA) as if it were equivalent to net cash flow to invested capital. This error may be a significant matter because the analyst has added back the noncash charges but ignored the requisite capital expenditures and additions to net working capital necessary to sustain the business as projected.

"When we discount net cash flow to equity, the appropriate discount rate is the cost of equity capital. When we discount net cash flow to all invested capital, the appropriate discount rate is the overall cost of capital or WACC."

Paragraph 8: Comment on expected cash flows:
We find the use of the term "actual cash flows" as used herein to be confusing. Only historic cash flows can be "actual". Even contractual cash flows are only "expected" as there is always a risk that that counter-party in the contract is unable to perform.

We recommend that the term expected cash flows be defined consistent with the finance literature (from Chapter 3):

"Net cash flows to be discounted or capitalized should be *statistical expected values*, that is, (mean) *probability-weighted* net cash flows."

Paragraph 16 (h): Comment on use of exit multiples (from Chapter 35):

"Some practitioners use a market multiple, such as the industry average multiple of earnings before interest, income taxes, depreciation and amortization (EBITDA) to estimate a terminal value.

"As we discussed in Chapter 4, the authors believe that use of a market-derived multiple for calculation of the terminal value is not appropriate as it mixes elements of the market and income approaches and does not represent a true income approach.

"In addition to mixing valuation approaches, it is not clear that a current average industry multiple reflects a long-term estimate of growth consistent with the sustainable long-term growth rate in net cash flows. If the growth rate imbedded in the multiple is inconsistent, utilizing this method will either over- or under-value the business.

"As an example, current multiples in an industry reflect the consensus growth estimates of the market which are built upon analysts' estimates of earnings. Analysts include both the earnings of the company expected from the existing business and the earnings expected from reinvestment of retained net cash flows and reinvestment of those retained net cash flows in investments that are unspecified. Typically, the net cash flow estimates used in the DCF method valuation are based upon the core business of the company at the valuation date. That is, the estimates include the expected cash flows from the business as it exists at that date. Further, the current multiples may represent years encompassing the rapid growth phase of the industry and include rates of growth for a period of years in excess of sustainable long-term growth for the industry upon maturity."

Paragraph 16 (k): Comment on suggested additional considerations needed when using a WACC:

The underlying assumptions of commonly used WACC are complex and require additional considerations of the appropriateness of the WACC. Practitioners often use the WACC in inappropriate circumstances where the underlying assumptions of the WACC are violated. Some of issues concerning use of the WACC are summarized as follows (from Chapter 18):

"Because we are interested in cash flows after entity-level taxes, literature and practitioners refer to this formulation of the WACC as an after-tax WACC. The basic formula for computing the after-tax WACC for an entity with three capital structure components is:

(Formula 18.3)

$$WACC = (k_e \times W_e) + (k_p \times W_p) + (k_{d(pt)}[1-t] \times W_d)$$

where:

$WACC$ = Weighted average cost of capital (after-tax)
k_e = Cost of common equity capital
W_e = Percentage of common equity capital in the capital structure, at market value
k_p = Cost of preferred equity capital
W_p = Percentage of preferred equity capital in the capital structure, at market value
$k_{d(pt)}$ = Cost of debt capital (pretax)
t = Income tax rate
W_d = Percentage of debt capital in the capital structure, at market value

"The assumption of a single WACC as shown in formula 18.3 and commonly employed to discount each increment of expected cash flow implies a constant capital structure over time. If

the capital structure varies significantly over time, using a constant WACC will likely result in the incorrect value of the company or project.

"Strengths of the WACC (formula 18.3) include:

- WACC lets one exploit capital market data, even when we are valuing non-traded assets
- WACC handles the interest tax shield very simply
- WACC is by far the most widely-used discount rate for valuing the business enterprise

"Weaknesses of the WACC (formula 18.3) include:

- WACC handling of income tax issues is simplistic and ignores personal taxes and capital gains treatment that are important considerations in the valuing of pass-through entities.
- Implicitly the interest tax shield equals the cost of debt capital times the market value of debt and assumes that the income tax deductions from interest expense result in reduced cash income taxes in the period in which the interest is paid.
- There may be a risk of realizing the interest tax shield
- More likely, interest deductions equal the face amount of debt times a coupon rate

"WACC (formula 18.3) assumptions are violated:

- Any time the market value of debt differs from the book value of debt
- When the coupon on the debt does not equal the expected return on the market value of debt capital
- When the income tax deduction does not equal the coupon multiplied by the face value of the debt
- When the interest tax shields do not result in reduced cash taxes (though the varying WACC method can adjust for this error by setting $t = 0$ in period when the tax shield will not be realized).
- When the equity-to-invested capital ratio is not constant in market value terms (though the varying WACC method can adjust for this error).

"WACC (formula 18.3) may be especially unreliable with:

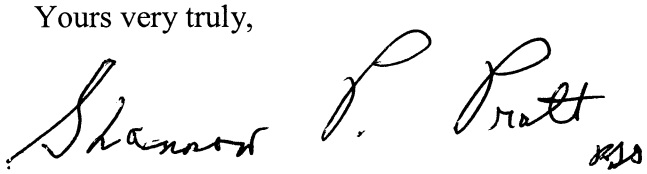
- High leverage capital structures
- Complex tax situations
- Complex capital structures including exotic securities in the capital structure
- In dynamically changing rather than static situations (though the varying WACC method can adjust for this error)."

In order for the user of valuation reports to understand that the valuator understood the underlying assumptions made and the applicability of the WACC in the specific circumstances, we believe that specific consideration of the WACC assumptions are just as important as those listed for the discount rate.

For a more complete discussion of these and other cost of capital issues, we suggest that you refer to *Cost of Capital: Applications and Examples* 4th ed.

We hope that the Members of the International Valuation Standards Council will find these comments useful.

Yours very truly,



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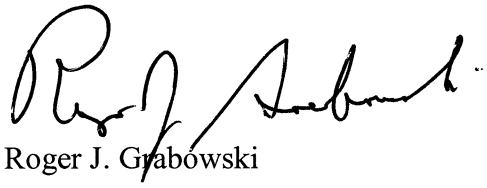

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