Thought Leadership

Estimating Capital Expenditures and Depreciation Expense in the Direct Capitalization Method

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Valuation analysts often rely on the income approach to estimate the value of operating companies for gift tax, estate tax, and generation-skipping transfer tax purposes. Two closely held business valuation variables that analysts frequently estimate when performing the business valuation income approach are (1) the projected capital expenditures and (2) the projected depreciation expense. These two valuation variables are related to one another and to other income approach valuation variables. This discussion considers the relative valuation impact of capital expenditures and depreciation expense, especially with regard to various projected growth rate assumptions.

Introduction

One of the most basic concepts in business or security valuation is that the value of a security is equal to the present value of the expected cash flow from the ownership of that security.

This valuation relationship is equally true whether the investment is a financial asset such as a U.S. Treasury bill, an ownership interest in real property, or an equity investment in an operating business enterprise.

This investment valuation relationship is often expressed by the following formula:

Formula #1:

$$V = \frac{I}{R}$$

where:

V = Value of the investment

I = Normalized "next period" income

R = Required rate of return

This simplified investment valuation formula is often referred to as the direct capitalization method. Along with the yield capitalization method, the direct capitalization method is a common income approach valuation method.

Using this valuation formula, an analyst can estimate the value of any investment or security if he or she knows (1) the investment's expected income and (2) the investor's expected rate of return on the investment.

Although this valuation formula only requires two inputs, estimating a value for each of those formula inputs is a complex—and often controversial—undertaking.

Every component in this valuation formula is worthy of its own discussion. This discussion focuses on the income portion of the direct capitalization method formula.

Specifically, this discussion presents best practices when estimating depreciation expense (often referred to as "depreciation" throughout this discussion) and capital expenditures. This discussion considers those cash flow components as part of the direct capitalization method.

This discussion focuses on the applicability of, the strengths of, and the weaknesses of, selecting various levels of capital expenditures (i.e., greater than, equal to, or less than) relative to the selected level of depreciation expense.

This discussion does not focus on estimating the specific levels of depreciation expense or capital expenditures to use in an income approach direct capitalization method valuation analysis.

Valuation Profession Treatment of Depreciation Expense and Capital Expenditures

Two surveys conducted in 2012 and 2013 demonstrate the degree to which valuation analysts vary on how to treat capital expenditures and depreciation expense.

In the 2012 survey, valuation analysts were asked whether depreciation expense should equal capital expenditures in a growth model: 44 percent said yes, 29 percent said no, and 27 percent said that those levels should depend on company growth and inflation.[1]

In the 2013 survey, analysts were asked how they typically handled capital expenditures and depreciation expense when estimating cash flow: 68 percent said they made them the same or very similar, 4 percent estimated capital expenditures less than depreciation expense, and 28 percent said they estimated capital expenditures materially greater than depreciation expense.[2]

Both surveys show that the consensus or default position among analysts is to set capital expenditures equal, or nearly equal, to depreciation expense in their models. It is fair to assume that the majority of these models assume some level of growth.

This position may be the analyst's default position. This is because certain U.S. courts have accepted valuations where depreciation and capital expenditures are offsetting, or because it is easier to perform and explain this adjustment than to justify why the amounts for depreciation expense and capital expenditures should differ.

It is the consensus opinion that the majority of operating companies subject to valuation for gift, estate, and generation-skipping transfer tax purposes warrant a positive long-term growth rate. A valuation model that assumes a 0 percent or negative long-term growth rate is typically only appropriate in extraordinary circumstances.

Facing a situation with zero or negative expected growth, business owners may:

1. achieve positive growth by adjusting operations,
2. scale back production or services offered to a point at which long-term growth will be positive, or
3. cease operations, either gradually over time or more abruptly.

This discussion provides information that analysts can consider when making such estimates, analyses, or assumptions.

Direct Capitalization Method Overview

The application of the direct capitalization method requires the analyst to apply several principles. The principles that are relevant to this discussion include the following:

1. The selected discount rate should be appropriately matched to the selected measure of income.
2. The selected growth rate should be appropriately matched to the selected measure of income.
3. Income should be normalized—that is, income should only include income or expense items that are expected to recur in perpetuity.

A detailed examination of these principles is outside the scope of this discussion. And, a detailed examination of these principles is not necessary since (1) these principles represent generally accepted valuation theory and (2) they are not controversial.

However, this discussion presents an overview of these three principles because they are relevant to the subsequent discussion about depreciation expense and capital expenditures.

Principle #1: Discount Rate and Income

In the direct capitalization formula, the selected discount rate (or rate of return) should be appropriately matched to the selected measure of income. The failure to properly match income with the discount rate is a fundamental flaw of the application of the direct capitalization method.

According to *Cost of Capital*, "A very common type of error in applying the income approach to valuation is to use a discount or capitalization rate that is not appropriate for the definition of economic income being discounted or capitalized. This general category of error has almost infinite variations."[3]

The appropriate discount rate is one that includes a rate of return for each component of the selected

Exhibit 1
Terminal Value Based on Alternative Direct Capitalization Rates

Present Value Discount Rate	12%	12%	12%	12%	12%
− LTG Rate	4%	3%	2%	1%	0%
= Direct Capitalization Rate	8%	9%	10%	11%	12%
Terminal Cash Flow (NCF)	100	100	100	100	100
÷ Direct Capitalization Rate	8%	9%	10%	11%	12%
= Indicated Value	1,250	1,111	1,000	909	833

measure of income. For example, if the selected measure of income includes a return from debt (i.e., it is estimated before the deduction of interest expense) and a return from equity, then the appropriate discount rate is one that considers the required rate of return from both debt capital and equity capital.

Likewise, if the income return is an after-tax return, then the discount rate should be an after-tax discount rate.

In the valuation of an operating company using the direct capitalization method, income is often estimated as subject company net cash flow to invested capital.

Net cash flow to invested capital (NCF) is typically calculated as follows:

Formula #2:

Net income
\+ Tax-affected interest expense
\+ Depreciation expense
– Capital expenditures
+/– Changes in net working capital
= NCF

When valuation analysts use Formula #2, they often think of depreciation expense and capital expenditures together. This is because depreciation expense is a function of capital expenditures.

In the direct capitalization method, capital expenditures should either:

1. exceed depreciation,
2. be equal to depreciation, or
3. be less than depreciation.

The appropriate discount rate based on the NCF formula presented in Formula #2 is the weighted average cost of capital (WACC) minus the estimated long-term growth rate of NCF (the "LTG rate").

In this example, the WACC is based on both:

1. the subject company's cost of equity capital and
2. its cost of debt capital.

The WACC is an appropriate discount rate for NCF because NCF includes a return on both equity capital and debt capital.

Based on the information above, and using more specific measures of income and rate of return, Formula #1 can be rewritten for an operating company as follows:

Formula #3:

$$Business\ Enterprise\ Value = \frac{Next\ Period\ NCF}{(WACC\ -\ LTG\ rate)}$$

Principle #2: LTG Rate and Income

In the direct capitalization method, the selected direct capitalization rate equals the selected discount rate (e.g., the WACC) minus the expected LTG rate of the selected income measure (e.g., NCF).

As evident from the direct capitalization formula, it is important to select an LTG rate that matches the selected income measure. This is important to reiterate because, in our experience, analysts often incorrectly select an LTG rate based on reference to factors other than the expected growth of the selected income measure.

For example, an analyst may select a 3 percent LTG growth rate. And, he or she may support this selected growth rate by citing historical growth in revenue, operating income, or net income.

Although such factors may be useful guideposts in an LTG rate analysis, they should not be relied on as proxies for the estimated LTG rate of NCF or another/different measure of income.

Another common inconsistency we have observed is the use of sensitivity tables that present the firm value in various scenarios where (1) income (i.e., NCF) is held constant and (2) the LTG rate changes (which causes the direct capitalization rate to change).

The potential error in such a sensitivity table is the assumption that the selected LTG rate is not related to the selected measure of income or the discount rate. This sensitivity table error often looks something like the data presented in Exhibit 1.

In fact, if one variable changes (i.e., the LTG rate), one would expect the other variables to change as well (i.e., NCF). For example, rapid growth is often

associated with increased risk and significant projected capital expenditures.

A subsequent section of this discussion revisits this exhibit and presents an alternative way to consider NCF, the LTG rate, and value.

Principle #3: Normalization of Income

One of the assumptions of the direct capitalization method is that the income will increase or decrease in perpetuity (i.e., forever) at a constant rate of growth.

Therefore, the appropriate level of income is some measure of normalized income. In order to normalize income, the analyst should exclude income and expenses that are not expected to recur.

According to *Cost of Capital*, the income that is capitalized "represents the long-term sustainable base level of economic income or a base from which the level of economic income is expected to grow or decline at a more or less constant rate."[4]

According to *Understanding Business Valuation*, "The objective in a single period capitalization method is to determine through analysis—and if necessary, adjustments—the level of benefits that are reflective of a *sustainable* level for the appraisal subject."[5]

As an example, let's assume that NCF in a direct capitalization method is estimated by reference to the company's three-year average net income. And, let's assume that the three-year average net income includes the results of an unprofitable subsidiary that was sold prior to the valuation date.

It would not be appropriate to include the results from that subsidiary in the normalized NCF of the subject company. This is because the company will not earn revenue or incur expenses related to that subsidiary in the future.

The valuation analyst will typically adjust for nonrecurring items such as this and calculate the NCF that he or she expects will recur in the future.

Other examples of nonrecurring income and expense items may include net operating loss carryforwards, gains on the sale of assets, litigation expense, restructuring expenses, and so on.

These normalization adjustments are especially important for capital expenditures and depreciation expense as these two variables can vary widely from year to year without any extraordinary events and through the normal course of business. Additionally, these variables are often fairly sizable relative to NCF.

We recognize that for certain periods, depreciation expense can exceed capital expenditures for a number of reasons. However, this unusual and often

temporary condition should not be modeled into a perpetuity model.

This is because, as discussed herein, the selected measure of income in a perpetuity model such as the direct capitalization method should be *normalized* income. The selected measure of income should not include income or expense items that are either temporary or not expected to recur in perpetuity.

Discounted Cash Flow and the Terminal Value

We frame this discussion in the context of the direct capitalization method. However, estimating depreciation expense and capital expenditures is important for the discounted cash flow (DCF) method.

The DCF method includes two components of income and value. The first component involves a projection of company results of operation for a discrete, multiyear period. The discrete cash flow projection is then converted to a present value.

The second component in the DCF method is the terminal value. The terminal value is "the present value of the stabilized benefit stream capitalized into the future,"[6] where the future represents all periods after the discrete projection period at a point in time where NCF is *normalized*.

The terminal value is often calculated using the Gordon growth model (GGM) formula. After estimating the terminal value, the analyst converts the estimated terminal value to a present value using an appropriate present value discount rate.

Similar to the direct capitalization method, the terminal value calculation in the DCF method typically assumes operations into perpetuity. The terminal value is an important component in the DCF method. This is because it can represent 75 percent or more of the total company value.[7]

In theory, a DCF method analysis should project out the cash flow for a length of time until the cash flow reaches a stable period at which an LTG rate can be applied. This would imply that depreciation expense and capital expenditures have also stabilized.

The GGM formula used to calculate the terminal value is fundamentally the same formula that is used to estimate value in the direct capitalization method described above.

The GGM formula is presented below.

Formula #4:

$$PV = (NCF_0 \times (1 + g)) \div (k - g)$$

where:

PV = Present value of the investment

NCF_0 = Net cash flow in the final discrete projection period[8]

g = Selected long-term growth rate

k = Selected cost of capital

In both (1) the direct capitalization model formula (i.e., Formula #1) and (2) the GGM formula (i.e., Formula #2), the next period income is divided by a risk-adjusted and growth-adjusted discount rate in order to estimate value.

Therefore, although we frame this discussion in the context of direct capitalization, the issues discussed herein relate to both the direct capitalization method and DCF methods where a terminal value is estimated using the GGM formula.

The next sections of this discussion focus on the following valuation variables:

1. Growth rate
2. Depreciation expense
3. Capital expenditures

Each of these variables has a significant impact on an overall valuation, whether via the direct capitalization method or the DCF method.

Growth Rate and Capital Expenditures

One of the most basic concepts of growth models, such as direct capitalization or the GGM formula, is that all of the valuation variables are related to each other. And, all selected valuation variables should be based on internally consistent variables.

Capital expenditures have a direct correlation to both growth and depreciation expense. Increased levels of capital expenditures should in turn lead to increased future growth. Likewise, increased capital expenditures will raise future levels of depreciation expense.

One way to think about capital expenditures is to break those outlays into two components:

1. Maintenance or replacement outlays
2. Growth-driven capital expenditures

Throughout this discussion, we consider maintenance capital expenditures as those expenditures required to maintain the existing size and capacity of a company. These capital expenditures do not include expenditures related to new capacity of an existing product line, a new product line, or other similar growth initiatives. And, when we refer to growth capital expenditures, we are referring to outlays that expand output capability.

Analysts often consider historical depreciation expense to be a good proxy for future capital expenditures. If a company consistently spent an amount equal to depreciation expense every year, the company's fixed asset level would remain unchanged. Any additional expenditure would result in an increased fixed asset base.

As long as a company earns a positive return on its capital investment, then capital expenditures in excess of maintenance capital requirements should result in some level of future growth.

The resulting boost to growth may be almost immediate, such as the purchase of equipment that increases capacity, or more delayed, such as the case with construction in progress or software development costs.

Projected capital expenditures should always reflect the expected LTG rate. Or conversely, a selected LTG rate should be supported by a certain level of capital expenditures and an assumed rate of return on that investment. If growth expectations are increased or decreased, then either capital expenditures need to be adjusted or new assumptions established regarding return on invested capital.

Assuming the rate of return on invested capital is held constant, then any change to the LTG rate assumption should require the analyst to adjust his or her assumptions for both capital expenditures and depreciation.

Nominal Growth and Real Growth Implications

Nominal values include the impacts of both inflation and real returns. Alternatively, real values are values that have been adjusted for the effects of inflation.

Nearly all company projections and discount rate data are presented in nominal terms. Therefore, our discussion of LTG rates is based on nominal LTG rates. In circumstances where the projected income and discount rate data are projected in real terms, then the selected LTG rate should be a real growth rate.

Based on this information, if we assume that the expected inflation rate in the United States is 3 percent, and the analyst selects an LTG rate of 3 percent in the direct capitalization method, then the analyst has selected:

1. a 3 percent *nominal* long-term growth rate and
2. a 0 percent *real* long-term growth rate.

And, if inflation is estimated at 3 percent, any selected LTG rate that is less than 3 percent results in negative real growth, and any selected LTG rate that is greater than 3 percent results in positive real growth.

Calculating the Reinvestment Rate

One reason that capital expenditures can exceed depreciation expense in a positive growth scenario is due to the need for capital to achieve those projections. The required capital can be estimated as the reinvestment rate.

For normalized NCF projections that include an assumption of a positive nominal LTG rate, equating capital expenditures and depreciation expense may be a flawed procedure.

When the estimated LTG rate is positive (i.e., any selected LTG rate greater than 0 percent—even if that growth rate results in negative or zero expected real growth) capital expenditures may exceed depreciation expense. This conclusion is true for any level of growth, real or nominal.

There are several generally accepted formulas to estimate a company's LTG rate and reinvestment rate. In addition to being useful, these formulas also illustrate the connected relationship between capital expenditures and the LTG rate (i.e., that the two variables increase or decrease in tandem).

According to the *Ibbotson SBBI Yearbook*,[9] a company's sustainable growth rate can be calculated as the company's reinvestment rate multiplied by its return on equity:

Formula #5:

$$g = b \times ROE$$

where:

g = LTG rate

b = Reinvestment rate

ROE = Return on equity (or return on investment)

In the growth formula presented above, the reinvestment rate is the amount of the company's earnings that are reinvested back into the subject business. This is also known as the plowback ratio, or reinvestment ratio. The plowback ratio measures how much a business is taking from its operating profit and investing back into the business.

Conceptually, it makes sense that a company that invests all of its annual cash flow back into the subject business as maintenance capital and growth capital will experience earnings growth at a faster rate than a company that distributes 100 percent of its annual cash flow to the company's owners.

Formula #5 is stated in a way to solve for growth. However, it can also be rewritten to solve for the reinvestment rate. Rewriting Formula #5 results in:

Formula #6:

$$b = g \div ROE$$

where:

b = Plowback ratio

g = LTG rate

ROE = Return on equity (or investment)

Formula #6 is useful in the direct capitalization method. This is because the reinvestment ratio—expressed as a percent—is essentially the amount of capital that the company needs to reinvest in order to achieve the estimated LTG rate.

The plowback ratio can be multiplied by NCF in order to estimate the amount of additional capital that is required to achieve the projected results.

As illustrated by Formula #6, as the selected LTG rate increases, so does the required plowback ratio (assuming a fixed ROE). Capital expenditures relative to depreciation expense should increase.

In order to confirm this formula, the analyst may:

1. estimate NCF by first assuming that depreciation expense and capital expenditures will offset,
2. select the appropriate LTG rate,
3. calculate the plowback ratio based on the selected LTG rate and other relevant valuation variables,
4. multiply the plowback ratio by NCF to estimate the company's growth capital,
5. reduce NCF by the estimated growth capital from step 4, and
6. capitalize the adjusted NCF from procedure 5 by the appropriate direct capitalization rate.

The reinvestment ratio is an important component of Formula #5 and Formula #6.

In the textbook *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, Aswath Damodaran provides the following formula to estimate the reinvestment rate as it relates to EBIT growth:[10]

Formula #7:

$$Reinvestment\ Rate = \frac{(capital\ expenditures - depreciation\ expense + change\ in\ WC)}{EBIT\ (1 - t)}$$

where:

EBIT = Earnings before interest and taxes

t = Income tax rate

WC = Working capital balances

The formulas presented in this section illustrate how a company's distribution policy, expected level of capital expenditures, and other cash flow items are related to the company's LTG rate. Let's further consider how these factors are related using an example.

Let's assume that no change in working capital is expected, and that capital expenditures were expected to equal depreciation expense in the direct capitalization model. These variables would result in a numerator of zero based on Formula #6.

That would result in a reinvestment rate of zero, which in turn would result in zero operating growth.

That is, based on Formula #2, if depreciation expense and capital expenditures are expected to offset, then the appropriate LTG rate should be 0 percent.

The hypothetical company in the above example is assumed to only invest in a maintenance level of capital expenditures. These capital expenditures do not increase the net investment in the company's fixed assets. If one ignores the effects of inflation for the moment, one can see that depreciation expense and capital expenditures will be approximately equal on an annual basis and the LTG rate would equal zero.

Let's revisit Exhibit 1, which presented a sensitivity table that was based on constant income and changing direct capitalization rates. The error of this Exhibit 1 analysis is the failure to recognize that the company would need different levels of capital expenditures in order to achieve different levels of projected growth.

As was discussed in this section, the different levels of capital expenditures can be estimated using one of the plowback ratio formulas presented above (or by some other relevant formula to estimate the reinvestment ratio).

Exhibit 2 corrects the error in Exhibit 1 by incorporating growth capital into the NCF estimates. As illustrated by Exhibit 2, the only scenario where the indicated value based on the adjusted NCF equals the indicated value based on the unadjusted NCF is the no-growth rate scenario.

In a no-growth scenario the company does not need to invest in growth capital in order to realize its expected LTG rate.

There are factors other than capital expenditures that can result in positive growth, such as improvements to efficiency or inflationary spikes. However, positive LTG will typically require levels of capital expenditures above depreciation expense.

There may be cases in a stagnant industry where no nominal growth is a reasonable expectation. A no-growth scenario implies that the company would be experiencing negative real growth.

This situation could occur through some combination of:

1. a decline in output,
2. a decline in sales prices, or
3. an increase in expenses.

This scenario would perhaps justify estimating deprecation expense equal to capital expenditures. However, if output is projected to increase, and without material increases to efficiency, then normalized capital expenditures may still be greater than depreciation expense in a perpetuity model such as the direct capitalization method.

The Effects of Inflation on Depreciation and Capital Expenditures

Even in scenarios where a company is only projected to invest in a maintenance level of capital expenditures, it still may be appropriate to estimate capital expenditures greater than depreciation expense. This may be due to:

1. the effects of inflation,
2. the depreciable lives of the acquired assets, and
3. the selected depreciation method related to the acquired assets.

Exhibit 2
Terminal Value Based on Alternative Direct Capitalization Rates

Present Value Discount Rate	12%	12%	12%	12%	12%
– LTG Rate	4%	3%	2%	1%	0%
= Direct Capitalization Rate	8%	9%	10%	11%	12%
LTG Rate	4%	3%	2%	1%	0%
÷ Required on Investment [a]	16%	16%	16%	16%	16%
= Plowback Ratio	25%	19%	13%	6%	0%
Unadjusted NCF	100	100	100	100	100
× (1 – Plowback Ratio)	75%	81%	87%	94%	100%
Adjusted NCF	75	81	87	94	100
÷ Direct Capitalization Rate	8%	9%	10%	11%	12%
= Indicated Value Based on Adjusted NCF	938	900	880	855	833
Indicated Value Based on Unadjusted NCF [b]	1,250	1,111	1,000	909	833

[a] The required return on investment equal the discount rate plus 4%.
[b] From Exhibit 1.

Once the purchased assets are put into use, then depreciation expense related to those capitalized assets will commence. In general, the faster an asset is depreciated, the closer depreciation expense and capital expenditures will be in the NCF calculation.

In this section, we illustrate this point with an example.

The longer the depreciable life of the capitalized assets, the less of an impact any given year's capital expenditures will have on subsequent years of depreciation expense.

And, the smaller the impact a current year's expenditure has on subsequent years of depreciation expense, the larger the difference between depreciation and capital expenditures in the NCF calculation (where capital expenditures will exceed depreciation).

Additionally, the type of depreciation method will also affect the degree to which a given year's capital expenditure will affect depreciation expense in subsequent years. For instance, a double-declining balance depreciation method will lead to a greater impact on depreciation expense in the years immediately after a capital expenditure as opposed to later years.

Exhibit 3 provides a simple illustration of depreciation relative to capital expenditures. The exhibit assumes a 3 percent LTG rate, five-year asset lives, and a straight line depreciation method. The selected

Exhibit 3
The Impact of Inflation and Depreciation Method on Depreciation and Capital Expenditures

Normalized Capital Expenditure	$1,000
Long-Term Nominal Growth Rate [a]	3%
Depreciable Asset Life (years) [b]	5

	Year 1	Year 2	Year 3	Year 4	Year 5
Capital Expenditure	$1,000	$1,030	$1,061	$1,093	$1,126
Annual Depreciation	$200	$206	$212	$219	$225
Total Depreciation in Year 5					$ 1,062
Depreciation /Capital Expenditures Ratio in Year 5					94.3%

[a] The estimated growth rate relates to both NCF and capital expenditures
[b] Assumes straight-line depreciation method

LTG rate of 3 percent is equal to the analyst's estimate for inflation.

That is, the selected LTG rate includes positive nominal growth but no real growth (and no expectation of growth capital expenditures).

Based on the calculation presented in Exhibit 3, projected depreciation expense should equal approximately 94 percent of projected capital expenditures in the direct capitalization formula. This is because the most recent year of depreciation expense includes portions of prior years' capital expenditures.

As the projected maintenance capital expenditures continue to increase in cost due to inflation, they will continue to exceed depreciation expense on an annual basis.

Applying the same analysis as above, but varying the rates of assumed growth rate and depreciable lives as provided in Exhibit 4, results in depreciation to capital expenditure ratios of between 81 percent and 98 percent.

All else being equal, shorter depreciable lives and lower growth rates both increase the depreciation expense to capital expenditure ratio. Those results are presents in Exhibit 4.

Holding everything else constant, a straight line depreciation expense method will exacerbate the delta between depreciation and capital expenditures, while a sum of the digits method will minimize that delta. A double declining balance method will produce a delta somewhere between the other two methods.

Although the ratios of depreciation expense and capital expenditures in Exhibit 4 are relatively close to 100 percent, the impact of incorrectly estimating these variables on the concluded value using a direct capitalization method could produce significant variances in valuation estimates.

Let's assume that a valuation analyst is valuing an operating company using the direct capitalization formula.

Let's further assume that the analyst has estimated:

1. normalized capital expenditures at $20 million,
2. normalized depreciation expense equals capital expenditures (i.e., $20 million), and
3. a direct capitalization rate of 8 percent.

Let's further assume that the appropriate amount of normalized depreciation expense is actually 90 percent of capital expenditures. Based on these valuation variables, the analyst overstated depreciation expense by $2 million (calculated as 10 percent of $20 million). Therefore, the subject company value was overstated by $25 million (calculated as $2 million divided by 8 percent).

Based on the valuation variables applied in the direct capitalization formula, incorrectly assuming that depreciation expense will equal capital expenditures could result in a material overstatement of the subject company's value.

Even in a situation where no real growth is generated—and only nominal growth through the effects of inflation are expected—capital expenditures may exceed depreciation expense due to the timing lag between the two variables.

The Implied Projected Return on Assets

One reasonableness test of the projected depreciation expense and capital expenditures is to analyze the projected return on assets based on the selected valuation variables. This analysis is best illustrated using an example.

Let's assume that an analyst performs the direct capitalization method by estimating:

1. a positive nominal LTG rate for NCF and
2. offsetting amounts for depreciation expense and capital expenditures in the calculation of NCF.

Exhibit 4
Depreciation Expense as a Percentage of Capital Expenditures

	Nominal Growth Rate		
Depreciable Asset Life [a]	1%	3%	5%
5 Years	98.0%	94.3%	90.9%
7 Years	97.1%	91.7%	86.8%
10 Years	95.7%	87.9%	81.1%

[a] Assumes straight-line depreciation method

Based on the analyst studies presented earlier in this discussion, these are common valuation variables applied by analysts. In fact, these may be the default variables regarding growth and capital expenditures for many analysts when performing a direct capitalization method.

Next, let's assign some values to these valuation variables. Let's assume the following subject company facts and estimates:

1. NCF in the direct capitalization formula equals $100.
2. Capital expenditures and depreciation expense (which are components of the NCF calculation) are estimated at -$10 and $10, respectively.
3. Fixed assets (i.e., net investment) equal $1,000 as of the valuation date.
4. The estimated LTG rate is 3 percent.

Based on these valuation variables, one can calculate the following:

1. After one year, the net investment in fixed assets will equal $1,000 (calculated as beginning fixed assets of $1,000, plus capital expenditures of $100, minus depreciation expense of $100).
2. During the first year, the return on average assets will equal 10 percent (calculated as $100 cash flow divided by the average assets of $1,000).
3. Year two NCF will equal $103.
4. Year two ending fixed assets will equal $1,000.
5. During the second year, the return on average assets will equal 10.3 percent (calculated as $103 cash flow divided by the average assets of $1,000).

Since the direct capitalization method is a perpetuity model—that is, the income components are expected to increase or decrease at a constant rate forever—the trends that are observed above will continue every year into the future. That is, NCF will increase by 3 percent every year in perpetuity, and the company's investment in fixed assets will always remain at $1,000.

Based on (1) ever-increasing income and (2) a constant investment in fixed assets, the subject company's return on fixed assets will increase every year. In the example above, the return on fixed assets will increase by 3 percent per year.

The 3 percent increase is equal to the selected LTG rate of NCF. In 20 years, the subject company return on fixed assets will increase from 10 percent to 17.5 percent, or by 75 percent.

This trend begs the question: Is it reasonable to assume an ever-increasing return on fixed assets? The answer, of course, depends on the nature of the subject company, the industry it operates in, and the other variables in the direct capitalization method.

However, it is a rare set of circumstances where a company can increase its earnings without also increasing its investment in net fixed assets.

If an analyst projects (1) a positive nominal LTG growth rate and (2) depreciation expense to equal capital expenditures, then the analyst should be prepared to explain why he or she has implicitly assumed that the subject company can increase its profitability every year into the future.

Modelling Unusual Depreciation Expense and Capital Expenditures

As noted earlier, certain circumstances may dictate unusual levels of depreciation expense relative to capital expenditures—such as a company with a positive expected LTG rate that is projected to have greater levels of depreciation expense than capital expenditures for an extended period of time.

The reasons for this trend may include the following factors, among others:

1. A recent, large capital purchase
2. Wide time gaps in major capital expenditure outlays
3. Specific depreciation methods utilized
4. Sales of capital assets

In a direct capitalization model (or the terminal value calculation in the DCF method), the analyst is using a one-period normalized cash flow to derive a value estimate. It is important to account for any discrepancies between the normalized long-term assumptions and the known divergences from the long-term forecast that are expected to occur over the near term.

If either capital expenditures or depreciation expense are expected to temporarily diverge from their normalized long-term state, then the analyst may account for those differences in a way that recognizes the temporary nature of the difference.

A straightforward way to account for near-term/nonpermanent expectations would be to:

1. assume the normalized long-term cash flow projections in the direct capitalization model,
2. account for (i.e., estimate the value of) the temporary differences, and
3. add the resulting value adjustment to the direct capitalization value estimate.

The procedure 2 estimates should be based on a time period that represents as many years as necessary until a point in time at which it is reasonable

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to assume that capital expenditures and depreciation expense will have normalized.

The same procedure noted above can be applied to the terminal value calculation in the DCF method. Or, alternatively, the DCF method discrete projection period can be expanded to cover the years until capital expenditures and depreciation expense are expected to reach normalized levels. Both of these procedures should result in the same valuation conclusion.

Conclusion

In perpetuity models such as the direct capitalization method or the GGM formula, the standard valuation analyst procedure has been to calculate NCF by assuming depreciation expense and capital expenditures are equal. In this discussion, we have presented several reasons why this may not be appropriate.

First, if the analyst expects that the company will experience positive real growth (i.e., growth that is greater than the inflation rate), then the analyst should account for the source of that growth.

Often, the source of real growth is product line expansion, geographic expansion, or some other strategy that requires additional capital expenditures to execute.

Second, even if the analyst expects that growth will be somewhere between 0 percent and inflation (i.e., no real growth is projected), then the effects of inflation may still justify estimated capital expenditures that exceed depreciation expense in the NCF calculation.

Of course, there will also be legitimate reasons that depreciation expense will be equal to capital expenditures in the NCF calculation. The purpose of this discussion is not to suggest a rule that states capital expenditures must always exceed depreciation expense.

The purpose of this discussion is to present various pros and cons of making different projections regarding depreciation expense and capital expenditure in a perpetuity model.

However, it is important to note that when a valuation analyst inappropriately selects depreciation expense that is equal to capital expenditures—when in fact it would be more appropriate to selected depreciation expense that is less than capital expenditures—the analyst will overstate NCF and, therefore, will overstate the concluded value of the company.

As with all valuation variables estimated in the direct capitalization method or GGM formula, depreciation expense and capital expenditures should be estimated based on an analysis of all relevant factors.

Depreciation expense and capital expenditures should not be estimated simply based on the procedures performed in the past or based on how a plurality of analysts elects to estimate these valuation variables.

Notes:

1. "Did the DE Chancery Draw a 'Bright-Line Rule' Requiring Normalization of Capex/Depreciation in Terminal Values?," *BVWire* (October 31, 2012).
2. "Valuation Update: Webinar Poll Results Reveal Common Industry Practices," *Financial Valuation and Litigation Expert* (December 2013/January 2014): 1, 5.
3. Shannon P. Pratt and Roger J. Grabowski, *Cost of Capital*, 5th ed. (New YorK: John Wiley & Sons, 2014), 1187.
4. Ibid., 36–37.
5. Gary Trugman, *Understanding Business Valuation*, 4th ed. (New York: American Institute of Certified Public Accountants, Inc., 2012), 425.
6. Ibid., 428
7. Robert P. Reilly and Robert P. Schweihs, *The Handbook of Business Valuation and Intellectual Property Analysis* (New York: McGraw-Hill, 2004), 222.
8. NCF in the terminal projection period is often calculated as NCF in the final discrete projection period × (1 + selected LTG rate), as represented in the GGM formula presented.
9. *Ibbotson SBBI Yearbook* (Chicago: Morningstar, 2013), 51.
10. Aswath Damodaran, *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 3rd ed. (New York: John Wiley & Sons, 2012), 290.

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