

**Research and Development Expenses:  
Implications for Profitability Measurement and Valuation**

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## **Abstract**

Most valuation models begin with a measure of accounting earnings to arrive at cash flow estimates. When using accounting earnings, we implicitly assume that the income is obtained by netting out only those expenses that are operating expenses, i.e., expenses designed to generate revenues in the current period. Expenses that are intended to provide benefits over multiple periods are assumed to be considered as capital expenditures, and these expenses are depreciated or amortized over multiple periods. In addition, when computing profitability measures such as return on equity and capital, we stick with this assumption that operating income measures income generated by assets in place. In this paper, we examine the accounting treatment of research and development expenses, and the effects of the treatment on operating income, capital and profitability. We argue that research and development expenses should be treated as tax-deductible capital expenditures, for purposes of valuation, and this can have significant effects on operating income, capital and expected growth measures for firms with substantial research expenses.

The operating income for a firm is estimated by netting out all operating expenses from revenues. When valuing a firm, we usually begin with after-tax operating income and then reduce it by the reinvestment needs of the firm. The reinvestment needs cover any investments that the firm needs to make to generate future growth, and include both capital expenditures and working capital investments. The distinction between operating and capital expenditures is critical for tax calculations, and is important in determining both the amount of capital on a firm's books and how its profitability is measured.

In this paper, we will consider the accounting treatment of research and development expenses as operating expenses, and argue that it is not appropriate to do so, at least for valuation purposes. Considering research and development expenses as capital expenses will have profound effects on estimates of cash flow and growth in valuation, and in determining earnings multiples for purposes of relative valuation.

### **Operating and Capital Expenditures**

Accounting statements classify all expenses into three categories - operating expenses, financing expenses and capital expenses. Operating expenses are expenses that, at least in theory, provide benefits only for the current period; the cost of labor and materials expended to create products which are sold in the current period would be a good example. Financing expenses are expenses arising from the non-equity financing used to raise capital for the business; the most common example is interest expenses. Capital expenses are expenses that are expected to generate benefits over multiple periods; for instance, the cost of buying land and buildings is treated as a capital expense. Operating expenses are subtracted from revenues in the current period to arrive at a

measure of operating earnings from the firm. Financing expenses are subtracted from operating earnings to estimate earnings to equity investors or net income. Capital expenses are written off over their useful life (in terms of generating benefits) as depreciation or amortization.

The distinction between operating and financing expenses may not be significant for tax purposes, since both are tax deductible, but the distinction between operating and capital expenses affects taxes. Operating expenses are deductible in the period in which they are made, whereas capital expenses are written off over the useful life of the investment. The distinction also matters for purposes of asset and capital measurement. Operating expenses create no assets and affect capital only indirectly through retained earnings. Capital expenses, on the other hand, create assets and consequently affect capital as well.

### **The Accounting Treatment of Research and Development Expenses**

Capital expenditures are defined as those expenditures that are likely to create benefits over multiple periods. By this definition, investments in land, plant and long term equipment are capital investments, but so is research and development. In fact, a reasonable argument can be made that research and development expenses (R&D) are more long term than investments in physical plant and equipment at many firms, especially those in the pharmaceutical and high technology sectors. Thus, it follows that R&D expenses should be treated as capital expenditures. In reality, however, accounting standards in the United States require the treatment of R&D as operating expenses. In this

section, we will examine the consequences of this rule for earnings and capital measurement at firms with substantial research expenses.

### ***Accounting Rules Governing R&D Expenses***

Prior to 1975, companies in the United States were allowed to capitalize R&D expenses. Accounting rule SFAS 2, which has governed the treatment of research and development expenses since 1975, requires that all R&D expenses be expensed in the period incurred. The only exception is for contract R&D done for unrelated entities.

The rationale for treating forcing firms to expense R&D seems to lie in the belief that the benefits are uncertain, and occur only when the research leads to a commercial product. Consequently, it is argued that the asset created by research is not one that can be used by the firm to borrow money. This, to us, sounds like a dangerous path to follow. Using this reasoning, there are a number of capital investments, especially those in riskier businesses, which would qualify for expensing, simply because they have no liquidation value and have uncertain cash flows.

Outside the United States, IAS 9 also requires the expensing of research cost but allows for the capitalization of development expenses. Development costs are defined to include all costs involved in turning research into commercial products or services. In the UK and Canada, firms are permitted, but not required, to capitalize development costs as the research gets closer to commercial exploitation. In general, though, most companies in most countries expense research and development expenses.

### ***Consequences for Earnings Measurement***

The treatment of R&D as an operating expense has the immediate effect of lowering both operating and net income. The tax deductibility of these expenses buffers the impact somewhat, and the net income and after-tax operating income are both reduced by the following:

$$\text{After-tax Effect of R\&D expense on earnings} = \text{R\&D Expenses} (1 - \text{marginal tax rate})$$

For companies that end up with negative earnings as a consequence of research expenses, the after-tax effect will be even larger because the tax benefit has to be deferred until future periods.

The treatment of research expenditures as operating expenses also implies that research expenditures create no assets. Thus, patents that emerge from internal research will not be shown as assets on the balance sheet. In contrast, patents acquired from third parties can be treated as assets. This contradiction in the treatment of patents has given rise to game playing on the part of firms with substantial research expenditures

### ***R&D Partnerships***

In an R&D partnership, a group of investors creates a partnership, which agrees to cover the entire research and development expense for a firm. In return, the partnership gets the rights to any products developed by the partnership. In most cases, however, the firm preserves the right to purchase the partnership or license the product some time in the future. From the perspective of the firm, this arrangement essentially means that R&D

expenses are eliminated, because the revenues from the partnership cover the expenses entirely. For partners in the partnership, there is the potential at least of a large payoff if the research pays off in the form of commercial products.

This arrangement can clearly be misused by firms that want to move research expenses off the books, and borrow funds to finance this research. SFAS 68 requires that there be an actual transfer of risk from the firm to the partnership. In other words, the firm should not be under any obligation to return cash received from the partnership, if the research does not pay off.

### **A Financial Analysis of Research and Development Expenses**

Research and development expenses are designed to generate future growth and should be treated as capital expenditures. In this section, we will consider how to reclassify research expenses and the consequences for reported earnings, capital and profitability.

#### ***A Reclassification of R&D Expenses***

The first step in the reclassification of R&D expenses is to remove it from operating expenses and show it as a capital expenditure. The steps that follow are not as simple. First, the reclassified R&D expense becomes a capital expense and is no longer expensed. Second, capital expenses create assets, and R&D is not an exception. The after-tax R&D expense has to be cumulated over time to create an asset that we can loosely call the research asset. Third, like other assets, the research asset can lose value

over time and hence may have to be amortized over its life. The amortization that is generated is not tax deductible, but it will affect operating income.

The movement of R&D from the operating expense to the capital expenditure column can have profound implications for profitability measures and for projections of cash flows into the future.

### ***The Effect on Assets and Capital***

When we treat R&D expenses as capital expenditures, we have to maintain consistency and treat cumulated R&D expenses as an asset. The simplest way to do this is to cumulate the after-tax research and development expenses<sup>1</sup> over time and create a research asset. This asset will then be amortized over time, with both the length of the amortization period and the amortization schedule being determined by the nature of the research expenses, and the estimated time until there is a payoff to the investment. Thus, for pharmaceutical companies where FDA approval can take as long as a decade, the research asset will be amortized over an extended period. In contrast, for high technology firms where the payoff is much sooner, the research asset will have to be amortized over a shorter period.

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<sup>1</sup> The reason we cumulate after-tax research and development expenses is because R&D expenses are tax deductible. Amortizing the entire R&D expense will generate amortization that is too large, relative to the capital investment from R&D.

If the research is on clearly identified products, there is a more direct approach to amortization. Research expenses should be completely written off when one of two scenarios occur. One is if the product is found not to be viable, and is abandoned. The research expense on that product should then be written off. The other is if the firm decides to invest in producing the product commercially, in which case the research expense on the asset has to be written off and replaced with the physical assets created by the investment.

The capital and assets of a firm will increase when R&D expenses are capitalized, but the extent of the change will depend upon how long the company has been in existence and its cumulated R&D over that period. Thus, firms which have been in existence for a long period and have invested substantially in R&D over that period will see a much bigger change in their capital than firms that have been around for short period. The amortization schedule can also make a difference, since the cumulated research asset gets reduced by the amortization each year. Thus, the research asset for a firm that amortizes its research over five years, can be estimated by cumulating R&D expenses over the last five years<sup>2</sup> and reducing this cumulated amount by the amortization on these expenses.

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<sup>2</sup> There might have been R&D expenses prior to the five years, but they will have no material impact on the current value of the research asset since they would have been entirely amortized by now.

Is there a way to estimate the market value of the research asset? The value of the patents generated by the research can be estimated using real option models, but basic research will be difficult to value.

*Illustration 1: Effect on Capital and Equity of Reclassifying R& D Expenses: Boeing*

To value the research asset for Boeing, we first need to make an assumption about the amortizable life of the research asset. In the case of Boeing, the products are new and improved airplanes that have long commercial lives. Consequently, we use a ten-year life for Boeing's research asset, and assume that any research expenses are amortized uniformly in the ten years after the expense is incurred. The following table values the research asset at Boeing, based upon the R&D expenses at Boeing over the last 10 years (including the current year):

<i>Year</i>	<i>R&amp;D</i>	<i>Unamortized Portion</i>	<i>Unamortized Value</i>
1988	\$751	0.10	\$75
1989	\$754	0.20	\$151
1990	\$827	0.30	\$248
1991	\$1,417	0.40	\$567
1992	\$1,846	0.50	\$923
1993	\$1,661	0.60	\$997
1994	\$1,704	0.70	\$1,193

1995	\$1,300	0.80	\$1,040
1996	\$1,633	0.90	\$1,470
1997	\$1,924	1.00	\$1,924
Capitalized Value of R& D Expenses =			\$8,587

Note that with the assumption of straight line amortization, only 1/10<sup>th</sup> of the research expense in 1988 remains amortized, 2/10<sup>th</sup> of the expense in 1989 and so on. The value of the research asset at Boeing is a substantial \$8.587 billion.

This research asset augments the assets, equity and capital of the firm. Thus, the adjusted book value of assets, equity and capital at Boeing can be estimated as follows:

	Equity	Capital
Book Value	\$14,353	\$22,319
+ Research Asset	\$8,587	\$8,587
= Adjusted Book Value	\$21,540	\$30,907

Firms with significant research expenditures will have much higher values for assets, capital and equity once research expenditures are capitalized.

### ***The Effect on Operating and Net Income***

Will treating research and development expenses as capital expenditures increase or decrease operating income? The effect depends upon the trend in research expenditures and amortization of previous research expenses. To illustrate, the following table lays out operating income, with the conventional treatment of R&D expenses, and operating income, with R&D treated as a capital expenditure:

Conventional Treatment of R&D	R&D as Capital Expenditures
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Revenues	Revenues
- Operating Expenses	- Operating Expenses
- R&D	- Amortization of Research Asset
= Operating Income	= Operating Income
- Taxes	- Taxes (based on conventional treatment)
= Operating Income after taxes	= Operating Income after taxes

Whether operating income increases or decreases when R&D is reclassified will depend upon whether the amortization of the research asset is greater than or less than the R&D expense in the current year. For high growth firms, where R&D expenses tend to grow substantially over time, the reclassification will lead to an increase in operating income. As these firms mature, and R&D expenses level off, the operating income may well decrease.

*Illustration 2: Effect of R&D Reclassification on Operating and Net Income*

In the following analysis, we will examine the effects of reclassifying R&D expenses as capital expenditures on operating income and net income at Boeing.

Operating Income	\$1,078
+ Research and Development Expenses	\$1,924
- Amortization of Research Asset	\$1,272
= Adjusted Operating Income	\$1,731

We also compute the effect on after-tax operating income of capitalizing R&D expenses as capital expenditures.

Operating Income (1-t)	\$701
+ Research and Development Expenses	\$1,924
- Amortization of Research Asset	\$1,272
= Adjusted After-tax Operating Income	\$1,353

Note that this estimate of the after-tax operating income is different from that obtained by multiplying the adjusted operating income by (1- tax rate). This reflects the tax benefit earned by the firm because the revenue code allows the entire R&D expense to be deducted for tax purposes, unlike its treatment of other capital expenditures. The magnitude of the tax benefit to the firm from expensing R&D, as opposed to capitalizing it, can be computed as follows:

Adjusted After-tax Operating Income	=	\$ 1,353 million
Adjusted Operating Income (1- tax rate)	=	\$ 1,125 million
Tax Benefit	=	\$ 208 million

Finally, we look at the effect on net income of reclassifying research and development expenses as capital expenditures.

Net Income	\$721
+ R & D expenses	\$1,924
- Amortization of Research Asset	\$1,272

= Adjusted Net Income	\$1,384
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Again, the adjusted net income reflects the tax benefit created by the tax treatment of research and development expenditures.

### ***The Effects on Profitability***

The reclassification of R&D from an operating to a capital expense has a significant impact on both the earnings and the capital estimates for a firm. Thus, the return on equity and capital for a firm will change when the reclassification is made. Will the return on equity and capital increase or decrease when R&D is recategorized? The return on capital after the recategorization of R&D will look as follows:

$$ROC_{R\&D \text{ Adjusted}} = \frac{EBIT(1-t) - R\&D \text{ Expense Amortization of Research Asset}}{(BV \text{ of Capital} + \text{Research Asset})}$$

The effect of reclassifying R&D expenses will depend upon two factors:

- The magnitude of the R&D expense is in the current year relative to R&D expenses in prior years: When the current R&D expense is significantly higher than expenses in previous years the returns on equity and capital will increase on the recategorization. (The increase in operating income in proportional terms will be greater than the increase in capital invested). When the current R&D expense is similar to or smaller than R&D expenses in previous years, the returns on equity and capital will drop when R&D expenses are recategorized.

- The level of the unadjusted return on capital: Firms with high unadjusted returns on capital are much more likely to see drops in the return when research and development is classified as a capital expenditure. This is because the net research expense (After-tax R&D expense - R&D amortization) as a percent of the research asset is likely to be lower than the unadjusted return on capital and thus pull the return down.

The effects on return on equity are similar, though the effects will be magnified because the proportional impact on net income and book value of equity of reclassifying R&D expenses is likely to be larger.

*Illustration 3: Effects of R&D Reclassification on Profitability Measures*

To compute the effects of reclassifying research and development expenses on profitability measures, we first compute the return on capital using both adjusted and unadjusted measures of operating income and capital:

	<i>Boeing</i>	<i>Boeing (Adjusted)</i>
After-tax Operating Income	\$701	\$1,353
BV of Capital - Beginning	\$21,547	\$30,039
BV of Capital - Ending	\$20,363	\$30,907
BV of Capital - Average	\$20,955	\$30,473
ROC (based on average)	3.34%	4.44%
ROC (based on beginning)	3.25%	4.51%

Note that the both beginning and ending capital are increased by the assessed value of the research asset. The net effect of reclassifying R&D expenses is an increase in the return on capital.

The effect on return on equity can also be similarly assessed. To do so, we compute the adjusted net income and book value of equity:

Return Ratios	Boeing	Boeing (Adjusted)
Net Income	\$732	\$1,384
BV of Equity- Beginning	\$13,502	\$21,437
BV of Equity- Ending	\$12,953	\$22,940
BV of Equity - Average	\$13,228	\$22,188
ROE (based on average)	5.53%	6.24%
ROE (based on beginning)	5.42%	6.46%

Note again that the return on equity increases when net income and book value of equity are adjusted to reflect the recapitalization of R&D expenses.

### ***The Effect on Cash Flows***

Reclassifying R&D expenses as capital expenses does not affect current cash flows since it has no tax effect. The following table clearly indicates this:

<i>Cash Flow with Conventional Treatment of R&amp;D</i>	<i>Cash Flow with R&amp;D treated as a Capital Expenditure</i>
EBIT(1-t)	EBIT (1-t)
+ Depreciation	+ <i>R &amp; D Expense</i>
- Cap Ex	- <i>R &amp; D Amortization</i>

<ul style="list-style-type: none"> <li>- Change in Working Capital</li> <li>= Free Cash Flow to Firm</li> </ul>	<ul style="list-style-type: none"> <li>= Adjusted After-tax Operating Income</li> <li>+ <i>R &amp; D Amortization</i></li> <li>+ Depreciation</li> <li>- Cap Ex</li> <li>- <i>R &amp; D Expense</i></li> <li>- Change in Working Capital</li> <li>= Free Cash Flow to Firm</li> </ul>
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Note that the taxes are still based upon the unadjusted operating income, and that reclassifying R&D for analysis purposes does not affect tax calculations. Working through the expanded calculation, we arrive at the same free cash flow to the firm. The same analysis applies when we look at free cash flow to equity.

If there is no effect on the free cash flows, why bother with the reclassification in the first place? By separating out R&D expenses from other operating expenses, we get a cleaner picture of what a firm is actually earning on its assets in place, and how much it is investing for future growth. This becomes critical when we project these cash flows into the future.

### ***The Effects on Expected Growth***

The real effects of recategorizing R&D show up when we compute the expected growth in operating income and cash flows. Note that the growth in operating income can be written in terms of the reinvestment rate and the return on capital earned on investments.

$$\text{Growth}_{\text{EBIT}} = \text{Reinvestment Rate} * \text{Return on Capital}$$

Where,

$$\text{Reinvestment Rate} = (\text{Cap Ex} - \text{Depreciation} + \text{Change in Working Capital}) / \text{EBIT} (1-t)$$

$$\text{Return on Capital} = \text{EBIT} (1-t) / \text{Capital Invested}$$

Firms whose primary capital expenditures are research and development expenses often have anemic reinvestment rates, when R&D is classified as an operating expense and thus look like they should have really low expected growth rates. The return on capital is also misestimated for the same reasons.

When R&D is reclassified as a capital expenditure, the reinvestment rate and return on capital will be affected:

$$\text{Reinvestment Rate}_{\text{R\&D Adjusted}} = \frac{\text{Cap Ex} - \text{Depreciation} - \text{WC} + \text{R\&D Expense} - \text{Amortization of Research Asset}}{\text{EBIT}(1-t) + \text{R\&D Expense} - \text{Amortization of Research Asset}}$$

$$\text{ROC}_{\text{R\&D Adjusted}} = \frac{\text{EBIT}(1-t) - \text{R\&D Expense} + \text{Amortization of Research Asset}}{(\text{BV of Capital} + \text{Research Asset})}$$

The growth in operating income will then reflect these changes. Generally, rapidly growing firms that increase research expenditures proportionately will have much higher reinvestment rates and lower return on capital after the adjustment. This will then result in higher growth in operating income.

The reclassification of research expenses also allows us to discriminate between growth firms that are investing in research and growth firms that are not. When R&D expenses are treated as operating expenses, the latter will look much better on all measures of profitability from operating margins to returns on capital. Treating R&D expenses as capital expenditures allows us to bring both groups of firms to an equal

footing in terms of profitability measures, while giving firms that are investing in research the benefits of higher growth and potentially higher value.

*Illustration 4: Effects on Reinvestment Rate and Expected Growth*

In the following table, we compute the reinvestment rate, return on capital and expected growth rate for Boeing using unadjusted numbers and estimates adjusted to reflect the capitalization of research expenses:

	<i>Unadjusted</i>	<i>With R&amp;D capitalized</i>
Net Cap Ex	\$37	\$689
EBIT(1-t)	\$701	\$1,353
Reinvestment Rate	5.28%	50.94%
Return on Capital	3.25%	4.51%
Expected Growth	0.17%	2.29%

Note that the reinvestment rate increases dramatically when we count the research expenses as capital expenditures. This reflects the fact the research expenses at Boeing have been increasing over time.

***The Effect on Discounted Cash Flow Value***

While reclassifying R&D expenses as capital expenditures might have no effect on current cash flows, it has profound effects on valuation for the following reasons:

- The estimates of expected growth can be tied much more closely to whether and how much a firm is investing for that growth (in R&D) and how effective it is in converting the R&D into profits (through the return on capital). Thus, it forces analysts to consider not just the magnitude of research expenditures but the quality of these investments as well.

- In valuation we often assume that operating margins and returns on capital at firms converge on industry averages as we move through time. If these industry averages are computed using the conventional definition of R&D as an operating expense, there is no reason to assume that firms will move towards these averages. If, on the other hand, the industry averages are computed with R&D reclassified as a capital expenditure, it can be argued that competitive pressures will push margins towards convergence.
- When computing terminal value, it is critical that assumptions about growth be consistent with assumptions about reinvestment rates and returns on capital. This is impossible to do as long as R&D expenses are treated as operating expenses. When they are reclassified as capital expenditures, the reinvestment rate can be computed and it will include research and development expenses.

*Illustration 5: Effects of R& D Reclassification on Value*

In the following illustration, we value Boeing twice, once with the conventional treatment of R&D as an expense and once with R&D expenses capitalized. We first present the valuation of Boeing, using the reported after-tax operating income. We begin by applying the fundamental growth rate (from the reinvestment rate and return on capital estimated in illustration 4) to revenues. Since 1997 was a year in which Boeing reported significantly lower operating income than in prior year, we projected that the after-tax operating margin would recover to the average level that Boeing enjoyed between 1992 and 1996. The improvement to the “target” margin of 4.12% is assumed to occur linearly

from the current level over the next 3 years. After year 3, we assume that the company is in stable growth.

For the other components, we assume that capital expenditures and depreciation grow at the same rate as revenues, and that non-cash working capital remains 5% of revenues over the entire period.

	Base	1	2	3	Terminal Year
Revenues	\$45,800	\$45,879	\$45,957	\$46,036	\$46,115
Operating Margin	1.53%	2.39%	3.26%	4.12%	4.12%
EBIT(1-t)	\$701	\$1,098	\$1,497	\$1,898	\$1,901
+ Deprec'n & Amort.	1354	\$ 1,356	\$ 1,359	\$ 1,361	\$ 1,363
- Capital Exp	-1391	\$ (1,393)	\$ (1,396)	\$ (1,398)	\$ (1,401)
- Change in WC		\$ 4	\$ 4	\$ 4	\$ 4
FCFF		\$1,057	\$1,456	\$1,856	\$1,860
Terminal Value				\$ 20,529	
Present Value		\$ 968	\$ 1,221	\$ 17,177	
Value of Firm =		\$ 19,365			
Growth Rate in Revenues =		0.17%			
Target after-tax Operating Margin =		4.12%			
Working Capital as % of Revenues =		5%			
Cost of Capital =		9.23%			

The growth rate used is computed based upon the reinvestment rate and return on capital computed in illustration 4.

We also valued Boeing, with R&D expenses re-categorized as capital expenses.

This affects every aspect of the valuation:

- The operating income used is the adjusted operating income estimated in illustration 2, with R&D expenses capitalized and amortized.
- The target after-tax operating margin in stable growth is the pre-R&D margin estimated for Boeing to be 5.55%, instead of 4.12%.
- The depreciation is augmented by the amortization of R&D expenses over time. We assume that both the R&D expenses and the amortization increase at the revenue growth rate over this period.
- The capital expenditures include the estimated R&D expenses over time

The following table summarizes the valuation of Boeing with these inputs:

	Base	1	2	3	Terminal Year
Revenues	\$45,800.00	\$ 46,850.98	\$ 47,926.08	\$ 49,025.85	\$ 50,150.85
Operating Margin	2.95%	3.82%	4.68%	5.55%	5.55%
EBIT(1-t)	\$1,353	\$ 1,788.99	\$ 2,244.02	\$ 2,718.99	\$ 2,781.38
+ Deprec'n & Amort	\$2,626	\$ 2,686	\$ 2,748	\$ 2,811	\$ 2,875
- Capital Exp	(\$3,315)	\$ (3,391)	\$ (3,469)	\$ (3,548)	\$ (3,630)
- Change in WC		\$ 53	\$ 54	\$ 55	\$ 56
FCFF		\$ 1,031	\$ 1,469	\$ 1,926	\$ 1,970
Terminal Value				\$ 28,410	
Present Value		\$ 944	\$ 1,231	\$ 23,278	
Value of Firm		\$ 25,453			
Growth Rate in Revenues =		2.29%			
Target after-tax Operating Margin		5.55%			
Working Capital as % of Revenues		5%			
Cost of Capital =		9.23%			

Note that the expected growth rate of 2.29% in revenues is estimated based upon the adjusted reinvestment rate and return on capital for Boeing. Overall, the value of Boeing as a firm increases by about \$ 6 billion.

The effects on valuation of capitalizing R&D expenses tend to be greatest when the growth rate is computed from the reinvestment rate and the return on capital. When the growth rate is an exogenous variable, analysts often adjust the growth rate to reflect the opportunities created by research. In these cases, the effects on value tend to be unpredictable, and value can be much higher than or lower than the true value, depending upon whether the growth rate is over or under estimated.

### ***The Effects on Earnings Multiples***

When research and development expenses are reclassified, there will be significant shifts in some of the multiples commonly used in valuation. All earnings multiples will have to be re-estimated, since reclassifying R&D as a capital expenditure changes both operating income and net income. Thus, price-earnings ratios, PEG ratios, Value/EBIT and Value/EBITDA multiples will all be affected. The book value ratios will also change since the book value of capital and equity will both shift when R&D is reclassified as an asset.

To the extent that multiples are used to compare how companies within a sector are valued, there are some who argue that there should be no change in the relative valuations and rankings when R&D is reclassified. This is clearly not true since R&D expenses vary across companies, depending upon their relative size, growth and stage in the life cycle. As a general rule, the earnings multiples of smaller, higher growth companies will decrease relative to the earnings multiples of larger, more mature firms.

*Illustration 6: Effects of R& D Reclassification on Multiples*

In the following table, we summarize both earnings and book value multiples for Boeing, when R&D expenses are capitalized, and compare them to the conventional measures:

	<i>Unadjusted</i>	<i>Adjusted</i>
PE Ratio	36.75	23.55
Value/EBITDA	16.83	9.40
Price/Book Value of Equity	2.52	1.51
Value/ Book Value of Capital	1.83	1.32

Note that the adjustment reduces the PE ratio, because the net income is much higher when R&D expenses are capitalized for Boeing. This reflects the fact that Boeing research expenses have been increasing over time, and the expense thus outweighs the amortization charge. There is a similar effect on the Value/EBITDA multiple, but this effect will occur for all firms with research expenses, since the amortization of the expense is added back.

Finally, the addition of the research asset to the book value of equity and capital reduces the market to book ratios for all firms with research expenses, though the magnitude of the impact will vary depending upon how large the expenses are relative to the size of the firm.

**Conclusion**

Accounting rules clearly specify that operating expenses are expenses designed to generate income in the current period, whereas capital expenditures are

designed to provide benefits over multiple periods. The current treatment of research and development expenses as operating expenses seems to violate this distinction. In this paper, we have argued that R&D expenses are in fact capital expenditures and should therefore not be shown as part of operating expenses. To be consistent, we also argue that research and development expenses create a research asset that has to be amortized over time.

The effects of reclassifying R&D expenses on operating income and profitability ratios will vary across companies. In firms where R&D expenses have been increasing rapidly over time, reclassifying R&D can push up operating income significantly and can make return on capital a much higher number. In mature firms, where R&D expenses have been stable over time, the return on capital may decrease when R&D is reclassified.