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Expectations and the Role of Intangible Investments

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AUTHORS

Michael J. Mauboussin
michael.mauboussin@morganstanley.com

Dan Callahan, CFA
dan.callahan1@morganstanley.com

Introduction

Here's a profile of a company. Do you want to buy the stock?

> This company will be profitable for each of the next 15 years. Both sales and net income will grow at close to a 40 percent compound annual rate. The company will also initiate a dividend in the third year, which will grow at nearly a 50 percent compound annual rate through the end of the period.

Here's another profile. Do you want to buy the stock?

> This company will have negative free cash flow for each of the next 15 years. The level of debt will grow at a 34 percent compound annual rate over this time. Its cash balance will start at 2.5 percent of sales and will dwindle to 2.0 percent by the end of the period.

The answer to both questions should be "yes." As you may have guessed, this is the same company, Wal-Mart Stores, Inc., from 1972-1986. The annual total shareholder return of Walmart's stock during this period was 29 percent versus the S&P 500's 11 percent.

You would be forgiven for thinking the first profile sounds better than the second one. The company was consistently profitable and grew its top and bottom lines at a healthy clip. Establishing and raising the dividend also signaled management's confidence in the future. The price-earnings ratio may have been high at times but at least there were earnings. We can't say the same for many of the companies going public today. Nearly 40 percent of companies listed in the U.S. in 2019 lost money, up from fewer than 20 percent in the 1970s.[1]

The negative free cash flow in the second profile tells you only that the company invested more money than it made. The firm required external financing, which led to rising debt and slim cash balances. But the second profile omitted the key fact that Walmart's annual return on invested capital averaged 18 percent during that time, a level well in excess of its cost of capital. It spent more than it earned, but its investments had a high payoff.

Anticipating Expectations Revisions

The one job of an equity investor is to take advantage of gaps between expectations and fundamentals.[2] Expectations reflect the future free cash flows a company must deliver to justify today's stock price. Fundamentals capture the company's actual results. Tomorrow's outcomes that are different than today's perceptions lead to revisions in expectations that are the source of excess returns.

Expectations are like the odds on the tote board that a racehorse will win. Fundamentals are the result of the race. Handicappers know that you don't make money by picking favorites. You make money by spotting mispriced odds and investing accordingly.[3]

Lots of factors determine the timing, magnitude, and value of free cash flows. These include macroeconomic growth, interest rates, inflation, the ferocity of competition, and the industry's spot in its life cycle. Because many of these are outside the control of investors and companies, they are generally not a source of excess returns.[4] Investors should be aware of potential macroeconomic developments but generally agnostic as to which ones will unfold. Scenario analysis is an effective means to accommodate macro outcomes.

What is in an investor's control is gaining a solid understanding of a company's prospects for creating value. This requires a grasp of the basic unit of analysis, which answers the fundamental question of how a company makes money. The basic unit of analysis for Walmart, and other retailers, is the return on investment for a store. Net present value is the tried and true way to conduct this analysis. A store creates value if the present value of future free cash flows it generates exceeds the investment the company makes in it.

It follows that a grasp of the magnitude and return on investment is central to understanding value. This point was made nearly 60 years ago in a seminal paper, "Dividend Policy, Growth, and the Valuation of Shares," by Merton Miller and Franco Modigliani, economists who won the Nobel Prize.[5] They pointed out that you can think of the value of a company as having two parts. The first is the steady state, which assumes that the firm can sustain its current profits into the future. The second is the present value of growth opportunities, which is based on the magnitude of investment, return on investment, and period that investment opportunities are available.[6]

Note that if the return on investment equals the cost of capital, the present value of growth is zero. In theory, the stock of a company without value-creating opportunities is worth the product of the steady-state earnings and the commodity price-earnings ratio, which is one divided by the discount rate.[7]

Here is the key insight: Understanding the magnitude and return on investment provides an investor with a better understanding of a company's future earnings. The challenge is that the mix of investment has shifted over time and is today more intangible than tangible. That means the recording of investments has largely migrated from the balance sheet to the income statement. An investor's job has not changed but the analytical approach has.

We discuss three essential aspects related to the rise of intangible investments. The first is how to measure them. We need to understand what defines an intangible investment, how the mix of tangible and intangible investments has changed over time, and how to accurately compare companies that invest primarily in intangible assets to those that invest in tangible assets.[8]

Second is the characteristics of intangible assets. Economists have for decades explored the differences between intangible and tangible assets. Investors do not need to rewrite economic theory. They just need to grasp the nature of non-rival goods.

Finally, we explore the implications for investors. One example is the usefulness of earnings. Investments that are recorded on the income statement reduce earnings and can even lead to losses. A reallocation of those investments to the balance sheet leads to higher earnings and invested capital. Comparing today's valuations to those of the past using simple metrics such as a price-earnings or price-book multiple can lead to misleading or faulty conclusions.

Measurement

An investment is a cost today that creates an asset that is expected to provide a benefit measured by the present value of future free cash flow. The net present value of an investment is positive when the benefit is greater than the cost.

Investments can be in tangible or intangible assets. Tangible assets are physical items, such as a machine, truck, or factory. Intangible assets are not physical. They can be customer relationships, product design, or instructions for how to manufacture a drug.

Exhibit 1 shows the types of intangible assets. Broad categories include "computerized information," where software development is a clear example, "innovative property," such as research and development (R&D), and "economic competencies," which capture investments such as branding.[9]

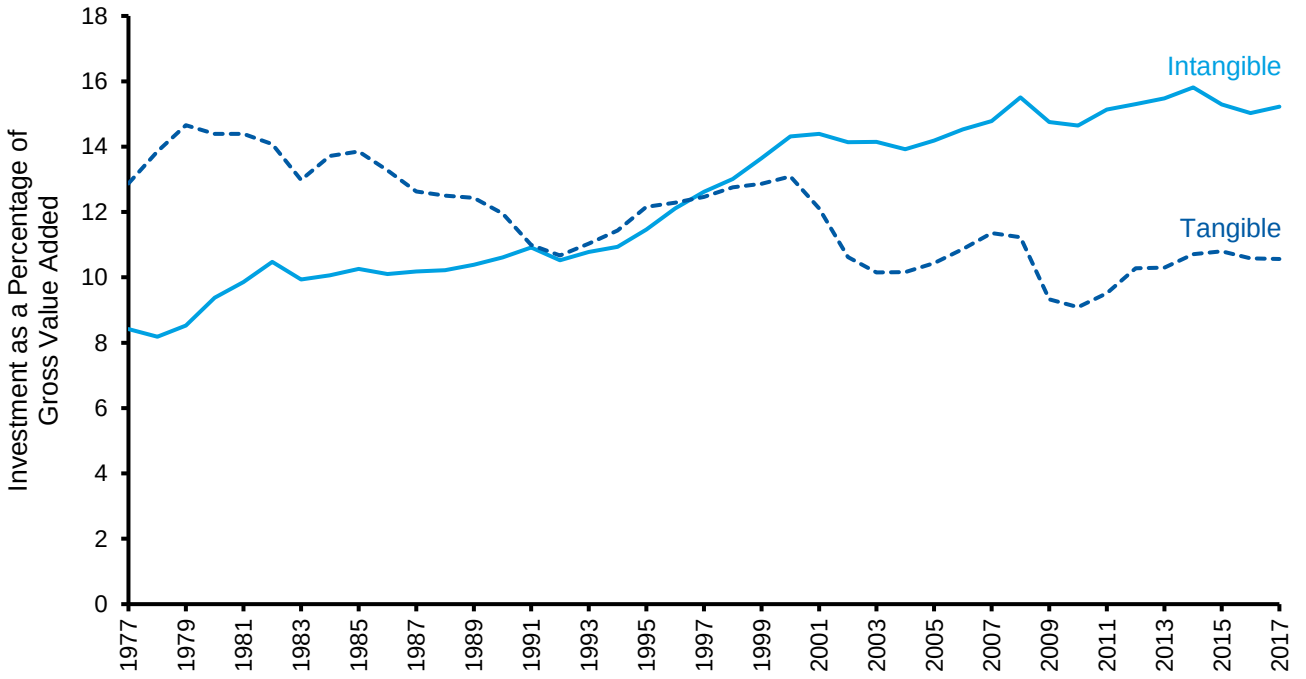
Exhibit 1: Categories of Intangible Assets

Broad Category	Type of Investment	Type of Legal Property That Might Be Created
Computerized Information	Software development	Patent, copyright, design intellectual property rights (IPR), trademark, other
	Database development	Copyright, other
Innovative Property	R&D	Patent, design IPR
	Mineral exploration	Patent, other
	Creating entertaining and artistic originals	Copyright, design IPR
	Design and other product development costs	Copyright, design IPR, trademark
Economic Competencies	Training	Other
	Market research and branding	Copyright, trademark
	Business process re-engineering	Patent, copyright, other

Source: Jonathan Haskel and Stian Westlake, Capitalism Without Capital: The Rise of the Intangible Economy *(Princeton, NJ: Princeton University Press, 2017), 44.*

The percentage of total investment that is intangible has grown steadily since the dawn of the Information Age. Exhibit 2 shows tangible and intangible investment as a percent of gross value added, a rough proxy for gross domestic product. In 1979, tangible investment was 1.7 times that of intangible investment. By 2017, the last measure we have, intangible investment was 1.4 times that of tangible investment. The mix of investment has seen a huge change within a couple of generations.

Exhibit 2: The Rise of Intangible Investments in the U.S., 1977-2017



Source: Unpublished update to Corrado and Hulten (2010) using methods and sources developed in Corrado and Hao (2013) and in Corrado et al. (2016) and Corrado et al. (2017) for INTAN-Invest© and the SPINTAN project, respectively. The SPINTAN project was funded by the European Commission FP-7 grant agreement 612774.
Note: Investment as a percentage of gross value added for the business sector.

This point about the broad shift from tangible to intangible investment has been made many times. To understand the implication for investors, we need to take a few more steps. The first is to understand how the accounting works.

In the fall of 1974, back when tangible assets were greater than intangibles ones, the Financial Accounting Standards Board (FASB) published a seemingly innocuous statement about the treatment of research and development (R&D). The FASB said that companies should expense R&D spending. They considered other treatments, including capitalizing R&D, but concluded that expensing was appropriate because "there is normally a high degree of uncertainty about the future benefits of individual research and development projects" and "a direct relationship between research and development costs and specific future revenue generally has not been demonstrated."[10]

In other words, the head accountants said that R&D should be expensed because it is uncertain and there is a "lack of causal relationship between expenditures and benefits" even when profits do go up. Accounting professors who studied the standards the FASB enacted in its first quarter century of existence found that the expensing of R&D was one of the five "associated with the most loss in shareholder value."[11]

Notwithstanding the substantial change in how companies invest, how companies account for investment has changed very little.[12] The notable exception are intangibles acquired through mergers and acquisitions (M&A). Accountants record the acquired intangible assets on the balance sheet and amortize them over time, typically 5-10 years.

This accounting mismatch lies at the core of the challenge. An analyst needs to understand where investments show up on the financial statements in order to know how much a company invests. Investors and economists who suggest that investment is limited to capital expenditures and changes in working capital are missing the boat by grossly understating the magnitude of investment.[13]

Let's delve into the income statement. Cost of goods sold reflects the direct costs of producing the good or service a company sells. Intangible investments are largely going to be found within selling, general, and administrative (SG&A) costs, which capture costs not directly related to making a good or providing a service.

This observation alone provides a valuable clue. Businesses with high gross margins, defined as gross profit divided by sales, are likely to record at least some investment on the income statement. The classic example is a software company.

The challenge is determining how much of SG&A should be classified as investment. The guiding principle is to separate how much a company needs to spend to maintain its current operations in a steady state from how much a company is spending to pursue value-creating growth. Luminita Enache and Anup Srivastava, professors of accounting, wrote a relevant paper called, "Should Intangible Investments Be Reported Separately or Commingled with Operating Expenses? New Evidence."[14]

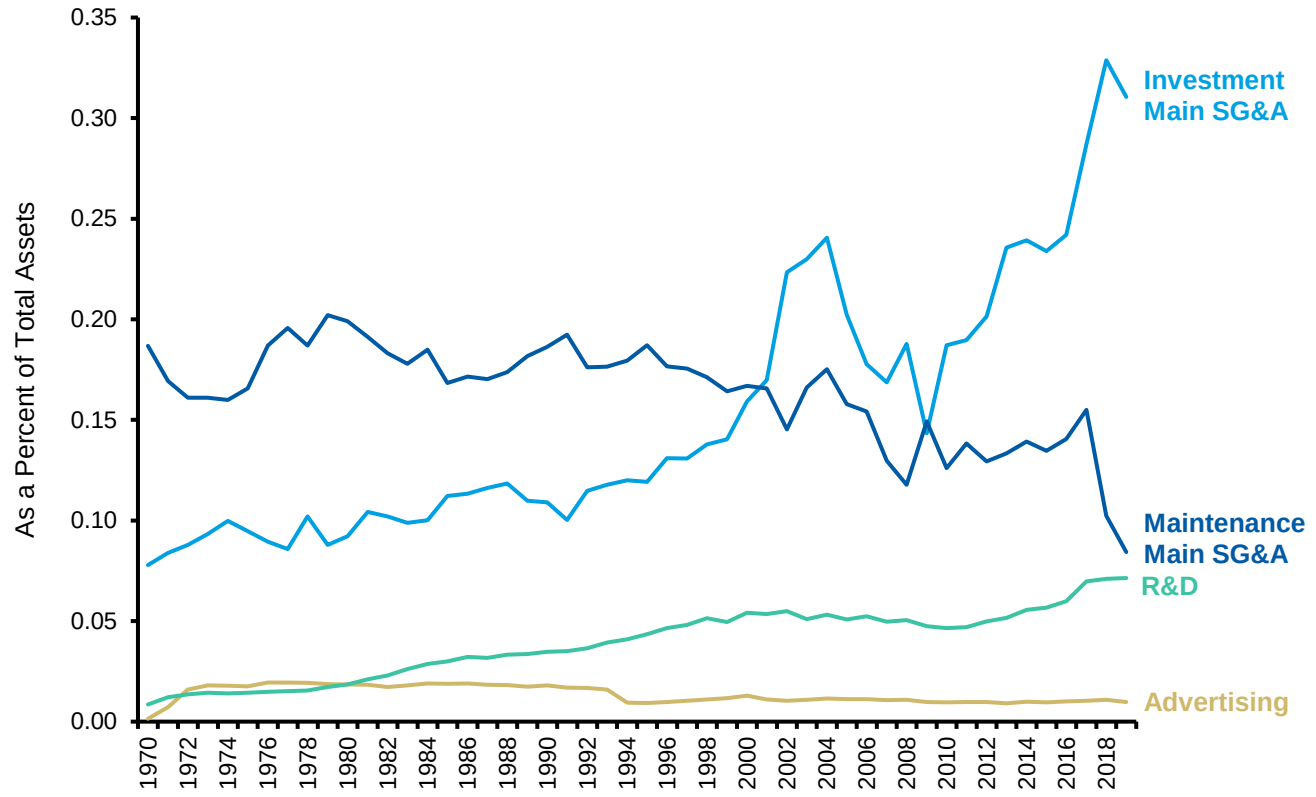
Their approach starts with total SG&A and subtracts R&D and advertising, generally considered intangible investments, to come up with what they call "Main SG&A." They then assess what part of Main SG&A is necessary to maintain the business ("Maintenance Main SG&A") and designate the remaining Main SG&A to intangible investments ("Investment Main SG&A"). Maintenance Main SG&A, which is matched with sales, captures costs such as office and warehouse rents, customer delivery costs, and sales commissions. Investment Main SG&A reflects spending that seeks to build organizational assets and includes employee training, customer acquisition costs, and software development.

Enache and Srivastava apply their analysis to a large sample of companies in the U.S. from 1970 to 2009. They show a marked rise in Investment Main SG&A relative to capital expenditures that is consistent with the aggregate data in exhibit 2. They also show that Maintenance Main SG&A was greater than Investment Main SG&A until the late 1990s. Since then, Investment Main SG&A has grown and Maintenance Main SG&A has shrunk, measured as a percentage of assets.

To update the data, we turned to our friends at O'Shaughnessy Asset Management (OSAM), a quantitative money management firm. Chris Meredith, OSAM's co-chief investment officer and director of research, substantially replicated the findings of Enache and Srivastava and extended the analysis through 2019.

Exhibit 3 shows the results. The updated data show that the secular trends remain soundly in place. Indeed, since the end of the financial crisis in 2009 the investment component of Main SG&A has soared and the maintenance piece has shrunk.[15] We estimate that for the Russell 3000 in the U.S., excluding those in the financial services and real estate industries, R&D spending in 2019 was approximately $435 billion, capital expenditures were roughly $930 billion, and Investment Main SG&A was in excess of $1.5 trillion.

Exhibit 3: Components of Selling, General, and Administrative (SG&A) Costs, 1970-2019



Source: O'Shaughnessy Asset Management based on Luminita Enache and Anup Srivastava, "Should Intangible Investments Be Reported Separately or Commingled with Operating Expenses? New Evidence," Management Science*, Vol. 64, No. 7, July 2018, 3446-3468.*

While the aggregate data are clear and compelling, an investor wants to do this type of analysis for individual companies. Unfortunately, there is no easy way to do so. Seasoned investors can get a sense of intangible investment through a study of the company and discussion with its management.

Charles Hulten, a professor of economics at the University of Maryland and one of the leading researchers in this field, wrote a paper seeking to quantify intangible investment for Microsoft.[16] We use Hulten's assumptions to update the analysis through fiscal 2020. This examination makes no statement about the merit of Microsoft as an investment.

Before we begin, we want to emphasize that free cash flow is unaffected by these adjustments. The goal of the exercise is to understand more accurately how much a company invests and to anticipate whether that investment will create value. But free cash flows do not change.

The main potential repercussion for valuation is based on the residual, or terminal, value. These changes increase earnings and investment in equal measure. As a result, residual value techniques that capitalize the earnings from the final explicit forecast period yield a higher terminal value. This effect is largely mitigated by the fact that intangible investment and amortization of intangibles converge as a company matures.

Two sets of crucial assumptions drive this analysis. The first is what percentage of each line item within SG&A, which includes R&D, sales and marketing (S&M), and general and administrative (G&A), is allocated to intangible investment. Hulten writes, "Following the general guidance of the CHS [Corrado, Hulten, Sichel] and macro research, adjusted to reflect the high-technology nature of the company, the fractions selected were

100 percent (R&D), 70 percent (S&M), and 20 percent (G&A)."[17] Using these ratios, Microsoft's intangible investment was $34 billion in fiscal 2020. Capital expenditures were $15 billion.

The second is the period of amortization. The ideal is to match the amortization period with the economic life of the asset that the company creates. While accountants do make judgments about this period for acquired intangibles, there are no set procedures for internal intangible investments. We follow closely the guidelines set out in a paper by Carol Corrado, an economist who has contributed substantially to this research, and Hulten.[18] We amortize R&D over six years, and the S&M and G&A investments each over two years.

Before we turn to the numbers we need to define free cash flow:

Free cash flow (FCF) = net operating profit after tax (NOPAT) – investment in growth (I)

You can think of NOPAT as the cash earnings a company would have if it had no financial leverage. You calculate it by starting with operating income, or earnings before interest and taxes (EBIT). You then add amortization from acquired intangible assets (A) and the embedded interest component of operating lease expense. Operating lease interest expense is added back because it is a financing cost rather than an operating expense. Finally, you subtract cash taxes (which include the tax provision, deferred taxes, and the tax shield).

Investments in future growth include changes in working capital, capital expenditures net of depreciation, and acquisitions. The model considers maintenance capital expenditures to be roughly equivalent to depreciation, so only spending above the level of depreciation is considered an investment. Assets that a company acquires through leases should also be included in investments.

Free cash flow is the cash available to pay the claimholders of the company. It is the number you forecast and discount to a present value in an unlevered discounted cash flow (DCF) model.

Let's turn to the numbers from Microsoft to make this exercise more concrete. We'll start with a standard calculation of FCF. We'll then introduce the adjustments based on Hulten's work and see how that affects the path to FCF. Finally, we'll examine invested capital, before and after capitalized intangible investment, and see how the return on invested capital changes given the new inputs.

Exhibit 4 shows the derivation of Microsoft's free cash flow for fiscal 2019 and 2020. Let's focus on fiscal 2020. EBITA adjusted for lease expense of $56 billion, minus cash taxes of $8 billion, leaves us with NOPAT of $48 billion. Working capital of negative $1 billion, net capital expenditures of $8 billion, and acquisitions of $3 billion sum to $10 billion of investment. Free cash flow is $38 billion, or $48 billion of NOPAT minus $10 billion of investment.

Exhibit 4: Free Cash Flow for Microsoft, 2019-2020

($ Billions)	2019	2020
Operating income (EBIT)	43	53
Amortization of intangibles	2	2
Operating lease payments	1	1
EBITA	46	56
Income tax provision	4	9
Deferred taxes	6	(1)
Tax shield	0	0
Cash taxes	11	8
Net Operating Profit after Tax (NOPAT)	**35**	**48**
Change in working capital	(4)	(1)
Additions to property and equipment *	17	19
Depreciation	10	11
Capital expenditures, net	7	8
Acquisitions	2	3
Investment (I)	**6**	**10**
Free cash flow	**29**	**38**

* = includes assets acquired under capital leases.

Source: Microsoft Corporation and Counterpoint Global estimates.

Let's address Microsoft's intangible investments that appear on the income statement.[19] We take the total for each component of SG&A in fiscal 2020, multiply it by Hulten's prescribed allocation, and come up with $34.0 billion in intangible investment. The comparable figure in fiscal 2019 was $30.6 billion. Here are the figures for fiscal 2020:

Item	Amount	Percent Allocated to Intangible	Intangible Investment
Research & Development	$19.3 billion	100	$19.3
Sales & Marketing	$19.6	70	$13.7
General & Administrative	$5.1	20	$1.0
Total	$44.0 billion		$34.0 billion

We applied the same ratios to the financial statements back to fiscal 1994, which allowed us to create a schedule for amortization. R&D investment in year zero is amortized in a straight line over the following six years. For instance, an R&D investment of $600 in 2014 would generate an amortization expense of $100 per year from 2015-2020. We apply the same approach to S&M and G&A using the shorter two-year amortization period.

This leaves us with amortization expense of $26.8 billion in fiscal 2020 and $24.7 billion in fiscal 2019. With the intangible investment and amortization expense in hand, we need to make adjustments in three places. First, we add the intangible investment net of the amortization expense back to NOPAT. This increases

NOPAT as long as aggregate intangible investment is growing. Second, we add the same figure to investment. This grows the total investment amount.

Finally, we capitalize the intangible investment on the balance sheet and amortize that figure to reflect net capitalized intangibles. We need to go back beyond the longest amortization period, in this case six years, to make sure that we accurately capture that amount.

Exhibit 5 shows adjusted FCF. Notice first that free cash flow is the same in exhibits 4 and 5. You can also see that adjusted NOPAT of $56 billion is nearly 15 percent higher than unadjusted NOPAT as a result of removing net intangible investment from the income statement. For Microsoft, NOPAT is a decent proxy for earnings. This analysis shows that earnings are understated in cases where intangible investment is large.

Exhibit 5: Free Cash Flow with Intangible Investment for Microsoft, 2019-2020

($ Billions)	2019	2020
Operating Income (EBIT)	43	53
Amortization of intangibles	2	2
Operating lease payments	1	1
EBITA	46	56
Income tax provision	4	9
Deferred taxes	6	(1)
Tax shield	0	0
Cash taxes	11	8
NOPAT	35	48
Intangible investment	31	34
Amortization of intangibles	25	27
Intangible investment, net	6	7
Adjusted NOPAT	**41**	**56**
Change in working capital	(4)	(1)
Additions to property and equipment *	17	19
Depreciation	10	11
Capital expenditures, net	7	8
Acquisitions	2	3
Investment	6	10
Intangible investment	31	34
Amortization of intangibles	25	27
Intangible investment, net	6	7
Adjusted investment	**12**	**17**
Free cash flow	**29**	**38**

* = includes assets acquired under capital leases.

Source: Microsoft Corporation and Counterpoint Global estimates.

At the same time, moving intangibles causes the investment to increase 70 percent, from $10 to $17 billion. The goal of this shift is to gain better insight into the magnitude of investment. It also allows for a more accurate assessment of past capital allocation decisions.

We now turn to invested capital, which you can consider a couple of ways that are equivalent. Invested capital represents the amount of net assets a company needs to run its business or the financing a company's creditors and shareholders have provided to fund the net assets. Dual-entry accounting ensures that both sides of the balance sheet are equal.

The left side of exhibit 6 shows the traditional calculation of invested capital. The total was $96 billion for fiscal 2020, assuming the company needs only 2 percent of its sales in cash. The equivalent sum was $89 billion in fiscal 2019. Return on invested capital (ROIC) is calculated as NOPAT divided by average invested capital. ROIC for fiscal 2020 was a very attractive 52 percent ($48 billion/$92 billion).

The right side of exhibit 6 introduces the capitalized intangible investments. This adjustment adds $78 billion to invested capital in 2020 and $71 billion in fiscal 2019. Invested capital in fiscal 2020 increases 80 percent, from $96 to $174 billion, after this adjustment. Revised ROIC, which has a higher numerator and denominator than the simpler version, drops to 33 percent ($56 billion/$167 billion).

Exhibit 6: Invested Capital, With and Without Adjustments, 2019-2020

($ Billions)

Operating Approach (Traditional)	2019	2020
Cash *	3	3
Accounts receivable, net	30	32
Deferred income taxes	0	0
Inventories	2	2
Other current assets	10	11
Total current assets	44	48
- NIBCLs	64	69
Net working capital	(19)	(20)
Property and equipment, net	36	44
Operating lease right-of-use assets	7	9
Goodwill	42	43
Intangible assets, net	8	7
Other long-term assets	15	13
Invested capital	89	96
NOPAT	35	48
Invested capital (average)	80	92
ROIC	43%	52%

Operating Approach (with Adjustments)	2019	2020
Cash *	3	3
Accounts receivable, net	30	32
Deferred income taxes	0	0
Inventories	2	2
Other current assets	10	11
Total current assets	44	48
- NIBCLs	64	69
Net working capital	(19)	(20)
Property and equipment, net	36	44
Operating lease right-of-use assets	7	9
Goodwill	42	43
Intangible assets, net	8	7
Other long-term assets	15	13
Invested capital	89	96
Capitalized intangibles, net	71	78
Adjusted invested capital	160	174
NOPAT	41	56
Invested capital (average)	148	167
ROIC	27%	33%

* = 2 percent of sales.

Source: Microsoft Corporation and Counterpoint Global estimates.
Note: NIBCLs is non-interest-bearing current liabilities.

Comparing the spending at Walmart to that of Microsoft shows the contrast between tangible and intangible investment. But intangible investment was and is crucial to Walmart, and tangible investment is essential for Microsoft. Walmart was a pioneer in the use of technology to make its operations more efficient than those of its competitors. For instance, the McKinsey Global Institute "found that Wal-Mart directly and indirectly caused the bulk of the productivity acceleration through ongoing managerial innovation that . . . drove the diffusion of best practice."[20] Likewise, Microsoft has to buy lots of servers to support its rapidly growing cloud computing business.

We estimate that tangible investment outstripped intangible investment three to one in the first five years that Walmart was public. This assumes that 20 percent of SG&A spending was intangible. We estimate that intangible investment exceeded tangible investment 1.5 to 1 in the last 5 years for Microsoft.

There are a few other topics worth discussing before leaving the topic of measurement.

The first is the nature and payoff from R&D. Many businesses, including biotechnology companies, invest heavily in R&D in the pursuit of future sales and profits. But a handful of leading accounting professors examined the nature of R&D for mature digital businesses and concluded that a large percentage of it was maintenance, not investment, spending.[21] This suggests that R&D is not a simple discretionary investment, but demands further analysis to sort out what is necessary to sustain the business versus what is truly an investment. This means that allocating 100 percent of Microsoft's R&D to intangible investment, as the Hulten analysis proposes, is inappropriately high.

Another recent finding is that R&D provided high returns in the 1980s and early 1990s, but those returns have declined and stabilized at a lower level in recent decades.[22] This is consistent with less R&D going toward investment. Researchers quantify R&D returns by studying the relationship between current R&D expense and future net income. Factors that might explain the lower returns include a declining cost of capital, the mix shift toward maintenance R&D, and a change in the complexion of public companies to include more intangible-intensive companies.

The definition of free cash flow we use is consistent with finance theory and proper valuation. But investors and companies commonly define free cash flow more colloquially as cash from operating activities minus capital expenditures.[23] This can lead to a slew of potential errors.

Investors regularly argue that businesses reliant on intangible assets are "capital light," which acknowledges the limited need for tangible assets. But this argument can be misleading because these businesses often pay their employees with stock-based compensation (SBC), such as restricted stock units, performance stock units, and employee stock options. Because these grants are not in the form of cash, accountants add back their expense in the calculation of cash from operating activities. SBC is a legitimate expense that should not be reversed. We estimate that SBC equals 15-20 percent of cash from operating activities for technology companies in the S&P 500 Index. The figure is much higher for many young companies.

Capital light businesses often don't need to raise a lot of external capital because their employees provide both a source of financing and a service.[24] SBC is tantamount to two transactions: the company sells shares (financing) and uses the proceeds to pay employees (compensation for service). Investors have to move the SBC figure from the "cash from operating activities" section to the "cash from financing activities" section to accurately portray the cash flow statement. A failure to do so overstates free cash flow.

Another possible error from using a simplified definition of free cash flow is the mistreatment of financing costs. The free cash flow we described earlier is for an unlevered discounted cash flow model. In other words, you use the cash flows to determine the value of the company's operations, and then add non-operating assets and subtract debt and other liabilities. Accordingly, the free cash flows should not reflect financing costs.

Because cash from operating activities starts with net income, financing costs are included. That means the simple FCF calculation doesn't work to calculate corporate value. But it does work for a levered discounted value model, which considers only the cash flows attributable to equity investors discounted to a present value at the cost of equity capital. In theory an unlevered and levered DCF model yield the same value.[25]

For those who are either building an unlevered DCF model or calculating ROIC, it is important to make an adjustment for operating lease expense. Effective for most companies in early 2019, the FASB updated its standards in Lease (Topic 842) to require all public companies to include all leases of 12 months or longer on their balance sheet. Before the update, operating leases were not capitalized and lease costs were expensed. After the update, operating leases are capitalized but lease costs are still expensed. This creates a mismatch.

The key is to be consistent. Consider the case of a company buying a store and financing it with debt. The company would record the store as an asset and debt as a liability. It would then subtract interest expense, a financing cost, from operating income.

Now consider the case of a company leasing the same store. It would also reflect the store on the asset and liability sides of the balance sheet according to the new accounting standard. But the lease cost is recorded as an operating, rather than a financing, expense.

The adjustment is to reclassify the embedded interest portion of the lease cost from the operating section of the income statement to the financing section. This increases NOPAT. Notably, the International Accounting Standards Board (IASB) properly treats the depreciation and interest expense components of operating lease payments.[26]

The final potential error is missing the magnitude of tangible investment. A company that assumes a capital lease discloses "principal payments of a capital lease" in the "cash from financing activities" section of the cash flow statement. These finance leases should count as capital expenditures but don't show up in "cash from investing activities" as they should.

To illustrate the point, Amazon.com's capital expenditures, officially called "purchases of property and equipment, net of proceeds from sales and incentives," were $12.7 billion in 2019, and its "principal repayments of finance leases," which are also effectively capital expenditures, were $9.6 billion. The true figure for capital expenditures is 75 percent higher than the one solely in "cash from investing activities." To the company's credit, it includes the lease figure in its narrower definition of free cash flow.[27]

Measurement boils down to doing the proper financial statement analysis to separate the cost of running a business at a steady state from the investment a company makes to grow value. The mix between maintenance and investment spending varies based on where a company or industry is in its life cycle and management's capital allocation choices. A more accurate assessment of the magnitude and return on investment will help an investor do the one job that matters: anticipating the timing, magnitude, and riskiness of free cash flow, the lifeblood of value.

Characteristics of Intangible Assets

Economists have known for a long time that characteristics of intangible assets are different from those of tangible assets.[28] An investor's task is to assess what the nature of intangible investments means for growth, return on investment, competition, and sustainable competitive advantage.

You can think of the distinction between intangible and tangible assets in two dimensions. The first is "rivalry." Economists call intangible assets "non-rival" goods because they can be used by more than one person at a time. Tangible assets are "rival" goods because they can't be used simultaneously. For example, the formula to create a life-saving drug is a non-rival good, but a factory that produces the drug is a rival good that only one company can use at a time.

The second dimension is "excludability." Paul Romer, an economist and recipient of the Nobel Prize, writes, "A good is excludable if the owner can prevent others from using it."[29] Technology and the legal system, including mechanisms such as patents and copyrights, determine excludability. Property rights allow tangible assets to be excludable. One of Romer's main insights is that intangible assets can be "partially excludable," which allows a firm to profit from its investments.

Jonathan Haskel and Stian Westlake provide a useful taxonomy of the characteristics of intangible investments that they call the four S's: scalability, sunkenness, spillovers, and synergies.[30] We draw from their work as we take a look at each.

The first characteristic is scalability. Intangible assets often have high upfront costs but, as non-rival goods, very low incremental costs. Drug development is a good example. Finding the formula for a safe and efficacious drug can cost billions, but once the recipe is in hand treatment can be produced very cheaply.[31] You can think of lots of goods with similar characteristics, including anything that can be represented digitally, such as software, music, and books.

Unreal Engine, a set of software tools to help build video games that is owned by Epic Games, is an interesting example. Developing and improving Unreal Engine is costly for Epic, but once the company builds the tools it can share them at essentially no marginal cost. Developers can download them for free, and Epic takes a share of revenues only when a game reaches $1 million on their platform.

Another central idea is that of network effects, which exist when the value of a good or service increases as more people use that good or service. Network effects have been around for a long time and apply to tangible as well as intangible assets. For instance, in the 1908 annual report the managers of American Telephone and Telegraph Company (AT&T) wrote, "A telephone—without a connection at the other end of the line—is not even a toy or scientific instrument. It is one of the most useless things in the world. Its value depends on the connection with the other telephone—and increases with the number of connections."[32]

Network effects are relevant for different types of businesses. One example is a platform that connects two sides of a market.[33] Uber and other ridesharing companies are a good illustration. They are attractive to passengers when there are lots of drivers and to drivers when there are ample riders. It is common for one network to become dominant in a particular business because of positive feedback. Network strength is a function of network size, structure, and connectivity.

Leading online social networks, including Facebook and Twitter, also benefit from network effects. Users tend to congregate where their friends are, which means a service becomes more valuable to a user as more people join.

Network effects are also applicable for complementary products. Most smartphone users own a device that operates on an Android or iOS operating system. As a result, there are network effects between the leading operating systems and application developers. This creates an ecosystem that is difficult for aspiring entrants into the operating system business to crack.

Scalability becomes very powerful for some intangible intensive businesses when economies of scale and network effects are combined. Supply-side economies of scale are operative when the cost of an incremental unit of production goes down with output. Demand-side economies of scale occur when the willingness-to-pay of all users rises as the user base grows. Lower incremental costs and higher incremental willingness-to-pay is a powerful potential backdrop for strong value creation.

The nature of scalability means that some businesses get large. This leads to Arthur's First Law: "High-tech markets are dominated 70-80 percent by a single player—product, company, or country."[34] W. Brian Arthur, a pioneering economist in this area of research, created this law after observing the outcomes of increasing returns. Arthur is quick to note that even if luck leads to the initial advantage, it blossoms as the result of positive feedback. Scalability also suggests that many companies will try to unseat a market leader even if it is hard because the payoffs are so high.

The next characteristic is the concept of sunkenness. Pretend that you invest in a tangible asset such as a factory that doesn't generate sufficient returns for you. You can typically turn around and sell that factory to another party and recover some or all of the price you paid. Now assume that you invest in an intangible asset such as a set of operating procedures for a retail store. If that business fails, those procedures have little value to others. The concept is called "sunkenness" because those costs are sunk.

Standardization is one reason there is such a difference between how tangible and intangible assets retain value. A tangible asset is commonly standard, whether it's a scale, a server computer, or a store. An intangible asset tends to be more unique and hence has less value for another person or firm.

Notwithstanding some of the challenges with intangible assets, there is evidence that lenders consider their value in capital structure decisions.[35] For example, 17 percent of buyout deals in the U.S. in 2019 were in the software industry, up from 6 percent in 2009.[36] And intangible investments can create option value even when the payoff and recovery is not promising.

The third characteristic of intangible assets is spillovers. Because intangible assets are non-rival goods and often non-excludable, other parties can imitate them readily. Products that are protected by patent or copyright are the exception.

One example is design. Shortly after the iPhone was launched in 2007, competitors swiftly emulated the phone's important design features. A more extreme example is the work of Wang Xing, a Chinese internet entrepreneur. Dubbed "The Cloner," he "meticulously recreated the home page, profiles, tool bars, and color schemes" of Facebook for his company, then known as the Xiaonei Network. He even added "A Mark Zuckerberg Production," on each page.[37] He went on to clone Twitter and Groupon in similar fashion.

The concept of protecting tangible assets has been around for thousands of years, but protecting intangible assets is only a few hundred years old. Returning to Romer's work, excludability is a function of technology and the law. Keeping non-rival goods from spreading is inherently difficult, and the fact that they do spread may be a positive externality for society.

We see this externality at work in cities. Ideas (and illnesses) tend to spread most efficiently in dense populations. Indeed, research shows that measures such as patents, wealth, and income increase at a predictable rate as cities get larger. This is called “superlinear scaling” because the slope of 1.15, using a logarithmic scale for population and the dependent variable, is greater than 1.0. Geoffrey West, a theoretical physicist who was the president and is now a distinguished professor at the Santa Fe Institute, writes that cities manifest “systematic increasing returns to scale.”[38]

A complete inability to protect intellectual property, however, may create a disincentive to invest. Companies should seek to manage their intellectual property as effectively as possible while enjoying the benefit of borrowing ideas from others. Further, it is worth recognizing that the strength of laws protecting intellectual property vary around the world.

Basic research is one way society can take advantage of spillovers. Indeed, a number of important commercial technologies today, including the Global Positioning System, the Internet, magnetic resonance imaging (MRI), and touch screen technology were the product of basic research developed or supported by the U.S. government.[39]

The final characteristic is synergies. Brian Arthur, among others, argues that innovation arises from combining technologies that already exist.[40] This is central to Paul Romer’s endogenous growth theory. Most economic models had assumed that technology was an exogenous, or external, factor driving economic growth. Romer showed that growth is the result of endogenous, or internal, factors. The combination of existing building blocks is an essential element of the framework.

While some building blocks are tangible, the recipe for putting things together is generally intangible. Recombination also suggests that bigger is better because the more blocks there are to work with, the more combinations of potentially useful technologies exist.

Arthur often shares the story of the development of the jet engine to illustrate the point. The engine is the result of the combination of a number of subsystems, including air inlet, compressor, combustion, turbine, and nozzle.[41] A jet engine’s remarkable power and efficiency is the sum result of these technologies combined in a valuable fashion.

Note that spillovers and synergies can be at odds. On the one hand, companies want their non-rival assets to be excludable so that they alone can benefit from them. On the other hand, the more ideas that are out there the more new solutions that can be found.

An appreciation for the growth and characteristics of intangible investments is essential to understand the prospects for future free cash flows for companies. This is especially important in drawing lessons from history, whether it’s the application of statistical factors to assess relative value or patterns of growth. We now turn to the implications of the rise of intangibles for investors.

Implications for Investors

The primary task of an investor is to anticipate revisions in expectations. This requires an understanding of price-implied expectations and having a sound thesis for why the market will revise those expectations. The primary purpose of financial accounting is to provide a company's external parties, including current and prospective shareholders and creditors, with the information they need to make informed economic decisions.

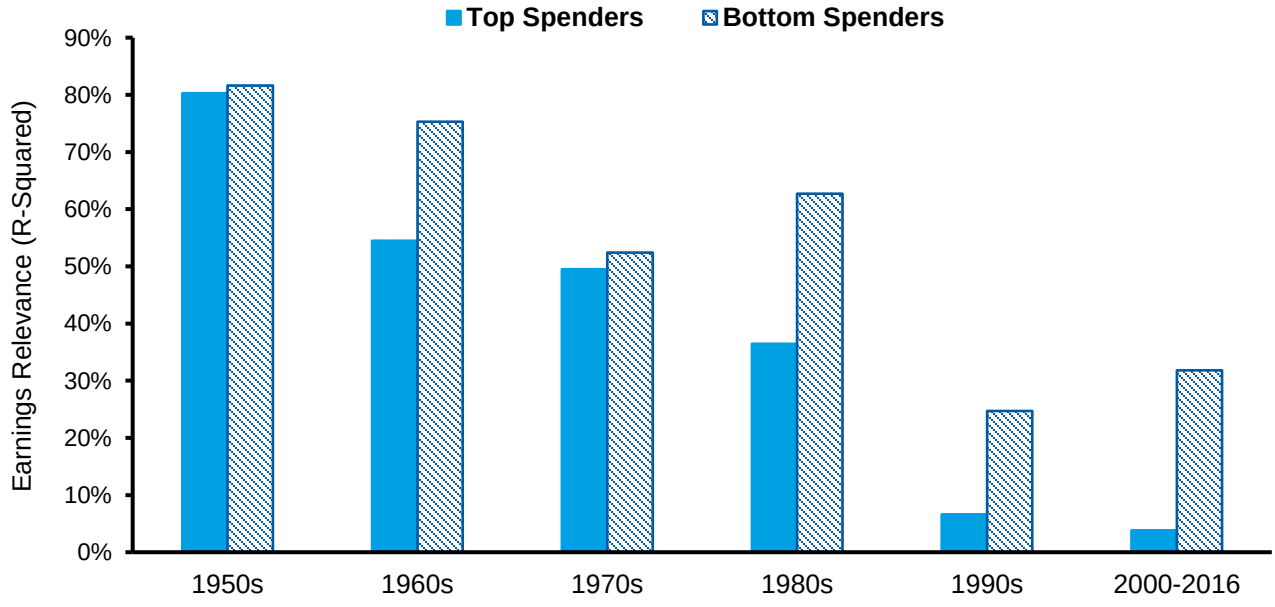
Earnings are deemed to be "the single most important output of financial reporting."[42] It used to be that earnings were on the income statement and investments were recorded mostly on the balance sheet. The rise of intangible investments means that the bottom line is now a mix of earnings and investment. The goal of this report is to allow an investor to untangle these pieces and assess them properly.

Earnings are less relevant for value today than in the past. This is because of the rise of intangibles and the increase in non-recurring, or ancillary, items reported in earnings.[43] We focus on the former, but investors seeking to understand value must thoughtfully deal with both.[44]

Baruch Lev, a professor of accounting at New York University Stern School of Business, argues that earnings have become less relevant for value over time.[45] He supports this claim by analyzing the correlation between contemporaneous earnings and market value. He further develops a proxy for intangible investment, R&D plus SG&A spending as a percentage of assets, which allows him to separate the universe of stocks into those that are above the median, the "top spenders," and those below, the "bottom spenders."

Exhibit 7 show the results of this analysis by decade from the 1950s through the 1990s and from 2000 to 2016. A couple of features stand out. First, there is a monotonic decline in earnings relevance for the top spenders. This coincides with the rise of intangible investment. Second, the relevance gap between the top and bottom spenders, which was modest in the 1950s, grows over time. The earnings relevance for companies that rely mostly on intangibles is low, and reclassifying investment improves the signal.

Exhibit 7: Earnings Relevance Has Declined Over Time



Source: Baruch Lev, "Ending the Accounting-for-Intangibles Status Quo," European Accounting Review*, Vol. 28, No. 4, September 2019, 717.*

That the relevance of earnings is declining does not mean that the stock market does not appreciate intangible investments and their potential payoff. Research shows that the market "seems to recognize some of the intangible asset value implicit in SG&A." This work also shows that investors may earn excess returns by buying companies with high intangible asset value.[46]

We demonstrated that free cash flow is not affected by the reclassification of intangible investments from the income statement to the balance sheet. Consistent with this, recent research reveals that investors respond more to surprises in free cash flow than they did in the past and that this result is particularly pronounced for young companies with lots of intangible assets.[47]

Value investing is buying something for less than it is worth. In other words, you buy when expectations are too low and sell when expectations are full or too high. This is what most active managers try to do. Discounted future free cash flow determines value, and shorthands such as multiples are useful only to the extent that they accurately capture value. They rarely do.

In recent decades, researchers have employed statistical factors, including ratios of price-book value and price-earnings, as proxies for expectations. Historically, the "value factor," buying statistically inexpensive stocks (value) and selling statistically expensive stocks (glamour) has generated excess returns.[48] In the last decade, however, this approach has fared poorly.[49]

It stands to reason that the signal from statistical factors would weaken if intangible investments distort earnings and book value. This development is not lost on quantitative investors. There is a good argument to be made that the ineffectiveness of the value factor is in part because of its diminished ability to reflect economic reality.

Baruch Lev and Anup Srivastava examined this issue and found two main results.[50] First, when they made the adjustments to reclassify intangible investment, 40-60 percent of stocks that had been classified either as "value" or "glamour" shifted categories. Value is defined as the cheapest 30 percent of stocks measured on price/book, and "glamour" is the 30 percent most expensive.

Second, the returns for the factor based on adjusted book value were higher than the returns for the factor based on traditional book value for nearly 90 percent of the years they measured. Further, the difference in returns was negligible in the 1970s and grew in significance through the decades. The authors summarize, "The adjustment of book values for the glaring accounting deficiencies of intangibles expensing could have quite a dramatic effect on the long-short value strategy throughout the past four decades."

Based on this discussion, we can say that it is useful to focus on free cash flow after properly categorizing earnings and investment. Recategorizing an intangible investment from a cost to a capital item allows for a clearer understanding of the magnitude of investment. The magnitude of investment can be paired with a thoughtful assessment of return on investment to assess future earnings.[51]

In their book, *The End of Accounting*, Feng Gu and Baruch Lev provide a framework, the "Strategic Resources and Consequences Report," to understand the crucial drivers of value by industry. The report covers resource development, strategic resources, resource preservation, resource deployment, and ultimately value creation. They provide examples for the media and entertainment, oil and gas, pharmaceutical and biotech, and insurance industries.

Gu and Lev's report is a useful complement to the accounting adjustments for getting to the essential elements of value and value creation. This allows for a more grounded assessment of gaps between expectations and fundamentals, the one job an investor needs to do well to succeed.

The world changes over time. One of the most profound changes we have seen in the corporate world is in the form of investment. Current accounting standards do a poor job of reflecting the rise of intangible investment. A thoughtful investor's best response is to make the adjustments necessary to see the world as it is.

This report discussed the measurement and characteristics of intangible assets. It also reviewed the implications of the growth of intangibles for investors. While free cash flow remains at the heart of valuation, the reclassification of investments can provide insight into future free cash flows.

Please see Important Disclosures on pages 23-25

Endnotes

[1] James Mackintosh, "Money-Losing Companies Mushroom Even as Stocks Hit New Highs," *Wall Street Journal*, January 9, 2020 and Feng Gu and Baruch Lev, "How to Distinguish Between GAAP Losers and Real Losers," *Lev The End of Accounting Blog*, February 6, 2020. For analysis of why these companies can be valued highly, see Masako Darrough and Jianming Ye, "Valuation of Loss Firms in a Knowledge-Based Economy, *Review of Accounting Studies*, Vol. 12, No. 1, March 2007, 61-93.
[2] Alfred Rappaport and Michael J. Mauboussin, *Expectations Investing: Reading Stock Prices for Better Returns* (Boston, MA: Harvard Business School Press, 2001).
[3] Steven Crist, "Crist on Value," in Beyer, et al., *Bet with the Best* (New York: Daily Racing Form Press, 2001).
[4] Nai-Fu Chen, Richard Roll, and Stephen A. Ross, "Economic Forces and the Stock Market," *Journal of Business*, Vol. 59, No. 3, July 1986, 383-403.
[5] Merton H. Miller and Franco Modigliani, "Dividend Policy, Growth, and the Valuation of Shares," *Journal of Business*, Vol. 34, No. 4, October 1961, 411-433.
[6] Stewart C. Myers, "Determinants of Corporate Borrowing," *Journal of Financial Economics*, Vol. 5, No. 2, November 1977, 147-175. For a breakdown of steady state versus future growth for 24 companies from early 2020, see Bartley J. Madden, *Value Creation Principles: The Pragmatic Theory of the Firm Begins with Purpose and Ends with Sustainable Capitalism* (Hoboken, NJ: John Wiley & Sons, 2020) 101.
[7] Michael J. Mauboussin and Dan Callahan, "What Does a Price-Earnings Multiple Mean? An Analytical Bridge between P/Es and Solid Economics," *Credit Suisse Global Financial Strategies*, January 29, 2014.
[8] Jonathan Haskel and Stian Westlake, *Capitalism Without Capital: The Rise of the Intangible Economy* (Princeton, NJ: Princeton University Press, 2017), 15-22.
[9] Carol A. Corrado, Charles Hulten, and Daniel Sichel, "Measuring Capital and Technology: An Expanded Framework," in Carol A. Corrado, John Haltiwanger, and Daniel Sichel, eds. *Measuring Capital in the New Economy* (Chicago: University of Chicago Press, 2005); Carol A. Corrado, Charles Hulten, and Daniel Sichel, "Intangible Capital and U.S. Economic Growth," *Review of Income and Wealth,* Vol. 55, No. 3, September 2009, 661-685; and presentation by Carol Corrado available at https://www.wilsoncenter.org/sites/default/files/media/documents/event/Corrado%20Presentation.pdf.
[10] "Accounting for Research and Development Costs," *Statement of Financial Accounting Standards No. 2*, October 1974.
[11] Urooj Khan, Bin Li, Shivaram Rajgopal, and Mohan Venkatachalam, "Do the FASB's Standards Add Shareholder Value?" *Accounting Review*, Vol. 93, No. 2, March 2018, 209-247.
[12] Baruch Lev, "Ending the Accounting-for-Intangibles Status Quo," *European Accounting Review*, Vol. 28, No. 4, September 2019, 713-736. For a detailed discussion of accounting for intangibles, see Thomas A. King, *More Than a Numbers Game: A Brief History of Accounting* (Hoboken, NJ: John Wiley & Sons, 2006), 131-143.
[13] Nicolas Crouzet and Janice Eberly, "Understanding Weak Capital Investment: The Role of Market Concentration and Intangibles," *NBER Working Paper No. 25869*, May 2019 and William Lazonick, "Profits Without Prosperity: Stock Buybacks Manipulate the Market and Leave Most Americans Worse Off," *Harvard Business Review*, Vol. 92, No. 9, September 2014, 46-55.
[14] Luminita Enache and Anup Srivastava, "Should Intangible Investments Be Reported Separately or Commingled with Operating Expenses? New Evidence," *Management Science*, Vol. 64, No. 7, July 2018, 3446-3468.
[15] Thomas Friedman, a foreign affairs columnist at the *New York Times*, argues that 2007 was a pivotal year because of the long list of technologies and companies that were launched. See Chapter 2, "What the Hell Happened in 2007?" in Thomas L. Friedman, *Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations* (New York: Farrar, Straus and Giroux, 2016).
[16] Charles R. Hulten, "Decoding Microsoft: Intangible Capital as a Source of Company Growth," *NBER Working Paper 15799*, March 2010.
[17] Ibid., 8.
[18] Carol A. Corrado and Charles R. Hulten, "Innovation Accounting," in Dale W. Jorgenson, J. Steven Landefeld, and Paul Schreyer, eds., *Measuring Economic Sustainability and Progress* (Chicago: University of Chicago Press, 2014), 614.

[19] For a detailed explanation of this process, see Tim Koller, Mark Goedhart, and David Wessels, *Valuation: Measuring and Managing the Value of Companies–Seventh Edition* (Hoboken, NJ: John Wiley & Sons, 2020), 467-481.
[20] Bill Lewis, Angelique Augereau, Mike Cho, Brad Johnson, Brent Neiman, Gabriela Olazabal, Matt Sandler, Sandra Schrauf, Kevin Stange, Andrew Tilton, Eric Xin, Baudouin Regout, Allen Webb, Mike Nevens, Lenny Mendonca, Vincent Palmade, Greg Hughes, and James Manyika, "US Productivity Growth, 1995-2000," *McKinsey Global Institute,* October 1, 2001.
[21] Vijay Govindarajan, Shivaram Rajgopal, Anup Srivastava, and Luminita Enache, "It's Time to Stop Treating R&D as a Discretionary Item," *Harvard Business Review*, January 29, 2019.
[22] Asher Curtis, Sarah McVay, and Sara Toynbee, "The Changing Implications of Research and Development Expenditures for Future Profitability," *Review of Accounting Studies*, Vol. 25, No. 2, June 2020, 405-437. For a more general discussion of R&D, see Anne Marie Knott, *How Innovation Really Works: Using the Trillion-Dollar R&D Fix to Drive Growth* (New York: McGraw Hill, 2017). For a macro discussion, see Nicholas Bloom, Charles I. Jones, John Van Reenen, and Michael Webb, "Are Ideas Getting Harder to Find?" *American Economic Review*, Vol. 110, No. 4, April 2020, 1104-1144. For evidence that R&D expenses generate more uncertain payoffs than do capital expenditures, see S. P. Kothari, Ted E. Laguerre, and Andrew J. Leone, "Capitalization versus Expensing: Evidence on the Uncertainty of Future Earnings from Capital Expenditures versus R&D Outlays," *Review of Accounting Studies*, Vol. 7, No. 4, December 2002, 355-382. For a discussion on R&D's ability to explain asset returns, see Woon Sau Leung, Kevin P. Evans, and Khelifa Mazouz, "The R&D Anomaly: Risk or Mispricing?" *Journal of Banking and Finance*, Vol. 115, June 2020, 105815.
[23] Katharine Adame, Jennifer Koski, Katie Lem, and Sarah McVay, "Free Cash Flow Disclosure in Earnings Announcements," *Working Paper*, June 3, 2020.
[24] Sanjeev Bhojraj, "Stock Compensation Expense, Cash Flows, and Inflated Valuations," *Review of Accounting Studies*, forthcoming and Qi Sun and Mindy Z. Xiaolan, "Financing Intangible Capital," *Journal of Financial Economics*, Vol. 133, No. 3, September 2019, 564-588. There is evidence that companies use more long-term equity compensation when the returns to SG&A spending are high. See Rajiv D. Banker, Rong Huang, and Ramachandran Natarajan, "Equity Incentives and Long-Term Value Created by SG&A Expenditure," *Contemporary Accounting Research*, Vol. 28, No. 3, September 2011, 794-830.
[25] Mauboussin and Callahan, "What Does a Price-Earnings Multiple Mean? An Analytical Bridge between P/Es and Solid Economics," 17.
[26] Matthew A. Stallings, "The Potential Impact of Lease Accounting on Equity Valuation: Implications of Cost of Capital and Free Cash Flow Estimates," *CPA Journal*, Vol. 87, No. 11, November 2017, 52-56. More technically, the financing component of the lease cost is moved to the financing section while the depreciation stays as an operating expense.
[27] Amazon.com, Form 10-K, 2019, 29.
[28] For an excellent discussion of the economics of intangible assets, see David Warsh, *Knowledge and the Wealth of Nations: A Story of Economic Discovery* (New York: W.W. Norton & Company, 2006). For applications to technology, see Carl Shapiro and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy* (Boston, MA: Harvard Business School Press, 1999).
[29] Paul M. Romer, "Endogenous Technological Change," *Journal of Political Economy*, Vol. 98, No. 5, Pt. 2, October 1990, S71-S102.
[30] Haskel and Westlake, *Capitalism Without Capital*, 56-88.
[31] Joseph A. DiMasi, Henry G. Grabowski, and Ronald W. Hansen, "Innovation in the Pharmaceutical Industry: New Estimates of R&D Costs," *Journal of Health Economics*, Vol. 47, May 2016, 20-33.
[32] American Telephone & Telegraph Annual Report, 1908. See https://beatriceco.com/bti/porticus/bell/pdf/1908ATTar_Complete.pdf. Thanks to James Currier, "The Network Effects Manual: 13 Different Network Effects, *NFX*, January 9, 2018.
[33] Thomas Eisenmann, Geoffrey Parker, and Marshall W. Van Alstyne, "Strategies for Two-Sided Markets," *Harvard Business Review*, Vol. 84, No. 10, October 2006, 92-101.
[34] W. Brian Arthur, "What's Your Law?" *Edge.org*, 2004. See www.edge.org/response-detail/10639.
[35] Steve C. Lim, Antonio J. Macias, Thomas Moeller, "Intangible Assets and Capital Structure," *Journal of Banking and Finance*, Vol. 118, September 2020.

[36] "US PE Breakdown: 2019 Annual," *PitchBook*, January 9, 2020.
[37] Kai-Fu Lee, *AI Superpowers: China, Silicon Valley, and the New World Order* (Boston: Houghton Mifflin Harcourt Publishing, 2018), 22-26.
[38] Geoffrey West, *Scale: The Universal Laws of Growth, Innovation, Sustainability, and the Pace of Life in Organisms, Cities, Economies, and Companies* (New York: Penguin Press, 2017), 275.
[39] Peter L. Singer, "Federally Supported Innovations: 22 Examples of Major Technology Advances That Stem from Federal Research Support," *Information Technology & Innovation Foundation*, February 2014.
[40] W. Brian Arthur, *The Nature of Technology: What It Is and How It Evolves* (New York: Free Press, 2009); Matt Ridley, *The Rational Optimist: How Prosperity Evolves* (New York: HarperCollins, 2010); and John H. Holland, *Signals and Boundaries: Building Blocks for Complex Adaptive Systems* (Cambridge, MA: MIT Press, 2012).
[41] Arthur, *The Nature of Technology,* 40.
[42] Ilia Dichev, John Graham, Campbell R. Harvey, and Shiva Rajgopal, "The Misrepresentation of Earnings," *Financial Analysts Journal*, Vol. 72, No. 1, January/February 2016, 22-35.
[43] For example, see John Hand and Baruch Lev, eds. *Intangible Assets: Values, Measures, and Risks* (New York: Oxford University Press, 2003); Anup Srivastava, "Why Have Measures of Earnings Quality Changed Over Time?" *Journal of Accounting and Economics*, Vol. 57, Nos. 2-3, April-May 2014, 196-217; Feng Gu and Baruch Lev, *The End of Accounting and the Path Forward for Investors and Managers* (Hoboken, NJ: John Wiley & Sons, 2016); and Vijay Govindarajan, Shivaram Rajgopal, and Anup Srivastava, "Why Financial Statements Don't Work for Digital Companies," *Harvard Business Review*, February 26, 2018.
[44] See Ethan Rouen, Eric So, and Charles C.Y. Wang, "Core Earnings: New Data and Evidence," *Harvard Business School Working Paper 20-047*, June 2020. The authors strip out non-recurring and ancillary items, which have risen over the decades, to derive "core earnings." They show that core earnings are more persistent and relevant for value than are GAAP earnings.
[45] Lev, "Ending the Accounting-for-Intangibles Status Quo" and Baruch Lev and Paul Zarowin, "The Boundaries of Financial Reporting and How to Extend Them," *Journal of Accounting Research*, Vol. 37, No. 2, Autumn 1999, 353-385.
[46] Rajiv D. Banker, Rong Huang, Ram Natarajan, and Sha Zhao, "Market Valuation of Intangible Asset: Evidence on SG&A Expenditure," *Accounting Review*, Vol. 94, No. 6, November 2019, 61-90.
[47] Katharine Adame, Jennifer Koski, and Sarah McVay, "Why Are Investors Paying More Attention to Free Cash Flows?" *Working Paper*, May 28, 2019.
[48] Eugene F. Fama and Kenneth R. French, "The Cross-Section of Expected Stock Returns," *Journal of Finance*, Vol. 47, No. 2, June 1992, 427-465.
[49] Eugene F. Fama and Kenneth R. French, "The Value Premium," *Fama-Miller Working Paper No. 20-01*, January 30, 2020; Cliff Asness, "Never Has a Venial Sin Been Punished This Quickly and Violently!" *AQR Perspectives*, February 19, 2020; and Pushkar Agrawal and Mike Nigro, "Diagnosing the Recent Decade of Drawdown in Value," *Two Sigma Investments*, July 27, 2020. Technically, the ratios are not price-book value and price-earnings, but rather book value-price and earnings-price. Flipping the ratios made for better looking exhibits in the opinions of the authors.
[50] Baruch Lev and Anup Srivastava, "Explaining the Recent Failure of Value Investing," *NYU Stern School of Business Working Paper*, March 31, 2020. The authors of this paper came to similar conclusions: Noël Amenc, Felix Goltz, and Ben Luyten, "Intangible Capital and the Value Factor: Has Your Value Definition Just Expired?" *Journal of Portfolio Management*, Vol. 46, No. 7, July 2020, 83-99.
[51] Meghana Ayyagari, Asli Demirguc-Kunt, and Vojislav Maksimovic, "The Rise of Star Firms: Intangible Capital and Competition," *Working Paper*, April 2020.

DEFINITIONS OF TERMS

Free cash flow (FCF) is a measure of financial performance calculated as net operating profit after tax minus investment in growth. FCF represents the cash that a company is able generate after laying out the money required to maintain or expand its asset base.

The S&P 500® Index measures the performance of the large cap segment of the U.S. equities market, covering approximately 75% of the U.S. equities market. The Index includes 500 leading companies in leading industries of the U.S. economy.

Price-earnings (P/E) is the price of a stock divided by its earnings per share. Sometimes called the multiple, P/E gives investors an idea of how much they are paying for a company's earning power. The higher the P/E, the more investors are paying, and therefore the more earnings growth they are expecting.

The **cost of capital** is the rate at which you discount future cash flows in order to determine the value today. The weighted average cost of capital blends the opportunity cost of the sources of capital, typically debt or equity, with the relative contribution of those sources.

Return on investment is a performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments.

Net present value is a measure of the value of estimated future cash flows discounted back to the present.

The **discount rate** is the rate at which you discount future cash flows in order to determine the value today.

The **price-to-book multiple or ratio (Price/Book)** compares a stock's market value to the book value per share of total assets less total liabilities. This number is used to judge whether a stock is undervalued or overvalued.

The Russell 3000® Index measures the performance of the largest 3,000 U.S. companies representing approximately 98% of the investable U.S. equity market. The Russell 3000 Index is constructed to provide a comprehensive, unbiased and stable barometer of the broad market and is completely reconstituted annually to ensure new and growing equities are reflected.

The residual, or terminal, value is the value of all future cash flows at the point of time in which growth is expected to become stable.

Return on invested capital represents the rate of return a company makes on the cash it invests in its business.

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