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From Financial Statements to Economic Cash Flows

Translating Accounting into Finance (Present Value Cash Flows)
Financial accounting is the "language of business." Although this book is not about financial statements, you must understand both their logic and their fundamentals. They contain the information to calculate the cash flows that ultimately are the value of the firm. Moreover, without understanding accounting, you cannot understand corporate income taxes — a necessary NPV input.

This chapter begins with a simple hypothetical project. Its economics makes computing cash flows (and NPV) easy. The chapter then explains how accountants would describe the project in a financial statement. This makes it easy for you to see the correspondence between the finance and the accounting descriptions. Finally, the chapter applies the same analysis to the financial statements of Intel (INTC).

This chapter also gently introduces some more details about corporate income taxes and capital structure. They will be explained in greater detail in Chapter 18.

14.1 Financial Statements

Isn't accounting just irrelevant numbers? Isn't what matters the project's actual cash flows, no matter how they are reported? (Yes and No.)

You already know that the value of a firm is determined by its underlying projects. These projects have cash flows that you use in an NPV analysis. Unfortunately, the accounting financials do not contain the kind of cash flows that you need for an NPV analysis. In addition to learning how to convert financials into cash flows, there are also many other good reasons why you should understand financial statements:

1. If you want to have an intelligent conversation about corporate finance and economics, you must understand the language of accounting. In particular, you must understand what earnings are — and what they are not.
2. Subsidiaries and corporations report financial statements, designed by accountants for accountants. It is true that they do not report the exact cash flows and cash-flow projections that you need for PV discounting. But how can you make good decisions about which projects to take if you cannot understand the only information to which you may ever have access?

3. Given that it may be all the information you ever get, you must be able to read what the company is willing to tell you if you want to get a glimpse of the operations of a publicly traded corporation or better understand its economics. If you want to acquire a company, the corporate financials may be your primary source of information.

4. The IRS levies corporate income tax. This tax is computed from a tax-specific variant of the corporate income statement. It relies on the same accounting logic as the published financials. (The reported public and unreported tax statements are constructed using the same accounting principles. But there are differences that are mandated by the respective regulatory agencies. For example, criminal penalties are deductible on public financial statements (under **generally accepted accounting principles** (**GAAP**), but not tax-deductible.) Because income taxes are definite costs, you must be able to understand and construct financial statements that properly subtract taxes from the projected cash flows when you want to compute NPV. And, if you become a tax guru, you may even learn how to structure projects to minimize the tax obligations, although most of this is beyond the scope of a first finance course.

➤ GAAP, § 14.1, Pg.3.

5. Many contracts are written on the basis of financials. For example, a bond covenant may require the company to maintain a ratio of current assets over current liabilities (explained soon) of greater than 1.5. Even if a change in accounting rules should not matter theoretically, such contracts can influence the reported financials on your projects' cash flows.

6. There is no doubt that managers care about their financial statements, if only because executive compensation is often linked to the numbers reported in them. Moreover, managers can engage in many maneuvers to manipulate their earnings *legally*. For example, firms can often increase their reported earnings by changing their depreciation policies (explained below). Companies are also known to actively lobby the **Financial Accounting Standards Board** (**FASB**) at great expense. For example, FASB adopted a mandatory rule in December 2004 that companies must value employee stock options when they are granted. Until then, firms' financial statements could treat these option grants as if they cost nothing. Although this new rule did not ask firms to change projects, it did reduce their *reported* net income (earnings), especially of technology firms. This rule was adopted despite vigorous opposition by corporate lobbies, which was aimed both at FASB and Congress.

   Why should companies and investors care about **recognition** of option costs in reported earnings (i.e., letting it flow into the bottom line, rather than merely **disclosure**, i.e., having options mentioned somewhere)? After all, companies disclose enough information in the footnotes to allow investors to determine these costs themselves. This is a big question. Some behavioral finance researchers believe that the financial markets value companies *as if they do not fully understand corporate financials*. That is, not only do they share the common belief that firms "manage" their earnings, but they also believe that the market fails to see through even mechanical accounting computations.

   Naturally, the presumption that the financial markets cannot understand accounting is a controversial hypothesis. If true, this could lead to all sorts of troublesome consequences. Value may no longer be just NPV, but instead

be based partly on smoke and mirrors. For example, if the market cannot understand financials, you should realize that it could have real share-price consequences when managers (legally) manipulate their earnings. A firm would especially benefit from a higher share price when it wants to sell more of its shares to the public. In this case, managers could and should maneuver their financials (legally, of course) to increase their earnings just before the equity issue. There is good evidence that firms do this — and also that the financial markets are regularly disappointed by these firms' performances years after their equity issues.

Even more troublesome, there is also evidence that managers prefer not to take some positive-NPV projects if these projects would harm their earnings. Does this sound far-fetched? Table 14.1 shows survey results. A good number of managers will pass up good projects or cut corners. Graham, Harvey, and Rajgopal found in an earlier survey that 55% would delay starting a project and 80% would defer maintenance and research spending in order to meet earnings targets. Starting projects, doing maintenance, and conducting R&D are presumably the right kinds of (positive-NPV) projects, so not taking them would decrease the underlying real value of the firm in a perfect capital market — even though it may increase the financial image of the firm's projects.

Pass Up Value-Creating Projects	(45%)
Cut Corners in Operations	(28%)
Pursue Very Risky Projects	(14%)
Issue Equity Even Though Undervalued	(14%)
Have Not Observed Suboptimal Decisions	(38%)

Table 14.1: ***Survey Answers of CFOs about Leverage-Constrained Suboptimal Choices.*** Have you observed highly levered firms to make suboptimal decisions due to their heavy debt loads? **Source:** Duke CFO Survey, John Graham (JF 2022)

Our chapter's accounting perspective: how to extract economic cash flows.

Of course, it is impossible for an introductory finance textbook to explain all the nuances of accounting. Instead, we focus here on only one issue of importance to a financier: How can you measure the cash flows that are in the numerator of present value terms — and why can you not use earnings for this? Accounting has more to offer than just this — and, fortunately, you can learn more about its broader scope in your accounting course.

The Contents of Financials

Companies communicate their internal operations through standardized financial reports.

Publicly traded companies report their financial results in **financial reports** to their shareholders and to the public. The standard rules that go into preparing the public financial statements are the aforementioned GAAP. They are set by a number of policymakers, most prominently the aforementioned FASB and change only rarely. The most important financial report is the **annual report**, which is filed with the SEC in Form **10-K**. (There is also a much shorter required **quarterly report**, called

a **10-Q**.) All annual reports begin with a general **management description and analysis** of the business and business developments, followed by the more formal presentation of the firm's financials. As a financier, you are most likely primarily interested in the financials. After all, you care more about *how much* money the firm makes than about *how* it makes it. Nevertheless, as much as you might like to save time and see the firm just as a black box (cash in, cash out), you rarely can: Knowledge of "how money is made" is usually necessary for a good understanding of "how much money is made" and "how *more* money can be made."

You must read some samples — please!

The principles in financial accounting statements have remained similar for many decades. If you have not seen an annual report (with financial statements), please spend some time reading one. Most large corporations publish their financials on their websites, so access is easy. Even better, the SEC runs **EDGAR** — a comprehensive electronic repository of corporate financials, including annual and quarterly reports.

Intel's Financials

We will look at Intel financials.

Tables 14.2-14.4 contain Intel's financial statements from 2013 to 2015. (The entire annual reports are available at https://www.intel.com. We choose an earlier year so that we can follow in Chapter 21 how predictions later on turned out to hold up.) Every annual report contains four financial statements. The first two are about "stocks." (Painfully, the term "stock" is ambiguous, because it has a second meaning. Here it does not mean "levered equity" [as opposed to debt] but "a quantity at a fixed moment in time" [as opposed to a "flow"):

1. **The balance sheet (BS)** in Table 14.2 is a snapshot of the firm's assets and liabilities — although figures are more backward-looking in accounting than in finance. Assets are listed in order of liquidity. Some assets (mostly cash and securities, accounts receivable, and inventories) are classified as **current assets**. The idea here is that they will convert into cash within one year or less. Longer-term assets — such as plants or brand reputation (an intangible asset) — are expected to turn into cash more slowly. Current assets are also often (but not always) easier to liquidate in case of financial distress if the firm needs money quickly.

   Just like finance, accounting forces the sum-total of all assets to be owned by creditors and shareholders. And, as with assets, some creditors are owed money over the coming year. The corresponding quantities are called **current liabilities**. Noncurrent liabilities include other debt that is more long-term, as well as obligations to others (suppliers, the IRS, etc.). The remainder — whatever assets are not accounted for by fixed obligations — is called equity. Therefore,

   $$\text{Assets} = \text{Liabilities} + \text{Shareholders' Equity}$$

   ➤ Warning about BV stock numbers, § 14.7, Pg.31.

   If all assets and liabilities were properly valued, then the accounting **book value** of shareholders' equity would be the market value, too. This is usually far from the truth. Difficulties in valuing assets and liabilities render many balance sheet numbers unreliable. *You have been warned!*

2. **The owners' equity statement** (or "shareholders' equity statement") explains the history of capital originally contributed to the firm and of earnings that were retained (not paid out). This financial statement is pretty useless. Thus, I have just omitted it.

Period Ending	Dec 26, **2015**	Dec 27, 2014	Dec 28, 2013
Assets			
Current Assets			
Cash And Cash Equivalents	15,308,000	2,561,000	5,674,000
Short Term Investments	10,005,000	11,493,000	14,413,000
Net Receivables	6,823,000	6,385,000	6,176,000
Inventory	5,167,000	4,273,000	4,172,000
Other Current Assets	3,053,000	3,018,000	1,649,000
Total Current Assets	**40,356,000**	**27,730,000**	**32,084,000**
Long Term Investment	7,851,000	9,120,000	7,694,000
Property Plant and Equipment	31,858,000	33,238,000	31,428,000
Goodwill	11,332,000	10,861,000	10,513,000
Intangible Assets	3,933,000	4,446,000	5,150,000
Accumulated Amortization	-	-	-
Other Assets	7,735,000	6,505,000	5,489,000
Deferred LngTm Asset Charges	-	-	-
Total Assets	**103,065,000**	**91,900,000**	**92,358,000**
Liabilities			
Current Liabilities			
Accounts Payable	10,845,000	12,210,000	11,191,000
Short/Current Long Term Debt	2,634,000	1,596,000	281,000
Other Current Liabilities	2,188,000	2,205,000	2,096,000
Total Current Liabilities	**15,667,000**	**16,011,000**	**13,568,000**
Long Term Debt	20,036,000	12,059,000	13,165,000
Other Liabilities	2,841,000	3,278,000	2,972,000
Deferred LT Liability Charges	2,539,000	3,775,000	4,397,000
Minority Interest	-	-	-
Negative Goodwill	-	-	-
Total Liabilities	**41,083,000**	**35,123,000**	**34,102,000**
Temporary Equity (Misc Stocks Options Warrants)	897,000	912,000	-
Stockholders' Equity			
Redeemable Preferred Stock	-	-	-
Preferred Stock	-	-	-
Common Stock	23,411,000	21,781,000	21,536,000
Retained Earnings	37,614,000	33,418,000	35,477,000
Treasury Stock	-	-	-
Capital Surplus	-	-	-
Other Stockholder Equity	60,000	666,000	1,243,000
Total Stockholder Equity	**61,085,000**	**55,865,000**	**58,256,000**
Net Tangible Assets	**45,820,000**	**40,558,000**	**42,593,000**

Table 14.2: ***Intel's Consolidated Balance Sheet 2013–2015.*** All numbers are in thousands. The original financial statements are further accompanied by 100 pages of notes that explain more detail.

Period Ending	Dec 26, **2015** ↓	Dec 27, 2014	Dec 28, 2013
Total Revenue	**55,355,000**	**55,870,000**	**52,708,000**
Cost of Revenue	20,676,000	20,261,000	21,187,000
Gross Profit	**34,679,000**	**35,609,000**	**31,521,000**
Operating Expenses			
Research Development	12,128,000	11,537,000	10,611,000
SG&A	7,930,000	8,136,000	8,088,000
Non Recurring	354,000	295,000	240,000
Others	265,000	294,000	291,000
Total Operating Expenses	20,677,000	20,262,000	19,230,000
Operating Income or Loss	**14,002,000**	**15,347,000**	**12,291,000**
Income from Continuing Operations			
Total Other	-	-	-
Gains on Equity Investments	315,000	411,000	471,000
Interest Expense	–105,000	43,000	–151,000
Income Before Tax	14,212,000	15,801,000	12,611,000
Income Tax Expense	2,792,000	4,097,000	2,991,000
Minority Interest	-	-	-
Net Income	11,420,000	11,704,000	9,620,000
No Preferred Stock or Adjustments			
Net Income To Common	11,420,000	11,704,000	9,620,000
Non-recurring Events			
Small Discontinued Operations, Extraordinary Items, Effect Of Accounting Changes, or Other Items			
Net Income Continuing Ops	11,735,000	12,115,000	10,091,000

Table 14.3: ***Intel's Consolidated Income Statements 2013-2015.*** All numbers are in thousands. The original financial statements are further accompanied by 100 pages of notes that explain more detail. Gains on equity investments are somewhat unusual in being broken out.

Period Ending	Dec 26, **2015** ↓	Dec 27, 2014	Dec 28, 2013
Net Income	**11,420,000**	**11,704,000**	**9,620,000**
Operating Activities, Cash Flows Provided By or Used In			
Depreciation	8,711,000	8,549,000	8,032,000
Adjustments To Net Income	(33,000)	264,000	(16,000)
Changes In A/R	(355,000)	(861,000)	271,000
Changes In Liabilities	(637,000)	(531,000)	1,441,000
Changes In Inventories	(764,000)	(98,000)	563,000
Changes In Other Ops	675,000	1,391,000	865,000
Total Cash Flow From Operating Activities	**19,017,000**	**20,418,000**	**20,776,000**
Investing Activities, Cash Flows Provided By or Used In			
Capital Expenditures	(7,326,000)	(10,105,000)	(10,711,000)
Investments	(2,446,000)	1,754,000	(3,813,000)
Other CF from Investing Actvts	1,589,000	(1,554,000)	(3,549,000)
Total CF from Investing Activities	**(8,183,000)**	**(9,905,000)**	**(18,073,000)**
Financing Activities, CF			
Dividends Paid	(4,556,000)	(4,409,000)	(4,479,000)
Sale Purchase of Stock	(1,810,000)	(9,457,000)	(559,000)
Net Borrowings	9,002,000	235,000	(31,000)
Other Cash Flows from Financing	(558,000)	(427,000)	(478,000)
Total Cash Flows From Financing	**1,912,000**	**(13,611,000)**	**(5,498,000)**
Effect Of Exchange Rate Changes	1,000	(15,000)	(9,000)
Change In Cash and Cash Equivalents	**12,747,000**	**(3,113,000)**	**(2,804,000)**

Table 14.4: ***Intel's Consolidated Cash Flow Statement 2013-2015.*** All numbers are in thousands. This Cash Flow Statement [as reported on YAHOO! FINANCE) is abbreviated. The Annual Report has this and more and 100 pages of financial notes.

The next two statements are about "flows" over a period of time:

3. **The income statement (IS)** in Table 14.3 reports the revenues and expenses of the company, resulting in *earnings* (also called *net income*) over the year.

In the above three statements, accountants try to "smooth out" temporary hiccups — which you will learn about soon. It is only in the fourth that they do not smooth:

4. **The cash-flow statement (CFS)** in Table 14.4 reports the sources and uses of cash.

You should familiarize yourself with and maybe mull over these Intel statements for a while before you go on.

Where is the Cash Flow we need?

Now, however hard you look, you will not be able to find an item entitled "cash flow for the NPV numerators." And the cash flows on the cash-flow statement look nothing like the earnings — so why does the financial world seem to consider them so important? You must learn what these financials really mean, if only for financial literacy. But our immediate goal is to see how we can extract a "cash flow for an NPV analysis."

The most important statements are the income and cash-flow statements, not the two stock statements.

For the most part, U.S. GAAP rules have focused on the accuracy of the two flow statements more than on the accuracy of the two stock statements. (The balance sheet does contain important information, but many of its entries are more backward-looking and quite precarious.) Fortunately, this suits us well. This chapter will be spending a lot of time explaining the income statement and cash-flow statement. The upshot is that the cash-flow statement comes closest to what you want for an NPV analysis. So let's explore the logic of accounting (and specifically, of net income). It is different from the logic of finance (and, specifically, of NPV cash flows). Your goal now is to learn how to read, interpret, and transform financial statements into NPV analysis cash flows.

Why Financiers and Accountants Think Differently

Earnings anticipate future costs and benefits (in some odd sense).

Financiers try to understand the firm value by working with the exact timing of hard cash inflows and outflows over the entire project's lifetime. Like financiers, accountants are interested in firm value. Unlike financiers, accountants focus not just on economic cash flows but also on annual earnings (a flow variable) in the income statement. These earnings try to incorporate changes of the (expected) *future* into the firm's net income *now*. (This is an oversimplification, because accuracy is not the only goal of the accounting estimates. Accountants also want **conservatism**. For example, entries on the balance sheet are recorded at the lower of either cost or market value. Thus, even if an accountant knows that the value is higher than the cost, she may not want to [or even be allowed to] use this knowledge. Accounting perspectives are generally more "backward-looking" than finance perspectives.)

The difference between income and economic cash flows is "accruals."

The key difference between the concept of income and cash flow is the **accrual**, which arises for economic transactions that have delayed cash implications. For example, if I have just committed to pay your firm $10,000 next year, the income statement would record your current firm value increase as $10,000 (perhaps time- and credit-risk-adjusted). In contrast, the cash flow statement would consider this to be a zero cash flow today — until tomorrow, when the payment actually occurs. The contrast is that the accountant (by and large) wants the income statement and balance sheet to be a good (though also conservative) representation of the economic value of the firm *today* (i.e., you already own my commitment to pay). The financier needs the exact timing of inflow and outflows for the NPV discounting instead.

When financiers view this machine, they see one big expense spike upfront, followed by years of no further expenses.

Accruals can be classified into long-term and short-term accruals. The primary *long-term accrual* is *depreciation*, which is the spreading of asset-purchasing cost over a number of years. For example, when a financier buys a maintenance-free instrument, he sees a device that costs a lot of cash today and produces cash flows in the future. If the instrument needs to be replaced every 20 years, then the financier sees a sharp spike in cash outflows every 20 years, followed by no further expenditures (but hopefully many cash inflows).

The accountant, however, sees the instrument as an asset that uses up a fraction of its value each year. She would try to determine an amount by which the instrument deteriorates in each year and would only "charge" this prorated deterioration to be the annual outflow (called an **expense**). The purchase of a $1 million instrument would therefore not reduce earnings by $1 million in the first year, followed by $0 in the remaining 19 years. Instead, it would be an expense of, say, $50,000 in each of the 20 years. (This is a common method of depreciation and is called **straight-line depreciation**, here over 20 years. There are others.) Note also how neither the earnings nor the cash flow figures are accurate values. If you wanted to sell the instrument early, its price would depend on market demand.

When accountants view this machine, they see depreciation: a little bit of use every year for many years.

To complicate matters further, accountants often use standardized schedules over which particular assets are depreciated. These are called **impairment rules**. For example, residential investment properties (houses) are commonly straight-line depreciated over 40 years (or 27.5 years for tax purposes) — often regardless of whether the house is constructed of straw or brick. This predetermined value schedule is usually not accurate. For example, if investors have recently developed a taste for old buildings, it could be that a building's value has doubled in line with prevailing real estate price increases, even though the financial statements might record this building to be worth nothing. (Even this is oversimplified. On occasion, accountants invoke procedures that allow them to adjust the value of an asset midway through its accounting life — but more often downward than upward.) Another common impairment rule is **accelerated depreciation**. (One form thereof is called MACRS, which is especially important in a tax context. But we are straying too far for the moment.)

This "little bit of use" cost comes from standardized impairment schedules.

If the instrument happens to continue working after 20 years, the financials that have just treated it as a $50,000 expense in year 20 will now treat it as a $0 expense in year 21. It remains worth $0 because it cannot depreciate any further — it has already been fully depreciated. The financier sees no difference between year 20 and year 21, just as long as the device continues to work.

There is usually inconsistency at the point when the device has been fully depreciated.

Short-term accruals come in a variety of guises. To a financier, what matters is the timing of cash coming in and going out. A sale for credit is not cash *until* the company has collected the cash. To the accountant, if the firm sells $100 worth of goods on credit, the $100 is booked as revenue (which flows immediately into net income), even though no money has yet arrived. In the accounting view, the sale has been made. To reflect the delay in payment, accountants increase the **receivables** (also **accounts receivables** or **A/R**) by $100. (Firms simultaneously establish an allowance for estimated nonpayments [bad debts]. Incidentally, FASB is considering new rules that would allow companies to book some sales later and tinker less with A/Rs.)

For short-term accruals, such as receivables, accounting logic relies on predicted future cash inflows.

Another short-term accrual is **income tax**, which a financier considers to be an outflow only when it has to be paid — typically a few months after the year has ended. However, on the income statement, when a firm in a, say, 40% corporate tax bracket makes $100 in profits, the income statement immediately subtracts the corporate income tax of $40 (which will eventually have to be paid on the $100 in profits) and therefore records net income of only $60. To reflect the fact that the full $100 cash is still around, $40 is recorded as **taxes payable**.

The logic of finance relies exclusively on actual cash flows (or immediate values).

Both approaches have their own advantages and disadvantages.

In sum, for a financier's cash flow statement, a machine costs a lot of cash today (so it is an immediate negative), the accounts receivable are not yet cash inflows (so they are not yet positives), and the corporate income tax is not yet a cash outflow (so it is not yet a negative). For an accountant's income statement, a machine costs a prorated amount over a period of years, the accounts receivable are (mostly) considered immediate positive earnings, and the corporate income tax is an immediate cost. There is a definite logic in the approaches of both accounting and finance: The accounting approach may be better in giving a snapshot impression of the firm's value; the finance approach is better in measuring the timing of the cash inflows and cash outflows for valuation purposes. Note that valuation leans much more heavily on the assumption that *all* future cash flows are fully considered. Today's cash flows alone would *not* usually make for a good snapshot of the firm's situation: The firm is not worth a negative amount just because it has recently bought an expensive device that has caused a large negative cash flow this year.

Trashy Accounting at Waste Management

A few years ago, Waste Management (WMX) settled a class action lawsuit by shareholders for $220 million — then the largest such settlement ever. The suit alleged that WMX had overstated its income by $1.32 billion over an 8-year period. About 47% of the company's reported income was fictitious.

One of WMX's dubious practices was that it had changed the accounting life of its waste containers from 12 to 18 years. Therefore, each year, it subtracted less depreciation, which increased its reported earnings by $1.7 billion. Of course, during that time, managers were handsomely rewarded for their superior earnings performance.

Q 14.1. What is the main difference between the depiction of a project in accounting (net income) and in finance (economic cash flows)?

Q 14.2. Is the firm's lifetime sum of net income equal to the firm's lifetime sum of cash flows?

14.2 Long-Term Accruals (Depreciation)

This hypothetical project will illustrate the difference between an accounting and a finance perspective for depreciation.

Rather than starting off trying to understand a creature as complex as the Intel financials, let's begin with a simple firm for which you know the cash flows. Your firm is basically just one machine, described in Table 14.5. We shall construct hypothetical financials, and then we shall reverse-engineer the quasi-published figures into cash flows. The machine is rather unusual: It lasts 6 years, has no maintenance costs, requires capital expenditures not only in the first but also the second year, and produces full output even in year 1. It produces net sales (after taking costs into account) of $60 per year, and customers pay cash immediately. Your corporate income tax rate is 40%, and your cost of capital is 12% per year. With $50 of debt at 10% interest, the firm's annual interest payments are $5. In this section, all sales and expenses are assumed to be cash transactions and not delayed. The loan is a bit "funny," in that it incurs no interest in the first year.

➤ Risk aversion and cost of capital, Pg.138.

Your goal is to understand how cash flows correspond to net income and balance sheets. Your goal is *not* to construct your own cash flow statement from the latter — the accountants can do this much better than you — and it will be right there for you to use "for free." Towards the end of the chapter, you will learn the fastest and easiest way to avoid all the calculations. But you need to understand where they all come from.

Why are you doing this?

"Real Project"	
Real Physical Lifespan	6 years
Capital Expenditure	\$75, year 1 (Y1)
	\$75, year 2 (Y2)
Gross Output	\$70/year
– Input Costs (Cash)	\$5/year
– Selling Costs (Cash)	\$5/year
= Net Output	\$60/year
Overall Cost of Capital	12%/year
Corporate Tax Rate (τ)	40%/year

Available Financing — Executed	
Debt Capacity	\$50
Debt Interest Rate	10%/year
	(= \$5/year)

Accounting Treatment	
Project Lifespan	3 years

Table 14.5: ***A Hypothetical Project.*** *Sidenote:* This debt contract provides cash necessary in year 1, and requires a first interest payment in year 2. Both principal and interest are repaid in year 6.

Doing Accounting

For the public financials, GAAP requests that firms use some discretion to match reported depreciation to true depreciation. (There are exceptions, especially in the name of conservatism.) In reality, matching actual lifespans to accounting lifespans is almost impossible to accomplish, if only because it is often unclear upfront how long assets will really last. For this reason, many firms simply rely on common standard depreciation schedules.

Depreciation schedules are not exact.

For the tax financials, the differences between actual and accounting life are even more pronounced. Depreciation rules for computing the corporate income tax are set by Congress. They are intentionally based on mechanistic schedule assumptions, regardless of the true asset life, and change with tax laws — and quite often. (Even U.S. states can have their own rules.) GAAP and IRS schedules are usually not the same.

Tax depreciation schedules are even more stylized.

However, for our first example, assume that both GAAP and the IRS have decreed that this particular machine should be depreciated over three years, even though it lasts longer. Consequently, \$75 investment generates \$25 in depreciation, three years in a row, beginning in the year of the capital expenditure, and none after the third year. How does depreciation affect the reported financials?

Start simple.

The income statement for this project is shown in Table 14.6. (I use Y as an abbreviation for "Year.") In going down the leftmost column of any of these tables, you will notice that accounting has its own jargon, just like finance. **COGS** abbreviates *cost of goods sold*. **SG&A** abbreviates *selling, general & administrative expenses*. Both of

A standard project's income statement.

	Income Statement	Y1	Y2	Y3	Y4	Y5	Y6
	Sales (Revenues)	$70	$70	$70	$70	$70	$70
–	Cost of Goods Sold (COGS)	$5	$5	$5	$5	$5	$5
–	Selling, General & Admin Expenses (SG&A)	$5	$5	$5	$5	$5	$5
=	EBITDA	$60	$60	$60	$60	$60	$60
–	Depreciation	$25	$50	$50	$25	$0	$0
=	EBIT (operating income)	$35	$10	$10	$35	$60	$60
–	Interest Expense	$0	$5	$5	$5	$5	$5
=	EAIBT (or EBT)	$35	$5	$5	$30	$55	$55
–	Corporate Income Tax (at 40%)	$14	$2	$2	$12	$22	$22
=	Net Income	$21	$3	$3	$18	$33	$33

	Excerpts from the Cash-Flow Statement	Y1	Y2	Y3	Y4	Y5	Y6
	Net Debt Issue	+$50					–$50
	Capital Expenditures[a]	–$75	–$75				
	Depreciation	+$25	+$50	+$50	+$25	$0	$0

Table 14.6: ***Income Statement and Excerpt from the Cash-Flow Statement of the Hypothetical Machine.*** Although I have broken depreciation out in this income statement, it is usually part of other components, most likely COGS or SG&A. Fortunately, depreciation is always fully broken out in the cash-flow statement. This is why you need to look it up in the latter. Table note [a]: *Sign Warning:* The accounting convention is to record capital expenditures as a negative number, i.e., as –$75, on the cash-flow statement. But beware: The same capital expenditures would be recorded as a positive asset on the balance sheet.

these are expenditures that have to be subtracted from **sales** (or **revenues**) to arrive at **EBITDA** (earnings before interest, taxes, depreciation, and amortization). Next, subtract out depreciation, which is a subject that deserves the long discussion below and that we will return to in a moment. Thus, you arrive at **operating income**, also called **EBIT** (earnings before interest and taxes). Finally, take out interest expense at a rate of 10% per year and corporate income tax (which you can compute from the firm's tax rate of 40%) and arrive at plain **earnings**, also called **net income**. Net income is often called the **bottom line** because of where it appears.

Compare our income statement to Intel's.

Note the similarity of this simple project's income statement to Intel's income statement from Table 14.3. In 2015, Intel had $55 billion in sales. COGS and SG&A (which included some depreciation) added up to $21 + $8 ≈ $29 billion. Intel breaks out research and development, because it is primarily an R&D company. This accounted for another $12 billion. This left an operating income of $14 billion. The next similar expense is interest expense — which here was confusingly named. It was not an expense of –$105 million (a double negative being a positive) but an expense of $105 million. Intel *paid* $105 million in *net* interest. (They paid $337 million and earned $232 million.) Then Intel subtracts about $2.7 billion in income tax, leaving it with net income of $11.42 billion. Yes, Intel has a few extra items and changes some of the names around, but the broad similarity should be obvious.

Capital expenditures and debt issuing are recorded on the cash-flow statement, not the income statement.

You have already reported most useful information of your project on the income statement. The two exceptions are the capital expenditures and the net debt issue. These do not go onto the income statement. Instead, they are reported on the cash-flow statement (also in Table 14.6). In this case, capital expenditures are $75 in year 1 and $75 in year 2, followed by $0 in all subsequent years. Net debt issuing is $50 in year 1, and the debt principal repayment of $50 occurs in year 6. (In addition, the cash-flow statement also reports depreciation. I will soon explain why you should actually read depreciation off the cash-flow statement — not off the income statement.)

Here is how capital expenditures enter the income statement: depreciation.

This is not to say that project capital expenditures and debt play no role in the income statement (IS) — they do, but not one-to-one. Specifically, capital expenditures reduce net income more slowly through depreciation:

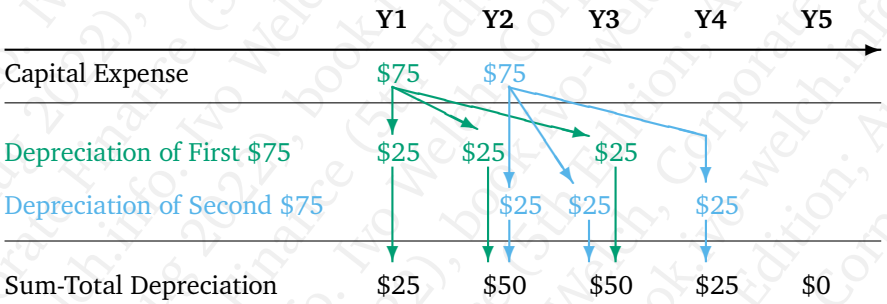
Year Y1: The IS records the first $25 depreciation from the first year's $75 capital expenditures.

Year Y2: The IS records the second $25 depreciation from the first year's $75 capital expenditures, plus the first $25 depreciation from the second year's $75 capital expenditures. Thus, a total of $50 is depreciated.

Year Y3: The IS records the third and final $25 remaining depreciation from the first year's $75 capital expenditures, plus the second $25 depreciation from the second year's capital expenditures. Again, a total of $50 is depreciated.

Year Y4: There is no more depreciation from the first year's capital expenditures. You only have the third installment of the second year's capital expenditures left. Thus, depreciation is $25.

You can visualize this as follows:



The Loan

The principal on the loan, either its funding or its repayment, plays no role on the income statement. However, the interest paid on the loan does go onto the income statement. Here, this is $5 per year.

Doing Finance

Here is the difference between full ownership and levered ownership.

Now, forget accounting for a moment and instead value the machine from a finance perspective. The firm consists of three components: the machine itself, the tax obligation, and the loan.

$$\begin{aligned}\text{NPV Project} &= \text{NPV Machine} - \text{NPV Taxes}\\ \text{NPV Levered Ownership} &= \text{NPV Machine} - \text{NPV Taxes} + \text{NPV Loan}\end{aligned}$$

Full project ownership is equivalent to holding both the debt (including all liabilities) and equity (the machine), and earning the cash flows due to both creditors and shareholders. Levered equity ownership adds the project "loan" to the package. As full project owner (debt plus equity), in the first year, you must originally supply $50 more in capital than if you are just a levered equity owner, but in subsequent years, as full owner, you then do not need to worry about paying back a lender.

Look only at inflows and outflows of the first component of the firm — the machine's actual cash flows, without taxes and loan.

First work out the actual cash flows of the first component, the machine itself. Without the taxes and the loan, the machine produces the following:

$$\begin{aligned}\text{NPV}_{\text{machine}} &= \frac{\$60-\$75}{(1+12\%)^1} + \frac{\$60-\$75}{(1+12\%)^2} + \frac{\$60}{(1+12\%)^3}\\ &\quad + \frac{\$60}{(1+12\%)^4} + \frac{\$60}{(1+12\%)^5} + \frac{\$60}{(1+12\%)^6} \approx \$119.93\end{aligned}$$

$$\begin{aligned}\text{NPV}_{\text{machine}} &= \frac{C_1}{1+r_1} + \frac{C_2}{1+r_2} + \frac{C_3}{1+r_3}\\ &\quad + \frac{C_4}{1+r_4} + \frac{C_5}{1+r_5} + \frac{C_6}{1+r_6}\end{aligned}$$

The tax obligation is a negative-NPV project, which must be valued.

➤ Income Statement, Table 14.6, Pg.12.

Unfortunately, corporate income tax — the second component — is an actual cost that cannot be ignored. Looking at Table 14.6, you see that Uncle Sam collects $14 in the first year, then $2 twice, then $12, and finally $22 twice. Assume that the stream of tax obligations has the same discount rate (12%) as that of the overall firm. (To value the future tax obligations, you need to know the appropriate discount factor. The firm's cost of capital is conservatively high. Unfortunately, we need to delay this issue until Chapter 18.) It is both convenient and customary (if not exactly correct)

to use the firm's overall cost of capital as the discount rate for its tax obligations.) With this cost-of-capital assumption, the net present cost of the tax liability is

$$\text{NPV}_{\text{tax liability}} = \frac{\$14}{1.12^1} + \frac{\$2}{1.12^2} + \frac{\$2}{1.12^3} + \frac{\$12}{1.12^4} + \frac{\$22}{1.12^5} + \frac{\$22}{1.12^6} \approx \$46.77$$

Put together,

The overall project NPV.

$$\begin{aligned}\text{NPV}_{\text{project}} &\approx \$119.93 - \$46.77 = \$73.16\\ \text{NPV Project} &= \text{NPV Machine} - \text{NPV Taxes}\end{aligned}$$

Now consider the third component — the loan. Assume that you are not the "full project owner," but only the "residual levered equity owner," so you do not extend the loan yourself. Instead, you would obtain a loan from a (hopefully) perfect capital market. Let us assume that your company "got what it paid for," a fair deal — a reasonable assumption for most large corporations in competitive financial markets. Your loan that provides \$50 and pays interest at a rate of 10% should thus be zero NPV. (This saves you the effort of having to compute the loan's NPV.)

The loan usually is a "zero-NPV" project, unless you can get an unusually great deal or suffer an unusually bad deal on the loan.

$$\text{NPV}_{\text{loan}} = \$0$$

Be my guest, though, and make the effort:

$$\text{NPV}_{\text{loan}} = \frac{+\$50}{1.10^1} + \frac{-\$5}{1.10^2} + \frac{-\$5}{1.10^3} + \frac{-\$5}{1.10^4} + \frac{-\$5}{1.10^5} + \frac{(-\$50)+(-\$5)}{1.10^6} = \$0$$

Therefore, the project NPV with the loan, that is, levered equity ownership, is the same as the project NPV without the loan. This makes sense: You are not generating or destroying any value by borrowing from one bank rather than another. Therefore,

$$\begin{aligned}\text{NPV}_{\text{levered ownership}} &= \$119.93 - \$46.77 + \$0 = \$73.16\\ \text{NPV}_{\text{levered ownership}} &= \text{NPV Machine} - \text{NPV Taxes} + \text{NPV Loan}\end{aligned}$$

Although the NPV remains the same, the cash flows to levered equity ownership are different from the cash flows to the project. The cash flows (and net income) are shown in Table 14.7. Note how different the cash flows and net income are. Net income is highest in years 5 and 6, but the levered cash flow in year 6 is negative. In contrast, in year 3 — the year with the highest levered cash flow — net income is lowest.

Earnings and cash flows are often very different.

Reverse-Engineering Income Accounting into Finance

If you neither knew the details of this machine nor the cash flow statement, but only the net income statement, could you compute the correct firm value by discounting the net income? Discounting net income with a cost of capital of 12% would yield

Discounting the net income would not give you the true project NPV.

$$\text{An incorrect NPV via net income} = \frac{\$21}{1.12^1} + \frac{\$3}{1.12^2} + \frac{\$3}{1.12^3} + \frac{\$18}{1.12^4} + \frac{\$33}{1.12\%^5} + \frac{\$33}{1.12^6} \approx \$70.16$$

which is not the correct answer of \$73.16. Neither would it be correct to discount the net income with a cost of capital of 10%,

$$\text{Incorrect NPV via net income} = \frac{\$21}{1.10^1} + \frac{\$3}{1.10^2} + \frac{\$3}{1.10^3} + \frac{\$18}{1.10^4} + \frac{\$33}{1.10^5} + \frac{\$33}{1.10^6} \approx \$75.24$$

Instead, you need the cash flows.

	Y1	Y2	Y3	Y4	Y5	Y6	Disc Rate	NPV
Cash Flow, Machine w/o Tax	–$15	–$15	+$60	+$60	+$60	+$60	12%	$119.93
+ Cash Flow, Uncle Sam	–$14	–$2	–$2	–$12	–$22	–$22	12%	–$46.77
= Cash Flow, **Project, After Tax**	–$29	–$17	+$58	+$48	+$38	+$38	12%	$73.16
+ Cash Flow, Loan	+$50	–$5	–$5	–$5	–$5	–$55	10%	$0.00
= **Levered Ownership**	+$21	–$22	+$53	+$43	+$33	–$17		$73.16
For Comparison, Net Income	*$21*	*$3*	*$3*	*$18*	*$33*	*$33*		

Table 14.7: ***Cash Flows and Net Income Summary.*** Because investors are risk-averse, the discount rate (also called the cost of capital or required expected rate of return) is higher for the machine than for the loan.

Instead, you must reverse-engineer the economic cash flows from the corporate financials.

If you needed them, how could you reverse-engineer the correct cash flows for the NPV analysis from the income statement? You just need to retrace your steps. Start with the net income numbers from Table 14.6. You add back the depreciations, because they *were not* actual cash outflows, and you subtract the capital expenditures, because they *were* actual cash flows.

➤ Income Statement, Table 14.6, Pg.12.

		Y1	Y2
	EBIT	+$35	+$10
+	Depreciation	+$25	+$50
"+"	(–) Capital Expenditures	+(–$75)	+(–$75)
=	Cash Flow, Project, Before Tax	–$15	–$15

I find the formula most intuitive if I think of the "depreciation + capital expenditures" terms as undoing the accountants' smoothing of the cost of machines over multiple periods.

Important

To take care of long-term accruals in the conversion from net income into cash flows, undo the smoothing — add back the depreciation and subtract out the capital expense.

Sidenote: The formula signs themselves seem ambiguous, because accountants use different sign conventions in the IS and CFS. For example, because capital expenditures are usually quoted as negative terms on the cash-flow statement, in order to subtract capital expenditures, you just add the (negative) number. In the formula below, you want to subtract corporate income tax, which appears on the income statement (Table 14.6) as a positive. Therefore, you have to subtract the positive. Sigh…I try to clarify the meaning (and to warn you) with the quotes around the + in the formulas themselves.

Next, you need to subtract corporate income taxes (and, again, look at the numbers themselves to clarify the signs in your mind; on the CFS, income tax is quoted as a negative, on the IS as a positive — more later). This gives you the following after-tax project cash flow:

Finish the reverse-engineering by subtracting off taxes.

		Y1	Y2
	EBIT	+$35	+$10
+	Depreciation	+$25	+$50
"+"	(–)Capital Expenditures	+(–$75)	+(–$75)
–	(+)Corporate Income Tax	–(+$14)	–(+$2)
=	Cash Flow, Project, After Tax	–$29	–$17

You can also get these numbers through an alternative calculation. Net income already has corporate income tax subtracted out, but it also has interest expense subtracted out. You get the same cash flow if you start with net income instead of EBIT but add back the interest expense:

A different way to peel our orange — to reverse-engineer it.

		Y1	Y2
	Net Income	+$21	+$3
+	Depreciation	+$25	+$50
"+"	(–)Capital Expenditures	+(–$75)	+(–$75)
+	Interest Expense	+$0	+$5
=	Cash Flow, Project, After Tax	–$29	–$17

Investors (equity and debt together) must thus come up with $29 in the first year and $17 in the second year. (You can read the cash flows in later years from line 3 of Table 14.7.)

If the project is financed partly by borrowing, then what part of the $29 and $17 can be financed by creditors, and what residual part must be financed by you? In the first year, your creditors provide $50; in the second year, creditors get back $5. Therefore, levered equity actually receives a positive net cash flow of $21 in the first year, and a negative cash flow of $22 in the second year. With the loan financed from the outside, you must add all loan inflows (principal proceeds) and subtract all loan outflows (both principal and interest). The cash flow for levered equity shareholders is as follows:

The cash flow to levered equity shareholders takes care of money coming in from and going out to creditors.

		Y1	Y2
	EBIT	+$35	+$10
+	Depreciation	+$25	+$50
"+"	(–)Capital Expenditures	+(–$75)	+(–$75)
–	Corporate Income Tax	–$14	–$2
=	Cash Flow, Project	–$29	–$17
+	Net Debt Issue	+$50	$0
–	Interest Expense	$0	–$5
=	Cash Flow, Levered Equity Ownership	+$21	–$22

A different way to peel the orange.

Again, net income already has both corporate income tax and interest expense subtracted out, so the same result comes out if you instead use the following formula:

		Y1	Y2
	Net Income	+$21	+$3
+	Depreciation	+$25	+$50
"+"	(–)Capital Expenditures	+(–$75)	+(–$75)
+	Net Debt Issue	+$50	$0
=	Cash Flow, Levered Equity Ownership	+$21	–$22

Solid Financial Analysis

EBITDA was all the rage among consultants and Wall Street for many years, because it seems both closer to cash flows than EBIT and more impervious to managerial earnings manipulation through accruals. Sadly, discounting EBITDA can be worse than discounting EBIT *if* capital expenditures are not netted out — which EBITDA users rarely do. (Not subtracting either capital expenditures or depreciation is equivalent to assuming that production falls like manna from heaven. EBIT may spread capital expenditures over time periods in an undesirable way, but at least it does not totally forget them!) Sometimes, a little bit of knowledge is more dangerous than none.

I always loved the example of a Bear Stearns analyst valued American Italian Pasta (AIP), then a small NYSE-listed pasta maker. Unfortunately, Herb Greenberg from TheStreet.com discovered that the analyst had not properly subtracted capital expenditures but added them. Fixing this mistake would have reduced the resulting value estimate of AIP from $58.49 to $19 per share (then trading at $43.65). To its credit, Bear Stearns admitted its mistake. Miracles always come in twos, however. Bear Stearns promptly came up with a new valuation in which Bear Stearns boosted the estimate of AIP's operating cash flows and dropped its estimate of the cost of capital. Presto! The NPV of AIP was suddenly $68 per share. How fortunate that Bear Stearns' estimates were so robust to basic errors.

Despite being the "most admired" securities firm in Fortune's "America's Most Admired Companies" survey in 2005-2007, Bear Stearns did not get to see the end of AIP — it collapsed itself in the Financial Crisis of 2008.

TheStreet.com

Q 14.3. Show that the formulas in this section yield the cash flows in Table 14.7 in years 3 through 6.

Q 14.4. Using the same cash flows as in the NPV analysis in Table 14.7, how would the project NPV change if you used a 10% cost of capital (instead of 12%) on the tax liability?

Depreciation Nuances

Why you need to get the depreciation number from the cash-flow statement.

I mentioned earlier that you should read depreciation from the cash-flow statement, not from the income statement. I now want to explain a little more about accounting for depreciation.

Depreciation comes in different forms with different names.

Economic depreciation can come in three different forms on accounting statements, called just **depreciation**, **depletion**, and **amortization**. They are all "allocated expenses" and not actual cash outflows. The name differences come from the asset types to which they apply.

Depreciation applies to **tangible assets**, such as factories.

Depletion applies to **natural resources**, such as mines.

Amortization applies to **intangible assets**, such as patents, copyrights, licenses, franchises, and so on. As late as the 1970s, average intangible assets for publicly traded U.S. firms were below 10%. Today, it is these intangible assets that have become the overwhelming majority of public firms' assets. (The exact amortization rules are laid down in FASB Rule 142; they are complex and much beyond our scope.)

Because depreciation, depletion, and amortization are conceptually the same thing, they are often lumped together under the catch-all phrase "depreciation," a convention that we are following.

In real life, do not use depreciation and amortization on the income statement to extract economic cash flows.

Unlike Intel, many firms report a "depreciation" line item on their income statement, too. However, you need to use the cash-flow statement's depreciation. On the income statement, corporations can roll some depreciation into either "cost of goods sold" or "selling, general & administrative expenses." (Doing so does not affect the bottom line.) For a machine, chances are that a real firm would not have reported depreciation separately, but would have rolled it into COGS. Because this is often misapplied, let's put it into a special reminder:

Important

Do not use depreciation or amortization figures from the income statement to undo the accounting adjustments for capital expenses. The income-statement depreciation is incomplete. You must use the cash-flow depreciation figure.

Go to the cash-flow statement for the depreciation number that is the equivalent of what we had in the machine example.

Therefore, the only complete depreciation for all assets, equivalent to our depreciation entries in our machine example, can be found on the cash-flow statement. For Intel 2015, this is the $8.711 billion in line 3 of the cash-flow statement in Table 14.4. This number is the exact equivalent of the depreciation row ($25, $50, $50, $25, $0, $0) for the machine in Table 14.6.

Q 14.5. Rework the example (income statement, cash-flow statement excerpts, cash flows, and NPV) with the following parameters:

Project		Available Financing — Executed	
Real Physical Lifespan	5 years	Debt Capacity	\$100
Cost	\$120, Y1	Debt Interest Rate	8%/year
Gross Output	\$80/year		
– Input Costs	\$6/year	**Accounting Treatment**	
– Selling Costs	\$8/year	Depreciation Method	Linear
= Net Output	\$66/year	Accounting Life	4 years
Overall Cost of Capital	8%/year		
Corporate Tax Rate (τ)	50%/year		

Assume that debt does not require any interest payment in the first year (the first payment of \$8 occurs in the second year). In this question, assume that the world is risk-neutral and perfect, so the debt and the project require the same expected rate of return (cost of capital).

Q 14.6. For the machine example in the text, do both the financials and the cash-flow analysis using monthly discounting. Assume that the loan is taken at the end of the first month (with an inflow of \$50), and the first interest payment of \$0.42 is paid in the second month. (Thus, unlike in the previous question, interest is paid during the first year.) Assume most expenses and income occur pro rata. (Warning: Unless you are a masochist, do not solve this question by hand. Use a computer spreadsheet!)

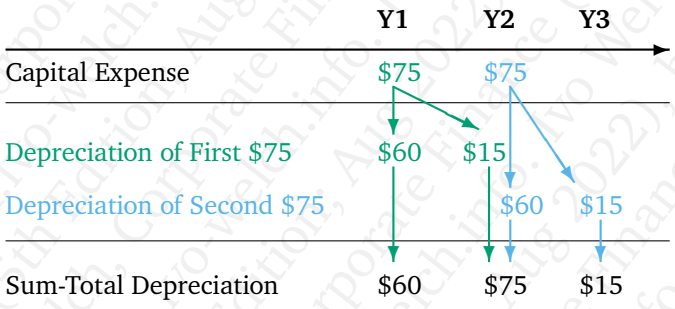
14.3 Paid and Deferred Taxes

Unreported IRS depreciation ≠ Publicly Reported GAAP depreciation

Our next real-world complication is the fact that GAAP and the IRS require different depreciation schedules. To extract the economic cash flows, you need to learn how to undo the accounting for what the firm reports on its public financials and what the firm actually pays to the IRS.

In an example, we have the IRS allow for faster depreciation.

Assume that the above example illustrated what GAAP requires the firm to disclose on its financial statements. The novelty is that we now assume that the IRS allows you to depreciate your plant in a different "accelerated fashion." Let's say the IRS depreciation schedule is not \$25 each for three years (as reported in your public financials), but \$60 in the first year and \$15 in the second year.



Consequently, although the accounting statement construction logic for the IRS is exactly the same as it is for your publicly reported financials, the numbers on your undisclosed IRS financials are different from those in your reported public financials:

Calculating Taxes.

	IRS Income Statement (Not Disclosed)	Y1	Y2	Y3	Y4	Y5	Y6
	Sales	$70	$70	$70	$70	$70	$70
–	COGS	$5	$5	$5	$5	$5	$5
–	SG&A	$5	$5	$5	$5	$5	$5
=	EBITDA	$60	$60	$60	$60	$60	$60
–	IRS Depreciation	$60	$75	$15	$0	$0	$0
=	EBIT, IRS	$0	–$15	$45	$60	$60	$60
–	Interest Expense, IRS	$0	$5	$5	$5	$5	$5
=	EAIBT (or EBT), IRS	$0	–$20	$40	$55	$55	$55
–	**Corporate Income Tax (at 40%)**	**$0**	**–$8**	**$16**	**$22**	**$22**	**$22**

(The IRS is not interested in a net income figure, so there is no reason to compute it.) Now compare the actual true taxes on your IRS financials against the GAAP-allocated income taxes in Table 14.6:

➤ Income Statement, Table 14.6, Pg.12.

		Y1	Y2	Y3	Y4	Y5	Y6
Publicly Reported GAAP	Pretend Tax	$14	$2	$2	$12	$22	$22
Undisclosed IRS Calculation	Actual Tax	$0	–$8	$16	$22	$22	$22

Both lines contain $74 in total taxes, but your real IRS taxes are lower in the first two years and higher in the next two years. This is because the IRS permitted a faster depreciation schedule than GAAP did. (Good for you! The firm receives cash earlier.)

Unfortunately, firms do not disclose their IRS financials, so you cannot work with them. Fortunately, publicly traded firms are required to report the differences between "IRS real taxes" and "GAAP pretend taxes." This is done in an "encoded" fashion on the balance sheet and called accumulated **deferred taxes** — the "cumulated differences between GAAP and IRS taxes." To understand this better, think of a hypothetical annual flow number that would be the amount by which you have overreported taxes on your financials:

The deferred tax account on the balance sheet allows you to learn the real taxes paid.

	Y1	Y2	Y3	Y4	Y5	Y6
"Deferred Tax" Annual Overreporting	$14	$10	–$14	–$10	$0	$0

Unfortunately, even this version is still not reported. However, its cumulative sum is reported:

One more transform — cumulation —to undo.

	Y1	Y2	Y3	Y4	Y5	Y6
Reported "Deferred Tax" Account	$14	$24	$10	$0	$0	$0

This deferred tax is reported as a liability on the balance sheet. An intuitive way to think of this number is as the amount by which your reported financial statements have overstated your real income tax (and thus understated your real income) to date. Our example firm had overreported on the disclosed financials the taxes that it had paid by $24 by the end of year 2 ($14 in year 1 and $10 in year 2).

Here is how you work your way back to uncover the actual taxes paid to the IRS.

Your task is again reverse-engineering — how can you undo the fake income tax term on the IS and replace it with a real income tax? The procedure is:

1. Compute the annual overreporting of deferred tax from the reported deferred tax account. This is the change in the deferred tax account every year:

	Y1	Y2	Y3	Y4	Y5	Y6
Reported Starting Point (DefTax)	$14	$24	$10	$0	$0	$0
⇒ Consecutive Annual Increase	$14	$10	–$14	–$10	$0	$0

2. To recover actual taxes paid, subtract the change from the GAAP-reported taxes paid:

		Y1	Y2	Y3	Y4	Y5	Y6
	Reported GAAP Taxes	$14	$2	$2	$12	$22	$22
–	Consecutive Annual Increase	$14	$10	–$14	–$10	$0	$0
⇒	Actual Taxes Paid to the IRS	$0	–$8	$16	$22	$22	$22

3. For financial figures that are before-tax, subtract the actual taxes paid instead of the GAAP taxes paid. For example,

		Y1	Y2	Y3	Y4	Y5	Y6
	Cash Flow, Machine w/o Tax	–$15	–$15	$60	$60	$60	$60
–	Actual Taxes Paid to the IRS	$0	–$8	$16	$22	$22	$22
⇒	Cash Flow, **Project**	–$15	–$7	$44	$38	$38	$38

For financial figures that are after-tax, such as after-tax cash flows, first add back the GAAP taxes that your after-tax figure had already subtracted. Then subtract the actual IRS taxes paid instead. Or, simpler, just add increases in deferred tax. For example, add these changes to the after-tax cash flows that you computed in Table 14.7 on Page 16:

		Y1	Y2	Y3	Y4	Y5	Y6
	Earlier Formula, Cash Flow, **Project, After Tax**	–$29	–$17	$58	$48	$38	$38
+	Changes in Deferred Tax	$14	$10	–$14	–$10	$0	$0
=	Better Formula for Cash Flows, **Project**	–$15	–$7	$44	$38	$38	$38

In sum, the new and improved formula to extract cash flows from financial statements is

Reverse-engineering: Add changes in deferred taxes to the cash flows from the earlier formula.

		Y1	Y2
	EBIT	+$35	+$10
+	Depreciation	+$25	+$50
"+"	(–)Capital Expenditures	+(–$75)	+(–$75)
–	(+)Corporate Income Tax	–(+$14)	–(+$2)
=	Cash Flow, Project, After Tax, GAAP Taxes	–$29	–$17
+	Changes in Deferred Taxes	+$14	+$10
=	Cash Flows, Project, After Tax, Real	–$15	–$7

That's it. You have taken care of the differences between the GAAP and IRS taxes.

Sign convention alert — when you see "deferred taxes" on the cash-flow statement, accountants really mean the "change in deferred taxes." (Otherwise, they could not add the numbers as cash flows to other cash flows.) You are supposed to be aware of this.

Deferred tax reporting.

Reuters reports on Pleasure Deferred

For many years, Citigroup Inc (C) had been grappling with a baffling problem — how to incur more U.S. taxes. In the Fall of 2008, the third-largest U.S. bank had tried to buy the foundering Wachovia, in part because the deal would have brought it more taxable domestic income. Citigroup was further reclassifying overseas profit as money that it would bring back to the United States — an odd move in an era in which many American companies were trying to keep much of their foreign income abroad in order to avoid paying higher U.S. taxes on the profits.

Citigroup was not feeling generous. It was just looking to use up $55 billion (!) of tax credits and deductions, known as deferred tax assets, which it had accumulated from losses and foreign tax payments largely during and after the Financial Crisis of 2008-9. About 95 percent of these future tax benefits were in the United States. Realizing these benefits over time should have been worth $27 billion — or about $9 per share for a stock that traded at around $50 a share in 2013.

Reuters explained it as follows: deferred tax assets arise because U.S. companies have to keep two sets of books — one for the financial markets, and a second for the Internal Revenue Service. The bank recognizes items including costs, such as expected losses on loans, at different times on the two books. A cost that is on a bank's books for investors, but will not be recognized for tax purposes until later, generates a deferred tax asset. Regulators force banks to use more capital to support these assets, because there is often doubt over whether the assets will be fully realized.

Indeed, Citigroup ultimately failed to convert all of their tax credits quickly enough into cash. This was because Congress lowered the corporate income tax from 35% to 21% in 2018 — thus reducing the effective value of Citibank's credits by over $18 billion. *Reuters, June 18, 2013*

Q 14.7. What are "deferred taxes"? On which of the four financial statements do they appear?

Q 14.8. Assume a firm reports the following information:

	2022	2021	2020
Deferred Tax Liability	$110	$332	$223

You have calculated the after-tax cash flows for a project based on GAAP to be $300 in 2022 and –$100 in 2021. What are the actual after-tax cash flows for the project?

14.4 Short-Term Accruals and Working Capital

More accruals are hidden in working capital.

In addition to long-term accruals and deferred taxes, firms also have short-term accruals. To run a business day-to-day requires cash. Firms must put money into cash registers (to make change), into inventories (to have something to sell), and into extending credit to buyers (to get them to bite). These current assets consist of **cash**, **accounts receivable**, and **inventories** (with the effective assumption that receivables and inventories will turn into cash fairly soon). Current liabilities are **accounts payable**, **bank overdrafts**, the aforementioned taxes payable, and other soon-due bills. **Net working capital**, often somewhat incorrectly just called **working capital**, is

➤ Current Assets and Liabilities, Pg.4.

$$\begin{aligned}\text{Net Working Capital} &= (\text{Current Assets}) - (\text{Current Liabilities})\\ &= (\text{Marketable Securities [=Cash]} + \text{Accounts Receivable} + \text{Inventories})\\ &\quad -(\text{Accounts Payable} + \text{Bank Overdrafts} + \text{Taxes Payable})\end{aligned}$$

Where would you find the physical changes in cash (in the cash register) itself? These are *not* in the changes of working capital. Instead, they are what you find at the bottom line of the cash-flow statement itself. In other words, the very purpose of the cash-flow statement is to tell you by how much the cash account of the firm is changing year to year.

Net income books cash before it comes in, so accounts receivable need to be taken out.

The cash-flow effects of working capital changes are best explained with an example. Say that a firm sells $100 of goods on credit at year 1. The firm books $100 as net income. But because the $100 is not yet available, the firm also books $100 into accounts receivable. To compute actual cash flows, recognize that the cash has not yet materialized: You need to subtract the $100 accounts receivable from the $100 net income.

These differences between cash flows and net income are year-to-year changes in working capital.

This becomes more intricate if you consider multiple years. For example, the firm in Table 14.8 always sells on credit and is always paid by its customers the following year. An NPV analysis requires the firm's actual cash receipts in line 2, but accountants have provided only the information in lines 3 and 4. How do you get back the information in line 2? Year 1 has already been discussed: You subtracted accounts receivable from net income to obtain the actual cash inflows of $0. Year 2 is more interesting: The firm previously had accounts receivable of $100, but now has accounts receivable of $300. It is the +$200 (= $300 – $100) *change* in accounts receivable that needs to be subtracted from the $300 in net income in order to infer

		Y0	Y1	Y2	Y3
Finance	1. Sales (Net Income) Made, Payment Later	$0	$100	$300	$0
	2. Actual Cash Receipts (for NPV Cash Flow)	$0	$0	$100	$300
Accounting	3. Reported Net Income	$0	$100	$300	$0
	4. Reported Accounts Receivable	$0	$100	$300	$0

Table 14.8: *Multi-Year Working Capital.* I have made up the sales number in line 1. The actual cash receipts in line 2 arise because customers always pay one year later. Lines 3 and 4 show how accountants book these sales and payment patterns. (Ultimately, your task will be to translate accounting numbers back into cash receipts numbers.)

the actual cash receipts of $100. In year 3, the firm no longer grows and is liquidated, so the remaining receivables turn into cash that can be recaptured from the business. Again, the formula to obtain the NPV cash flow (line 2) subtracts the change in working capital (accounts receivable) of $0 – $300 = –$300 from the $0 net income to conclude that you got a +$300 cash inflow. Table 14.9 shows these calculations. (Incidentally, recall how you started this subsection with the year 1 computation: You subtracted $100 in accounts receivable from the $100 net income. This worked only because the accounts receivable was the same as the *change* in accounts receivable, because the original accounts receivable was zero.)

		Y0	Y1	Y2	Y3
Finance	1. Sales (Net Income) Made, Payment Later	$0	$100	$300	$0
	2. Actual Cash Receipts (for NPV Cash Flow)	$0	$0	$100	$300
Accounting	3. Reported Net Income	$0	$100	$300	$0
	4. Reported Accounts Receivable	$0	$100	$300	$0
	Your Computations				
	5. Change in Accounts Receivable	*$0*	*+$100*	*+$200*	*–$300*
	6. Net Income (line 3) – Change in Accounts Receivable (line 5)	*$0*	*$0*	*+$100*	*+$300*

Table 14.9: *Multi-Year Working Capital.* Line 6 recovers line 2 from the financials.

Other short-term accruals that are components of working capital work similarly. For example, although corporate income tax is deducted on the income statement for the year in which the earnings have occurred, firms do not have to immediately pay these taxes. Instead, they can often defer them to the next tax filing deadline or perhaps even a little longer. To the extent that more taxes can be delayed, more cash

Working capital already contains other delayed payments, making our lives easier.

is available than is suggested by net income. Therefore, delayed taxes must be added back to net income when computing finance cash flows. Of course, at some point in the future, these taxes payable will have to be paid, and they will then have to be counted as a cash outflow of the firm. But for now, the permitted delay in payment is like a government loan at zero interest — and one that the accounting item *net income* ignores.

Important

To take care of short-term accruals in the conversion from net income into cash flows, undo the smoothing — subtract *changes* in net working capital. (Equivalently, you can add *decreases* in net working capital.)

Working Capital Management

Entrepreneurs usually fail for one of two reasons, and both are common: The first is that the business is just not a good idea to begin with. (The best "cure" is to try to remain extra skeptical and careful.) The second is that the business is too good of an idea and the entrepreneur is not equipped to handle the success. The growth in sales consumes so much cash for increases in working capital that the firm fails to pay back its own loans: The cash is tied up in production, or in inventory, or in credit extended to customers (payment to be received), when instead it is needed to flow back to the bank. For growing firms, proper working capital management is an issue of first-order importance.

Expand our valuation formula for another source of cash.

You can now expand our formulas to include changes in working capital:

Project Economic Cash Flow	
= EBIT	
+Depreciation – Capital Expenditures	← undoes long-term accruals
–Corp. Income Tax + Changes in Deferred Tax Accounts	← undoes IRS tax timing
–Increase in (Net) Working Capital	← undoes advance booking

(Sign convention alert: In this formula, I am quoting the purchasing of assets in capital expenditures as a positive number. If you are using the negative number from the cash-flow statement, don't subtract but add it.)

Q 14.9. A firm reports the following financials.

	Y0	Y1	Y2	Y3	Y4	Y5	Y6
Reported Sales (=Net Income)	$0	$100	$100	$300	$300	$100	$0
Reported Accounts Receivable	$0	$100	$120	$340	$320	$120	$0

Can you describe the firm's customer payment patterns? Extract the cash flows.

Q 14.10. Construct the financials for a firm that has quarterly sales and net income of $100, $200, $300, $200, and $100. Half of all customers pay immediately, while the other half always pay *two* quarters after purchase.

Q 14.11. (Advanced) Amazonia can pay suppliers after it has sold to customers. Amazonia has 25% margins and is reporting the following:

Month	Jan	Feb	Mar	Apr	May
Reported Sales	$0	$100	$100	$400	$0
Reported Net Income	$0	$25	$25	$100	$0
Reported Accounts Payable	$0	$75	$75	$300	$0

What are Amazonia's actual cash flows?

14.5 Earnings Tricks

There is considerable discretion in financial reporting.

Even though the United States has some of the tightest accounting regulations in the world, managers still have a lot of discretion when it comes to financials. They have to. It is impossible to define everything by rule. Value assessments must partly be based on opinions. And there is often no clear line. It can be many shades of gray, instead. The slope between an ethical and legal judgment call (sometimes called "management"), and unethical and criminal behavior (sometimes called "manipulation") can be a slippery one.

Not only earnings — but also cash flows — can be "managed."

You already know that managers must make many judgments when it comes to accrual accounting. For example, managers can judge overoptimistically how many products customers will return, how much debt will not be repaid, how much inventory will spoil, how long equipment will last, whether a payment is an expense (fully subtracted from earnings) or an investment (an asset that is depreciated over time), or how much of an expense is "unusual." However, manipulation is possible not only for earnings and accruals but also for cash flows — though doing so may be more difficult and costly. For example, if a firm designates some of its short-term securities as "trading instruments," their sale can then create extra cash — what was not cash before now counts as cash! Similarly, you already know that firms can reduce inventory, delay payments to suppliers, and lean on customers to accelerate payment — all of which will generate immediate cash, but doing so will also possibly anger suppliers and customers so much that it will hurt the business in the long run. Firms can also sell off their receivables at a discount, which may raise the immediate cash at hand but reduce the profit that the firm will ultimately receive. A particularly interesting form of earnings management occurs when a firm aggressively sells products on credit. The sales can be immediately booked as earnings, with the loans counting as investments. Of course, if the customers default, all the company has accomplished is giving away its product for free.

Comparing (short-term) accruals to those of similar firms (industry, size, and growth rate) can sometimes give you good warning signs.

One quick measure of comparing how aggressive or conservative financials are is to compare the firm to other similar firms on the basis of the ratio of its short-term accruals divided by its sales. It is important that "similar" here means firms that are not only in the same industry but also growing at roughly the same rate. The reason is that growing firms usually consume a lot of cash — an established firm will show higher cash flows than a growing firm. If the firm is unusual in having much higher accruals — especially short-term accruals — than comparable firms, it is a warning flag that this firm deserves more scrutiny. Managers who decide

to manipulate their numbers to jack up their earnings more than likely will try to manage their accruals aggressively in order to create higher earnings, too. Of course, this does not mean that all managers who manage their accruals aggressively do so to deceive the market and will therefore underperform later on. A manager who is very optimistic about the future may treat accruals aggressively — believing in few returns, great sales, and a better future all around. Indeed, as noted earlier, the slope from managerial optimism to illegal earnings manipulation is slippery. Finally, another earnings warning sign for the wary investor is when a firm changes its fiscal year — this is sometimes done in order to make it more difficult to compare financials to past performance or to financials of other firms in the same industry.

Q 14.12. Are short-term or long-term accruals easier to manipulate?

Q 14.13. Give some examples of how a firm can depress the earnings that it currently reports in order to report higher earnings later.

14.6 Economic Cash Flows from Intel's Financials

The Intel cash-flow statement looks very much like our construction.

Now, if you take another look at the complete Intel cash-flow statement in Table 14.4, you can immediately see the procedures that we have just discussed. Starting with net income of \$11.42 billion, add back depreciation of \$8.711, subtract capital spending of \$7.326 (a few lines lower), add (changes in) deferred income taxes (not broken out), and add the decrease in net working capital (the sum of \$0.355, \$0.637, and \$0.764).

Now "wing it" for Intel — each firm does it a little differently.

There are also some other items that have not been explained, so let's tie up these loose ends. There are two pieces of good news here. First, you now understand the main logic of what is going on. Second, you can now rely on the accountants to do most of the hard work for you. The logic of how to handle the remaining items in the cash-flow statement is either similar to what we have already discussed and/or obvious from the name. For instance, you hopefully won't need an explanation from me for "effects of exchange rate changes." Like me, you will have to "wing it" — or better, seek to understand the specific company you are analyzing.

Here are two more potentially important items: goodwill and miscellany.

Many cash flow statements also have other items that we have not discussed. One is called **investment in goodwill**. I have no idea who came up with this name, because it is a total misnomer. It actually has to do with cash laid out when our firm has acquired other firms. Intel apparently did not need accounting for large recent acquisitions, so it did not report goodwill. Other items are catch-alls, such as "adjustments to net income" (huh?) and "changes in other operations" (huh?), both of which are hopefully explained in the footnotes.

Now apportioning the Intel cash flows to creditors and shareholders.

With \$19.017 + (–\$8.183) = 10.834 in cash flows generated by Intel's projects, all that is left is to apportion them between creditors and shareholders. Shareholders receive inflows from new debt issued, and pay interest and principal. New debt plus principal repayment is called "net issuance of debt." For Intel, this amounted to \$9.002 billion, which Intel will use for its Altera acquisition in 2016. (Shareholders paid a further \$0.1 in net interest.)

Please do not consider the cash-flow formulas that we dissected to be the one perfect, end-all formula to compute NPV cash flows. No formula can cover *all* items in *all* companies. Even for Intel, we had to lump together some items and ignore others (such as foreign exchange effects). Again, every business operates and reports differently. Still, this chapter has given you a good start for understanding the link between earnings and cash flows and realized cash flows for an NPV analysis.

We have a suggestive cash-flow formula, not a perfect one.

On Wall Street, analysts also call the cash flow to financial debt and equity **free cash flow**. Sometimes, they work with an abbreviated formula:

A common shortcut formula: "free cash flow."

$$\begin{aligned}\text{Free Cash Flow} = \ & \text{EBIT} - \text{Taxes} + \text{Depletion \& Depreciation \& Amortization} \\ & - \text{Capital Expenditures} - \text{Increases in Working Capital}\end{aligned}$$

The idea is that this helps you assess what you can wring out of the firm if you bought it and stopped activities like acquisitions or increased capital expenditures.

The Best and Quickest Way To Obtain Cash Flows

Here is a much easier and foolproof method if you have the cash-flow statement.

Usually, you can avoid having to construct the cash flow from the income statement with our long formulas. For a firm that has reported full public financials, you can rely on the corporate **cash-flow statement** itself. After all, it tries to construct most of the information for you. Its big categories, including some for which we just had a vague miscellaneous designation in our long formula, are *cash flows from operating activity* and *cash flows from investing activity*. You can use this sum instead of fiddling with the components. There is only one difference between what accountants consider cash flows and what financiers consider cash flows: interest payments. Accountants consider interest payments as a necessary expense to run the business. Financiers consider them a distribution to the firm's financiers. If you take care of this detail, you can then rely on our accounting friends. It is worth mentioning that, in past decades, most publicly traded firms had considerable interest expenses that needed to be added back. In recent decades and especially after the Great Recession of 2008-9, even non-financial firms have been holding large amounts of cash, thus creating net interest income instead of net interest expense.

Important

The easiest and most reliable way to extract economic cash flows for a present value analysis is to rely on the accounting cash-flow statement. Using the cash flow statement is the most accurate formula because there are all sorts of little (or big) accounting nuances that any other formula would omit.

We need only to take care of the fact that accountants consider interest a cost of doing business, whereas financiers consider it a payout to capital providers.

Project cash flows (CF) are due to financial creditors and shareholders together and are computed as

$$\begin{aligned}\text{Project Cash Flow} = {} & \text{Cash Flow from Operating Activity} \\ & + \text{Cash Flow from Investing Activity} \\ & + \text{(Net) Interest Expense}\end{aligned}$$

Net income, a component of cash flow from operating activity, has had interest expense subtracted out. But interest expense is cash that is being returned to (debt) investors. Thus, to obtain the total amount of cash flows generated by the project and available (paid out to) the sum total of both creditors and shareholders, the interest expense (from the income statement) must be added back. There are instances in which the firm has more interest-earning cash than interest-earning liabilities. In this case, there can be some mild ambiguity on how you should treat it — but it rarely matters.

Equity cash flows (CF) are available only to levered equity (i.e., the company's shareholders):

$$\begin{aligned}\text{Equity Cash Flow} = {} & \text{Project Cash Flow} \\ & + \text{Net Issuance of Debt} - \text{Interest Expense}\end{aligned}$$

Equity receives all debt proceeds and pays all debt principal and interest. Substituting the first formula into the second formula shows that equity cash flows can also be computed as *Cash Flow from Operating Activity* plus *Cash Flow from Investing Activity* plus *Net Issuance of Debt*.

A sidenote: These project cash flows are **not** from the thought experiment of unlevering the firm, which can have tax consequences and which will be covered in Chapter 18. Instead, these project cash flows are for a thought experiment in which the firm has the same debt and equity, but you own it all.

Intel's cash flow, the easy way.

Will these formulas give you the same result? Apply them to Intel. Adding *total operating activity* of +$19.0 and *total investing activity* of –$8.2 gives $10.8 in *operating activity net of investing activity*. Finally, you need to add back any interest expense that was taken out from net income. (After all, the project generated these funds and they were paid out to capital providers, just as dividends are paid out.) In Intel's case, the cash flow that you would use in an NPV analysis of the business of Intel for 2015 is

$$\text{Project Cash Flow} = \$19.0 + (-\$8.2) + (+\$0.1) = \$10.9$$

$$\text{Project Cash Flow} = \text{Operating} + \text{Investing} + \text{Interest Expense}$$

These are the cash flows accruing to all claimants together, debt and equity. You are still interested in the cash flow that is earned by Intel's levered equity (without the creditors). You need to add cash obtained from *net issuance of debt* (the difference of

debt principal that was raised and repaid, which you can read from the cash-flow statement), and you need to subtract the interest that you just added:

Equity Cash Flows = \$10.9 + (\$9.0) + (–\$0.1) = \$19.8

Equity Cash Flows = Project Cash + Net Issuance of Debt – Interest Expense

By how much did Intel's earnings and cash flows differ?

Intel showed a very healthy net income of \$11.4 billion in 2015, but \$0.3 billion less than the \$11.7 billion it made in 2014. Did it also suffer a decline in cash flows? Project cash flow in 2014 was \$20.4 + (–\$9.9) – \$0.043 ≈ \$10.5, so here the answer is no. Equity cash flow in 2014 was \$10.5 – \$0.2 + \$0.043 ≈ \$10.3, so here the answer is yes. Intel shareholders borrowed a lot of money in 2015, which they had not in 2014 — to finance the impending Altera acquisition.

What Intel did with the money.

The cash-flow statement in Table 14.4 also continues when we stopped. It proceeds to tell you what Intel did with its (post-interest) cash flows:

Dividends: It used \$4.556 billion to pay dividends.

Equity: It repurchased \$1.810 billion in stock.

Debt: It paid \$0.558 billion in other cash flows for something.

Furthermore, in anticipation of its 2016 Altera acquisition, Intel borrowed \$9.002 billion, leaving it with \$12.747 billion more cash at the end of 2015 than at the end of 2014.

The task is done!

Your task is done — you should now be able to look at a financial statement, understand its structure, and assess its cash flows.

Q 14.14. From memory, can you recall the main components of economic cash flows that determine the cash flows used in an NPV analysis? Do you understand the logic?

Q 14.15. What were the cash flows produced by Intel's projects in 2013 and 2014?

Q 14.16. Do a financial analysis for Microsoft. Obtain the past financial statements from a website of your choice (e.g., YAHOO!FINANCE or Microsoft's own website). Compute the cash flows that you would use for an NPV analysis of the firm value and the equity value over the most recent three fiscal years.

14.7 What To Believe on the Balance Sheet

The book value of equity is particularly tempting and problematic.

Generally, financial accounting in the United States is geared toward producing relatively accurate flow values on the income and cash-flow statements, not accurate stock values on the balance sheet. There is one particular balance sheet item that is especially seductive: the **book value of equity** (BV of equity, or BVE). Unfortunately, it is also the least reliable value on the least reliable financial statement. Because of the way that depreciation and other rules work, after the accountants have completed all their bookkeeping, the book value of equity becomes what is required to equalize the left-hand side and right-hand side of the balance sheet. Put differently, the book value of equity is a "placeholder." On occasion, it can be entirely meaningless. For example, it can even be negative — and obviously any number that can be negative is not sensible for a claim that has limited liability. Firms in the same industry can have very different equity book values if they are of different age. For older firms,

➤ Flow vs stock financials' accuracy, Pg.8.

the book value of older assets is often just a fraction of the true market value, not because these assets are typically worthless, but because accountants have typically written them down to be of zero value.

Don't misunderstand my statement: The book value of debt is often reasonable; only the book value of assets and even more so of equity are untrustworthy.

Are other balance sheet items more reliable? It depends. Fortunately, unlike the book value of equity, the **book value of liabilities** tends to be more reliable, if only because it is harder for a firm to weasel out of its commitments to pay. Many of these commitments are relatively short-term, too. Even the **book value of financial debt** (a component of liabilities that can contain many long-term liabilities) is usually reasonably accurate, at least if interest rates have not changed dramatically since the debt's issue. Besides, you rarely have an alternative, because the *market* value of debt (or of total liabilities) is usually not available.

Total Assets have the same problem.

Unfortunately, the **book value of assets** remains troublesome. It is the sum of the book value of equity, financial debt, and nonfinancial liabilities. Although the latter two are often reasonably accurate, the first is not. Thus, the accounting item "total assets" also generally misstates (often understates) the true values of (older) firms.

Important

Balance sheet stock numbers are often inaccurate as measures of true values. This applies especially to the book value of equity. In turn, it applies, to a lesser extent, to the book value of assets. The most reliable figures on the balance sheet are often cash and short-term instrument assets and financial-debt liability figures.

Summary

This chapter covered the following major points:

- There are four required financial statements: the balance sheet, the income statement, the shareholders' equity statement, and the cash-flow statement. Although every company reports its numbers a little differently, the major elements of these statements are fairly standard.
- Financial statements also serve more purposes than just NPV calculations, and are well worth studying in more detail — elsewhere.
- Earnings (net income) are *not* the cash-flow inputs required in an NPV analysis.
- Accountants use "accruals" in their net income (earnings) computation, which you need to undo in order to extract actual cash flows.
- The primary long-term accrual is "depreciation," an allocation of capital expenditures. The prime operation to undo this is to add back depreciation and subtract out capital expenditures.
- Deferred taxes adjust for differences in the depreciation schedules that GAAP and the IRS prescribe.
- The primary short-term accrual is "changes in working capital," an allocation of soon-expected but not-yet-executed cash inflows and outflows. Examples are accounts payable, accounts receivable, and taxes payable. The prime operation to undo them is to subtract changes in working capital.
- If a cash-flow statement is available, it conveniently handles most of the difficulties in undoing accruals for the NPV analysis. However, accountants believe interest expense to

be a cost of operations, whereas financiers believe it to be a payout to financiers. Thus, interest expense requires special handling.

- Formula 14.6 shows how to compute cash flows that accrue to project financiers (the "owners," who — in the sense it is used here — are themselves the debt holders plus the equity holders). It is *cash flow from operating activity*, plus *cash flow from investing equity*, plus *interest expense*.
- Formula 14.6 shows how to compute cash flows that accrue to levered equity owners (equity only). It is the cash flow that accrues to project owners, plus *net issuance of debt*, minus *interest expense*.
- Balance sheet values, especially the book value of equity and the book value of assets, tend to be unreliable measures of their true value equivalents.

A final observation: One common source of (avoidable) errors when analyzing financial statements is getting the accounting convention signs wrong.

Keywords

10-k, p.3; 10-q, p.4; a/r, p.9; accelerated depreciation, p.9; accounts payable, p.24; accounts receivable, p.24; accounts receivables, p.9; accrual, p.8; amortization, p.19; annual report, p.3; bank overdraft, p.24; book value, p.4; book value of assets, p.32; book value of equity, p.31; book value of financial debt, p.32; book value of liabilities, p.32; bottom line, p.13; cash, p.24; cash-flow statement, p.29; cogs, p.11; conservatism, p.8; current assets, p.4; current liabilities, p.4; deferred taxes, p.21; depletion, p.19; depreciation, p.19; disclosure, p.2; earnings, p.13; ebit, p.13; ebitda, p.13; edgar, p.4; expense, p.9; fasb, p.2; financial accounting standards board, p.2; financial report, p.3; free cash flow, p.29; gaap, p.2; generally accepted accounting principles, p.2; impairment rule, p.9; income tax, p.9; intangible asset, p.19; inventories, p.24; investment in goodwill, p.28; management description and analysis, p.4; natural resources, p.19; net income, p.13; net working capital, p.24; operating income, p.13; quarterly report, p.3; receivables, p.9; recognition, p.2; revenue, p.13; sales, p.13; sg&a, p.11; straight-line depreciation, p.9; tangible assets, p.19; taxes payable, p.9; working capital, p.24.

Answers

AQ 14.1 The main difference between how accountants see income and how financiers see cash flows is accruals. Examples are the treatment of depreciation (versus capital expenses) and the delayed payments/receipts.

AQ 14.2 Basically yes: The lifetime sum of net income should be approximately equal to the firm's lifetime cash flows. Cash flows just have different timing. For example, a firm's capital expenditures are not booked immediately, but the sum of all lifetime depreciation should add up to the sum of all lifetime capital expenditures. This abstracts away from some discounting that accountants are doing, and many specific accounting cases that we have not covered, but the intent of earnings is that it should come out alike.

AQ 14.3 The calculations in Table 14.7 for years 1 and 2 are in the chapter text. Project cash flows thereafter are

	Y3	Y4	Y5	Y6
EBIT	$10	$35	$60	$60
+ Depreciation	$50	$25	$0	$0
– Capital Expenditures	$0	$0	$0	$0
= Cash Flow, Project, Pre Tax	$60	$60	$60	$60
– Corporate Income Tax	$2	$12	$22	$22
= Cash Flow, Project, Post Tax	$58	$48	$38	$38

Cash flows to levered equity are

	Y3	Y4	Y5	Y6
+ Net Debt Issue	$0	$0	$0	–$50
– Interest Expense	$5	$5	$5	$5
= Cash Flow, Levered Equity	$53	$43	$33	–$17

Alternatively,

	Y3	Y4	Y5	Y6
Net Income	$3	$18	$33	$33
+ Depreciation	$50	$25	$0	$0
– Capital Expenditures	0	0	0	0
+ Net Debt Issue	$0	$0	$0	–$50
= Cash Flow, Levered Equity	$53	$43	$33	–$17

AQ 14.4 Analogous to the cash flows in Table 14.7, a 10% instead of a 12% cost of capital on the tax liability would increase the NPV of the tax obligation from $46.77 to

$$\text{NPV}_{\text{tax liability}} = \frac{\$14}{1.1} + \frac{\$2}{1.1^2} + \frac{\$2}{1.1^3} + \frac{\$12}{1.1^4} + \frac{\$22}{1.1^5} + \frac{\$22}{1.1^6} \approx \$50.16$$

Therefore, the project value would decrease by $3.39.

AQ 14.5 The income statement is now as follows:

		Y1	Y2	Y3	Y4	Y5
	Sales (Revenues)	$80	$80	$80	$80	$80
–	COGS	$6	$6	$6	$6	$6
–	SG&A	$8	$8	$8	$8	$8
=	EBITDA	$66	$66	$66	$66	$66
–	Depreciation	$30	$30	$30	$30	$0
=	EBIT (Oper. Income)	$36	$36	$36	$36	$66

(continued)

=	EBIT (Oper. Income)	$36	$36	$36	$36	$66
–	Interest Expense	$0	$8	$8	$8	$8
=	EAIBT (or EBT)	$36	$28	$28	$28	$58
–	Income Tax (at 50%)	$18	$14	$14	$14	$29
=	Net Income	$18	$14	$14	$14	$29

The cash-flow statement excerpt is now as follows:

	Y1	Y2	Y3	Y4	Y5
Capital Expenditures	–$120				
Net Debt Issue	+$100				–$100
Depreciation	$30	$30	$30	$30	$0

The cash-flow formula is EBIT plus depreciation (or use EBITDA instead) minus capital expenditures, minus corporate income tax. For year 1, this is: $36+$30–$120–$18 = –$72. The first levered equity cash flows are –$72 + $100 = +$28.

CFlow	Rate	Y1	Y2	Y3	Y4	Y5	NPV
Mchn	8%	–$54	$66	$66	$66	$66	$152.41
U.S.	8%	–$18	–$14	–$14	–$14	–$29	–$69.81
Prjct	8%	–$72	+$52	+$52	+$52	+$37	$82.60
Loan	8%	+$100	–$8	–$8	–$8	–$108	$0
Lev. Eq.	8%	+$28	+$44	+$44	+$44	–$71	$82.60

AQ 14.6 The (summarized) cash flows using monthly discounting (month is now abbreviated M) are as follows:

	M1	M2--M12	M13	M14--M36
EBIT	$2.92	$2.92	$0.83	$0.83
Depreciation	$2.08	$2.08	$4.17	$4.17
Cap.Exp.	–$75	0	–$75	0
Project CF, Pre Tax	–$70.00	$5.00	–$70.00	$5.00
Tax	$1.00	$1.00	$0.16	$0.16
Project CF, Post Tax	–$71.00	$4.00	–$70.16	$4.84
Loan	$50	–$0.42	–$0.42	–$0.42
Levered Cash Flow	–$21.00	$3.58	–$70.58	$4.42

Month	M37-M48	M49-M71	M72	PV
EBIT	$2.92	$5.00	$5.00	
Depreciation	$2.08	0	0	
Cap.Exp.	0	0	0	
Project CF, Pre Tax	$5.00	$5.00	$5.00	$115.59
Tax	$1.00	$1.83	$1.83	$46.25
Project CF, Post Tax	$4.00	$3.17	$3.17	$69.34
Loan	–$0.42	–$0.42	–$50.42	$0.00
Levered Cash Flow	$3.58	$2.75	–$47.25	$69.34

Tax is calculated as 40%·(EBIT – Depreciation – Interest Expense). For discounting, this uses a 1% monthly rate for project cash flows and taxes, and a 0.83% rate for the loan.

AQ 14.7 Deferred taxes is an account that represents the cumulated difference between taxes indicated on the firm's income statement and the (lower) amount of taxes that the firm has actually paid. They are the results of different accounting procedures that are used for reporting to shareholders and for reporting to Uncle Sam. (Note: Deferred taxes are *not* adjusted for the fact that taxes are typically paid the year after the income is earned.) They are reported on the balance sheet.

AQ 14.8 The deferred tax account increased $109 from 2020 to 2021. This means that the cash outflow was not as large as the income statement would have you believe. Thus, we add that back to the GAAP cash flows. The 2021 real after-tax cash flow was –$100 + $109 = $9. The deferred tax account decreased $222 from 2021 to 2022. This means that the firm paid out more than what the taxes on the income statement indicated, so this reduces the project cash flow. The 2022 real after-tax cash flow was $300 – $222 = $78.

AQ 14.9 To find the cash flows, work out the change in accounts receivable each year. Then subtract these changes from the net income.

	Y1	Y2	Y3	Y4	Y5	Y6
Reported NI	$100	$100	$300	$300	$100	$0
Reported A/R	$100	$120	$340	$320	$120	$0
Change in A/R	$100	$20	$220	–$20	–$200	–$120
Cash Flows	$0	$80	$80	$320	$300	$120

The firm's customers did not all pay the next period. Therefore, the cash flows were delayed.

AQ 14.10 The cash flows are as follows (Q is Quarter):

	Q1	Q2	Q3	Q4
Reported NI	$100	$200	$300	$200
Immediate CF	$50	$100	$150	$100
+ Delayed Cash Flow (CF)			+$50	+$100
⇒ = CF	=$50	=$100	=$200	=$200
⇒ Change in A/R	$50	$100	$100	$0
⇒ A/R	$50	$150	$250	$250

	Q5	Q6	Q7
Reported NI	$100	$0	$0
Immediate CF	$50	$0	$0
+ Delayed CF	+$150	+$100	+$50
⇒ = Cash Flow (CF)	=$200	=$100	=$50
⇒ Change in A/R	–$100	–$100	–$50
⇒ A/R	$150	$50	$0

It is easier to obtain the change in A/R first: You know that net income minus the change in A/R must add up to cash flows (change in A/R = net income–cash flows). And, knowing the change in A/R, calculating accounts receivable requires simple addition.

AQ 14.11 In February, Amazonia has cash inflows of $100 ($25 net income plus $75 change in accounts payable). In March, Amazonia has another $100 in sales, but payables stay the same. (It has to pay its old suppliers $75, even though it gets to keep $75 from its new suppliers.) Amazonia gets cash inflows of $25 only. In April, Amazonia gets net income cash inflows of $100, plus the $225 change in payables, for cash inflows of $325. Finally, in May, Amazonia has cash outflows of $300. The pattern is as follows:

Month	Jan	Feb	Mar	Apr	May
Cash Flows	$0	$100	$25	$325	–$300

Note that Amazonia has total 5-month cash flows of $150, just as it has total 5-month net income of $150. The working capital has only influenced the timing attribution.

AQ 14.12 Short-term accruals are easier to manipulate. To manipulate long-term accruals, you would have to manipulate the depreciation schedule, and though this may be possible a few times, if it is done often, it will most surely raise eyebrows.

AQ 14.13 If a firm assumes that fewer of its customers will actually pay their bills in the future (i.e., more will default), then its earnings are (too) conservative. There are also many other ways in which a firm can do this that have not been discussed. For example, a firm can take out a reserve against a judgment in a pending lawsuit.

AQ 14.14 Start with EBIT. Then undo accruals for taxes: Subtract off corporate income tax and add changes in deferred taxes. Then undo long-term accruals: Subtract off capital expenditures and add back depreciation. Then take care of the other components, changes in working capital first. Don't forget goodwill and other miscellany — they are quite big in some firms.

AQ 14.15 2013: $20.776 – $18.073 ≈ $2.703 2014: $20.418 – $9.905 ≈ $10.510

AQ 14.16 This will depend on the year of the analysis.

End of Chapter Problems

Q 14.17. Answer from memory: If you have access to a firm's cash-flow statement and income statement, how would you compute the economic cash flows that accrue to shareholders?

Q 14.18. Although accounting numbers are sometimes thought of as imaginary presentations, why is a firm not just a firm, and accounting numbers not just "funny numbers"? That is, what is the most important direct cash-flow influence of accounting in most corporations?

Q 14.19. Which statements on the firm's financial reports are about flows, and which are about stocks?

Q 14.20. Use an appropriate website to find out how MACRS works. How would you depreciate $10,000 in computer equipment?

Q 14.21. What would be the most common accounting value of residential investment property in each of the next 50 years when you purchased it for $3 million? (Hint: Use a straight line 40-year depreciation schedule.)

Q 14.22. Consider a $50,000 SUV that you expect to last for 10 years. The IRS uses an MACRS 5-year depreciation schedule on cars. It allows depreciating 20% in year 1, 32%, 19.2%, 11.52%, 11.52%, and 5.76% in the following years. You can finance this car yourself. You can produce sales of $100,000 per year with it. Maintenance costs will be $5,000 per year. Your income tax rate is 30% per annum. Your cost of capital is 12% per annum.

1. What are the income and cash-flow statements for this car?
2. What is the net present value of this car?
3. Show how you can infer the economic value of the car from the financials.

Q 14.23. Rework the previous question, but assume that you finance the entire car with a loan that charges 10% interest per annum. (The net present value now is the bundle "loan plus car," of course.)

Q 14.24. What is an accrual? How do long-term and short-term accruals differ?

Q 14.25. On its income statement, Verizon (VZ) lists income taxes of $6.8 billion in 2021, $5.6 billion in 2020, and $2.9 billion in 2019. On its balance sheet, it lists deferred income taxes are $40.7 billion in 2021, $35.7 billion in 2020, $34.7 billion in 2019, and $33.8 billion in 2018. How much did Verizon actually pay in income taxes in these years?

Q 14.26. Construct the financials for a firm that has quarterly sales and net income of $100, $200, $300, $200, $100. One-quarter of all customers pay immediately, while the other three-quarters always pay *two* quarters after purchase.

Q 14.27. In early 2022, General Motors (GM) reported the following information (in millions of dollars):

Income Statement

	2021	2020	2019
Net Income	$9,837	$6,634	$5,481

Balance Sheet

Year	2021	2020	2019
Accounts Rcvbl	$34,043	$34,244	$33,398
Inventories	$12,988	$10,235	$10,398
Othr Crrnt Assts	$6,396	$6,396	$7,407
Deferred Taxes	$21,152	$24,136	$24,640
Payables&Accrued	$38,227	$39,865	$44,271

Ignoring all other accruals, how would you adjust the net income to be more cash-oriented, that is, reflective of short-term accruals?

Q 14.28. Give some examples of how a firm can depress the cash flows that it reports in order to report higher cash flows later.

Q 14.29. Explain why EBITDA is more difficult to manipulate than EBIT.

Q 14.30. Among Intel's working capital items, which items allowed Intel to pull cash out of the business, and which items forced Intel to put more back into the business?

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