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Pro Forma Financial Statements and An Intel Case

Value, Financial Structure, and Corporate Strategy Analysis

According to Merriam-Webster, **pro forma** is a Latin term meaning "for form." Its use dates from around 1580. Pro forma has two definitions: "provided in advance to prescribe form or describe items;" and "made or carried out in a perfunctory manner or as a formality." In finance, a pro forma is a model of financial performance in a likely hypothetical future scenario. Hopefully, your pro formas will be more like the first definition than the second.

In a sense, pro formas are what much of corporate finance is all about—the standard business approach to contemplate decisions. For example, if you want to propose a new project to your boss, to the board of directors, or to an external venture capitalist, you will almost surely be asked to produce a business plan with a "pro forma." These financials will then be used as the baseline for discussion and evaluation of your proposed project. Unfortunately, pro formas are highly specific to the business. All this chapter can do is to give you some general guidance.

21.1 The Goal and Logic

Pro formas are more detailed than simple cash flow projections. This focus helps you think about the economics of business.

Creating a pro forma is a challenge similar to those of earlier chapters, where you had to estimate value. There, you needed to understand a whole variety of issues—the expected cash flows (which require knowledge of production, marketing, customers, etc.), appropriate costs of capital, corporate and capital structures, agency conflicts, and so on. The main novelty here is that you need to do this in the context of "pretend" financial statements rather than just isolated formulas. Creating a pro forma can help impose some discipline and structure on your thinking about the design and value of your proposed project. It forces you to think about important "details," such as what you believe sales and costs will be, how you will manage working capital, how quickly earnings and cash flows will turn positive, when taxes will become important, etc.

Forecasting pro formas is both hard and different from business to business.

No finance professor would dispute the importance of pro formas, but we are often reluctant to teach much about them. The cynical view is that constructing a pro forma is difficult and that we finance professors prefer it "easy." (Remember: theory is easy; practice is hard—not the other way around.) The less cynical view is that there are some good reasons for our reluctance:

1. **Idiosyncrasy:** In contrast to the many beautifully simple, elegant, and universal theoretical concepts in finance (such as present value), financials and pro formas are messy and uniquely different for each business. Forecasting the financials for a new cancer drug is different from forecasting for a new toy fad, which is different from forecasting for a retail

store, which is different from forecasting for aluminum mining, and so on. Many of the guidelines for creating good pro formas are necessarily less universal and more ad hoc.

2. **Relativity:** The difficulties in making good financial projections for a specific project are often tremendous. You must understand the limits of what you can and cannot do: You should be able to do it better than your peers—a *relative* rather than an *absolute* standard. Looking in retrospect at what later actually happened in relation to what you had predicted in your pro forma will likely turn into a lesson in humility. (Welcome to the club.)
3. **Learning by doing:** The best way to learn about pro formas is to struggle with constructing them. After reading this chapter, work through a few of the many "Harvard Business School" case studies.

Still, this chapter helps to prepare you. It will give you general guidance to help design better pro formas—important if you want to be an effective entrepreneur, manager, or analyst. You must be able to produce your own pro formas and critically analyze those of others.

Q 21.1. What does a full pro forma analysis do that a simpler projection analysis does not?

An External Analyst's View versus an Entrepreneur's View

Pro formas put together by outsiders are often used to value the business—and potentially acquire it.

There are two different types of pro formas. The first type are pro formas created by outsiders, such as external analysts, who construct them to assess market values. They often do this for privately held firms without known market values, but **private equity** buyers also sometimes create them to assess whether the market values of publicly traded companies seem too low. If their own pro forma value estimates are much higher than the current market values, then they may take a closer look at these firms as potential buyout or investment candidates.

Pro formas are often used by insiders to plan the business.

The second type are pro formas created by insiders who have more expertise and information than outsiders. For example, entrepreneurs or venture capitalists often create pro formas not only to assess values but also to help execute their business plans. They know the operational details and plans, but they tend to suffer from over-optimism. Moreover insiders have to worry about the following issues:

Working capital: Entrepreneurs must usually worry greatly about working-capital projection and management. It's often life or death. A small entrepreneur could lose the entire business if it were to run out of cash, even if only briefly and even if the underlying business economics are sound. (For large firms, working capital is just another operational issue.)

Non-Ideal financial markets: Almost all of moden finance relies on the ideal of perfect capital markets with good owner diversification. This is rarely the case for startups. Asymmetric information issues are rampant. There are few capital providers—mostly themselves, friends, and family. Most entrepreneurs have all their money staked on one horse. Consequently, they should care less about covariance with the market portfolio, and more about their startup's own risk.

➤ Entrepreneurial finance, Sect. 11.5, Pg.269.

Start-up versus mature phase: Entrepreneurs usually do not have a long prior history of operations that can give good guidance for the future. If everything goes according to plan, then their revenues will often start with a sharp initial business growth curve, to be followed later by a more stable period—or death. As firms mature and grow, they become less likely to default. This later decline in credit risk allows their borrowing rates of return to decline. You will learn in a moment that the end of the start-up growth phase is often a natural break. It is often a good choice for the time horizon T, the break where you stop the detailed projection period for your pro forma and resort to a "wholesale" final market value for all remaining value.

This chapter mostly takes the perspective of an external analyst evaluating Intel in mid 2016. Intel has no working-capital viability problems. It has a long operational and financial history and is already in its stable mature phase. It could easily borrow a few more billions with a single phone call if it wanted. Its share owners are typically widely diversified. Intel stock should only be small parts of their portfolios. As Intel outsiders, you and I have no detailed knowledge of how the next few years will be different from the past. Therefore, we could just as well work out one terminal value right now and dispense with the initial detailed-projection phase altogether. We want to work out detailed projections only to illustrate the process.

Intel is an imperfect example, because it could be done a lot more simply.

Q 21.2. What are usually the two most important projection goals for a pro forma analysis for an entrepreneur?

21.2 The Template

The standard method for creating a pro forma separates the future into a "detailed projection" time period, for which you forecast the financials in great detail, and a **terminal value** (TV). You can think of the TV as the "then market value" of the business—a going-concern value of the business if you were to sell it at this point in the future. We have to decide for how many years we want to project financials in detail before capping the value analysis. So, the three big areas that you must work on are

You must decide on a detailed projection phase and a terminal value.

1. A choice of horizon T to separates the initial and terminal phases;
2. Detailed financials during the initial projection phase, from time +1 (next year) to time T–1;
3. A terminal value (TV) at time T – 1, which is a stand-in for the cash flows from time T to eternity.

Let's cover them one by one in the context of Intel. You already know the financials from Chapter 14, comparables from Chapter 15, and capital structure from Chapter 16. Our goal is to construct a good pro forma as of early 2016, presuming you already know the 2015 financials.

Q 21.3. What are the three main components of a pro forma to work out?

21.3 The Length of the Detailed Projection Period

What is a suitable value for the horizon T, i.e., the number of years for which you should project detailed financials and beyond which you should substitute a "wholesale" TV estimate?

How many years of detailed financials should you project?

As an initial step, let us take a brief detour into forecasting. Here are some surprising insights that hold in many cases:

1. You may be able to project future cash flows in the very long term as accurately as in the intermediate term.
2. At some point, your cash flows are not very likely to grow that fast anymore. This is not to say that they won't grow at all—just that your expected value forecasts today no longer grow very steeply and/or reliably.

The very long run may not be any more daunting than the intermediate run. Although future cash flows may be equally uncertain, their present values could be less uncertain.

When applicable, you can estimate the *present* value of long-term cash flows *better* than that of intermediate-term cash flows. This is best explained by example.

An example of "constant" uncertainty, which does grow with horizon.

If you have to forecast the temperature in 2 hours, your (short-term) forecast will be pretty good, and much better than your 6-week forecast. But how would your 6-week forecast compare to your 5-year forecast? Most likely, both your prediction and level of accuracy would be similar. For example, your Los Angeles temperature forecast for August of next year should probably be the same 80 degrees, plus or minus 10 degrees, as your forecast for August in 5 years. Thus, if the environment is stable, then your uncertainty is not likely to grow with your horizon after some point. (But watch it! A stable environment is often a stronger assumption than you may realize—think about what global warming could do, for example.)

When you discount the long-term uncertainty, it may be less problematic from an NPV perspective.

Now say you want to value an ice cream parlor. How does your temperature forecast affect your parlor's estimated present value? The effect of temperature uncertainty for August of next year is less discounted and thus more important than the effect of temperature uncertainty in August in 20 years. If your parlor expects to earn \$100,000, and a 10-degree temperature difference can cause you to earn revenues anywhere between \$75,000 and \$125,000, then the temperature uncertainty for August of next year can cause a present value difference of about $\$50{,}000/1.15^1 \approx \$43{,}000$ at a 15% discount rate (cost of capital). But the same temperature and revenue uncertainty in 20 years cause only a present value difference of about $\$50{,}000/1.15^{20} \approx \$3000$. Consequently, to estimate your parlor's value today, your intermediate-term uncertainty may worry you more than your long-term uncertainty—as long as the uncertainty does not grow with time. And this is surprisingly often the case.

Economic Rents

Economics and strategy: Scarce resources create rents for (existing) shareholders!

The role of intermediate-term versus long-term uncertainty generalizes beyond ice cream parlors, because knowledge of economics and strategy allows you to put reasonable bounds on long-term future profitability (beyond 20 years). At such far-out horizons, you should not expect businesses to still have unusually large growth rates and to earn **economic rents**, where economic rents are defined as investment rates of return that are much higher than the costs of capital. Economic rents can only be achieved when a firm has assets and capabilities that are scarce, valuable, and difficult to imitate. Examples of such scarce resources can be the presence of a unique CEO (e.g., Steve Jobs at Apple Computer), economies of scale (e.g., Google's and Microsoft's computer software or Amazon's and Wal-Mart's mass logistics and buying power), unduplicable corporate reputation (e.g., Coca-Cola's brand name), legally protected intellectual property (e.g., Glaxo's retroviral drug patents or Disney's Mickey Mouse), or consumer switching costs (e.g., Comcast's cable). In the long run (i.e., over decades) scarce resources tend to become less scarce as new technologies and consumers make old advantages obsolete.

You should think about barriers to potential competition. The forces of economics have worked on products historically, too.

To determine how long it might take before a product becomes a commodity and thus produces only normal profits, you need to "think economics." If the company owns few unique resources and there are few entry barriers, then it may take only a couple of years before unusually high corporate growth rates slow down and there are no more economic rents. For example, there are few entry barriers to television technology today. Consequently, the industry that produces televisions does not earn excess rents within 10 years. (A DVD player cost \$800 in 1997. It costs \$20 today.) Other products enjoy more scarcity and entry barriers for longer periods of time. For example, if you can develop a drug curing melanoma and get a patent, you may be able to earn economic rents for 15 to 25 years—although better competitors' drugs will eventually come onto the scene and your patent will eventually run out.

Don't get caught up in today's perspective.

Your first reaction might be to dismiss my long-term perspective as academic ignorance. Amazon, Google, Apple, or even Uber may just seem too good in 2016 for you to believe in their eventual slowdown or even demise. But like most of us, you are just letting your present-day experience color your long-term forecasts. Look back 50 years and ask yourself whether the fast-growing, exciting companies operating then are still the same. Or just look back 25 years. Can you even name the companies from the 1980s that still earn large economic rents? If you

had picked two companies that looked similar in 1985, are both companies still around? For example, Dell is doing ok, but Gateway looked just as good in 1985 and has long since been dead—and there are literally hundreds of now-bankrupt mail-based computer retailers that looked no different from Dell then, either. Standing in 1985, you should not have expected to earn large economic rents if you had bet on any one computer hardware vendor then. In 2004, in my first edition, I wrote here that Wal-Mart seemed like an unbeatable juggernaut but that it would almost surely not remain so in 20 years. It definitely would not have the scarce and unique resources that would allow its shareholder-owners to continue earning rates of return much above their investments' costs of capital. I had to wait less than I expected—by 2008, Wal-Mart had already lost much of its glamour. Its share price had dropped from $60 in 2004 to below $50 in mid-2008. By mid-2016, it hovered around $75. This was less than a 3% per year rate of return since 2004. My 2016 prediction is that Apple, the world's most valuable company in 2015 at over $700 billion, will no longer be a top-10 company in 2036.

My point is that over short horizons, there is relatively less uncertainty, but more disagreement. You and I may come to very different conclusions as to how well Apple will perform over the next 10 years. Yet over very long horizons, like 50 years, we may be more uncertain, but we should also be less in disagreement. We should agree that all the hot companies today—from Amazon to Google to Apple to Uber to whatever—will neither be earning large excess profits nor be growing fast. In fact, some of them may even have gone out of business by 2050 altogether (what heresy!).

Over the long run, markets become more perfect.

The perspective of the economist lends insight into a good choice for T. The economics that helps you decide on when a firm is likely to settle into a lower economic growth rate is taught in great detail in business strategy courses and carries different labels (e.g., Porter's Five Forces). To determine when economic rents are likely to dry up, strategy suggests you ask questions such as:

The discipline of business strategy asks: What factors delay the erosion of economic rents?

- How long before your entry barriers will erode?
- How long before your success will be mimicked by the competition?
- How long before you will be squeezed by stakeholders that can hold you up, like suppliers, employees, or customers?

Business Maturity and Discount Rates as Considerations

The first good consideration for choosing your horizon T is thus to contemplate the underlying firm economics. It should be around the point where the company will earn only "ordinary profits." This point is where long-run economic forces will have eroded most of the economic edge of the company—where growth will return from the initial but unsustainably high short-term rates to sustainable, ordinary long-term rates. At this point, the terminal value (TV) is relatively easier to forecast. Your goal, then, should be to capture the initially rapid and possibly unstable growth phase with detailed financial forecasts, and the stable period with the TV. Another way to say this is that a good T is the point in time when you expect the present value of growth opportunities (PVGO) to be low.

The first consideration for setting T: business economics.

➤ PVGO, Sect. 15.3, Pg.401.

But there is also a second consideration to your choice of T. You want to pick a horizon such that the discount factor is high enough so that the precise choice of T would not matter *too* much. For example, at a 10% discount rate, $1 in 5 years is still worth 62 cents today. An incorrect TV would make a big difference to your NPV estimate. If you were to use 20 or even 30 years, $1 would be worth only about 15 or 6 cents in present value, respectively. Such high discount factors can help plaster over the errors that your TV estimate will inevitably commit. And when it comes to exit values on horizons that are so far away, the best you can hope for is a *halfway* reasonable estimate of market value, anyway.

The second consideration for setting T: discount factors.

Typical T: 5 to 10 years.

For most businesses, you would pick a terminal phase about 3 to 20 years out, with 5 to 10 years being most common. (Mukhlynina and Nyborg report that the typical managerial projection length is 5 years.)

IMPORTANT

The choice of break point T between a detailed projection period and a terminal market value is often dictated by two considerations:

1. A desire to distinguish between an upfront strong growth phase and a subsequent mature and stable phase
2. A desire to have a small discount factor on the TV to reduce the present value importance of estimation errors

In practice, most pro formas choose a T between 5 and 10 years.

Intel — conflicting advice about good T choices

What would be a good T breakpoint for Intel? The first criterion tells us "very short." Intel is a stable company, so it is not clear what we gain from a longer initial period. Our forecast for Intel in 5 years is probably similar to our forecast for this year. We could "lump" the value created in all future years into one TV fairly soon. The second criterion tells us "very long." The discount rate on Intel 2016 is quite low—in fact, corporate discount rates as low as 5% per annum are not absurd. Thus, valuation mistakes will matter for a long time. (For startup firms, the two criteria tend to coincide better.)

Illustration Only

Now, you are reading a book about finance, not about Intel. We have no idea of Intel's business. All we want to do is to illustrate the pro-forma process. Thus, I am now making an executive decision: I choose a horizon of $T = 3$ years. We will try to project in detail from 2016 to 2018, and then summarize all cash flows from 2019 to eternity with one terminal value (TV) estimate for 2018.

Q 21.4. Is it usually easier to predict the growth rate of earnings (or cash flows) of new businesses in two years or in twenty years?

Q 21.5. What considerations would push you toward a longer detailed projection horizon?

21.4 The Detailed Projection Phase

In real life, you must use all your economic knowledge to make a good projection.

We have now dealt with the first goal of choosing the horizon T. Our next goal is to determine your expected cash flows during the beginning detailed growth period, from next year up to the year of your TV. The good news is that if you were an actual analyst, you would probably know your business quite well and thus be able to reasonably predict the immediate future. You could use Intel's historical cash flows for some guidance about future cash flows. Of course, to do this well, you would still have to understand a lot about the underlying economics of the business, and you would still have to make many assumptions. In this process, you would want to use additional information that we have mostly ignored so far—such as the specific industry economics or the current and historical corporate balance sheets. The bad news is that you are not a real analyst—and our book is not about Intel. There are no universal truths about pro formas in Intel's business operations. You probably do not know much about Intel's business—and even if I could fully explain and analyze its many businesses, it would not help you elsewhere. Pharmaceutical drug research, aluminum mining, fad toys, and a new stamping machine each have their own unique business, financial, and accounting patterns. There is little generality here. In contrast to the terminal value, long-run economic forces are unlikely to bite forcefully in the early detailed projection-phase period.

Even though we lack specific information, we cannot simply brush over the initial growth phase. Accurate, detailed forecasts have a significant impact on project wealth through two channels. First, these forecasts for the first few years have direct contributions to today's present value. Second, the terminal value itself is also (usually) estimated relative to a baseline expected cash flow from the last year of the initial phase. If your baseline is wrong, your TV will also be wrong.

IMPORTANT: Your detailed projections will also influence your TV.

We are going to have to make up some estimates to illustrate the process. Be warned yet again: My financial projections for Intel are necessarily very naïve. Again, our goal is not accuracy but illustration.

Warning: Don't expect precision in any pro forma—especially in mine.

We will go over two primary methods for projecting financials next:

1. Direct extrapolation of the accounting component that you are interested in (i.e., the economic NPV cash flows for the project, though sometimes also the earnings)
2. Detailed financial modeling of all, or most, items in the financial statements

Projecting economic cash flows directly (almost a cheat) or indirectly (via detailed financials).

The first is a drastic shortcut, used only when time and knowledge are severely limited. We actually used it in earlier book parts, where cash flow forecasts fell like manna from heaven. In business settings, the second method is more common.

Q 21.6. Assume that it is easier in your business to forecast the long-run rather than the 5-year growth rate. Further, assume that 80% of the present value will sit in the TV. Is it still important to get good intermediate projections?

Faking It: Direct Extrapolation of Historical Cash Flows

You could directly project the final cash flows themselves forward. Here (and probably often elsewhere), it gives bad results.

The first method is really a "cheat": It is a shortcut that avoids having to do the full-blown financial pro forma analysis. It directly projects the historical cash flows forward—for example, by assuming a constant growth rate forever. By applying Formula 14.1 for project cash flows to Intel from 2013 to 2015, you can compute the cash flows that accrued to the firm:

➤ Economic cash flows, Formula 14.1, Pg.387.

$$\begin{aligned}
\text{Asset Cash Flow}_{2013} &= \$20.8 + (-\$18.1) + (\approx \$0) = \$2.7\\
\text{Asset Cash Flow}_{2014} &= \$20.4 + (-\$9.9) + (\approx \$0) = \$10.5\\
\text{Asset Cash Flow}_{2015} &= \$19.0 + (-\$8.2) + (\approx \$0) = \$10.8
\end{aligned}$$

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

Over the last few years, Intel showed increasing asset cash flows, but only because its operating cash flows were declining. It was all due to a reduction in investing activities. (Actually, Intel had purchased part of another company [ASML] in 2013, and did not repeat this in 2014 and 2015.) Would it make sense to assume that this cutback in investment will continue? Probably not. First, there is a natural limit to reduction in investments (zero!). Second, if Intel reduces its investments further, presumably its future sales, net income, and operating cash flows would eventually also suffer. *And*, we already know that further declines in investing activities would not be the case: Intel purchased Altera for $17 billion at the end of 2015, although this investing has not yet shown up on its 2015 financials. The Altera acquisition will draw down the cash hoard and (likely) produce a large negative asset cash flow for 2016, but positive cash flows in years after. Presumably, this is what Intel management is hoping for.

Warning: You really need to understand the business. Mechanical extrapolation rarely works well.

Growth Cash Flow Projections

	Already Known			"Detailed" Model Assumes Growth of 8% @ 2016			Terminal Value (see next section)
Time →	Y_{-2}	Y_{-1}	Y_0	Y_1	Y_2	Y_3	Y_4	Y_4-**to-**Y_∞
	2013	2014	2015	**2016**	**2017**	**2018**		**2019**
Cash Flows	$2.7	$10.5	$10.8	really a bad idea in this (and most) cases. it's not 100%!				

Declining Growth of Earnings Projections

	Already Known			"Detailed" Model Assumes Growth of 8% @ 2016			Terminal Value (see next section)	
Time →	Y_{-2}	Y_{-1}	Y_0	Y_1	Y_2	Y_3	Y_4	Y_4-**to-**Y_∞
	2013	2014	2015	**2016**	**2017**	**2018**	**2019**	
Earnings	$9.6	$11.7	$11.4	$12.3	$13.2	$14.0	[$14.7]	?

Exhibit 21.1: *Pro Forma: Direct Projections (in millions).* In the top panel, we give up because it should be obvious that this is a *really* bad idea. In the bottom panel, we are extrapolating the historical earnings growth rate (9% in 2015) into the future—8% in 2016, 7% in 2017, and so on.

Who Gained on an Ordinary Day?

June 1, 2015 was an uneventful day for the stock market. The S&P 500 dropped by 0.1%. But Intel announced its acquisition of Altera. Instead of more internal investment, Intel now made a large external bet. Had the company run out of good technology ideas "Inside Intel"? Did Altera have better ideas? Whatever the reason, Intel's stock price promptly declined by about 1.6% or $3 billion. Altera's stock price increased by about 10% or $2 billion. Thus, if Intel's stock price response was not just due to the market learning that Intel had run out of ideas, then it seems that Intel was overpaying. *Yahoo Finance*

You could project earnings instead of cash flows—which has advantages (e.g., smoothness) and disadvantages (e.g., not used for NPV).

➤ Comparables, Chapter 15, Pg.395.

A better method would be to project net income. It smoothes out the lumpiness of Intel's (ASML and Altera) acquisitions and investments. In Chapter 15, you worked with earnings rather than cash flows, and for the same "lumpiness-of-cash-flows" reason. In the very long run, earnings and cash flows should be roughly equal—after all, earnings "just" shift the time-series accruals. The question here is whether historical net income growth or historical cash flow growth represents the present value of the future cash flow growth stream better, given that you have to work with time-truncated forecasts. For a reminder:

Net income (earnings): On the positive side, earnings are smoother than cash flows, because the accountants have reflected likely future cash flows in current earnings. On the negative side, the discount factors are wrong, because you are applying them not to actual cash flows but to earnings, which may well be combinations of actual and future cash flows. Moreover, the human intervention also means that historical net income could have been

more easily manipulated than historical cash flows.

Cash flows: On the positive side, cash flows are the gold standard *if you can project them out accurately to infinity*. On the negative side, if you have to truncate your forecast in the future or rely on a finite number of cash flows as representative of the future, it is not clear whether or not your history paints an accurate picture of the future.

So let's also create a growth rate projection for earnings. Intel had net income of \$9.6, \$11.7, and \$11.4 billion. That's a two-year growth rate of about $\sqrt{11.4/9.6}-1 \approx 9\%$ per year. If we looked back in time, it would show that this growth rate has been steadily coming down over the years. (In between, it had turned negative [new CEO clearing the deck in 2013!] and then positive again.) It would make sense to assume a further long-term decline. Without real corporate intelligence, I am making another executive decision for our book. Assume a decline of 1% in the net income growth rate per year: 8% for 2016, 7% for 2017, 6% for 2016, and so on. (If we had hit the inflation rate (about 2% from the TIPS Treasury term structure), I would have stopped the decline in the growth rate, if not sooner.)

Let's work the Intel forecast based on earnings, not cash flows.

In many if not most cases, earnings-based forecasting is better for established companies than cash-flow-based forecasting. In Intel's case, earnings-based projecting is clearly better. Academic research has shown that earnings-based TV projections are usually superior to pure cash-flow-based TV projections *on average for publicly traded corporations*. But you could also try other approaches. For example, you could try to distinguish between lower cash flows due to investment (which should create higher future cash flows) and lower cash flows due to lower sales or higher costs (which should not create higher future cash flows).

What should you use? Earnings forecasting tends to be better than cash flow forecasting.

Q 21.7. If you do a direct projection, is it usually better to project cash flows or earnings based on the last three years of data?

The Real Thing: Detailed Financial Pro-Forma Projections

The second and more common method of projecting economic cash flows during the initial period is to project complete financial statements. Detailed financial projections requires providing individual components for the economic cash flows you ultimately seek. Doing so is often (but not always) better than projecting bottom line items for three reasons:

The more sophisticated method attempts to model the complete financial statements, not just the "end product of" economic cash flows (or earnings). (This is the real pro forma analysis.)

1. As just noted, neither cash flow nor earnings forecasts are particularly reliable. Cash flows are difficult to project directly, because they tend to be volatile and lumpy. Net income is smoother but contains many fictional accounting accruals that are not true cash. You are caught between the proverbial rock and hard place.
2. The full projection method can make it easier to incorporate your knowledge of the underlying business into the economic cash flow estimates. For example, you may happen to know that unusual expenses will be zero next year, or that a new payment system may speed up the collection of receivables. By forecasting the individual items, you can integrate such economic knowledge into your cash flow estimates. And pro forma statements are particularly relevant for startup firms, for which you should not project huge growth rates and negative earnings forever.
3. The full projection method can help you judge other important information—such as working capital availability, suitable debt-equity ratios, and your interest rate coverage. Especially for entrepreneurs who are often in danger of a liquidity crisis, such information can be just as important as the economic cash flows themselves. In fact, *all* ratio analyses, such as those exploring the financial health and profitability ratios, are often more useful for future pro forma financials than current financials. Ratio analysis can then help you judge whether the firm is on a sound or dangerous path.

➤ Financial ratios, Sect. 15.6, Pg.420.

The Income Statement: The Sales Top Line

	Income Statement	Time → December 2013	2014	2015	*Estimated 2016*	*2017*	⋯
	Sales[a]	$52.7	$55.9	$55.4	*$57*	⋯	⋯
	– COGS[b]	$21.2	$20.3	$20.7	*$21*	⋯	⋯
=	Gross Profit[c]	$31.5	$35.6	$34.7	*$36*	⋯	⋯
	R&D[d]	$10.6	$11.5	$12.1	*$13*	⋯	⋯
	+ SG&A[e]	$8.1	$8.1	$7.9	*$8*	⋯	⋯
	+ Others[f]	$0.5	$0.6	$0.6	*$0.6*	⋯	⋯
–	= **Operating Expenses**[g]	$19.2	$20.3	$20.7	$21.6	⋯	⋯
=	**Operating Income**[h]	$12.3	$15.3	$14.0	$14.4		
	+ Net Interest Income /Adjustments[i]	$0.3	$0.5	$0.2	*$0*	⋯	⋯
=	**Income Before Tax**[j]	$12.6	$15.8	$14.2	$14.4	⋯	⋯
	– Corporate Income Tax[k]	$3.0	$4.1	$2.8	$2.9	⋯	⋯
=	**Net Income After Tax**[l]	$10.1	$12.1	$11.7	$11.5	⋯	⋯

a. Grows by 3% in 2016
b. Intuition
c. Calculated
d. Grows by $0.9 billion
e. Remains similar
f. Remains similar
g. Calculated
h. Calculated
i. Remains similar
j. Calculated
k. 20% Tax Rate, as in 2015
l. Calculated

Exhibit 21.2: *A Possible Intel Pro Forma Income Statement Model for 2016 (in billions of dollars).* Footnotes are for 2017.

The baseline for detailed pro formas is sales prediction.

The detailed projection method usually starts by forecasting future sales in the income statement. *Your sales forecast is the single most critical aspect of any real pro forma,* because it becomes the baseline number from which many other financial item forecasts will follow. In Intel's case, you could use a mechanistic model that extrapolates sales growth from historical financials. Exhibit 21.2 reminds us that Intel sales grew at an annualized rate of $\sqrt{\$55.4/\$52.7}-1 \approx 5\%$/year from 2013 to 2015. With the 2016 slowdown in desktop and servers, a 3% sales growth rate seems reasonable. This suggests sales of about $57 billion in 2016.

Pro formas should explain all assumptions!

Like every other pro forma line item, the sales forecast should have a footnote (in Exhibit 21.2) to explain the basic assumptions behind the estimate. Admittedly, my footnotes in Exhibit 21.2 are mostly perfunctory. For example, my note "a" does not even explain where my 3% came from. In the real world, you would carefully explain the background assumptions behind each and every critical component of your pro forma—sometimes with many paragraphs and additional tables.

You can use more information and even subjective judgments!

Do not believe that sales forecasting is always as simple as this. You could, and should, use an economic model based on detailed business intelligence. For example, as a real-world analyst, you might use your knowledge to determine

- whether Intel is about to launch many exciting new products or whether it has few new projects in the pipeline;
- whether Intel had paid less in dividends in order to reinvest its earnings into improved sales, which are about to turn into more sales or profitability;
- whether there is a recession or a boom on the horizon for 2016-2020;

and so on. These determinations would help you adjust your sales estimates for a more accurate projection. In a real pro forma, if your money were on the line, it would be reckless to forecast sales through a mechanistic model without an economic model! Peeking at YAHOO! FINANCE, Intel's analysts' consensus forecast in mid-2016 agreed with us: the analysts' average estimate was also \$57 billion. Analysts tend to be optimistic, but here they not only had the benefit of understanding the industry and Intel better than us, but they also had the benefit of having already seen the sales from the first six months of 2016.

The Income Statement: Other Components

How to estimate other financial line items. You could extrapolate them by themselves, but the better way is often to project them in relation to (as a fraction of) sales.

With economic intuition, you would then go down item by item on the income statement. So, let's talk about an estimate for COGS. You have a whole range of options, including but not limited to a plain growth forecast (similar to what we used for sales). Here are five possible methods:

1. **A plain growth forecast:** You could repeat the sales exercise with COGS: A pure growth model could take COGS' historical two-year growth rate of $\sqrt{\$20.7/\$21.2} - 1 \approx -1\%$ and project that this will continue in 2016. If applied to the year 2015 COGS of \$20.7, your 2016 COGS forecast would thus be $20.7 \cdot (1 - 1\%) \approx \$20.5$ billion.
2. **A pure proportion of sales forecast:** You could forecast COGS not only relative to its own history but also relative to your already-projected sales of \$57 billion for 2016. You also know the historical relationship between COGS and sales, which you can use to predict a relationship between 2016 sales and 2016 COGS.

	2013	2014	2015
COGS	21.2	20.3	20.7
Sales	52.7	55.9	55.4
Fraction	40%	36%	37%

   At 38% of sales, your 2016 COGS estimate would be about $\$57 \cdot 0.38 \approx \$21.7$ billion.
3. **An economies-of-scale forecast:** You could pose a model with economies of scale. Given a sales forecast, other items then become some combination of fixed and variable costs. For example,

$$\text{A Financial Item}_{\text{Future}} = \text{Fixed Component} + \text{Variable Coefficient} \times \text{Sales}_{\text{Future}}$$

   COGS (selling costs) usually have both fixed and variable costs. That is, COGS would not go up one-to-one with sales, but less than one-to-one. The "fixed component" would have costs that would not change with sales (e.g., some necessary maintenance costs or salaries), and the "variable component" would have costs that would increase with sales (e.g., the silicon). Unfortunately, for COGS at Intel in 2016, this happens not to work. The best fitting line was

$$\text{COGS}_{2016} \approx \$34.9 - 26\% \cdot \text{Sales}_{2016}$$

   Stop! This makes no sense. More sales should *not* translate into less cost. Thus, we are better off *not* using this formula, even though this is suggested by Intel's historical relation.

Fixed and variable cost components.

For illustration of the technique, let's use total operating expenses (TOEs) instead. Here, the best fitting line was

$$\text{Total Operating Expenses}_{\text{Future}} = -\$2 \text{ billion} + 40\% \times \text{Sales}_{\text{Future}}$$

So, if Intel sells $55 billion, you would expect TOE to be $20 billion; if it sells $60 billion, you would expect it to be $22 billion.

Fixed and variable cost coefficients should change with horizon. In the short run, the fixed costs tend to matter more. In the long run, the variable costs tend to matter more. For example, Intel should and would not change its R&D in response to a one-year drop in sales. It is too expensive to fire and hire good engineers with knowledge of Intel's unique intellectual property. However, if Intel's sales were to drop for many years, Intel probably should and would pare back its research. The fixed coefficient would get closer to zero and the variable coefficient would get closer to one. (Well, in the long run, if Intel and we are not dead).

More sophisticated methods can use more information than just sales—for example, they can use industry benchmarks or the company's own depreciation.

4. **An industry-based forecast:** You could draw on information from other firms, such as Microsoft. Sometimes, this approach can help to understand best practice. Alas, in Intel's case, the silicon product seems so different in its production cost from software costs that this does not seem like a good idea.
5. **A disaggregated forecast:** If you were even more sophisticated, you could recognize that COGS contains some depreciation. Thus, the history of Intel's past capital expenditures could also influence your COGS estimate. You could throw past capital expenditures into your statistical regression, too, to come up with a better predictive formula.

The sky—your economic and econometric background knowledge—is your limit. For illustration's sake, let's adopt $21 billion as our predicted COGS in Exhibit 21.2.

Other financial line items in the table may follow other models.

You can repeat these forecasting processes to predict other income statement items. Again, you have many options. Like COGS, SG&A contains both fixed and variable expenses, as well as depreciation that relates to past investments. SG&A might thus be modeled as a combination of a fixed component, plus a sales-variable component, plus a past capital-expenditure-based component. There is also no need to remain consistent across different items—you could use one method to estimate COGS and another to estimate SG&A (or any other financial statement item, for that matter). In this case, SG&A was stable enough and $8 billion seems as good an estimate as any. R&D has been marching up steadily at a good clip (about 7% per year), and Intel should be smart enough not to let R&D be affected greatly by current year's sales, so $13 billion is a good guess. Sometimes it makes sense to be more sophisticated for interest expense (e.g., using yield curve information, debt coming due, etc.), but net interest expense is negligible anyway.

Looking over my pro forma, I see that I predict declining but good positive net income for Intel, with modestly increasing R&D. (Peeking at the actual financial statements, I noticed that the YAHOO! FINANCE analysts are more optimistic than I am. They forecast see modestly *increasing* net income.)

The Cash Flow Statement

Your cash flow statement model would rely on your income statement model.

Next, you would model the cash flow statement. Exhibit 21.3 is my attempt for Intel. It starts by transferring the projected net income from the pro forma income statement model into the pro forma cash flow statement model. For the remaining cash flow items, my illustration is perfunctory. With a lot of time, you could try to figure out how the historical pattern of capital expenditures (from the cash flow statement) and property, plant, and equipment (from the balance sheet) are likely to impact depreciation in 2016 relative to 2015. Here, we use a number of $8.8. (We also ignore the fact that some parts of depreciation have already been modeled into components of items in the income statement; you really should check the internal consistency of your forecasts—something we shall not do here.)

	Cash Flow Statement	Time → December 2013	2014	2015	*Estimated 2016*	···
	Net Income[a]	$10.1	$12.1	$11.7	*$11.5*	···
+	Depreciation[b]	$8.0	$8.5	$8.7	*$8.8*	···
+	All Others (incl W/C)[c]	$3.2	$0.2	–$1.1	*–$0.5*	···
=	**Total Operating Activity**[d]	$20.8	$20.4	$19.0	*$20*	···
	Capital Expenditures[e]	–$7.3	–$10.1	–$10.7	*–$10*	···
+	Investments[f]	–$3.8	$1.8	–$2.4	*–$17*	···
+	Other CF from Investments[g]	–$3.5	–$1.5	+$1.6	*$0*	···
=	**Total Investing Activity**[h]	–$18.1	–$9.9	–$8.2	*–$27*	···
	Operating Plus Investing[i]	$2.6	$11.5	$11.0	*–$7*	···

a. Transfer from IS (Table 21.2)
b. Eyeballed (Long-Term)
c. Intuition ?!
d. Calculated
e. Similar to previous years
f. Altera Acquisition
g. Similar to previous years
h. Calculated
i. Calculated

Exhibit 21.3: *A Possible Intel Pro Forma Cash Flow Statement Model (in billions of dollars).* Footnotes are for 2017. Note that changes in working capital that contribute positively to the cash flows are decreases in the amount of net working capital on the balance sheet.

A quick rundown of other cash flow statement components.

The remaining operating-cash-flow items have been steadily sucking up Intel's cash. Actually, you should really model them in detail. But for our textbook, just recognize that Intel dropped a lot of cash into building product inventory in 2015. Thus, I am assuming that such spending will not repeat. Instead of sucking up $1.1 billion, I am assuming that 2016 will suck up only $0.5 billion. The more dramatic change—and we already know that it will be reflected in the 2016 financials—is the Altera acquisition for $16.7 billion. Given that Intel also has ongoing capital expenditures, we already know that investing activity cash flows will be turning negative in 2016—and that this one-year large negative flow will be unlikely to repeat in the year(s) after (unless Intel decides to buy more firms).

Financing Policy, the Balance Sheet, and Linkages

The four financial statements have other linkages, which we omit for lack of space.

One step that we have mostly bypassed is to think more about your financing policy. It would influence not only the remainder of your cash flow statement (the financing cash flows), but also your balance sheet (debt and equity positions), and even your income statement (interest payments). In fact, depending on what you assume, you may have to go back to the income statement and go through your forecasts again. Other linkages will arise, too. For example:

- What you assume about financing cash flows will influence your end-of-period cash position on your balance sheet, because the cash position next year is the cash position this year plus the net of all cash flows.
- What you assume about how your technology will change your inventory or your collection

abilities will influence both your current assets and current liabilities on your balance sheet, as well as your consumption of working capital on your cash flow statement.

Future years—more work and trouble.

Of course, you would also need to provide detailed projections for the remaining detailed projection period, 2017-2020. The principles are the same as they were for your projection of 2016. We will skip all these for (your) mercy's sake.

Q 21.8. What financial statement line item plays the role of a "base forecast" from which many other forecasts are (often) derived?

Q 21.9. How do economies of scale manifest themselves in line item forecasts?

Q 21.10. Are the income statement and the cash flow statement linked?

What To Do With The Pro Forma?

After you have also projected the other two financial statements—the balance sheet and the statement of owners' equity—up to the terminal time, T, what can you do with these numbers?

Economic Project Cash Flows

The projected cash flows for Intel are now much higher, due to our "other investing" assumptions.

The first important use of the pro forma is project value analysis. Having guesstimated the components of the cash flow statement for 2016, you can now compute the economic cash flow for your NPV analysis, using the basic cash flow formula (Formula 14.1). It should be apparent that this is difficult to do. Acquisitions can create year-to-year gyrations that swamp our external ability to predict.

➤ Economic cash flows, Formula 14.1, Pg.387.

Ratio and Soundness Analysis

Pro formas allow for ratio or financial health analyses.

A second common use for detailed financial projections is forward-looking ratio analysis to judge whether the business remains viable and sound. Such an analysis can serve to check the reasonableness of your forecasts—and the viability of the firm in your scenario. For example, if a start-up firm were to end up with a very high debt-equity ratio and very little cash, the implied future interest coverage ratio should set off an alarm. Or a growth path may have an interim negative cash position—a situation that could doom an otherwise healthy firm. The firm may be on a collision course with reality, and management should change course to preserve cash before the entire firm evaporates. However, because most ratio analysis requires aspects of the financials that we do not have space to model—specifically, the financing policy on the cash flow statement and the full balance sheet—we will not discuss this any further. Once you have the full pro forma model, the ratio analysis principles and soundness principles remain exactly the same as they were in Chapter 15. And for Intel, its main business is so sound (though slowly declining!) that we do not have to worry about soundness.

➤ Financial ratios, Sect. 15.6, Pg.416.

➤ Other financial ratios, Sect. 15.6, Pg.416.

Corporate Policy Changes

Historical projections work only if the economic environment is stable.

Pro-forma projections depend not only on external factors—for example, whether the economy is going into a recession—but also on many choices that managers make. For example, managers must make decisions about how quickly to pay or collect outstanding bills, how much to invest into new projects versus how much to pay out in dividends, how much to finance with debt versus how much to finance with equity, and so on. You have to be careful to realize that historical extrapolations may no longer work if either the external environment or the corporate policy is changing.

This point is even more important to recognize when you are not an external analyst but a manager constructing a pro forma in order to contemplate a corporate policy change. For example, if you invest more in new factories, all sorts of relationships—some of them nonobvious—may change. For instance, the relationship between COGS and sales may change if the consumers of your product ask for more or less complementary products from other producers, which in turn may change the cost of raw materials that you require for production. Just be careful not to think too mechanistically about the effect of changes in one policy on other items in your financials.

If the firm is changing its own policy, then the world would likely no longer be stable—and history may no longer be a good guide for projecting.

Q 21.11. Does ratio analysis make sense in the context of a pro forma?

21.5 The Terminal Value (TV) Multiplier

Your third goal is to determine the firm's terminal market value (TV). Conceptually, the TV is your best estimate of what you believe the firm could be sold for at future time T. In practice, it is most commonly estimated with the growing perpetuity formula—even though there is often a clearly better alternative available, as I will explain below. You would start with your detailed estimated value of cash flows for time T, assume that they will grow forever at some sustainable long-term growth rate $\mathsf{E}(g)$, and discount them back:

After you have decided on T and the cash flows up to T, you can work on the TV.

➤ Growing perpetuity, Formula 3.1, Pg.40.

$$\mathsf{E}(\text{TV}_{\text{Future}}) = \frac{\mathsf{E}(\text{Cash Flow}_{\text{Future+1}})}{\mathsf{E}(r) - \mathsf{E}(g)} \tag{21.1}$$

You "only" need the right multiplier, $1/[\mathsf{E}(r) - \mathsf{E}(g)]$, on the final cash flow projection now. (Mukhlynina and Nyborg report that 2% and expected GDP growth are common values.)

The Cost of Capital

Many analysts would rely on the CAPM to determine the cost of capital for Intel, even though the CAPM is known not to work. However, in Intel's case, it does not matter. Intel had an equity market-beta of just about 1.0, calculated from daily historical rates of return from YAHOO! FINANCE (check it!). No matter how aggressively you shrink this toward 1.0, the market-beta value will still be about 1.0—and this is also what our simpler comparables model with debt capacity and duration from Chapter 9 would advise.

Estimate an appropriate expected rate of return. You might use the CAPM on Intel stock—or a firm that is similar.

A more difficult subject than the market-beta is the estimate of the equity premium (i.e., the expected rate of return on the stock market above Treasuries). My own estimate was about 3%. On the other hand, the typical CFO in 2015 used a higher average equity premium estimate of about 5% (arithmetic relative to short-term Treasuries). Such consensus estimates would be consistent with Intel *equity* cost-of-capital estimates of about 6% over 1 year Treasuries, 7% over 10 years Treasuries, and 8-9% over 30 year Treasuries. (For us, we can consider them to be premium estimates above some risk-free interest adjustments that incorporate imperfect-market premiums.)

➤ Equity Premium, Sect. 9.3, Pg.199.

If we adopt these estimates, our equity cost of capital for Intel could be

	2016	2017	...	2026	...	2036	...
Equity Cost of Capital	6%	6.1%	...	7%	...	8%	...

We need the *asset* cost of capital, not the *equity* cost of capital, but Intel had almost no net debt (i.e., more cash and short-term financial instruments than debt, both about 25% of the

firm). I looked up Intel's quoted spread (cost of) outstanding debt, and it was about 1% over Treasury on short-term, 2.5% on long-term.

	2016	2017	...	2026	...	2036	...
Intel Spread above Treasury	1.0%	1.1%	...	2%	...	3%	...
Prevailing Treasury Rate	0.6%	0.8%	...	1.6%	...	2.2%	...

➤ Default Premium, Sect. 6.2, Pg.113.

The spread above Treasury is too high an estimate for the *expected* rate of return, because Intel debt also contains some default premium. (A more reasonable cost-of-debt estimate may be half the spread plus the Treasury.) No matter how we spin it, Intel's cost of capital seems very low. With a 25% debt ratio, even with an equity premium estimate as high as 5%, Intel's asset cost of capital would have been

	2016	2017	...	2026	...	2036	...
Asset Cost of Capital	5.0%	5.1%	...	6%	...	7%	...

The discount factors on cash flows compound these rates to

	2016	2017	...	2026	...	2036	...
1-Year Discount Factor	0.95	0.95	...	0.94	...	0.94	...
Cumulative Discount Factor	0.95	0.90	...	0.6	...	0.3	

This is not a tax-adjusted average cost of capital. You could try to improve on the cost of capital with more sophisticated techniques and less rounding. However, I have intentionally not done so, because we as a profession really are not capable of estimating the cost of capital much better than this.

Q 21.12. When would you want to use asset betas, and when would you want to use equity betas?

Q 21.13. What is the most common model used to estimate the cost of capital in pro formas? Do you trust it? What is the alternative?

The Cost of Capital Minus the Growth Rate of Cash Flows

It is easy to come up with a (uselessly) wide range for $E(g)$.

Next, we need an estimate of the eternal expected growth rate of cash flows, $E(g)$ (or, equivalently, the cost of capital $E(r)$ minus the growth rate of earnings). Sometimes, it is more intuitive to think of such changes not in terms of nominal growth rates, but in terms of real growth rates. Because $[E(r) - E(g)]$, it is largely unaffected by inflation. Just make sure to quote both in the same terms. It is easy to come up with *high* upper bounds on Intel's sustainable growth rates. For example, $E(g)$ cannot be above the firm's cost of capital, or the value would be infinite. We would also not expect $E(g)$ to be much above the eternal growth rates of GDP—we would not expect the economy to eventually consist of nothing but Intel—and it looks as if GDP growth is slowing to about 2% this century. In sum, a number like 2-3% is probably an upper bound on Intel's *eternal* growth rate $E(g)$. We can also think of *low* lower bounds. Although it is not impossible to imagine Intel fading away, this is unlikely to happen soon, so we might want to choose an estimated growth rate of no less than, say, –1% per annum. (Will Intel soon experience meaningful competition? That's the $100 billion question!)

Of course, you need to do better than these very wide limits. Otherwise, your valuation range would just be too wide to be useful. To improve on your eternal growth rate estimate, perhaps you could draw on information from other sources:

It is difficult to come up with a (usefully) narrow range for $E(g)$. Subjective judgment is needed, yet again.

1. **Internal company information:** For example, you can assume that managers will not drastically overinvest or underinvest forever. This means you should be consistent in your choice of expected cash flows and the expected growth rate of your cash flows. Would you really want to assume that Intel will invest half of its net income every year forever, but that this investment will grow its sales by only 1% forever? Maybe yes, maybe no. If Intel stopped R&D, it would be wiped off the map by other firms. In this industry, investment is essential.
2. **Industry or comparable firm information:** You could try to learn more from other firms. Alas, in Intel's case, this is pretty hopeless. There are no other firms with similar operations and economics. For what Intel does, it stands alone.

In the absence of light, 2-3% looks like a reasonable long-term growth rate for earnings in another decade or so. The cost of capital looks as if it will be around 6% per annum (with one rate standing in for shorter and longer costs of capital). How does this affect the terminal value multiplier? Unfortunately, quite a bit.

Wow—this is novel! We do not have too bad of a dilemma for Intel with respect to the eternal growth rate.

$E(r) \backslash E(g)$	–1%	0%	1%	2%	3%	4%
4%	20	25	33	50	100	
5%	17	20	25	33	50	100
6%	14	17	20	25	33	50
7%	13	14	17	20	25	33
8%	11	13	14	17	20	25

Let's pick a stagnant \$12 billion net income estimate for 2018 (and it would be worse if I picked a higher estimate). The \$12 billion would be multiplied to take it from then to eternity. In this case, the factor-25 multiplier would get us a value estimate of about \$300 billion. If we are off by 1%, the multiplier could be 17 or 50, i.e., about \$240 billion or \$600 billion—an unpleasantly large and imprecise range.

In this case, shouldn't we calculate it better to get more accuracy? Unfortunately, the real problem is not our casualness. The real problem is our ignorance. We are intrinsically not capable of higher accuracy. We don't have the knowledge. We could pretend capability and fake it, but it would be a lie. Also, Intel is not unusual: over two-thirds of the values of most Fortune-500 companies are in terminal values far in the future that we simply do not understand. Remember—valuation is relative, not absolute.

➤ Relative vs. Absolute Valuation, Sect. 1.1, Pg.1.

Alternative Terminal Value Methods

Other approaches to terminal value estimation are sometimes better, so let's consider some. One alternative approach is to use the book value itself. This is usually bad, because the book value of equity rarely has a resemblance of realism. Intel's book value was \$100 billion, it's equity value was only \$60 billion. Yet, peeking at the actual stock market value at the end of 2016, we can see that Intel's true equity market cap was already over \$150 billion.

Book values, Liquidation values, Replacement values.

Another approach is to think of bounds. For example, what would the assets be worth if you liquidated them? In Intel's case, this value would be much lower than its continuation value. A lot of Intel's value is brand name and distribution, which would likely disappear in a liquidation. If Intel's value was primarily in real-estate, it might have been different.

Bounds: what could it be?

Bounds: what would it cost to put it together?

Yet another approach is to think of the replacement value. If someone wanted to put together Intel, how much would it cost? But then again, Intel already exists, and even with enough funds, you could not recreate Intel's quasi-monopoly even if you had all the money and wanted to. After all, you would then have the actual Intel to compete with!

Often Best: Use publicly-traded comparables here.

My preferred method is often multiples obtained from comparables today. After all, the growing perpetuity formula is just one method to attach a multiple to a final detailed-projection-period earnings estimate and often a very subject one. We already know that the financial markets often assess publicly-traded firms at much higher multiples than reasonable r and g_E estimates in formula 21.1 suggest, so we should take this into account. And the best way to take this into account may well be to use what the market is using today. That is, we let (hopefully better) firm-specific projections—perhaps obtained with inside information on corporate projects and detailed market information—speak to the numerator, and we let the financial markets speak to the denominator.

➤ Comparables, Chapter 15, Pg.395.

IMPORTANT

When the terminal value is for a company that *by then* will be similar to publicly-traded corporations today, you can use public comparables from today. Although this is not exact, it is likely to be better than what you can ever attempt to guesstimate yourself.

Q 21.14. Are your present value estimates (usually) sensitive to your assumption about the eternal growth rate of earnings or cash flows, assuming that they are used only in the TV forecast?

21.6 Basic Intel Pro Formas

Some Assembly Required

Ego Caesar

Time for more executive decisions. As emperor, I declare that the best cash flow estimate for 2016 is –$8 billion (incl. Altera), followed by $12 billion (reflecting Altera, too), then $13 billion, and $14 billion; that the best cost of capital estimate is 5%; and that the best eternal growth rate is 1%. Exhibit 21.4 is the resulting pro-forma. I translated the $14 billion cash flow estimate for 2019 back into a TV of $350 billion in 2018, using the forward P/E ratio of 25 based on the TV multiplier. (If I already knew today's P/E ratio for Intel, I would of course be done. I would just multiply it by today's earnings and have perfection.) With 2017, 2018, and 2019 also yielding some positive net cash flows, even when discounted, Intel should be worth somewhere between $250 billion and $400 billion. A lot of this value is due to Intel's low cost of capital. Of course, this is not the only estimate that we could have produced. We could have reasonably relied on different forecasts and obtained different values. But $250 to $400 billion, say $300 billion, is good.

Just a ballpark estimate

This turns out to be all wrong. Because Intel is public, we can check the actual market value. Intel's actual stock market value in 2016 was about $170 billion (with no net debt [i.e., debt net of cash]). Our pro-forma value estimate of $300 billion was certifiably *way too high*.

What?

What went wrong? In this case, I would guess the terminal value component! We guesstimated a P/E ratio of about 25, based on a cost of capital estimate of about 5-6% and an eternal growth rate estimate of 1-2%. Yet Intel's prevailing P/E ratio in 2015 (which we would not have known) was only 15. To get to a lower multiplier requires a higher cost of capital or a lower growth rate of earnings. Intel's cost of capital was not too uncertain and 5% still seems quite reasonable. This means that our earnings growth rate must have been optimistic. For *eternity*, Intel seems valued as if its net income and profits are likely to shrink. How do you justify this in economic terms? I don't know.

➤ Relative vs. Absolute Valuation?, Sect. 1.1, Pg.1.

Y_{-1} 2014	Y_0 2015		Y_1 2016	Y_2 2017	Y_3 2018	Y_4 to Y_∞ 2019
$11.5	$11	Projected Annual Asset CF's	–$8	$12	$13	($14...)
		TV in 2018 for CF's from 2019 to Eternity at $E(r)-E(g)\approx 4\%$:			$\frac{\$14}{4\%}\approx\$350$	
		Total Cash Flows:	–$8	$12	≈ $360	
		Discount Factor: ($E(r)\approx 5\%$)	$1/1.05^1$	≈ 0.9	≈ 0.86	
		2001 Present Value of CF's:	–$8	$11	≈$310	
		Total PV of Asset CF's from 2016 to Eternity	≈$300 to $350			

Exhibit 21.4: *An Unbiased Pro-Forma Cash Flow Statement.* This pro forma estimates Intel's total firm value (i.e., not merely its equity value) using holistic estimates from earlier tables. Final numbers are rounded ruthlessly to avoid giving the impression that there is much accuracy here. All values are in billions of dollars.

Calibrating Pro Formas

Calibration

It it would be silly for you to claim that Intel should be worth $300 billion when it is evidently trading for about $170 billion. If we admit to knowing the public value, what can we do to bring our own pro-forma more in line with what we observe? That is, how can we twist the estimates to come up with a pro forma value estimate that fits the actual market value of Intel? You must find "good" reasons why Intel could be worth more than what our original pro forma suggested. You must find reasons to change the inputs to your model. Although this could be called model "fudging," the technical term is model **calibration**.

You can tinker with all pro forma input numbers.

Typically, you have three calibration tools at your disposal that can increase the pro forma value so that it will reach the market value: Change the cash flows, change the cost of capital, or change the growth rate.

Change the growth rate of your cash flow estimates.

1. **Detailed projections:** You can depart from our current projected cash flow and income path. In our case, this seems implausible. We only forecast three years of income, and anything more permanently below $12 billion would seem odd, given Intel's long and steady business.
2. **Cost-of-capital projections:** You can increase your estimate of Intel's cost of capital above 5-6%. This again has two effects: It makes future cash flows more valuable, and it increases your estimated TV. The first effect is relatively unimportant—you already know that present values over short horizons are reasonably robust to modest changes in the cost of capital. It is the second effect that gives you a lot of valuation "bang for the buck."
3. **Eternal earnings growth projections:** You can reduce Intel's eternal earnings growth rate estimate $E(g)$, thereby changing its growth profile. Doing so would assume that Intel has more of the characteristics of a growth firm than a value firm. Increasing the eternal

growth rate is just as powerful as reducing the long-term cost of capital, because g and r enter only as a difference in the perpetuity formula.

In the real world, you would probably choose a combination of all three tools. In Intel's case, we would most have to twist on the eternal growth rate.

Be cognizant of what you are doing when you are "calibrating" the inputs!

What is most important here is that you remain conceptually clear about what you are doing when you are calibrating a pro forma: You are "fudging" input estimates to make the outcome fit a market value. You are adopting a "deus ex machina"—a number that is dropped on you from another part of the stage (the financial markets), even though you may not fully understand it. But don't be appalled: This is not so different from what we have always done. Calibration is the equivalent of conducting a *relative* valuation that accepts known market value as a good baseline. After all, every financial concept in this book is based on valuation relative to known market values—though usually only of comparable companies, not of the same company. Calibration is often a justifiable and reasonable procedure because the financial market value of Intel is likely efficient and probably much better than our own pro forma estimate.

Selling Pro Formas: Investment Banking and Calibration

Now put yourself into the shoes of a pro forma buyer or seller.

Investment bankers often fudge more when they come out low to keep their clients.

For example, if you work for an investment banking firm that is proposing a capital structure change or merger for Intel, you will have to present your pro forma to Intel's management. What would happen if you showed them the original $300 billion pro forma, or one calibrated a little lower? Intel's management would likely be pleased with your high pro-forma value estimate. They would lament the fickleness of the market, and you would fake sympathy. Then you would suggest whatever makes the highest fees for your firm. What if your pro forma would have yielded a value estimate of $50 billion? You would have fudged and fudged some more. Otherwise, angry management would never want to speak to you again.

Modify your pro forma to reflect the public market value information, or you will look silly.

If you are a retail investor, and you read the $300 billion pro forma in an analyst's report, how should you react? You should not believe it! On some level, it is silly to claim a $300 billion value for a good that you can buy for $170 billion (plus a takeover premium) in a near-perfect market. You would typically do an "intuitive" recalibration. Most of your faith should be in the market value of Intel, not in your pro forma value analysis. Investors should and would not have trusted our ability to forecast the economics. However, with more knowledge, credibility, and certification, your value analysis might have just raised enough doubts to suggest that Intel might be just a little undervalued. After all, any public market value is the clearing price where the bears and bulls on Intel are in equilibrium—and our analysis could have nudged you to be more bullish towards Intel. A reasonable synthesis of the Intel value estimates would instead have concluded a value closer to the market value than to the pro forma value—say, a synthesis estimate of $200 billion. (What did I do after I did this analysis? I bought a few more shares.)

Q 21.15. What exactly does the technical term "calibration" mean in the context of a pro forma?

Q 21.16. What are your three main calibration tools?

An Unfair Peek at 2016

How would you like a detective movie in which you won't find out who the murder was? In a sense, you shouldn't find out. If any of multiple suspects fit the bill, the movie could have many different endings. Any single ending may well be misleading. How did our pro-forma do? Should I let you leave without learning how we ended up doing? Maybe yes. While educationally great, it's not very satisfying. So if you are curious, read on. Just be aware that it could have turned out very different, e.g., if the economy had gone into recession. Ex-post outcomes are not the best ex-ante expected value. To judge the quality of your forecasts, you should test your abilities on many firms in many years.

Do not overread ex-post outcomes.

So here is what actually happened:

Tada.

	Actual		(Exhibit 21.2 and 21.3)	
	2015	2016	Our 2015 Predictions for 2016	
Net Revenue	55,355	59,387	57	too low
Margin	34,679	36,191	36	right
R&D	12,128	12,740	13	little too high
Oper Income	14,002	12,874	14.4	too high
Taxes	2,792	2,620	2.9	little too high
Net Income	11,420	10,316	11.5	too high
Oper Cash	19,017	21,808	20	too low

All in all, our predictions were not stellar but pretty decent. As of mid-May 2017, the marketcap of Intel stood at around 173 for a PE ratio of about 16. My own added shares had neither outperformed nor underperformed greatly. Then again, they were just a small part of my portfolio. If it had not been for this chapter, I would not even have paid attention to Intel.

21.7 Sensitivity and Scenario Analyses

What should you learn from this chapter? Perhaps most importantly, do not trust pro-forma estimates. When someone else is handing you a calibrated pro forma, be afraid—be very afraid.

Don't trust anyone.

In terms of your own pro formas, you should try to understand how robust your estimates actually are. Such analyses are usually easiest to perform in spreadsheets because they allow you to try out different assumptions and alternative scenarios relatively painlessly.

You need sensitivity analysis—try different inputs.

Fiddling with Individual Items

Always keep your ultimate goal in mind—you want to find the best value estimate for your business. Your goal is not an exercise in NPV analysis. It is not beauty or simplicity, either. Although these are nice (especially for us academics), you cannot neglect important value drivers just because the outcome is messier. Use your imagination, your head, and your good common sense!

You want a best value estimate—not the simplest or most complex, easiest or hardest, or even most conceptually beautiful pro forma.

You should always pay attention to other information—and even your personal intuition. For example, in the Intel valuation, our estimated expected cash flow for 2017 was $12 billion. If you had good reason to believe that this was a high estimate, adjust ("fudge") it! Your estimate does not have to be based on formal, scientific forecasting. Of course, the consumer of your pro forma may not agree with your estimate, so you should be ready to mount a good defense for your number.

You can use ad hoc assumptions if you believe they offer better estimates.

Similarly, there are no laws that say that you have to use the growing perpetuity formula on cash flows to obtain your TV. Instead of using the assumption that growth will remain eternally the same (the 2% per year), you could develop another formula that assumes high growth rates

You can also use alternative methods to estimate your TV.

for a few years (say, 3% next year), followed by growth-rate declines until the growth rate reaches below the inflation rate (say, 1% per year). Or, you might deem it best if you avoided all formulas and instead assumed that you could find a buyer for Intel who would be paying $200 billion in 2018 (perhaps by breaking it up)—ultimately, it is this quantity that you seek to model with your TV. Again, you'd better be ready to argue why a $200 billion is the best estimate.

Scenario analysis can help to determine expected (rather than just most likely) cash flows.

Modeling the pro forma as a spreadsheet also allows you to consider specific future scenarios. For example, what would happen if the new product were to be wildly successful, or if it were to fall on hard times? What would happen in a recession, based on what has happened in past recessions? What would happen if sales were to decline by 5% each year over the next decade rather than grow slowly? What would happen if sales were to decline forever? How bad would one, or many, inputs have to be for you to regret having bought into the project in the first place? And, of course, you can ask the venerable payback question: How long will it take before you get your money back? Admittedly, with more time, technology, and printing space, you should look at many different modified scenario analyses to understand our Intel pro forma better. A detailed pro forma analysis of even one company, such as Intel, could easily consume a few books all by itself. The sky is the limit. There is no point at which you know you have it perfectly nailed. More likely, at some point, you realize that you are not learning more or getting any more precise, so you might as well stop.

Q 21.17. What is the main computer tool for building pro formas?

➤ Typical versus expected values, Sect. 13.2, Pg.325.

Do Not Forget Failure

The biggest problem: A pro forma is usually one scenario, not an expected value! Overall failure is often not considered.

The biggest problem in most pro formas, however, is not even in the details. It is the fact that a pro forma is just one particular scenario, and usually a reasonably optimistic one. Many pro formas are just a "typical" or median outcome (recall Section 13.2). This would not be dissimilar to an average outcome, *but it would be conditional on the project not being aborted altogether*.

Entrepreneurial ventures—especially tech ventures—often have almost all value in their TV estimates.

Obviously, this is more important for entrepreneurial ventures or start-ups than it is for Intel. For example, if someone pitches you a new magazine, most of the time the pro forma will project a mildly optimistic scenario—*on condition that the magazine succeeds*. It probably does not take into account the fact that 50% of all new magazines fold within a year. It is your task as the consumer of the pro forma to determine for yourself the probability of overall magazine failure, or you will end up misled. (Immediate death does not matter for our Intel pro forma. Intel is likely to stay around for a few more years, even though or perhaps because of its mindset. Andy Grove, former chairman of Intel, had a famous quote: "Only the paranoid survive.")

Q 21.18. What may be the biggest common mistake in contemplating most pro formas?

Assessing the Quality of a Pro Forma

Can you assess the robustness and quality of our pro forma?

The question "Which Intel pro forma is correct?" is almost a non-sequitur. No pro forma is correct. A better question is, "Which Intel pro forma is better?" This is not an easy question, either. Even if you know the ex-post outcome, you will still never know for sure what the best ex-ante pro forma would have been. Even a lousy pro forma forecast will occasionally beat a good pro forma forecast. (Even a stopped clock is correct twice a day.) It often remains a judgment issue, but there are clearly pro formas that rely on better assumptions, are better reasoned, and are more likely to come true than others. Perhaps the better question is, "How can I judge how good a

pro forma is?" Or best, "How can I judge how good *my* pro forma is?" There is no easy answer, either. However, here are some relevant issues that you might contemplate.

The Terminal Value?

Some analysts think that judging what fraction of the value sits in the black box gives a good metric for the quality of a pro forma. This is a mistaken conclusion. With the same level of ignorance, a few more years of detailed projections (and thus a lower fraction of value in the terminal value) are not going to improve the estimate. Moreover, even for old, mature, slow, publicly traded value firms, most value sits in cash flows decades into the future. We don't understand why. How could we then pretend to be able to judge young, immature, fast, private growth investments any better? Even more of their values today should be in their terminal value (and in their probability of failure!). Just remain appropriately skeptical and humble, young Luke Skywalker.

Q 21.19. If you produce a pro forma for a firm in which 60% of the value sits in the TV and one in which 90% of the value sits in the TV, which pro forma is more reliable?

21.8 Caution—The Emperor's New Clothes

Do not instinctively trust pro formas! They can look very professional, and still be utterly not credible.

➤ Income Model, Exhibit 21.2, Pg.602.

➤ Cash Flow Model, Exhibit 21.3, Pg.605.

Did our projections seem arbitrary to you? They should have, because they *were* arbitrary—and I made a point of warning you throughout. But look back at our financial projections in Exhibits 21.2 and 21.3. If you did not round, but quoted a few more digits (for pseudo-accuracy), if you expanded the footnotes with some more mumbo-jumbo, and if you added a few more columns of future years, a naïve reader might be fooled into thinking that you were a sophisticated analyst who knew what you were doing! A well-written pro forma can easily convey an image of professional knowledge even where there is none. (Form over content!) Do not believe any pro forma. Even the best emperor (pro formas) only wear bathing suits.

Do not lose the forest and discuss only mini-details.

Another danger for the unwary pro forma reader is falling into the trap of looking at the trees rather than the forest. You can easily get involved in endless discussions of a particular projected item in someone else's pro forma. In real life, most pro formas rely on plenty of heroic assumptions—in some cases, there are just one or two critical assumptions; in other cases, there may be many. You must look at the big picture as well as at the minor assumptions. There is devil in both the details and in the sum total.

With all the problems, a pro forma may still be the best tool you have at your disposal.

I hope I have not been sounding dismissive. On the contrary—again, you have *no* alternative. Forecasting the future is inherently a difficult, but important, task. The universal use of heroic assumptions does not mean that there is no difference between a good and a bad pro forma. A good pro forma should be based on solid economics and have detailed footnotes explaining and justifying just about every important line item. It is a starting point for a good discussion, not an end in itself.

Closing the circle—valuation is more art than science.

Ultimately, finance is about value, so it must revolve around projections, and pro formas are good tools to organize projections. Projecting is very hard. Remember how the book started? I told you then that valuation is both an art and a science. I stressed that the formulas are easy; the application is hard. I warned you that theory is easy; practice is hard. I trust that you believe me now. Welcome to the club of financiers!

Q 21.20. How trustworthy are business pro formas?

Summary

This chapter covered the following major points:

- The purpose of pro formas is to project financials, which are then often used to compute a project's NPV today. You can also use pro formas to perform a ratio analysis to test the financial soundness of a business plan or to analyze a project's working capital requirement.
- Pro formas are usually split into a detailed forecast period and a TV.
- A good horizon choice for the detailed forecast period depends on the prevailing discount rate and the economics of the business. The detailed projection period is often applied to the initial strong-growth period, while the TV is often applied to the stable, no-more-growth phase.
- A quick-and-dirty pro forma analysis may just project the line items of direct use. A more complete and detailed pro forma analysis can try to project many intermediate components.
- A useful distinction is to think of fixed versus sales-variable forecasts for individual components.
- Scenario analysis helps you to better understand the uncertainty in your pro forma.
- Calibration is the deliberate manipulation of inputs to meet the observed valuation in the financial markets.
- Pro formas are often idiosyncratic and not very reliable. But you have no better alternative. Use caution in constructing and interpreting pro formas.

Preview of the Chapter Appendix in the Companion

The appendix to this chapter decomposes financial statement variables in historical firm data into fixed and variable cost components. These formulas can help in a pinch, although their use is not to be regarded as a particularly good idea.

Keywords

Calibration, 611. Economic rent, 596. Private equity, 594. Pro forma, 593. Terminal value, 595.

Answers

Q 21.1 A full pro forma analysis forces you to think more about the economics of your business, and about issues such as working capital and cash management.

Q 21.2 Entrepreneurs are inside analysts. They are often primarily interested in working capital management and secondarily in a present value analysis.

Q 21.3 The three components that you need to work out are your choice of horizon, your detailed financial projections, and your TV estimate.

Q 21.4 The growth rate of earnings or cash flows is probably easier to predict in twenty years, when it is likely to be "normal." It is in the start-up phase (i.e., in two years) that most new businesses have unusual uncertainty. (Of course, if the business were to go bankrupt, our growth rate projection in twenty years is as good as any other—multiplying zero by any number will still give zero.)

Q 21.5 You would choose a longer detailed projection horizon if your growth phase is longer before you get to a stable business phase. You would also choose a longer horizon if your discount rate is smaller.

Q 21.6 The intermediate projections are still very important, because your terminal projection starts with the intermediate projections.

Q 21.7 It is usually better to forecast earnings rather than cash flows, because earnings are smoother and intrinsically designed to

reflect long-term health. The logic is the same why we typically use earnings rather than cash flows for comparables.

Q 21.8 The "base forecast" for pro formas is usually sales. It will in turn influence COGS, SG&A, and so on.

Q 21.9 Economies of scale manifest themselves in a coefficient that is not one-to-one with sales. For costs, (e.g., COGS) this means a smaller coefficient; for gains (e.g., earnings), this means a larger coefficient.

Q 21.10 Yes, the income statement and cash flow statement are linked. The latter even begins with net income. In addition, there can also be many other relevant linkages that you would expect a reasonable model for the firm to satisfy. For example, bill collection technologies could influence both cash management and earnings.

Q 21.11 Yes, ratio analysis does make sense—indeed, it may make *more* sense in a pro forma context than it does in a historical one.

Q 21.12 You would want to use asset betas if you are trying to determine the value of the firm. You would want to use equity betas if you are trying to determine the value of the equity. In turn, this depends on whether you care about (buying) the firm or the equity. For discounting the equity cash flows, use a cost of capital based on the equity beta; for discounting the asset cash flows, use one based on the asset beta.

Q 21.13 The most common model to estimate the cost of capital in pro formas is the CAPM. It is not particularly good. In real life, it seems at least as important to get the term and liquidity premiums right. (See the benchmarking chapter for alternatives.)

Q 21.14 Yes, unfortunately, present value estimates (usually) remain sensitive to the assumption about the eternal growth rate of earnings or cash flows.

Q 21.15 Calibration occurs in the context of publicly traded corporations. It means that you are changing your estimates to obtain a value that is in line with the actual observed market value.

Q 21.16 Your three main calibration tools are to change your three inputs of the pro forma analysis: the cash flow forecasts in the initial period (themselves based on sales and other items), the cost of capital, and the eternal growth rate.

Q 21.17 A computer spreadsheet is the main tool to help you build pro formas. If you are very sophisticated, you might consider a Monte Carlo simulator, too (explained in Section 21.7).

Q 21.18 The biggest common mistake in contemplating pro formas may be forgetting about the probability of total failure and business shutdown.

Q 21.19 You cannot infer from the percentage of the value that sits in the TV which of the two pro formas is more reliable! For instance, you can put more or less into the TV by stretching the number of years in the initial projection phase, but this does not mean that you have fed more information into your forecast.

Q 21.20 Usually, pro formas are not very trustworthy. They may look professional, but no one has a true crystal ball for complex businesses.

End of Chapter Problems

Q 21.21. Are internal or external pro formas usually more accurate?

Q 21.22. What are common and reasonable detailed projection period horizons?

Q 21.23. What are the problems with a simple projection of historical sales growth rates?

Q 21.24. Look over a general income statement and balance sheet. Make a good guess and justify which financial statement items are likely to increase more than one-to-one with sales, which are likely to increase less than one-to-one with sales, and which are likely to move one-to-one with sales?

Q 21.25. What specific methods can you use to forecast individual financial statement items, such as SG&A? Discuss.

Q 21.26. In a detailed projection, does it make sense to project the cash flow statement before you project the income statement?

Q 21.27. How can you obtain a discount rate for use in your financial analysis?

Q 21.28. Can you compute the market beta of Intel prevailing in early 2011 based on three years of daily stock returns? (You can download the data from YAHOO! FINANCE.)

Q 21.29. Answer these questions if your course covered the following: What would be the alternative to using the CAPM for determining the appropriate cost of capital? Look back at the appendix of Chapter 10. Can you compute the cost of capital with this alternative, following the recipe?

Q 21.30. When would you want to calibrate your pro forma model to available market data? Do you believe that most pro formas are calibrated, whether they state it or not? Is caution advisable?

Q 21.31. When would you want to use only one of your three calibration tools? When would you want to use all three?

Q 21.32. Can agency problems affect the numbers in your pro formas?

Q 21.33. When would you believe pro formas in real life to be objective, and when would you believe them to be tailored to what the audience wants to hear?

Q 21.34. Consider a startup that plans to start supermarkets in neglected areas. What is the best way to assess a terminal value?

Q 21.35. Come up with a pro forma for a company assigned by your instructor. (This makes a good final project for a corporate finance course.)

Q 21.36. Pick any publicly traded corporation today. You and a number of your friends should work out three types of pro formas: one if you are a bidder for the corporation, one if you are the owner of the corporation, and an unbiased one. Compare the results. (Note: Often, the average value estimate is a good estimate. Who came closest?)

Data and Programming for Masters Students

(Deliberately omitted. Previous assignments have been sufficiently brutal.)