

Excel Modeling

Monday, December 9, 2024 1:35 PM

Introduction

Welcome to this lesson on Excel modeling. This lesson will build nicely on the business metric lesson. Now that you know how to calculate and interpret a business metric, you can start forecasting the key metrics.

By the end of this lesson, you will understand the fundamentals of sales and financial forecasting models. This lesson will prepare you nicely for the project at the end of the lesson. The project will have you use actual S&P 500 data from the New York Stock Exchange to forecast out a P&L statement for a company of your choice.

The data will include financial performance data from over 500 companies. By the end of the course, you will have mastered how to use advanced Excel tools, and this will set you up nicely for completing the project. So, let's get started.

Lesson Structure

So, you might be asking yourself, what will this lesson cover?

- First, we will start with a brief introduction to fundamental ideas used in creating forecasting models.
- We will review the two approaches to modeling, top-down and bottom-up.
- You will learn about inputs and outputs of a model, and the types of inputs required to create models.
- We will practice Excel functions and tools that can make forecasting models easier and interactive. You will learn advanced tools like Index, Match, and Offset that can come in handy during scenario analysis.

I'm so excited to show you the ins and outs of modeling techniques in Excel.
So, let's dig in.

Lesson Topics

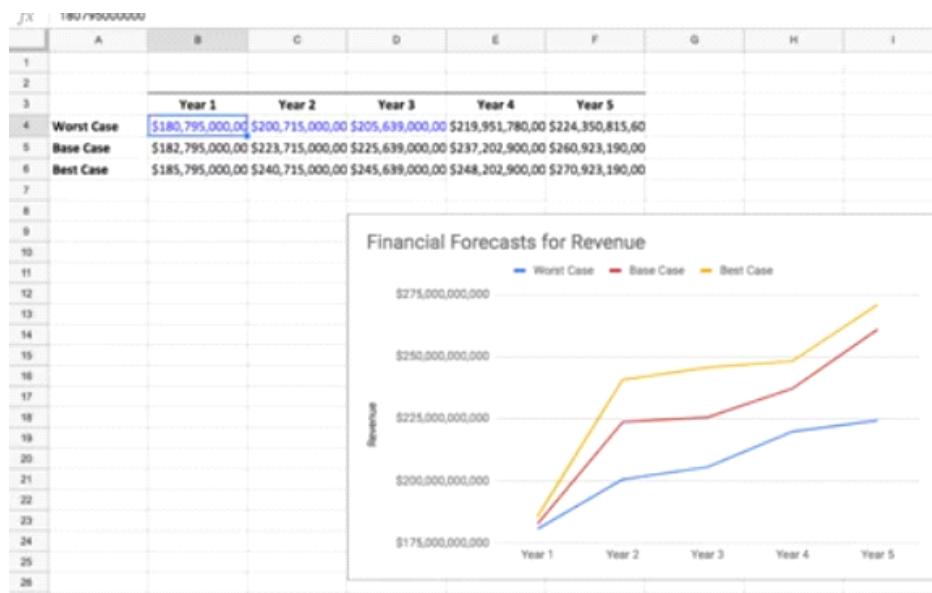
- Introduction to Modeling
- Approaches to Modeling
- Components of a Forecast Model
- Excel Functions and Tools

Introduction to Modeling

Modeling refers to using certain inputs and using those inputs to predict and forecast how our desired business metric will perform in the future.

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How far out you forecast really depends on the type of company you have. Startups usually forecast six months to a year out, while most established companies forecast out a few years.



It can also depend on the metric, for example, sales bookings, maybe for a few months out. Models are continuously updated on an ongoing basis, monthly, quarterly, annually, depending on the metric.

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Most businesses forecast the **sales bookings** and **financial statements**. Typically, businesses forecast all three financial statements, **profit & loss statement**, **cash flow statement**, and **balance sheet**.

However, in this lesson, we will focus on the profit & loss statement.

	Income Statement		Forecast
	2018	2019	
3 Revenue last year	\$1,000,000	\$1,030,000	
4 COGS	\$450,000		
5 Gross Profit	\$550,000	\$618,000	
6 SGAs	\$235,000		
7 Operating expenses	\$12,000		
8 Total Operating Expenses	\$247,000		
9 Operating Profit/EBIT	\$303,000	\$319,300	
10 Income tax	\$90,900		
11 Interest expenses	\$22,000		
12 Net Profit	\$190,100	\$201,510	

Operating statistics	Historical	Assumption
	2018	
17 Revenue growth (%)	2%	3%
18 Gross margin	0.55	0.6
19 Operating margin	0.303	0.31
20 Income tax	0.3	0.3
21 Interest	0.05	0.05

We have provided some website links that go over how to forecast the other two financial statements, as it requires more specialized knowledge of finance and accounting. In the next video, we will go over two approaches to modeling, top-down and bottom-up approach. See you in the next video.

Resources on Modeling Financial Statements

We recommend the following websites that layout considerations for making assumptions for financial forecasting.

- [Modeling the 3 Financial Statements](#)(opens in a new tab)
- [Blog on forecasting taxes and interest rates](#)(opens in a new tab). Scroll down to the bottom of the page where it talks about interest income.
- [Forecasting Revenue and Growth](#)

Top-Down Approach

Forecasting model requires careful thinking about which approach you want to take to create the models. One approach to modeling is top-down. It takes a macro approach to forecasting.

Here, you start with the best estimate of the larger size of the market narrowing down to identify the portion of the market that the company is serving, and then estimate what it will take to capture that portion of the market. Top-down is a macro approach, but it is less credible and typically adopted when there's limited historical data.



We'll next look at an example that shows why this is less credible. Let's go to the WeCart example. We start with the online grocery delivery market, which is about \$20 billion, and then we start getting into the specifics, such as which market segments the company wants to focus on. Say the executive team at WeCart wants to retain the focus on the urban market, which is about \$17 million. Now, the assumption is that WeCart will aim to capture five percent of this market, and with that we arrive at \$850,000.



Finally, based on our product pricing, say \$4.95 per delivery, we can now arrive at our sale quantity estimates of about a 170,000 customer orders. As you can see, this is a less credible way to forecast because you're talking in guesses and estimates based on macro figures. It's harder to convince potential investors you can realistically achieve this forecasted revenue.



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The term "macro approach" in the context of the Top-Down Approach refers to starting with a broad overview or large-scale perspective before narrowing down to specific details. Here's a breakdown of what that means:

1. **Starting Point:** In a macro approach, you begin with the overall market size or industry figures. For example, you might look at the total revenue of the online grocery delivery market, which could be estimated at \$20 billion.
2. **Narrowing Down:** After establishing the broad market size, you then focus on the specific segment that your company is targeting. For instance, if your company, WeCart, is focusing on the urban market, you would then narrow down to that segment, which might be valued at \$17 million.
3. **Estimation:** Finally, you make estimates based on assumptions about market share. If WeCart aims to capture 5% of the urban market, you would calculate the expected revenue based on that percentage.

Limitations of the Macro Approach:

- **Credibility:** Because this approach relies heavily on estimates and assumptions rather than detailed data, it can be seen as less credible. Investors may find it hard to trust forecasts that are based on broad figures without supporting evidence from more granular data.
- **Lack of Detail:** The macro approach may overlook important factors that could influence the market, such as competition, customer preferences, and operational capabilities, which are often better captured in a bottom-up approach.
- **Risk of Overgeneralization:** By focusing on the larger picture, you might miss nuances that could significantly impact your business's performance.

In summary, while the macro approach can provide a quick overview and help in initial planning, it's essential to complement it with more detailed, data-driven analysis to build a robust and credible business case.

Bottom-Up Approach

A bottom up approach takes a micro approach to forecasting. The approach starts by looking at historical data. The more data you have, the better. But often, even as little as six months to one year data is used in this approach. The model forecasts are based on these data to make assumptions about how the key metrics will behave, and then we forecast out the revenue based on these assumptions.



Let's look at a sample income statement that uses bottom up approach to forecast out revenues and net income. For instance, we started with the historical data. For example, last year's income statement metrics, then we use this historical numbers to calculate out margin metrics as well as historical income tax rates and interest expenses.

Income Statement					
	2018	2019	Operating Statistics	Historical 2018	Assumption 2019
Revenue Last Year	\$1,000,000	\$1,030,000	Revenue Growth (%)	2%	3%
COGS	\$450,000	-	Gross Margin	0.55	0.6
Gross Profit	\$550,000	\$618,000	Operating Margin	0.303	0.31
SGAs	\$235,000	-	Income Tax	0.3	0.3
Operating Expenses	\$12,000	-	Interest	0.05	0.05
Total Operating Expense	\$247,000	-			
Operating Profit/EBT	\$303,000	\$319,300			
Income Tax	\$90,900	-			
Interest Expenses	\$22,000	-			
Net Profit	\$190,100	\$201,510			

The next step is to use those margins and metrics to come up with the assumptions for the future, in this case, the following year. Finally, using those assumptions in our model, we forecast out the key metrics for next year.

Operating Statistics	Historical 2018	Assumption 2019
Revenue Growth (%)	2%	3%
Gross Margin	0.55	0.6
Operating Margin	0.303	0.31
Income Tax	0.3	0.3
Interest	0.05	0.05

As you can see, bottom up approach is based on assumptions as well, but it is built on previously attained numbers. There are specific to how the company has performed, and not generalizations that relate to the market as a whole.

Components of a Model

There are essentially two parts to a model, inputs and outputs. You need the inputs to create a model or drivers of the model. The output is what you're aiming to forecast.

The golden forecasting is to find the related inputs which can help you best predict your key outputs.

Typically, for inputs, we could include a combination of historical data, assumptions and scenario analysis.

Inputs and Outputs

- Inputs:
 - Historical data: Past performance
 - Assumptions: Changing circumstances
 - Scenarios: Possible future
- Outputs:
 - Forecasted metrics or KPIs

Let's go through each of these in the next set of videos.

Historical Data & Assumptions

In modeling, assumptions on what you think will come to for the inputs or metrics in the model. It can be assumptions about the circumstances that affect the metrics in the model. To build your assumptions out, you start with information available to you based on historical data.

For example, we can assume we will continue to gain market share at the same rate as we have for the last six months, or we assume that we will continue to see spikes and sales around holidays or on certain days of the week.

As you make assumptions, pay attention to your forecasts about metrics you have less control over. Costs are usually harder to change drastically. So, when you make your assumptions about reducing the future costs, make sure you're being realistic. For instance, when estimating the cost of delivery, the cost of gas is typically harder to predict since gas prices are fairly volatile.

So, in general, be careful about the assumptions you make about changes in costs, and check to see if those assumptions are reasonable and make sense.

Historical Data

Historical data is about what's your metric show for the past. So, for sales, we look at prior sales data from the last year or month.

A	B	C	D	E	F
Sales Person Team	Customer Name	Units	Contract Terms = Number of months in the contract	Price per Units (by mon)	Bookings Forecast
Formula		Pieces per box X # of days	Number of months in the contract	Units * Price per Unit (unit = box)	Price per unit X Contract Term (month)
Details and Notes				Units * \$15	
John Smith	Target	4,000	12	\$48,000	\$576,00
Adam McFarland	Charles Schwab	5,050	24	\$121,200	\$2,908,80
Cory Jones	Amazon	4,300	15	\$64,500	\$967,50
Indiana Tucker	PepsiCo	6,034	24	\$144,816	\$3,475,55

For financial modeling, we look at prior financial statements quarterly or annual results. Here is an example of a financial model.

Ticker	AAPL									
Income Statement										
Historical										
Forecast										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6				
Revenue	\$ 170,910,000,000	\$ 182,795,000,000	\$ 233,715,000,000	\$ 215,639,000,000	\$ 237,202,900,000	\$ 260,923,190,000				
COGS	\$ 106,606,000,000	\$ 112,258,000,000	\$ 140,089,000,000	\$ 131,376,000,000						
Gross Profit	\$ 64,304,000,000	\$ 70,537,000,000	\$ 93,626,000,000	\$ 84,263,000,000	\$ 104,369,276,000	\$ 26,092,319,000				
Sales, General and Admin.	\$ 10,830,000,000	\$ 11,993,000,000	\$ 14,329,000,000	\$ 14,194,000,000						
Other operating expenses	\$ -	\$ -	\$ -	\$ -						
Research & Development	\$ 4,475,000,000	\$ 6,041,000,000	\$ 8,067,000,000	\$ 10,045,000,000						
Total operating expenses	\$ 15,305,000,000	\$ 18,034,000,000	\$ 22,396,000,000	\$ 24,239,000,000						
Operating income/EBIT	\$48,999,000,000	\$52,503,000,000	\$71,230,000,000	\$60,024,000,000	\$ 75,904,928,000	\$ 83,495,420,800				
Scenario	Strong case									
Operating statistics										
Historical										
Assumptions										
Revenue growth (%)			28%	-8%	10.0%	10.0%				
Gross margin	0.38	0.39	0.40	0.39	0.44	0.44				
Operating margin	0.29	0.29	0.30	0.28	0.32	0.32				
Operating Scenarios - sensitivity analysis										
Revenue growth (%)										
Strong case	1				10.0%	10.0%				
Base case	2				5.0%	5.0%				
Weak case	3				2.0%	2.0%				
Gross Margin										
Strong case	1				0.44	0.44				
Base case	2				0.40	0.41				

We're using these primers data on revenue and COGS to calculate our operating income. We then use our historical data to calculate our assumptions.

Scenario	Strong case									
Operating statistics										
Historical										
Assumptions										
			28%	-8%	10.0%	10.0%				
Revenue growth (%)										
Gross margin	0.38	0.39	0.40	0.39	0.44	0.44				
Operating margin	0.29	0.29	0.30	0.28	0.32	0.32				
Operating Scenarios - sensitivity analysis										
Revenue growth (%)										
Strong case	1				10.0%	10.0%				
Base case	2				5.0%	5.0%				
Weak case	3				2.0%	2.0%				
Gross Margin										
Strong case	1				0.44	0.44				
Base case	2				0.40	0.41				
Weak case	3				0.37	0.37				
Operating Margin										
Strong case	1				0.32	0.32				
Base case	2				0.30	0.31				
Weak case	3				0.28	0.28				

Similarly for sales forecasting, we use our prior months' data on bookings closed in one probability, and these inputs are used to forecast out our future bookings.

A	B	C	D	E	F
Sales Person Team	Customer Name	Units	Contract Terms = Number of months in the contract	Price per Units (by mon)	Bookings Forecast
Formula		Pieces per box X # of days	Number of months in the contract	Units * Price per Unit (unit = box)	Price per unit X Contract Term (month)
Details and Notes				Units * \$15	
John Smith	Target	4,000	12	\$48,000	\$576,00
Adam McFarland	Charles Schwab	5,050	24	\$121,200	\$2,908,80
Cory Jones	Amazon	4,300	15	\$64,500	\$967,50
Indiana Tucker	PepsiCo	6,034	24	\$144,816	\$3,475,51

C	D	E	F	G	H
Units	Contract Terms = Number of months in the contract	Price per Units (by mon)	Bookings Forecast	Closed/Won Probability	Weighted Bookings Forecast
Pieces per box X # of days	Number of months in the contract	Units * Price per Unit (unit = box)	Price per unit X Contract Term (month)		Bookings Forecast * Close/Won Probability
		Units * \$15			
4,000	12	\$48,000	\$576,000	0.65	\$374,400
5,050	24	\$121,200	\$2,908,800	0.75	\$2,181,600
4,300	15	\$64,500	\$967,500	0.9	\$870,750
6,034	24	\$144,816	\$3,475,584	0.8	\$2,780,467

Historical Data

Historical data is about what your performance metrics show for the past. For sales, for example, we look at prior sales data from the previous year or months. For financial modeling, we look at prior financial statements, as well as quarterly and monthly results. Above we are using prior year data (e.g., Revenue, COGS) to get our operating income, which we then use to calculate the historical operating margin.

Formulas for Calculating Historical Financial Metrics

Typically, the historical statistics or metrics used to forecast financial metrics in an Income Statement are:

1. Revenue Growth
2. Gross Margin
 - Operating Margin
 - Historical Tax Rate
 - Historical Interest Expense Rate

The following list provides more information about calculating the historical statistics.

1. Revenue Growth (in %) = ((Current Year's Revenue / Previous year's revenue) - 1)
2. Gross Margin = (1 - (Current Year's Cost of COGS / Current Year's Total Revenue))
Keep in mind the two terms COGS and Cost of Revenue can be used interchangeably.
3. Operating Margin = Current Year's Operating Income / Current Year's Total Revenue
4. Historical Tax Rate is the tax rate from the companies previous year's tax rate.
5. Historical Interest Rate is the interest rate coming from the previous year's Debt Schedule.

Additional Resources on Developing Assumptions

We recommend the following websites that layout considerations for making assumptions for financial forecasting.

- [Forecasting Revenue and Growth\(opens in a new tab\)](#)
- [Revenue Forecasting](#)

Bottom-Up Sales Forecasting

We will next focus on Sales Forecasting. We will go through an example of forecasting sales bookings using both the bottom-up approach and the top-down approach.

- In the bottom-up approach, you will see how historical data is used for forecasting.
- In the top-down approach, you will use assumptions about Santa RAM, that influences sales productivity, and in turn, the projected bookings.

Though there are many ways to implement each of these approaches, the examples here, will provide a foundation for extending these practices to new examples. I've provided additional resources below the videos for you to see other examples of sale forecast. Before we begin, let's take a moment to revisit the sales funnel.

As you remember, the sales metrics are tracking the conversions from prospects into leads and then turning these leads into qualified leads and finally, we hope to win or close the deals and increase our sales bookings. Now, let's go over a sales forecast using a bottom-up approach.



This is the more common approach and it comes from the sales funnel historical data

Sales Bottom Up Intro

Let's say you're the sales manager for a company that makes flatware, say using renewable products like bamboo, and you've been asked to forecast the sales for the company. Your sales team has several accounts which offer opportunities to make a sales deals, and you're trying to forecast your sales metrics for the next year. Account refers to the companies where you provide your products in bulk. You're not selling to the individual customer here, but rather to the company that will buy the products in bulk.

A	B	C	D	E	F	G	H
Sales Person Team	Account Name	Units	Contract Terms of this Opportunity	Price for all Units in 1 mon in this opportunity	Bookings Forecast	Closed/Won Probability	Weighted Bookings Forecast
For each person in our team	Which account is this opportunity with?	How many units is this opportunity LIKELY to book/sale?	Based on how long the sales contract would be for...	...what are the sales that we could generate IF these units were sold each month in the contract term?	What is our bookings forecast?	How likely is the probability of win for this opportunity?	Now, what is the weighted bookings forecast if we give the higher likelihood opportunities more weight in our forecast?
4							

Now, let's go over sales forecast example using a bottom-up approach. This is the more common approach and it comes from the sales file historical data.

We start with having one row for each person in our sales team. So, in the model, we are trying to understand for each person in our sales team, which account is this opportunity with? How many units is this opportunity likely to create a booking for or sale?

Based on how long the sales contract would be for, what are the sales that we would generate if these units were sold each month in the contract term? That provides us with our bookings forecast. In column F, we can go one step further and we can ask how likely is the probability of a win for this opportunity? Based on that probability, we can calculate the weighted bookings forecast.

A	B	C	D	E	F	G	H
Sales Person Team	Account Name	Units	Contract Terms of this Opportunity	Price for all Units in 1 mon in this opportunity	Bookings Forecast	Closed/Won Probability	Weighted Bookings Forecast
For each person in our team	Which account is this opportunity with?	How many units is this opportunity LIKELY to book/sale?	Based on how long the sales contract would be for...	...what are the sales that we could generate IF these units were sold each month in the contract term?	What is our bookings forecast?	How likely is the probability of win for this opportunity?	Now, what is the weighted bookings forecast if we give the higher likelihood opportunities more weight in our forecast?
4							

So, let's walk through the sales model using a bottom-up approach. I've kept the overarching themes here on the top, so you can see what is the motivation for each of these columns.

A	B	C	D	E	F	G	H
Sales Team Member	Account Name	Units/month	Contract Terms	Price for all Units in 1 mon	Bookings Forecast	Closed/Won Probability	Weighted Bookings Forecast
For each person in our team	Which account is this opportunity with?	How many units is this opportunity LIKELY to book/sale?	Based on how long the sales contract would be for...	...what are the sales that we could generate IF these units were sold each month in the contract term?	What is our bookings forecast?	How likely is the probability of win for this opportunity?	Now, what is the weighted bookings forecast if we give the higher likelihood opportunities more weight in our forecast?
4							
5							
Formula			Number of months in the contract	Units * Price per Unit (unit = box)	Price for units X Contract Term (month)		Bookings Forecast * Close/Won Probability
Notes				Units * \$5			
9 Joe Smith	Company A	4,000	12	\$20,000	\$240,000	0.65	\$156,000
10 Adam McFarland	Company B	5,050	24	\$25,250	\$606,000	0.75	\$454,500
11 Cory Jones	Company C	4,300	15	\$21,500	\$322,500	0.9	\$290,250
12 Indiana Tucker	Company D	6,034	24	\$30,170	\$724,080	0.8	\$579,264

- We start with this column with a row for each sales team member. This is followed by the company, which is the company name for which you are going to be selling products in bulk,
- Then comes in column C, the units per month. So, this is the number of units this opportunity is likely to create a bookings for.
- Contract terms shows the number of months each opportunity is for.
- Price for all units in one month shows the number of units times the sales price per unit, which is \$5 here, and this is showing the sales price for their projected unit over a month. For example, how much would Joe Smith, working with company A, bring in revenues from the sale of 4,000 units per month?
- Then you multiply that with the number of months in the contract term to arrive at the bookings

forecast.

A	B	C	D	E	F	G	H
For each person in our team	Which account is this opportunity with?	How many units is this opportunity LIKELY to book/sale?	Based on how long the sales contract would be for...	...what are the sales that we could generate IF these units were sold each month in the contract term?	What is our bookings forecast?	How likely is the probability of win for this opportunity?	Now, what is the weighted bookings forecast if we give the higher likelihood opportunities more weight in our forecast?
Sales Team Member	Account Name	Units/month	Contract Terms	Price for all Units in 1 mon	Bookings Forecast	Closed/Won Probability	Weighted Bookings Forecast
Formula Notes			Number of months in the contract	Units * Price per Unit (unit = box)	Price for units X Contract Term (month)		Bookings Forecast * Close/Won Probability
9 Joe Smith	Company A	4,000	12	\$20,000	\$240,000	0.65	\$156,000
10 Adam McFarland	Company B	5,050	24	\$25,250	\$606,000	0.75	\$454,500
11 Cory Jones	Company C	4,300	15	\$21,500	\$322,500	0.9	\$290,250
12 Indiana Tucker	Company D	6,034	24	\$30,170	\$724,080	0.8	\$579,264

We can go one step further and multiply the bookings forecast with the win probability to show a more realistic weighted forecast.

So, let's look at this example. We're more likely to get the sales contract with Corey Jones, Company C, because it has a win probability of 0.9, versus this opportunity with Joe Smith, Company A, which has a lower probability. So, the 290k is a weighted bookings forecast, which shows this is a high probability that you'll win this compared to this one.

It takes into account the probability, so you can get a realistic estimate of how likely are we getting this amount versus the amount.

So, this is a bottoms-up sales forecast. As you can see, here we're using an opportunity level forecast to project out the bookings for the whole company.

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The win probability value is typically derived from historical data and sales analytics. It represents the likelihood of successfully closing a deal based on various factors, including past performance, the nature of the opportunity, and the relationship with the client. Here are some common methods to determine the win probability:

- Historical Data Analysis:** Look at past sales data to identify patterns. For example, if deals similar to the current opportunity have a 70% close rate, you might set the win probability at 0.7.
- Sales Team Input:** Sales representatives often have insights into the likelihood of closing a deal based on their interactions with the client. Their assessments can be used to set the win probability.
- CRM Tools:** Many Customer Relationship Management (CRM) systems have built-in analytics that can provide win probabilities based on various metrics and historical data.
- Market Conditions:** Consider external factors such as market trends, competition, and economic conditions that might affect the likelihood of closing a deal.
- Assumptions:** In some cases, especially in the early stages of forecasting, the win probability may be based on assumptions or estimates until more data is available.

In your case, if you are working with a specific opportunity, you might want to gather data from previous similar deals or consult with your sales team to establish a realistic win probability.

Assumptions and KPIs

Here are the formulas used in the sales forecasting example described in the video above.

- **Contract Terms** = Number of months in the contract
- **Price per Unit (by mon)** = Units needed in 1 month X Price per Unit
- **Bookings Forecast** = Price per Unit X Contract Term (month)
- **Closed/Won Probability** = Probability of Closing the deal
- **Weighted Bookings Forecast** = Bookings Forecast * Closed/Won Probability

Additional Resources on Sales Forecasting:

As described in the video, there are several different ways and goal of sales forecasting. The following websites provide more examples of sales forecasting.

- [Sales Hacker - Forecasting Methods](#)(opens in a new tab)
- 1. [Sales Hacker - Forecasting Metrics](#)(opens in a new tab)
- 2. [Insight Squared](#)(opens in a new tab)
- 3. [Seismic: Improving sales productivity](#)

Top-Down Sales Forecasting

Let's go over a top-down model that focuses on bookings for sales person. The model is divided into four portions here. We're starting with an assumptions about the dollar amount we need in bookings. Then we figured out how much time and effort it would require to get to generate those bookings. Let's look at this more closely.

We start with an assumption about how productive this sales person who we are going to hire will be. We measure this in terms of the number of opportunities being generated, and then we look at how much revenue on average would this person generate per unit and per an opportunity. We use these assumptions to arrive at the average size of opportunity we can expect the sales person to generate.

1	Key Seller Assumptions & KPIs
3	
4	How productive would this sales person be?
	+
5	How much revenue on average would this person generate per opportunity in a month?
6	
7	How long would each contract be?
8	What is the average size of the opportunity we can expect this sales person to generate?
9	

Then we make assumptions about how much time and effort it will take us to arrive at those bookings. For this, we project out when we will hire the person.

13	
14	When can we expect to hire this person?
15	
16	
17	
18	
19	Sales Productivity Schedule
20	
21	
22	When is the ramp time, or length of time a sales person needs to start generating leads and bookings?
23	
24	
25	
26	
27	Projected Bookings per Sales Person

Then based on our sales historical data, we come up with the assumption that a new sales member would take X number of months to get up to speed to start generating those leads and bookings.

19	
20	Sales Productivity Schedule
21	
22	When is the ramp time, or length of time a sales person needs to start generating leads and bookings?
23	
24	
25	
26	
27	Projected Bookings per Sales Person
28	
29	Based on the ramp time and average size of the opportunity, what are project bookings we expect this person to generate?
30	
31	
32	
33	
34	Total Bookings
35	

Then finally, we use the ramp time and the average size of opportunity assumptions, to project out when he will see the bookings that we expect this person to generate. As you can see, we get to the final bookings number for each sales team member and month, by starting with our bookings in the more broad sense and then narrowing down to each person and month.

Sales Topdown Example

So, let's walk through the model. I've kept the overarching themes here on the left. So, you can see what is the motivation for each of these sections.

- We start with the number of opportunities we expect the person to close annually.
- Average price per unit is the average price per unit or product for manufacturing. If you work in a sales SaaS company, this would be the average price per seat.
- Average units per opportunity is the average number of units you can expect to sell per opportunity.
- Average contracts month per opportunity is the average length of time in months that sales contract can be for.

		C
1		
2	Key Seller Assumptions &	
3		
4	How productive would this sales person be?	# Opportunities Closed by Sales Person (Annually)
		24
5	How much revenue on average would this person generate per opportunity in a month?	Avg PPU/mo
		\$233
6		Avg Units per Oppy
		56
7	How long would each contract be?	Avg Contract Months/Opty
		10
8	What is the average size of the opportunity we can expect this sales person to generate?	Avg Opportunity Size (Booking)
		\$130,480

Next, we get to the average opportunity size. You just take the product of these three numbers, average price per unit, average units per opportunity and average contract months per opportunity to get this number of bookings. This is the average booking size we expect this salesperson to create on an annual basis.

5	How much revenue on average would this person generate per opportunity in a month?	Avg PPU/mo
		\$233
6		Avg Units per Oppy
		56
7	How long would each contract be?	Avg Contract Months/Opty
		10
8	What is the average size of the opportunity we can expect this sales person to generate?	Avg Opportunity Size (Booking)
		\$130,480

Next, we see how we are going to get to these booking sites. We start with the assumption that the center ramp or the length of time we can expect the new seller to reach full productivity after being hired is **three months**.

	A	B	C	D	E	F	G	H	
10	Sales Hiring Schedule								
11									
12									
13	When can we expect to hire this person?	Sales Employee	Projected Hire Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019		
14		Sales Person 1	12/16/2018	0	1	1	1		
15		Sales Person 2	1/15/2019	0	0	1	1		
16		Sales Person 3	2/14/2019	0	0	0	1		
17									
18			Seller Ramp Assumption	3					
19									
20									
21	When is the ramp time, or length of time a sales person needs to start generating leads and bookings?	Sales Productivity Schedule		Projected Ramp Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019
22		Sales Person 1	3/31/2019	0	0	0	0	1	
23		Sales Person 2	4/30/2019	0	0	0	0	0	
24		Sales Person 3	5/31/2019	0	0	0	0	0	
25									

So, we have the projector and hire date here and we use dummy coding. Dummy coding refers to when you

give a value of zero or one to a sale because it means something's got to represent something has happened. It's kind of one and zero are dummies for the presence of something happening. So, in the sales hiring schedule, we're trying to create dummy coding for the projected hire date and after that, indicating a **one for the person having been hired**.

For this, we use two Excel functions. One is **EOMONTH** and the other is **TODAY**. Let's start with **TODAY**. So, for sales person one, say, we are going to hire them on 12/16. So, we start with the today function just says okay. Whatever today's date is, just add 30 days to it.

	B	C	D	E	F	G
g Schedule						
e	Projected Hire Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019	
	=TODAY()+30	0	1	1	1	
	1/15/2019	0	0	1	1	
	2/14/2019	0	0	0	1	

Well, since I'm doing the recording on **11/16**, it is just adding 30 days to that and so on. Here, we're adding 60 days to it and here we are adding 90 days to it.

	B	C	D	E	F	G
Hiring Schedule						
Employee	Projected Hire Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019	
son 1	12/16/2018	0	1	1	1	
son 2	1/15/2019	0	0	1	1	
son 3	2/14/2019	0	0	0	1	

EOMONTH allows you to state that **TODAY** date and add months to that date and give that final date. So, today's date is **11/16** and is adding zero months to it but it's giving me the end of the month, which is **11/30**.

	B	C	D	E	F	G
Hiring Schedule						
Employee	Projected Hire Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019	
son 1	12/16/2018	0	1	1	1	
son 2	1/15/2019	0	0	1	1	
son 3	2/14/2019	0	0	0	1	

It does the same thing, giving it a one-month laps, two-month laps and a three-month laps.

`=EOMONTH(TODAY(),1)`

B	C	D	E	F	G
Hiring Schedule					
Employee	Projected Hire Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019
Son 1	12/16/2018	0	1	1	1
Son 2	1/15/2019	0	0	1	1
Son 3	2/14/2019	0	0	0	1

So, now we can see that the hiring schedule shows that once a person has hired, a month from then, they will be employed and available to start generating leads, and that's what this table is showing.

`=IF($C14<=E$13,1,0)`

B	C	D	E	F	G
Hiring Schedule					
Employee	Projected Hire Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019
Son 1	12/16/2018	0	1	1	1
Son 2	1/15/2019	0	0	1	1
Son 3	2/14/2019	0	0	0	1

For the center productivity schedule, we borrow the end of month function again and get three months for every month from today.

So, because we are trying to generate the schedule when the seller is going to be productive, we want to give the seller three months of ramp time.

18	19	20	Seller Ramp Assumption	3
21	When is the ramp time, or length of time a sales person needs to start generating leads and bookings?	Sales Productivity Schedule	Projected Ramp Date	11/30/2018 12/31/2018 1/31/2019 2/28/2019 3/31/2019
22	Sales Person 1	3/31/2019	0 0 0 0 1	
23	Sales Person 2	4/30/2019	0 0 0 0 0	
24	Sales Person 3	5/31/2019	0 0 0 0 0	
25				

So, starting from today, end of the month of today's month, just add three months to that. So, that's what end of month does here.

`=EOMONTH(C14,C19)`

A	B	C	D	E	F	G	H
16	Sales Person 3	2/14/2019	0	0	0	1	
Seller Ramp Assumption							
18	19	20	Seller Ramp Assumption	3			
21	When is the ramp time, or length of time a sales person needs to start generating leads and bookings?	Sales Productivity Schedule	Projected Ramp Date	11/30/2018 12/31/2018 1/31/2019 2/28/2019 3/31/2019			
22	Sales Person 1	3/31/2019	0 0 0 0 1				
23	Sales Person 2	4/30/2019	0 0 0 0 0				
24	Sales Person 3	5/31/2019	0 0 0 0 0				
25							

C14 : =TODAY()+30

A	B	C	D	E	F	G
Sales Hiring Schedule						
13 Sales Employee		Projected Hire Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019
14 When can we expect to hire this person?	Sales Person 1	12/16/2018	0	1	1	1
15	Sales Person 2	1/15/2019	0	0	1	1
16	Sales Person 3	2/14/2019	0	0	0	1

We're just giving it C14, which is this month, this date here and it's adding three months to that, same here and use the dummy coding to create the productivity schedule that shows three months since the person was hired, the person is going to be productive or not.

C24 : =EOMONTH(C15,\$C\$19)

A	B	C	D	E	F	G	H	
16 Sales Person 3		2/14/2019	0	0	0	1		
17		Seller Ramp Assumption	3					
18								
19 When is the ramp time, or length of time a sales person needs to start generating leads and bookings?	Sales Productivity Schedule		Projected Ramp Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019
20	Sales Person 1	3/31/2019	0	0	0	0	1	
21	Sales Person 2	4/30/2019	0	0	0	0	0	
22	Sales Person 3	5/31/2019	0	0	0	0	0	

H23 : =IF(\$C23<=H\$22,1,0)

D	E	F	G	H	I	J	K	L	
16 0	0	0	1						
17									
18									
19									
20									
21									
22	11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019	4/30/2019	5/31/2019	6/30/2019	7/31/2019
23	0	0	0	0	1	1	1	1	1
24	0	0	0	0	1	1	1	1	1
25	0	0	0	0	0	1	1	1	1

Person hire date

This matrix describes the productive discussion.

Finally, we get to our projections for when a seller will be productive and the projected bookings based on that. Since we only need the bookings the seller will generate per month, we're trying to calculate that dollar amount per month.

A	B	C	D	E	F	G	H
22 When, or length of time a sales person needs to start generating leads and bookings?		Projected Ramp Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019
23 Sales Person 1		3/31/2019	0	0	0	0	1
24 Sales Person 2		4/30/2019	0	0	0	0	0
25 Sales Person 3		5/31/2019	0	0	0	0	0
26							
27							
28 Based on the ramp time and average size of the opportunity, what are project bookings we expect this person to generate?	Projected Bookings per Sales Person		11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019
29	Sales Person 1		\$0	\$0	\$0	\$0	\$260,960
30	Sales Person 2		\$0	\$0	\$0	\$0	\$0
31	Sales Person 3		\$0	\$0	\$0	\$0	\$0
32	Total Bookings		\$0	\$0	\$0	\$0	\$260,960

We need to multiply the productivity dummy variable, here with the projected average booking that we expect based on this number.

So, let me break that down.

D23	<input type="button" value="X"/> <input type="button" value="✓"/> <input type="button" value="fx"/> =IF(\$C23<=D\$22,1,0)						
A time, or length of time a sales person needs to start generating leads and bookings?	B	C Projected Ramp Date	D	E	F	G	H
Sales Person 1		3/31/2019	11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019
Sales Person 2		4/30/2019	0	0	0	0	1
Sales Person 3		5/31/2019	0	0	0	0	0

C8	<input type="button" value="X"/> <input type="button" value="✓"/> <input type="button" value="fx"/> =C5*C6*C7	
A	B	C
How productive would this sales person be?	# Opportunities Closed by Sales Person (Annually)	24
How much revenue on average would this person generate per opportunity in a month?	Avg PPU/mo	\$233
How long would each contract be?	Avg Units per Oppy	56
What is the average size of the opportunity we can expect this sales person to generate?	Avg Contract Months/Oppy	10
		\$130,480

So, this is telling us that, start with this booking number, the number of opportunities the person will be generating per month, that's this number, and multiply that with this value, which is whether the person is productive or not.

D30	<input type="button" value="X"/> <input type="button" value="✓"/> <input type="button" value="fx"/> =D23*\$C\$8*(\$C\$4/12)		
A time, or length of time a sales person needs to start generating leads and bookings?	B	C Projected Ramp Date	D
Sales Person 1		3/31/2019	11/30/2018
Sales Person 2		4/30/2019	0
Sales Person 3		5/31/2019	0
Based on the ramp time and average size of the opportunity, what are project bookings we expect this person to generate?	Projected Bookings per Sales Person		
Sales Person 1		11/30/2018	\$0
Sales Person 2			\$0
Sales Person 3			\$0
Total Bookings			\$0

So, it generates that projected booking per person for that month based on this and then we can get our total bookings at the bottom.

H30 : =H23*\$C\$8*(\$C\$4/12)

A	B	C	D	E	F	G	H
19		3					
20							
21	When is the ramp time, or length of time a sales person needs to start generating leads and bookings?	Sales Productivity Schedule					
22		Projected Ramp Date	11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019
23	Sales Person 1	3/31/2019	0	0	0	0	1
24	Sales Person 2	4/30/2019	0	0	0	0	0
25	Sales Person 3	5/31/2019	0	0	0	0	0
26							
27	Based on the ramp time and average size of the opportunity, what are we projecting bookings we expect this person to generate?	Projected Bookings per Sales Person					
28			11/30/2018	12/31/2018	1/31/2019	2/28/2019	3/31/2019
29	Sales Person 1		\$0	\$0	\$0	\$0	\$260,960
30	Sales Person 2		\$0	\$0	\$0	\$0	\$0
31	Sales Person 3		\$0	\$0	\$0	\$0	\$0
32	Total Bookings		\$0	\$0	\$0	\$0	\$260,960
33							

I made a copy of the CSV, so you can look at the CSV file yourself too. Feel free to watch this video again, slowly, as you follow along with the file on your computer.

Quiz: Top-Down Sales Forecasting

Question 1 of 3

What would be your formula for calculating Average Opportunity Size in Bookings?

- Number of opportunities closed X Average Price Per Unit/month X Average Units per Opportunity
- Number of opportunities closed X Average Price Per Unit/month X Average Contract Months Per Opportunity
- Average Price Per Unit/month X Average Units per Opportunity X Average Contract Months Per Opportunity ✓
- Number of opportunities closed X Average Price Per Unit/month X Average Units per Opportunity X Average Contract Months Per Opportunity

Question 2 of 3

What Excel functions can you use to automate the Projected Hire Date?

- TODAY() ✓
- EOMONTH()
- SUM()

That's right! You can use the TODAY() function and add 30 days to get a date a month away, or 60 days to get a date two months away.

Question 3 of 3

What will be the **Total Projected Bookings** at the *end of the first month* when **Sales Person 1** is productive?

\$2,968,000

\$1,484,000 ✓

\$4,452,000

Solution:

SUBSTITUTE		<input type="button" value="X"/>	<input type="button" value="✓"/>	<input type="button" value="fx"/>	= B5 * B6 * B7
	A		B		
3					
4	# Opportunities Closed by Sales Person (Annually)		53		
5	Avg PPU/mo	\$250			
6	Avg Units per Oppy	56			
7	Avg Contract Months/Opty	24			
8	Avg Opportunity Size (Booking)				= B5 * B6 * B7

D35						
A		B	C	D	E	F
9						
10						
11	Sales Hiring Schedule					
12						
13	Sales Employee	Projected Hire Date	12/31/2024	1/31/2025	2/28/2025	3/31/2025
14	Sales Person 1	1/10/2025	0	1	1	1
15	Sales Person 2	2/9/2025	0	0	1	1
16	Sales Person 3	3/11/2025	0	0	0	1

A	B	C	D	E	F	G	H	I	J	K	L	
17		Seller Ramp Assumption										
18		4										
19												
20												
21	Sales Productivity Schedule	Projected Ramp Date	12/31/2024	1/31/2025	2/28/2025	3/31/2025	4/30/2025	5/31/2025	6/30/2025	7/31/2025	8/31/2025	9/30/2025
22	Sales Person 1	5/31/2025	0	0	0	0	0	1	1	1	1	
23	Sales Person 2	6/30/2025	0	0	0	0	0	1	1	1	1	
24	Sales Person 3	7/31/2025	0	0	0	0	0	0	1	1	1	
25												
26												
27	Projected Bookings per Sales Person											
28			COMPLETE PROJECTED BOOKINGS SCHEDULE									
29			12/31/2024	1/31/2025	2/28/2025	3/31/2025	4/30/2025	5/31/2025	6/30/2025	7/31/2025	8/31/2025	9/30/2025
30	Sales Person 1		\$0	\$0	\$0	\$0	\$0	\$1,484,000	\$1,484,000	\$1,484,000	\$1,484,000	\$1,484,000
31	Sales Person 2		\$0	\$0	\$0	\$0	\$0	\$1,484,000	\$1,484,000	\$1,484,000	\$1,484,000	\$1,484,000
32	Sales Person 3		\$0	\$0	\$0	\$0	\$0	\$0	\$1,484,000	\$1,484,000	\$1,484,000	\$1,484,000
33	Total Bookings		\$0	\$0	\$0	\$0	\$0	\$1,484,000	\$2,968,000	\$4,452,000	\$4,452,000	

Scenario or Sensitivity Analysis

Scenarios are used commonly for financial forecasting. They are tied to assumptions. Think of scenarios as developing different futures for your company. Typically, these include a best case, base case, and a weak case scenario.

A	B	C	D	E	F	G	H	I	J
7				Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
8	Revenue		\$ 170,910,000,000	\$ 182,795,000,000	\$ 233,715,000,000	\$ 215,639,000,000	\$ 237,202,900,000	\$ 260,923,190,000	
9	COGS		\$ 106,606,000,000	\$ 112,258,000,000	\$ 140,089,000,000	\$ 131,376,000,000			
10	Gross Profit		\$ 64,304,000,000	\$ 70,537,000,000	\$ 93,626,000,000	\$ 84,263,000,000	\$ 104,369,276,000	\$ 26,092,319,000	
11	Sales, General and Admin.		\$ 10,830,000,000	\$ 11,993,000,000	\$ 14,329,000,000	\$ 14,194,000,000			
12	Other operating expenses		\$ -	\$ -	\$ -	\$ -			
13	Research & Development		\$ 4,475,000,000	\$ 6,041,000,000	\$ 8,067,000,000	\$ 10,045,000,000			
14	Total operating expenses		\$ 15,305,000,000	\$ 18,034,000,000	\$ 22,396,000,000	\$ 24,239,000,000			
15	Operating income/ EBIT		\$48,999,000,000	\$52,503,000,000	\$71,230,000,000	\$60,024,000,000	\$ 75,904,928,000	\$ 83,495,420,800	
16									
17	Scenario	Strong case							
18									
19	Operating statistics								
20				Historical			Assumptions		
21	Revenue growth (%)				28%	-8%	10.0%	10.0%	
22	Gross margin		0.38	0.39	0.40	0.39	0.44	0.44	
23	Operating margin		0.29	0.29	0.30	0.28	0.32	0.32	
24									
25	Operating Scenarios - sensitivity analysis								
26									
27	Revenue growth (%)								
28	Strong case	1					10.0%	10.0%	

You change the assumptions here located in these cells based on the scenarios.

Scenario	Strong case								
Operating statistics									
				Historical			Assumptions		
Revenue growth (%)					28%	-8%	10.0%	10.0%	
Gross margin	0.38	0.39	0.40	0.39			0.44	0.44	
Operating margin	0.29	0.29	0.30	0.28			0.32	0.32	

You can see that assumptions changing in response to the scenario which is chosen. This in turn also affects the income forecast above.

Scenario	Strong case								
Operating statistics									
				Historical			Assumptions		
Revenue growth (%)					28%	-8%	10.0%	10.0%	
Gross margin	0.38	0.39	0.40	0.39			0.44	0.44	
Operating margin	0.29	0.29	0.30	0.28			0.32	0.32	

	A	B	C	D	E	F	G	H	I	J
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
7					\$ 170,910,000,000	\$ 182,795,000,000	\$ 233,715,000,000	\$ 215,639,000,000	\$ 226,420,950,000	\$ 237,741,997,500
8	Revenue				\$ 106,606,000,000	\$ 112,258,000,000	\$ 140,089,000,000	\$ 131,376,000,000		
9	COGS				\$ 64,304,000,000	\$ 70,537,000,000	\$ 93,626,000,000	\$ 84,263,000,000	\$ 90,568,380,000	\$ 11,887,099,875
10	Gross Profit				\$ 10,830,000,000	\$ 11,993,000,000	\$ 14,329,000,000	\$ 14,194,000,000		
11	Sales, General and Admin.				\$ -	\$ -	\$ -	\$ -		
12	Other operating expenses				\$ -	\$ -	\$ -	\$ -		
13	Research & Development				\$ 4,475,000,000	\$ 6,041,000,000	\$ 8,067,000,000	\$ 10,045,000,000		
14	Total operating expenses				\$ 15,305,000,000	\$ 18,034,000,000	\$ 22,396,000,000	\$ 24,239,000,000		
15	Operating income/ EBIT				\$ 48,999,000,000	\$ 52,503,000,000	\$ 71,230,000,000	\$ 60,024,000,000	\$ 67,926,285,000	\$ 73,700,019,225
16										
17	Scenario	Base case								
18										
19										
20										
21										
22										
23										
24										

Transitioning to Spreadsheet Tools

To build out the financial model, let's first take a look at some Excel functions and tools specifically for Financial modeling. As we introduce you to each of these, we will work towards a financial model, so this will set you up nicely for your final project.

- **Data validation** is a spreadsheet tool that allows you to limit what values are accepted in a cell. You can create drop-down lists of items, restrict cell value to date ranges and numbers.
- **INDEX** function is used when you want the cell to have a value chosen from a specified array and row number indicated within the INDEX function.
- **MATCH** is a LOOKUP function that can locate the position of the lookup value within an array only when it meets specific criteria defined in the MATCH function.
- **INDEX AND MATCH** together add a powerful feature for advanced formulas. Together they can give a value from an array (the purpose of the INDEX function) based on a numeric position (which is provided by the Match function).
- And finally... **OFFSET**. Here you can select a start point in the spreadsheet, and tell Excel to return a set of cells that are counted from the starting point.

We are going to work through an actual example for each of them in the coming videos.

Data Validation

Let's look at this spreadsheet. We have some ticker symbols in this column here and then a bunch of financial data, then we'll get to in a short while. Looking at this ticker symbol, we can see that each ticker symbol is repeated a few times. What we want to create as a data validation is a drop-down list that contains only one occurrence of each of these ticker symbols.

D14

	A	B	C	D	E	F	G	H	I
1	Ticker Symbol	Years	Period Ending	Total Revenue	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items	
2	1 AVGO	Year 1	11/1/2015	\$ 6,824,000,000	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000	
3	2 AVGO	Year 2	10/30/2016	\$ 13,240,000,000	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000	
4	3 CSRA	Year 1	4/3/2015	\$ 4,069,746,000	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000	
5	4 CSRA	Year 2	4/1/2016	\$ 4,250,447,000	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000	
6	5 HPE	Year 1	10/31/2014	\$ 55,123,000,000	\$ 39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000	
7	6 HPE	Year 2	10/31/2015	\$ 52,107,000,000	\$ 37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000	
8	7 HPE	Year 3	10/31/2016	\$ 50,123,000,000	\$ 35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000	
9	8 MYL	Year 1	12/31/2014	\$ 7,719,600,000	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -	
10	9 MYL	Year 2	12/31/2015	\$ 9,429,300,000	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -	

To get started, we're going to use pivot tables. Well, there are many ways to create data validation drop-down list.

This is one of the ways. So, we select ticker symbols, you go to Insert menu, pivot table, we've selected the cell already, and we say new worksheet, and it creates a pivot table here for us.

The screenshot shows the 'Create PivotTable' dialog box. The 'Table/Range' field contains 'Dataset:\$B\$1:\$B\$10'. The 'Location' dropdown is set to 'New Worksheet'. The 'OK' button is highlighted in blue.

We select ticker symbol, and it shows up under the rows, and you can see any repeated occurrences of each ticker symbol had been eliminated, and each symbol shows up only once.

The screenshot shows the PivotTable Fields pane. Under 'Row Labels', 'AVGO (Ticker Symbol)' is selected. Under 'VALUES', 'Ticker Symbol' is selected. The 'OK' button is highlighted in blue.

We need access to this unique list of names. I'm going to go ahead and paste it in here, and then once I've pasted and I'm going to go ahead and select it again, and use name box to give this list a name called company list.

Clipboard		Font	
company_list		X	✓
		fx	AVGO
A	B	C	D
1			
2			AVGO
3	Row Labels		CSRA
4	AVGO		HPE
5	CSRA		MYL
6	HPE		
7	MYL		
8	Grand Total		

Once I've done that, I can reference this list by simply calling this name in my formulas.

Clipboard		Font	
company_list		X	✓
		fx	AVGO
A	B	C	D
1			
2			AVGO
3	Row Labels		CSRA
4	AVGO		HPE
5	CSRA		MYL
6	HPE		
7	MYL		
8	Grand Total		

We can now go ahead and create a new worksheet here. We're going to call it data validation. I'm going to type in ticker symbol because I want this to show up next to that, and then in this cell, I'm going to go Data, Data Validation. You have the option to choose various criteria.

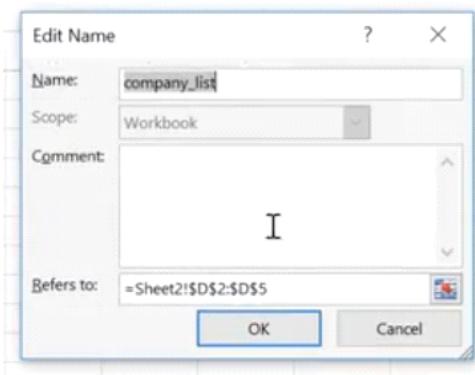
The screenshot shows the Microsoft Excel ribbon with the 'DATA' tab selected. In the center, the 'Data Validation' dialog box is open, displaying the 'Settings' tab. Under 'Validation criteria', 'Allow' is set to 'List', 'Ignore blank' is checked, and 'In-cell dropdown' is checked. The 'Source' field contains the formula '=company_list'. At the bottom right of the dialog box are 'OK' and 'Cancel' buttons. The background of the worksheet shows a table with columns A through D and rows 1 through 8, containing data such as AVGO, CSRA, HPE, and MYL.

So, I'm going ahead and select a list, and as a source, I'm going to reference back to this list here, and I can see it automatically filled into named box, and I go ahead and click Okay, and there you have it. You have a data drop-down menu that only references each of these names separately.

	A	B	C
1			
2	Ticker Symbol	<input type="text"/>	
3		AVGO	
4		CSRA	
5		HPE	
		MYL	

Another trick I just want to mention is that if you find that you're having problems with the data range it's not showing up correctly, you can go to the formula tab at the top, and you can go to Name Manager, and here you can actually see all named boxes that you have, and it tells you which file it's referring to, and you can confirm which ones you want to delete, which ones you want to edit, or you can use the edit option to do that and correct the reference, which sheet did refers to.

Name	Value	Refers To	Scope	Comment
company_list	(=AVGO;"CSR	=Sheet2!\$D\$2:\$D\$5	Workbook	
costofrevenue	(=)	=C:\Users\...	Work...	
otheroperexpense	(=)	=C:\Users\...	Work...	
resdevelop	(=)	=C:\Users\...	Work...	
sgas	(=)	=C:\Users\...	Work...	
tickersymbols	(=)	=C:\Users\...	Work...	
totalrevenue	(=)	=C:\Users\...	Work...	
years	(=)	=C:\Users\...	Work...	



So, this is also an option if you're having some trouble with the Data Validation. See you in the next video.

Excel Steps

Purpose: The purpose of data validation tools is to confirm that the values within the cell are validated against a criterion. In other words, the values within the cell are confined to specific requirements. There are several criteria, including a provided list of values, date range, range of whole numbers or decimal values.

To access the Data Validation tool within MS Excel, you **use the Data tab** and choose **Data Validation**.

Index

Excel Syntax

Purpose: INDEX takes a range of cells and returns a cell from that range that is based on a cell count number provided within the INDEX function.

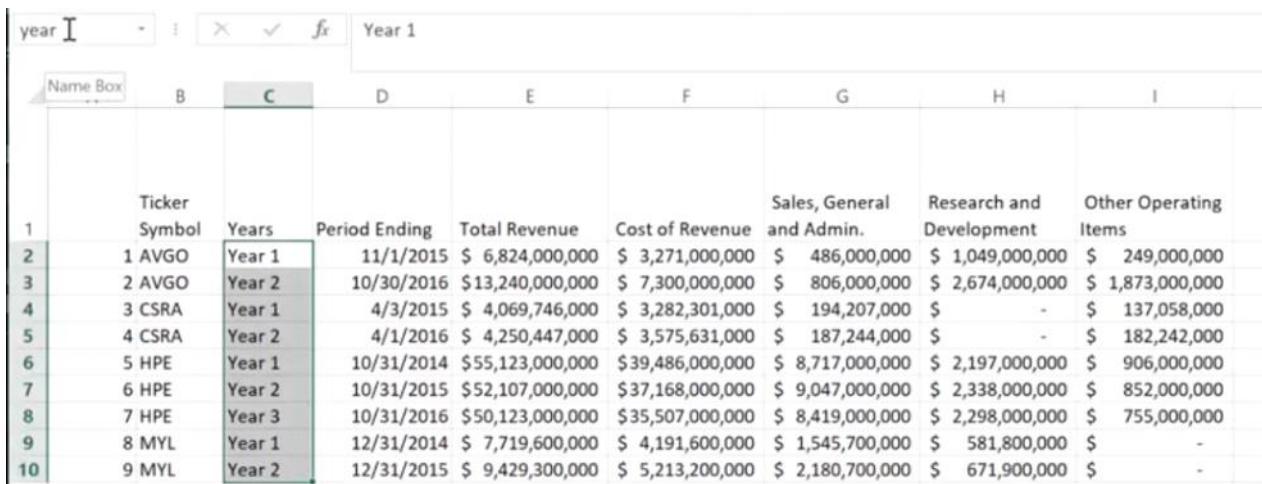
The following is the generic syntax for INDEX:

INDEX(array, row number, column number)

Once you have entered your formula, instead of hitting enter, you need to press Ctrl+Shift+Enter. This places the curly braces around the formula. Missing this step can cause #NAME? error.

Now let's see a simple example. I have already created the named array for the cells to correspond with the column headers.

So, here we have year in the name box, we have total revenue, cost of revenue, SGAs, R & D, and other operating items.



	Ticker Symbol	Years	Period Ending	Total Revenue	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items
1	1 AVG0	Year 1	11/1/2015	\$ 6,824,000,000	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000
2	2 AVG0	Year 2	10/30/2016	\$ 13,240,000,000	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000
3	3 CSRA	Year 1	4/3/2015	\$ 4,069,746,000	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000
4	4 CSRA	Year 2	4/1/2016	\$ 4,250,447,000	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000
5	5 HPE	Year 1	10/31/2014	\$ 55,123,000,000	\$ 39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000
6	6 HPE	Year 2	10/31/2015	\$ 52,107,000,000	\$ 37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000
7	7 HPE	Year 3	10/31/2016	\$ 50,123,000,000	\$ 35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000
8	8 MYL	Year 1	12/31/2014	\$ 7,719,600,000	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -
9	9 MYL	Year 2	12/31/2015	\$ 9,429,300,000	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -

As part of index, this is what I want to do. I want to be able to pull for this particular ticker symbol, the appropriate total revenue, cost of revenue, SGA, R and D, and other operating items for year one. So, it shows up like this.

	A	B	C	D	E	F	G
1							
2	Ticker symbol	AVGO	+ ↴				
Income Statement							
5			Historical				
6			Year 1		Year 2		Year 3
7	Revenue		\$ 6,824,000,000				
8	COGS		\$ 3,271,000,000				
9	Gross Profit		\$ 3,553,000,000				
10	Sales, General and Admin.		\$ 486,000,000				
11	Other operating expenses		\$ 249,000,000				
12	Research & Development		\$ 1,049,000,000				
13	Total operating expenses		\$ 1,784,000,000				
14	Operating income/ EBIT		\$1,769,000,000				
15							
16							
17							

So, keep in mind this is horizontal. It's the very first row. Each row indicating a different item in the financial statement, but we want to convert it to a vertical array.

	A	B	C	D	E	F	G	H	I
Income Statement									
1	Ticker Symbol	Years	Period Ending	Total Revenue	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items	
2	1 AVGO	Year 1	11/1/2015	\$ 6,824,000,000	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000	
3	2 AVGO	Year 2	10/30/2016	\$13,240,000,000	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000	
4	3 CSRA	Year 1	4/3/2015	\$ 4,069,746,000	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000	
5	4 CSRA	Year 2	4/1/2016	\$ 4,250,447,000	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000	
6	5 HPE	Year 1	10/31/2014	\$ 55,123,000,000	\$ 39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000	
7	6 HPE	Year 2	10/31/2015	\$ 52,107,000,000	\$ 37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000	
8	7 HPE	Year 3	10/31/2016	\$ 50,123,000,000	\$ 35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000	
9	8 MYL	Year 1	12/31/2014	\$ 7,719,600,000	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -	
10	9 MYL	Year 2	12/31/2015	\$ 9,429,300,000	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -	
11									
12									
13									

So, how do we go about doing that? So, I've placed all the formulas here so you can follow me along, and this is how we use the index.

	A	B	C	D	E	F	G	H	I	J	K
1											
2	Ticker symbol	AVGO									
Income Statement											
4			Historical			Formula					
5			Year 1		Year 2		Year 3				
6	Revenue								=(INDEX(Total_revenue,1))		
7	COGS								=(INDEX(Cost_of_revenue,1))		
8	Gross Profit								=I7-I8		
9	Sales, General and Admin.								=INDEX(SGAs,1)		
10	Other operating expenses								=INDEX(Other_operating_item,1)		
11	Research & Development								=INDEX(R_and_D,1)		
12	Total operating expenses								=\$SUM(I10:I12)		
13	Operating income/ EBIT								=I9-I13		
14											
15											
16											
17											

We've already defined the array from which we want to pull the values. This is how we want to be if we wanted, from this array, you want the very first value.

From this array, we want the very first value to be pulled into each of these cells. So, this is how you do it.

	Ticker Symbol	Years	Period Ending	Total Revenue	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items
1	1 AVGCO	Year 1	11/1/2015	\$ 6,824,000,000	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000
2	2 AVGCO	Year 2	10/30/2016	\$13,240,000,000	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000
3	3 CSRA	Year 1	4/3/2015	\$ 4,069,746,000	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000
4	4 CSRA	Year 2	4/1/2016	\$ 4,250,447,000	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000
5	5 HPE	Year 1	10/31/2014	\$55,123,000,000	\$39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000
6	6 HPE	Year 2	10/31/2015	\$52,107,000,000	\$37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000
7	7 HPE	Year 3	10/31/2016	\$50,123,000,000	\$35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000
8	8 MYL	Year 1	12/31/2014	\$ 7,719,600,000	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -
9	9 MYL	Year 2	12/31/2015	\$ 9,429,300,000	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -

So, you'll say equal index. One way to do it is to select the array, but keep in mind that I've actually already named it. So, I'm going to actually just call it up. So, the way to call it up is you say, total. So, you start typing in the word, and it shows up with this icon. You can select that, and it puts that in the array parameter. Then for row number, we just want the very first row. We don't have a column specification, so because it's one array, we're going to say one for the row number, and we close the bracket.

	A	B	C	D	E	F	G
1							
2		Ticker symbol	AVGO				
Income Statement							
Historical							
6				Year 1	Year 2	Year 3	
7	Revenue			\$ 6,824,000,000			
8	COGS						
9	Gross Profit						
10	Sales, General and Admin.						
11	Other operating expenses						
12	Research & Development						
13	Total operating expenses						
14	Operating income/ EBIT						

Keep in mind there's one final step. You have to Control, Shift, and Enter on the PC, and it puts the value in. I repeat the same for the rest of the cells. I start typing cost of revenue, one, and I press Control, Shift, Enter, and I believe it's the same on the mark.

IF	X	✓	fx	=INDEX(Cost_of_revenue, 1)	
1	A	B	C	INDEX(array, row_num, [column_num]) INDEX(reference, row_num, [column_num], [area_num])	G
2	Ticker symbol	AVGO			
3					
4		Income Statement			
5				Historical	
6				Year 1	Year 2
7	Revenue			\$ 6,824,000,000	Year 3
8	COGS			=INDEX(Cost_of_revenue, 1)	
9	Gross Profit				
10	Sales, General and Admin.				
11	Other operating expenses				
12	Research & Development				
13	Total operating expenses				
14	Operating Income/ EBIT				

This is actually going to be our formula because this is revenue minus COGS, and it's blue because I prepopulated the blue format, because it's a calculation we're doing here.

E8	X	✓	fx	=E7-E8	
1	A	B	C	D	E
2	Ticker symbol	AVGO			F
3					G
4		Income Statement			
5				Historical	
6				Year 1	Year 2
7	Revenue			\$ 6,824,000,000	Year 3
8	COGS			\$ 3,271,000,000	
9	Gross Profit			=E7-E8	
10	Sales, General and Admin.				
11	Other operating expenses				
12	Research & Development				
13	Total operating expenses				
14	Operating Income/ EBIT				

So, we keep using the Index function to calculate the SGA, other operating expenses and R & D. For the total operating expenses, I just add up the SGA, other operating expenses and R & D, and operating income is gross profit minus the total operating expenses, which gives us the operating income, or EBIT.

1	A	B	C	D	E	F	G
2	Ticker symbol	AVGO					
3							
4		Income Statement					
5				Historical			
6				Year 1	Year 2	Year 3	
7	Revenue			\$ 6,824,000,000			
8	COGS			\$ 3,271,000,000			
9	Gross Profit			\$ 3,553,000,000			
10	Sales, General and Admin.			\$ 486,000,000			
11	Other operating expenses			\$ 249,000,000			
12	Research & Development			\$ 1,049,000,000			
13	Total operating expenses			\$ 1,784,000,000			
14	Operating Income/ EBIT			\$ 1,769,000,000			
15							

So, this is how you do an index function.

Match with One Criterion

So, now we have built-in the year one values in our income statement, but as we move to year two, we quickly realize that it's not going to be so easy moving down the list.

	A	B	C	D	E	F	G	I
1								
2	Ticker symbol	AVGO						
3								
4								
5								
6								
7	Revenue			\$ 6,824,000,000	\$ 13,240,000,000			
8	COGS			\$ 3,271,000,000	#NAME?			
9	Gross Profit			\$ 3,553,000,000	#NAME?			
10	Sales, General and Admin.			\$ 486,000,000	#NAME?			
11	Other operating expenses			\$ 249,000,000	#NAME?			
12	Research & Development			\$ 1,049,000,000	#NAME?			
13	Total operating expenses			\$ 1,784,000,000	#NAME?			
14	Operating Income/ EBIT			\$ 1,769,000,000	#NAME?			
15								
16								
17								

AVGO and year one were the very first row in our original data. But as we go further down, it becomes more challenging to hard-code in the row number. Because what if it was CSRA or year three for HPE ticker symbol? We want to match both of these criteria for the cell value to be pulled and placed into our dashboard.

	A	B	C	E	F	G	H	I
1	Ticker	Symbol	Years	Total Revenue	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items
2	1	AVGO	Year 1	\$ 6,824,000,000	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000
3	2	AVGO	Year 2	\$ 13,240,000,000	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000
4	3	CSRA	Year 1	\$ 4,069,746,000	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000
5	4	CSRA	Year 2	\$ 4,250,447,000	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000
6	5	HPE	Year 1	\$ 55,123,000,000	\$ 39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000
7	6	HPE	Year 2	\$ 52,107,000,000	\$ 37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000
8	7	HPE	Year 3	\$ 50,123,000,000	\$ 35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000
9	8	MYL	Year 1	\$ 7,719,600,000	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -
10	9	MYL	Year 2	\$ 9,429,300,000	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -
11								
12								
13								
14								
15								
16								

This is where the match function comes in handy. So, let's walk through one example. We're matching just one criteria, the ticker symbol.

Clipboard		Font		Alignment		Number		Styles		Cells		Editing	
J4		X	✓	fx									
D	E	F	G	H	I	J	K						
1 Period Ending	Total Revenue		Ticker Symbol	AVGO									
2 11/1/2015	\$ 6,824,000,000				One criterion	Need location of ticker symbol in H2							
3 10/30/2016	\$ 13,240,000,000												
4 4/3/2015	\$ 4,069,746,000												
5 4/1/2016	\$ 4,250,447,000												
6 10/31/2014	\$ 55,123,000,000												
7 10/31/2015	\$ 52,107,000,000												
8 10/31/2016	\$ 50,123,000,000												
9 12/31/2014	\$ 7,719,600,000												
10 12/31/2015	\$ 9,429,300,000												
11													
12													
13													
14													
15													
16													

Dashboard matching Data MATCH_intro Completed_Dashboard Sheet4

Again, it's the empty dashboard we're trying to fill, and this is the data we want to pull from. I've gone ahead and hidden the extra financial metrics that we were showing earlier. So, right now, we're trying to match just the AVGO ticker symbol, just one criteria. So to do that, I've replicated that in this worksheet here. So you can see we have the ticker symbol, and the total revenue. We're trying to, in our dashboard, select the value that meets at least this ticker symbol.

So, we want the INDEX to, we don't want to hard-code the number one here. We just wanted to match it when the ticker symbol matches AVGO. So, we need to plug in the position for it. So, MATCH can return the number representing the position in the ticker symbol array.

B		E		F	G	H	I	J	K	L	M	N	O
1 Ticker Symbol	Total Revenue												
2 AVGO	\$ 6,824,000,000												
3 AVGO	\$ 13,240,000,000												
4 CSRA	\$ 4,069,746,000												
5 CSRA	\$ 4,250,447,000												
6 HPE	\$ 55,123,000,000												
7 HPE	\$ 52,107,000,000												
8 HPE	\$ 50,123,000,000												
9 MYL	\$ 7,719,600,000												
10 MYL	\$ 9,429,300,000												

Ticker Symbol AVGO

One criterion Need location of ticker symbol in H2

Formula

=MATCH(H2,ticker_symbol,0)

=INDEX(Total_revenue,1)

=INDEX(Total_revenue,MATCH(H2,ticker_symbol,0))

So this is the ticker symbol array. I'll go ahead and actually call it ticker_symbol. We'll look for a MATCH H2 here, that's the ticker symbol, ticker_symbol_array is the one here, and we're saying if this match type value is one, MATCH will look for the largest value that is less than or equal to the lookup value.

If MATCH type is zero, MATCH looks for the first value that is exactly equal to the lookup value.

There is another MATCH type negative one that looks for the smallest value that is greater than or equal to the lookup value.

I'm providing some example for this in the text box below. So, we're going to go ahead in zero because we want MATCH to look for the position in this array, ticker_symbol array, that matches AVGO, which matches this condition that we're trying to meet. So, we referred to this lookup value.

1	Ticker Symbol	Total Revenue	F	G	H	I	J	K	L
2	AVGO	\$ 6,824,000,000	Ticker Symbol	AVGO					
3	AVGO	\$ 13,240,000,000							
4	CSRA	\$ 4,069,746,000							
5	CSRA	\$ 4,250,447,000							
6	HPE	\$ 55,123,000,000							
7	HPE	\$ 52,107,000,000							
8	HPE	\$ 50,123,000,000							
9	MYL	\$ 7,719,600,000							
10	MYL	\$ 9,429,300,000							

This is the lookup value highlighted in blue, ticker_symbol is actually referring to this ticker symbol right here, and zero is the condition we're trying to meet. Then we hit Enter there, it gives us the value one.

1	Total Revenue		F	G	H	I	J	K	L
2	\$ 6,824,000,000	Ticker Symbol	AVGO						
3	\$ 13,240,000,000								
4	\$ 4,069,746,000								
5	\$ 4,250,447,000								
6	\$ 55,123,000,000								
7	\$ 52,107,000,000								
8	\$ 50,123,000,000								
9	\$ 7,719,600,000								
10	\$ 9,429,300,000								

Place this here so you can see the formula, but I had to do the Ctrl + Shift + Enter again, and this is the value of return.

So, we want the value one to show up here inside the INDEX function, and that's why we just plugin whatever we take as a MATCH into the INDEX function, because it's looking for. Let me show you that. So, it's looking for the row number, and that row number's provided by the MATCH function.

=INDEX(Total_revenue,1)
INDEX(array, <u>row num</u> , [column_num])

As you can see, the column number right here is the zero because we're saying stay within the total revenue array, match the very first value in terms of row number but stay within the zero column number.

=INDEX(Total_revenue,1)	\$ 6,824,000,000
=INDEX(Total_revenue,MATCH(H2,ticker_symbol,0))	\$ 6,824,000,000

When we do this, it gives us this value. I've again placed it here so that you can see what the formula looks like and what it gives, and it's the same value that is given by having the MATCH function is there. So, we can put this MATCH function inside the INDEX function, and it tells INDEX which cell to pull the total revenue value from and it returns the value to us.

Excel Syntax

Purpose: The purpose of the MATCH function is to provide the location of a defined lookup value within a given lookup array.

The following is the generic syntax for INDEX:

MATCH(lookup_value, lookup_array, [match_type])

Match type can vary from 0 (match is an exact match), 1 (match is less than or equal to lookup value), to -1 (match is greater than or equal to lookup value).

Additional Resources to learn about Match Function

Here is the [Office support documentation to learn more about MATCH function](#)

Index and Match with Multiple Criteria

So, in our data, since we have two rows for a company at least, we have Year 1 and Year 2 data, we are in a pickle if you just try to use match with one criteria, because when we get to this, it's trying to match two criteria both the ticker symbol and the Year 1.

	A	B	C	E
1	Ticker		Years	Total Revenue
2	Symbol	Year 1	\$ 6,824,000,000	
3	AVGO	Year 2	\$ 13,240,000,000	
4	CSRA	Year 1	\$ 4,069,746,000	
5	CSRA	Year 2	\$ 4,250,447,000	
6	HPE	Year 1	\$ 55,123,000,000	
7	HPE	Year 2	\$ 52,107,000,000	
8	MYL	Year 3	\$ 50,123,000,000	
9	MYL	Year 1	\$ 7,719,600,000	
10	MYL	Year 2	\$ 9,429,300,000	

So, this is where we will use Match with two criteria. For doing this, the Match function in Excel uses Boolean logic.

If you're familiar with Boolean logic this will be straightforward. Using Boolean logic, we can assign a variable, a value of 1 when a particular condition is true and the variable is assigned a value of 0 if the condition is not met.

So, let's first tackle the Boolean logic here. We can see that the ticker symbol AVGO is true in the case of cell 1 and cell 2 which corresponds to the ticker symbol AVGO and the ticker symbol column here. The value of Year 1 is true in the case of cell 1 or row 1, But we want the condition of both ticker symbol AVGO and the Year 1 to be true which happens to be only in the case of row 1. So, this is when both the criteria are met.

	A	B	C	E	J	K	L	M	O	P	Q	R	S
1	Ticker Symbol	Years	Total Revenue				Ticker Symbol	Years	MEETS MATCH CRITERIA			Ticker Symbol	Years
2	1 AVGO	Year 1	\$ 6,824,000,000				1	1	1	TRUE		TRUE	TRUE
3	2 AVGO	Year 2	\$ 13,240,000,000				1	0	0			TRUE	FALSE
4	3 CSRA	Year 1	\$ 4,069,746,000				0	1	0			FALSE	TRUE
5	4 CSRA	Year 2	\$ 4,250,447,000				0	0	0			FALSE	FALSE
6	5 HPE	Year 1	\$ 55,123,000,000				0	1	0			FALSE	TRUE
7	6 HPE	Year 2	\$ 52,107,000,000				0	0	0			FALSE	FALSE
8	7 HPE	Year 3	\$ 50,123,000,000				0	0	0			FALSE	FALSE
9	8 MYL	Year 1	\$ 7,719,600,000				0	1	0			FALSE	TRUE
10	9 MYL	Year 2	\$ 9,429,300,000				0	0	0			FALSE	FALSE

So, I have indicated here with the true and false as well that these two are true. But these are true in these rows, but the combination of the two conditions is true only in this one, the first one, and this is the value that we want to pull out here and then for Year 2, where the condition is met, we'll have to pull it out here.

E7 : {=INDEX(Total_revenue,MATCH(1,(B2=ticker_symbol)*(E6=year),0))}

A	B	C	D	E	F	G	I
1							
2	Ticker symbol	AVGO					
Income Statement							
Historical							
Year 1 Year 2 Year 3							
Revenue							
\$ 6,824,000,000 \$ 13,240,000,000 #N/A							
COGS							
\$ 3,271,000,000 \$ 7,300,000,000 #N/A							
Gross Profit							
\$ 3,553,000,000 \$ 5,940,000,000 #N/A							
Sales, General and Admin.							
\$ 486,000,000 \$ 806,000,000 #N/A							
Other operating expenses							
\$ 249,000,000 \$ 1,873,000,000 #N/A							
Research & Development							
\$ 1,049,000,000 \$ 2,674,000,000 #N/A							
Total operating expenses							
\$ 1,784,000,000 \$ 5,353,000,000 #N/A							
Operating income/ EBIT							
\$ 1,769,000,000 \$ 587,000,000 #N/A							

So, we're saying match the condition when the value is 1.

So, we want both the conditions ticker symbol, AVGO to be met, which is row 1 as we know, and we want the second Year 1 value to be matched as well.

So, only when both of these conditions are one, meet that condition exactly using, that's where the match type is zero and give us the location. So, when we do this, we see that the value is 1.

IF	B	C	E	F	G	H	I	J
			Total Revenue					
	B	C	E	F	G	H	I	J
	Ticker Symbol	Years		Ticker Symbol	AVGO	Years		
	AVGO	Year 1	\$ 6,824,000,000			Year 1		
	AVGO	Year 2	\$ 13,240,000,000					
	CSRA	Year 1	\$ 4,069,746,000					
	CSRA	Year 2	\$ 4,250,447,000					
	HPE	Year 1	\$ 55,123,000,000					
	HPE	Year 2	\$ 52,107,000,000					
	HPE	Year 3	\$ 50,123,000,000					
	MYL	Year 1	\$ 7,719,600,000					
	MYL	Year 2	\$ 9,429,300,000					

We want to plug in this particular value in the index function and say, "Give me the cost of revenue from the cost of revenue array when the row number is 1." So, I can show you this to be true.

J4														
	E	F	G	H	I	J	K							
1	Total Revenue		Ticker Symbol	AVGO										
2	\$ 6,824,000,000		Years	Year 1										
3	\$ 13,240,000,000													
4	\$ 4,069,746,000													
5	\$ 4,250,447,000													
6	\$ 55,123,000,000													
7	\$ 52,107,000,000													
8	\$ 50,123,000,000													
9	\$ 7,719,600,000													
10	\$ 9,429,300,000													
11														
12														
13														
14														
15														

The formula bar shows the formula: =MATCH(1,(H1=ticker_symbol)*(H2=year),0)

Cell H1 contains "AVGO" and cell H2 contains "Year 1".

Cell J1 displays the formula: =INDEX(costofrevenue,1)

Cell J1 displays the value: \$6,824,000,000

We're making both the condition to be true. What it does is, Excel does in the background is it calculates the, okay, when H1 equal to ticker symbol and it does the Boolean logic behind times when is a Boolean logic true for the years.

Multiply both of those conditions because it's assigning a value of 1 for every true condition and 0 when the condition isn't met. So, it's multiplying both of those and it's giving this final array and when this condition is met.

So, it's saying, "Okay. One match this condition exactly in the first location." So, it gives us back the number 1. That is how you get the value for and total revenue.

We can repeat the process for all of her cells. You have to type it in by hand, let me do that. So, we have total revenue, match it to the ticker symbol and to the F6 is year, give me the total revenue value when those conditions are met.

F7														
	X	✓	fx	{=INDEX(Total_revenue,MATCH(1,(B2=ticker_symbol)*(F6=year),0))}										
1	A	B	C	D		Formula Bar	F		G					
2	Ticker symbol	AVGO												
3														
4	Income Statement													
5														
6														
7	Historical													
8	Year 1													
9	Revenue	\$ 6,824,000,000	\$ 13,240,000,000	#N/A										
10	COGS	\$ 3,271,000,000	\$ 7,300,000,000	#N/A										
11	Gross Profit	\$ 3,553,000,000	\$ 5,940,000,000	#N/A										
12	Sales, General and Admin.	\$ 486,000,000	\$ 806,000,000	#N/A										
13	Other operating expenses	\$ 249,000,000	\$ 1,873,000,000	#N/A										
14	Research & Development	\$ 1,049,000,000	\$ 2,674,000,000	#N/A										
15	Total operating expenses	\$ 1,784,000,000	\$ 5,353,000,000	#N/A										
16	Operating income/ EBIT	\$1,769,000,000	\$587,000,000	#N/A										
17														

The formula bar shows the formula: {=INDEX(Total_revenue,MATCH(1,(B2=ticker_symbol)*(F6=year),0))}

Cell B2 contains "AVGO" and cell F6 contains "Year 1".

That's how you get the dashboard. You can see that this is an interactive dashboard because when you change the ticker symbol the value changes. It's showing up as N/A in the case of Year 3 because as you, let me show you this actual data. As you can see, there's no Year 3 value except in the case of the HPE.

	A	B	C	E
1		Ticker		
2		Symbol	Years	Total Revenue
1	AVGO		Year 1	\$ 6,824,000,000
2	AVGO		Year 2	\$ 13,240,000,000
3	CSRA		Year 1	\$ 4,069,746,000
4	CSRA		Year 2	\$ 4,250,447,000
5	HPE		Year 1	\$ 55,123,000,000
6	HPE		Year 2	\$ 52,107,000,000
7	HPE	+	Year 3	\$ 50,123,000,000
8	MYL		Year 1	\$ 7,719,600,000
9	MYL		Year 2	\$ 9,429,300,000
10				

So, when you actually look at HPE, that's when those values show up correctly. That's how you do a dashboard using index and matching.

A	B	C	D	E	F	G
1						
2	Ticker symbol	HPE				
Income Statement						
5			Historical			
6			Year 1	Year 2	Year 3	
7	Revenue		\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000	
8	COGS		\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000	
9	Gross Profit		\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000	
10	Sales, General and Admin.		\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000	
11	Other operating expenses		\$ 906,000,000	\$ 852,000,000	\$ 755,000,000	
12	Research & Development		\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000	
13	Total operating expenses		\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000	
14	Operating income/ EBIT		\$3,817,000,000	\$2,702,000,000	\$3,144,000,000	
--						

Excel Syntax

To combine INDEX and MATCH when you need MATCH to meet multiple criteria, Excel uses boolean logic to create the MATCH criteria. The following is the generic syntax for combining INDEX and MATCH when you need MATCH to meet multiple criteria:

INDEX(array, MATCH(1, (condition 1)*(condition 2), [match_type]))

Offset - Part I

Offsets are useful tools for scenario analysis. We can see how in this example when we change the scenario, it changes the assumptions here, and when the assumptions are changed, it changes the forecasted Sinek metrics here.

A	B	C	D	E	F	G	H	I
Operating statistics								
				Historical			Assumptions	
Revenue growth (%)				-6%	-4%	-7.0%	-7.0%	
Gross margin				0.28	0.29	0.29	27.0%	27.0%
Operating margin				0.07	0.05	0.06	0.07	0.07
Scenario Weak case								
Operating Scenarios - sensitivity analysis								
Revenue growth (%)								
Strong case				1		-3.0%	-3.0%	
Base case				2		-5.0%	-5.0%	
Weak case				3		-7.0%	-7.0%	
Gross Margin								
Strong case				1		0.31	0.31	
Base case				2		0.29	0.29	
Weak case				3		0.27	0.27	

A	B	C	D	E	F	G	H	I
Historical								
				Year 1	Year 2	Year 3	Year 4	Year 5
Revenue				\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000	\$ 47,610,550,000	\$ 61,425,736,500
COGS				\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000		
Gross Profit				\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000	\$ 13,808,886,500	\$ 17,813,463,585
Sales, General and Admin.				\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000		
Other operating expenses				\$ 906,000,000	\$ 852,000,000	\$ 755,000,000		
Research & Development				\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000		
Total operating expenses				\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000		
Operating income/ EBIT				\$ 3,817,000,000	\$ 2,702,000,000	\$ 3,144,000,000	\$ 2,857,011,000	\$ 3,685,544,190
Forecast								
Scenario Base case								
Operating statistics								
				Historical			Assumptions	
Revenue growth (%)				-6%	-4%	-5.0%	-5.0%	
Gross margin				0.28	0.29	0.29	29.0%	29.0%
Operating margin				0.07	0.05	0.06	0.06	0.06
Scenario Base case								

Let's build one scenario analysis. I split up the video into various steps. So, they're building on each concept. For starters, let's define the four steps to take to create a financial forecast.

Step 1 is to calculate the operating statistics that include the gross and operating margin, and revenue growth. This is all based on the historical data, which you can find in the income statement over here. So, this is step 1. The first box here.

A	B	C	D	E	F	G	H	I	J
				Year 1	Year 2	Year 3	Year 4	Year 5	
Revenue				\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000			
COGS				\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000			
Gross Profit				\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000			
Sales, General and Admin.				\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000			
Other operating expenses				\$ 906,000,000	\$ 852,000,000	\$ 755,000,000			
Research & Development				\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000			
Total operating expenses				\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000			
Operating income/ EBIT				\$ 3,817,000,000	\$ 2,702,000,000	\$ 3,144,000,000			
4									
Operating statistics									
				Historical			Assumptions		
Revenue growth (%)									3
Gross margin									
Operating margin									
1									

Step 2 is to create the scenarios. I have them here in this box here. So, this is the scenario that we are going to be creating. Typically, we have a strong base and weak case. Some business analysts choose to have two additional scenarios as well, we're going to stick with three cases.

2

Operating Scenarios - sensitivity analysis		
Revenue growth (%)		
1	Strong case	1
2	Base case	2
3	Weak case	3
Gross Margin		
1	Strong case	1
2	Base case	2
3	Weak case	3
Operating Margin		
1	Strong case	1
2	Base case	2
3	Weak case	3

Then come the assumptions as part of step 3. These assumptions change in response to the scenario that is chosen over here. This is where we're going to use offset.

1

Operating statistics		
	Historical	Assumptions
Revenue growth (%)		
Gross margin		
Operating margin		

2

Operating Scenarios - sensitivity analysis		
Revenue growth (%)		
1	Strong case	1
2	Base case	2
3	Weak case	3
Gross Margin		

3

Finally, step 4 may be develop the forecasted scenarios that change dynamically based on the scenarios that are chosen because that affects the assumptions, and the assumptions go inside the forecasted metrics.

4

Income Statement					
	Historical			Forecast	
	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000		
COGS	\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000		
Gross Profit	\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000		
Sales, General and Admin.	\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000		
Other operating expenses	\$ 906,000,000	\$ 852,000,000	\$ 755,000,000		
Research & Development	\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000		
Total operating expenses	\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000		
Operating income/ EBIT	\$3,817,000,000	\$2,702,000,000	\$3,144,000,000		

1

Operating statistics		
	Historical	Assumptions
Revenue growth (%)		
Gross margin		
Operating margin		

3

So, for step 1, we need to calculate our gross and operating margin here for a based on a historical data. So, we have this original data that we have seen before, and the gross margin is basically one minus the cost of revenue or cost of goods sold, those two terms are interchangeable over the total revenue.

	A	B	C	E	F	G	H	I	J	K
1	Ticker Symbol	Years	Total Revenue	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items	Gross Profit	Operating Profit	
2	1 AVGO	Year 1	\$ 6,824,000,000	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000	\$ 3,553,000,000	\$ 1,769,000,000	
3	2 AVGO	Year 2	\$ 13,240,000,000	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000	\$ 5,940,000,000	\$ 587,000,000	
4	3 CSRA	Year 1	\$ 4,069,746,000	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000	\$ 787,445,000	\$ 456,180,000	
5	4 CSRA	Year 2	\$ 4,250,447,000	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000	\$ 674,816,000	\$ 305,330,000	
6	5 HPE	Year 1	\$ 55,123,000,000	\$ 39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000	\$ 15,637,000,000	\$ 3,817,000,000	
7	6 HPE	Year 2	\$ 52,107,000,000	\$ 37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000	\$ 14,939,000,000	\$ 2,702,000,000	
8	7 HPE	Year 3	\$ 50,123,000,000	\$ 35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000	\$ 14,616,000,000	\$ 3,144,000,000	
9	8 MYL	Year 1	\$ 7,719,600,000	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -	\$ 3,528,000,000	\$ 1,400,500,000	
10	9 MYL	Year 2	\$ 9,429,300,000	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -	\$ 4,216,100,000	\$ 1,363,500,000	

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items	Gross Profit	Operating Profit	Gross Margin [1-(Cost of Revenue/Total Revenue)]	Operating Margin [Operating Income/Total Revenue]					
2	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000	\$ 3,553,000,000	\$ 1,769,000,000	0.521	0.259					
3	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000	\$ 5,940,000,000	\$ 587,000,000	0.449	0.044					
4	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000	\$ 787,445,000	\$ 456,180,000	0.193	0.112					
5	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000	\$ 674,816,000	\$ 305,330,000	0.159	0.072					
6	\$ 39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000	\$ 15,637,000,000	\$ 3,817,000,000	0.284	0.069					
7	\$ 37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000	\$ 14,939,000,000	\$ 2,702,000,000	0.287	0.052					
8	\$ 35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000	\$ 14,616,000,000	\$ 3,144,000,000	0.292	0.063					
9	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -	\$ 3,528,000,000	\$ 1,400,500,000	0.457	0.181					
10	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -	\$ 4,216,100,000	\$ 1,363,500,000	0.447	0.145					

So, you plug in this formula in here, copy and paste it, and it gives us the gross margin. For operating margin, this is your operating profit over your total revenue. So, now we have our historical margin ratios here.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Cost of Revenue	Sales, General and Admin.	Research and Development	Other Operating Items	Gross Profit	Operating Profit	Gross Margin [1-(Cost of Revenue/Total Revenue)]	Operating Margin [Operating Income/Total Revenue]					
2	\$ 3,271,000,000	\$ 486,000,000	\$ 1,049,000,000	\$ 249,000,000	\$ 3,553,000,000	\$ 1,769,000,000	0.521	0.259					
3	\$ 7,300,000,000	\$ 806,000,000	\$ 2,674,000,000	\$ 1,873,000,000	\$ 5,940,000,000	\$ 587,000,000	0.449	0.044					
4	\$ 3,282,301,000	\$ 194,207,000	\$ -	\$ 137,058,000	\$ 787,445,000	\$ 456,180,000	0.193	0.112					
5	\$ 3,575,631,000	\$ 187,244,000	\$ -	\$ 182,242,000	\$ 674,816,000	\$ 305,330,000	0.159	0.072					
6	\$ 39,486,000,000	\$ 8,717,000,000	\$ 2,197,000,000	\$ 906,000,000	\$ 15,637,000,000	\$ 3,817,000,000	0.284	0.069					
7	\$ 37,168,000,000	\$ 9,047,000,000	\$ 2,338,000,000	\$ 852,000,000	\$ 14,939,000,000	\$ 2,702,000,000	0.287	0.052					
8	\$ 35,507,000,000	\$ 8,419,000,000	\$ 2,298,000,000	\$ 755,000,000	\$ 14,616,000,000	\$ 3,144,000,000	0.292	0.063					
9	\$ 4,191,600,000	\$ 1,545,700,000	\$ 581,800,000	\$ -	\$ 3,528,000,000	\$ 1,400,500,000	0.457	0.181					
10	\$ 5,213,200,000	\$ 2,180,700,000	\$ 671,900,000	\$ -	\$ 4,216,100,000	\$ 1,363,500,000	0.447	0.145					

I've plugged them in here using our index and match functions. So, I've referred to this as the named box for gross margin you can see, and this is named box for operating margin.

Income Statement		Historical			Forecast	
		Year 1	Year 2	Year 3	Year 4	Year 5
Revenue		\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000		
COGS		\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000		
Gross Profit		\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000		
Sales, General and Admin.		\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000		
Other operating expenses		\$ 906,000,000	\$ 852,000,000	\$ 755,000,000		
Research & Development		\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000		
Total operating expenses		\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000		
Operating Income/ EBIT		\$3,817,000,000	\$2,702,000,000	\$3,144,000,000		

Operating statistics		Historical			Assumptions	
		Revenue growth (%)	Gross margin	Operating margin		
1	Revenue growth (%)	=F\$8/\$E\$8-1	0.28	0.29	0.29	
	Gross margin		0.07	0.05	0.06	
	Operating margin					

Income Statement		Historical			Forecast	
		Year 1	Year 2	Year 3	Year 4	Year 5
Revenue		\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000		
COGS		\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000		
Gross Profit		\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000		
Sales, General and Admin.		\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000		
Other operating expenses		\$ 906,000,000	\$ 852,000,000	\$ 755,000,000		
Research & Development		\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000		
Total operating expenses		\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000		
Operating Income/ EBIT		\$3,817,000,000	\$2,702,000,000	\$3,144,000,000		

Operating statistics		Historical			Assumptions	
		Revenue growth (%)	Gross margin	Operating margin		
1	Revenue growth (%)	=F\$8/\$E\$8-1	0.28	0.29	0.29	
	Gross margin		0.07	0.05	0.06	
	Operating margin					

So, I just said okay within the gross margin array, give me an exact match for where the ticker symbol and year- as you can see, ticker symbol and year are matched and give me that particular gross margin or operating margin, and plug it in for me into these cells. So, that's what I did here, and then for operating margin, I reference the array is referring to the operating margin saying give me that exact ticker symbol and your match and plug in that value.

Income Statement		Historical			Forecast	
		Year 1	Year 2	Year 3	Year 4	Year 5
Revenue		\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000		
COGS		\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000		
Gross Profit		\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000		
Sales, General and Admin.		\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000		
Other operating expenses		\$ 906,000,000	\$ 852,000,000	\$ 755,000,000		
Research & Development		\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000		
Total operating expenses		\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000		
Operating Income/ EBIT		\$3,817,000,000	\$2,702,000,000	\$3,144,000,000		

Operating statistics		Historical			Assumptions	
		Revenue growth (%)	Gross margin	Operating margin		
1	Revenue growth (%)	=F\$8/\$E\$8-1	0.28	0.29	0.29	
	Gross margin		0.07	0.05	0.06	
	Operating margin					

Revenue growth, you're just taking your current year's revenue over your previous year's revenue minus one. What essentially does is it gives you the difference between the two years of revenue based on last year's revenue so you can see how much the revenue growth has occurred in the current year based on last year's revenue.

I'm using HPE as a ticker symbol, so you can see all the 3-years historical data.

Income Statement					
	Historical			Forecast	
	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000		
COGS	\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000		
Gross Profit	\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000		
Sales, General and Admin.	\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000		
Other operating expenses	\$ 906,000,000	\$ 852,000,000	\$ 755,000,000		
Research & Development	\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000		
Total operating expenses	\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000		
Operating Income/ EBIT	\$3,817,000,000	\$2,702,000,000	\$3,144,000,000		

Operating statistics		
Revenue growth (%)	=F\$8/\$E\$8-1	Historical
Revenue margin		-6%

You can see this looks different for the companies with just two years data, but I delete the financial forecast would actually be for one company, for your own company so, you're going to have this as a dynamic array.

Okay. So, we have the historical upgrading statistics here and step 1 is done.

Correction : In the above videos, the formula in column D is incorrect, and should instead say `=F$7/$E$7 -1`.

$$\text{Revenue growth} = \frac{\text{current year's revenue} - \text{Previous Year's revenue}}{\text{Previous Year's revenue}} - 1$$

So, now we're going to cover step two. We're creating the three scenarios for each of our operating statistics, because eventually these will feed into the forecast above.

Operating Scenarios - sensitivity analysis			
Revenue growth (%)			
1	Strong case	1	-3.0%
2	Base case	2	-5.0%
3	Weak case	3	-7.0%
Gross Margin			
1	Strong case	1	0.31
2	Base case	2	0.29
3	Weak case	3	0.27
Operating Margin			
1	Strong case	1	0.08
2	Base case	2	0.06
3	Weak case	3	0.07

We've created row for each of these three scenarios and the actual numbers are based on historical data, which we know as here, knowledge of the business analysis, research, and assumptions about the business

itself.

You would be asking questions like, do you expect the revenue growth to stay the same or increase? If so, by how much? Let's walk through each of these, base case is the status quo. So, we can plug this in. So, the average growth was -6%. So, you can see that in year two the revenues were lower than year one, and then they were even further lower in year three.

Income Statement				Forecast	
	Historical			Forecast	
	Year 1	Year 2	Year 3	Year 4	Year 5
Revenue	\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000		
COGS	\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000		
Gross Profit	\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000		
Sales, General and Admin.	\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000		
Other operating expenses	\$ 906,000,000	\$ 852,000,000	\$ 755,000,000		
Research & Development	\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000		
Total operating expenses	\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000		
Operating income/ EBIT	\$3,817,000,000	\$2,702,000,000	\$3,144,000,000		

Operating statistics				Assumptions	
	Historical			Assumptions	
	Revenue growth (%)	Gross margin	Operating margin	-6%	-4%
Revenue growth (%)	=F\$8/\$E\$8-1			-6%	-4%
Gross margin		0.28	0.29	0.29	
Operating margin		0.07	0.05	0.06	

So, this company isn't doing well. So, the revenue growth was -6% off of year one, and -4% off of year two. So, the base case is to just keep the status quo and keep it an average of -5. The strong case is that you actually reduce this decline and you say, okay it's going to be -3. The weak case is where it becomes worse. So, just for simplicity reason, just kept this as -7 to just show you.

1	A	B	C	D	E	F	G	H	I
19		Revenue growth (%)	=F\$8/\$E\$8-1						
20		Gross margin		0.28	0.29	0.29			
21		Operating margin		0.07	0.05	0.06			
22									
23									
24		Scenario	Strong case						
25									
26		Operating Scenarios - sensitivity analysis							
27									
28									
		Revenue growth (%)							
29	1	Strong case	1				-3.0%	-3.0%	
30	2	Base case	2				-5.0%	-5.0%	
31	3	Weak case	3				-7.0%	-7.0%	
32		Gross Margin							
33	1	Strong case	1			0.31		0.31	
34	2	Base case	2				0.29		0.29
35	3	Weak case	3					0.27	0.27
36		Operating Margin							

For gross margin, we can see that the gross margin, we can see has been 0.28 to 0.29.

So, I'm going to keep this as the base case and then prove it by a percentage 0.02 here.

Then, the weak case would be where it declined a little bit. Again, this will be based on more about the assumptions about the company and having a better business knowledge about the company itself.

Then finally for operating margin, it was 0.07 through 0.05, it ranged in that. So, I'm going to keep it at an average of base cases 0.06, strongest 0.08 and 0.09, and then weak cases 0.07 and we'll just keep it there. So, we have our scenarios mapped out now and we get to step three. I'm just going to pause here and we can watch the next step in the next video.

Operating margin

	A	B	C	D	E	0.07	F	0.05	G	0.06	H	I
24		Scenario	Strong case									
25												
26												
27												
28												
29												
30												
31												
32												
33												
34												
35												
36												
37												
38												
39												

Now, we get to step three. We want the values here in the assumptions to change depending on which scenario we choose. We don't want to hardcode them by selecting only the strong case for revenue growth, gross margin, and operating margin.

Operating statistics

1			Historical		Assumptions	3
Revenue growth (%)	=F\$8/\$E\$8-1		-6%	-4%	-7.0%	-7.0%
Gross margin		0.28	0.29	0.29	0.27	0.27
Operating margin		0.07	0.05	0.06	0.07	0.07

So, now we're looking for a way to tell Excel to use this cell, in this row and this column when the scenario is a strong case scenario, and use the cell in this row and this column when the scenario chosen is a base case and change it to this.

Operating statistics

1			Historical		Assumptions	3
Revenue growth (%)	=F\$8/\$E\$8-1		-6%	-4%	-7.0%	-7.0%
Gross margin		0.28	0.29	0.29	0.27	0.27
Operating margin		0.07	0.05	0.06	0.07	0.07
2 Scenario Weak case						
Operating Scenarios - sensitivity analysis						
Revenue growth (%)						
1	Strong case	1			-3.0%	-3.0%
2	Base case	2			-5.0%	-5.0%
3	Weak case	3			-7.0%	-7.0%
Gross Margin						

This is where offset can be used, and here is what the generic function isn't looking for. So, it's looking for a reference point, some place to start with, and then it's asking for how many rows do you want me to move over, and how many columns? Based on that, that is the value I'll return in this particular cell.

Excel Syntax

Purpose: The purpose of the OFFSET function is to return a range that is a specified number of rows and columns from a reference cell or range

OFFSET(cell_reference, number of rows to offset by, number of columns to offset by)

=OFFSET(
OFFSET(reference, rows, cols, [height], [width])

Okay, and so for the rules I want it to be able to move to the right row and give me this value. I'm actually going to go ahead and use the match function to match the row based on the scenario that is chosen here.

2

Scenario		Base case						
Operating Scenarios - sensitivity analysis								
Revenue growth (%)								
1	Strong case	1		-3.0%	-3.0%			
2	Base case	2		-5.0%	-5.0%			
3	Weak case	3		-7.0%	-7.0%			
	Gross Margin							

So, that just kind of a criteria that we're using and the scenario, and so therefore I'm going to use the match function to narrow down which row I am selecting. For the which row am I selecting this one, this one or this one. This one, this one and this one. Then the column I can tell is the one over here, or the one over here.

So, I'm going to switch over to this tab here because you can see that I'm using this reference point. So, offset is always looking for a starting point. So, that's what you do.

1

Operating statistics					
		Historical		Assumptions	
Revenue growth (%)	=\$F\$8/\$E\$8-1		-6%	-4%	-3.0%
Gross margin		0.28	0.29	0.29	31.0%
Operating margin		0.07	0.05	0.06	0.32

2

Operating Scenarios - sensitivity analysis					
Revenue growth (%)					
1	Strong case	1	H28	-3.0%	-3.0%
2	Base case	2		-5.0%	-5.0%
3	Weak case	3		-7.0%	-7.0%
	Gross Margin		H32		

So when you're actually plugging in the offset function, it's starting a reference. Reference is the starting point from which to count the number of rows and columns. So, I want in here, I want the reference point to be let's say this (H28) because I'm talking about revenue growth, so I have this empty cell. So, I'm going to just use this as my starting point and say okay, go down to this row and this column.

So, I'm going to show you this. So, I'm saying okay, start with this reference point, blue border cell here, and match for the row, match whatever is in.

F : =OFFSET(\$H\$28,MATCH(C24,\$B\$29:\$B\$31),0,0)

	A	B	C	D	MATCH(lookup_value, lookup_array, [match_type])	G	H	I
1								
			Operating statistics					
					Historical		Assumptions	
	Revenue growth (%)	=F\$8/\$E\$8-1			-6%	-4%	=OFFSET(\$H\$28,MAT	-3.0%
	Gross margin				0.28	0.29	31.0%	31.0%
	Operating margin				0.07	0.05	0.32	0.32
2								
			Scenario Strong case					
			Operating Scenarios - sensitivity analysis					
			Revenue growth (%)					
							H28	
			Strong case	1			-3.0%	-3.0%
			Base case	2			-5.0%	-5.0%
			Weak case	3			-7.0%	-7.0%
							H32	
			Gross Margin					

So, matched function will return for me the row that I'm looking for, which will be C24 because it's looking for this scenario, matching it within this lookup array, and saying strong case matches the row one of these three cases, and so it's going to return the value. I'm asking it for an exact match, that's why I have the match type to be zero.

```
=OFFSET($H$28,MATCH(C24,$B$29:$B$31),0)
```

OFFSET(reference, rows, cols, [height], [width]) F

So, it's going to say, okay match row is one, and then column. So, now I have the match giving me back row is one, and now for this is the column reference. So, I'm saying okay, stay in this column which belongs to H28 and give me this cell.

So, if it says base case, match will give me back 2 because off the lookup array it'll give me the second row for the year four and five which will be -5%.

	A	B	C	D	E	F	G	H	I
			Operating income/ EBIT	\$3,817,000,000	\$2,702,000,000	\$3,144,000,000	\$ 2,857,011,000	\$ 3,685,544,190	
Operating statistics									
1 Revenue growth (%) =F\$8/\$E\$8-1 Historical -6% -4% -5.0% -5.0%									
Gross margin 0.28 0.29 0.29 29.0% 29.0%									
Operating margin 0.07 0.05 0.06 0.06 0.06									
2 Scenario Base case									
Operating Scenarios - sensitivity analysis									
							H28		
			Revenue growth (%)						
							-3.0%	-3.0%	
			Strong case	1					
			Base case	2			-5.0%	-5.0%	
			Weak case	3			-7.0%	-7.0%	
							H32		
			Gross Margin						

So, when I again, Control, Alt, Shift, it gives me -5, which is this case because right now scenario is selected as base case.

If I change it to a strong case, then it switches to -3. So, for this one, well it's one column of H28. So, staying with the same reference point, I'm saying H28 is the reference cell, match it to the same criteria, strong, the scenario criteria and give me an exact match for that row. Then for column I'm saying, offset move over one

column.

				=OFFSET(\$H\$28,MATCH(\$C\$24,\$B\$29:\$B\$31,0),1)				
A	B	C	F	OFFSET(reference, rows, cols, [height], [width])	G	H	I	
Operating Income/ EBIT			\$3,817,000,000	\$2,702,000,000	\$3,144,000,000	\$ 15,558,179,200	\$ 20,381,214,752	
1	Operating statistics			Historical		Assumptions		
Revenue growth (%)	=F\$8/\$E\$8-1			-6%	-4%	-3.0% =OFFSET(\$H\$28,MATCH(
Gross margin		0.28	0.29	0.29	0.29	31.0%	31.0%	
Operating margin		0.07	0.05	0.06	0.06	0.32	0.32	
2	Scenario Strong case							
Operating Scenarios - sensitivity analysis								
Revenue growth (%)					H28			
1	Strong case	1				-3.0%		-3.0%
2	Base case	2				-5.0%		-5.0%
3	Weak case	3				-7.0%		-7.0%
Gross Margin					H32			

That's this column for year 5 . So, it's going to give me -3. So, that's how offset and match are used.

So, for gross margin, the only difference is I'm using the same offset and match combination, but this time I decided to use this empty cell right above gross margin, but in essence it's the same exact principle that I'm saying, okay, for match row H32, match it for me for C24 in this lookup array.

				=OFFSET(\$H\$32,MATCH(\$C\$24,\$B\$33:\$B\$35,0),0)				
A	B	C	D	MATCH(lookup_value, lookup_array, [match_type])	G	H	I	
Operating statistics				Historical		Assumptions		
1	Revenue growth (%)	=F\$8/\$E\$8-1		-6%	-4%	-3.0% =OFFSET(\$H\$32,MAT		
20	Gross margin		0.28	0.29	0.29	31.0%	31.0%	
21	Operating margin		0.07	0.05	0.06	0.32	0.32	
2	Scenario Strong case				H28			
Operating Scenarios - sensitivity analysis								
Revenue growth (%)						-3.0%		-4.0%
29	1	Strong case	1				-3.0%	-4.0%
30	2	Base case	2				-5.0%	-5.0%
31	3	Weak case	3				-7.0%	-7.0%
32	Gross Margin				H32			
33	1	Strong case	1			0.31	0.31	
34	2	Base case	2			0.29	0.29	
35	3	Weak case	3			0.27	0.27	

That's what the B33, B35 is. You can see in the purple colored cells, give me an exact match of that row. So, this gives me back row one, two, or three, based on whatever is inside this scenario strong scenario here. Give me just the column the first with still within the same column as H32 for year four and for year five, just move by a column.

1

	B	C	F	G	H	I
	Operating statistics			Assumptions		
Revenue growth (%)	=F\$8/\$E\$8-1		Historical	-6%	-4%	
Gross margin		0.28	0.29	0.29	-3.0%	-4.0%
Operating margin		0.07	0.05	0.06	31.0%	=OFFSET(\$H\$32,MATCH(

So, that is how I repeated it for operating margin and using H36 as a reference point, and we get our assumptions and they are dynamic.

2

	A	B	C	D	E	F	G	H	I
Operating Scenarios - sensitivity analysis	Scenario	Strong case							
Revenue growth (%)							H28		
1 Strong case	1						-3.0%	-4.0%	
2 Base case	2						-5.0%	-5.0%	
3 Weak case	3						-7.0%	-7.0%	
Gross Margin							H32		
1 Strong case	1						0.31	0.32	
2 Base case	2						0.29	0.29	
3 Weak case	3						0.27	0.27	
Operating Margin							H36		
1 Strong case	1						0.32	0.32	
2 Base case	2						0.06	0.06	
3 Weak case	3						0.07	0.07	

We're finally ready for step four, which is the next video.

So, finally we're at the last step in the financial forecasting process. Here, I've created the equations for you so you can see what I'm doing for year four, year five, and we start plugging in the values from the assumptions.

4

	B	C	E	F	G	H	I	J	K	L
HPE										
Income Statement		Historical			Forecast					
		Year 1	Year 2	Year 3	Year 4	Year 5				
Revenue	\$ 55,123,000,000	\$ 52,107,000,000	\$ 50,123,000,000	\$ 48,619,310,000	\$ 46,674,537,600			Year 4	Year 5	
COGS	\$ 39,486,000,000	\$ 37,168,000,000	\$ 35,507,000,000	\$ 15,071,986,100	\$ 14,935,852,032			G7*(1+H19)	=H7*(1+I19)	
Gross Profit	\$ 15,637,000,000	\$ 14,939,000,000	\$ 14,616,000,000					=H7*I20	=I7*I20	
Sales, General and Admir	\$ 8,717,000,000	\$ 9,047,000,000	\$ 8,419,000,000							
Other operating expense	\$ 906,000,000	\$ 852,000,000	\$ 755,000,000							
Research & Developmen	\$ 2,197,000,000	\$ 2,338,000,000	\$ 2,298,000,000							
Total operating expense	\$ 11,820,000,000	\$ 12,237,000,000	\$ 11,472,000,000							
Operating income/ EBIT	\$ 3,817,000,000	\$ 2,702,000,000	\$ 3,144,000,000	\$ 15,558,179,200	\$ 14,935,852,032			=H7*H21	=I7*I21	

So, this one is year four revenue will be based on of year three's revenue, so it's just going to add whatever the assumption here above revenue growth. So, you just say, G7 which is previous year's revenue times one plus the revenue growth percent expected. So, it's taking this year, year three's revenue * (1 + (-3)), and that's the reason why it's actually going down. For year five, it's doing the same thing. You just a reference into year four instead.

Then for gross margins, we are forecasting it based on the revenue, so we just take whatever the revenue is for year four times the gross margin, so it's just multiplying this revenue with gross margin and that gives us the gross profit.

IF C X ✓ f_x =H7*H20

	B	C	E	F	G	H	I	
2	HPE							
3								
4	Income Statement							
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17	Operating statistics							
18								
19								
20								

Similarly, we do that for operating income base on the formula. So, now we can see that our financial forecast is based on the historical data for this company but also the assumptions that we make, and as described earlier as we change the scenario analysis the forecast to the metrics change as well. So now, we have a dynamic representation of our financial forecast based on scenarios. So, that's called scenario analysis as well, it's one way to create a financial forecast using some advanced Excel tools. I've provided the formulas that I've used below and you can also find them in the CSV file in the resource.

I hope you find this video helpful.

Formatting principles for Modeling

Here is a guide to best practices for formatting financial models.

1. All inputs to the model should be colored BLUE. These include hard-coded values.
2. All formulas and calculations should be coded in BLACK.
3. Any links to other sheets within the workbook should be coded in GREEN.
4. Any links to other files should be coded in RED.

Here is a good website to review the best practices:

- [Formatting for Financial Modeling](#)

Quiz: Bottom-Up Financial Forecasting

[Lesson](#) [Downloads](#)

Quiz

It's now time to practice bottom-up financial forecasting. We have provided a sample data file titled "Practice DataSet _FinancialForecast Bottom Up" at the bottom of the page. Both Excel and CSV formats are available.

Go ahead and download the file. And then answer the quiz questions below.

Question 1 of 5

Match the **Gross Margin** for the ticker symbol NAVI for each of the 3 years we have historical data on.

 These are the correct matches.

Gross Margin	Year
0.632	Year 1
0.620	Year 2
0.646	Year 3

Question 2 of 5

Match the **Operating Profit** for the ticker symbol WRK for each of the 3 years we have historical data on.

 These are the correct matches.

Operating Profit	Year
\$910,000,000	Year 1
\$993,300,000	Year 2
\$796,700,000	Year 3

Go ahead and make the following **assumptions for the three forecasting statistics for the next two years** for the company **Paypal** (Ticker Symbol PYPL).

Revenue growth (%)	Year 4	Year 5
Strong case	16.0%	17.0%
Base case	15.5%	15.5%
Weak case	14.0%	14.0%
Gross Margin		
Strong case	0.93	0.93
Base case	0.92	0.92
Weak case	0.90	0.90
Operating Margin		
Strong case	0.17	0.17
Base case	0.15	0.15
Weak case	0.14	0.14

Strong case	0.17	0.17
Base case	0.15	0.15
Weak case	0.14	0.14

Given these assumptions, now complete the financial forecast for PYPL's Income Statement up to the EBIT or Operating Income for Year 4 and Year 5.

Once you have completed that, please complete the remaining quiz questions.

Question 3 of 5

Which of these formulas is the correct way to forecast revenues for Year 4?

- Total Revenue for Year 3 x (1 - Assumption for Year 4 Revenue growth)
- Total Revenue for Year 3 x (1 + Assumption for Year 4 Revenue growth) ✓
- Total Revenue for Year 3 - Total Revenue for Year 2

Question 4 of 5

Which of these formulas is the correct way to forecast operating income for Year 5?

- Operating income for Year 3 X 2
- Operating income for Year 4 * Assumption for Operating Margin for Year 4
- Forecasted Revenue for Year 5 * Assumption for Operating Margin for Year 5 ✓
- Forecasted Revenue for Year 4 (1 + Assumption for Operating Margin for Year 5)

Question 5 of 5

Match the forecast for Gross Profit and Operating Income for PYPL.

✓ These are the correct matches.

Forecasted metric	Value
Gross Profit for Year 4	\$11,520,709,200
Gross Profit for Year 5	\$13,306,419,126
Operating Income for Year 4	\$1,878,376,500
Operating Income for Year 5	\$2,169,524,858

Forecasted metric Value

Gross Profit for Year 4

\$11,520,709,200

Gross Profit for Year 5

\$13,306,419,126

Operating Income for Year 4

\$1,878,376,500

Operating Income for Year 5

\$2,169,524,858

	A	B	C	D	E	F	G	H	I	J	K	L
1	Ticker Symbol	Years	Period Ending	Total Revenue	Cost of Revenue	Sales, General and Admin.	Other Operating Items	Gross Margin	Gross Profit	Total Operatin Expenses	Operating Income	
2	1 NAVI	Year 1	12/31/2013	\$ 5,015,000,000	\$ 1,844,000,000	\$ 446,000,000	\$ 104,000,000	0.632	\$ 3,171,000,000	\$ 550,000,000	\$ 2,621,000,000	
3	2 NAVI	Year 2	12/31/2014	\$ 5,115,000,000	\$ 1,945,000,000	\$ 495,000,000	\$ 122,000,000	0.620	\$ 3,170,000,000	\$ 617,000,000	\$ 2,553,000,000	
4	3 NAVI	Year 3	12/31/2015	\$ 4,183,000,000	\$ 1,479,000,000	\$ 545,000,000	\$ 137,000,000	0.646	\$ 2,704,000,000	\$ 682,000,000	\$ 2,022,000,000	
5	4 PYPL	Year 1	12/31/2014	\$ 8,025,000,000	\$ 747,000,000	\$ 5,494,000,000	\$ 516,000,000	0.907	\$ 7,278,000,000	\$ 6,010,000,000	\$ 1,268,000,000	
6	5 PYPL	Year 2	12/31/2015	\$ 9,248,000,000	\$ 792,000,000	\$ 6,339,000,000	\$ 608,000,000	0.914	\$ 8,456,000,000	\$ 6,947,000,000	\$ 1,509,000,000	
7	6 PYPL	Year 3	12/31/2016	\$ 10,842,000,000	\$ 834,000,000	\$ 7,698,000,000	\$ 724,000,000	0.923	\$ 10,008,000,000	\$ 8,422,000,000	\$ 1,586,000,000	
8	7 QRVO	Year 1	3/29/2014	\$ 1,148,231,000	\$ 940,573,000	\$ 180,317,000	\$ -	0.181	\$ 207,658,000	\$ 180,317,000	\$ 27,341,000	
9	8 QRVO	Year 2	3/28/2015	\$ 1,710,966,000	\$ 1,279,152,000	\$ 309,348,000	\$ -	0.252	\$ 431,814,000	\$ 309,348,000	\$ 122,466,000	
10	9 QRVO	Year 3	4/2/2016	\$ 2,610,726,000	\$ 2,009,936,000	\$ 588,822,000	\$ -	0.230	\$ 600,790,000	\$ 588,822,000	\$ 11,968,000	
11	10 WRK	Year 1	9/30/2014	\$ 9,895,100,000	\$ 7,961,500,000	\$ 937,600,000	\$ 86,000,000	0.195	\$ 1,933,600,000	\$ 1,023,600,000	\$ 910,000,000	
12	11 WRK	Year 2	9/30/2015	\$ 11,124,800,000	\$ 8,986,500,000	\$ 1,026,100,000	\$ 118,900,000	0.192	\$ 2,138,300,000	\$ 1,145,000,000	\$ 993,300,000	
13	12 WRK	Year 3	9/30/2016	\$ 14,171,800,000	\$ 11,413,200,000	\$ 1,750,100,000	\$ 211,800,000	0.195	\$ 2,758,600,000	\$ 1,961,900,000	\$ 796,700,000	

M2	D	E	F	G	H	I	J	K	L	M	N
1	Period Ending	Total Revenue	Cost of Revenue	Sales, General and Admin.	Other Operating Items	Gross Margin	Gross Profit	Total Operatin Expenses	Operating Income	Gross Margin	Operating Margin
2	12/31/2013	\$ 5,015,000,000	\$ 1,844,000,000	\$ 446,000,000	\$ 104,000,000	0.632	\$ 3,171,000,000	\$ 550,000,000	\$ 2,621,000,000	0.632	0.523
3	12/31/2014	\$ 5,115,000,000	\$ 1,945,000,000	\$ 495,000,000	\$ 122,000,000	0.620	\$ 3,170,000,000	\$ 617,000,000	\$ 2,553,000,000	0.620	0.499
4	12/31/2015	\$ 4,183,000,000	\$ 1,479,000,000	\$ 545,000,000	\$ 137,000,000	0.646	\$ 2,704,000,000	\$ 682,000,000	\$ 2,022,000,000	0.646	0.483
5	12/31/2014	\$ 8,025,000,000	\$ 747,000,000	\$ 5,494,000,000	\$ 516,000,000	0.907	\$ 7,278,000,000	\$ 6,010,000,000	\$ 1,268,000,000	0.907	0.158
6	12/31/2015	\$ 9,248,000,000	\$ 792,000,000	\$ 6,339,000,000	\$ 608,000,000	0.914	\$ 8,456,000,000	\$ 6,947,000,000	\$ 1,509,000,000	0.914	0.163
7	12/31/2016	\$ 10,842,000,000	\$ 834,000,000	\$ 7,698,000,000	\$ 724,000,000	0.923	\$ 10,008,000,000	\$ 8,422,000,000	\$ 1,586,000,000	0.923	0.146
8	3/29/2014	\$ 1,148,231,000	\$ 940,573,000	\$ 180,317,000	\$ -	0.181	\$ 207,658,000	\$ 180,317,000	\$ 27,341,000	0.181	0.024
9	3/28/2015	\$ 1,710,966,000	\$ 1,279,152,000	\$ 309,348,000	\$ -	0.252	\$ 431,814,000	\$ 309,348,000	\$ 122,466,000	0.252	0.072
10	4/2/2016	\$ 2,610,726,000	\$ 2,009,936,000	\$ 588,822,000	\$ -	0.230	\$ 600,790,000	\$ 588,822,000	\$ 11,968,000	0.230	0.005
11	9/30/2014	\$ 9,895,100,000	\$ 7,961,500,000	\$ 937,600,000	\$ 86,000,000	0.195	\$ 1,933,600,000	\$ 1,023,600,000	\$ 910,000,000	0.195	0.092
12	9/30/2015	\$ 11,124,800,000	\$ 8,986,500,000	\$ 1,026,100,000	\$ 118,900,000	0.192	\$ 2,138,300,000	\$ 1,145,000,000	\$ 993,300,000	0.192	0.089
13	9/30/2016	\$ 14,171,800,000	\$ 11,413,200,000	\$ 1,750,100,000	\$ 211,800,000	0.195	\$ 2,758,600,000	\$ 1,961,900,000	\$ 796,700,000	0.195	0.056

K6	A	B	C	E	F	G	H	I		
1	Ticker Symbol	PYPL								
4	Income Statement									
6	Historical					Forcasting				
7	Revenue		\$ 8,025,000,000				\$ 12,522,510,000			
8	COGS		\$ 747,000,000				\$ 14,463,499,050			
9	Gross Profit		\$ 7,278,000,000				\$ 11,520,709,200			
10	Sales, General and Admin.		\$ 5,494,000,000				\$ 13,306,419,126			
11	Other Operating Items		\$ 516,000,000							
12	Total Operating Expenses		\$ 6,010,000,000				\$ 8,422,000,000			
13	Operating Income		\$ 1,268,000,000				\$ 1,878,376,500			
16	Operating Statistics									
17	Historical					Assumptions				
18	Revenue Growth (%)				15.2%		17.2%			
19	Gross Margin				0.907		0.923			
20	Operating Margin				0.158		0.146			

K39 : [x ✓ f x ✓]

A	B	C	E	F	G	H	I
19	Gross Margin		0.907	0.914	0.923	0.92	0.92
20	Operating Margin		0.158	0.163	0.146	0.15	0.15
21							
22							
23	Scenario	Base Case					
24							
25	Operating Scenarios - Sensitivity Analysis						
26							
27	Revenue Growth (%)						
28	Strong Case	1			16.0%		17.0%
29	Base Case	2			15.5%		15.5%
30	Weak Case	3			14.0%		14.0%
31	Gross Margin						
32	Strong Case	1			0.93		0.93
33	Base Case	2			0.92		0.92
34	Weak Case	3			0.90		0.90
35	Operating Margin						
36	Strong Case	1			0.17		0.17
37	Base Case	2			0.15		0.15
38	Weak Case	3			0.14		0.14