Lesson 1

Lesson 2

Lesson 3

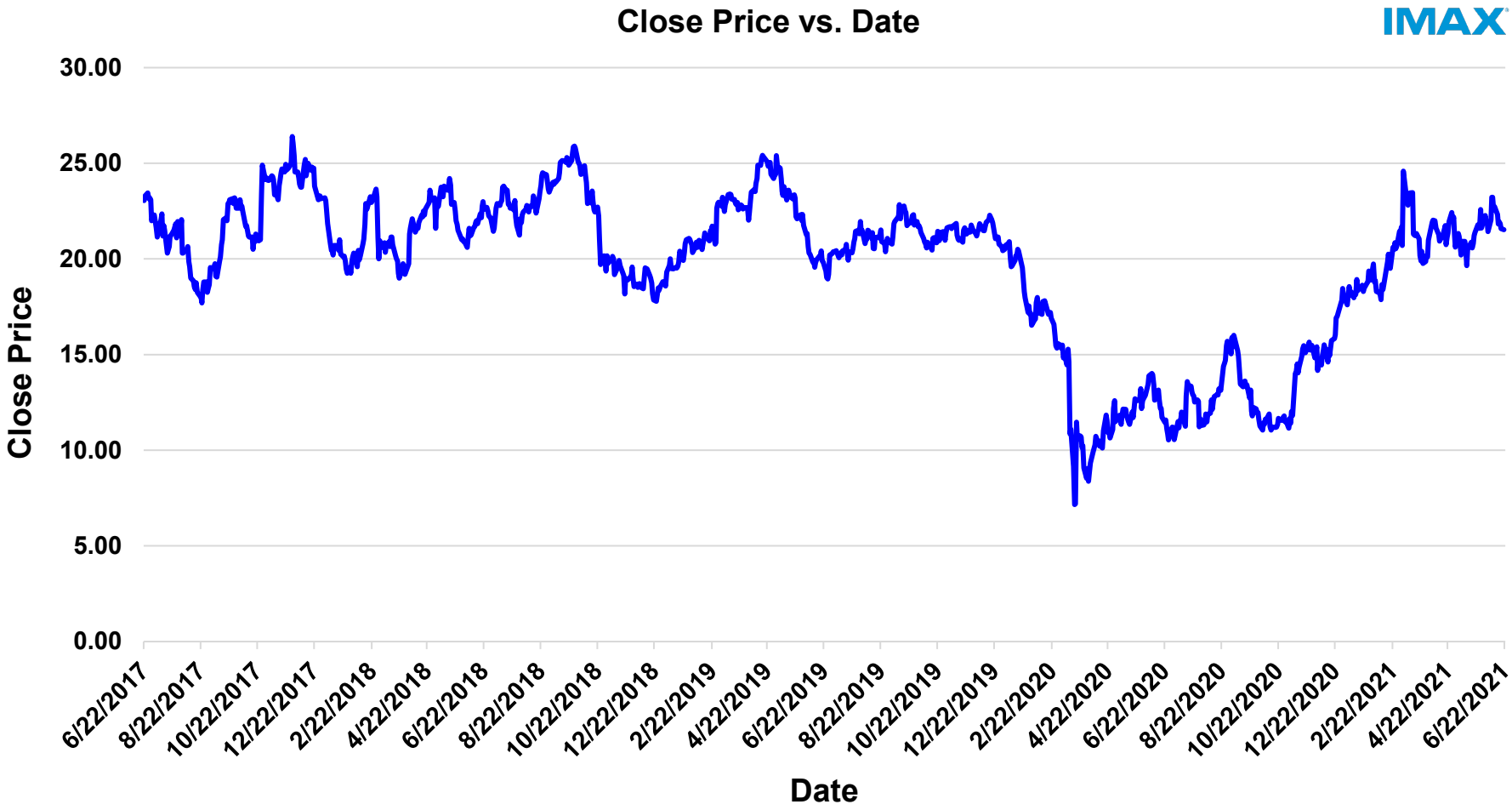
Lesson 4

What is Financial Modeling?

Financial modeling is an endeavor to shape and/or create an abstract depiction of real financial data.

Why is it helpful or necessary?

It helps condense large data sets into simple spreadsheets that can be used as templates for gaining relevant insights into a company's performance. Throughout this short course, these concepts are illustrated visa vie IMAX Corporation when dealing with actual financial data.



Where can one find the financials (proforma) for a publicly traded company?

- Yahoo Finance
- Wall Street Journal
- The investor relations section of the corporation's website

What tools will we be using?

- Microsoft Excel
- Visual Basic for Applications (VBA)

The following sample historical pricing data was imported directly from Yahoo Finance into Excel

Once any set of data is in Excel it is **EASY** to manipulate it by removing or expanding what is already there.

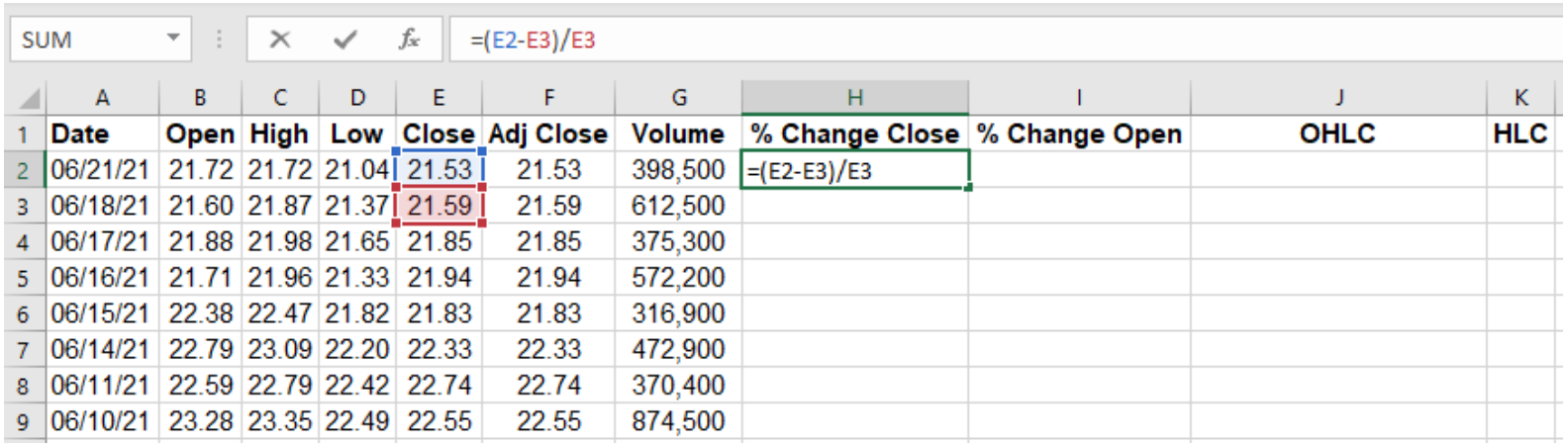
For example, we can add % changes in prices over time and averages

Adding these statistics involves the use of formulas

However, removing irrelevant data can be done by hiding or deleting columns and/or rows.

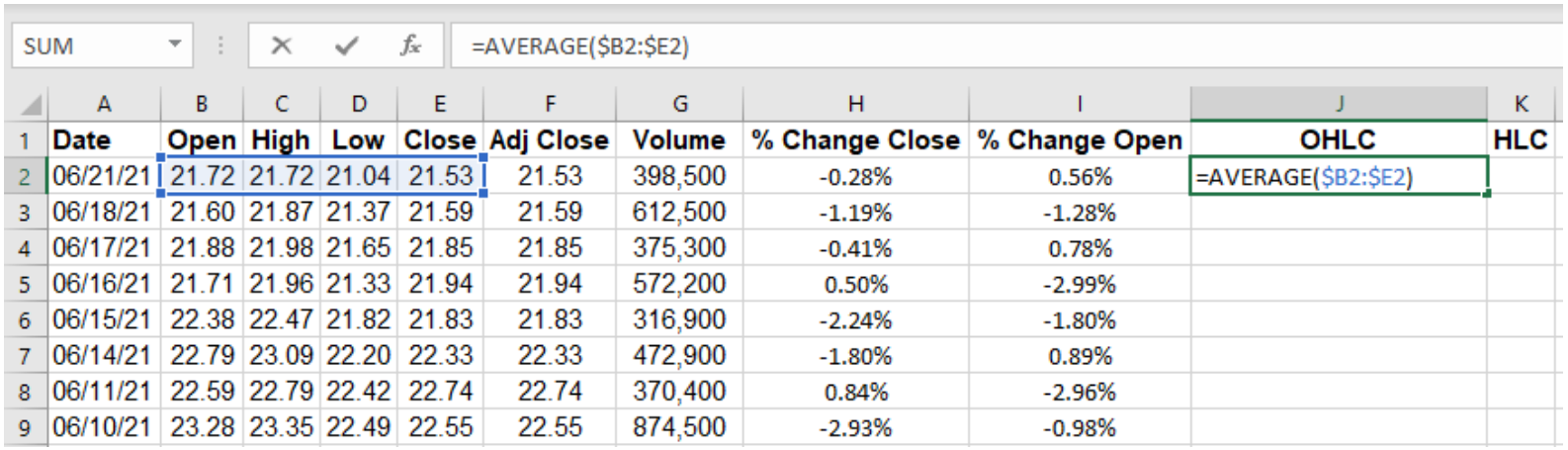
Date	Open	High	Low	Close	Adj Close	Volume
06/21/21	21.72	21.72	21.04	21.53	21.53	398,500
06/18/21	21.60	21.87	21.37	21.59	21.59	612,500
06/17/21	21.88	21.98	21.65	21.85	21.85	375,300
06/16/21	21.71	21.96	21.33	21.94	21.94	572,200
06/15/21	22.38	22.47	21.82	21.83	21.83	316,900
06/14/21	22.79	23.09	22.20	22.33	22.33	472,900
06/11/21	22.59	22.79	22.42	22.74	22.74	370,400
06/10/21	23.28	23.35	22.49	22.55	22.55	874,500
06/09/21	23.51	23.54	23.03	23.23	23.23	659,600
06/08/21	22.15	23.38	21.81	23.23	23.23	1,592,500
06/07/21	21.63	22.11	21.48	22.04	22.04	985,600
06/04/21	22.03	22.39	21.42	21.43	21.43	661,000
06/03/21	21.85	22.31	21.14	21.93	21.93	1,631,900
06/02/21	21.00	22.32	20.64	21.99	21.99	1,630,800
06/01/21	21.63	22.41	21.54	22.27	22.27	809,700
05/28/21	22.82	23.57	21.53	21.61	21.61	1,180,800
05/27/21	21.62	22.71	21.51	22.59	22.59	1,615,500
05/26/21	21.75	22.12	21.55	21.60	21.60	734,400
05/25/21	21.95	22.23	21.55	21.61	21.61	601,900
05/24/21	21.75	22.04	21.40	21.79	21.79	478,800
05/21/21	21.40	21.57	21.16	21.38	21.38	534,800
05/20/21	20.82	21.26	20.57	21.21	21.21	703,400
05/19/21	20.17	20.82	19.96	20.80	20.80	843,100
05/18/21	20.84	21.05	20.57	20.57	20.57	709,000
05/17/21	20.81	20.96	20.52	20.87	20.87	413,500
05/14/21	20.61	20.74	20.24	20.61	20.61	1,073,800
05/13/21	19.72	20.74	19.65	20.46	20.46	796,600
05/12/21	20.37	20.61	19.58	19.65	19.65	849,800
05/11/21	20.39	21.03	20.35	20.57	20.57	413,000
05/10/21	21.05	21.33	20.89	20.92	20.92	408,200
05/07/21	20.25	21.13	20.15	20.92	20.92	630,300

When looking at the percent change between 2 values, subtract the old value from the new value and divide the result by the old value as shown:



	A	B	C	D	E	F	G	H	I	J	K
1	Date	Open	High	Low	Close	Adj Close	Volume	% Change Close	% Change Open	OHLC	HLC
2	06/21/21	21.72	21.72	21.04	21.53	21.53	398,500	=(E2-E3)/E3			
3	06/18/21	21.60	21.87	21.37	21.59	21.59	612,500				
4	06/17/21	21.88	21.98	21.65	21.85	21.85	375,300				
5	06/16/21	21.71	21.96	21.33	21.94	21.94	572,200				
6	06/15/21	22.38	22.47	21.82	21.83	21.83	316,900				
7	06/14/21	22.79	23.09	22.20	22.33	22.33	472,900				
8	06/11/21	22.59	22.79	22.42	22.74	22.74	370,400				
9	06/10/21	23.28	23.35	22.49	22.55	22.55	874,500				

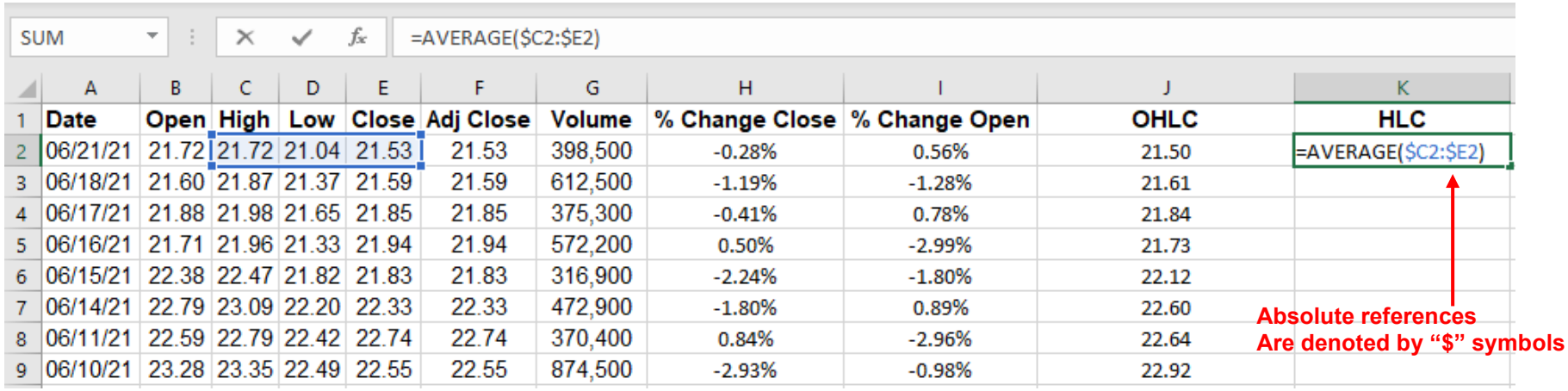
To get the Open, High, Low, Close (OHLC), we take the average of the cells B2:E2 as shown by the excel formula =AVERAGE($B2:$E2) below.



	A	B	C	D	E	F	G	H	I	J	K
1	Date	Open	High	Low	Close	Adj Close	Volume	% Change Close	% Change Open	OHLC	HLC
2	06/21/21	21.72	21.72	21.04	21.53	21.53	398,500	-0.28%	0.56%	=AVERAGE($B2:$E2)	
3	06/18/21	21.60	21.87	21.37	21.59	21.59	612,500	-1.19%	-1.28%		
4	06/17/21	21.88	21.98	21.65	21.85	21.85	375,300	-0.41%	0.78%		
5	06/16/21	21.71	21.96	21.33	21.94	21.94	572,200	0.50%	-2.99%		
6	06/15/21	22.38	22.47	21.82	21.83	21.83	316,900	-2.24%	-1.80%		
7	06/14/21	22.79	23.09	22.20	22.33	22.33	472,900	-1.80%	0.89%		
8	06/11/21	22.59	22.79	22.42	22.74	22.74	370,400	0.84%	-2.96%		
9	06/10/21	23.28	23.35	22.49	22.55	22.55	874,500	-2.93%	-0.98%		

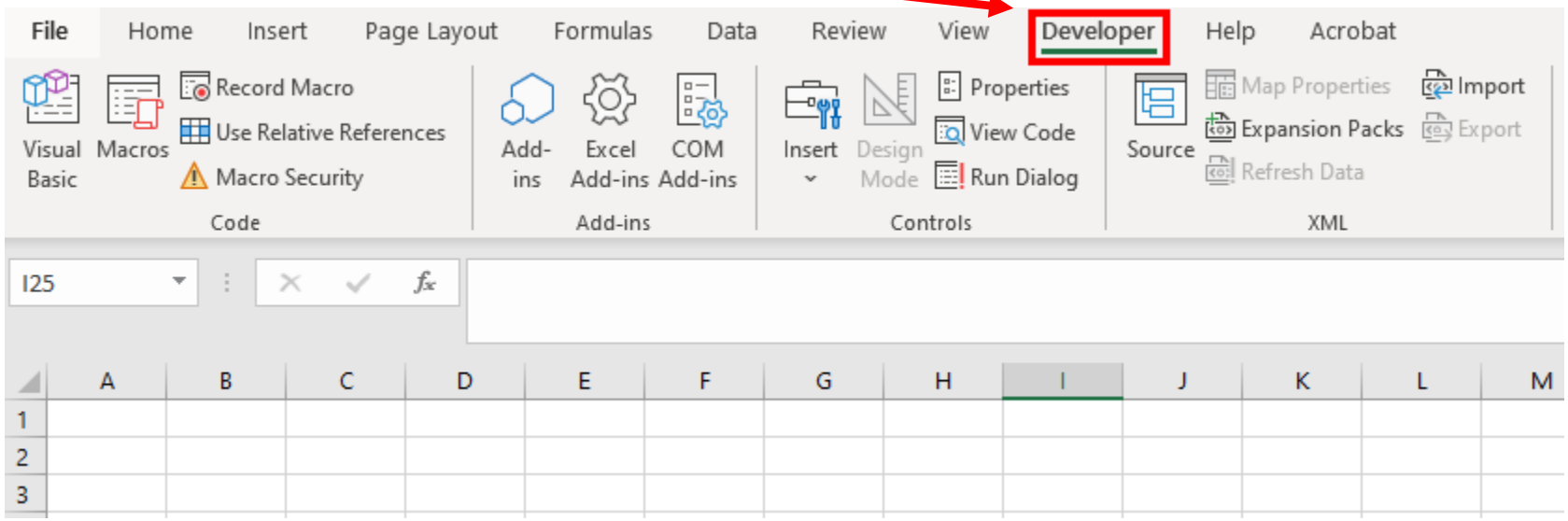
We bring the formula down to the rest of the cells by clicking on the right corner of cell J2, following the same procedure for HLC, starting in cell K2.

Let's not forget to adjust the formula in the HLC and the OHLC averages by locking in these absolute references.



	A	B	C	D	E	F	G	H	I	J	K
1	Date	Open	High	Low	Close	Adj Close	Volume	% Change Close	% Change Open	OHLC	HLC
2	06/21/21	21.72	21.72	21.04	21.53	21.53	398,500	-0.28%	0.56%	21.50	=AVERAGE($C2:$E2)
3	06/18/21	21.60	21.87	21.37	21.59	21.59	612,500	-1.19%	-1.28%	21.61	
4	06/17/21	21.88	21.98	21.65	21.85	21.85	375,300	-0.41%	0.78%	21.84	
5	06/16/21	21.71	21.96	21.33	21.94	21.94	572,200	0.50%	-2.99%	21.73	
6	06/15/21	22.38	22.47	21.82	21.83	21.83	316,900	-2.24%	-1.80%	22.12	
7	06/14/21	22.79	23.09	22.20	22.33	22.33	472,900	-1.80%	0.89%	22.60	
8	06/11/21	22.59	22.79	22.42	22.74	22.74	370,400	0.84%	-2.96%	22.64	
9	06/10/21	23.28	23.35	22.49	22.55	22.55	874,500	-2.93%	-0.98%	22.92	

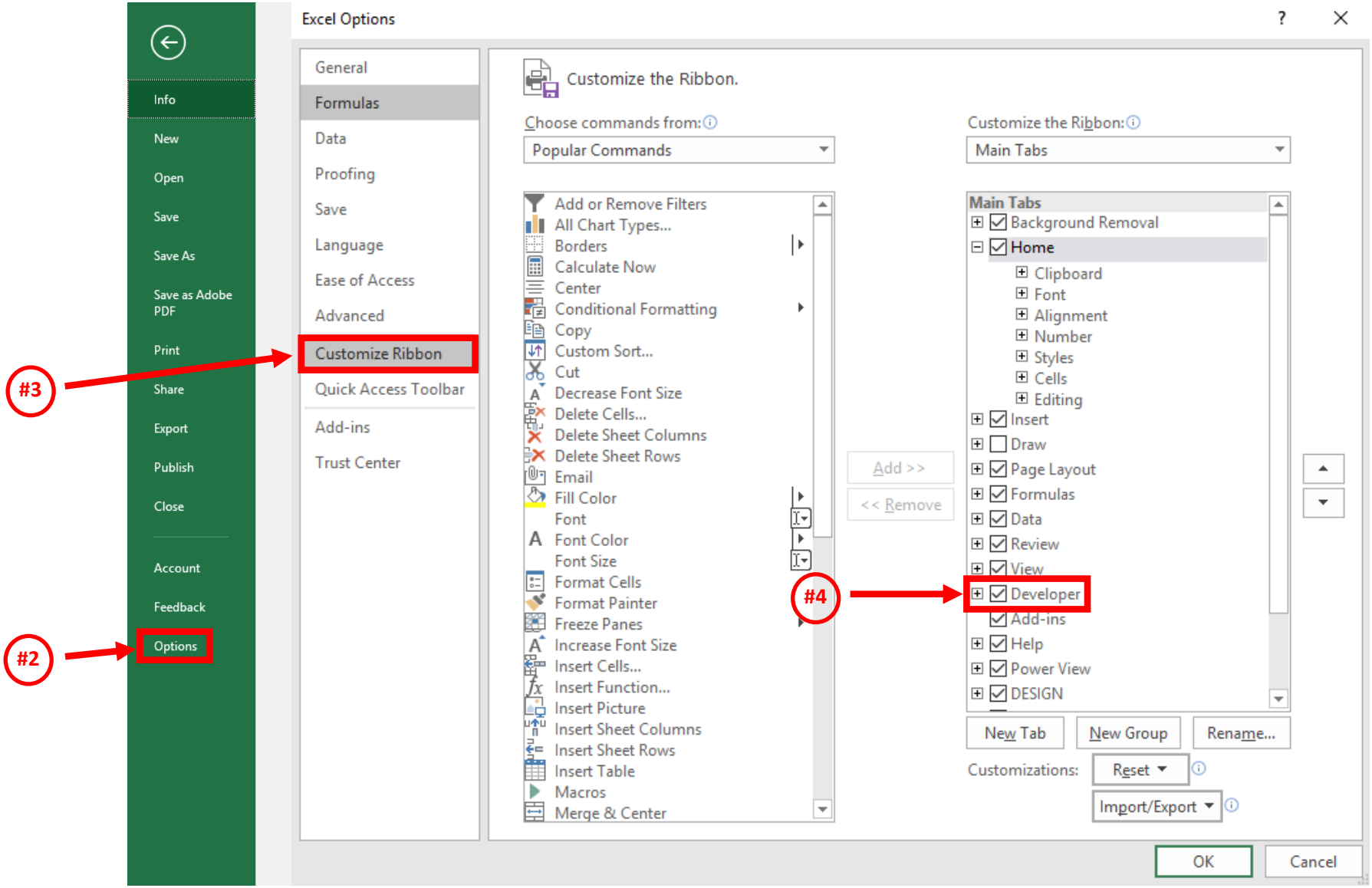
Before we proceed with more built-in Excel formulas, let us delve into a little bit of VBA (Visual Basic for Applications). VBA is the back-end programming language of Microsoft Excel and other Microsoft Office programs. It is important to ensure that our Microsoft Excel package has the Developer Tab added onto it.



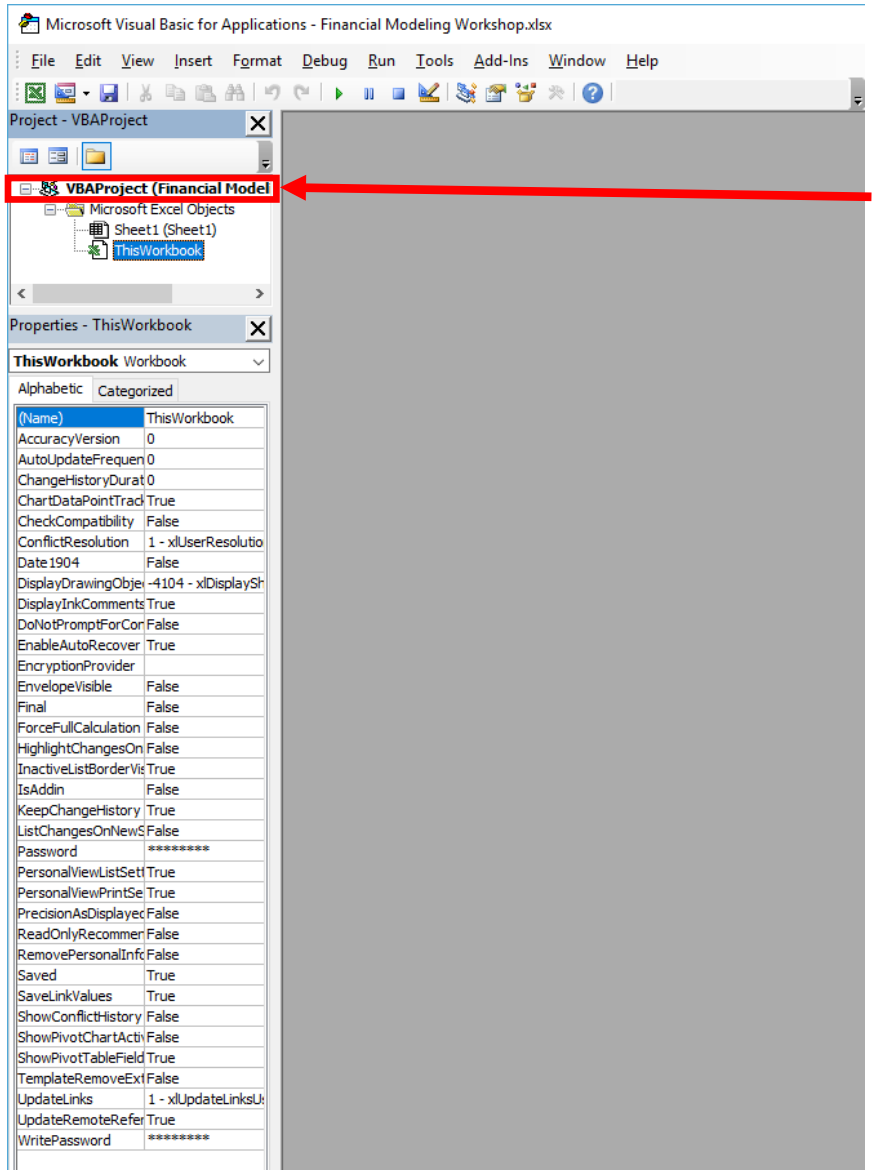
This step is **NOT** mandatory for entering the visual basic editor but is necessary if you are recording macros to automate various processes.

If you are just writing code (i.e. coding a function), you can enter the VBA environment simply by pressing **ALT + F11** on your keyboard.

1. Click on “File.”
2. Click on “Options.”
3. Click on “Customize Ribbon.”
4. Make Sure there is a check mark next to “Developer.”



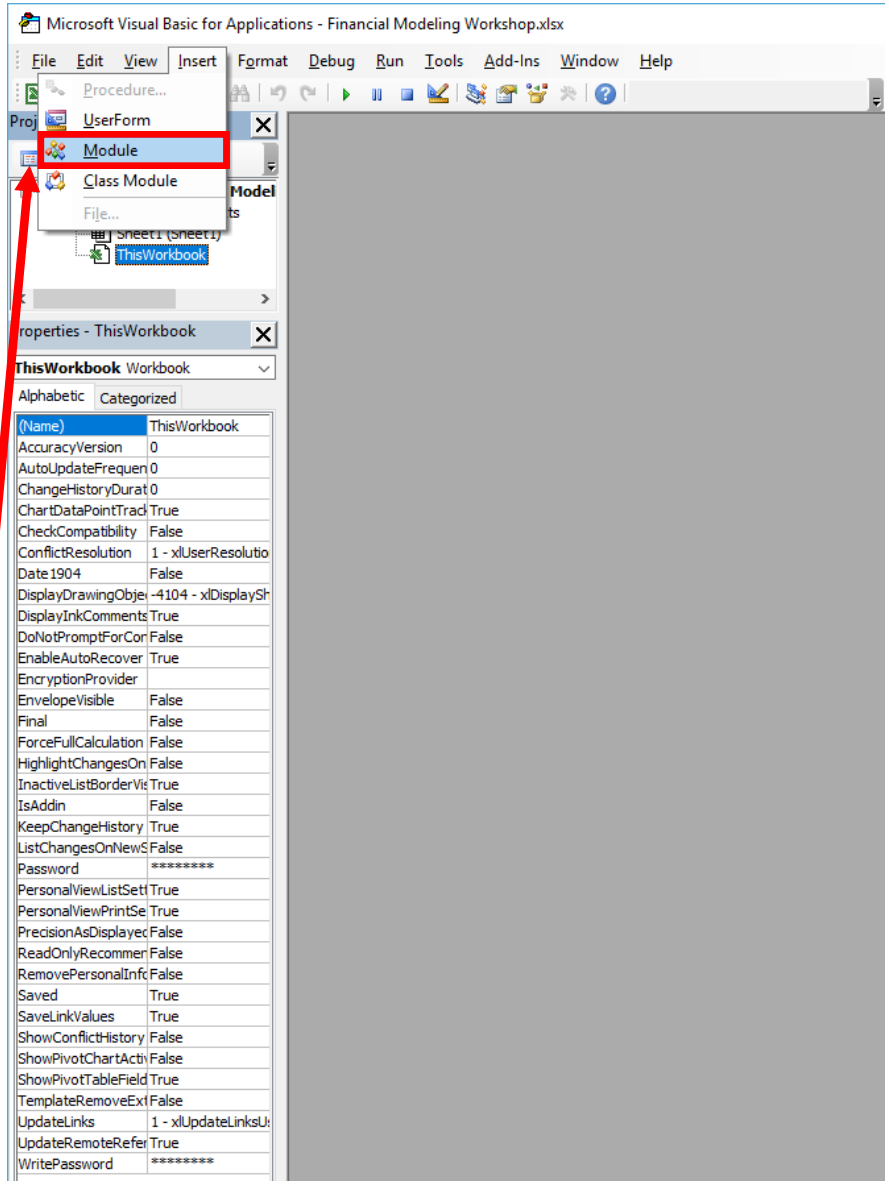
We're not going to cover the entirety of VBA programming but will work with the basics.



We want to ensure that we are looking at the correct VBAProject.

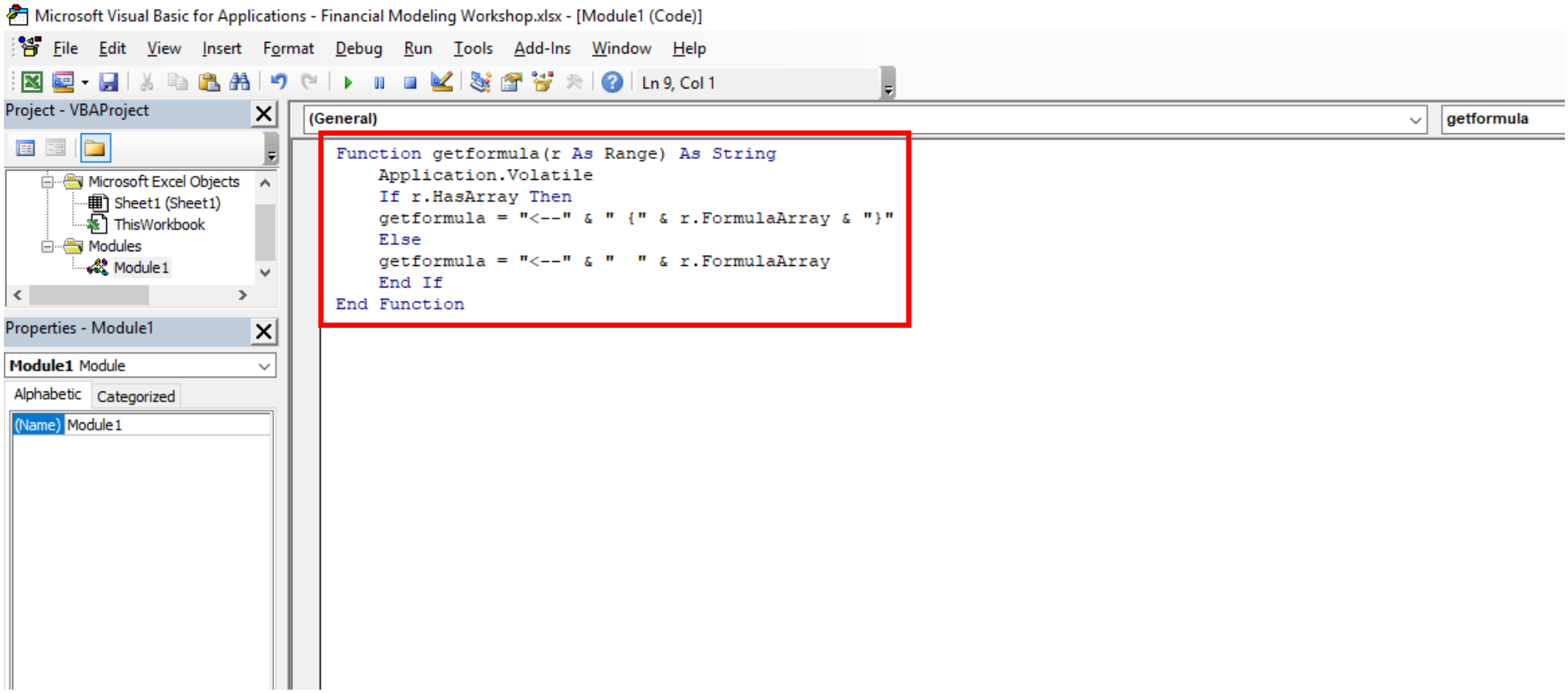
The project name is the name of the Excel File that you are working within. In this case, it is called: "Financial Modeling Workshop."

We will begin by inserting a module.



Let's start by writing a basic function.

One of the most used functions in Financial Modeling is “getformula.” It simply tells us what formula we plugged into any given cell.



Application.Volatile: this function is recalculated when any given cell in any workbook in the application window changes value.

If r.HasArray Then: if, then statement stating that if the range r has an array, then the formula (getformula) = some defined array.

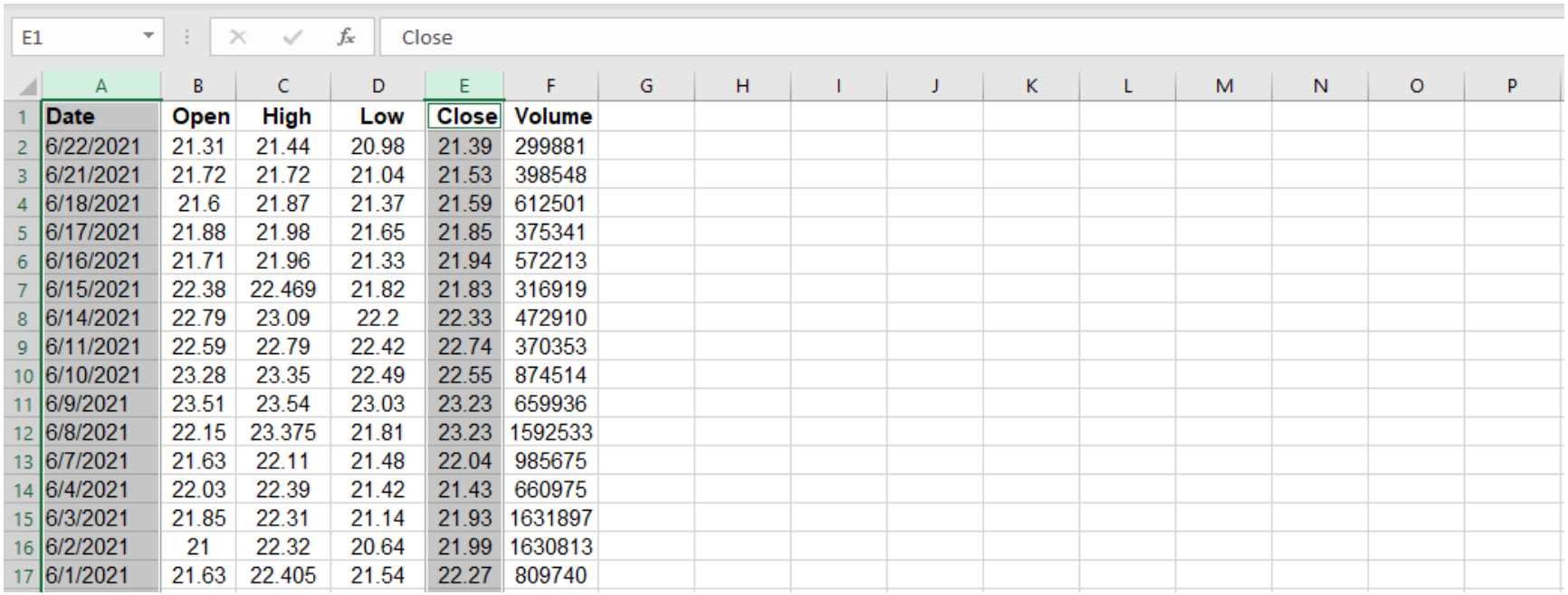
As we have seen in our introduction, historical pricing inquiries (HPI) can be pulled from reliable data sources like Yahoo Finance and Wall Street Journal.

We're going to go ahead and pull this data for IMAX from WSJ.

https://quotes.wsj.com/IMAX/historical-prices

The data is download into a flat .csv file. The file is then converted to an .xlsx file, and the worksheet is renamed to "HPI."

Let's go ahead and select Column A and Column E simultaneously by holding down the "ctrl" button if you're using Windows (or "cmd" button if you're using a MAC).



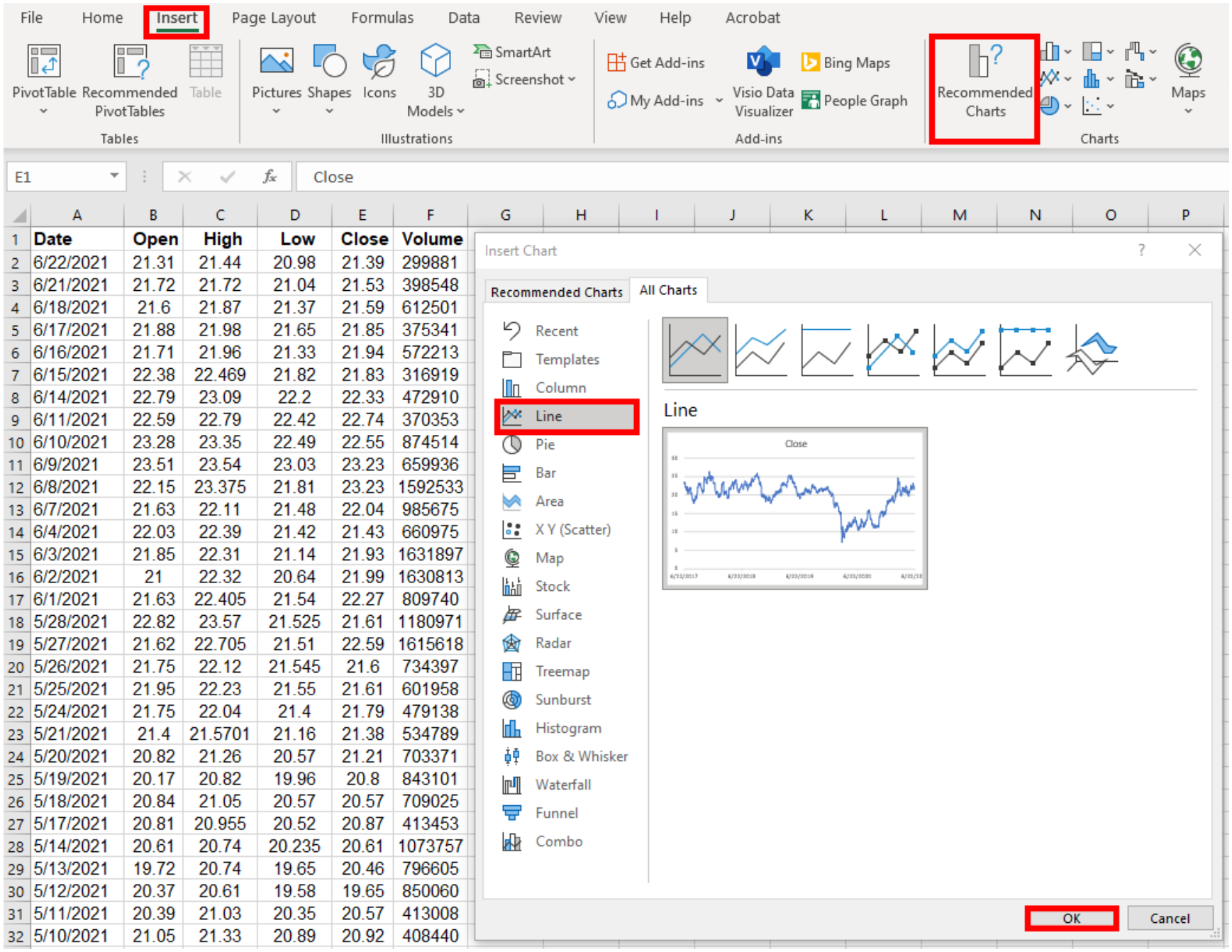
E1 | Close

	A	B	C	D	E	F
1	Date	Open	High	Low	Close	Volume
2	6/22/2021	21.31	21.44	20.98	21.39	299881
3	6/21/2021	21.72	21.72	21.04	21.53	398548
4	6/18/2021	21.6	21.87	21.37	21.59	612501
5	6/17/2021	21.88	21.98	21.65	21.85	375341
6	6/16/2021	21.71	21.96	21.33	21.94	572213
7	6/15/2021	22.38	22.469	21.82	21.83	316919
8	6/14/2021	22.79	23.09	22.2	22.33	472910
9	6/11/2021	22.59	22.79	22.42	22.74	370353
10	6/10/2021	23.28	23.35	22.49	22.55	874514
11	6/9/2021	23.51	23.54	23.03	23.23	659936
12	6/8/2021	22.15	23.375	21.81	23.23	1592533
13	6/7/2021	21.63	22.11	21.48	22.04	985675
14	6/4/2021	22.03	22.39	21.42	21.43	660975
15	6/3/2021	21.85	22.31	21.14	21.93	1631897
16	6/2/2021	21	22.32	20.64	21.99	1630813
17	6/1/2021	21.63	22.405	21.54	22.27	809740

Now, let's do the following:

- graph date vs. close price
- examine different ways we can arrange this data (Pivot Table)

1. Click Insert
2. Click on Recommended Charts
3. Click on "All Charts" tab in the pop-up dialog box and select the "Line" graph on the left-hand side; click "OK."



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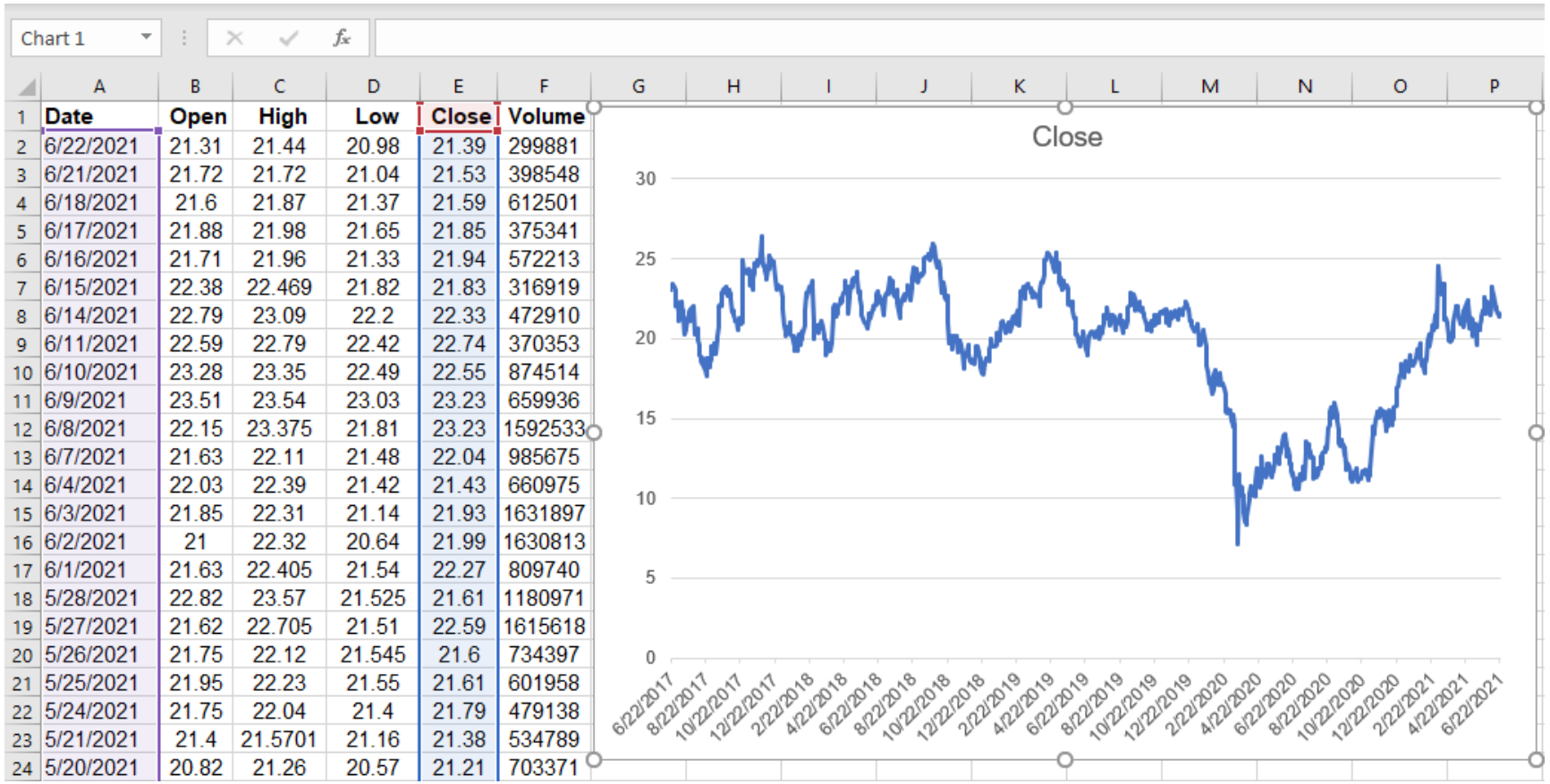
15	6/3/2021	21.85	22.31	21.14	21.93	1631897
16	6/2/2021	21	22.32	20.64	21.99	1630813
17	6/1/2021	21.63	22.405	21.54	22.27	809740
18	5/28/2021	22.82	23.57	21.525	21.61	1180971
19	5/27/2021	21.62	22.705	21.51	22.59	1615618
20	5/26/2021	21.75	22.12	21.545	21.6	734397
21	5/25/2021	21.95	22.23	21.55	21.61	601958
22	5/24/2021	21.75	22.04	21.4	21.79	479138
23	5/21/2021	21.4	21.5701	21.16	21.38	534789
24	5/20/2021	20.82	21.26	20.57	21.21	703371
25	5/19/2021	20.17	20.82	19.96	20.8	843101
26	5/18/2021	20.84	21.05	20.57	20.57	709025
27	5/17/2021	20.81	20.955	20.52	20.87	413453
28	5/14/2021	20.61	20.74	20.235	20.61	1073757
29	5/13/2021	19.72	20.74	19.65	20.46	796605
30	5/12/2021	20.37	20.61	19.58	19.65	850060
31	5/11/2021	20.39	21.03	20.35	20.57	413008
32	5/10/2021	21.05	21.33	20.89	20.92	408440

The following graph is created; when clicking inside the graph, columns A and E are auto selected to represent that the data is pulled from those two columns.



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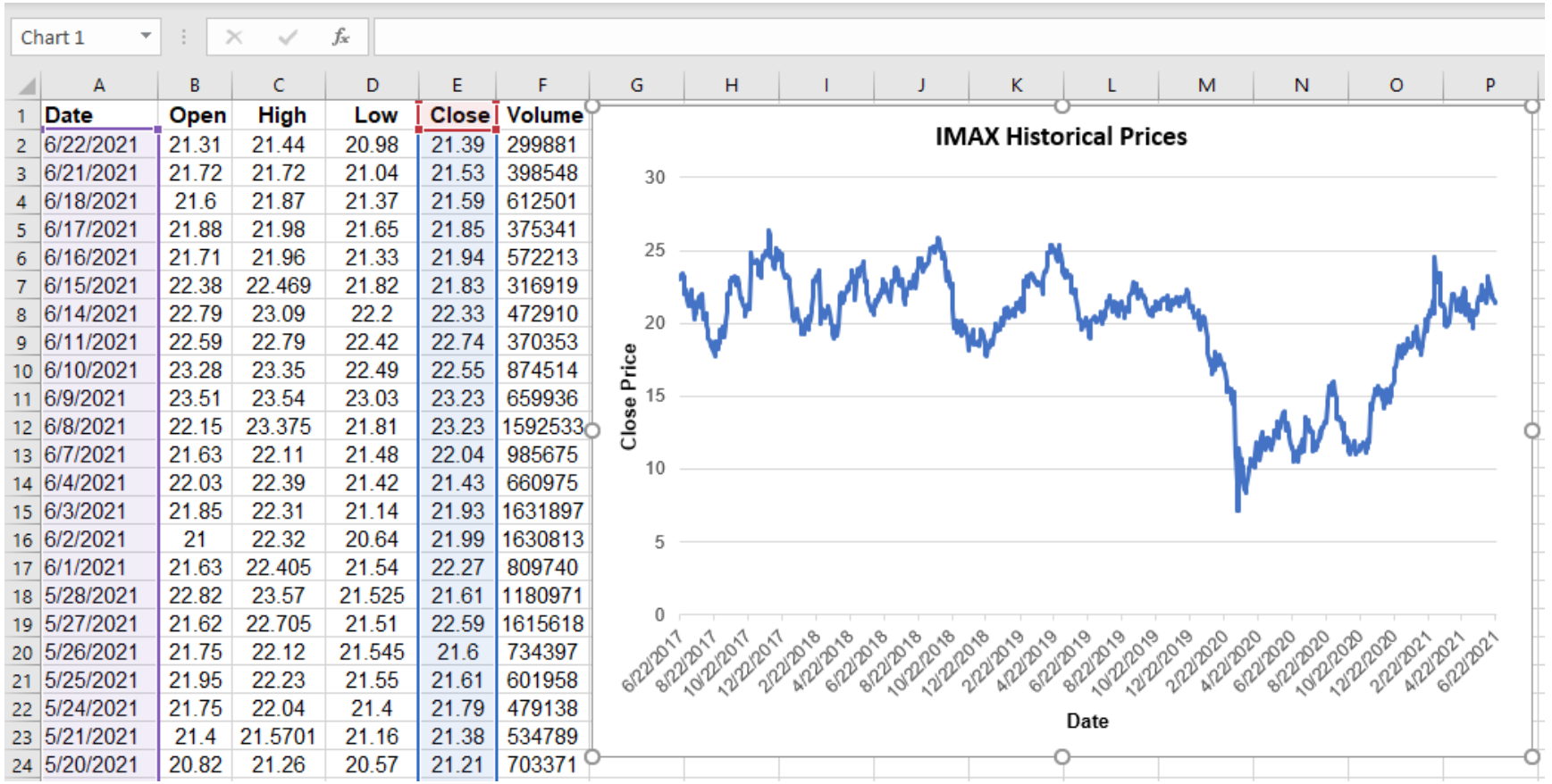
21	5/25/2021	21.95	22.23	21.55	21.61	601958
22	5/24/2021	21.75	22.04	21.4	21.79	479138
23	5/21/2021	21.4	21.5701	21.16	21.38	534789
24	5/20/2021	20.82	21.26	20.57	21.21	703371

Now, let's rename the graph to "IMAX Historical Prices," and add the x-axis, and y-axis titles.

- To add the axis labels, click on the graph, go to the design tab on the menu above, and select the "Add Chart Element" drop-down menu.
- From there, you will further select "Axis Titles," and add "Primary Horizontal," and "Primary Vertical" axes.



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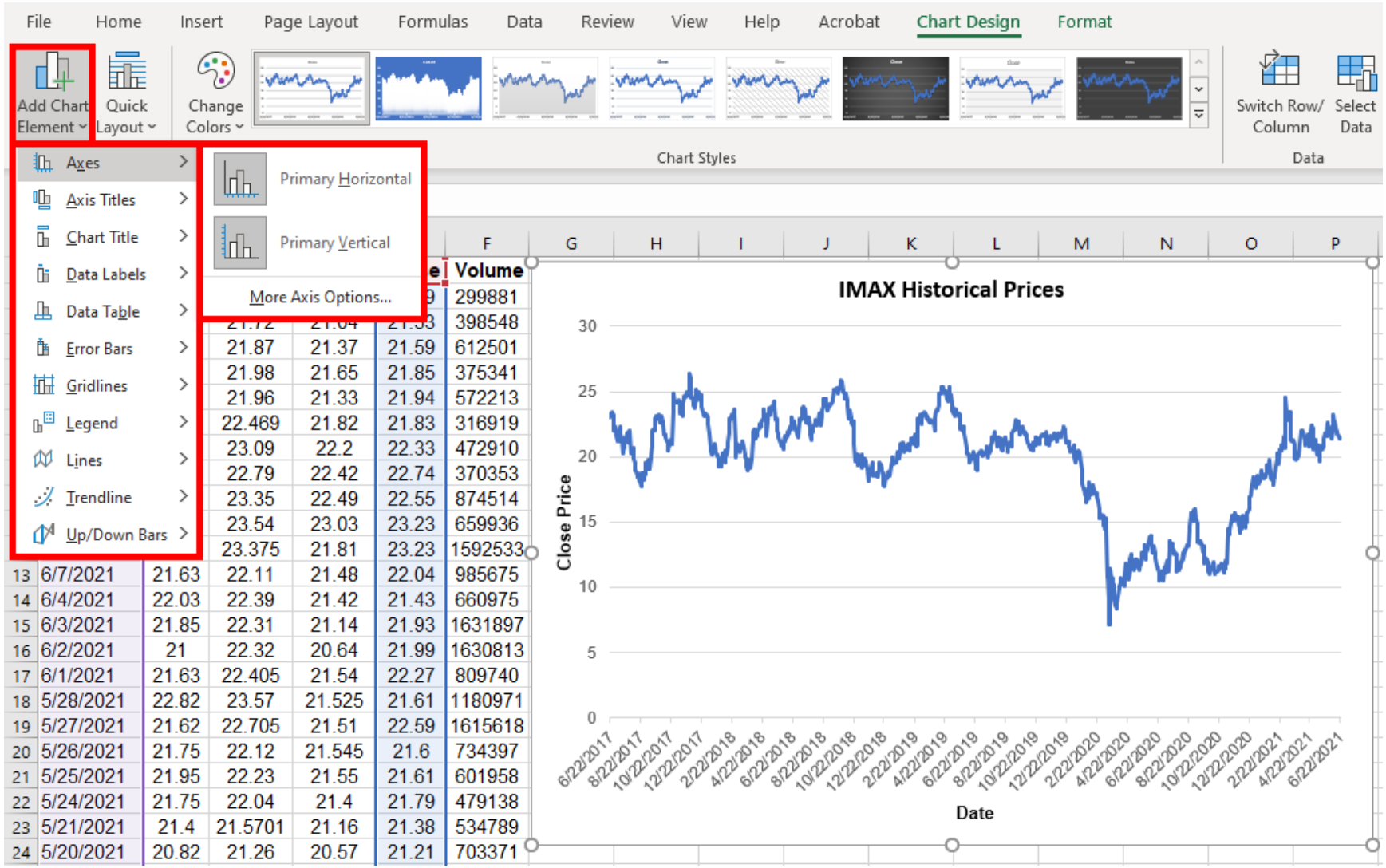
18	5/28/2021	22.82	23.57	21.525	21.61	1180971
19	5/27/2021	21.62	22.705	21.51	22.59	1615618
20	5/26/2021	21.75	22.12	21.545	21.6	734397
21	5/25/2021	21.95	22.23	21.55	21.61	601958
22	5/24/2021	21.75	22.04	21.4	21.79	479138
23	5/21/2021	21.4	21.5701	21.16	21.38	534789
24	5/20/2021	20.82	21.26	20.57	21.21	703371

Below are the steps for selecting axis titles:

1. Click on “Add Chart Element.”
2. Click on “Axis Titles.”
3. Select “Primary Horizontal.”
4. Select “Primary Vertical.”

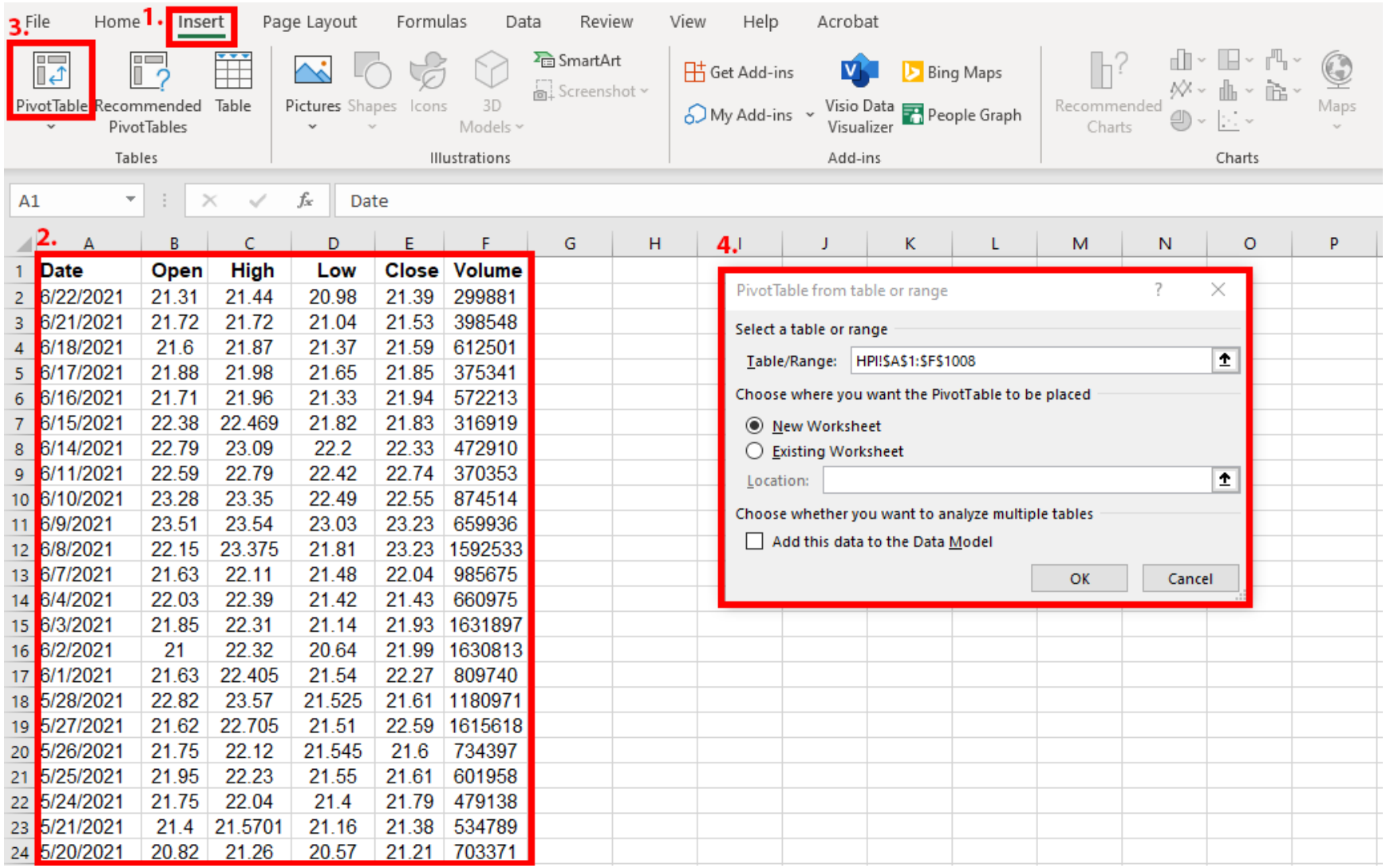


						Volume
						299881
						398548
		21.87	21.37	21.59		612501
		21.98	21.65	21.85		375341
		21.96	21.33	21.94		572213
		22.469	21.82	21.83		316919
		23.09	22.2	22.33		472910
		22.79	22.42	22.74		370353
		23.35	22.49	22.55		874514
		23.54	23.03	23.23		659936
		23.375	21.81	23.23		1592533
13	6/7/2021	21.63	22.11	21.48	22.04	985675
14	6/4/2021	22.03	22.39	21.42	21.43	660975
15	6/3/2021	21.85	22.31	21.14	21.93	1631897
16	6/2/2021	21	22.32	20.64	21.99	1630813
17	6/1/2021	21.63	22.405	21.54	22.27	809740
18	5/28/2021	22.82	23.57	21.525	21.61	1180971
19	5/27/2021	21.62	22.705	21.51	22.59	1615618
20	5/26/2021	21.75	22.12	21.545	21.6	734397
21	5/25/2021	21.95	22.23	21.55	21.61	601958
22	5/24/2021	21.75	22.04	21.4	21.79	479138
23	5/21/2021	21.4	21.5701	21.16	21.38	534789
24	5/20/2021	20.82	21.26	20.57	21.21	703371

Now that we've explored the graphical aspects of Historical Prices, let's take a look at how we can reorganize this data into a Pivot Table. This feature is built into excel and is easy to implement. The basic steps are outlined below:

1. Select range of data
2. Click on "Insert" tab in excel
3. Select Pivot Table
4. The resulting dialog box pops open

As you can see from the Pivot Table dialog box above, the Table/Range is set to $A$1:$F$1008, which is exactly the range of data we need. As such, we want to ensure to capture the entire range of data so that the resulting pivot table does not omit anything of value. For our purposes, we want the PivotTable report to be placed in a New Worksheet (so we select the “New Worksheet” radio button), but we can also put the data in our existing worksheet.



	A	B	C	D	E	F
1	Date	Open	High	Low	Close	Volume
2	6/22/2021	21.31	21.44	20.98	21.39	299881
3	6/21/2021	21.72	21.72	21.04	21.53	398548
4	6/18/2021	21.6	21.87	21.37	21.59	612501
5	6/17/2021	21.88	21.98	21.65	21.85	375341
6	6/16/2021	21.71	21.96	21.33	21.94	572213
7	6/15/2021	22.38	22.469	21.82	21.83	316919
8	6/14/2021	22.79	23.09	22.2	22.33	472910
9	6/11/2021	22.59	22.79	22.42	22.74	370353
10	6/10/2021	23.28	23.35	22.49	22.55	874514
11	6/9/2021	23.51	23.54	23.03	23.23	659936
12	6/8/2021	22.15	23.375	21.81	23.23	1592533
13	6/7/2021	21.63	22.11	21.48	22.04	985675
14	6/4/2021	22.03	22.39	21.42	21.43	660975
15	6/3/2021	21.85	22.31	21.14	21.93	1631897
16	6/2/2021	21	22.32	20.64	21.99	1630813
17	6/1/2021	21.63	22.405	21.54	22.27	809740
18	5/28/2021	22.82	23.57	21.525	21.61	1180971
19	5/27/2021	21.62	22.705	21.51	22.59	1615618
20	5/26/2021	21.75	22.12	21.545	21.6	734397
21	5/25/2021	21.95	22.23	21.55	21.61	601958
22	5/24/2021	21.75	22.04	21.4	21.79	479138
23	5/21/2021	21.4	21.5701	21.16	21.38	534789
24	5/20/2021	20.82	21.26	20.57	21.21	703371

PivotTable1

Click in this area to work with the PivotTable report

PivotTable Fields

Choose fields to add to report:

Search

- Date
- Open
- High
- Low
- Close
- Volume
- Quarters
- Years

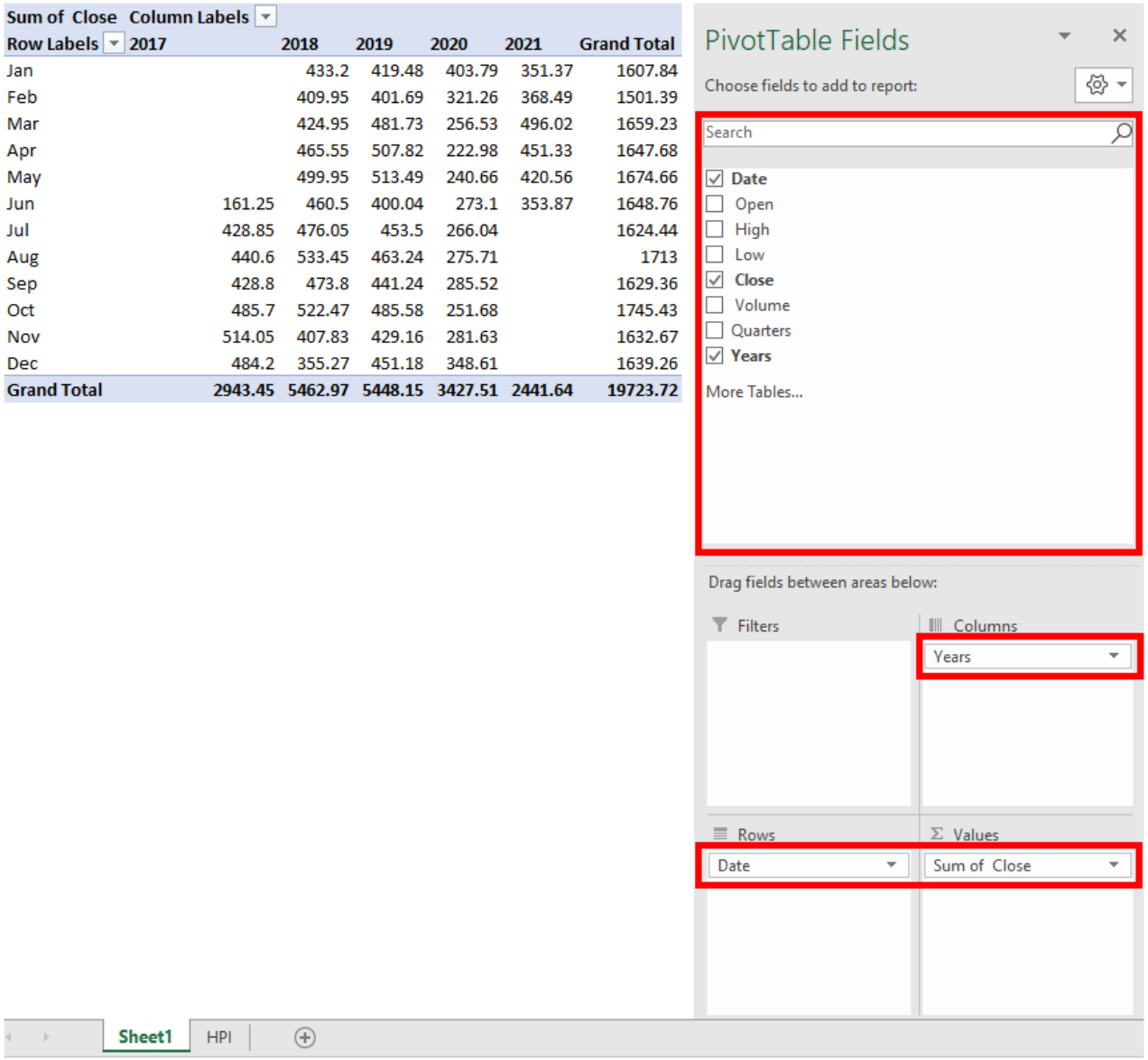
More Tables...

Drag fields between areas below:

Filters	Columns

Rows	Values

1. Let's put a check mark next to "Date." Notice how Quarters and Years are auto selected because they are all tied in.
2. We will uncheck quarters because we don't want to see the quarterly data.
3. Let's now go ahead and put a check mark next to "Close" since close price is a variable that is of interest to us.
4. Let's also ensure that "Years" are checked.

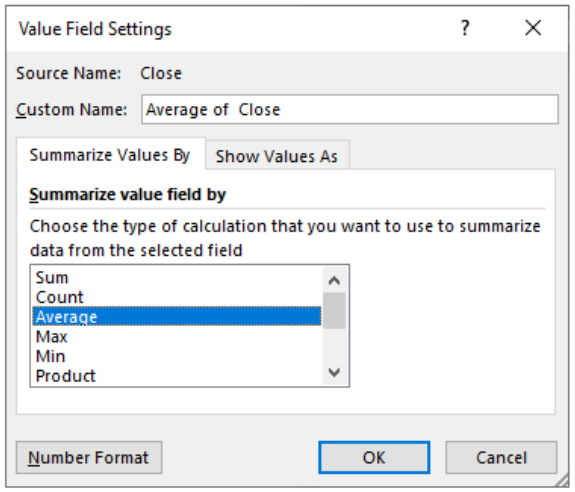


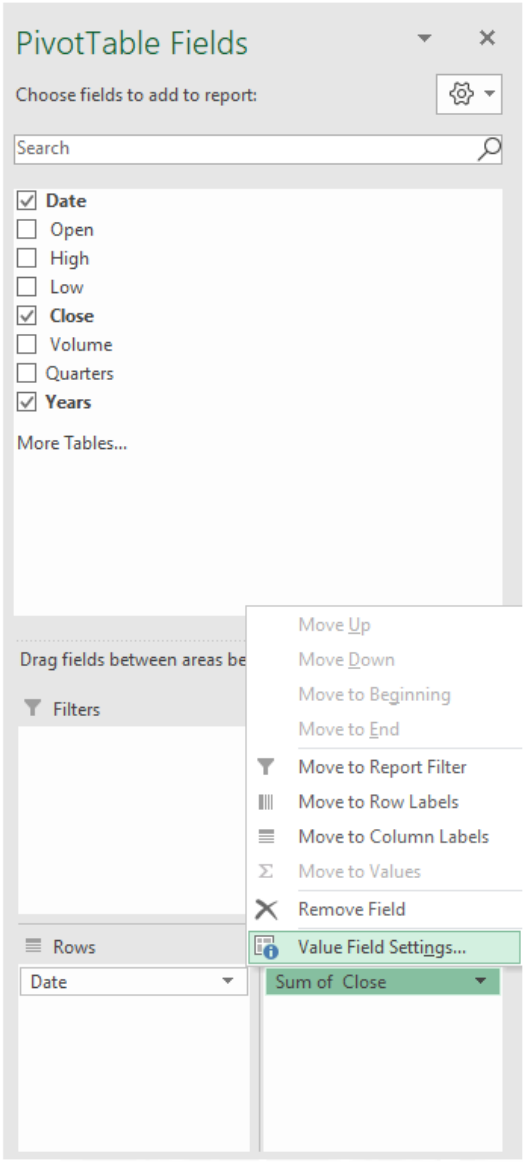
Sum of Close	Column Labels					
Row Labels	2017	2018	2019	2020	2021	Grand Total
Jan		433.2	419.48	403.79	351.37	1607.84
Feb		409.95	401.69	321.26	368.49	1501.39
Mar		424.95	481.73	256.53	496.02	1659.23
Apr		465.55	507.82	222.98	451.33	1647.68
May		499.95	513.49	240.66	420.56	1674.66
Jun	161.25	460.5	400.04	273.1	353.87	1648.76
Jul	428.85	476.05	453.5	266.04		1624.44
Aug	440.6	533.45	463.24	275.71		1713
Sep	428.8	473.8	441.24	285.52		1629.36
Oct	485.7	522.47	485.58	251.68		1745.43
Nov	514.05	407.83	429.16	281.63		1632.67
Dec	484.2	355.27	451.18	348.61		1639.26
Grand Total	2943.45	5462.97	5448.15	3427.51	2441.64	19723.72

The data is now arranged precisely as we want it – with closing prices organized by months. There's one problem, though: The pivot table automatically summed the data as opposed to giving us the average close price for the month and year. This is an easy fix. We will adjust it manually.

1. Let's do a drop down on "Sum of Close" in the "Values" area and select "Value Field Settings."
2. Then proceed to change the calculation from "Sum" to "Average."

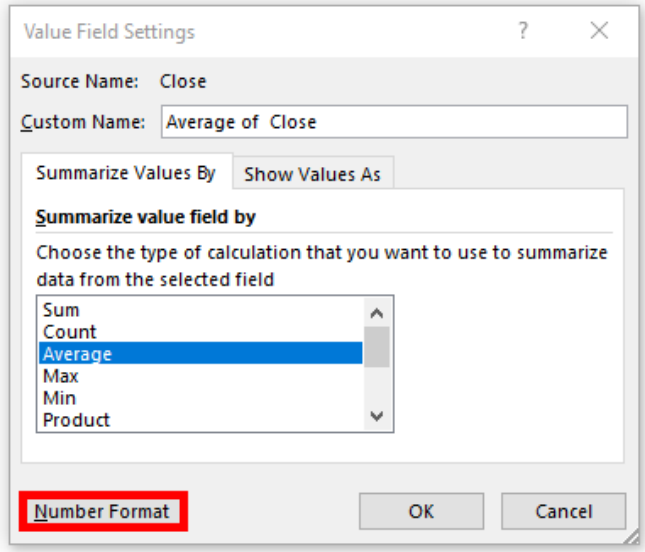
Sum of Close	Column Labels					
Row Labels	2017	2018	2019	2020	2021	Grand Total
Jan		433.2	419.48	403.79	351.37	1607.84
Feb		409.95	401.69	321.26	368.49	1501.39
Mar		424.95	481.73	256.53	496.02	1659.23
Apr		465.55	507.82	222.98	451.33	1647.68
May		499.95	513.49	240.66	420.56	1674.66
Jun	161.25	460.5	400.04	273.1	353.87	1648.76
Jul	428.85	476.05	453.5	266.04		1624.44
Aug	440.6	533.45	463.24	275.71		1713
Sep	428.8	473.8	441.24	285.52		1629.36
Oct	485.7	522.47	485.58	251.68		1745.43
Nov	514.05	407.83	429.16	281.63		1632.67
Dec	484.2	355.27	451.18	348.61		1639.26
Grand Total	2943.45	5462.97	5448.15	3427.51	2441.64	19723.72

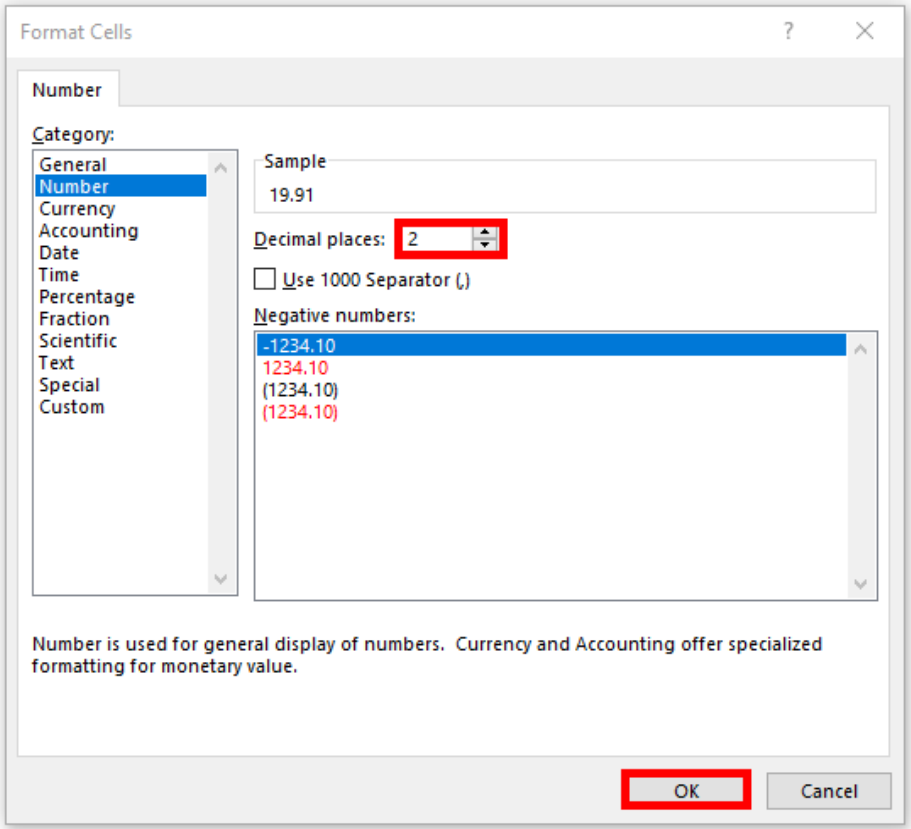




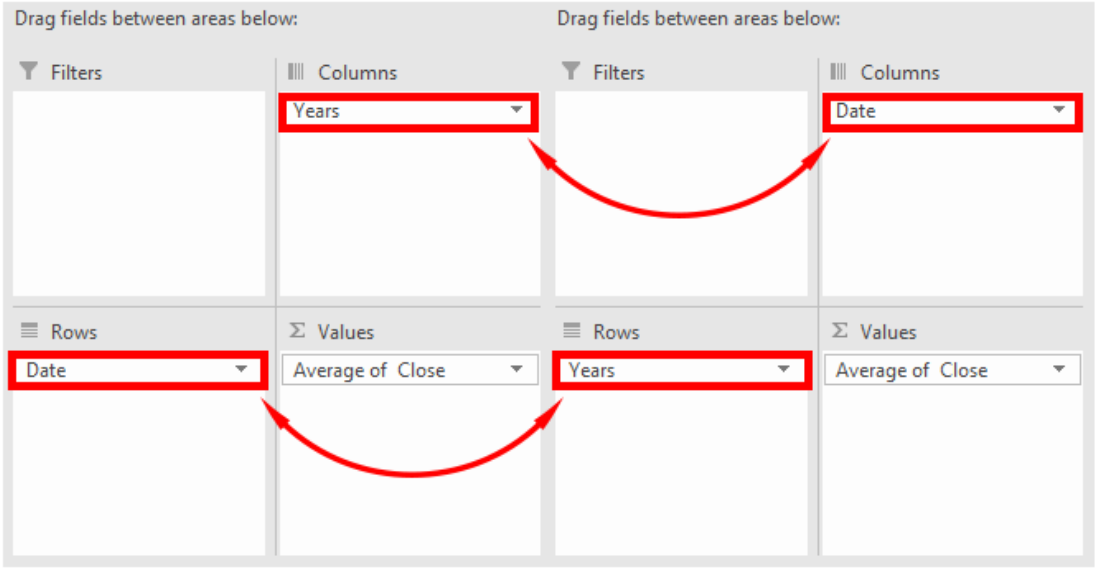
- The resulting pivot table now looks like the following, with average values as opposed to summed values.
- A simple rounding of decimal points (down to 2 decimals) gives us a better-looking data set.

Average of Close	Column Labels					
Row Labels	2017	2018	2019	2020	2021	Grand Total
Jan		20.63	19.98	19.23	18.49	19.61
Feb		21.58	21.14	16.91	19.39	19.76
Mar		20.24	22.94	11.66	21.57	19.07
Apr		22.17	24.18	10.62	21.49	19.62
May		22.73	23.34	12.03	21.03	19.94
Jun	23.04	21.93	20.00	12.41	22.12	19.17
Jul	21.44	22.67	20.61	12.09		19.11
Aug	19.16	23.19	21.06	13.13		19.25
Sep	21.44	24.94	22.06	13.60		20.37
Oct	22.08	22.72	21.11	11.44		19.39
Nov	24.48	19.42	21.46	14.08		19.91
Dec	24.21	18.70	21.48	15.85		19.99
Grand Total	**22.13**	**21.76**	**21.62**	**13.55**	**20.69**	**19.59**





We can also switch data between different Pivot Table fields. For instance, we now have “Years” in columns and “Date” in Rows.



The resulting Pivot Table now looks like this:

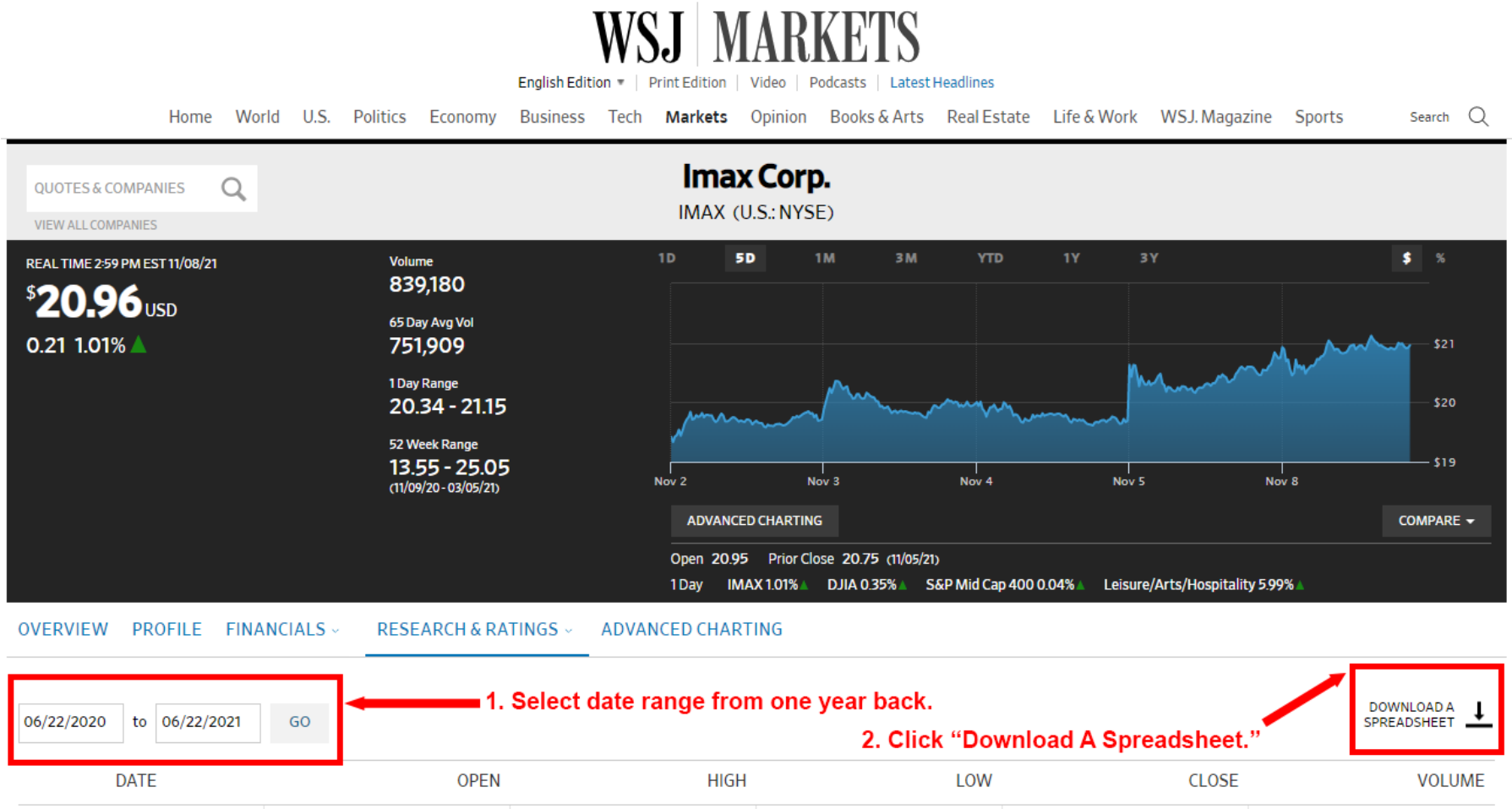
Average of Close	Column Labels												
Row Labels	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Grand Total
2017						23.04	21.44	19.16	21.44	22.08	24.48	24.21	22.13
2018	20.63	21.58	20.24	22.17	22.73	21.93	22.67	23.19	24.94	22.72	19.42	18.70	21.76
2019	19.98	21.14	22.94	24.18	23.34	20.00	20.61	21.06	22.06	21.11	21.46	21.48	21.62
2020	19.23	16.91	11.66	10.62	12.03	12.41	12.09	13.13	13.60	11.44	14.08	15.85	13.55
2021	18.49	19.39	21.57	21.49	21.03	22.12							20.69
Grand Total	**19.61**	**19.76**	**19.07**	**19.62**	**19.94**	**19.17**	**19.11**	**19.25**	**20.37**	**19.39**	**19.91**	**19.99**	**19.59**

As we have seen in our introduction, historical pricing inquiries (HPI) can be pulled from reliable data sources like Yahoo Finance and The Wall Street Journal.

We're going to go ahead and pull this data for IMAX from The Wall Street Journal.

https://quotes.wsj.com/IMAX/historical-prices

and we're going to see what happens when some of this data is missing and piece it back together using the VLOOKUP() formula.



	A	B	C	D	E	F
1	Date	Open	High	Low	Close	Volume
2	6/22/2021	21.31	21.44	20.98	21.39	299881
3	6/21/2021	21.72	21.72	21.04	21.53	398548
4	6/18/2021	21.6	21.87	21.37	21.59	612501
5	6/17/2021	21.88	21.98	21.65	21.85	375341
6	6/16/2021	21.71	21.96	21.33	21.94	572213
7	6/15/2021	22.38	22.469	21.82	21.83	316919
8	6/14/2021	22.79	23.09	22.2	22.33	472910
9	6/11/2021	22.59	22.79	22.42	22.74	370353
10	6/10/2021	23.28	23.35	22.49	22.55	874514
11	6/9/2021	23.51	23.54	23.03	23.23	659936
12	6/8/2021	22.15	23.375	21.81	23.23	1592533
13	6/7/2021	21.63	22.11	21.48	22.04	985675
14	6/4/2021	22.03	22.39	21.42	21.43	660975
15	6/3/2021	21.85	22.31	21.14	21.93	1631897
16	6/2/2021	21	22.32	20.64	21.99	1630813
17	6/1/2021	21.63	22.405	21.54	22.27	809740
18	5/28/2021	22.82	23.57	21.525	21.61	1180971
19	5/27/2021	21.62	22.705	21.51	22.59	1615618
20	5/26/2021	21.75	22.12	21.545	21.6	734397
21	5/25/2021	21.95	22.23	21.55	21.61	601958
22	5/24/2021	21.75	22.04	21.4	21.79	479138
23	5/21/2021	21.4	21.5701	21.16	21.38	534789
24	5/20/2021	20.82	21.26	20.57	21.21	703371
25	5/19/2021	20.17	20.82	19.96	20.8	843101
26	5/18/2021	20.84	21.05	20.57	20.57	709025
27	5/17/2021	20.81	20.955	20.52	20.87	413453
28	5/14/2021	20.61	20.74	20.235	20.61	1073757
29	5/13/2021	19.72	20.74	19.65	20.46	796605
30	5/12/2021	20.37	20.61	19.58	19.65	850060
31	5/11/2021	20.39	21.03	20.35	20.57	413008
32	5/10/2021	21.05	21.33	20.89	20.92	408440
33	5/7/2021	20.25	21.13	20.15	20.92	630308
34	5/6/2021	20.76	20.76	20.08	20.21	560763
35	5/5/2021	21.33	21.33	20.62	20.68	507176
36	5/4/2021	21.08	21.2	20.56	21.18	606152
37	5/3/2021	20.97	21.53	20.89	21.33	734072
38	4/30/2021	21.14	21.175	20.5534	20.62	927372
39	4/29/2021	21.63	22.27	20.53	21.28	1081809
40	4/28/2021	21.74	22.41	21.7	22.18	683381

HPI

Ready Average: 43638.47468 Count: 1008 Sum: 43943944

So, after downloading the historical prices based upon the date range of 06/22/2020 - 06/22/2021, the following spreadsheet is directly exported into Excel. Highlighting Column A automatically brings up Excel's built-in summary statistics dashboard at the very bottom of the screen, and we can instantly see that the count is 1,008, telling us that this column of data contains 1,008 cells. Without the header cell (A1), it's 1,007 dates from (6/22/2020 – 6/22/2021). So, this is our master list of data because it holds the original integrity of the report.

Let's now say, for example, that some of the data in this list was lost and several rows went missing. How would we tackle the problem of finding these missing rows? This is precisely when the VLOOKUP() function comes in handy. Let's look at what happens when we receive this data partially (with only 346 rows of data). Let's find out what happened to the 661 missing rows of data. We know that entire rows of data are missing because if only cells were missing, blanks would show up in the midst of the dataset.

What do we know about the data?

1. Dates in column A are in reverse chronological order.

2. The rest of the columns B-F are quantitative variables tied in with column A.

So, if we have the dates, we can find the corresponding info? Well, almost…

We are going to tell excel to search the data up and down until an exact match is found. VLOOKUP() tells excel to vertically lookup values in one dataset, and find it in another.

	A	B	C	D	E	F
1	Date	Open	High	Low	Close	Volume
2	6/22/2021	21.31	21.44	20.98	21.39	299881
3	6/21/2021	21.72	21.72	21.04	21.53	398548
4	6/18/2021	21.6	21.87	21.37	21.59	612501
5	6/17/2021	21.88	21.98	21.65	21.85	375341
6	6/16/2021	21.71	21.96	21.33	21.94	572213
7	6/15/2021	22.38	22.469	21.82	21.83	316919
8	6/14/2021	22.79	23.09	22.2	22.33	472910
9	6/11/2021	22.59	22.79	22.42	22.74	370353
10	6/10/2021	23.28	23.35	22.49	22.55	874514
11	6/9/2021	23.51	23.54	23.03	23.23	659936
12	6/8/2021	22.15	23.375	21.81	23.23	1592533
13	6/7/2021	21.63	22.11	21.48	22.04	985675
14	6/4/2021	22.03	22.39	21.42	21.43	660975
15	6/3/2021	21.85	22.31	21.14	21.93	1631897
16	6/2/2021	21	22.32	20.64	21.99	1630813
17	6/1/2021	21.63	22.405	21.54	22.27	809740
18	5/28/2021	22.82	23.57	21.525	21.61	1180971
19	5/27/2021	21.62	22.705	21.51	22.59	1615618
20	5/26/2021	21.75	22.12	21.545	21.6	734397
21	5/25/2021	21.95	22.23	21.55	21.61	601958
22	5/24/2021	21.75	22.04	21.4	21.79	479138
23	5/21/2021	21.4	21.5701	21.16	21.38	534789
24	5/20/2021	20.82	21.26	20.57	21.21	703371
25	5/19/2021	20.17	20.82	19.96	20.8	843101
26	5/18/2021	20.84	21.05	20.57	20.57	709025
27	5/17/2021	20.81	20.955	20.52	20.87	413453
28	5/14/2021	20.61	20.74	20.235	20.61	1073757
29	5/13/2021	19.72	20.74	19.65	20.46	796605
30	5/12/2021	20.37	20.61	19.58	19.65	850060
31	5/11/2021	20.39	21.03	20.35	20.57	413008
32	5/10/2021	21.05	21.33	20.89	20.92	408440
33	5/7/2021	20.25	21.13	20.15	20.92	630308
34	5/6/2021	20.76	20.76	20.08	20.21	560763
35	5/5/2021	21.33	21.33	20.62	20.68	507176
36	5/4/2021	21.08	21.2	20.56	21.18	606152
37	5/3/2021	20.97	21.53	20.89	21.33	734072
38	4/30/2021	21.14	21.175	20.5534	20.62	927372

HPI HPI Partial

Ready Average: 44026.51734 Count: 347 Sum: 15233175

1. We're going to go back to the HistoricalPrices (2) workbook and add columns G-K and label them to reference that the data is coming from the HPI Partial worksheet. This is the worksheet that contains only the partial data.

2. We're going to enter the VLOOKUP function in cell G2:

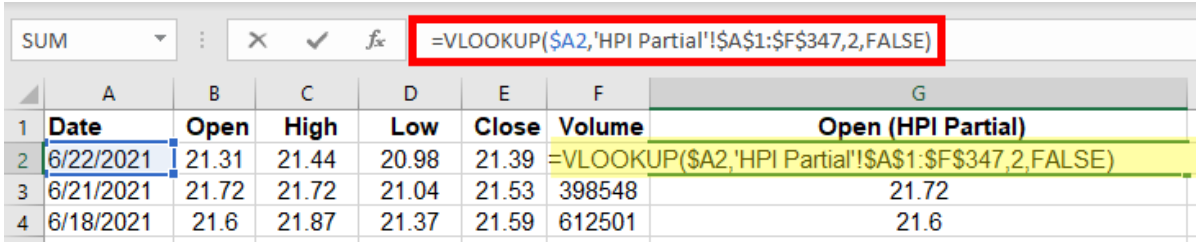
=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

The value we want to look up (find)

The range of data where the lookup value is located

The column # in the range that has the value we are looking for

We want to specify FALSE for an exact match, otherwise, if we omit or put in TRUE, we only get an approximate match



	A	B	C	D	E	F	G
1	Date	Open	High	Low	Close	Volume	Open (HPI Partial)
2	6/22/2021	21.31	21.44	20.98	21.39	=VLOOKUP($A2,'HPI Partial'!$A$1:$F$347,2,FALSE)	
3	6/21/2021	21.72	21.72	21.04	21.53	398548	21.72
4	6/18/2021	21.6	21.87	21.37	21.59	612501	21.6

In cell G2, we are telling Excel to vertically lookup cell A2 (which is the first value on this sheet) in worksheet 'HPI Partial' that spans the range of A$1:F$347 (we want to absolute reference this range with the $ sign in the middle to lock in the **ROWS ONLY**), where the open price is located in column #2, and we want an **EXACT** match!

Closing the parentheses and pressing enter returns the value of the exact match. Let's bring this formula in cell G2 down to the bottom, to populate column G with the full range of data. However, in this process, we find that some of the values in column G are returned as #N/A. This tells us exactly where the data is missing. We can leave the formula as is, but prefer to clean up the #N/A's for aesthetic reasons, and amend the formula to replace these errors as hyphens (-). In so doing, we modify the VLOOKUP() function to the following:

=IFERROR(VLOOKUP(A2,'HPI Partial'!A$1:F$347,2,FALSE), "-")

If there is an error…

Return values as hyphens

Now that the formula is modified to account for #N/A errors, as a shortcut to the process, we apply the same formula across columns G-K, remembering to **ONLY** change the column index numbers (this corresponds to our respective columns of interest within the partial list we are looking up the values from).

Once we run the formula across columns G-L, we can proceed to do a dropdown filter on row 1, choosing column G as a baseline, unselecting all, and re-selecting **ONLY** the hyphens. Once the filter is applied, this shows us (in columns A-F) the exact data that was missing from our partial list. The dashboard at the bottom of the screen also shows us that 661 records were found. In our original problem, we were missing exactly 661 rows of data! We are done!

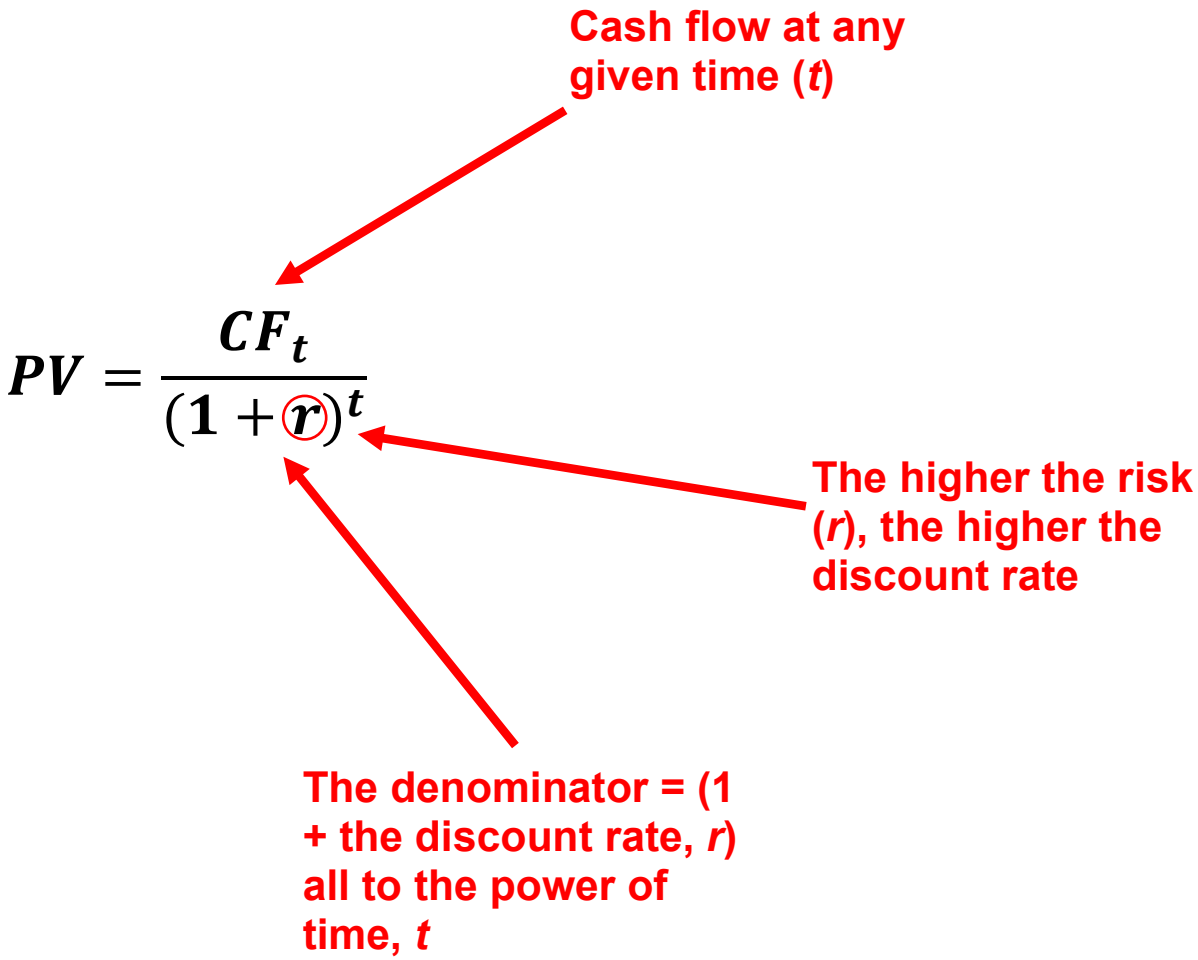
J86 =IFERROR(VLOOKUP($A86,'HPI Partial'!$A$1:$F$347,5,FALSE),"-")

	A	B	C	D	E	F	G
1	Date	Ope	High	Low	Clos	Volun	Open (HPI Partial)
71	3/15/2021	23.45	23.72	22.97	23.46	1097457	-
72	3/12/2021	23.21	23.62	22.91	23.45	928045	-
73	3/11/2021	23	23.43	22.48	23.38	1187558	-
74	3/10/2021	23.35	23.79	22.44	22.81	1367334	-
75	3/9/2021	23.81	24.07	22.94	23.16	1380342	-
76	3/8/2021	24.52	24.6	22.67	23.39	1724647	-
77	3/5/2021	22.5	25.05	21.75	24.59	4085476	-
78	3/4/2021	21.52	21.7272	20.27	20.71	666274	-
79	3/3/2021	21.51	22.05	21.51	21.67	704396	-
80	3/2/2021	21.47	22.015	21.09	21.46	468023	-
81	3/1/2021	21.09	21.46	20.87	21.44	478143	-
82	2/26/2021	20.65	21.18	20.31	20.67	590307	-
83	2/25/2021	20.89	21.28	20.4	20.53	864155	-
84	2/24/2021	20.55	20.9416	20.06	20.84	744177	-
85	2/23/2021	20.64	20.99	20.0355	20.51	707707	-
86	2/22/2021	19.5	20.62	19.425	20.6	1485803	-
87	2/19/2021	20.17	20.17	19.47	19.51	365018	-
88	2/18/2021	19.96	20.52	19.89	19.98	531925	-
89	2/17/2021	20.01	20.4	19.99	20.25	918656	-
90	2/16/2021	20	20.47	19.44	19.85	1446611	-
91	2/12/2021	18.42	18.75	18.29	18.64	311748	-
92	2/11/2021	18.65	18.73	18.17	18.4	441305	-
93	2/10/2021	17.95	18.79	17.66	18.65	486137	-
94	2/9/2021	18.1	18.29	17.41	17.87	540744	-
95	2/8/2021	18.53	18.63	17.96	18.2	539607	-
96	2/5/2021	18.39	18.64	18.16	18.29	332601	-
97	2/4/2021	18.87	18.9	17.96	18.3	690175	-
98	2/3/2021	18.86	19.07	18.352	18.87	524687	-
99	2/2/2021	19.88	19.9738	18.44	18.8	876324	-
100	2/1/2021	19.27	19.85	18.76	19.73	812137	-
101	1/29/2021	19.17	19.74	18.75	18.9	678163	-
102	1/28/2021	19.53	19.96	19.03	19.33	1027666	-
103	1/27/2021	19	20.2066	18.64	19.37	3285053	-
104	1/26/2021	19	19.07	18.1	18.81	1759102	-
105	1/25/2021	18.1	19	18.1	18.73	1040079	-
106	1/22/2021	18.1	18.495	17.92	18.47	673723	-
107	1/21/2021	18.69	18.69	18.13	18.3	445484	-
108	1/20/2021	18.65	18.94	18.44	18.62	573272	-
109	1/19/2021	18.63	19	18.37	18.56	529165	-

HPI | HPI Partial

Ready 661 of 1007 records found

Present Value: the value (today) of a set of anticipated cash flows (future)



Net Present Value: The present value of acquiring the asset – the cost of acquiring the asset (negative cash flow) at $t = 0$.

Usually <0, because it is the cost of acquiring the asset

Cash flow at initial time ($t = 0$)

Cash flow at any given time t

$$NPV = \sum_{t=0}^{N} \frac{CF_t}{(1+r)^t} = CF_0 + \sum_{t=1}^{N} \frac{CF_t}{(1+r)^t}$$

Present Value = PV

Though the concept of ***opportunity cost*** is omnipresent in the study of Microeconomics, ceteris paribus, the exact financial cost of any endeavor must be met with the value(s) of the ensuing alternative(s).

Going further, if we are to look at the value of an investment, we must look at its return and compare it against other feasible investment alternatives. From a purely technical standpoint, adjusting the discount rate *r* will obviously affect the net present value.

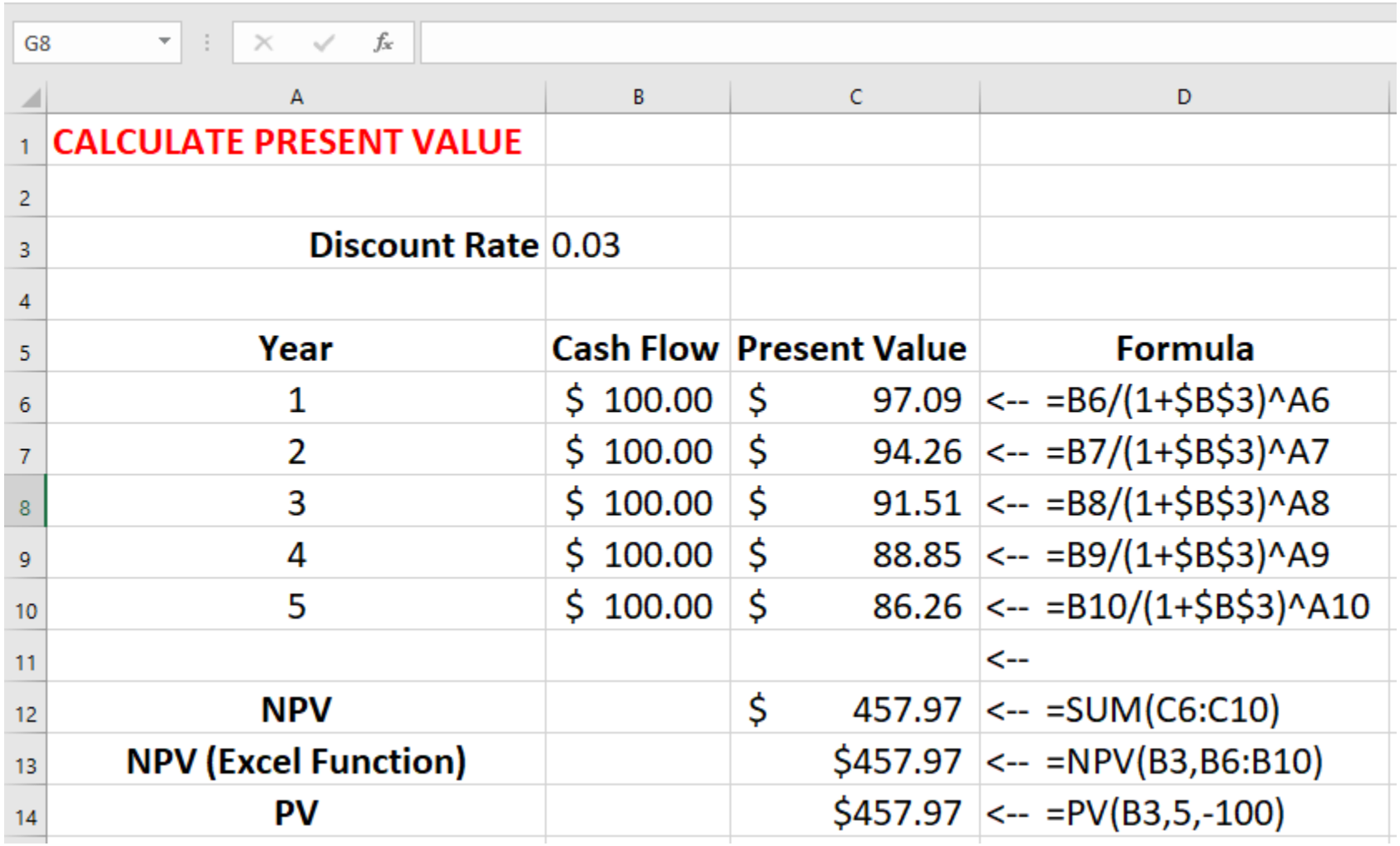
If a disciplined investor was to consider two different investments with an equal amount of risk and forego one investment's rate of return for another, this is the cost of capital of the investment decision, or, once again, opportunity cost.

As we cover valuation, we will see that some returns do not stack up against the company's cost of capital, thereby increasing risk, and ultimately decreasing valuation.

Finance, as opposed to theoretical economics delves deeper into opportunity costs and quantifies these costs as real dollar figures.

In the ensuing excel demo, we will show how NPV is calculated step by step.

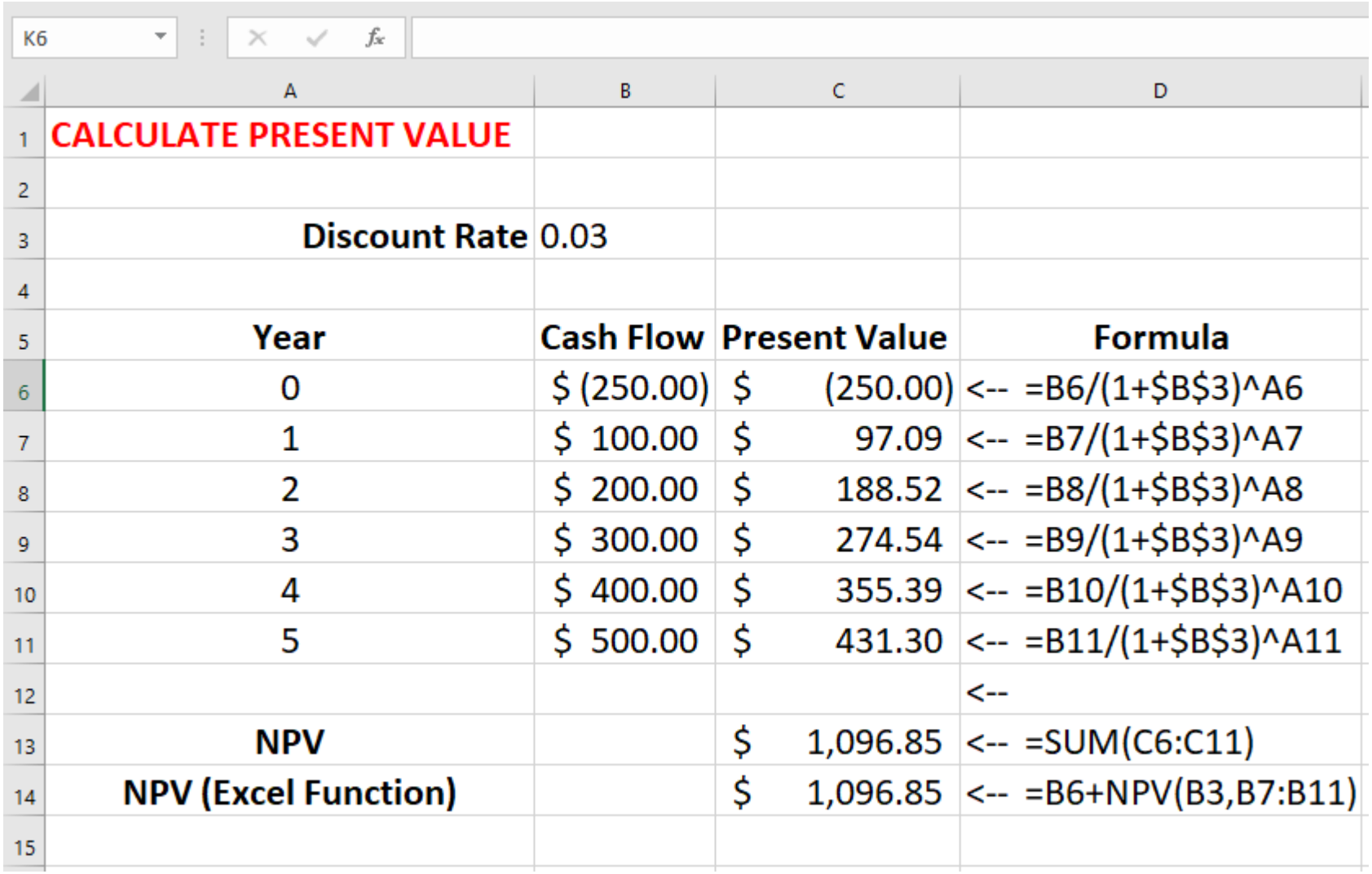
In this example, assuming the cash flow is static at time *t*, we can use Excel's PV function to calculate NPV; however, Excel's PV function CANNOT be used to calculate NPV when the cash flows vary across time *t*.



	A	B	C	D
1	CALCULATE PRESENT VALUE			
2				
3	Discount Rate	0.03		
4				
5	Year	Cash Flow	Present Value	Formula
6	1	$ 100.00	$ 97.09	<-- =B6/(1+$B$3)^A6
7	2	$ 100.00	$ 94.26	<-- =B7/(1+$B$3)^A7
8	3	$ 100.00	$ 91.51	<-- =B8/(1+$B$3)^A8
9	4	$ 100.00	$ 88.85	<-- =B9/(1+$B$3)^A9
10	5	$ 100.00	$ 86.26	<-- =B10/(1+$B$3)^A10
11				<--
12	NPV		$ 457.97	<-- =SUM(C6:C10)
13	NPV (Excel Function)		$457.97	<-- =NPV(B3,B6:B10)
14	PV		$457.97	<-- =PV(B3,5,-100)

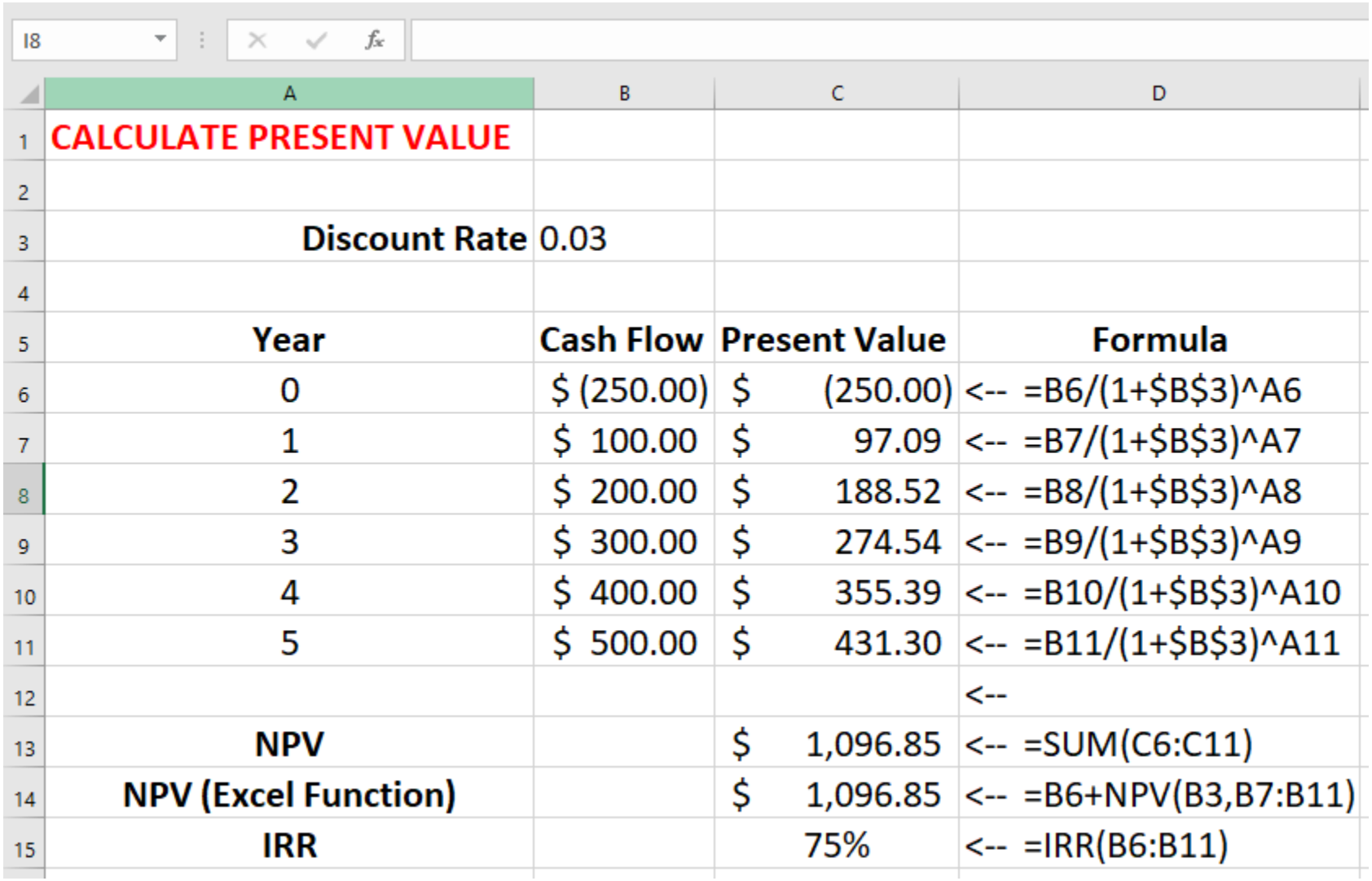
In the example below, an initial investment of \$250.00 is made at $t = 0$. From $t = 1$ through $t = 5$, cash flow increases by \$100.00/ year. We calculate Present Value for each year starting in cell C6, by using the formula

=B6/(1+$B$3)^A6 = $$PV = \frac{CF_t}{(1+r)^t}$$



	A	B	C	D
1	CALCULATE PRESENT VALUE			
2				
3	Discount Rate	0.03		
4				
5	Year	Cash Flow	Present Value	Formula
6	0	$ (250.00)	$ (250.00)	<-- =B6/(1+$B$3)^A6
7	1	$ 100.00	$ 97.09	<-- =B7/(1+$B$3)^A7
8	2	$ 200.00	$ 188.52	<-- =B8/(1+$B$3)^A8
9	3	$ 300.00	$ 274.54	<-- =B9/(1+$B$3)^A9
10	4	$ 400.00	$ 355.39	<-- =B10/(1+$B$3)^A10
11	5	$ 500.00	$ 431.30	<-- =B11/(1+$B$3)^A11
12				<--
13	NPV		$ 1,096.85	<-- =SUM(C6:C11)
14	NPV (Excel Function)		$ 1,096.85	<-- =B6+NPV(B3,B7:B11)
15				

In this example, we calculate the IRR by using Excel's built-in IRR function =IRR(values, [guess]). IRR (the internal rate of return) is the rare of return where NPV = 0. The higher the IRR, the healthier the investment.



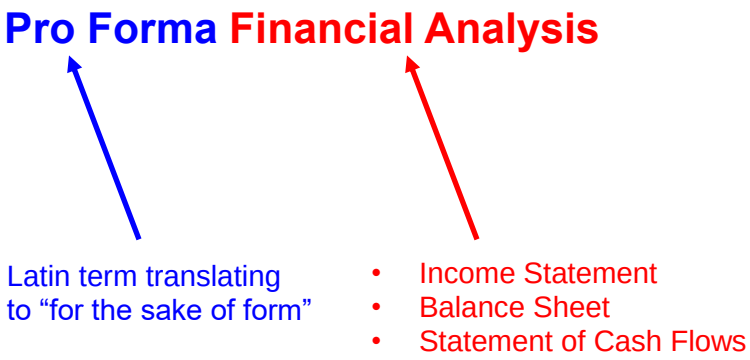
	A	B	C	D
1	CALCULATE PRESENT VALUE			
2				
3	Discount Rate	0.03		
4				
5	Year	Cash Flow	Present Value	Formula
6	0	$ (250.00)	$ (250.00)	<-- =B6/(1+$B$3)^A6
7	1	$ 100.00	$ 97.09	<-- =B7/(1+$B$3)^A7
8	2	$ 200.00	$ 188.52	<-- =B8/(1+$B$3)^A8
9	3	$ 300.00	$ 274.54	<-- =B9/(1+$B$3)^A9
10	4	$ 400.00	$ 355.39	<-- =B10/(1+$B$3)^A10
11	5	$ 500.00	$ 431.30	<-- =B11/(1+$B$3)^A11
12				<--
13	NPV		$ 1,096.85	<-- =SUM(C6:C11)
14	NPV (Excel Function)		$ 1,096.85	<-- =B6+NPV(B3,B7:B11)
15	IRR		75%	<-- =IRR(B6:B11)

The Wall Street Journal is an excellent resource for data mining, albeit not all reports are downloadable into excel (only the Historical Prices are).

For this reason, we must copy and paste the income statement, balance sheet, and statement of cash flow separately into Excel in order to build an all-encompassing pro forma statement.

However, in so doing, we build an automated process (macro) that takes the pasted data and arranges it in such a way that helps our efforts and is aesthetically sound.

What is a pro forma statement?



As we discussed in our introduction, we can obtain the financials of any publicly traded company via:

- Yahoo Finance
- The Wall Street Journal
- The investor relations section of the corporation’s website

Piecing together a pro forma from the investor relations section of the company’s website can prove to be quite cumbersome.

- Some companies don’t have exportable excel files
- Makes the workload more tedious and time consuming
- It confuses certain line items that are available in other reliable sources

Income Statement

- A company's performance measured by revenues and expenses
- In Economics:

  Profit = $\pi = \mathrm{TR} - \mathrm{TC}$.
- In Finance/ Accounting:

  Profit = Revenue – Cost
- Operating Income (or Loss) = Total Revenue – Total Operating Expenses
- EBIT = Earnings Before Interest and Taxes
- Net Income from Continuing Operations =

  = Total Other Income (and/or Expenses) Net + EBIT – Income Tax Expense

Balance Sheet

- **Assets = Liabilities + Shareholder's Equity**

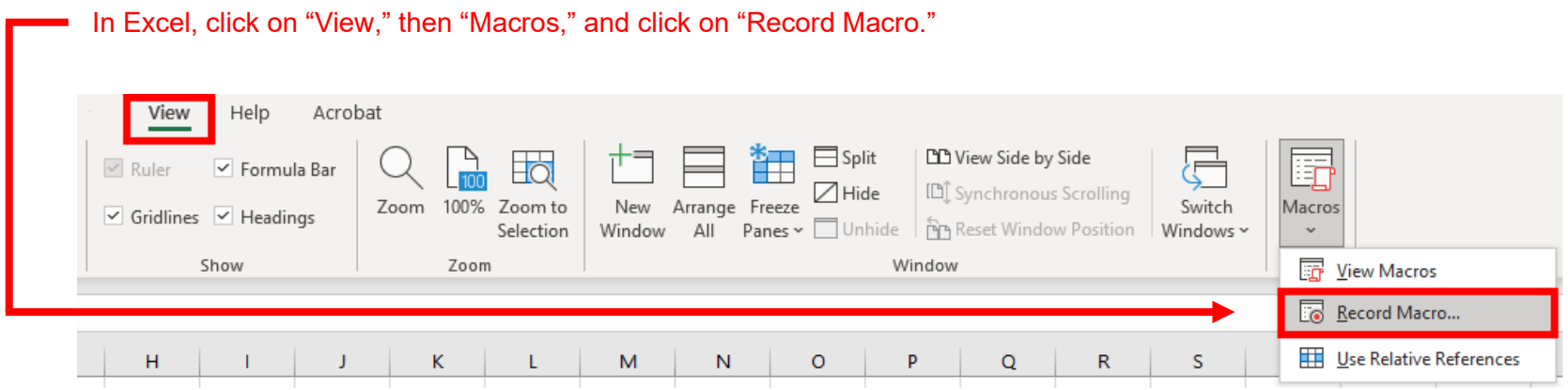
Cash Flow Statement:

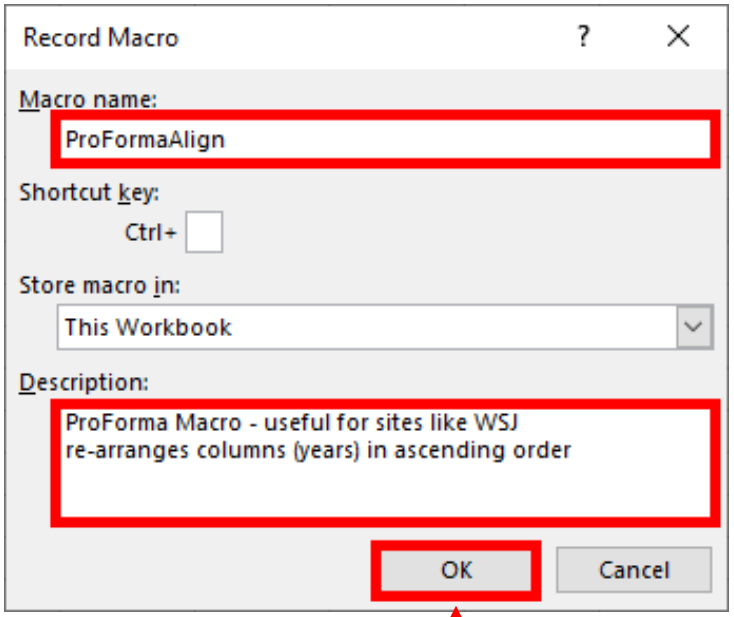
- Cash from Operating Activities
- Cash from Investing Activities
- Cash from Financing Activities
- We are going to compute Free Cash Flow (FCF) and use the discounted cash flow model (DCF) to valuate a company.
- Before we compute the FCF, let's remember that financing activities of the cash flow statement can be disregarded.
- FCF = Operating activities – Capital Expenditures (CAPEX)

Recording Our First Macro

We will record a macro (automated process) that will create a script on the back end (in VBA).

1. In Excel, click on “View,” then “Macros,” and click on “Record Macro.”





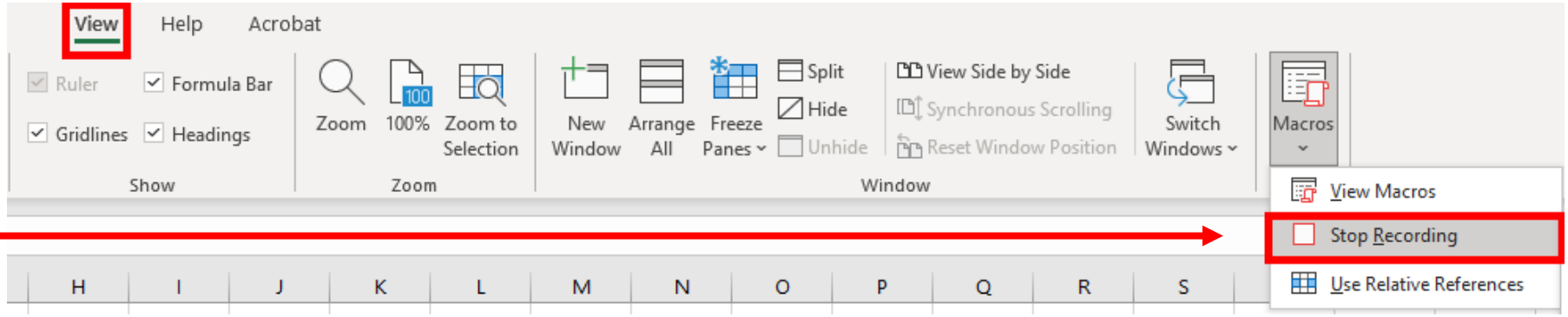
3 Ensure that you name your macro such that it **DOES NOT** contain any spaces.

2 Make sure that you have your steps mapped out such that you do not make any mistakes in the process (i.e., accidentally click or type somewhere that was not intended).

4 Write-up an optional description

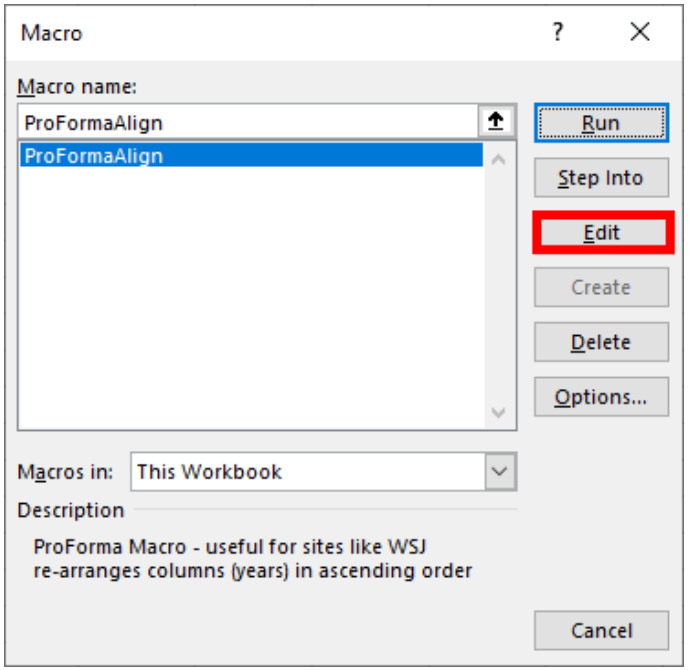
5 Click “OK”

6. Once you are finished going through the process of recording a macro, go back to “View,” “Macros,” and ensure to click on “Stop Recording.”



7. To view the resulting script, go back to the process in the diagram above.

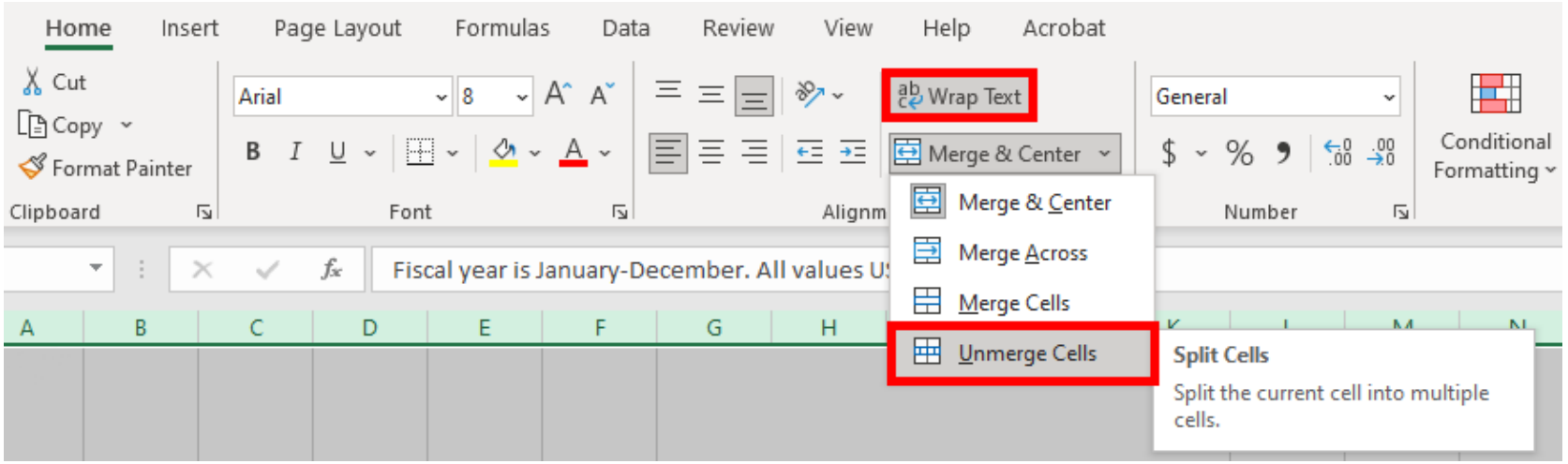
8. The resulting dialog box pops up; click “Edit.”



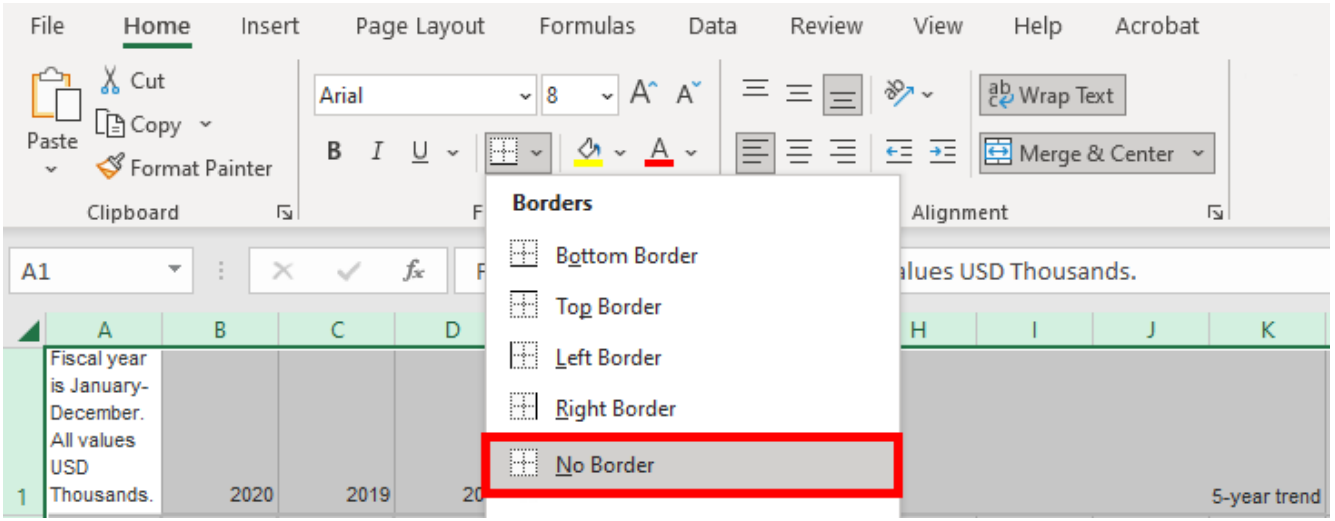
Let's access the income statement for IMAX on the Wall Street Journal website and copy and paste it into a blank workbook in excel:

https://www.wsj.com/market-data/quotes/IMAX/financials/annual/income-statement

9. Let's name our macro: "WSJProForma."
10. Let's add the following description: "ProForma Macro – useful for sites like WSJ re-arranges columns (years) in ascending order"
11. Select all data in range: (column A – column K).
12. Unselect "Wrap Text."
13. With the data still selected, click on "Unmerge Cells."



14. Get rid of the border surrounding the data set (you want to ensure to remove all borders in columns A-K).



15. Insert a blank column in front of column B (where the header is marked as 2020).

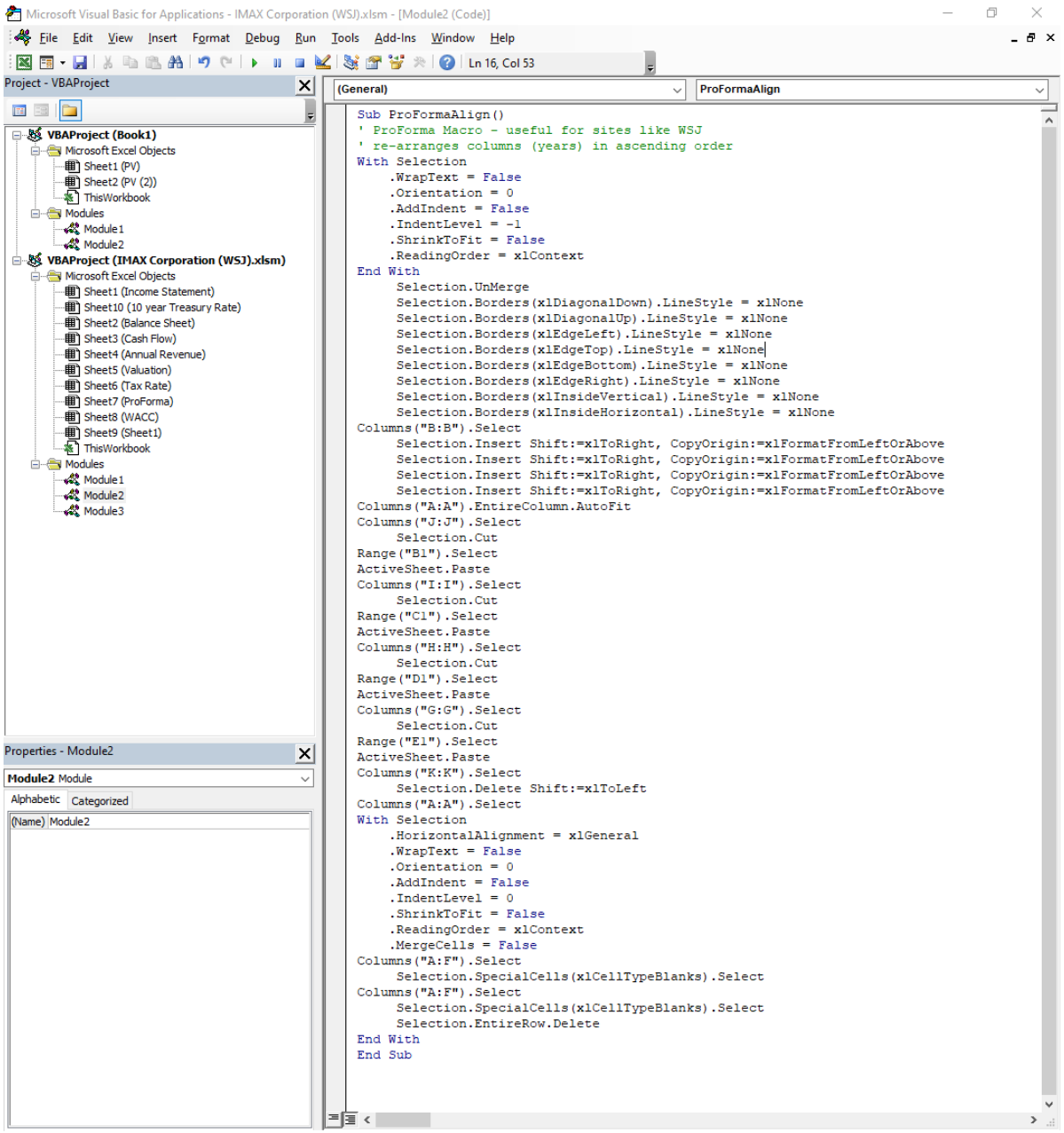
16. Repeat step 7 (above) 4 times until 4 blank columns are created in front of 2020. You can do this by pressing down ctrl + y on your keyboard 3 more times as a shortcut. The reason for creating 4 more columns to the front of 2020 is so that we can proceed to rearrange the years in chronological order.

17. Highlight column J (where the header is marked as year 2016), copy the data, and paste the data into column A. Do the same for columns I – F, until all the dates are rearranged in chronological order.

18. If there is any data in column K: such as “5 year-trend, etc.,” ensure to delete it. You can do this by deleting column K in its entirety. Data in column K is what was left over from the copying and pasting of original data.

19. Go back to Column A, highlight it, and align it to the left.

20. This concludes the steps for this macro. Ensure to go back to the View tab on top of the Excel menu, go to “Macros,” and click on “Stop Recording.”



The script for this macro should look like this:

```
Sub ProFormaAlign()
' ProForma Macro - useful for sites like WSJ
' re-arranges columns (years) in ascending order
With Selection
    .WrapText = False
    .Orientation = 0
    .AddIndent = False
    .IndentLevel = -1
    .ShrinkToFit = False
    .ReadingOrder = xlContext
End With
     Selection.UnMerge
     Selection.Borders(xlDiagonalDown).LineStyle = xlNone
     Selection.Borders(xlDiagonalUp).LineStyle = xlNone
     Selection.Borders(xlEdgeLeft).LineStyle = xlNone
     Selection.Borders(xlEdgeTop).LineStyle = xlNone
     Selection.Borders(xlEdgeBottom).LineStyle = xlNone
     Selection.Borders(xlEdgeRight).LineStyle = xlNone
     Selection.Borders(xlInsideVertical).LineStyle = xlNone
     Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
Columns("B:B").Select
     Selection.Insert Shift:=xlToRight, CopyOrigin:=xlFormatFromLeftOrAbove
     Selection.Insert Shift:=xlToRight, CopyOrigin:=xlFormatFromLeftOrAbove
     Selection.Insert Shift:=xlToRight, CopyOrigin:=xlFormatFromLeftOrAbove
     Selection.Insert Shift:=xlToRight, CopyOrigin:=xlFormatFromLeftOrAbove
Columns("A:A").EntireColumn.AutoFit
Columns("J:J").Select
     Selection.Cut
Range("B1").Select
ActiveSheet.Paste
Columns("I:I").Select
     Selection.Cut
Range("C1").Select
ActiveSheet.Paste
Columns("H:H").Select
     Selection.Cut
Range("D1").Select
ActiveSheet.Paste
Columns("G:G").Select
     Selection.Cut
Range("E1").Select
ActiveSheet.Paste
Columns("K:K").Select
     Selection.Delete Shift:=xlToLeft
Columns("A:A").Select
With Selection
    .HorizontalAlignment = xlGeneral
    .WrapText = False
    .Orientation = 0
    .AddIndent = False
    .IndentLevel = 0
    .ShrinkToFit = False
    .ReadingOrder = xlContext
    .MergeCells = False
Columns("A:F").Select
     Selection.SpecialCells(xlCellTypeBlanks).Select
Columns("A:F").Select
     Selection.SpecialCells(xlCellTypeBlanks).Select
     Selection.EntireRow.Delete
End With
End Sub
```

	A	B	C	D	E	F	G	H	I	
1	**Fiscal year is January-December. All values USD Thousands.**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**Formula**
2	**Income Statement**									
3	Sales/Revenue	287,937.00	290,541.00	373,805.00	377,334.00	380,767.00	374,401.00	395,664.00	137,003.00	
4	Sales Growth	-	0.90%	28.66%	0.94%	0.91%	-1.67%	5.68%	-65.37%	
5	Cost of Goods Sold (COGS) incl. D&A	124,952.00	118,577.00	156,377.00	176,735.00	198,540.00	170,617.00	184,247.00	119,057.00	
6	COGS excluding D&A	88,267.00	85,647.00	114,590.00	130,782.00	132,295.00	114,286.00	121,269.00	66,353.00	
7	Depreciation & Amortization Expense	36,685.00	32,930.00	41,787.00	45,953.00	66,245.00	56,331.00	62,978.00	52,704.00	
8	Depreciation	16,239.00	17,764.00	21,361.00	25,532.00	29,915.00	33,903.00	35,630.00	36,155.00	
9	Amortization of Intangibles	2,854.00	2,988.00	3,285.00	3,235.00	4,319.00	5,507.00	6,290.00	6,565.00	
10	Amortization of Deferred Charges	17,592.00	12,178.00	17,141.00	17,186.00	32,011.00	16,921.00	21,058.00	9,984.00	
11	COGS Growth	-	-5.10%	31.88%	13.02%	12.34%	-14.06%	7.99%	-35.38%	<-- =(I5-H5)/H5
12	Gross Income	162,985.00	171,964.00	217,428.00	200,599.00	182,227.00	203,784.00	211,417.00	17,946.00	
13	Gross Income Growth	-	5.51%	26.44%	-7.74%	-9.16%	11.83%	3.75%	-91.51%	
14	Gross Profit Margin	-	-	-	-	47.86%	-	-	13.10%	
15	SG&A Expense	98,131.00	106,898.00	121,564.00	134,342.00	135,656.00	133,038.00	129,034.00	132,933.00	
16	Research & Development	14,771.00	16,096.00	12,730.00	16,315.00	20,855.00	13,728.00	5,203.00	5,618.00	
17	Other SG&A	83,360.00	90,802.00	108,834.00	118,027.00	114,801.00	119,310.00	123,831.00	127,315.00	
18	SGA Growth	-	8.93%	13.72%	10.51%	0.98%	-1.93%	-3.01%	3.02%	
19	EBIT	64,854.00	65,066.00	95,864.00	66,257.00	46,571.00	70,746.00	82,383.00	-114,987.00	
20	Unusual Expense	-1,258.00	4,510.00	2,476.00	4,111.00	17,399.00	24,273.00	3,567.00	9,137.00	
21	Non Operating Income/Expense	-1,012.00	-2,486.00	-5,517.00	-3,978.00	1,754.00	-1,796.00	-2,792.00	-378.00	
22	Non-Operating Interest Income	55	405	968	1,490.00	1,027.00	1,844.00	2,105.00	2,388.00	
23	Interest Expense	1,345.00	1,124.00	1,761.00	1,805.00	1,942.00	2,916.00	2,793.00	7,010.00	
24	Interest Expense Growth	-	-16.43%	56.67%	2.50%	7.59%	50.15%	-4.22%	150.98%	
25	Gross Interest Expense	1,345.00	1,124.00	1,761.00	1,805.00	1,942.00	2,916.00	2,793.00	7,010.00	
26	Pretax Income	63,810.00	57,351.00	87,078.00	57,853.00	30,011.00	43,605.00	75,336.00	-129,124.00	
27	Pretax Income Growth	-	-10.12%	51.83%	-33.56%	-48.13%	45.30%	72.77%	-271.40%	
28	Pretax Margin	-	-	-	-	7.88%	-	-	-94.25%	
29	Income Tax	16,629.00	14,466.00	20,052.00	16,212.00	16,790.00	9,518.00	16,768.00	26,504.00	
30	Income Tax - Current Domestic	1,068.00	3,495.00	10,862.00	1,396.00	6,898.00	4,893.00	-2,369.00	-555.00	
31	Income Tax - Current Foreign	2,662.00	10,344.00	10,526.00	9,873.00	13,909.00	11,548.00	12,375.00	3,441.00	
32	Income Tax - Deferred Domestic	13,198.00	-433	518	3,583.00	-8,748.00	-5,993.00	3,913.00	10,801.00	
33	Income Tax - Deferred Foreign	-299	1,060.00	-1,854.00	1,360.00	4,731.00	-930.00	2,849.00	12,817.00	
34	Equity in Affiliates	-2,757.00	-1,071.00	-2,402.00	-2,321.00	-703	-492	3	-1858	
35	Other After Tax Income (Expense)	-	-426	-769	-	-	-	-		
36	Consolidated Net Income	44,424.00	41,388.00	63,855.00	39,320.00	12,518.00	33,595.00	58,571.00	-157,486.00	
37	Minority Interest Expense	-	2,433.00	8,780.00	10,532.00	10,174.00	10,751.00	11,705.00	-13,711.00	
38	Net Income	44,424.00	38,955.00	55,075.00	28,788.00	2,344.00	22,844.00	46,866.00	-143,775.00	
39	Net Income Growth	-	-12.31%	41.38%	-47.73%	-91.86%	874.57%	105.16%	-406.78%	<-- =(I38-H38)/H38
40	Net Margin	-	-	-	-	0.62%	-	-	-104.94%	
41	Extraordinaries & Discontinued Operations	-309	355	-	-	-	-	-	-	
42	Discontinued Operations	-309	355	-	-	-	-	-	-	
43	Net Income After Extraordinaries	44,733.00	38,600.00	55,075.00	28,788.00	2,344.00	22,844.00	46,866.00	-143,775.00	
44	Net Income Available to Common	44,115.00	39,310.00	55,075.00	28,788.00	2,344.00	22,844.00	46,866.00	-143,775.00	
45	EPS (Basic)	0.66	0.58	0.79	0.43	0.04	0.36	0.76	-2.43	
46	EPS (Basic) Growth	-	-12.85%	37.34%	-45.57%	-90.70%	805.50%	111.04%	-417.52%	
47	Basic Shares Outstanding	67,151.00	68,346.00	69,526.00	67,575.00	65,380.00	63,075.00	61,310.00	59,237.00	
48	EPS (Diluted)	0.64	0.56	0.78	0.42	0.04	0.36	0.76	-2.43	
49	EPS (Diluted) Growth	-	-11.91%	37.53%	-45.59%	-91.52%	910.55%	110.89%	-418.44%	
50	Diluted Shares Outstanding	68,961.00	69,754.00	71,058.00	68,263.00	65,540.00	63,207.00	61,489.00	59,237.00	
51	EBITDA	101,539.00	97,996.00	137,651.00	112,210.00	112,816.00	127,077.00	145,361.00	-62,283.00	
52	EBITDA Growth	-	-3.49%	40.47%	-18.48%	0.54%	12.64%	14.39%	-142.85%	
53	EBITDA Margin	-	-	-	-	29.63%	-	-	-45.46%	
54	EBIT	64,854.00	65,066.00	95,864.00	66,257.00	46,571.00	70,746.00	82,383.00	-114,987.00	
55	**Balance Sheet**									
56	Assets									
57	Fiscal year is January-December. All values USD Thousands.	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	
58	Cash & Short Term Investments	29,546.00	106,503.00	317,449.00	204,759.00	158,725.00	141,590.00	109,484.00	317,379.00	
59	Cash Only	29,546.00	106,503.00	317,449.00	204,759.00	158,725.00	141,590.00	109,484.00	317,379.00	
60	Cash & Short Term Investments Growth	-	260.47%	198.07%	-35.50%	-22.48%	-10.80%	-22.68%	189.89%	
61	Cash & ST Investments / Total Assets	6.14%	17.14%	34.10%	23.88%	18.32%	16.21%	12.31%	31.81%	
62	Total Accounts Receivable	90,409.00	91,595.00	117,049.00	118,329.00	156,001.00	120,220.00	127,108.00	91,237.00	
63	Accounts Receivables, Net	73,074.00	76,051.00	97,981.00	96,349.00	130,546.00	120,220.00	127,108.00	91,237.00	
64	Accounts Receivables, Gross	73,961.00	76,998.00	99,695.00	97,599.00	132,513.00	123,250.00	132,246.00	105,532.00	
65	Bad Debt/Doubtful Accounts	-887	-947	-1,714.00	-1,250.00	-1,967.00	-3,030.00	-5,138.00	-14,295.00	
66	Other Receivables	17,335.00	15,544.00	19,068.00	21,980.00	25,455.00	-	-	-	
67	Accounts Receivable Growth	-	1.31%	27.79%	1.09%	31.84%	-22.94%	5.73%	-28.22%	
68	Accounts Receivable Turnover	3.18	3.17	3.19	3.19	2.44	3.11	3.11	1.5	
69	Inventories	9,825.00	17,063.00	38,753.00	42,121.00	30,788.00	44,560.00	42,989.00	39,580.00	

70	Finished Goods	5,004.00	6,705.00	10,375.00	10,303.00	6,981.00	10,122.00	11,843.00	6,470.00	
71	Work in Progress	500	1,211.00	2,628.00	3,818.00	2,601.00	4,733.00	4,608.00	3,014.00	
72	Raw Materials	4,321.00	9,147.00	25,750.00	28,000.00	21,206.00	29,705.00	26,538.00	30,096.00	
73	Other Current Assets	3,602.00	4,946.00	6,498.00	6,626.00	7,549.00	10,294.00	10,237.00	10,420.00	
74	Prepaid Expenses	3,602.00	4,946.00	6,498.00	6,626.00	7,549.00	10,294.00	10,237.00	10,420.00	
75	Total Current Assets	133,382.00	220,107.00	479,749.00	371,835.00	353,063.00	316,664.00	289,818.00	458,616.00	
76	Net Property, Plant & Equipment	132,847.00	183,424.00	218,267.00	245,415.00	276,781.00	280,658.00	306,849.00	277,397.00	
77	Property, Plant & Equipment - Gross	225,337.00	290,436.00	328,244.00	378,203.00	427,511.00	451,979.00	497,654.00	501,384.00	
78	Buildings	15,832.00	16,584.00	67,150.00	69,861.00	74,478.00	77,468.00	80,850.00	80,875.00	
79	Land & Improvements	1,593.00	8,180.00	8,203.00	8,203.00	8,203.00	8,203.00	8,203.00	8,203.00	
80	Construction in Progress	8,055.00	43,250.00	9,616.00	18,315.00	23,398.00	24,327.00	14,483.00	5,660.00	
81	Leases	-	-	-	-	-	-	17147	15553	
82	Leased Property	162,783.00	184,489.00	205,367.00	230,629.00	270,016.00	292,146.00	327,684.00	342,670.00	
83	Other Property, Plant & Equipment	37,074.00	37,933.00	37,908.00	51,195.00	51,416.00	49,835.00	49,287.00	48,423.00	
84	Accumulated Depreciation	92,490.00	107,012.00	109,977.00	132,788.00	150,730.00	171,321.00	190,805.00	223,987.00	
85	Buildings	10,410.00	10,998.00	12,679.00	14,877.00	17,364.00	20,012.00	22,931.00	25,921.00	
86	Leases	54,273.00	66,736.00	77,936.00	92,950.00	107,861.00	124,112.00	137,978.00	163,300.00	
87	Leased Property	54,273.00	66,736.00	77,936.00	92,950.00	107,861.00	124,112.00	137,978.00	163,300.00	
88	Other Property, Plant & Equipment	27,807.00	29,278.00	19,362.00	24,961.00	25,505.00	27,197.00	29,011.00	33,124.00	
89	Total Investments and Advances	5,784.00	3,384.00	2,198.00	3,869.00	11,358.00	5,244.00	19,742.00	16,612.00	
90	LT Investment - Affiliate Companies	5,784.00	3,384.00	2,198.00	1,389.00	3,484.00	-	15,685.00	13,633.00	
91	Other Long-Term Investments	-	-	-	2,480.00	7,874.00	5,244.00	4,057.00	2,979.00	
92	Long-Term Note Receivable	89,775.00	90,292.00	101,005.00	102,853.00	106,747.00	136,506.00	140,483.00	137,399.00	
93	Intangible Assets	66,772.00	66,578.00	67,977.00	69,443.00	70,238.00	73,122.00	69,374.00	65,272.00	
94	Net Goodwill	39,027.00	39,027.00	39,027.00	39,027.00	39,027.00	39,027.00	39,027.00	39,027.00	
95	Net Other Intangibles	27,745.00	27,551.00	28,950.00	30,416.00	31,211.00	34,095.00	30,347.00	26,245.00	
96	Other Assets	28,326.00	34,690.00	36,058.00	43,140.00	17,717.00	30,142.00	38,898.00	24,471.00	
97	Deferred Charges	9,294.00	25,457.00	26,273.00	32,963.00	6,208.00	16,367.00	17,921.00	5,777.00	
98	Tangible Other Assets	19,032.00	9,233.00	9,785.00	10,177.00	11,509.00	13,775.00	20,977.00	18,694.00	
99	Total Assets	481,145.00	621,533.00	931,020.00	857,334.00	866,612.00	873,600.00	889,069.00	997,750.00	
100	Assets - Total - Growth	-	29.18%	49.79%	-7.91%	1.08%	0.81%	1.77%	12.22%	
101	Asset Turnover	-	-	-	-	0.44	-	-	0.15	
102	Return On Average Assets	-	-	-	-	0.27%	-	-	-15.24%	
103	All values USD Thousands.	2013	2014	2015	2016	2017	2018	2019	2020	
104	ST Debt & Current Portion LT Debt	-	-	2,000.00	-	2,000.00	-	18,677.00	16,634.00	
105	Short Term Debt	-	-	-	-	-	-	18677	16634	
106	Current Portion of Long Term Debt	-	-	2,000.00	-	2,000.00	-	-	-	
107	Accounts Payable	19,396.00	26,145.00	23,455.00	19,990.00	24,235.00	32,057.00	20,414.00	20,837.00	
108	Accounts Payable Growth	-	34.80%	-10.29%	-14.77%	21.24%	32.28%	-36.32%	2.07%	
109	Other Current Liabilities	142,164.00	163,991.00	200,741.00	183,474.00	213,410.00	204,433.00	188,654.00	170,702.00	
110	Accrued Payroll	1,600.00	101.5	1,800.00	-	-	-	-	-	
111	Miscellaneous Current Liabilities	140,564.00	163,889.50	198,941.00	183,474.00	213,410.00	204,433.00	188,654.00	170,702.00	
112	Total Current Liabilities	161,560.00	190,136.00	226,196.00	203,464.00	239,645.00	236,490.00	227,745.00	208,173.00	
113	Current Ratio	0.83	1.16	2.12	1.83	1.47	1.34	1.27	2.2	
114	Quick Ratio	0.76	1.07	1.95	1.62	1.34	1.15	1.08	2.01	
115	Cash Ratio	0.18	0.56	1.4	1.01	0.66	0.6	0.48	1.52	
116	Long-Term Debt	-	4,710.00	27,667.00	27,316.00	23,357.00	37,753.00	18,229.00	305,676.00	
117	Long-Term Debt excl. Capitalized Leases	-	4,710.00	27,667.00	27,316.00	23,357.00	37,753.00	18,229.00	305,676.00	
118	Non-Convertible Debt	-	4,710.00	27,667.00	27,316.00	23,357.00	37,753.00	18,229.00	305,676.00	
119	Deferred Taxes	-24,259.00	-23,058.00	-25,766.00	-20,779.00	-30,708.00	-31,264.00	-23,905.00	1,151.00	
120	Deferred Taxes - Credit	-	-	-	-	-	-	-	19134	
121	Deferred Taxes - Debit	24,259.00	23,058.00	25,766.00	20,779.00	30,708.00	31,264.00	23,905.00	17,983.00	
122	Total Liabilities	161,560.00	194,846.00	253,863.00	230,780.00	263,002.00	274,243.00	245,974.00	532,983.00	
123	Total Liabilities / Total Assets	33.58%	31.35%	27.27%	26.92%	30.35%	31.39%	27.67%	53.42%	
124	Common Equity (Total)	319,585.00	382,775.00	623,891.00	562,012.00	527,746.00	512,161.00	547,694.00	385,489.00	
125	Common Stock Par/Carry Value	327,313.00	344,862.00	448,310.00	439,213.00	445,797.00	422,455.00	423,386.00	407,031.00	
126	Retained Earnings	-43,051.00	-6,259.00	19,930.00	-47,366.00	-87,592.00	-85,385.00	-40,253.00	-202,849.00	
127	Other Appropriated Reserves	35,323.00	44,172.00	155,651.00	172,104.00	174,674.00	176,007.00	168,599.00	181,318.00	
128	Treasury Stock	-	-	-	-1,939.00	-5,133.00	-916.00	-4,038.00	-11.00	
129	Common Equity / Total Assets	66.42%	61.59%	67.01%	65.55%	60.90%	58.63%	61.60%	38.64%	
130	Total Shareholders' Equity	319,585.00	382,775.00	623,891.00	562,012.00	527,746.00	512,161.00	547,694.00	385,489.00	
131	Total Shareholders' Equity / Total Assets	66.42%	61.59%	67.01%	65.55%	60.90%	58.63%	61.60%	38.64%	
132	Accumulated Minority Interest	-	43,912.00	53,266.00	64,542.00	75,864.00	87,196.00	95,401.00	79,278.00	
133	Total Equity	319,585.00	426,687.00	677,157.00	626,554.00	603,610.00	599,357.00	643,095.00	464,767.00	
134	Liabilities & Shareholders' Equity	481,145.00	621,533.00	931,020.00	857,334.00	866,612.00	873,600.00	889,069.00	997,750.00	<– =I122+I133
135	**Cash Flow**									
136	Fiscal year is January-December. All values USD Thousands.	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	
137	Net Income before Extraordinaries	44,115.00	42,169.00	64,624.00	39,320.00	12,518.00	33,595.00	58,571.00	-157,486.00	
138	Net Income Growth	-	-4.41%	53.25%	-39.16%	-68.16%	168.37%	74.34%	-368.88%	
139	Depreciation, Depletion & Amortization	36,685.00	32,930.00	40,887.00	45,953.00	66,245.00	56,331.00	62,978.00	52,704.00	
140	Depreciation and Depletion	16,239.00	17,764.00	21,361.00	25,532.00	29,915.00	33,903.00	35,630.00	36,155.00	
141	Amortization of Intangible Assets	20,446.00	15,166.00	19,526.00	20,421.00	36,330.00	22,428.00	27,348.00	16,549.00	

142	Deferred Taxes & Investment Tax Credit	12,899.00	627	-1,336.00	4,940.00	-4,017.00	-6,923.00	6,762.00	23,618.00	
143	Deferred Taxes	12,899.00	627	-1,336.00	4,940.00	-4,017.00	-6,923.00	6,762.00	23,618.00	
144	Other Funds	-4,911.00	4,822.00	16,088.00	18,533.00	19,761.00	14,522.00	7,994.00	61,861.00	
145	Funds from Operations	88,788.00	80,548.00	120,263.00	108,746.00	94,507.00	97,525.00	136,305.00	-19,303.00	
146	Changes in Working Capital	-33,755.00	6,057.00	-36,578.00	-30,874.00	-9,141.00	12,447.00	-45,929.00	-3,708.00	
147	Receivables	-31,032.00	-4,358.00	-36,149.00	-5,909.00	-45,060.00	35,267.00	-12,997.00	20,668.00	
148	Inventories	1,884.00	-7,603.00	-21,070.00	-3,825.00	10,832.00	-14,022.00	1,942.00	1,637.00	
149	Accounts Payable	7,238.00	-5,186.00	9,183.00	-3,360.00	4,204.00	7,749.00	-11,774.00	414.00	
150	Other Accruals	-1,289.00	5,702.00	-2,577.00	3,914.00	-642	-3266	-8505	-6399	
151	Other Assets/Liabilities	-10,556.00	17,502.00	14,035.00	-21,694.00	21,525.00	-13,281.00	-14,595.00	-20,028.00	
152	Net Operating Cash Flow	55,033.00	86,605.00	83,685.00	77,872.00	85,366.00	109,972.00	90,376.00	-23,011.00	
153	Net Operating Cash Flow Growth	-	57.37%	-3.37%	-6.95%	9.62%	28.82%	-17.82%	-125.46%	
154	Net Operating Cash Flow / Sales	19.11%	29.81%	22.39%	20.64%	22.42%	29.37%	22.84%	-16.80%	
155	All values USD Thousands.	2013	2014	2015	2016	2017	2018	2019	2020	
156	Capital Expenditures	-15,502.00	-43,022.00	-48,322.00	-20,065.00	-29,357.00	-22,064.00	-10,352.00	-2,601.00	
157	Capital Expenditures (Fixed Assets)	-13,016.00	-40,104.00	-43,257.00	-15,278.00	-24,143.00	-13,368.00	-7,421.00	-697.00	
158	Capital Expenditures (Other Assets)	-2,486.00	-2,918.00	-5,065.00	-4,787.00	-5,214.00	-8,696.00	-2,931.00	-1,904.00	
159	Capital Expenditures Growth	-	-177.53%	-12.32%	58.48%	-46.31%	24.84%	53.08%	74.87%	
160	Capital Expenditures / Sales	-5.38%	-14.81%	-12.93%	-5.32%	-7.71%	-5.89%	-2.62%	-1.90%	
161	Net Assets from Acquisitions	-4,000.00	-2,500.00	-2,000.00	-1,911.00	-1,606.00	-	-	-	
162	Sale of Fixed Assets & Businesses	-	507	-	-	-	-34810	-55642	-6654	
163	Purchase/Sale of Investments	-22,775.00	-16,838.00	-28,474.00	-42,910.00	-42,634.00	-34,810.00	-55,642.00	-6,654.00	
164	Purchase of Investments	-22,775.00	-16,838.00	-28,474.00	-42,910.00	-42,634.00	-34,810.00	-55,642.00	-6,654.00	
165	Net Investing Cash Flow	-42,277.00	-61,853.00	-78,796.00	-64,886.00	-73,597.00	-56,874.00	-65,994.00	-9,255.00	
166	Net Investing Cash Flow Growth	-	-46.30%	-27.39%	17.65%	-13.43%	22.72%	-16.04%	85.98%	
167	Net Investing Cash Flow / Sales	-14.68%	-21.29%	-21.08%	-17.20%	-19.33%	-15.19%	-16.68%	-6.76%	
168	All values USD Thousands.	2013	2014	2015	2016	2017	2018	2019	2020	
169	Change in Capital Stock	8,768.00	48,766.00	201,302.00	-102,922.00	-34,605.00	-74,915.00	-32,144.00	-41,244.00	
170	Repurchase of Common & Preferred Stk.	-	-3,063.00	-34,276.00	-118,514.00	-51,273.00	-83,728.00	-35,654.00	-41,244.00	
171	Sale of Common & Preferred Stock	8,768.00	51,829.00	235,578.00	15,592.00	16,668.00	8,813.00	3,510.00	-	
172	Proceeds from Stock Options	-202	40,995.00	199,969.00	2,479.00	-	7796	1106	-	
173	Other Proceeds from Sale of Stock	8,970.00	10,834.00	35,609.00	13,113.00	16,668.00	1,017.00	2,404.00	-	
174	Issuance/Reduction of Debt, Net	-13,151.00	4,283.00	23,424.00	-2,000.00	-2,000.00	12,424.00	-20,000.00	286,537.00	
175	Change in Current Debt	-13,151.00	-	-	-	-	-	-	-	
176	Change in Long-Term Debt	-	4,283.00	23,424.00	-2,000.00	-2,000.00	12,424.00	-20,000.00	286,537.00	
177	Issuance of Long-Term Debt	-	4,283.00	23,757.00	-	-	63091	35000	286537	
178	Reduction in Long-Term Debt	-	-	-333	-2,000.00	-2,000.00	-50,667.00	-55,000.00	-	
179	Other Funds	-	-790	-19,511.00	-20,860.00	-20,931.00	-8,371.00	-4,974.00	-4,726.00	
180	Other Uses	-	-790	-19,511.00	-20,860.00	-20,931.00	-8,371.00	-4,974.00	-4,726.00	
181	Net Financing Cash Flow	-4,383.00	52,259.00	205,215.00	-125,782.00	-57,536.00	-70,862.00	-57,118.00	240,567.00	
182	Net Financing Cash Flow Growth	-	1292.31%	292.69%	-161.29%	54.26%	-23.16%	19.40%	521.18%	
183	Net Financing Cash Flow / Sales	-1.52%	17.99%	54.90%	-33.33%	-15.11%	-18.93%	-14.44%	175.59%	
184	Exchange Rate Effect	-163	-54	842	106	-267	629	630	-406	
185	Net Change in Cash	8,210.00	76,957.00	210,946.00	-112,690.00	-46,034.00	-17,135.00	-32,106.00	207,895.00	
186	Free Cash Flow	42,017.00	46,501.00	40,428.00	62,594.00	61,223.00	96,604.00	82,955.00	-23,708.00	
187	Free Cash Flow Growth	-	10.67%	-13.06%	54.83%	-2.19%	57.79%	-14.13%	-128.58%	<-- =(I186-H186)/H186
188	Pessimistic FCF Growth					12.56%				<-- =AVERAGE(C187:I187)
189	Optimistic FCF Growth					26.32%				<-- =AVERAGE(H187:I187)
190	Free Cash Flow Yield	-	-	-	-	4.04%	-	-	-2.22%	

Above is the pro forma for IMAX Corporation from 2013 - 2020.

Let's save the file as a macro enabled workbook and copy and paste the remaining pro forma statements into our excel file into separate sheets. So, in effect, we will have 3 sheets:

1. Income Statement
2. Balance Sheet
3. Cash Flow

In this section we are going to cover the key components of valuation, and effectively set up the valuation worksheet. Based upon the cash flow statement,

Free Cash Flow = operating activities – capital expenditures.

FCF = Free Cash Flow = Cash flow that is available (left over) after operations and fixed investments are taken care of.

Terms:

Equity: looking at the share price in consideration of buying or selling shares and/or looking at the company's equity as a whole when looking at acquiring the company

Debt: when the company's liabilities are substantial, this factors into a lower valuation based on higher risk.

Cost of Debt: interest expense/debt.

WACC: weighted average cost of capital: Debt and equity are proportionally weighted in determining the cost of capital, and ultimately risk. The higher the WACC, the higher the risk.

$$\boldsymbol{WACC} = \frac{\boldsymbol{E}}{\boldsymbol{E}+\boldsymbol{D}}\boldsymbol{R_e} + \frac{\boldsymbol{D}}{\boldsymbol{E}+\boldsymbol{D}}\boldsymbol{R_d}(\mathbf{1}-\boldsymbol{T_c})$$

$\boldsymbol{R_e}$ = cost of equity
$\boldsymbol{R_d}$ = cost of debt
$\boldsymbol{E}$ = market value of the firm's equity
$\boldsymbol{D}$ = market value of the firm's debt
$\boldsymbol{V} = \boldsymbol{E} + \boldsymbol{D}$ = total market value of the firm's financing (equity and debt)
$\boldsymbol{E/V}$ = percentage of financing that is equity
$\boldsymbol{D/V}$ = percentage of financing that is debt
$\boldsymbol{T_c}$ = corporate tax rate

Enterprise Value

$$EV = \sum_{t=1}^{N} \frac{FCF_t}{(1+WACC)^t} \quad \rightarrow \quad \frac{\text{Free Cash Flow at time } (t)}{(1+\text{Weighted Average Cost of Capital})^t}$$

where $WACC =$ discount rate

$$= \sum_{t=1}^{N} \frac{FCF_t}{(1+WACC)^{t-0.5}} + \frac{\text{Terminal value}}{(1+WACC)^{N-0.5}}$$

$$= \sum_{t=1}^{N} \frac{FCF_t}{\left(1+\frac{E}{V}R_e+\frac{D}{V}R_d(1-T_c)\right)^{t-0.5}} + \frac{\text{Terminal value}}{\left(1+\frac{E}{V}R_e+\frac{D}{V}R_d(1-T_c)\right)^{N-0.5}}$$

where $WACC = \frac{E}{V}R_e+\frac{D}{V}R_d(1-T_c)$

and $V = (E+D) = (\text{Equity} + \text{Debt})$

Rearranging the terms gives us the following:

$$= \left[\sum_{t=1}^{N} \frac{FCF_t}{(1+WACC)^t} + \frac{\text{Terminal Value}}{(1+WACC)^N}\right](1+WACC)^{0.5}$$

$$= \left[\sum_{t=1}^{N} \frac{FCF_t}{\left(1+\frac{E}{E+D}R_e+\frac{D}{E+D}R_d(1-T_c)\right)^{t}} + \frac{\text{Terminal Value}}{\left(1+\frac{E}{E+D}R_e+\frac{D}{E+D}R_d(1-T_c)\right)^{N}}\right]$$

$$\left[\frac{(1+\frac{E}{E+D}R_e+\frac{D}{E+D}R_d(1-T_c))^{0.5}}{1}\right]$$

Equity (market cap): share price (x) shares outstanding

Ex. (=23.8 (x) 65,380.00) → shares outstanding is found on the income statement of the last fiscal year = $1,556,044.00 (in thousands)

Debt: the formal way of calculating this is to subtract the sum of cash and short-term investments from short-term debt and current portion of long-term debt.

However, we will simplify this process to long-term debt and capitalized leases on the company's balance sheet and average the last 3 years' worth of data:

Fiscal year is January-December. All values USD Thousands.	
Long-Term Debt	
2018	$37,753.00
2019	$18,229.00
2020	$305,676.00
Latest 3-year average	$120,552.67

To calculate the cost of equity in WACC, we will use the CAPM (capital asset pricing model).

However, please note that while there are other methods of valuation and modeling such as the Gordon Model, we are refraining from such complexities and keeping our model simple using the principle of Occam's Razor.

CAPM (Capital Asset Pricing Model)

Developed by William F. Sharpe, Jack Treynor, John Lintner, and Jan Mossin.

- Exceptional tool for making decisions in portfolio investments.

William F. Sharpe is a professor of Finance (Emeritus) at UCLA

- Developed Sharpe Ratio for investment performance analysis
- Received 1990 Nobel Prize in Economics

(Risk-free Rate of Return + Beta of Asset) x (Expected Return of Market – Risk free rate of return)

We use the **CAPM** to calculate the **Cost of Equity**

$$= \frac{E(R_i) - R_f}{\beta_i} = E(R_m) - R_f$$

$$= E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

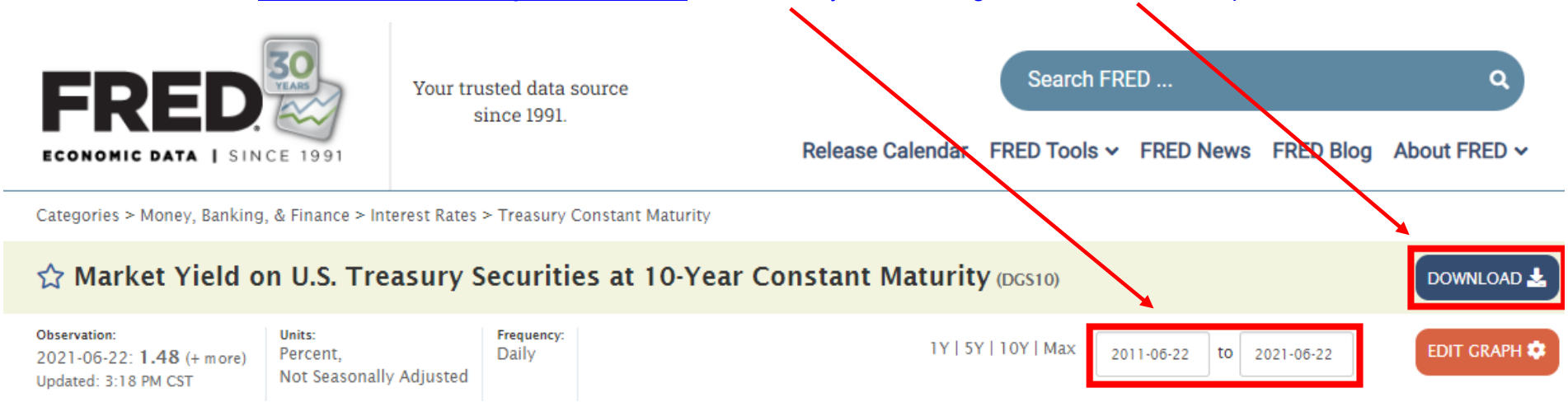
$E(R_i)$ = **expected return of capital asset**

R_f = **risk free rate of return** → R_f = https://fred.stlouisfed.org/series/DGS10/

β_i = **beta of the asset (sensitivity)** → β_i = https://finance.yahoo.com/quote/IMAX/key-statistics?p=IMAX

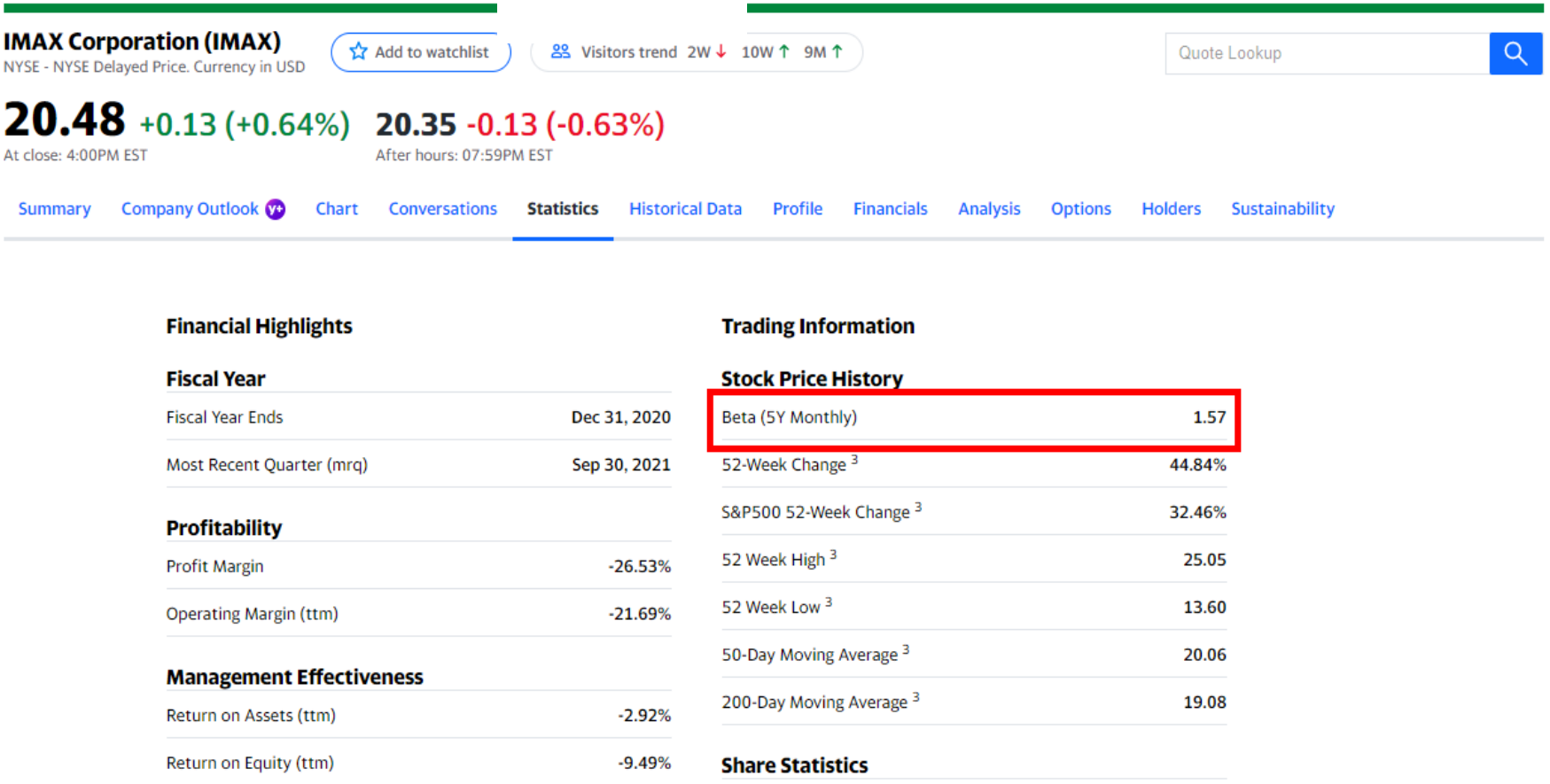
$E(R_m)$ = **expected return of market** → $E(R_m)$ = https://finance.yahoo.com/quote/SPY/performance/

We can get the risk-free rate of return by taking the average of the 10-year Treasury Bond yields; an excellent resource for this endeavor is the St. Louis Federal Reserve: https://fred.stlouisfed.org/series/DGS10/. Select a 10-year date range, and download the report into Excel



The average rate for this date range is 1.48%.

The beta of the asset can be found on Yahoo Finance: https://finance.yahoo.com/quote/IMAX/key-statistics?p=IMAX



IMAX Corporation (IMAX)
NYSE - NYSE Delayed Price. Currency in USD
Add to watchlist | Visitors trend 2W ↓ 10W ↑ 9M ↑ | Quote Lookup

20.48 +0.13 (+0.64%)
At close: 4:00PM EST

20.35 -0.13 (-0.63%)
After hours: 07:59PM EST

Summary | Company Outlook | Chart | Conversations | Statistics | Historical Data | Profile | Financials | Analysis | Options | Holders | Sustainability

Financial Highlights

Fiscal Year

Fiscal Year Ends	Dec 31, 2020
Most Recent Quarter (mrq)	Sep 30, 2021

Profitability

Profit Margin	-26.53%
Operating Margin (ttm)	-21.69%

Management Effectiveness

Return on Assets (ttm)	-2.92%
Return on Equity (ttm)	-9.49%

Trading Information

Stock Price History

Beta (5Y Monthly)	1.57
52-Week Change [3]	44.84%
S&P500 52-Week Change [3]	32.46%
52 Week High [3]	25.05
52 Week Low [3]	13.60
50-Day Moving Average [3]	20.06
200-Day Moving Average [3]	19.08

Share Statistics

$$\beta_i = \text{beta of asset (sensitivity)} = 1.57$$

The expected return of the market $E(R_m)$ can be measured by looking at the average of the S&P 500 via Yahoo Finance as follows:

Performance Overview

25.97%	37.78%	21.83%
YTD Daily Total Return	1-Year Daily Total Return	3-Year Daily Total Return

Trailing Returns (%) Vs. Benchmarks

Monthly Total Returns	SPY	Category
YTD	15.25%	7.50%
1-Month	2.25%	-0.25%
3-Month	8.36%	3.20%
1-Year	40.90%	13.45%
3-Year	18.51%	10.14%
5-Year	17.51%	15.76%
10-Year	14.71%	7.33%
Last Bull Market	0.00%	0.00%
Last Bear Market	0.00%	0.00%

$$E(R_m) = \text{Average} = 16.78$$

$$\textbf{Cost of Debt} = \frac{\text{latest fiscal year's interest expense from income statement}}{\text{latest3} - \text{year average of long} - \text{term debt from balance sheet}}$$

$$= \frac{\$7,010}{\$120,552.67} = 0.06$$

$$\textbf{Weight of Equity} = \frac{E}{E+D} = \frac{\$1,267,079.43}{(\$1,267,079.43 + \$26,113.33)}$$

$$\textbf{Weight of Debt} = \frac{D}{E+D} = \frac{\$26,113.33}{(\$1,267,079.43 + \$26,113.33)}$$

$$\textbf{Tax Rate} = \frac{\text{income tax expense}}{\text{income before tax}}$$

We pull this data on the company's income statement:

	A	B	C	D	E	F	G	H	I	J	K	L
1		Formula	2013	2014	2015	2016	2017	2018	2019	2020	Average Tax Rate	Formula
2	Income Before Tax		63,810.00	57,351.00	87,078.00	57,853.00	30,011.00	43,605.00	75,336.00	-129,124.00	35,740.00	<-- =AVERAGE(C2:J2)
3	Income Tax Expense		16,629.00	14,466.00	20,052.00	16,212.00	16,790.00	9,518.00	16,768.00	26,504.00	17,117.38	<-- =AVERAGE(C3:J3)
4	5 Year Tax Rate	--> =C3/C2	26%	25%	23%	28%	56%	22%	22%	-21%	32%	<-- =AVERAGE(C4:G4)
5	Latest 2 Year Tax Rate										0.866%	<-- =AVERAGE(I4:J4)
6												

	A	B	C
1	**EQUITY**	*in thousands*	**Formula**
2	Shares Outstanding	59,237.00	<-- =ProForma!I47
3	Share price	**21.39**	<-- 21.39
4	**Equity value ("market cap")**	**$ 1,267,079.43**	<-- =B3*B2
5			
6	**DEBT**	**$ 120,552.67**	<-- =ProForma!K116
7			
8	**Cost of Equity (based on CAPM)**	**16.62**	<-- =B11+(B10*B22)
9	Risk-Free Rate of Return + Beta of Asset * (Expected Return of the Market - Risk-Free Rate of Return)		
10	Beta	0.99	<-- 0.99
11	10 year Treasury Rate	0.02	<-- ='10 year Treasury Rate'!B2622*0.01
12	**Expected Market Return (as of 11/10/2021))**		
13	S&P500 Rate of Return	SPY	<-- SPY
14	YTD	15.25	<-- 15.25
15	1-Month	2.25	<-- 2.25
16	3-Month	8.36	<-- 8.36
17	1-Year	40.9	<-- 40.9
18	3-Year	18.51	<-- 18.51
19	5-Year	17.51	<-- 17.51
20	10-Year	14.71	<-- 14.71
21	Average	16.78	<-- =AVERAGE(B14:B20)
22	Market Premium	16.76	<-- =B21-B11
23			
24	**Cost of Debt**	**0.06**	<-- =B25/B26
25	Interest Expense	7,010.00	<-- =ProForma!I23
26	Latest 3 Year Average Debt	$ 120,552.67	<-- =B6
27			
28	Weight of Equity (E/(E+D))	0.913123466	<-- =B4/(B4+B6)
29	Weight of Debt (D/(E+D))	0.086876534	<-- =B6/(B4+B6)
30			
31	Tax Rate	0.008658066	<-- ='Tax Rate'!K5
32			
33	**WACC**	**15.17805421**	<-- =(B28*B8)+(B29*B24)*(1-B31)
34			
35			

Building on the previous section, let's further breakdown the **Enterprise Value formula.**

$$EV = \left[\sum_{t=1}^{N} \frac{FCF_t}{(1+WACC)^t} + \frac{\text{Terminal Value}}{(1+WACC)^N}\right](1+WACC)^{0.5}$$

$$= \underbrace{\left[\sum_{t=1}^{N} \frac{FCF_t}{(1+\frac{E}{E+D}R_e + \frac{D}{E+D}R_d(1-T_c))^t} + \frac{\text{Terminal Value}}{(1+\frac{E}{E+D}R_e + \frac{D}{E+D}R_d(1-T_c))^N}\right]}_{\text{Use Excel's NPV function}}(1+\frac{E}{E+D}R_e + \frac{D}{E+D}R_d(1-T_c))^{0.5}$$

The reason we take $(1+WACC)^{0.5}$ is due to the underlying assumption that incoming cash flows continuously at any given year, and as such, it would be a misguided effort to calculate this value at year end.

Effectively, the formula breaks down to $= \text{NPV}(\text{rate, value range}) * (1+WACC)^{0.5}$ in Excel.

Enterprise Value = $(77,381.24) <-- = NPV(B6,D11:H11)*(1+B6)^0.5

Based upon the WACC we calculated in the previous section, we are going to create our valuation workbook as follows:

IMAX Corporation - Valuation

Free cash flow (FCF) year ending 31 Dec. 2020

Growth rate of FCF, years 1-5 (optimistic)

Long-term FCF growth rate (pessimistic)

WACC

The reason why we have to re-forecast our long-term pessimistic growth rate is because if it is not less than the WACC, we will effectively calculate a terminal value of less than "0." The company CANNOT reinvest beyond the discount rate (past 100%).

	2021	2022	2023	2024	2025	Formula
FCF (Forecast)	$ (22,533.85)	$ (21,417.85)	$ (20,357.12)	$ (19,348.93)	$ (18,390.66)	<-- =G$8*(1+$B$3)
Terminal value					$ (6,088.11)	<-- =H9*(1+B5)/(B6-B5)
Total	$ 77,336.29	$ 97,690.44	$ 123,401.60	$ 155,879.69	$ 5,945,867.36	<-- =SUM(H9:H10)

Enterprise value	$ (77,382.24)	<-- =NPV(B5,D10:H10)*(1+B5)^0.5
Add back initial cash and marketable securities	$ 317,379.00	<-- =ProForma!I58
Subtract out 2020 financial liabilities	$ 532,983.00	<-- =ProForma!I122
Equity Value	$ (292,986.24)	<-- =B12+B13-B14
Per Share (1 million shares outstanding)	-0.29	<-- =B15/1000000

$$\text{Terminal Value} = \frac{FCF_t\ (1+g)}{(WACC\ -g)}; \text{where } t = 5\ \rightarrow \text{last year} = 5$$

$$\text{Terminal Value} = \frac{(\text{Last year of forecasted cash flow}) \text{ x } (1\ +\ \text{long term growth rate})}{\text{WACC} -\ \text{long term growth rate}}$$

We will use the ROIC approach to:

- compute normalized earnings and/or cash flow instantaneously
- Map out the variables of these calculations and reference them back to the Pro Forma
- Estimate pessimistic cash flows
- Estimate optimistic cash flows

ROIC: Return on Investment Capital

$$\text{ROIC} = \frac{\text{EBIT}\ (1 - \text{tax rate})}{\text{Total Assets}}$$

$$\text{Normalized Return assets (pre} - \text{tax)} = \frac{\text{EBIT}}{\text{Total Assets}}$$

This method takes into account historic averages, market cap, and makes assumptions based upon other variables to drive calculations.
We discussed equity and cost of equity while covering WACC and CAPM, but let us refresh here:

$$\text{Equity} = \text{market cap} = \frac{\text{share price}}{\text{shares outstanding}}$$

$$\text{Cost of Equity} = \text{Risk Free Rate of Return} + \text{Beta*(Expected Return of Market} - \text{Risk Free Rate of Return)}$$
$$= \text{US Treasury Rate} + \text{(Beta*Market Premium)}$$

$$\text{FCFE} = \text{free cash flow to equity} = \text{Net Income} - \text{(CAPEX} - \text{Depreciation) x (1} - \text{Debt Ratio)}$$

To gain a more visual insight into IMAX's performance, we will graph sales vs. free cash flow from 2013 – 2018:

	2013	2014	2015	2016	2017	2018	2019	2020
Revenue	287,937.00	290,541.00	373,805.00	377,334.00	380,767.00	374,401.00	395,664.00	137,003.00
Free Cash Flow	42,017.00	46,501.00	40,428.00	62,594.00	61,223.00	96,604.00	82,955.00	-23,708.00