

# **Dividend Discount versus Total Payout Valuation: Learning Activities for the Finance Curriculum**

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## **ABSTRACT**

*The Dividend Discount Model (DDM) and its constant growth version (the Gordon model) are ubiquitous in core finance textbooks. As noted by Straehl and Ibbotson (2017): “Although a growing body of literature discusses the importance of buybacks as a form of payout, the impact of buybacks on stock returns has been largely ignored in practice because many practitioners continue to rely on traditional supply models that use dividends as the sole source of payout” (page 32).[1] We describe learning activities for the undergraduate and MBA finance curriculum to allow students to examine for themselves the validity of the constant growth assumption using historical dividend data. Their findings motivate their subsequent analysis of alternative, more complicated, total payout models.*

## **INTRODUCTION**

The Dividend Discount Model (DDM) is usually taught as the first stock valuation model in an intro-level (core) Finance course. Textbooks also usually expand the discussion to include stock buybacks as another form of payout in addition to dividends. Students invariably learn to apply the constant growth formula to dividends as well as repurchases.

We describe learning activities for the undergraduate and MBA finance curriculum to allow students to examine for themselves the validity of the constant growth assumption using historical dividend data. While mature firms with stable profits are more likely to pay dividends (Fama and French, 2001), a growing body of literature show that more firms have been favoring buybacks as their payout method. Given that the constant growth model relies heavily on the assumption that firms make regular and steadily growing payouts to shareholders, it will be beneficial for the students to see whether this is borne out in the real world.

These activities also allow for a richer discussion of the model, starting with the growth rate. Students will see that not all firms payout consistently. For firms that have a mixed payout record, growth rates tend to have more variability and are much higher or lower than firms that payout regularly. Even firms that payout regularly will exhibit different growth patterns between dividends and repurchases. The students will also get a chance to examine how a significant economic event might impact firms' payout policies. For example, following the 2009 Financial Crisis, due to the need for financial flexibility, some firms choose not to pay dividends to maintain a low leverage (Arslan-Ayaydin, Florackis, & Ozkan, 2014). Second, by calculating the cost of equity, students will see how a different topic in the course (risk and return) relates directly to another topic (stock valuation). They will also get to see first-hand why the constant growth model breaks down when the growth rate exceeds the cost of equity or when there is only a very small difference between the two. More importantly, the students will get to observe that the DDM usually results in a stock price estimate that is lower than the market price. This is because it excludes repurchases, which is a significant amount for many companies. Finally, it gives the instructor the chance to tee up a quick introduction to payout policy, which is usually discussed in more advanced corporate finance courses. Specifically, that how firms choose between dividends and repurchases may be influenced by market imperfections such as taxes and information asymmetry.

## **THE LEARNING ACTIVITIES**

The activity is broken down into three parts. The first part ties closely to the course material. It will be introduced to the students when we cover dividend discount model. In addition to the textbook material, we will assign outside readings to give students more foundational knowledge about the model and how it is used in the real-world. The list of readings is provided. (See Appendix 1) Because the activity will be applied to different levels of Finance courses, including Intro-Finance, Advanced Finance, and MBA Finance, the reading list for each course will be slightly different. For the more advanced course, we will incorporate a diverse set of research papers that cover various valuation methods and discuss different payout policies. We believe these readings will enhance the students' ability to contrast the two forms of payout using real data in the later activity.

The second part of the activity is a hands-on exercise. For the Intro-Finance course, we will provide students with two datasets with all relevant information about firms' dividends and repurchases information. The data will be extracted from Compustat. We will demonstrate how the data can be retrieved in class, but students are not required to do that on their own. One dataset contains only the dividend paying firms, and the other one contains firms using both dividends and repurchases. Each dataset contains 25 companies. The list of firms is provided in Appendix 2. Students will be asked to select one company from each dataset. Instructions for this activity are provided in Appendix 3. Summary calculations for all 50 companies are reported in Tables 1A through 2B.

For the Advanced Finance courses including the MBA course, we will only provide the guidelines about how the data can be retrieved from WRDS CompuStat and CRSP (See Appendix 4), and students will be asked to gather the information on their own. It is important to incorporate the two major databases from WRDS in this exercise because it gives students a chance to learn how to extract and process large amounts of data from an external source. It has the added benefit of making students aware of the resources that are available at the college. The technical skills they acquire via this project can be helpful not only in Finance courses, but also in other quantitative intensive or research-based courses. The skills will also be valuable to them in the workforce. Students are then also given the instructions from Appendix 3.

The third part of the activity is a written report. Students typically struggle to describe and communicate their findings. The last part of the activity is designed to improve student's writing skills. The report asks students to discuss the dividend discount model, which should include its advantages and limitations. They are also asked to talk about the differences between the dividend paying firms and the mix payout firms, including discussing the difference between the stock price they calculate (intrinsic value) and the market price of the same stock. This will be a great place for them to think about the usefulness of the dividend discount model and why they should be cautious when using the model to estimate firm value. For students in the Advanced Finance course, they also need to talk about the different payout options companies can have and how they are chosen in the real world. They should also propose ways to improve the model, so it can provide better estimation for different types of firms.

## **CONCLUSION**

In this paper, we describe how we set up a series of learning activities to help reinforce student understanding of the classic Dividend Discount Model. The project also utilizes the WRDS subscription, which further sharpens students' analytical skills. It helps to prepare students to be competitive in the today's technology-focused and data-driven workforce. We believe our work is also particularly timely given the AACSB's recent addition of a section on "Technology Agility" to accreditation Standard 9.

In addition to the data-driven hands-on practices, students are also introduced to various scholarly readings, which is designed to improve their reading abilities and increase their interests in reading. One of the biggest challenges we face as teachers nowadays is the lack of student's interests in reading. Students find reading to be boring and unproductive. However, the ability to read is a very important skill for everyone who is interested in learning on his own. The project hopes to close this gap by showing them how to read and what to read, so they can slowly regain the interests and start to read more.

Moreover, the project is designed to enhance student's learning by asking students to apply the financial models they learn in the classroom with real-world data. The hands-on exercises helps make learning more fun for the students, so they can retain the knowledge, which will improve their performances at the Exit Exam.

Finally, the project is also structured to improve student's written communication skills. We believe this is a key skill for every college student, especially for business students. Not only will students practice how to write, they will also learn to write critically because the required discussion in the written report asks them to compare the outcomes and discuss the pros and cons of the methods.

## REFERENCES

Arslan-Ayaydin, Florackis, & Ozkan, 2014. "Financial flexibility, corporate investment and performance: Evidence from financial crises." *Review of Quantitative Finance and Accounting*. Vol 42 Issue 2. 211-250

Compustat (2018). Available at: WRDS <https://wrds-web.wharton.upenn.edu/wrds/> (Accessed: September 2019)

Fama, E. and French, K. 2001. "Disappearing dividends: changing firm characteristics or lower propensity to pay?" *Journal of Financial Economics*, Vol 60 Issue 1. 3-43

Yahoo!Finance <https://finance.yahoo.com/> (Accessed: September 14, 2019)

Straehl, P. U., and Roger, G. I. 2017. "The Long-Run Drivers of Stock Returns: Total Payouts and the Real Economy." *Financial Analysts Journal*, vol. 73, no. 3 (Third Quarter): 32-52.

## Appendix 1. Reading list

### Intro-Finance:

1. Besley, S. and Brigham, E., 2018. CFIN, 6<sup>th</sup> Edition. Cengage
  - a. Chapter 7: Stock (Equity) – Characteristics and Valuation
  - b. Chapter 8: Risk and Rates of Return
  - c. Chapter 11: The Cost of Capital and Capital Structure Concepts
  - d. Chapter 13: Distribution of Retained Earnings: Dividends and Stock Repurchases
2. Penman, S. 1998. A Synthesis of Equity Valuation Techniques and the Terminal Value Calculation for the Dividend Discount Model. *Review of Accounting Studies*. Volumn 2 Issue 4, 303-323.

### Advanced Financial Management

1. Brigham, E. and Daves, P., 2018. Intermediate Financial Management, 13<sup>th</sup> Edition. Cengage
  - a. Chapter 2: Risk and Return: Part I
  - b. Chapter 3: Risk and Return: Part II
  - c. Chapter 8: Basic Stock Valuation
  - d. Chapter 15: Distributions to Shareholders: Dividends and Repurchases
2. Dann, L. 1981. Common stock repurchases: An analysis of returns to bondholders and stockholders. *Journal of Financial Economics*. Vol 9 Issue 2. 113-138
3. Ivanovski, Z., Narasanov, Z., and Ivanovska, N. 2015. Accuracy of Dividend Discount Model Valuation at Macedonian Stock – Exchange. *Journal of International Scientific Publications*. Vol 9.
4. Olweny, T. 2011. The Reliability of Dividend Discount Model in Valuation of Common Stock at the Nairobi Stock Exchange. *International Journal of Business and Social Science*. Vol 2 No 6.
5. Penman, S. 1998. A Synthesis of Equity Valuation Techniques and the Terminal Value Calculation for the Dividend Discount Model. *Review of Accounting Studies*. Volumn 2 Issue 4, 303-323.

### MBA Finance

1. Jaffe, J., Westerfield, R., and Ross, S. 2016. Corporate Finance, 11<sup>th</sup> Edition. McGraw-Hill.
  - a. Chapter 9: Stock Valuation
  - b. Chapter 11: Risk and Return: The Capital Asset Pricing Model (CAPM)
  - c. Chapter 13: Risk, Cost of Capital, and Valuation

- d. Chapter 16: Capital Structure
  - e. Chapter 19: Dividends and Other Payouts
2. Dann, L. 1981. Common stock repurchases: An analysis of returns to bondholders and stockholders. *Journal of Financial Economics*. Vol 9 Issue 2. 113-138
  3. Ivanovski, Z., Narasanov, Z., and Ivanovska, N. 2015. Accuracy of Dividend Discount Model Valuation at Macedonian Stock – Exchange. *Journal of International Scientific Publications*. Vol 9.
  4. Olweny, T. 2011. The Reliability of Dividend Discount Model in Valuation of Common Stock at the Nairobi Stock Exchange. *International Journal of Business and Social Science*. Vol 2 No 6.
  5. Penman, S. 1998. A Synthesis of Equity Valuation Techniques and the Terminal Value Calculation for the Dividend Discount Model. *Review of Accounting Studies*. Volumn 2 Issue 4, 303-323.
  6. Manconi, A., Peyer, U., and Vermaelen, T. 2018. Are Buybacks Good for Long-term Shareholder Value? Evidence from Buybacks Around the World. Finance Working Paper.

Appendix 2. List of the 25 stocks included in each category. We ask the students to select one stock from each group.

Dividend Aristocrats	Mixed payout Stocks
3M CO	AMERICAN AIRLINES GROUP INC
ABBOTT LABORATORIES	APPLE INC
AT&T INC	AES CORP (THE)
AUTOMATIC DATA PROCESSING	ALLERGAN PLC
BECTON DICKINSON & CO	ALASKA AIR GROUP INC
CATERPILLAR INC	AMGEN INC
CHEVRON CORP	DELTA AIR LINES INC
CLOROX CO/DE	DOLLAR GENERAL CORP
COCA-COLA CO	FREEMPORT-MCMORAN INC
COLGATE-PALMOLIVE CO	GILEAD SCIENCES INC
CONSOLIDATED EDISON INC	GENERAL MOTORS CO
DOVER CORP	JACOBS ENGINEERING GROUP INC
EMERSON ELECTRIC CO	JUNIPER NETWORKS INC
EXXON MOBIL CORP	KANSAS CITY SOUTHERN
GENUINE PARTS CO	LEIDOS HOLDINGS INC
GRAINGER (W W) INC	LAM RESEARCH CORP
JOHNSON & JOHNSON	MGM RESORTS INTERNATIONAL
KIMBERLY-CLARK CORP	NETAPP INC
LEGGETT & PLATT INC	NVIDIA CORP
PENTAIR PLC	PULTEGROUP INC
PPG INDUSTRIES INC	CONSTELLATION BRANDS
SMITH (A.O.)	SKYWORKS SOLUTIONS INC
STANLEY BLACK & DECKER INC	SYMANTEC CORP
UNITED TECHNOLOGIES CORP	THERMO FISHER SCIENTIFIC INC
VF CORP	WESTERN DIGITAL CORP

Table 1A. Summary calculations for Dividend Aristocrats using the 30-year average growth rate in dividends per share.

Company Name	Ticker	Number of Obs	30-yr Average sales growth	30-yr Average dividend per share growth	30-yr Average repurchase growth	30-yr average total payout growth	Dividends per share (FY 2018)	Beta	Risk-free rate	Market risk premium	CAPM cost of equity	Stock price (9/13/2018 close)	Constant growth estimate (assuming g = 30-yr ave growth in DPS)
3M CO	MMM	30	4.01%	4.75%	194.66%	14.88%	5.440	1.28	2.25%	11.00%	16.33%	171.44	49.21
ABBOTT LABORATORIES	ABT	30	7.14%	3.84%	121.52%	10.20%	1.120	0.81	2.25%	11.00%	11.16%	84.27	15.88
AT&T INC	T	30	12.58%	0.71%	46.65%	15.41%	2.000	0.76	2.25%	11.00%	10.61%	37.91	20.34
AUTOMATIC DATA PROCESSING	ADP	30	7.69%	8.06%	105.66%	27.44%	2.400	0.97	2.25%	11.00%	12.92%	159.74	53.35
BECTON DICKINSON & CO	BDX	30	7.95%	6.80%	-195.77%	20.32%	3.000	1.21	2.25%	11.00%	15.56%	260.70	36.57
CATERPILLAR INC	CAT	30	6.99%	10.34%	9.42%	36.68%	3.280	1.52	2.25%	11.00%	18.97%	133.78	41.92
CHEVRON CORP	CVX	30	9.50%	3.25%	432.33%	11.64%	4.480	0.84	2.25%	11.00%	11.49%	121.50	56.14
CLOROX CO/DE	CLX	30	5.73%	5.98%	222.06%	37.93%	3.480	0.59	2.25%	11.00%	8.74%	158.94	133.61
COCA-COLA CO	KO	30	4.98%	3.12%	48.81%	10.15%	1.560	0.31	2.25%	11.00%	5.66%	54.26	63.25
COLGATE-PALMOLIVE CO	CL	30	4.17%	2.62%	400.34%	28.91%	1.660	0.78	2.25%	11.00%	10.83%	70.71	20.75
CONSOLIDATED EDISON INC	ED	30	3.22%	0.17%	-733.66%	5.97%	2.860	0.18	2.25%	11.00%	4.23%	71.71	70.65
DOVER CORP	DOV	30	5.10%	4.99%	224.51%	25.82%	1.900	1.73	2.25%	11.00%	21.28%	99.67	12.24
EMERSON ELECTRIC CO	EMR	30	3.88%	3.11%	118.40%	10.00%	1.940	1.46	2.25%	11.00%	18.31%	65.55	13.16
EXXON MOBIL CORP	XOM	30	6.09%	2.77%	29.06%	5.35%	3.230	1.21	2.25%	11.00%	15.56%	72.64	25.96
GENUINE PARTS CO	GPC	30	6.53%	4.29%	24.06%	9.12%	2.835	0.86	2.25%	11.00%	11.71%	98.68	39.85
GRAINGER (W W) INC	GW W	30	7.02%	7.82%	367.87%	31.62%	5.360	1.34	2.25%	11.00%	16.99%	295.56	63.05
JOHNSON & JOHNSON	JNJ	30	7.78%	4.35%	43.23%	17.34%	3.540	0.73	2.25%	11.00%	10.28%	130.78	62.25
KIMBERLY-CLARK CORP	KMB	30	5.06%	4.72%	619.32%	17.83%	3.970	0.47	2.25%	11.00%	7.42%	132.41	154.05
LEGGETT & PLATT INC	LEG	30	6.37%	5.60%	38.97%	16.50%	1.480	1.15	2.25%	11.00%	14.90%	42.13	16.80
PENTAIR PLC	PNR	30	6.31%	3.12%	50.17%	0.81%	1.050	1.06	2.25%	11.00%	13.91%	37.84	10.03
PPG INDUSTRIES INC	PPG	30	3.84%	2.35%	138.69%	22.30%	1.860	0.96	2.25%	11.00%	12.81%	119.38	18.21
SMITH (A.O.)	AOS	30	5.22%	1.63%	-805.62%	33.96%	0.760	1.66	2.25%	11.00%	20.51%	50.24	4.09
STANLEY BLACK & DECKER INC	SWK	30	8.46%	4.27%	633.87%	38.91%	2.580	1.51	2.25%	11.00%	18.86%	146.25	18.44
UNITED TECHNOLOGIES CORP	UTX	30	4.68%	3.82%	-59.48%	43.79%	2.835	1.32	2.25%	11.00%	16.77%	138.06	22.73
VF CORP	VFC	30	6.20%	6.02%	-191.51%	42.27%	1.940	1.46	2.25%	11.00%	18.31%	90.30	16.73



Table 1B. Summary calculations for Dividend Aristocrats using the 8-year post financial crisis average growth rate in dividends per share.

Company Name	Ticker	2011-2018 Average dividend per share growth	2011-2018 Average repurchase growth	2011-2018 average total payout growth	Dividends per share (FY 2018)	Beta	Risk-free rate	Market risk premium	CAPM cost of equity	Stock price (9/13/2018 close)	Constant growth estimate (assuming g = '11-'18 ave growth in DPS)
3M CO	MMM	13.01%	49.71%	24.20%	5.440	1.28	2.25%	11.00%	4.23%	171.44	185.20
ABBOTT LABORATORIES	ABT	3.28%	354.35%	0.88%	1.120	0.81	2.25%	11.00%	11.16%	84.27	14.68
AT&T INC	T	2.20%	-9.42%	12.99%	2.000	0.76	2.25%	11.00%	10.61%	37.91	24.32
AUTOMATIC DATA PROCESSING	ADP	7.58%	10.29%	6.55%	2.400	0.97	2.25%	11.00%	12.92%	159.74	48.31
BECTON DICKINSON & CO	BDX	9.26%	-30.19%	3.95%	3.000	1.21	2.25%	11.00%	15.56%	260.70	52.06
CATERPILLAR INC	CAT	10.91%	-13.44%	47.52%	3.280	1.52	2.25%	11.00%	18.97%	133.78	45.11
CHEVRON CORP	CVX	5.97%	244.96%	8.04%	4.480	0.84	2.25%	11.00%	11.49%	121.50	85.99
CLOROX CO/DE	CLX	7.20%	47.08%	14.94%	3.480	0.59	2.25%	11.00%	8.74%	158.94	242.66
COCA-COLA CO	KO	0.65%	-1.70%	3.01%	1.560	0.31	2.25%	11.00%	5.66%	54.26	31.33
COLGATE-PALMOLIVE CO	CL	-0.43%	-4.40%	-0.56%	1.660	0.78	2.25%	11.00%	10.83%	70.71	14.67
CONSOLIDATED EDISON INC	ED	2.33%	-37.30%	3.67%	2.860	0.18	2.25%	11.00%	4.23%	71.71	153.88
DOVER CORP	DOV	7.48%	193.84%	41.05%	1.900	1.73	2.25%	11.00%	21.28%	99.67	14.79
EMERSON ELECTRIC CO	EMR	4.85%	129.14%	16.72%	1.940	1.46	2.25%	11.00%	18.31%	65.55	15.11
EXXON MOBIL CORP	XOM	8.14%	-20.32%	-2.72%	3.230	1.21	2.25%	11.00%	15.56%	72.64	47.09
GENUINE PARTS CO	GPC	7.18%	21.52%	7.11%	2.835	0.86	2.25%	11.00%	11.71%	98.68	67.05
GRAINGER (W W) INC	GWV	12.76%	22.01%	12.41%	5.360	1.34	2.25%	11.00%	16.99%	295.56	142.75
JOHNSON & JOHNSON	JNJ	6.68%	54.72%	15.93%	3.540	0.73	2.25%	11.00%	10.28%	130.78	105.01
KIMBERLY-CLARK CORP	KMB	5.55%	6.71%	3.63%	3.970	0.47	2.25%	11.00%	7.42%	132.41	223.48
LEGGETT & PLATT INC	LEG	6.78%	52.72%	6.36%	1.480	1.15	2.25%	11.00%	14.90%	42.13	19.46
PENTAIR PLC	PNR	4.88%	451.28%	77.51%	1.050	1.06	2.25%	11.00%	13.91%	37.84	12.20
PPG INDUSTRIES INC	PPG	0.19%	130.69%	29.60%	1.860	0.96	2.25%	11.00%	12.81%	119.38	14.77
SMITH (A.O.)	AOS	8.46%	49.53%	42.92%	0.760	1.66	2.25%	11.00%	20.51%	50.24	6.84
STANLEY BLACK & DECKER INC	SWK	8.67%	1949.69%	92.93%	2.580	1.51	2.25%	11.00%	18.86%	146.25	27.52
UNITED TECHNOLOGIES CORP	UTX	6.63%	42.84%	21.47%	2.835	1.32	2.25%	11.00%	16.77%	138.06	29.82
VF CORP	VFC	4.38%	507.83%	17.82%	1.940	1.46	2.25%	11.00%	18.31%	90.30	14.54

Table 2A. Summary calculations for Growth Stocks using the 30-year average growth rate in dividends per share.

Company Name	Ticker	Number of Obs	30-yr Average sales growth	30-yr Average dividend per share growth	30-yr Average repurchase growth	30-yr average total payout growth	Dividends per share (FY 2018)	Beta	Risk-free rate	Market risk premium	CAPM cost of equity	Stock price (9/13/2018 close)	Constant growth estimate (assuming g = 30-yr ave growth in DPS)
AMERICAN AIRLINES GROUP INC	AAL	30	6.15%	25.00%	12.69%	10.32%	0.4	1.97	2.25%	11.00%	23.92%	29.95	n/a
APPLE INC	AAPL	30	17.41%	10.53%	313.00%	90.54%	2.72	1.08	2.25%	11.00%	14.13%	218.75	83.60
AES CORP (THE)	AES	29	18.75%	66.94%	-26.83%	151.31%	0.52	0.72	2.25%	11.00%	10.17%	15.79	n/a
ALLERGAN PLC	AGN	27	28.77%	2.86%	1147.78%	469.17%	2.88	1.92	2.25%	11.00%	23.37%	166.14	14.44
ALASKA AIR GROUP INC	ALK	30	8.23%	6.33%	533.25%	73.37%	1.28	1.08	2.25%	11.00%	14.13%	65.87	17.44
AMGEN INC	AMGN	30	25.08%	43.34%	89.87%	41.27%	5.28	0.80	2.25%	11.00%	11.05%	195.47	n/a
DELTA AIR LINES INC	DAL	30	6.70%	1.36%	63.22%	98.59%	1.31	1.30	2.25%	11.00%	16.55%	60.01	8.74
DOLLAR GENERAL CORP	DG	30	13.45%	-1.15%	136.49%	1792.40%	1.16	0.55	2.25%	11.00%	8.30%	157.78	12.14
FREEMONT-MCMORAN INC	FCX	30	18.61%	4.24%	19.14%	282.91%	0.15	1.78	2.25%	11.00%	21.83%	10.76	0.89
GILEAD SCIENCES INC	GILD	29	83.24%	21.76%	120.81%	113.53%	2.28	1.18	2.25%	11.00%	15.23%	66.52	n/a
GENERAL MOTORS CO	GM	30	1.19%	-8.02%	75.16%	-3.53%	1.52	1.25	2.25%	11.00%	16.00%	38.86	5.82
JACOBS ENGINEERING GROUP INC	JEC	30	11.47%	33.33%	24.99%	33.29%	0.6	1.18	2.25%	11.00%	15.23%	91.21	n/a
JUNIPER NETWORKS INC	JNPR	22	170.45%	45.00%	64524.75%	64524.67%	0.72	0.57	2.25%	11.00%	8.52%	24.27	n/a
KANSAS CITY SOUTHERN	KSU	30	9.56%	-9.03%	80.54%	27.33%	1.44	1.12	2.25%	11.00%	14.57%	133.09	5.55
LEIDOS HOLDINGS INC	LDOS	14	4.93%	292.60%	96.71%	61.08%	1.28	1.20	2.25%	11.00%	15.45%	85.82	n/a
LAM RESEARCH CORP	LRCX	30	24.82%	57.63%	108.41%	92.38%	2.55	1.55	2.25%	11.00%	19.30%	235.56	n/a
MGM RESORTS INTERNATIONAL	MGM	30	49.14%	-45.45%	45.99%	37.37%	0.48	1.19	2.25%	11.00%	15.34%	29.07	0.43
NETAPP INC	NTAP	25	35.53%	25.98%	15.39%	17.26%	1.6	1.55	2.25%	11.00%	19.30%	56.57	n/a
NVIDIA CORP	NVDA	23	75.23%	64.42%	128.44%	113.28%	0.61	2.44	2.25%	11.00%	29.09%	181.94	n/a
PULTEGROUP INC	PHM	30	9.22%	3.00%	702.61%	719.68%	0.36	0.49	2.25%	11.00%	7.64%	35.25	7.99
CONSTELLATION BRANDS	STZ	30	16.52%	33.78%	589.49%	391.76%	2.96	1.11	2.25%	11.00%	14.46%	204.07	n/a
SKYWORKS SOLUTIONS INC	SWKS	30	20.73%	70.87%	1596.53%	1598.32%	1.34	1.26	2.25%	11.00%	16.11%	82.14	n/a
SYMANTEC CORP	SYMC	30	20.71%	114.64%	154.22%	128.77%	0.3	1.41	2.25%	11.00%	17.76%	24.46	n/a
THERMO FISHER SCIENTIFIC INC	TMO	30	16.76%	-5.16%	26.20%	36.36%	0.66	1.14	2.25%	11.00%	14.79%	297.65	3.14
WESTERN DIGITAL CORP	WDC	30	13.60%	23.77%	154.98%	136.25%	2	2.17	2.25%	11.00%	26.12%	64.6	105.42

Table 2B. Summary calculations for Dividend Aristocrats using the 8-year post financial crisis average growth rate in dividends per share.

Company Name	Ticker	2011-2018 Average sales growth	2011-2018		2011-2018		Dividends per share (FY 2018)	Beta	Risk-free rate	Market risk premium	CAPM cost of equity	Stock price (9/13/2018 close)	Constant growth estimate (assuming g = '11-'18 ave growth in DPS)
			Average dividend per share growth	Average repurchase growth	total payout growth	average							
AMERICAN AIRLINES GROUP INC	AAL	10.46%	25.00%	41.72%	37.57%	0.4	1.97	2.25%	11.00%	23.92%	29.95	n/a	
APPLE INC	AAPL	21.12%	48.15%	275.23%	201.11%	2.72	1.08	2.25%	11.00%	14.13%	218.75	n/a	
AES CORP (THE)	AES	-4.78%	75.40%	9.32%	30.47%	0.52	0.72	2.25%	11.00%	10.17%	15.79	n/a	
ALLERGAN PLC	AGN	21.91%	2.86%	1692.72%	674.81%	2.88	1.92	2.25%	11.00%	23.37%	166.14	14.44	
ALASKA AIR GROUP INC	ALK	10.43%	27.65%	28.06%	43.38%	1.28	1.08	2.25%	11.00%	14.13%	65.87	n/a	
AMGEN INC	AMGN	5.92%	43.34%	208.65%	50.69%	5.28	0.80	2.25%	11.00%	11.05%	195.47	n/a	
DELTA AIR LINES INC	DAL	4.36%	65.89%	83.32%	75.10%	1.31	1.30	2.25%	11.00%	16.55%	60.01	n/a	
DOLLAR GENERAL CORP	DG	8.83%	9.72%	51.27%	54.92%	1.16	0.55	2.25%	11.00%	8.30%	157.78	n/a	
FREEPORT-MCMORAN INC	FCX	0.82%	-25.17%	5.56%	346.22%	0.15	1.78	2.25%	11.00%	21.83%	10.76	0.24	
GILEAD SCIENCES INC	GILD	19.22%	21.76%	112.83%	101.91%	2.28	1.18	2.25%	11.00%	15.23%	66.52	n/a	
GENERAL MOTORS CO	GM	1.25%	8.37%	-49.01%	-7.71%	1.52	1.25	2.25%	11.00%	16.00%	38.86	21.59	
JACOBS ENGINEERING GROUP INC	JEC	6.50%	33.33%	68.39%	89.16%	0.6	1.18	2.25%	11.00%	15.23%	91.21	n/a	
JUNIPER NETWORKS INC	JNPR	1.72%	45.00%	37.87%	37.69%	0.72	0.57	2.25%	11.00%	8.52%	24.27	n/a	
KANSAS CITY SOUTHERN	KSU	5.38%	13.25%	20.93%	40.89%	1.44	1.12	2.25%	11.00%	14.57%	133.09	123.76	
LEIDOS HOLDINGS INC	LDOS	3.45%	292.60%	175.89%	64.98%	1.28	1.20	2.25%	11.00%	15.45%	85.82	n/a	
LAM RESEARCH CORP	LRCX	24.69%	57.63%	144.38%	108.32%	2.55	1.55	2.25%	11.00%	19.30%	235.56	n/a	
MGM RESORTS INTERNATIONAL	MGM	9.27%	9.09%	291.86%	166.42%	0.48	1.19	2.25%	11.00%	15.34%	29.07	8.38	
NETAPP INC	NTAP	2.64%	25.98%	44.60%	48.61%	1.6	1.55	2.25%	11.00%	19.30%	56.57	n/a	
NVIDIA CORP	NVDA	16.98%	64.42%	159.09%	128.76%	0.61	2.44	2.25%	11.00%	29.09%	181.94	n/a	
PULTEGROUP INC	PHM	11.12%	34.50%	1660.36%	2404.30%	0.36	0.49	2.25%	11.00%	7.64%	35.25	n/a	
CONSTELLATION BRANDS	STZ	14.25%	33.78%	515.97%	54.61%	2.96	1.11	2.25%	11.00%	14.46%	204.07	n/a	
SKYWORKS SOLUTIONS INC	SWKS	18.14%	70.87%	329.40%	332.30%	1.34	1.26	2.25%	11.00%	16.11%	82.14	n/a	
SYMANTEC CORP	SYMC	-1.18%	114.64%	44.70%	53.99%	0.3	1.41	2.25%	11.00%	17.76%	24.46	n/a	
THERMO FISHER SCIENTIFIC INC	TMO	11.01%	10.64%	-13.92%	23.38%	0.66	1.14	2.25%	11.00%	14.79%	297.65	17.60	
WESTERN DIGITAL CORP	WDC	11.23%	23.77%	213.26%	171.11%	2	2.17	2.25%	11.00%	26.12%	64.6	105.42	

Appendix 3 (Instructions for the activity)

Instructions for the activity

- I. Select one stock from Group A (Dividend Aristocrats) and one stock from Group B (Growth Stocks). Do the following steps for both stocks.
  
- II. Copy and paste the data from the main Excel files provided on the class website and fill in the Excel template (provided). We will use Procter & Gamble as an example.

	A	B	C	D	E	F
		Dividends per share (DPS)	Total dividends	Repurchases	Revenues	
1	Year					
2	1988					
3	1989					
4	1990					
5	1991					
6	1992					
7	...					
31	2017					
32	2018					
33						

The filled in table should look like

	A	B	C	D	E	F
		Dividends per share (DPS)	Total dividends	Repurchases	Revenues	
1	Year					
2	1988	2.7500	466.00	250.00	19,336.00	
3	1989	3.0000	504.00	794.00	21,398.00	
4	1990	1.7500	592.00	179.00	24,081.00	
5	1991	1.9500	675.00	837.00	27,026.00	
6	1992	1.0250	694.00	40.00	29,362.00	
7	...	...	...	...	...	
31	2017	2.6981	6,989.00	5,172.00	65,058.00	
32	2018	2.7860	7,057.00	6,965.00	66,832.00	

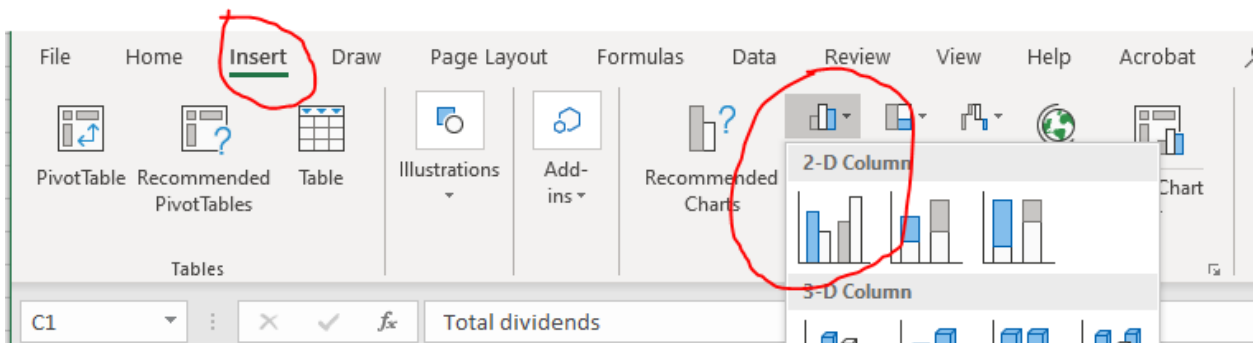
### Appendix 3 (Instructions for the activity)

Next, we will calculate total payout by adding total dividends and repurchases together. On cell F1, type "Total payout". On cell F2 type the formula " $=C2+D2$ ". Copy cell F2 onto cells F3:F32 by left clicking on cell F2, select "Copy", highlight cells F3:F32, left click and select "Paste".

	A	B	C	D	E	F
1	Year	Dividends per share (DPS)	Total dividends	Repurchases	Revenues	Total payout
2	1988	2.7500	466.00	250.00	19,336.00	716.00
3	1989	3.0000	504.00	794.00	21,398.00	1,298.00
4	1990	1.7500	592.00	179.00	24,081.00	771.00
5	1991	1.9500	675.00	837.00	27,026.00	1,512.00
6	1992	1.0250	694.00	40.00	29,362.00	734.00
7	...	...	...	...	...	...
31	2017	2.6981	6,989.00	5,172.00	65,058.00	12,161.00
32	2018	2.7860	7,057.00	6,965.00	66,832.00	14,022.00

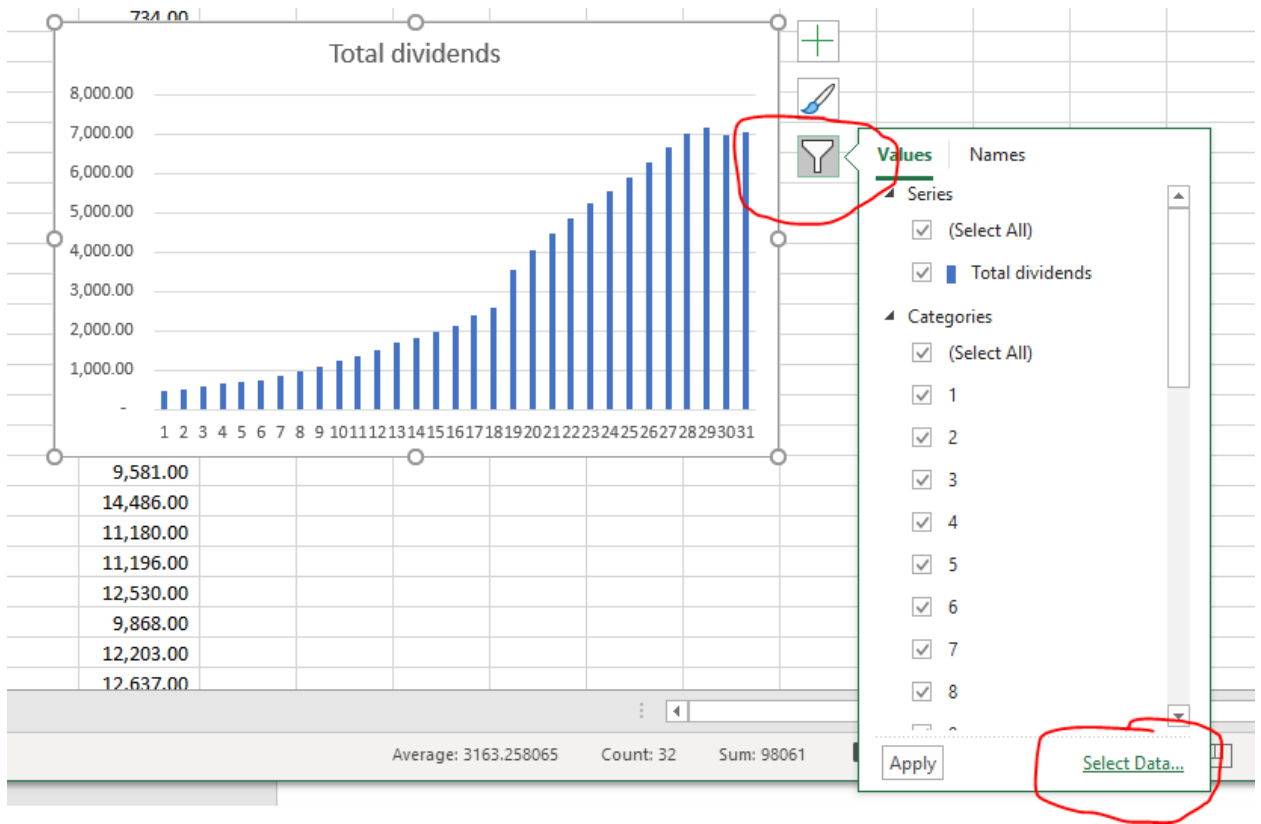
- III. Visualize the data. We will examine any trends in total dividends, repurchases, and total payout by graphing the data.

We'll start with total dividends. Highlight cells C1:C32, on the menu bar click "Insert" and choose the first 2-D column option from the "Column or Bar Chart" icon.

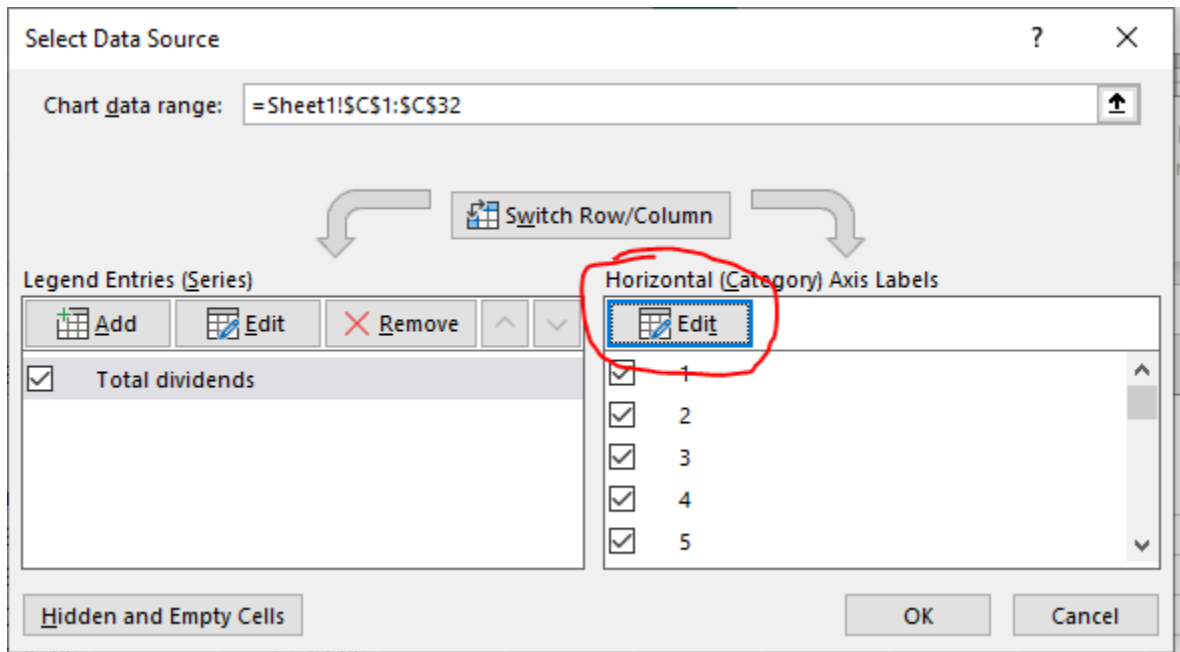


A chart should appear in the middle of the screen. Click on "Chart Filters" and click on "Select Data"

Appendix 3 (Instructions for the activity)

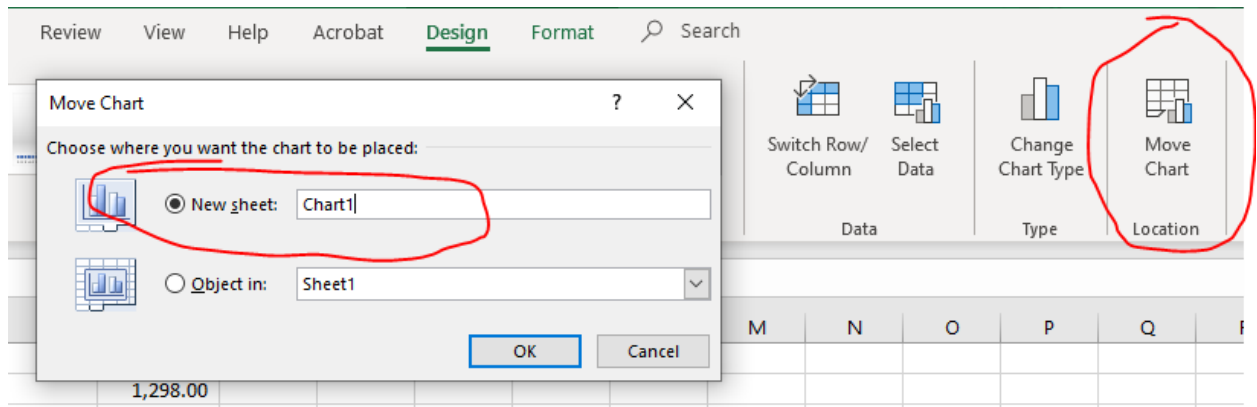


Click on the "Edit" icon and highlight cells A2:A32 on the "Axis Labels" dialog box. Click "OK" to exit.

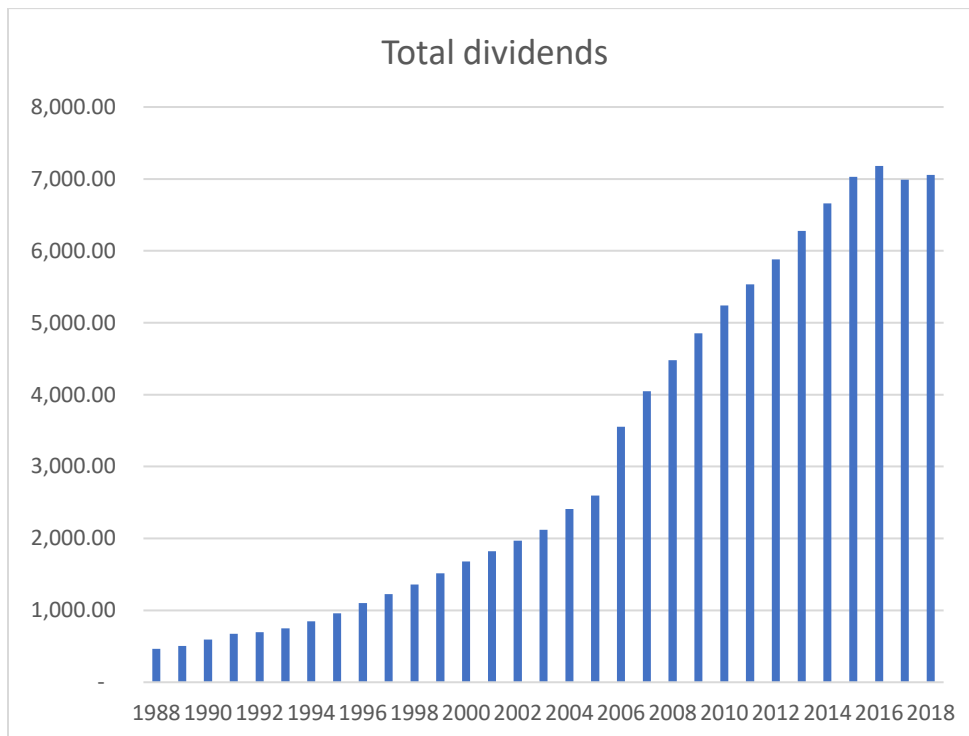


### Appendix 3 (Instructions for the activity)

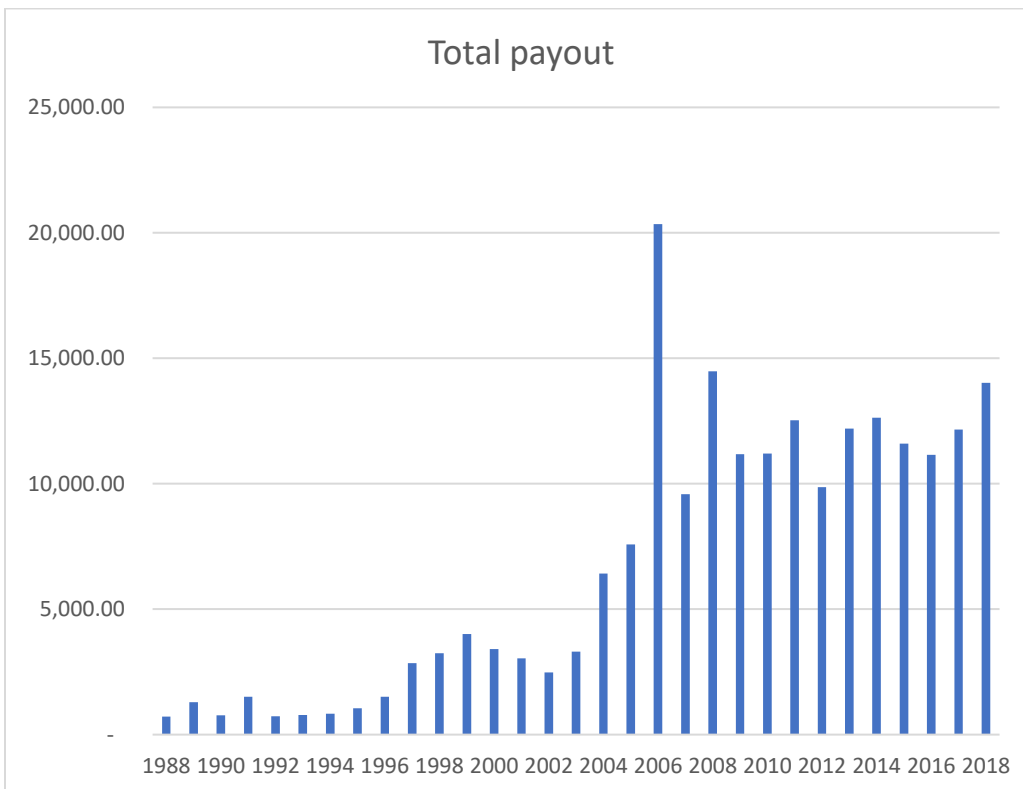
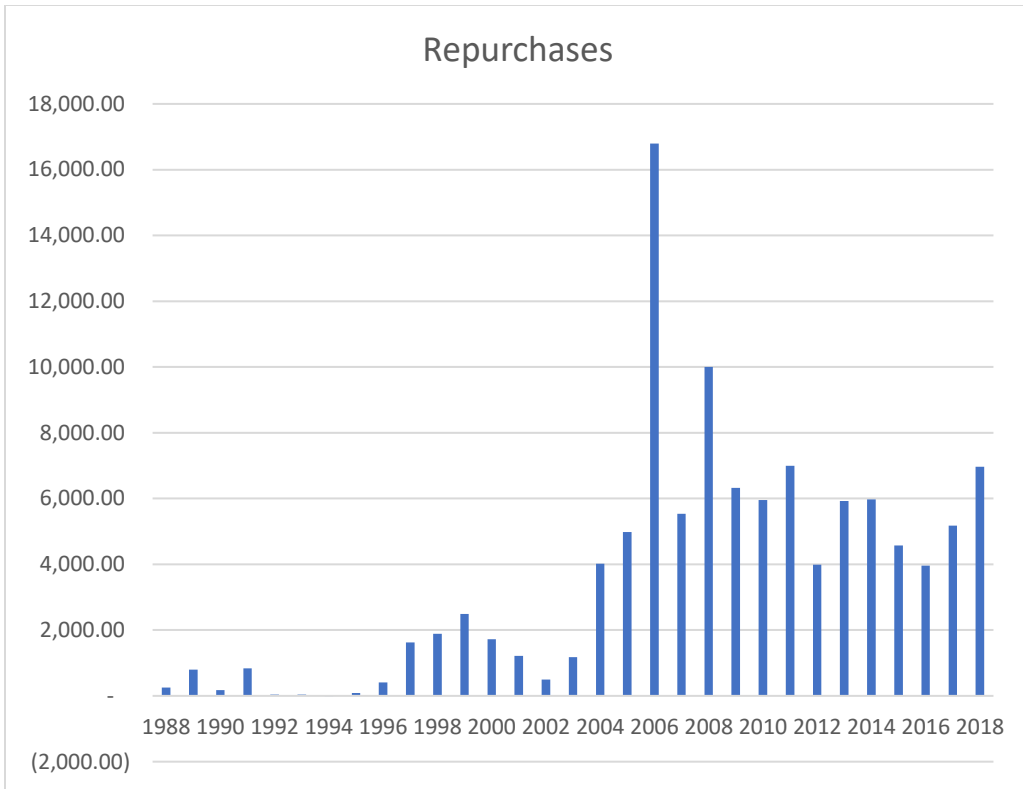
Finally, move the chart into a different worksheet by clicking on the “Move Chart” icon and choosing “New Sheet”.



Repeat these steps for repurchases and total payout. Copy and paste the charts into a Word document or Powerpoint slide by left clicking on the upper portion of the chart and selecting “Copy”. For Proctor & Gamble, the charts look like:



Appendix 3 (Instructions for the activity)





Appendix 3 (Instructions for the activity)

IV. Calculate the growth rates.

First we will calculate the growth rate of dividends per share (DPS). Because the share count changes from year to year, calculating the growth rate of total dividends will reflect both changes in dividends and changes in total shares. Type “DPS growth rate” in cell G1. To calculate the growth rate, type the formula “=B3/B2-1” on cell G3. Copy cell G3 onto cells G4:G32.

Next, calculate the growth rate in repurchases. Type “Repurchases growth rate” in cell H1. On cell H3, type the formula “=D3/D2-1”. Copy cell H3 onto cells H4:H32.

Next, calculate the growth rate in total payout. Type “Total payout growth rate” in cell I1. On cell I3, type the formula “=F3/F2-1”. Copy cell I3 onto cells I4:I32.

	A	B	C	D	E	F	G	H	I
		Dividends per share (DPS)	Total dividends	Repurchases	Revenues	Total payout	DPS growth rate	Repurchases growth rate	Total payout growth rate
1	Year								
2	1988	2.7500	466.00	250.00	19,336.00	716.00			
3	1989	3.0000	504.00	794.00	21,398.00	1,298.00	0.090909	2.18	0.81
4	1990	1.7500	592.00	179.00	24,081.00	771.00	-0.41667	(0.77)	(0.41)
5	1991	1.9500	675.00	837.00	27,026.00	1,512.00	0.114286	3.68	0.96
6	1992	1.0250	694.00	40.00	29,362.00	734.00	-0.47436	(0.95)	(0.51)
7	1993	1.1000	748.00	38.00	30,433.00	786.00	0.073171	(0.05)	0.07
31	2017	2.6981	6,989.00	5,172.00	65,058.00	12,161.00	0.01501	0.30	0.09
32	2018	2.7860	7,057.00	6,965.00	66,832.00	14,022.00	0.032578	0.35	0.15

V. Calculate the average growth rates. We will calculate two growth rates. The first is a long-run average growth rate from the entire period. Next, we will examine if payout patterns have changed after the financial crisis. Many firms suspended or reduced dividend payments in 2009 and 2010. We will calculate dividend growth rates in the years after the financial crisis, from 2011-2018.

For the 30-yr average DPS growth rate, type “DPS 30-yr” on cell L2. On cell M2, type the formula “=AVERAGE(G2:G32).

For the 8-yr average DPS growth rate, type “DPS 8-yr” on cell L3. On cell M3, type the formula “=AVERAGE(G25:G32).

For the 30-yr average repurchase growth rate, type “Rep 30-yr” on cell L4. On cell M4, type the formula “=AVERAGE(H2:H32).

Appendix 3 (Instructions for the activity)

For the 8-yr average repurchase growth rate, type “Rep 8-yr” on cell L5. On cell M5, type the formula “=AVERAGE(H25:H32).

For the 30-yr average total payout growth rate, type “TP 30-yr” on cell L6. On cell M6, type the formula “=AVERAGE(I2:I32).

For the 8-yr average total payout growth rate, type “TP 8-yr” on cell L7. On cell M7, type the formula “=AVERAGE(I25:I32).

H	I	J	K	L	M	N
	Total payout growth rate					
Repurchases growth rate						
				DPS 30-yr	0.023281	
2.18	0.81			DPS 8-yr	0.056336	
(0.77)	(0.41)			Rep 30-yr	0.26	
3.68	0.96			Rep 8-yr	0.07	
(0.95)	(0.51)			TP 30-yr	0.19	
(0.05)	0.07			TP 8-yr	0.04	

VI. Estimate a stock price (intrinsic value) using the constant growth formula on dividends per share.

First we need to calculate the cost of equity ( $r_E$ ). We will use the CAPM formula and assume that the risk-free rate ( $R_f$ ) is equal to 2.25% and the market risk premium (MRP) is equal to 11%. You can obtain your stocks’ betas from the “Betas” spreadsheet posted on the class website.

- On cell L9 type “ $R_f$ ”, on cell M9 enter 0.0225
- On cell L10 type “MRP”, on cell M10 enter 0.11
- On cell L11 type “Beta”, on cell M11 enter (0.34 --- this is Proctor & Gamble’s beta. You can obtain your stocks’ betas from the “Betas” spreadsheet posted on the class website.)
- On cell L12 type “ $R_e$ ”, on cell M12 type the formula “=M11\*M10+M9”

Finally, we will calculate two (intrinsic value) prices using the 30-year and 8-year DPS average growth rates respectively.

- On cell L14 type “P30-yr”, on cell M14 type the formula “=B32\*(1+M2)/(M12-M2)”
- On cell L15 type “P8-yr”, on cell M15 type the formula “=B32\*(1+M3)/(M12-M3)”

Appendix 3 (Instructions for the activity)

We can compare the stock price estimates with the actual stock price that we obtain from Yahoo!Finance. On cell L16 type "StkPrice", on cell M16 enter the stock price (for P&G, it is \$122.12)

H	I	J	K	L	M	N
	Total payout growth rate					
Repurchases growth rate				DPS 30-yr	0.023281	
2.18	0.81			DPS 8-yr	0.056336	
(0.77)	(0.41)			Rep 30-yr	0.26	
3.68	0.96			Rep 8-yr	0.07	
(0.95)	(0.51)			TP 30-yr	0.19	
(0.05)	0.07			TP 8-yr	0.04	
(1.34)	0.06					
(7.54)	0.25			Rf	0.0225	
3.76	0.44			MRP	0.11	
3.01	0.89			Beta	0.34	
0.16	0.14			Re	0.0599	
0.32	0.23					
(0.31)	(0.15)			P30-yr	77.85291	
(0.30)	(0.11)			P8-yr	825.7795	
(0.59)	(0.19)			StkPrice	122.12	
1.36	0.34					

VII. Questions for discussion. In your write-up (or class presentation) please address the following points for the two stocks that you covered:

- Describe the historical pattern of dividends, repurchases, and total payouts for each stock.
- Is there a difference between the payout practices between the two companies? To what can you attribute this difference? (Hint: among other things, you can examine the growth in revenues for the two companies.)
- Does the constant growth model applied to DPS return a stock price estimate that is close to the current market price? Why or why not? What variables/assumptions could affect the constant growth formula estimates?
- Assuming you know the number of shares outstanding, would the constant growth formula be applicable to the total payout for either stock that you looked at? Why or why not?

## Appendix 4 (How to extract data from WRDS)

### Instructions for data extraction

To Conduct a web query through WRDS, you need to follow the steps below

- Log into the WRDS website <http://wrds-web.wharton.upenn.edu/wrds/>. Click on Sign In and key in the class username and password distributed in class to log in. If you see the Terms of Use page, make sure you select Accept.
- After logging in, you need to decide on the database you want to search. You can see what data we are subscribed to by clicking on the Get Data tab.
  - If you need to get the stock return information, you need to click on CRSP. It will then direct you to the CRSP main page. Select Stock/Security files, which will take you to the frequency page. If you need to get the monthly stock returns, which is normally the case if you want to obtain beta, you should click on Monthly Stock File tab. That will direct you to the main search page for monthly stock returns.
  - You need to tell WRDS what data to extract for you: the date range, the list of companies, the variables for these companies, and finally how to output these data, so you can analyze them afterwards.
    - At the Data Range, please specify the begin and end year and month
    - At the Company Codes, please select ticker (tic) as the firm identifier. We will provide you the list of firm tickers. If you have just a few firms, list their ticker symbols in the space provided, separated by spaces. If you have a large number of firms, read the on-line directions for creating a .txt file that contains the ticker symbols, one per row.
    - At the Query Variables, please select the following
      - ✓ CUSIP
      - ✓ Company Name
      - ✓ TICKER
      - ✓ SIC Code
      - ✓ Holding Period Return (this is the monthly rate of return inclusive of dividends and adjusted for splits)
      - ✓ Value-Weighted Return (includes distributions)
    - At the Output, please select Excel spreadsheet (\*.xlsx), so you can work on it in Excel.
    - Once done, just click Submit Query.
    - Now you just have to wait patiently. When it is ready, a link appears that contains your file. WRDS gives it a filename that ends with .xlsx. Right click on this link and save it to your hard-drive, key drive, etc. You may want to rename the file, so it will be easier for you to identify later.
  - If you need to get the accounting level information, you need to click on COMPUSTAT – Capital IQ. It will then direct you to the COMPUSTAT main page.

## Appendix 4 (How to extract data from WRDS)

Select North America – Annual Updates. You will then choose between Fundamental Annual and Fundamental Quarterly. We normally work with annual data, so let's click on the Fundamental Annual tab, which will take you to the main Query page.

- Similar to CRSP, you also need to tell WRDS what data to extract for you: the date range, the list of companies, the screening variables, and the query variables.
  - At the Date Range, you need to first choose Fiscal Year for Date Variable. You can then input the year and month that's given to you
  - At the Company Codes, please select ticker (tic) as the firm identifier. We will provide you the list of firm tickers. If you have just a few firms, list their ticker symbols in the space provided, separated by spaces. If you have a large number of firms, read the on-line directions for creating a .txt file that contains the ticker symbols, one per row.
  - At the Screening Variables, please don't change anything. They are pre-selected already for your convenience.
  - At the Query Variables, please select the ones that we are asking in the project requirements.
  - At the Output, please select Excel spreadsheet (\*.xlsx), so you can work on it in Excel.
  - Once done, just click Submit Query.
  - Now you just have to wait patiently. When it is ready, a link appears that contains your file. WRDS gives it a filename that ends with .xlsx. Right click on this link and save it to your hard-drive, key drive, etc. You may want to rename the file, so it will be easier for you to identify later.

If you follow the step-by-step instruction above, you should be able to pull the requested information from WRDS easily.