

Valuation of Alphabet Inc.

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70-391: Finance

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1 Executive Summary

Alphabet Inc. is an American multinational conglomerate headquartered in Mountain View, California. Alphabet Inc. was founded recently in October 2nd, 2015 by Larry Page and Sergey Brin through a corporate restructuring of Google Inc. Alphabet Inc. is a holding company with Google as its main subsidiary. In total, Alphabet Inc. owns over 200 different companies and employs over 98,000 people. Alphabet Inc. makes about 84% of their yearly revenue from advertising and ranks 27th among Fortune 500 companies. Alphabet Inc. is in the technology sector and internet content and information industry. Some of their products include technology, internet, software, life sciences, autonomous cars, research and development, biotechnology, video games, among others.

Alphabet Inc. has more than 70 offices operating in over 50 countries. Alphabet Inc. has its operations in very geographically diverse places because of how it carries out operations around the world. By having operations geographically dispersed, Alphabet Inc. has easier access to information, especially to any news regarding recent releases of new technology. This makes it easier for Alphabet Inc. to operate because by having operations around the globe, if a problem occurs, they'll have an easier time pinpointing the issues.

Since the current prices of Class A and Class C shares are \$1240.14 and \$1236.34 respectively (both as of 4/17/19) and the estimated price from our valuation is \$1290, we recommend investors to buy Class A or Class C shares of Alphabet Inc. for this reason and various others that shall be covered later in our report.

1.1 Alphabet Inc. and the Technology Industry

The technology industry appears to be a highly profitable and still growing industry that is estimated to be valued at \$3 trillion, and is still expected to grow exponentially in the next 20 years. Alphabet Inc. is one of the leaders in the industry, and is expected to keep leading the industry for the next 10 years at least. Alphabet Inc. keeps investing in innovative technology and also in startups to diversify its business. With technology on the rise all over the world, investing in Alphabet Inc. would be a good idea because investors are expected to get 1.04 times the return over the next few years if they were to invest now.

1.2 Opportunities in the Technology Industry

Technology is in demand all over the world. The demand for new technology and updates is especially prevalent in Asian countries, specifically China. The companies from China are constantly competing with Alphabet Inc. to become the leading technology leaders. Even in 3rd world countries, there has been a rise of technology usage as well. Technology is perceived as something that is designed to make people's lives easier and more convenient. The newest technology upgrades and gadgets are especially desirable all over the world, which is why there are numerous opportunities for people who are well-versed in technology. Technology is also supposed to be able to raise the educational level of people all over the world because of how it makes information so accessible no matter where people are in the world. This raises the intellectual level of human beings in general, which is why technology is valued so highly in society. Because of this, Alphabet Inc. has many opportunities to explore more areas of undiscovered technology and to make more advances in technology as well. By making more advances, this will keep Alphabet Inc. as a leader in the technology sector, which would only succeed in increasing Alphabet Inc.'s valuation and return for its investors.

An interesting sector to invest in within technology would be Artificial Intelligence (AI). The AI sector is expected to be worth \$13 trillion by 2030. Alphabet Inc. has already started making advances in this sector by using AI technology for Health, Automobiles, and also across other industries. Google has gone so far as to have developed an AI system that has created its own "child", and the original AI system has been able to train its creation to a level that it outperforms every other human-built AI system similar to it, which shows just how strong technology is. With these kinds of opportunities and advances that Alphabet Inc. has already made, Alphabet Inc. is viewed as a very attractive technology company to invest in.

2 Board of Directors

Name	Title	Independent/ Inside
Lawrence Page	CEO, CO - Founder, and Director (Principal Executive Officer)	Inside
Sergey Brin	President, CO - Founder, and Director	Inside
John L. Hennesy	Director, Chair	Independent
Eric E. Schmidt	Director	Inside
L. John Doerr	Director	Independent
Roger W. Ferguson, Jr.	Director	Independent
Diane B. Greene	Director	Inside
Ann Mather	Director	Independent
Alan R. Mulally	Director	Independent
Sundar Pichai	Director	Inside
K. Ram Shriram	Director	Independent

Figure 1: Board of Directors

2.1 Committees

- Audit Committee
- Leadership Development and Compensation Committee
- Nominating and Corporate Governance Committee
- Executive Committee

2.2 Directors on the Leadership Development and Compensation Committee

- L. John Doerr
 - Independent
- K. Ram Shriram
 - Independent

2.3 Fraction of the Compensation Committee that are Inside Directors

0% of the Committee's directors are inside directors.

2.4 Effectiveness of the Board of Directors

Although Alphabet Inc.'s board of directors has 5 insider directors, it has 6 independent directors, so a majority of the board is independent. Another thing of note is that the Chair of the Board is an independent director and not the CEO. Also, the compensation committee only has independent directors. In addition, the company has corporate governance guidelines outlined under investor relations on the company website, guidelines which clearly exist to work in the best interest of shareholders. From the above observations, we believe that the board of directors is effective in performing its corporate governance function.

2.5 Sources

The appendix contains screenshots of:

Figure 1a: Current Board of Directors, from last page of latest 10-K

Figure 1b: Committee composition, and whether director is inside/independent, from 2018 Proxy Statement

3 Major shareholders

It is noteworthy that Alphabet Inc. has 3 classes of shares: A, B, and C. Classes A and C are publicly traded whereas Class B is privately traded and completely held by insiders. Class A shares have 1 vote each, Class B shares have 10 votes each, and Class C shares have no voting power. We only really care about share classes that have votes, so in examining ownership, we only look at Class A and Class B shares. It is easy to obtain from Yahoo! Finance that there are 299.36 million Class A shares, but harder to obtain info on private Class B shares. The most recent 10-K, published in February 2019, states that there are 46.5 million Class B shares as of Jan. 30, 2019. Since the Class A shares' number on Jan. 30, 2019 roughly matched the number of such shares on April 17, 2019, we assumed that the number of Class B shares outstanding did not change from January, and used both numbers.

3.1 Percent of Firm's Shares Held by Insiders

0.10% of firm's Class A shares

13.53% of firm's shares with voting powers *

60.87% in terms of voting power **

* Weighted avg. of share classes A and B in terms of number:

$$(46.5 + 0.001*299.36)/(299.36+46.5) = 0.1353$$

** Weighted avg. of share classes A and B in terms of voting power:

$$(46.5 * 10 + 0.001*299.36) / (299.36 + 46.5*10) = 0.6087$$

3.2 Percent of Firm's Shares Held by Institutional Investors

99.3% of firm's Class A shares

85.95% of firm's shares with voting powers *

38.89% in terms of voting power **

* Weighted avg. of share classes A and B in terms of number:

$$(0.993*299.36)/(299.36 + 46.5) = 0.85949$$

** Weighted avg. of share classes A and B in terms of voting power:

$$(0.993*299.36)/(299.36 + 46.5*10) = 0.3889$$

Individual investors own about 5.19% of shares with votes, and have about 2.35% voting power.

3.3 The Firm's Marginal Investor

Alphabet Inc.'s marginal investor is the Institutional Investor because much of the Class A shares and much of the shares with votes are held by institutional investors. Institutional investors hold 99.3% of Class A shares and 85.95% of shares with votes. Because the marginal investor is an institutional investor, they can be also be assumed to be well diversified. Thus, the marginal investor should only face systematic risk.

3.4 Capacity of Individual Investors to Influence Management

In terms of voting power, insiders hold 60.87% and institutional investors hold 38.89%. Individual investors only hold 2.35% of the voting power, which represents only a very small share of ownership. Thus, individual investors do not have the ability to influence management. In terms of voting power, not absolute number, there is high ownership concentration by insiders. According to the 10-K published in Feb. 2019, Larry Page, Sergey Brin, and Eric E. Schmidt own enough Class B shares to have 56.6% of the voting power. These 3 insiders hold considerable influence over management. Alphabet Inc. has also issued 349.29 million Class C shares, which have no voting rights, to ensure that insiders such as those three can retain relative ownership of the voting power. Hence, there is weak shareholder governance for small investors.

3.5 Sources

The appendix has screenshots of the Bloomberg Pages that contain:

Figure 2a: The percent of Class A shares held by insiders (DES)

Figure 2b: The percent of Class A shares held by institutional investors (DES)

Figure 2c: The firm's largest shareholders (HDS)

4 Firm Characteristics

(in millions of USD)	2014	2015	2016	2017	2018	Source
Revenue	66,001	74,989	90,272	110,855	136,819	10-K
EBIT	16,877	19,360	23,716	28,882	31,392	10-K
Depr. & Amort.	4,979	5,063	6,144	6,915	9,035	10-K
Capital Expenditures	10,959	9,950	10,212	13,184	25,139	10-K
Current Assets	78,656	90,114	105,408	124,308	135,676	10-K
Current Liabilities	16,779	19,310	16,756	24,183	34,620	10-K

Figure 2: Alphabet Inc.'s Financial Statement Data

Book Value of Debt	\$4,000 million	Bloomberg
Sum of cash, cash equiv., and marketable sec.	\$109,140 million	10-K
Number of Class A Shares Outstanding	299.36 million	Nasdaq
Curr. Market Price per Class A Share	\$1240.14	Yahoo! Finance
Number of Class C Shares Outstanding	349.29 million	Nasdaq
Curr. Market Price per Class C Share	\$1236.34	Yahoo! Finance
Market Capitalization	\$859,490 million	Yahoo! Finance
Risk Free Rate	2.60%	FRED (DGS10)
Beta (Adj.)	1.131	Bloomberg
Credit Rating	Aa2/AA+	Bloomberg

Figure 3: Alphabet Inc.'s Market Data

4.1 Sources

In appendix, can find screenshots of Bloomberg pages for:

Figure 3a: Total Debt (DDIS)

Figure 3b: Beta (BETA)

Figure 3c: Credit rating (CRPR)

5 Cost of Capital Calculation

	Equity	Debt	Capital
Market Value (in millions USD)	\$859,490.00	\$4,000.00	\$856,490.00
Weight in cost of capital	99.54%	0.46%	100%
Cost of component and, in italics, WACC	8.23%	3.169%	<i>8.21%</i>

Figure 4: Weighted Average Cost of Capital Table

5.1 Estimated Default Spread

Since the credit rating of Alphabet Inc. is Aa2/AA+, the closest rating in the table is Aa2/AA, which means an estimated default spread of 1.00%.

5.2 Estimated Cost of Debt

The pre-tax cost of debt is 3.60%, which is calculated by adding the default spread, 1.00% and the risk free rate, 2.60%. Therefore, multiplying the pre-tax cost of debt by 1 minus the tax rate, 12%, gives the estimated after-tax cost of debt of 3.169%.

5.3 Equity

The market value of equity is \$859,490 million.

Weight in cost of capital is 99.54%

Cost of component is 8.23%

Normally the market value of equity is obtained by multiplying share price and number of shares outstanding. However, since Alphabet Inc. has multiple share classes and it does not publish info on Class B shares, we directly use the market capitalization since it is synonymous with market value of equity. The cost of component for equity is calculated through the CAPM equation, by adding the risk free rate, 2.6% to the beta, 1.131, multiplied by the ERP, 4.98%. For the ERP, we decided to use NYU Professor Damodaran's most recently published trailing 12-month adjusted estimate because he is generally respected as an expert at estimating ERPs. We also assume that the market portfolio return will match the return of the S&P 500 index, since it is a pretty large group of stocks, which should be pretty representative.

5.4 Debt

The market value of debt is \$4,000 million

Weight in cost of capital is 0.46%

Cost of component is same as after-tax cost of debt, so it equals 3.169%.

5.5 Capital

The market value of capital is \$863,490 million

The cost of capital, or WACC, is 8.21%. The WACC is calculated by the formula:

$WACC = E/(E+D)*Re + D/(E+D)*Rd*(1-t)$, where E = Equity, D = Debt, Re = Cost of equity, Rd = Cost of debt, and t = tax rate.

6 Valuation

Valuation Calculation	
Terminal Cash Flow	\$ 68,082
Terminal Cost of Capital	8.21%
Terminal Value	\$1,213,823
PV (Terminal Value)	\$ 551,473
PV (10 Forecasted CF)	\$ 168,228
PV	\$ 719,702
Value of Operating Assets	\$ 719,702
Debt	\$ 4,000
Cash	\$ 109,140
Value of Equity	\$ 824,842
Number of shares (in millions)	639.65
Estimated Value per Share	\$ 1,290
Market price per share	\$ 1,238.06
Value as a percent of price	104%

Figure 5: Valuation Calculation

6.1 Evaluate the Estimated Value

104%

6.2 Why this Figure Differs from 100%

This figure differs from 100% possibly because of the various assumptions we made in calculating cash flows. Since Alphabet Inc. had a very high average revenue growth rate of 20.1%, meaning that it is still growing rapidly, we assumed it would keep the same revenue growth rate for the first five years of valuation, before decreasing linearly stepwise to the terminal growth rate, instead of decreasing linearly in terms of rate from the first year of valuation. We might be assuming too much growth by keeping the revenue growth rate at that high of a number for that many years. This would result in too much revenue, causing a higher estimated share price. Also, maybe the assumed terminal growth rate of 3.0%, chosen to match the expected average growth rate of the U.S. GDP might be too high, making free cash flows too high, resulting in higher revenue, causing the higher share price.

Another assumption that could throw off the valuation is the use of the effective tax rate instead of tax rate including local, state, and federal tax rates, because it was more easily obtainable. We also assume that the most recent effective tax rate of 12.0% will stay the same throughout all years of valuation because the corporate tax rate decreased only last year from 35% to 21%, which made it unreasonable to use the average effective tax rate over the past 5 years, which would have been too high. However, 12.0% is a pretty low tax rate, which might not carry forward depending on various possible fluctuations due to unforeseen tax law changes and etc. It might end up being higher in future years in actuality, so underestimating the tax rate would result in a higher estimated share price too.

Yet another assumption we made that could be off is the assumption that the change in net working capital grows at half the rate of the annual capital expenditures growth rate, since usually, for sake of simplicity, we would assume that the revenue, operating income, and capital expenditures all grow at the same rate every year, but ~ 20% growth in change in net working capital every year would be too high. However, it seems that we might have reduced the growth rate by too much, and should actually increase it to more than half of capital expenditures growth, since the estimated share price is too high.

Some other assumptions that we made that could throw valuation off are our numbers for number of shares and market price per share. For the market price per share, because there are multiple share classes, and information on Class B shares is unavailable, we calculated it as an average of just the prices of Class A and Class C shares, weighted by the numbers of shares just for those classes. Because we didn't incorporate the price of Class B shares, for the number of shares, we just assumed it was the sum of only Class A and Class C shares. Not incorporating Class B shares into the calculation would definitely throw off the valuation, and cause it to overvalue the firm.

In terms of corporate governance, we are assuming no change in Alphabet Inc.'s policies and that there is no change in the ratio of insider to independent members of board, as well as any addition of insider members to the compensation committee.

As outlined in our executive summary, we are recommending investment in Alphabet Inc. because we valued the company at 104% of the current market price per share weighted between Class A and Class B shares, as well as because the company is a leader of a still rapidly growing industry that is very attractive to investment.

6.3 Alternative Approaches to Valuation

Regarding valuation, there are other approaches that we could take. One other approach is doing a comparable company analysis, wherein we evaluate some companies similar to Alphabet Inc. and apply their valuation metrics to it. For example, we could take P/E values or other multiples and compare them to those of companies in the same industry as Alphabet Inc. We could average these values and multiply by Alphabet Inc.'s earnings divided by number of shares. By doing this, we can eliminate some of the simplifying assumptions, such as the equity risk premium, and possibly result in an estimated value per share closer to the market price per share.

Appendix

Signature	Title	Date
/s/ LARRY PAGE Larry Page	Chief Executive Officer, Co-Founder, and Director (Principal Executive Officer)	February 4, 2019
/s/ RUTH M. PORAT Ruth M. Porat	Senior Vice President and Chief Financial Officer (Principal Financial Officer)	February 4, 2019
/s/ AMIE THUENER O'TOOLE Amie Thuener O'Toole	Vice President and Chief Accounting Officer	February 4, 2019
/s/ SERGEY BRIN Sergey Brin	President, Co-Founder, and Director	February 4, 2019
/s/ JOHN L. HENNESSY John L. Hennessy	Director, Chair	February 4, 2019
/s/ ERIC E. SCHMIDT Eric E. Schmidt	Director	February 4, 2019
/s/ L. JOHN DOERR L. John Doerr	Director	February 4, 2019
/s/ ROGER W. FERGUSON, JR. Roger W. Ferguson, Jr.	Director	February 4, 2019
/s/ DIANE B. GREENE Diane B. Greene	Director	February 4, 2019
/s/ ANN MATHER Ann Mather	Director	February 4, 2019
/s/ ALAN R. MULALLY Alan R. Mulally	Director	February 4, 2019
/s/ SUNDAR PICHAI Sundar Pichai	Director	February 4, 2019
/s/ K. RAM SHRIRAM K. Ram Shriram	Director	February 4, 2019

Figure 1a: This exhibit presents Alphabet Inc.'s Board of Directors. It comes from 2018's 10-K.

Name	Age	Director Since	Occupation	Experience/ Qualification	Independent	Membership on Standing Committees				
						AC	LDCC	NCGC	EC	
Larry Page	45	1998	Chief Executive Officer, Alphabet, and Co-Founder	Leadership, Technology						
Sergey Brin	44	1998	President, Alphabet, and Co-Founder	Leadership, Technology						✓
Eric E. Schmidt	62	2001	Technical Advisor, Former Executive Chairman, Alphabet	Leadership, Technology						
L. John Doerr	66	1999	General Partner of Kleiner Perkins Caufield & Byers	Leadership, Technology, Finance, Global, Industry	✓					
Roger W. Ferguson, Jr.	66	2016	President and Chief Executive Officer of TIAA	Leadership, Finance, Global	✓	✓				
Diane B. Greene	62	2012	Senior Vice President, Chief Executive Officer, Google Cloud, Former Chief Executive Officer and President of VMware	Leadership, Technology, Industry						
John L. Hennessy	65	2004	Former President of Stanford University	Leadership, Education, Technology	✓ *					
Ann Mather	58	2005	Former Chief Financial Officer of Pixar	Leadership, Finance	✓					
Alan R. Mulally	72	2014	Former Chief Executive Officer and President of Ford Motor Company	Leadership, Finance, Global, Industry	✓	✓				
Sundar Pichai	45	2017	Chief Executive Officer, Google	Leadership, Technology						✓
K. Ram Shriram	61	1998	Managing Partner of Shervette Ventures	Leadership, Technology, Global, Industry	✓			✓		

AC	Audit Committee		Committee Chairperson
LDCC	Leadership Development and Compensation Committee		Audit Committee Financial Expert
NCGC	Nominating and Corporate Governance Committee	★	Chairman of the Board of Directors
EC	Executive Committee		

Figure 1b: This exhibit is a screenshot from Alphabet Inc.'s last published DEF-14A for its annual shareholder meeting in 2018. From this, we obtained info about whether each director of the board was inside or independent; the committees and their makeup; and the percentage of insiders on the compensation committee.

11) Insider Holdings OWN »	
% Held by Insiders	0.10%
Net Change Last 6M	-6.48%

Figure 2a: This exhibit presents a screenshot of the section of Bloomberg’s DES page that contains information on Alphabet Inc.’s insider ownership for Class A shares.

8) Inst Holdings OWN »	
# of Inst. Owners	3,682
Shares Owned	297.32M
Shares Out/Float	99.3%/99.4%
# of Buyers/Sellers	1.378k/1.3...
Shares Bought	23.16M

Figure 2b: This exhibit presents a screenshot of the section of Bloomberg’s DES page that contains information on Alphabet Inc.’s institutional ownership for Class A shares.

GOOGL UW \$ C 1231.91 +5.38 Q1231.71 / 1232.13Q 2x4

On 16 Apr d Vol 386,468 O 1230.00Q H 1235.87Q L 1225.47Q Val 475.949M

GOOGL UW Equity 25) Export Settings Security Ownership

ALPHABET INC-CL A CUSIP 02079K30

1) Current 2) Historical 3) Matrix 4) Ownership Summary 5) Insider Transactions 6) Options 7) Debt

Search Name All Holders, Sorted by Size 21) Save Search 22) Delete Search 23) Refine Search

Text Search Holder Group All Holders Investment Manager View

24) Color Legend Shrs Out 299.4M % Out 84.07 Float/Shrs Out 99.86 SI % Out 0.63

Holder Name	Portfolio Name	Source	Opt	Position	% Out	Latest Chg	File Dt
		All	All				
1. Vanguard Group I...		ULT-AGG		21,943,224	7.33	0	12/31/18
2. BlackRock Inc		13G		18,767,367	6.27	0	12/31/18
3. FMR LLC		13G		16,125,005	5.39	0	12/31/18
4. State Street Corp		ULT-AGG		10,742,476	3.59	140,396	12/31/18
5. Capital Group Cos...	Multiple Portfol...	13F		10,107,670	3.38	-270,733	12/31/18
6. T Rowe Price Gro...		ULT-AGG		7,061,458	2.36	479,518	12/31/18
7. Wellington Manag...	WELLINGTON MA...	13F		3,991,885	1.33	447,806	12/31/18
8. Norges Bank	NORGES BANK	13F		3,896,181	1.30	391,643	12/31/18
9. Geode Capital Ma...	GEODE CAPITAL...	13F		3,825,248	1.28	252,414	12/31/18
10. Northern Trust C...	NORTHERN TRU...	13F		3,782,363	1.26	148,429	12/31/18

Figure 2c: This exhibit presents a screenshot of Bloomberg’s HDS page for Alphabet Inc. It contains the information regarding the firm’s largest shareholders for Class A shares. We see that Vanguard Group Inc., BlackRock Inc., FMR LLC, State Street Corp, and Capital Group Cos. are the five largest shareholders of Class A shares. We can see that ownership concentration is low for Class A shares since no investor owns more than 7.33% of these shares, though we cannot say that for Alphabet Inc. overall.



Figure 3a: This exhibit presents a screenshot of Bloomberg’s DDIS page for Alphabet Inc., displaying “Total Debt” in Curr USD (MLN), under Consolidate setting of “Curr Issr & Subs” and Payments setting of “Principal Only”. This “Total Debt” value is what we used as a proxy for the book value of debt in the calculation of the cost of capital.

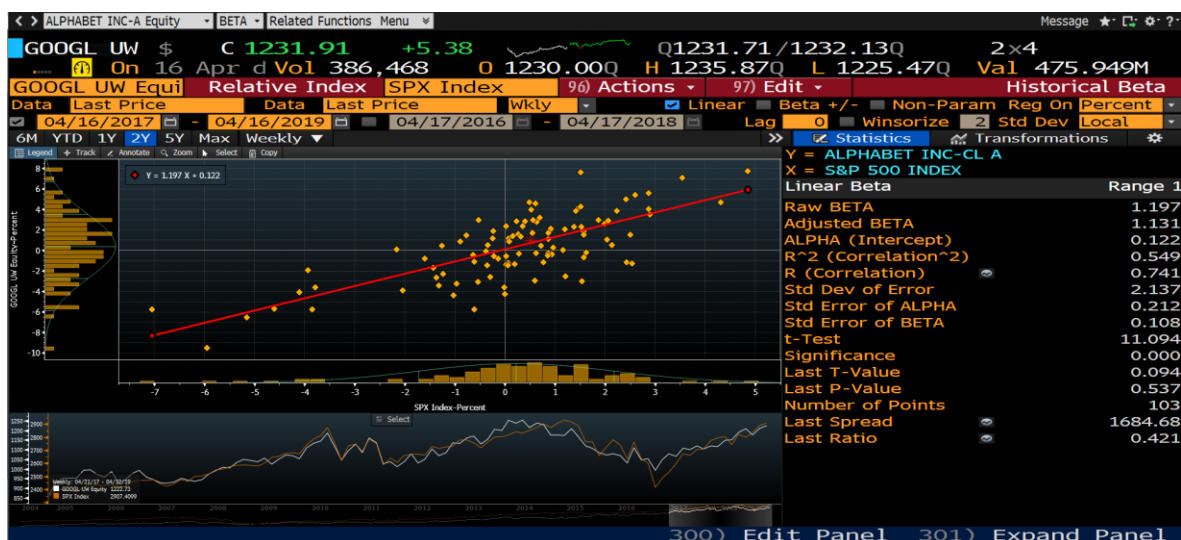


Figure 3b: This exhibit presents a screenshot of Bloomberg’s BETA page for Alphabet Inc. It shows Alphabet Inc.’s adjusted beta.

ALPHABET INC-A Equity			
CRPR - Related Functions Menu			
GOOGL UW \$	C	1231.91	+5.38
On 16 Apr d	Vol	386,468	0.1
GOOGL UW Equity			
Alphabet Inc			
1) Bloomberg Default Risk DRSK »			
Moody's			
2) Outlook		STABLE	
3) Issuer Rating		Aa2	
4) Long Term Rating		Aa2	
5) Senior Unsecured Debt		Aa2	
6) Short Term		P-1	
7) Standard & Poor's			
8) Outlook		STABLE	!
9) LT Foreign Issuer Credit		AA+	
10) LT Local Issuer Credit		AA+	
11) ST Foreign Issuer Credit		A-1+	
12) ST Local Issuer Credit		A-1+	

Figure 3c: This exhibit presents a screenshot of Bloomberg’s CRPR page for Alphabet Inc. It shows Alphabet Inc.’s credit ratings by Moody’s and Standard & Poor’s.