



# ENGR 111 Project

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## Introduction

### Overview

Alibaba Group Holding Limited, also known as Alibaba, is a Chinese multinational technology company specializing in e-commerce, retail, Internet, and technology. Founded on 28 June 1999 in Hangzhou, China, the company provides consumer-to-consumer (C2C), business-to-consumer (B2C), and business-to-business (B2B) sales services via web portals, as well as electronic payment services, shopping search engines, and cloud computing services. It owns and operates a diverse portfolio of companies around the world in numerous business sectors.



### IPO

On 19 September 2014, Alibaba's initial public offering (IPO) on the New York Stock Exchange raised US\$25 billion, giving the company a market value of US\$231 billion and, by far, then the largest IPO in world history. It is one of the top 10 most valuable corporations and is named the 31st-largest public company in the world on the Forbes Global 2000 2020 list.



## Market

Alibaba is one of the world's largest retailers and e-commerce companies. In 2020, it was also rated as the fifth-largest artificial intelligence company. It is also one of the biggest venture capital firms, and one of the biggest investment corporations in the world. The company hosts the largest B2B, C2C, and B2C marketplaces in the world. Competitors in the B2B market include Amazon Business, ExportHub, and so on, but none of their influence is comparable to Alibaba's. Its biggest competitors in the C2C and B2C retail markets include JD.com & Pinduoduo in China and eBay & Amazon globally. Its biggest competitors in the cloud computing market are Tencent & Huawei in China, and Amazon, Microsoft & Google globally.



## SWOT Analysis

A quick analysis that shows the strengths, weaknesses, opportunities and threats of Alibaba.

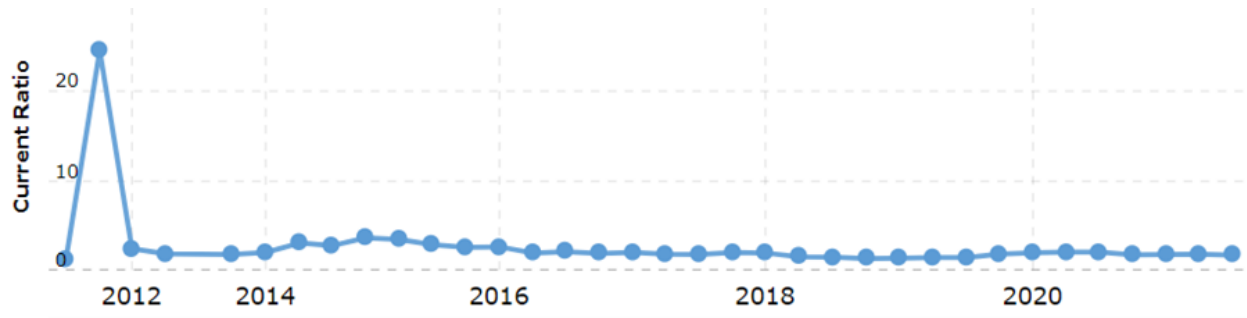
- **Strengths:** dominating B2B market share internationally; dominating B2C/C2C market share in China
- **Weaknesses:** limited B2C/C2C & cloud computing influence outside China
- **Opportunities:** foreseeable strong demand for online shopping & cloud computing services globally due to COVID-19
- **Threats:** entry of new B2C/C2C competitors in China such as Pinduoduo drastically encroaching its customer base and sales due to price advantage; crackdown from the Chinese government on tech companies due to privacy and monopoly concerns

## References:

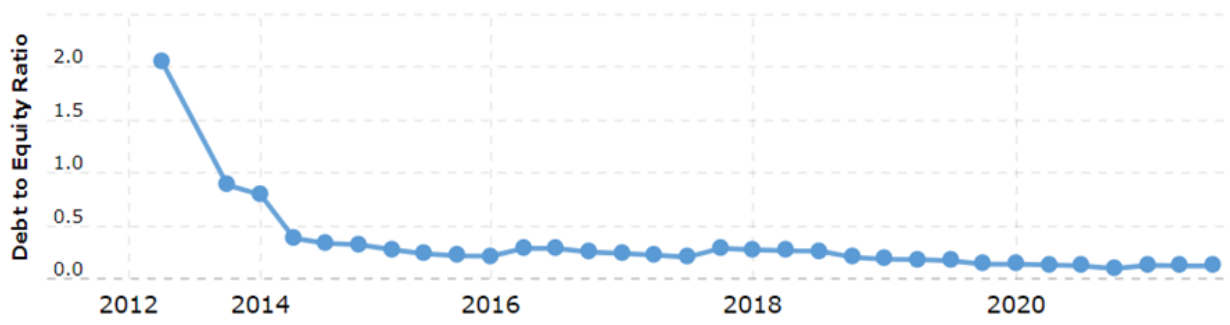
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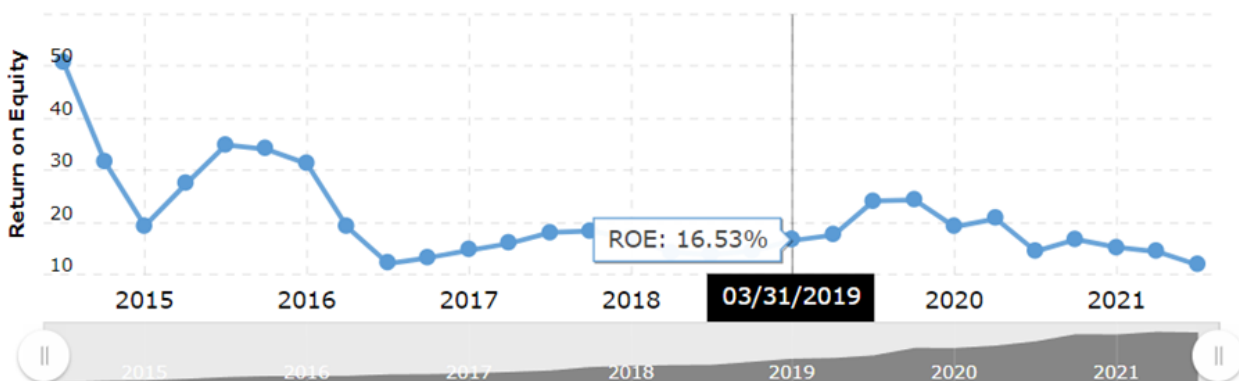
## Ratio Analysis



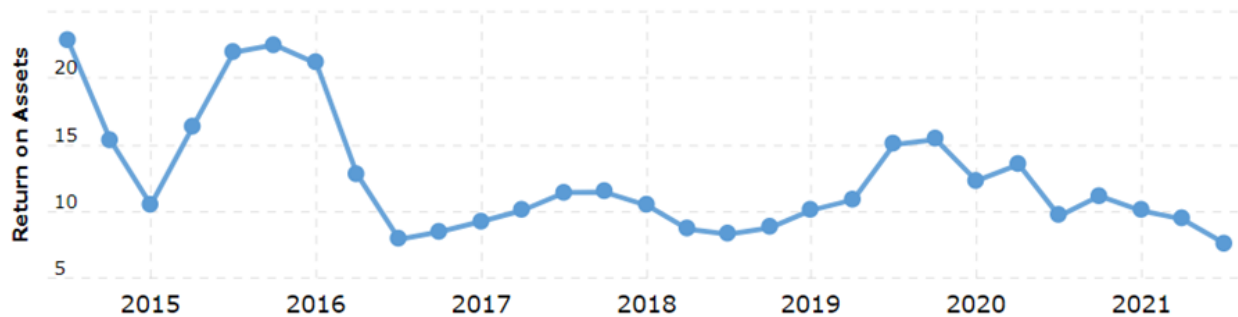
The above graph shows Alibaba's current ratios from 2010 to 2022. Excluding the outlier of 2011, the company's current ratio is mostly around 1.8 which is an ideal current ratio (anywhere between 1.5 and 3.0). This indicates that while the company has enough capacity to pay its current liabilities, it is also managing its assets efficiently. Moreover, the source also indicates that Alibaba has a nice quick ratio of 1.64 throughout the years.



In terms of debt-to-equity ratio, Alibaba shows a decreasing trend over these years. From above 0.3 in 2014 to around 0.12 after 2020, Alibaba made its stocks less risky for the shareholders. This ratio was extremely high before 2014 which is probably because the company was still in rapid expansion and thus had to borrow a lot of money from lenders as leverage to grow.



The ROE ratio of the company fluctuates a lot but it is always around 15% to 20%, which is also an ideal value. This indicates that the company is utilizing its shareholders' equities efficiently (ROE not too low) and the company is not overly indebted (ROE not too high).



Like its ROE, Alibaba's ROA also fluctuates but is always within the range of healthy values. The ROA is a little lower than the ROE because the company does not have zero debt. Corresponding to previous results, the company is not heavily in debt and it is using assets efficiently to generate its income.

In conclusion, the ratios of Alibaba are mostly in a relatively stable and healthy condition in recent years, despite some zigzagging in the beginning. The company is generally **operating efficiently with great capacity and liquidity**.

#### References:

- "Alibaba Balance Sheet 2010-2022: Baba." *Macrotrends*, <https://www.macrotrends.net/stocks/charts/BABA/alibaba/balance-sheet>.

## Growth

Table below shows the sales/revenue of Alibaba in millions of US Dollars. Sales growth is calculated by the formula  $(Sales_{t+1} - Sales_t)/Sales_t \times 100\%$ .

	Alibaba		JD.com		Tencent	
Year	Revenue (million USD)	Growth (%)	Revenue (million USD)	Growth (%)	Revenue (millions USD)	Growth (%)
2014	8,463		18,535.01		12,850.12	
2015	12,293	45.256	27,985.88	50.989	16,551.69	28.806
2016	15,686	27.601	37,465.31	33.872	22,866.67	38.153
2017	22,994	46.589	55,689.37	48.642	35,188.48	53.885
2018	39,898	73.515	67,197.98	20.666	47,248.06	34.271
2019	56,152	40.739	82,864.84	23.314	54,593.72	15.547
2020	71,985	28.197	114,299.10	37.934	69,851.07	27.947
2021	109,480	52.087	N/A	N/A	N/A	N/A
average	42,119	44.855	57,720	35.903	37,021	33.102
* N/A: no available data						

As seen from the table, Alibaba has positive sales growth from 2015 to 2021. Compared to its competitors JD.com and Tencent, the average sales growth for Alibaba is higher, but the absolute revenue is lower than JD.com.

Based on Alibaba's growth rate, we can project the growth rate next year to be approximately 45% and construct the Pro Forma Income Statement as shown in the table below:

Alibaba Pro Forma Income Statement			
	2021		2022
Sales	109,480	-	158746
Cost	84,208	76.92%	122101.6
Pre-tax Income	25,272	23.08%	36644.4
Taxes(17%)	4,469	4.08%	6480.05
Net Income	20,803	19.00%	30164.35
Dividends	0	0.00%	0
Retained Earnings	20,803	19.00%	30164.35

\* Note that dividends of Alibaba equals zero because it does not currently pay any dividend to its shareholders.

The Pro Forma Balance Sheet is shown below:

Alibaba Pro Forma Balance Sheet							
	2021		2022		2021		2022
Cash and Short Term Investments	69,064	63.08%	100,142.80	Accounts Payable	847	0.77%	1,228.15
Total Receivables	8,132	7.43%	11,791.40	Notes Payable	0	-	40978.35
Inventory	3,980	3.64%	5,771.00	Accrued Expenses	26,028	-	26,028.00
Prepaid Expenses	2,648	2.42%	3,839.60	Current Port. of LT Debt/Capital Leases	1,920	-	1,920.00
Other Current Assets	8,086	7.39%	11,724.70	Other Current liabilities	25,114	-	25,114.00
Net Current Assets	91,910	83.95%	133,269.50	Net Current Debt	53,909	-	95,268.50
Net Fixed Assets	149,551	136.60%	216,848.95	Long-term Debt	19,388	-	56,521.60
Total Assets	241,461	220.55%	350,118.45	Deferred Income Tax	8,514	-	8,514.00
				Minority Interest	19,642	-	19,642.00
				Other Liabilities	4,845	-	4,845.00
				Total Liability	106,298	-	184,791.10
				Stock	1,239	-	1,239.00
				Additional Paid-In Capital	56,330	-	56,330.00
				Retained Earnings	80,324	-	110,488.35
				Unrealized Gain (Loss)	-19	-	-19.00
				Other Equity	-2,711	-	-2,711.00
				Total Equity	135,163	-	165,327.35
				Total Liability & Equity	241,461	-	350,118.45
				D/E Ratio	0.44		0.53



The spontaneous accounts are identified and listed as a percentage of sales. They include all accounts in the current asset accounts and accounts payable. The projected numbers for these accounts are first calculated with a 45% increase. Then, retained earnings for 2022 was increased by 30,164.35 million USD. The other accounts remain unchanged. The External Financial Need in order to reach the sales projection is the difference between assets and total liabilities & equities.  $EFN = 350,118.45 - 272,007 = 78,111.95$  million USD. To determine the plug variables,  $change\ in\ NWC = NWC_{2022} - NWC_{2021} = 78,979.35 - 38,001 = 40,978.35$  million USD. Plug the change of NWC into short-term debt (notes payable account). The remaining debt should go into Long-term Debt, which is equal to  $78,111.95 - 40,978.35 = 37,133.60$  million USD.

After constructing the Pro Forma Balance Sheet, the new D/E ratio for 2022 is calculated to be 0.53, with an increase of 0.09 from 2021.

### References:

- “Alibaba.com (Baba) Balance Sheet.” Investing.com, <https://www.investing.com/equities/alibaba-balance-sheet>.
- “JD Financial Statements 2012-2022: JD.” *Macrotrends*, <https://www.macrotrends.net/stocks/charts/JD/jd/financial-statements>.
- “Tencent Holding Financial Statements 2010-2022: TCEHY.” *Macrotrends*, <https://www.macrotrends.net/stocks/charts/TCEHY/tencent-holding/financial-statements>.
- “Will Alibaba Ever Pay a Dividend?” *Sure Dividend*, 12 Jan. 2022, <https://www.suredividend.com/baba-dividend/>.

## Bonds

Bonds of Alibaba Group Holding Ltd.				
ISIN	MATURITY	COUPON	YIELD	TYPE
US01609WAV46	12/6/2047	4.20%	5.07%	long term
US01609WAU62	12/6/2037	4.00%	4.64%	long term
US01609WAR34	11/28/2034	4.50%	4.45%	long term
US01609WAT99	12/6/2027	3.40%	3.63%	intermediate term
US01609WAQ50	11/28/2024	3.60%	3.00%	short term
US01609WAS17	6/6/2023	2.80%	2.36%	short term

### Long Term (US01609WAU62):

The current price of the bond US01609WAU62 is 94.93 USD, with an annual yield of 4.64%. The yield was decreasing from the initial trade date and reached a minimum yield on 11/2018. The yield was increasing from 11/2018 and reached a peak yield on 7/2020. The yield has been decreasing since 7/2020.

### Short Term (US01609WAQ50):

The current price of the bond US01609WAQ50 is 102 USD, with an annual yield of 3.00%. The yield reached peak yields on 8/2016 and 8/2017 and reached a minimum yield on 11/2018. The yield was increasing from 11/2018 and reached a peak yield on 8/2020. The yield has been decreasing since 8/2020.

While the yields of both the long term and the short term bonds are increasing, the long term bond reaches its peak faster with a higher yield. While the yields of both the long term and the short term bonds are decreasing, the yield of the long term bond decreases at a higher rate. This indicates that investors are willing to invest more in Alibaba's long term bonds for better return when the company is during its growth period, and they are more likely to stop investing in long term bonds when the company is during its recession, because they may believe that the company will not be able to promise a relatively high yield in the future.

**Bonds from Competitor:**  
**Bonds of Tencent Holdings Ltd.**

**Long Term (US88032XAH70):**

The current price of the bond US88032XAH70 is 91.03 USD, with an annual yield of 4.82%. The yield was decreasing from the initial trade date and reached a minimum yield on 11/2018. The yield was increasing from 11/2018 and reached a peak yield on 7/2020. The yield has been decreasing since 7/2020.

**Short Term (US88032XAE40):**

The current price of the bond US88032XAE40 is 100.75 USD, with an annual yield of 2.88%. The yield was decreasing from the initial trade date and reached a minimum yield on 11/2018. The yield was increasing from 11/2018 and reached a peak yield on 9/2020. The yield has been decreasing since 9/2020.

While the long term and the short term bonds of both companies experienced sharp decreases after they reached the recent peak yields, the long term and the short term bonds of Tencent decreased less rapidly compared to the long term and the short term bonds of Alibaba. This indicates that investors generally have more faith in Tencent when both companies are in their recession.

**References:**

- “Alibaba Group Holding LTD.DL-Notes 2017(18/37) Bond | Markets Insider.” *Business Insider*, Business Insider, [https://markets.businessinsider.com/bonds/alibaba\\_group\\_holdingdl-notes\\_201718-37-bond-2037-us01609wau62](https://markets.businessinsider.com/bonds/alibaba_group_holdingdl-notes_201718-37-bond-2037-us01609wau62).
- “Alibaba Group Holding LTD.DL-Notes 2015(15/24) Bond | Markets Insider.” *Business Insider*, Business Insider, [https://markets.businessinsider.com/bonds/alibaba\\_group\\_holdingdl-notes\\_201515-24-bond-2024-us01609waq50](https://markets.businessinsider.com/bonds/alibaba_group_holdingdl-notes_201515-24-bond-2024-us01609waq50).
- “Tencent Holdings LTD.DL-Med.-Term NTS18(18/38)REG.S Bond | Markets Insider.” *Business Insider*, Business Insider, [https://markets.businessinsider.com/bonds/tencent\\_holdingsdl-med-term\\_nts1818-38regs-bond-2038-us88032xah70](https://markets.businessinsider.com/bonds/tencent_holdingsdl-med-term_nts1818-38regs-bond-2038-us88032xah70).
- “Tencent Holdings LTD.DL-Med.-Term NTS18(18/23)REG.S Bond | Markets Insider.” *Business Insider*, Business Insider, [https://markets.businessinsider.com/bonds/tencent\\_holdingsdl-med-term\\_nts1818-23regs-bond-2023-us88032xae40](https://markets.businessinsider.com/bonds/tencent_holdingsdl-med-term_nts1818-23regs-bond-2023-us88032xae40).

## Stock

The company's stock prices after adjustment are listed as follows. Data included was from 2014/9/19 to 2022/3/14, since Alibaba had their first IPO on 2014/9/19.

Date	Adj Close	Monthly Return
2014/10/1	98.6	
2014/11/1	111.64	0.1322515213
2014/12/1	103.94	-0.06897169473
2015/1/1	89.08	-0.1429670964
2015/2/1	85.12	-0.04445442299
2015/3/1	83.24	-0.02208646617
2015/4/1	81.29	-0.02342623739
2015/5/1	89.32	0.09878213802
2015/6/1	82.27	-0.078929691
2015/7/1	78.34	-0.04776953932
2015/8/1	66.12	-0.1559867245
2015/9/1	58.97	-0.1081367211
2015/10/1	83.83	0.42157029
2015/11/1	84.08	0.002982225933
2015/12/1	81.27	-0.03342055186
2016/1/1	67.03	-0.1752184078
2016/2/1	68.81	0.02655527376
2016/3/1	79.03	0.1485249237
2016/4/1	76.94	-0.02644565355
2016/5/1	82	0.06576553158
2016/6/1	79.53	-0.03012195122
2016/7/1	82.48	0.03709292091
2016/8/1	97.19	0.1783462658
2016/9/1	105.79	0.0884864698
2016/10/1	101.69	-0.03875602609
2016/11/1	94.02	-0.07542531222

2016/12/1	87.81	-0.06604977664
2017/1/1	101.31	0.1537410318
2017/2/1	102.9	0.01569440332
2017/3/1	107.83	0.04791059281
2017/4/1	115.5	0.07113048317
2017/5/1	122.46	0.06025974026
2017/6/1	140.9	0.1505797812
2017/7/1	154.95	0.09971611072
2017/8/1	171.74	0.1083575347
2017/9/1	172.71	0.005648072668
2017/10/1	184.89	0.07052284176
2017/11/1	177.08	-0.04224133268
2017/12/1	172.43	-0.02625931782
2018/1/1	204.29	0.1847706316
2018/2/1	186.14	-0.08884428998
2018/3/1	183.54	-0.01396798109
2018/4/1	178.54	-0.02724201809
2018/5/1	198.01	0.109051193
2018/6/1	185.53	-0.06302711984
2018/7/1	187.23	0.009162938608
2018/8/1	175.01	-0.06526731827
2018/9/1	164.76	-0.05856808182
2018/10/1	142.28	-0.1364408837
2018/11/1	160.86	0.1305875738
2018/12/1	137.07	-0.1478925774
2019/1/1	168.49	0.2292259429
2019/2/1	183.03	0.08629592261
2019/3/1	182.45	-0.003168879419
2019/4/1	185.57	0.0171005755
2019/5/1	149.26	-0.1956674031

2019/6/1	169.45	0.1352673188
2019/7/1	173.11	0.02159929183
2019/8/1	175.03	0.01109121368
2019/9/1	167.23	-0.04456378906
2019/10/1	176.67	0.0564492017
2019/11/1	200	0.1320541122
2019/12/1	212.1	0.0605
2020/1/1	206.59	-0.02597831212
2020/2/1	208	0.006825112542
2020/3/1	194.48	-0.065
2020/4/1	202.67	0.04211229947
2020/5/1	207.39	0.02328909064
2020/6/1	215.7	0.0400694344
2020/7/1	251.02	0.1637459434
2020/8/1	287.03	0.1434547048
2020/9/1	293.98	0.02421349685
2020/10/1	304.69	0.03643104973
2020/11/1	263.36	-0.1356460665
2020/12/1	232.73	-0.116304678
2021/1/1	253.83	0.09066300004
2021/2/1	237.76	-0.06331008943
2021/3/1	226.73	-0.04639131898
2021/4/1	230.95	0.01861244652
2021/5/1	213.96	-0.07356570686
2021/6/1	226.78	0.05991774163
2021/7/1	195.19	-0.1392979981
2021/8/1	166.99	-0.1444746145
2021/9/1	148.05	-0.1134199653
2021/10/1	164.94	0.11408308
2021/11/1	127.53	-0.226809749

2021/12/1	118.79	-0.06853289422
2022/1/1	125.79	0.05892751915
2022/2/1	105.19	-0.1637650052
2022/3/1	86.71	-0.1756820991
<b>Average Monthly Return</b>	<b>0.004268800293</b>	
<b>Volatility (STD of monthly return)</b>	<b>0.1087668587</b>	

After analyzing the data using the mean and standard deviation formulas, the average monthly return rate is calculated to be 0.004268800293 with a standard deviation of 0.1087668587 representing the risk level. During the same time period, NYSE experienced a volatility of 0.04229 according to the data from Yahoo Finance. By comparing the two risk levels, we can infer that **the stock of Alibaba is more risky compared to the market average.**

#### References:

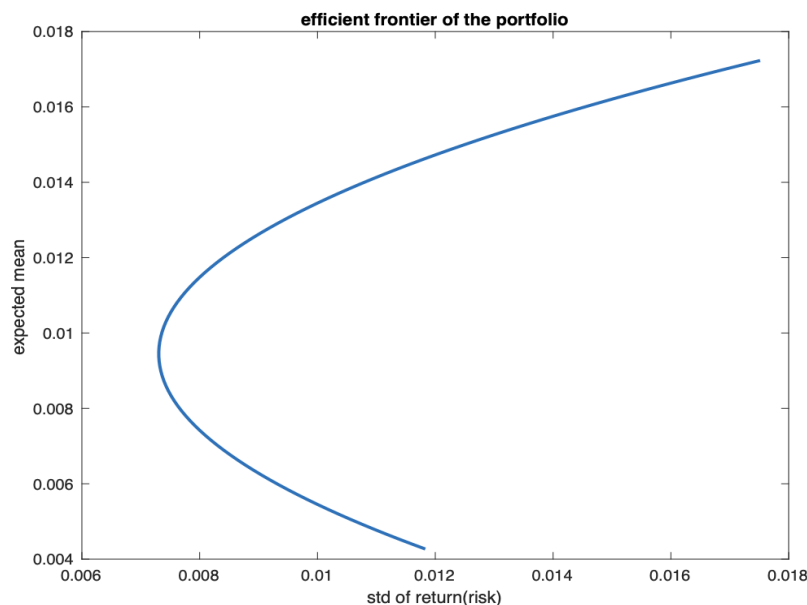
- “NYSE Composite (DJ) (^Nys) Historical Data.” *Yahoo! Finance*, Yahoo!, 19 Mar. 2022, <https://finance.yahoo.com/quote/%5ENYA/history?period1=1411171200&period2=1647216000&interval=1mo&filter=history&frequency=1mo&includeAdjustedClose=true>.

## Portfolio

From the analysis of Alibaba's stock, we concluded that it is more volatile compared to the market average. Therefore, investment in the stock is relatively risky, and it is not recommended to invest in Alibaba solely. According to the Financial Times' *The Best Bet for the 2020s is Short Tech, Long Commodities* posted on February 27, 2022, traditional commodities such as metals and energies performed the best in the stock market during the past year when tech companies' stocks performed the worst. To minimize the risk of investment, **we recommend forming a portfolio composed of Alibaba's stock and another stock of long commodities, for example, Barrick Gold Corporation.**

Using the data from Yahoo Finance, we can calculate the expected return of *Barrick Gold Corporation* to be 0.01736196341, and the risk to be 0.1336475145. The correlation between the two companies is 0.0003933378542, a relatively small value. The correlation shows that the two companies are not strongly correlated, and their combination could be considered as a good portfolio with less risk.

With the data collected and calculated, the efficient frontier of the portfolio can be plotted as shown below:



To calculate the minimum variance portfolio (MVP), we use the equation:

$$\sigma_{portfolio}^2 = \omega_{Alibaba}^2 \sigma_{Alibaba}^2 + (1 - \omega_{Alibaba})^2 \sigma_{Barrick Gold}^2 + 2 \omega_{Alibaba} (1 - \omega_{Alibaba}) \sigma_{Alibaba, BarrickGold}$$

With  $\sigma_{Alibaba} = 0.1087668587$ ,  $\sigma_{BarrickGold} = 0.1336475145$ ,  $\sigma_{Alibaba, BarrickGold} = 0.0003933378542$ ,



We solve for  $\min \sigma_p^2$  when  $\frac{d\sigma_p^2}{d\omega_{Alibaba}} = 0$ , which becomes  $\omega_{Alibaba} = 0.604331$ . So, the MVP should be composed of 60.4% of Alibaba's stock and 39.6% of Barrick Gold's stock. Plugging back into the equation, we obtain  $\sigma_p = 0.0854695$ . **The risk of the MVP is 0.0854695.**

Date	Adj Close (Barrick Gold Corporation)	Monthly Return (Barrick Gold)
2014/10/1	10.728184	
2014/11/1	10.74626	0.001684907716
2014/12/1	9.792647	-0.08873905898
2015/1/1	11.641865	0.1888374001
2015/2/1	11.860492	0.01877937942
2015/3/1	10.023787	-0.1548590902
2015/4/1	11.907817	0.1879559093
2015/5/1	10.846909	-0.08909340814
2015/6/1	9.791218	-0.0973264365
2015/7/1	6.484617	-0.3377108956
2015/8/1	6.383581	-0.01558087394
2015/9/1	5.859557	-0.08208934766
2015/10/1	7.084905	0.2091195631
2015/11/1	6.762444	-0.04551380717
2015/12/1	6.836301	0.01092164312
2016/1/1	9.179913	0.3428187261
2016/2/1	12.866696	0.4016141547
2016/3/1	12.598227	-0.02086541875
2016/4/1	17.969635	0.4263622175
2016/5/1	15.557608	-0.1342279351
2016/6/1	19.852621	0.2760715529
2016/7/1	20.326851	0.02388752598
2016/8/1	15.817002	-0.2218665843
2016/9/1	16.495312	0.04288486529

2016/10/1	16.374302	-0.007336023714
2016/11/1	13.981922	-0.1461057699
2016/12/1	14.895758	0.06535839636
2017/1/1	17.188847	0.1539424177
2017/2/1	17.319345	0.007592015916
2017/3/1	17.728539	0.02362641312
2017/4/1	15.609329	-0.1195366409
2017/5/1	15.441286	-0.01076554924
2017/6/1	14.907845	-0.03454641019
2017/7/1	15.844853	0.06285335003
2017/8/1	16.856829	0.06386780616
2017/9/1	15.102148	-0.1040931838
2017/10/1	13.562837	-0.1019266266
2017/11/1	12.933969	-0.04636699534
2017/12/1	13.610423	0.05230057378
2018/1/1	13.52577	-0.00621971852
2018/2/1	10.835666	-0.1988873092
2018/3/1	11.73924	0.08338887522
2018/4/1	12.701009	0.08192770571
2018/5/1	12.436993	-0.02078700991
2018/6/1	12.408343	-0.002303611492
2018/7/1	10.57497	-0.1477532496
2018/8/1	9.847292	-0.0688113536
2018/9/1	10.500678	0.06635184577
2018/10/1	11.893821	0.1326717189
2018/11/1	12.083364	0.01593625799
2018/12/1	12.861623	0.06440747792
2019/1/1	12.784703	-0.005980582699
2019/2/1	12.068606	-0.05601201686
2019/3/1	13.090236	0.08465186452

2019/4/1	12.144991	-0.07220992807
2019/5/1	11.858551	-0.02358503189
2019/6/1	15.108548	0.274063585
2019/7/1	15.577995	0.03107161588
2019/8/1	18.567129	0.1918818179
2019/9/1	16.636488	-0.1039816657
2019/10/1	16.665287	0.001731074491
2019/11/1	16.127691	-0.03225843035
2019/12/1	17.952896	0.1131721212
2020/1/1	17.885298	-0.00376529781
2020/2/1	18.387478	0.02807781005
2020/3/1	17.751066	-0.0346111631
2020/4/1	24.921259	0.4039302766
2020/5/1	23.254671	-0.0668741495
2020/6/1	26.179985	0.1257946844
2020/7/1	28.094404	0.07312529018
2020/8/1	28.81353	0.02559677009
2020/9/1	27.393656	-0.04927803015
2020/10/1	26.048822	-0.04909289947
2020/11/1	22.550308	-0.134306035
2020/12/1	22.287346	-0.01166112676
2021/1/1	21.886211	-0.01799832964
2021/2/1	18.266232	-0.1653999863
2021/3/1	19.461845	0.06545482396
2021/4/1	20.887083	0.07323241964
2021/5/1	23.668749	0.1331763751
2021/6/1	20.401518	-0.1380398685
2021/7/1	21.476841	0.05270798967
2021/8/1	19.799732	-0.07808918453
2021/9/1	17.886467	-0.09663085339

2021/10/1	18.203569	0.01772859895
2021/11/1	18.817953	0.03375074415
2021/12/1	18.915705	0.005194613888
2022/1/1	19.065041	0.007894815446
2022/2/1	22.469866	0.1785899647
2022/3/1	23.870001	0.06231167556

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