



2020 Stock Market Crash

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What Happened?

March 9, 12, & 16

"Black Monday"

Low Oil Prices

Dow Jones, S&P 500 dropped

Whiting Petroleum filed for Bankruptcy

The Short 2020 Recession

Why Happened?

Corona Virus (COVID-19) Panic

High inventory/ low demand

Shutdown orders

02 Indexes & Stocks

Indexes



S&P 500

TOPIX

Stocks



bp



US- Treasury bills



02 Indexes- Dow Jones

Dow Jones Industrial Average (Stock Price Index for U.S.) Closing Price
(SEP. 2019 to SEP. 2020)



02 Indexes- Dow Jones

Dow Jones - Monthly Rate of Return (%) 2019/10 to 2020/09

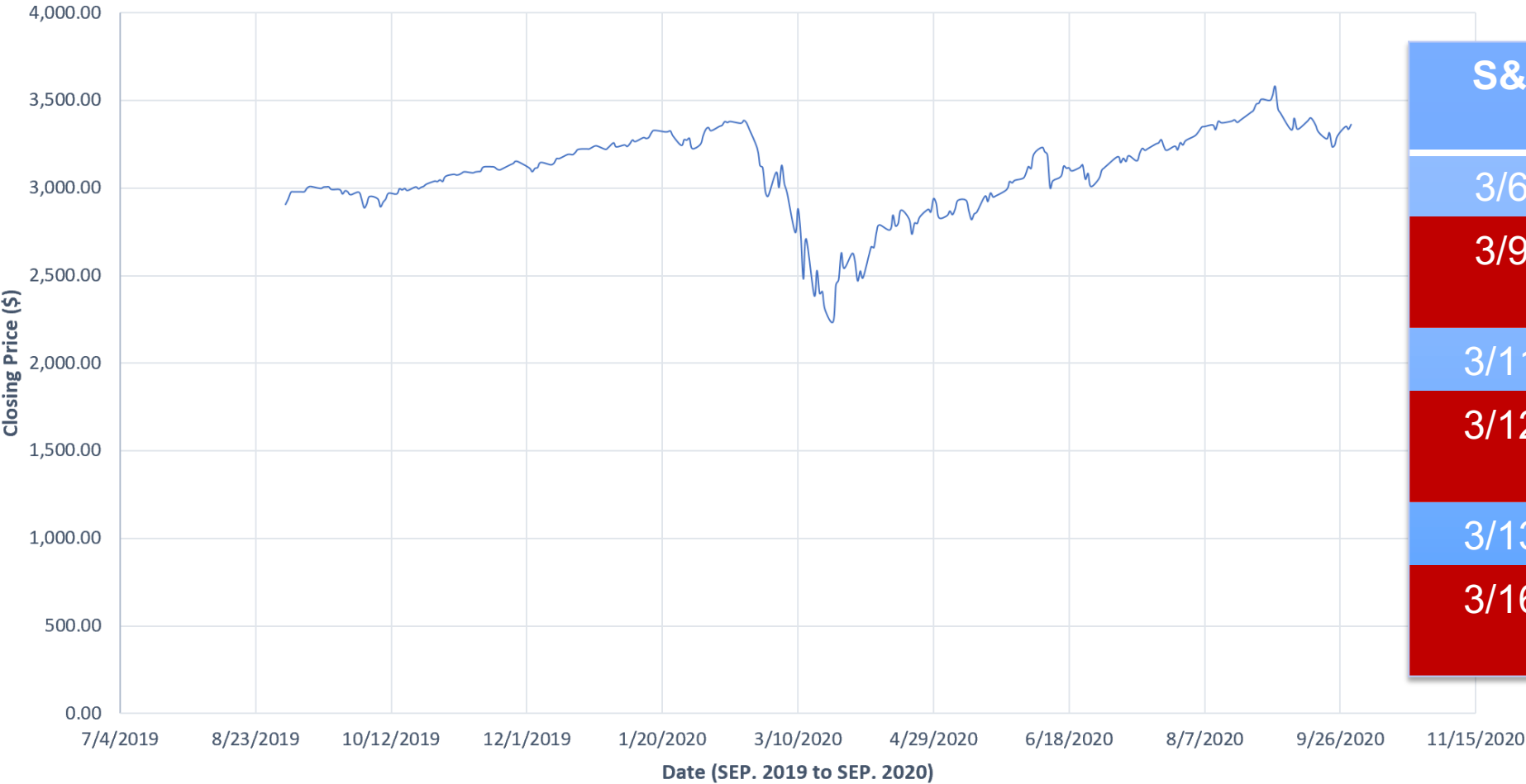


Average Monthly Return
0.52%

Average Monthly Standard Deviation
7.16%

02 Indexes- S&P 500

S&P 500 (Stock Price Index for U.S.) Closing Price
(SEP. 2019 to SEP. 2020)



02 Indexes- S&P 500

S&P 500 - Monthly Rate of Return (%) 2019/10 to 2020/09



Average Monthly Return
1.25%

Average Monthly Standard Deviation
6.83%

02 Indexes- Topix

Topix (Stock Price Index for Japan) Closing Price
(SEP. 2019 to SEP. 2020)



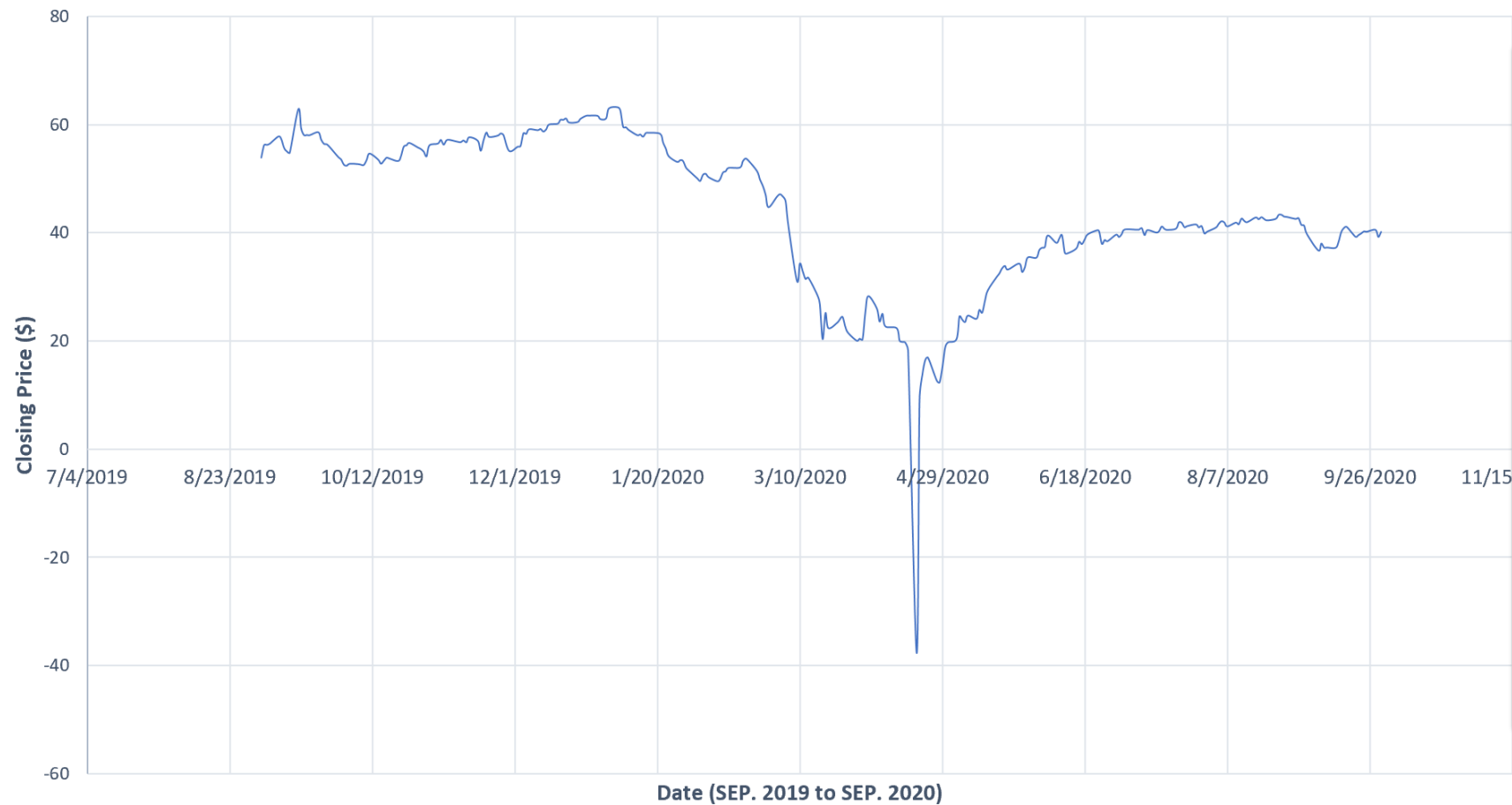
02 Indexes- Topix

Topix - Monthly Rate of Return (%) 2019/10 to 2020/09



02 Stocks- Crude Oil (WTI)

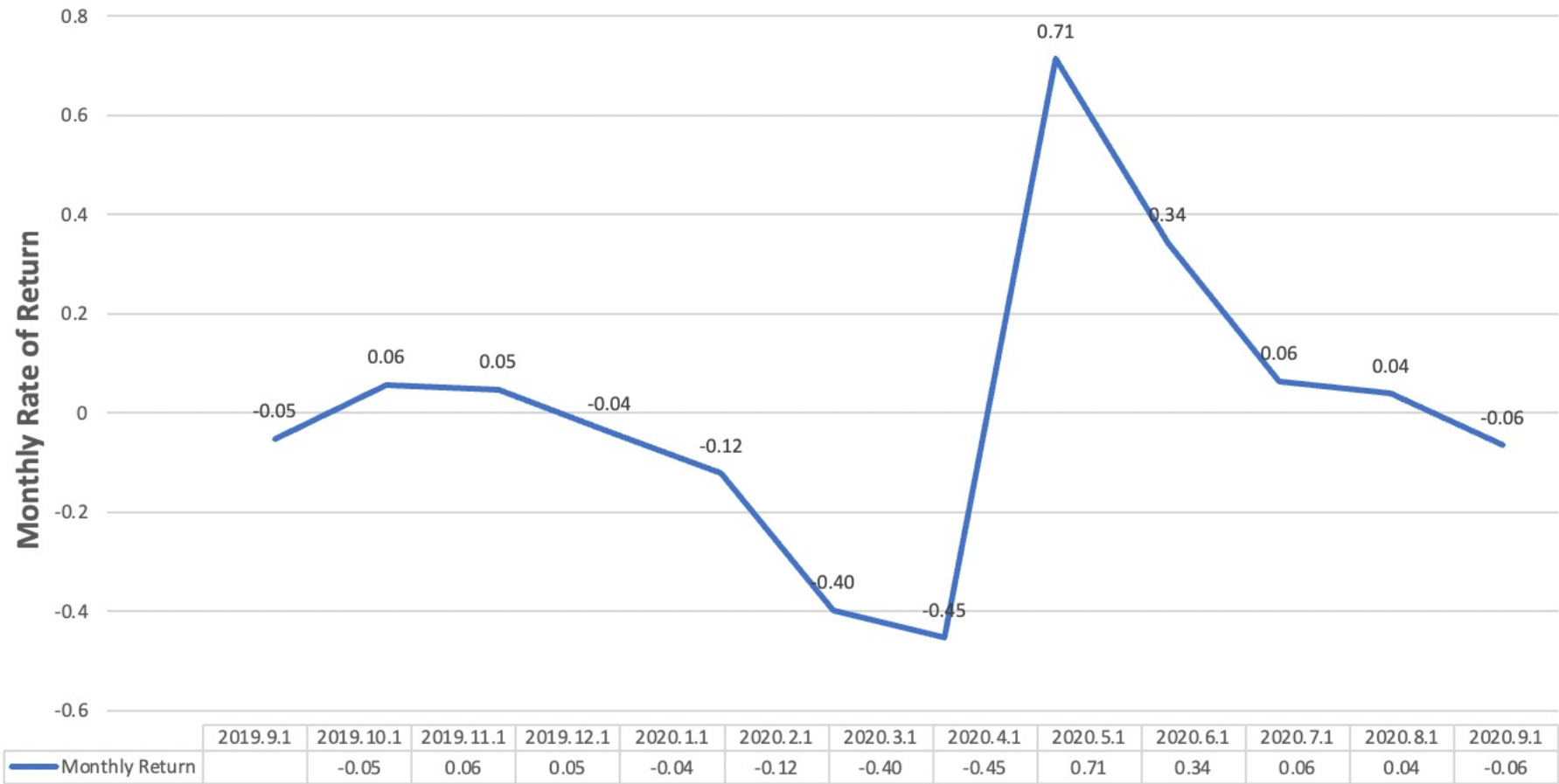
Crude Oil Stock Closing Price
(SEP. 2019 to SEP. 2020)



Crude Oil	Closing Price (\$)
3/6/2020	41.28
3/9/2020	31.13 (-24.59%)
3/11/2020	32.98
3/12/2020	31.5 (-4.49%)
3/13/2020	31.73
3/16/2020	28.7 (-9.55%)

02 Stocks- Crude Oil (WTI)

Crude Oil - Monthly Rate of Return (%) 2019/09 to 2020/09



Average Monthly Return
1.15%

Average Monthly Standard Deviation
30.47%

02 Stocks- Brent Oil

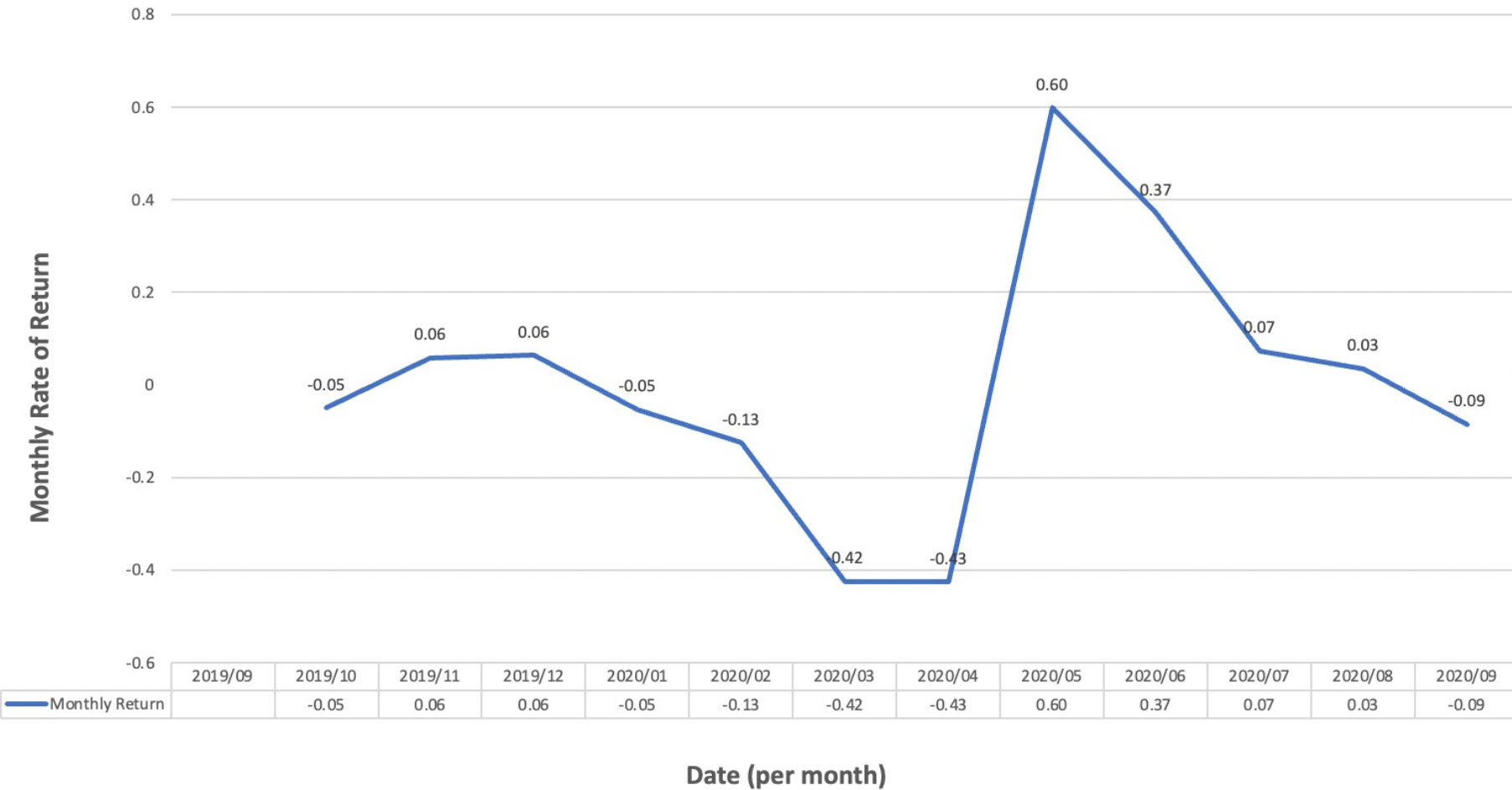
Europe Brent Spot Price FOB (Dollars per Barrel)



Brent Oil	Dollars per Barrel (\$)
3/6/2020	45.6
3/9/2020	35.33 (-22.52%)
3/11/2020	34.45
3/12/2020	31.02 (-9.96%)
3/13/2020	32.25
3/16/2020	27.98 (-13.24%)

02 Stocks- Brent Oil

Brent Oil - Monthly Rate of Return (%) 2019/09 to 2020/09



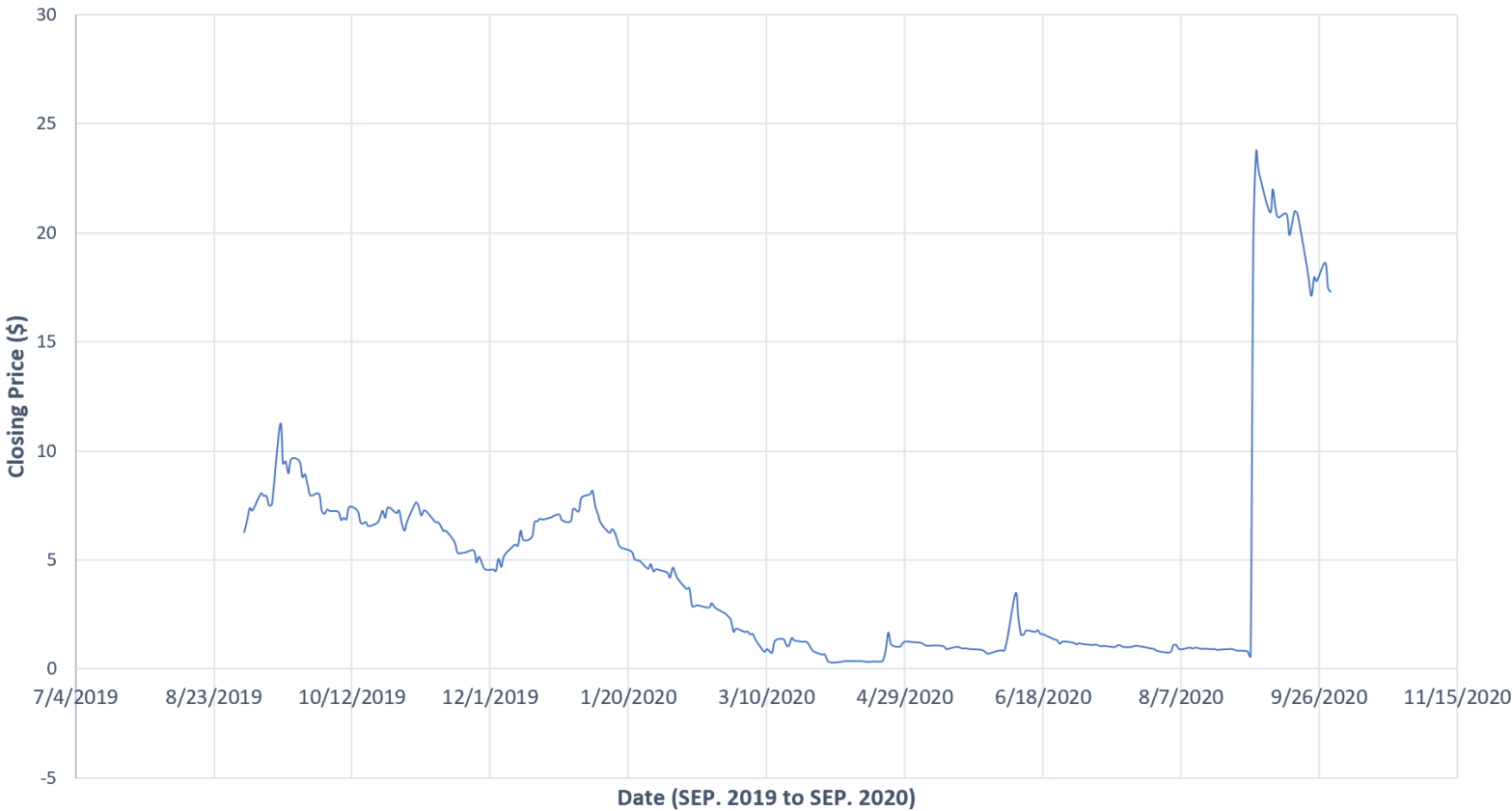
Average Monthly Return
0.29%

Average Monthly Standard Deviation
28.60%

02 Stocks- Whiting Petroleum (WLL)

Whiting Petroleum Corporation Closing Stock Price
(SEP. 2019 to SEP. 2020)

WLL	Closing Price (\$)
3/6/2020	1.33
3/9/2020	0.8 (-39.85%)
3/11/2020	0.82
3/12/2020	0.75 (-8.54%)
3/13/2020	1.3
3/16/2020	1.37 (5.38%)

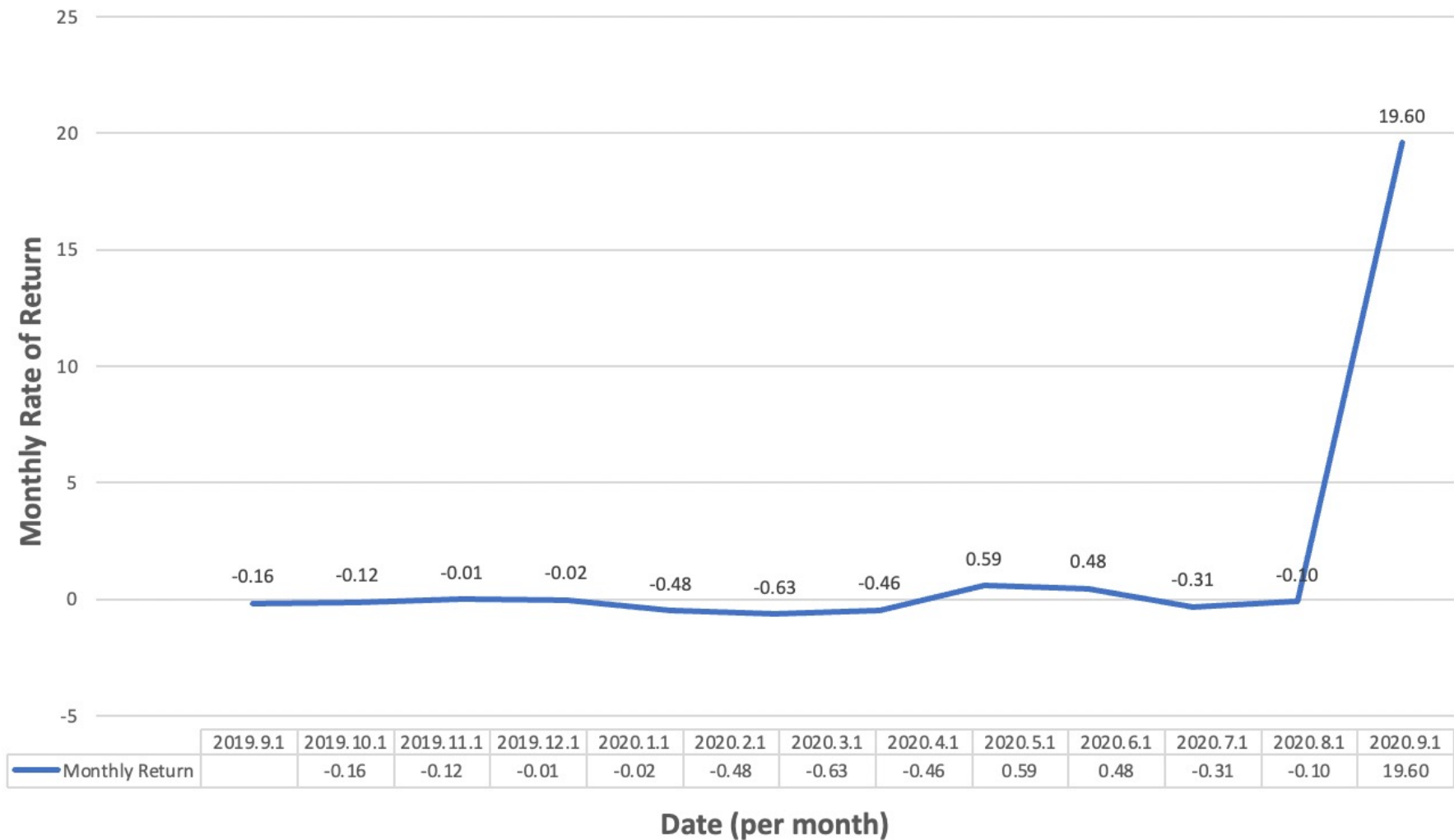


	2018				2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Crude oil	\$ 62.89	\$ 67.90	\$ 69.50	\$ 58.83	\$ 54.90	\$ 59.83	\$ 56.45	\$ 56.96	\$ 46.08	\$ 27.85	\$ 40.94	\$ 42.67
Natural gas	\$ 3.13	\$ 2.77	\$ 2.88	\$ 3.62	\$ 3.00	\$ 2.58	\$ 2.29	\$ 2.44	\$ 1.88	\$ 1.66	\$ 1.89	\$ 2.51

*Quarterly average NYMEX price trends for crude oil and natural gas prices

02 Stocks- Whiting Petroleum (WLL)

Whiting Petroleum - Monthly Rate of Return (%) 2019/09 to 2020/09



*The results do not include 2020.9
(outlier removed)

Average Monthly Return
-11.01%

Average Monthly Standard Deviation
37.81%

02 Stocks- BP

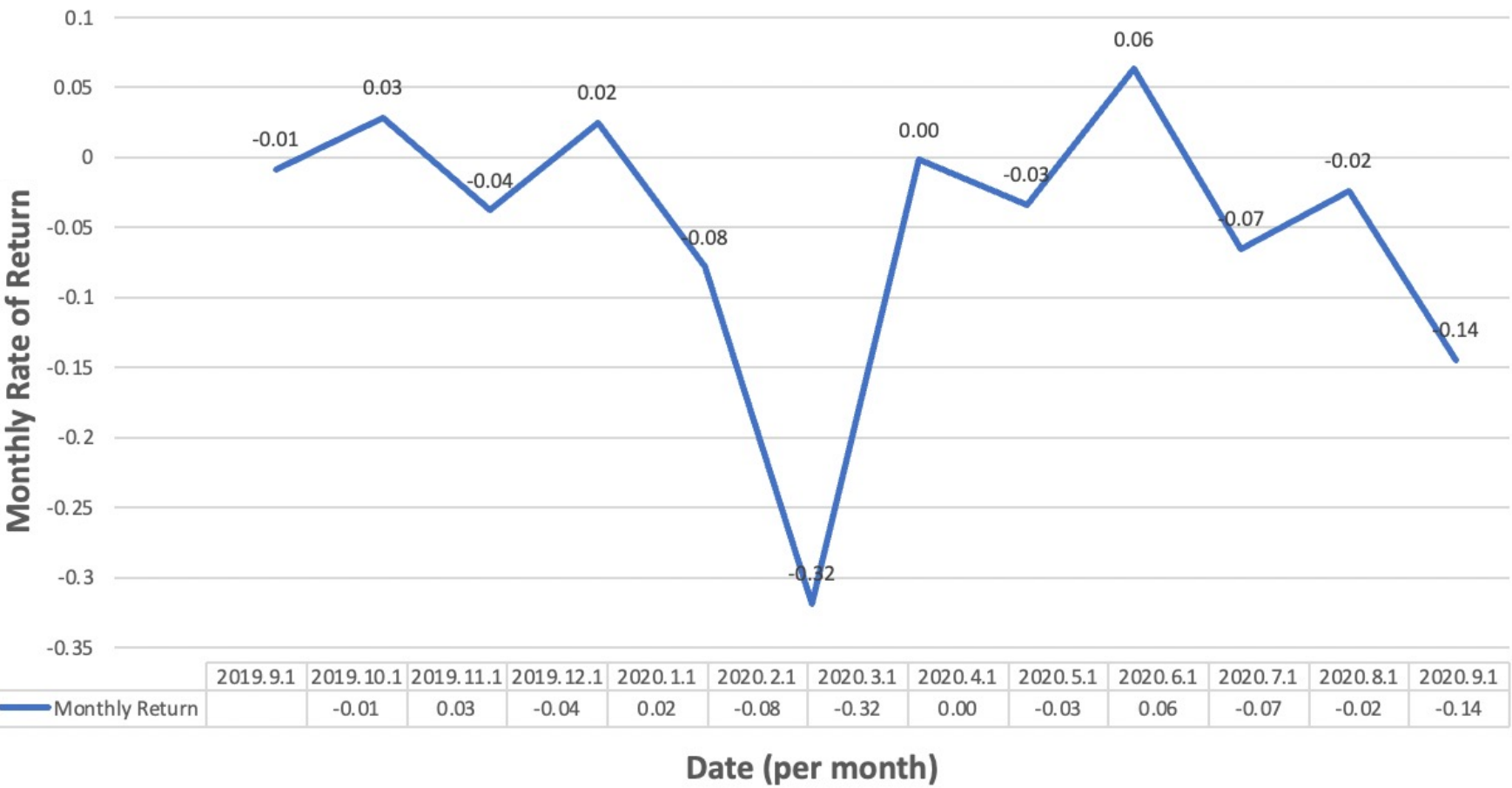
BP p.l.c.	Closing Price (\$)
3/6/2020	45.6
3/9/2020	35.33 (22.52%)
3/11/2020	34.45
3/12/2020	31.02 (-9.96%)
3/13/2020	32.25
3/16/2020	27.98 (-13.24%)

BP Stock Closing Price
(SEP. 2019 to SEP. 2020)



02 Stocks- BP

BP - Monthly Rate of Return (%) 2019/09 to 2020/09

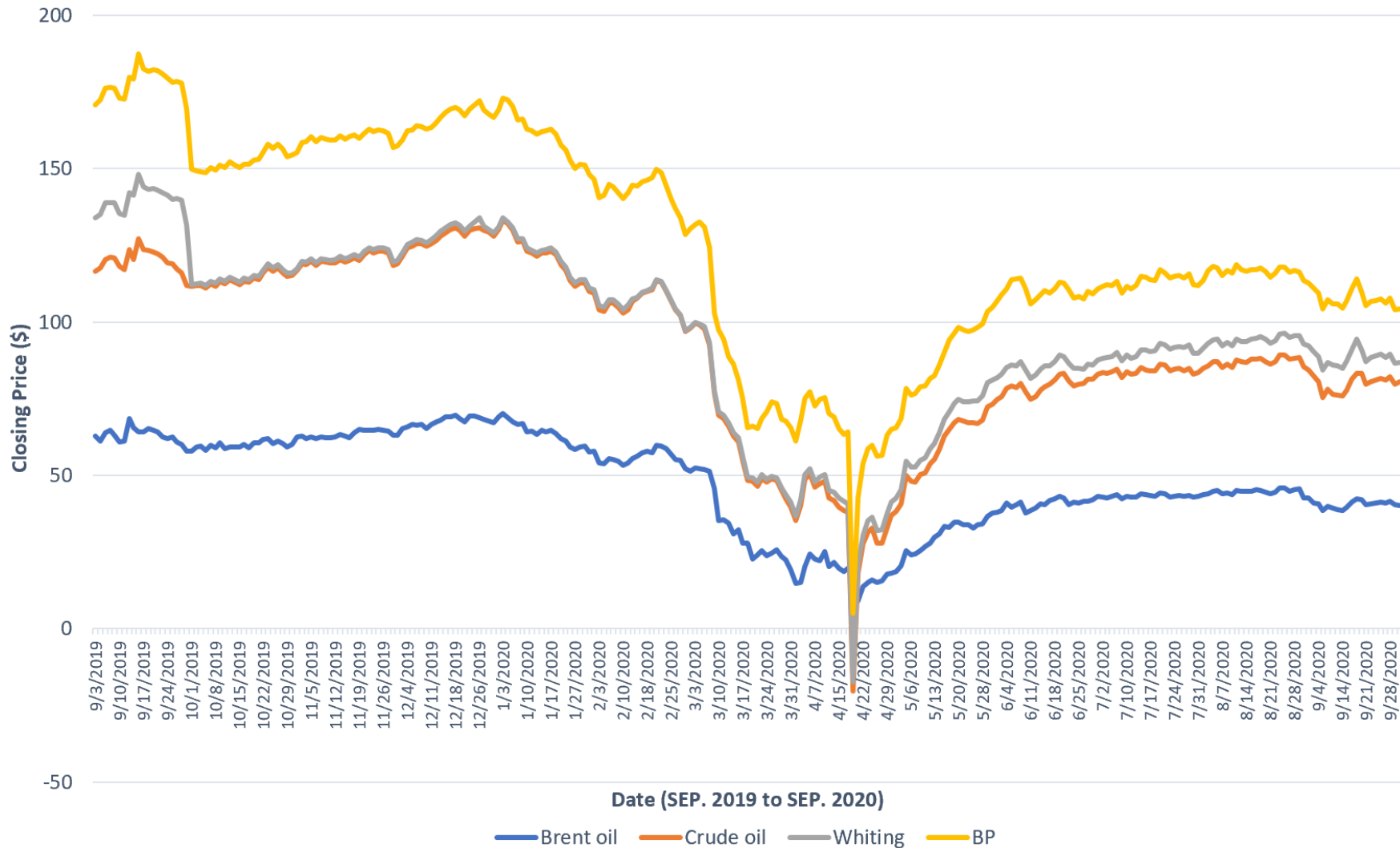


Average Monthly Return
-4.96%

Average Monthly Standard Deviation
10.09%

03 Comparison Between Stocks

Stock Price Comparison between Brent Oil, Crude Oil, Whiting Petroleum Corporation, BP



03 Beta

	Dow Jones	S&P 500
Crude Oil	2.31	2.44
Brent Oil	2.39	2.50
WLL (no outlier)	3.14	3.18
BP	1.29	1.34

$$\beta_s = \frac{Cov(r_s, r_m)}{Var(r_m)}$$

r_s = return on the stock

r_m = return on the market

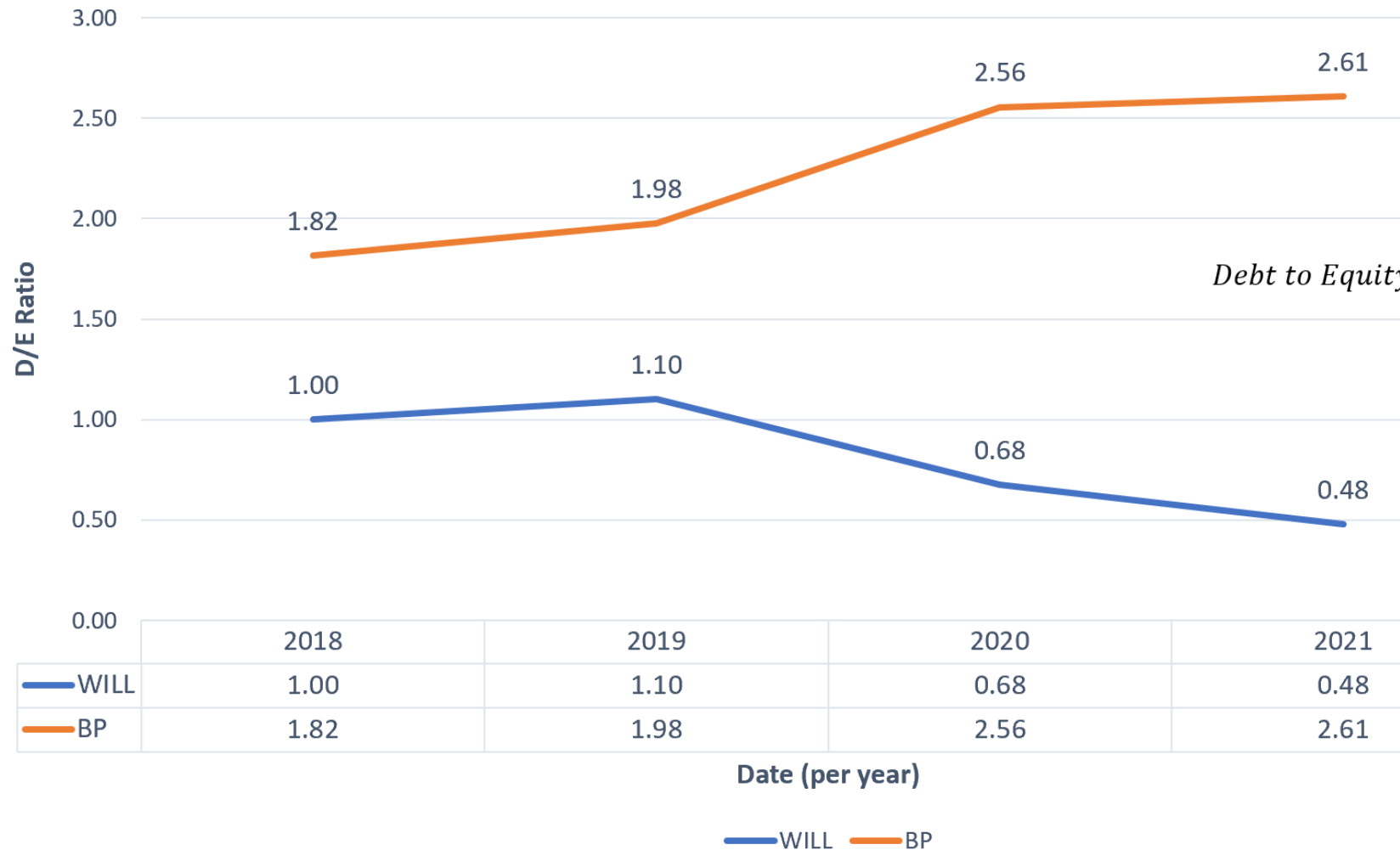
$Cov(r_s, r_m)$ = covariance of the stock and the market

$Var(r_m)$ = variance of the market

04 Capital Structure between WLL & BP

Debt-to-Equity ratio (D/E) of WLL & BP
2018-2021

*Balance sheet data by WSJ.com



$$\text{Debt to Equity Ratio} = \frac{\text{Total Liabilities}}{\text{Total Shareholders' Equity}}$$

05 US Treasury Bills

US Treasury Bills Rate 3-&6-Months 2019-2020



05 US Treasury Bills

- **Demand for Higher Yield**
- **Sold Stocks, Bought bonds**
- **Demand increased, Yield decreased**

Year to Maturity	Average Rate
2019 (3 months)	2.06%
2019 (6 months)	2.05%
2020 (3 months)	0.35%
2020 (6 months)	0.36%

YTM	Average Rate/Year
2019	2.055%
2020	0.355%

06 Sharpe Ratio & Reward-risk Ratio

➤ Sharpe Ratio

$$\frac{E(R) - r_f}{\sigma}$$

$E(R) - r_f$ = risk premium
 σ = standard deviation

➤ Reward-risk Ratio

$$E(R_A) = R_f + \beta_A \times [E(R_M) - R_f]$$

R_f = risk-free rate

β_A = beta for firm A

$E(R_M) - R_f$ = market risk premium

	Risk premium (2020 Rf rate) %	Standard Deviation %	Sharp Ratio
Crude Oil	0.795	30.47	0.026
Brent Oil	-0.065	28.60	-0.0023
WLL (no outlier)	-11.365	37.81	-0.301
BP	-5.315	10.09	-0.527

	Beta (S&P 500)	Market risk premium (S&P 500)	Reward-risk ratio (2020 Rf rate)
Crude Oil	2.44	0.895	2.54
Brent Oil	2.50	0.895	2.59
WLL (no outlier)	3.18	0.895	3.20
BP	1.34	0.895	1.55

07 Conclusion

- **Fears of the Corona virus made investors feel uncertain about the stock market but the government took actions to calm investors.**
- **The Central Banks and Federal Reserves helped the US during the 2020 stock market crash.**
- **Development and distribution of vaccines lessens the fear for investor and everyone.**
- **Following the 2020 recession came a boom due to the fears of the virus lessening, stimulus packages, and investors investments.**
- **In addition, the former president Trump helped soothe investors by increasing unemployment insurance, rental assistance, and cash payments to taxpayer.**
- **Whiting Petroleum merged with Oasis despite the fact that they filed for Bankruptcy.**

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Q & A

Thank you