Brigham Murdoch

May 4, 2016

Finance 4460

Final Investment Report

I. Firm Description/Introduction/Investment Summary

Nvidia is a fabless (outsourced manufacturing) designer of a multitude of semiconductors such as graphics processing units (GPUs) and application programming interface (APIs), and software that often complements such technology. The company is a global leader in Artificial Intelligence software and hardware, and its products are used in cloud computing, gaming, architecture, engineering, and a plethora of other fields and applications. It "was incorporated in 1993 and is headquartered in Santa Clara, California". ("Nvidia Corporation (NVDA)")

My analysis of Nvidia leads me to recommend holding this stock. The company has had an incredible run up in price over the past several years. The semiconductor industry also is likely to see large growth in the years to come. However, Nvidia's current P/E ratios are at extremely high levels and likely unsustainable. The equity valuation I performed also raises concerns about how sustainable the current price of NVDA is.

II. Industry and Macroeconomic Analysis

Nvidia operates in the semiconductor industry. Semiconductors are the devices that power computers and electronics and have recently proven to be a critical industry in the world economy. Accordion to deloitte.com "Although it took recent chip shortages to cement their "critical" status, semiconductors have now established their place as a truly essential industry. . .

Across multiple end markets, the absence of a single critical chip, often costing less than a dollar, can prevent the sale of a device worth tens of thousands of dollars. Based on our analysis, the chip shortage of the past two years resulted in revenue misses of more than US$500 billion worldwide between the semiconductor and its customer industries, with lost auto sales of more than US$210 billion in 2021 alone." (Kulik) The vital role of the semiconductor industry is likely to ensure its continued growth for years to come. According to the Semiconductor Industry Association, "The World Semiconductor Trade Statistics (WSTS) Semiconductor Market Forecast released in June 2021 projected worldwide semiconductor industry sales will increase significantly to $527 billion in 2021, an upward revision from its Fall 2020 forecast for 2021, due mainly to the continued strong demand growth in the overall market from 2020. In 2022, WSTS forecasts global sales will continue growing to $573 billion." (Ravi) Semiconductors have a great deal of upside with the industry expected to grow nearly 8.73% this year.

III. Risk / Return Analysis

Using 5 years of Nvidia's financial information, I have performed a risk/return analysis on the price of NVDA (Ticker for Nvidia) in order to judge if Nvidia's upside is appropriate for the amount of risk an investor would take on. I also used financial information for AMD (Ticker for Advanced Micro Devices), a competitor of Nvidia in the Semiconductor space to use as a benchmark. BIL (SPDR Bloomberg 1-3 Month T-Bill ETF), a proxy for the risk-free rate, is used to compare NVDA's performance to that of a risk-free investment. All calculations are based on closing prices.

To start off, NVDA's holding period return (HPR) for the period June 1, 2017-May 1, 2022 comes in around 442.39%. An investor would have multiplied their money more than 5 times over the past 5 years. By comparison, AMD also has an incredible APR of 630.21%. BIL has an

HPR of -0.07%. The HPR indicates the two semiconductor companies may provide massive investment potential. It also indicates AMD has had a larger return than NVDA. However, HPR only tells us what NVDA's aggregate return has been during the time period. It's also important to compare NVDA's monthly averages.

During the same time period NVDA had a monthly arithmetic average return of 3.77%. AMD had a monthly arithmetic average of 4.65%. BIL's monthly arithmetic average was -0.0011%. To consider the effects of compounding, we will also want to consider the monthly geometric average of each investment. NVDA had a monthly geometric average return of 2.91%. AMD had a monthly geometric average of 3.43%. BIL had a monthly geometric average that was -0.0011%.

We can annualize our returns to show the average annual returns per year rather than per month. NVDA had an annual arithmetic average return of 55.88%. AMD had an annual arithmetic average of 72.63%. BIL had an annual arithmetic average of -0.0132%. For geometric averages, NVDA had an annual geometric average return of 41.04%. AMD had an annual geometric average of 49.84%. BIL had an annual geometric average of -0.0133%. The arithmetic and geometric averages of Nvidia's stock, like it's HPR, lie below the arithmetic and geometric averages of AMD and above the arithmetic and geometric averages of BIL.

A key part of financial analysis is measuring risk. One way to do this is with the Standard deviation, which indicates how far an assets price is to fluctuate around these means. A higher number will indicate greater fluctuation and more risk. NVDA has a monthly standard deviation of 13.04%, AMD has a monthly standard deviation of 16%, and BIL has a monthly standard deviation of 0.05%. Annualized, NVDA has an annual standard deviation of 45.19%, AMD has an annual standard deviation of 55.43%, and BIL has an annual standard deviation of 0.17%.

While AMD and NVDA both demonstrate high potential return in HPR and their arithmetic and geometric averages, their standard deviations show how they carry large amounts of risk as well.

To compare the amount of potential return (arithmetic average) each investment has for every unit of risk (standard deviation), I have calculated the Sharpe ratio for each investment. Sharpe ratios above 1 are ideal, as it indicates an investment has more potential return relative to its amount of risk. BIL will not be included, as the risk-free rate is subtracted from the arithmetic return to calculate risk. The annual sharp ratio of NVDA is 1.2354349, and the annual sharp ratio of AMD Is 1.310575558. While both NVDA and AMD comparatively have a lot of risk compared to the risk free BIL, both have sharp ratios above one, so each offers relatively more return per unit of risk.

The Sharpe ratio isn't perfect, so our analysis would benefit from calculating the CAPM beta, which compares an equities volatility relative to the entire market. According to Yahoo Finance, the beta of NVDA is 1.42, the beta if AMD is 1.81, and the beta of BIL is 0. This means for every $1 the market moves, NVDA is expected to move $1.42, AMD is expected to move $1.81, and BIL is expected to not move at all.

IV. Equity Valuation

To understand Nvidia's intrinsic value, I performed an equity valuation using 10 years of financial statements (2012-2021) to calculate several valuation methods. Here are the results.

In 2021, Nvidia's ROE was 36.65%. ROE shows how much income a firm takes in relative to the amount of equity its shareholders own.

Using P/E to calculate NVDA's valuation, we get NVDA valued around a low price of $280.92 and a high price of $525.51.

NVDA's PEG is 3.81 on the low side of constant growth and 2.07 on the high side of constant growth.

NVDA is a growth-oriented company, so calculating it's value gives us a variety of prices. Using the residual income method, NVDA is valued at $69.53 on the low end and $76.33 on the high end. NVDA has a very small dividend, so using the Dividend Discount model to evaluate this stock leaves us with valuations of $3.09 on the low end and $3.43 on the high end. Finally, NVDA's valuation based on the Free Cash Flow model is -$25.46 and -$27.57. P/E, Residual Income, Dividend, and Free Cash Flow is combined into a weighted average with 30%, 30%, 10%, and 30% respectively. The result is an average valuation for NVDA of $136.71. With an initial price on May 4, 2022, of $203.34, we expect NVDA to return -32.77% per year with these valuation methods.

V. Concluding Remarks

In conclusion, Nvidia is a high growth company with a lot of potential, but its current market price may be overvalued so I recommend that investors hold. NVDA has some good price performance holding it up, and the company could continue growing revenues for years to come. But my analysis indicates that the current price of NVDA may be unsustainable and could drop significantly. The direction of NVDA is unclear, so investor should sit tight on their holding at this time.

Figure I: NVDA valuation foot ball field chart.

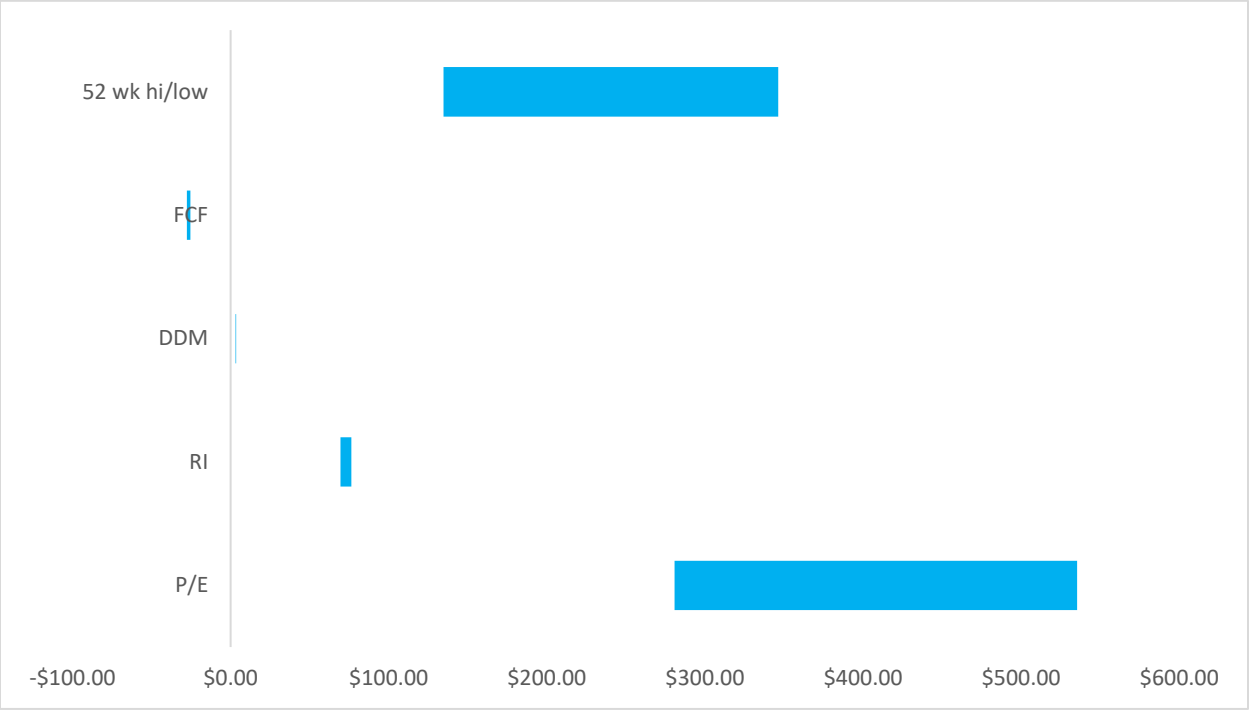

Figure 2: NVDA Final Price Calculation and Return

Model	Weighting	Valuation
P/E	30.00%	$408.21
RI	30.00%	$72.93
DDM	10.00%	$3.26
FCF	30.00%	-$26.52
	Weighted Valuation	**$136.71**
	Current Price	$203.34
	Upside/Downside	**-32.77%**

Works Cited

Brandon Kulik Principal | Deloitte Consulting LLP bkulik@deloitte.com . "2022 Semiconductor Industry Outlook." *Deloitte United States*, 1 Mar. 2022, https://www2.deloitte.com/us/en/pages/technology-media-and-telecommunications/articles/semiconductor-industry-outlook.html.

"Advanced Micro Devices, Inc. (AMD) Stock Price, News, Quote & History." *Yahoo! Finance*, Yahoo!, 5 May 2022, https://finance.yahoo.com/quote/AMD?p=AMD&.tsrc=fin-srch.

"Nvidia Corporation (NVDA) Company Profile & Facts." *Yahoo! Finance*, Yahoo!, 4 May 2022, https://finance.yahoo.com/quote/NVDA/profile?p=NVDA.

"Nvidia Corporation (NVDA) Stock Price, News, Quote & History." *Yahoo! Finance*, Yahoo!, 5 May 2022, https://finance.yahoo.com/quote/NVDA?p=NVDA&.tsrc=fin-srch.

"Nvidia." *Wikipedia*, Wikimedia Foundation, 4 May 2022, https://en.wikipedia.org/wiki/Nvidia.

Ravi, Sarah. "2021 State of the U.S. Semiconductor Industry." *Semiconductor Industry Association*, 24 Sept. 2021, https://www.semiconductors.org/state-of-the-u-s-semiconductor-industry/.

"SPDR Bloomberg 1-3 Month T-Bill ETF (BIL) Stock Price, News, Quote & History." *Yahoo! Finance*, Yahoo!, 5 May 2022, https://finance.yahoo.com/quote/BIL?p=BIL&.tsrc=fin-srch.