Case 5

U.S. Economy

5.1 Current State

The U.S. economy is currently in the mid- and late-expansion phase of its business cycle, with Gross Domestic Product (GDP) growth moderating after a strong recovery from the COVID-19-induced recession [1]. As shown in Figure 5.1, the annualised growth rate has stabilised between 2% to 4% in recent years. This performance stands out compared to other G7 countries, where average GDP growth rates typically remain below 2% [2]. The rapid recovery in real GDP during 2022, following the pandemic, further highlights the resilience and stability of the U.S economy.

The unemployment rate is another crucial indicator for economic health and is highly dependent on economic activity. Historically and theoretically, when economic activity is high, more workforce is required to produce goods and services, leading to a lower unemployment rates [3]. Current data indicates the labour market continues to demonstrate the resilience of the US economy despite signs of economic slowing. As shown in Figure 5.2, the unemployment rate has held steady at around 4.1%, a historically low level.
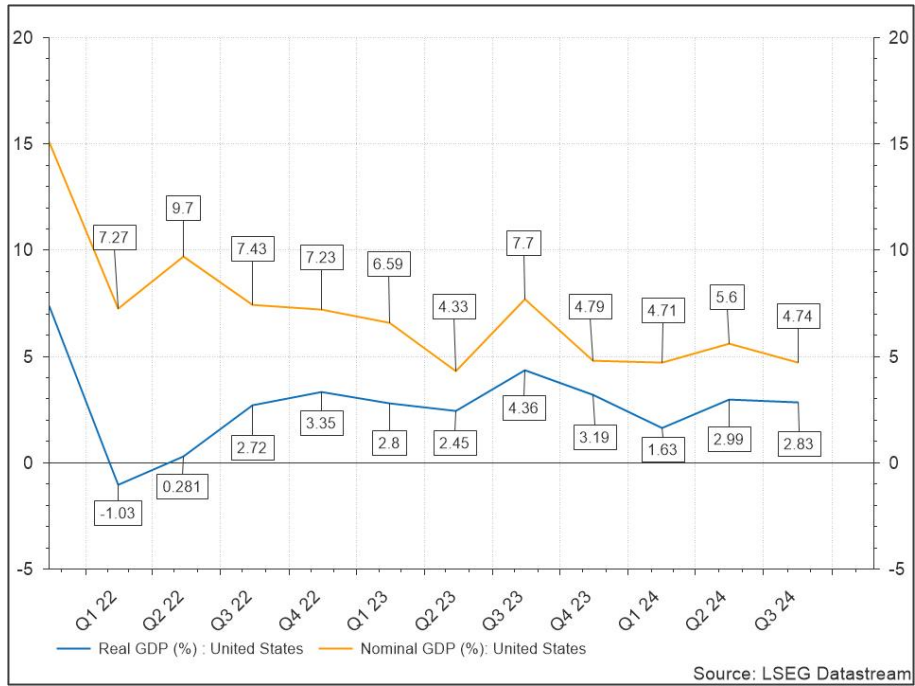
Figure 5.1: Annualised Quarter-over-Quarter (QoQ) GDP Growth Rates of U.S.
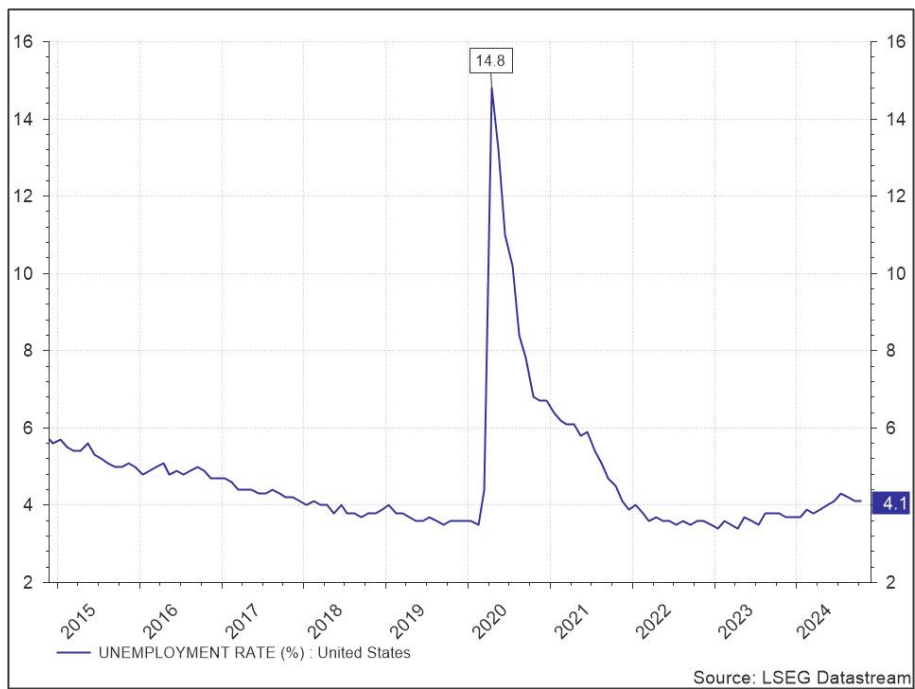

Figure 5.2: Unemployment Rate of U.S.

Inflation remains a central concern for policymakers and businesses. Figure 5.3 shows U.S. inflation and federal funds rates in recent years. As of October 2024, the Consumer Price Index recorded a year-over-year increase of 2.4%, significantly down from the 9.81% peak in mid-2022. The Federal Reserve has maintained the federal funds rate at 4.75% as of November, reflecting its commitment to achieving its 2% inflation target [4].

Figure 5.3: U.S. Inflation Rate and Federal Funds Rate

Monetary tightening over the past two years has curbed demand-side inflationary pressures but raised borrowing costs, impacting investment and consumer spending. Despite these headwinds, GDP growth has remained resilient, reflecting the robustness of the U.S. economy. The ability to maintain growth amid high borrowing costs and slight increases in unemployment highlights the economy's adaptability and stability.
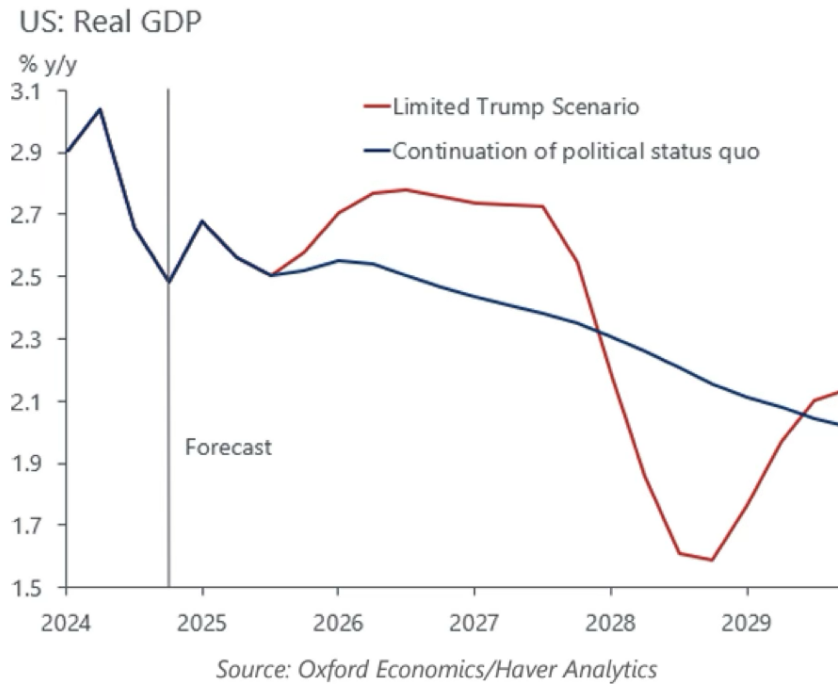
5.2 Future Outlook

US: Real GDP

Figure 5.4: Projected U.S. Real GDP Growth

Aggressive economic policies under Trump, including tariffs, deportations, and tax cuts, are expected to cause significant shifts in the U.S. economy. Tariffs (10% on all imports and 60% on imports from China) aim to reduce imports and lower the trade deficit but risk inflation from higher costs and shrink the tax base. Deporting unauthorised immigrants reduces the labour supply, increasing labour costs and inflationary pressures. If inflation rises too high, the Federal Reserve may tighten monetary policy, potentially increasing interest rates and reducing employment by 0.5% annually and by a cumulative 5% over time [5]. Tax cuts and corporate incentives are expected to provide short-term growth by boosting disposable income and investment, but the $200 billion in new tax cuts will outweigh the $85 billion in tariff revenue, pushing the federal deficit from 6.1% of GDP in fiscal 2024 to 6.8% by fiscal 2026 [6]. While Trump's policies are expected to initially boost GDP growth, as shown in Figure 5.4 [7], inflationary pressures, labour market constraints, and a widening deficit are likely to drive a sharp slowdown by 2028.

Despite the inflationary risk of Trump's policies, growth is projected to accelerate in 2026, partly due to adjustments in monetary policy. As inflation progresses towards the

Federal Reserve's 2% target, the Fed began reducing the interest rate range in September [4]. By November, the rate was lowered further to 4.5% - 4.75% [8]. Looking ahead, additional rate cuts are anticipated, which are expected to encourage increased business activity and economic expansion. This forecast of interest rate reductions aligns with projections from Deloitte, with rates expected to decline to 4% in 2025 and approximately 3% in 2026 [Appendix A] [9]. However, this outlook depends on mitigating inflationary pressures from Trump's fiscal policies. While looser monetary policy is expected to support growth, its feasibility hinges on balancing inflation and economic stabilisation.

Meanwhile, long-term treasury interest rates have increased significantly over the last two months, as shown in Figure 5.5, constraining potential consumption growth in the short term by making big-ticket purchases less affordable [6]. Additionally, the economy faces near-term challenges as elevated interest rates over the past few years continue to dampen momentum [10].
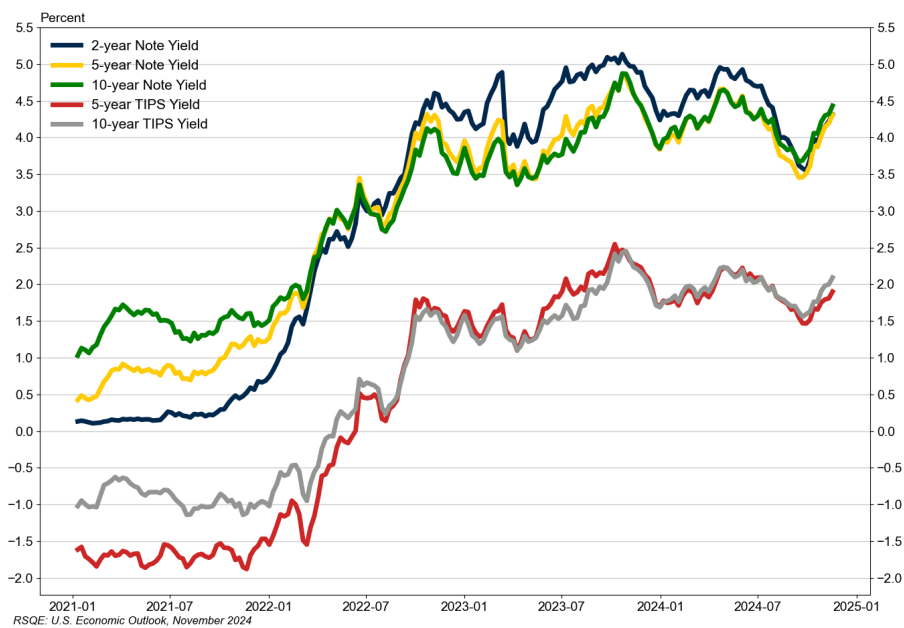

Figure 5.5: U.S. Long Term Treasury Interest Rates

Additionally, according to the U.S. Economic Outlook for 2025–2026 [6], an extension of the Tax cuts and Jobs Act of 2017 is expected, which will stimulate economic growth in 2026.

Case 6

NVIDIA Performance

6.1 Introduction

NVIDIA Corporation (NASDAQ: NVDA) is a leading semiconductor company specialising in GPUs and AI-based computing solutions, maintaining a dominant market position in data centre and gaming industries, as shown in Figure 6.1 [11] and Figure 6.2 [12]. Re-knowned for its innovation in accelerated computing, NVIDIA's products drive advancements in AI, cloud computing, and autonomous systems. The company has achieved strong financial growth, with significant revenue contribution from AI chips, particularly in data centres, and consistently high margins. NVIDIA's stock is a key component of major indices, including the S&P 500, and is favoured by growth investors due to its leadership in AI and computing markets, despite geopolitical and valuation risks.
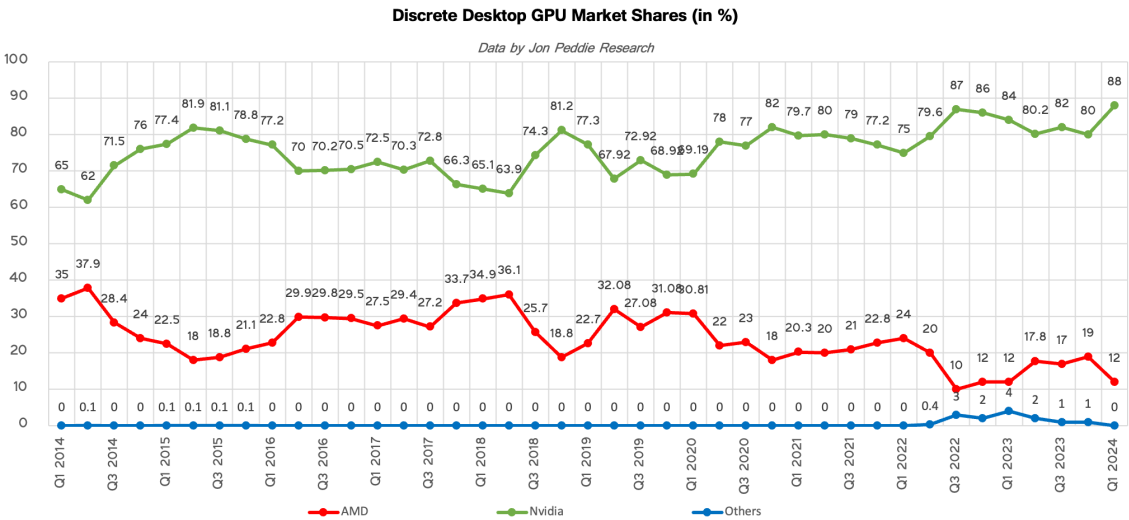

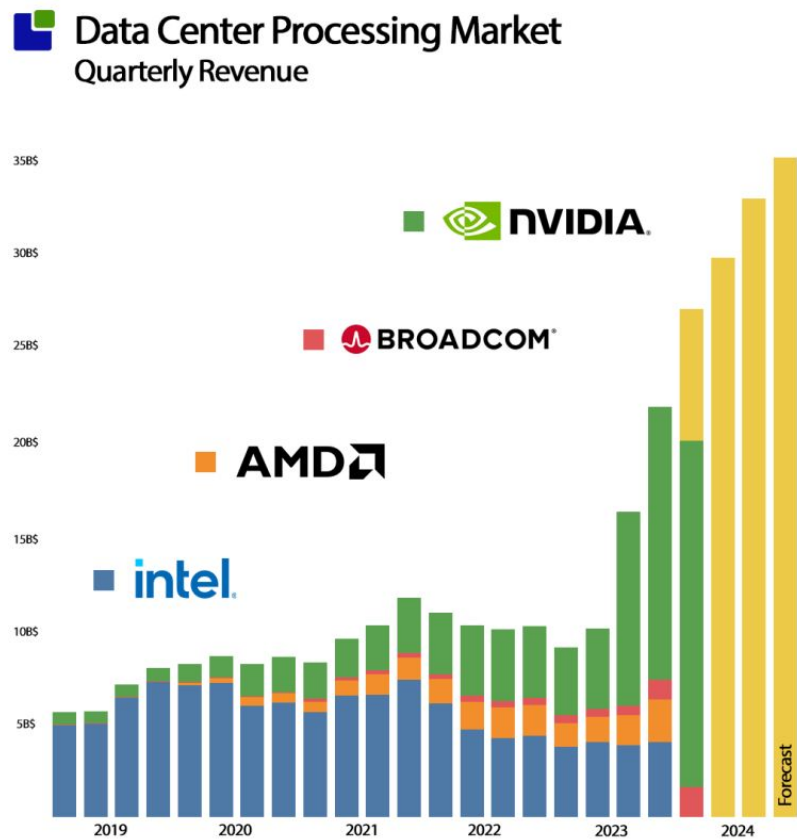**Figure 6.1:** Desktop GPU Market Share

Figure 6.2: Data Center Processing Market

6.2 Company Performance

NVIDIA's stock performance reflects its exceptional financial growth and strategic positioning in the AI-driven market. In Q3 FY25, NVIDIA reported an exceptional 94% year-over-year revenue increase, totalling $35.1 billion. This performance highlights its dominance in AI infrastructure, with data centres contributing 88% of total revenues. Such growth reflects NVIDIA's ability to meet surging demand for advanced architectures like Hopper and Blackwell while maintaining robust profitability metrics, including a gross margin of 74.6% and an operating income of $21.9 billion (+110% YoY). [13].

The short-term outlook for NVIDIA's, as shown in Figure 6.3, projects quarterly revenue of $37.5 billion for Q4, reflecting continued strong demand. However, supply concerns in the gaming segment remain a challenge.

7

Figure 6.3: NVIDIA Q4 FY25 Financial Forecast

6.3 Competitor Profile

As shown in Table 6.1 [14], the data indicates that Nvidia exhibits robust financial health, particularly compared to its competitors, AMD and Intel. Nvidia's trailing twelve months price-to-earnings ratio stands at 63.24, notably lower than AMD's, suggesting a more balanced valuation concerning its growth prospects and profitability. Additionally, its three- and five-year ratios underscore its potential for sustainable long-term growth.

Company	Market Cap	PE Ratio	TTM PE Ratio	3Y PE Ratio	5Y PE Ratio
NVIDIA	$3.232T	53.18	63.24	75.84	75.75
AMD	$203.236B	114.05	299.49	0.90	22.25
Intel	$84.339B	-5.40	45.61	11.74	11.71

Table 6.1: PE Ratio Comparison of Nvidia, Advanced Micro Devices, and Intel
As of 11 December 2024

Figure 6.4 [14] shows the Diluted Earning per Share (EPS) of the three companies. Over a three-year interval, only NVIDIA's EPS demonstrates a steady upward trend, reflecting improved profitability and returns. In contrast, AMD and Intel have experienced declines, with AMD seeing minor drops and Intel facing sharper decreases, indicating

profitability challenges for both competitors.
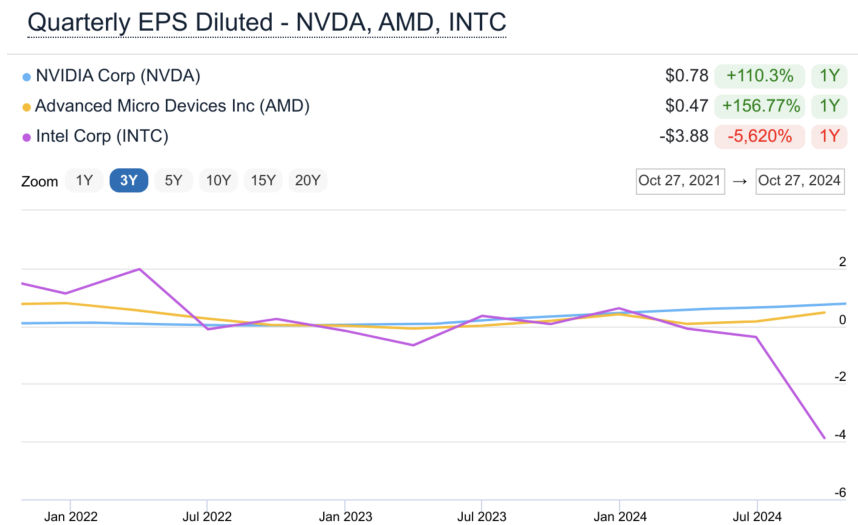
Figure 6.4: Diluted EPS of three major semiconductor companies

When comparing net income (Figure 6.5 [14]), NVIDIA shows consistent growth, including a significant surge over the past three years. Conversely, AMD's net income has remained relatively stable, while Intel has experienced a substantial decline in recent periods.
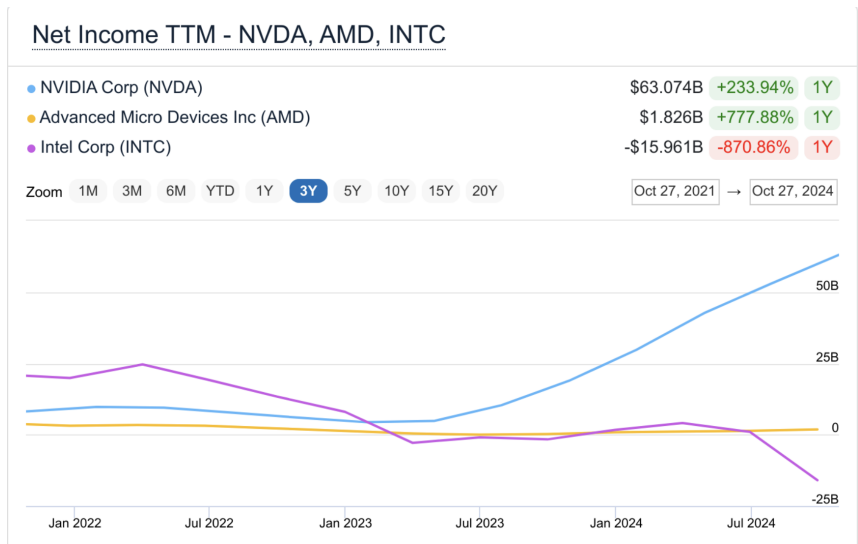
Figure 6.5: Net Income of three major semiconductor companies

Based on these fundamental metrics, NVIDIA clearly stands out as a leader in the semiconductor industry. Its exceptional performance underscores a strong market position that is unlikely to face significant challenges in the short term.

6.4 NVIDIA's Growth and Volatility

An analysis of historical data from Yahoo Finance [15] reveals NVIDIA's impressive annualised return of 197.99%, reflecting its exceptional growth and dominant position in the semiconductor and AI markets. This growth has been driven by rising demand for GPUs and AI hardware.
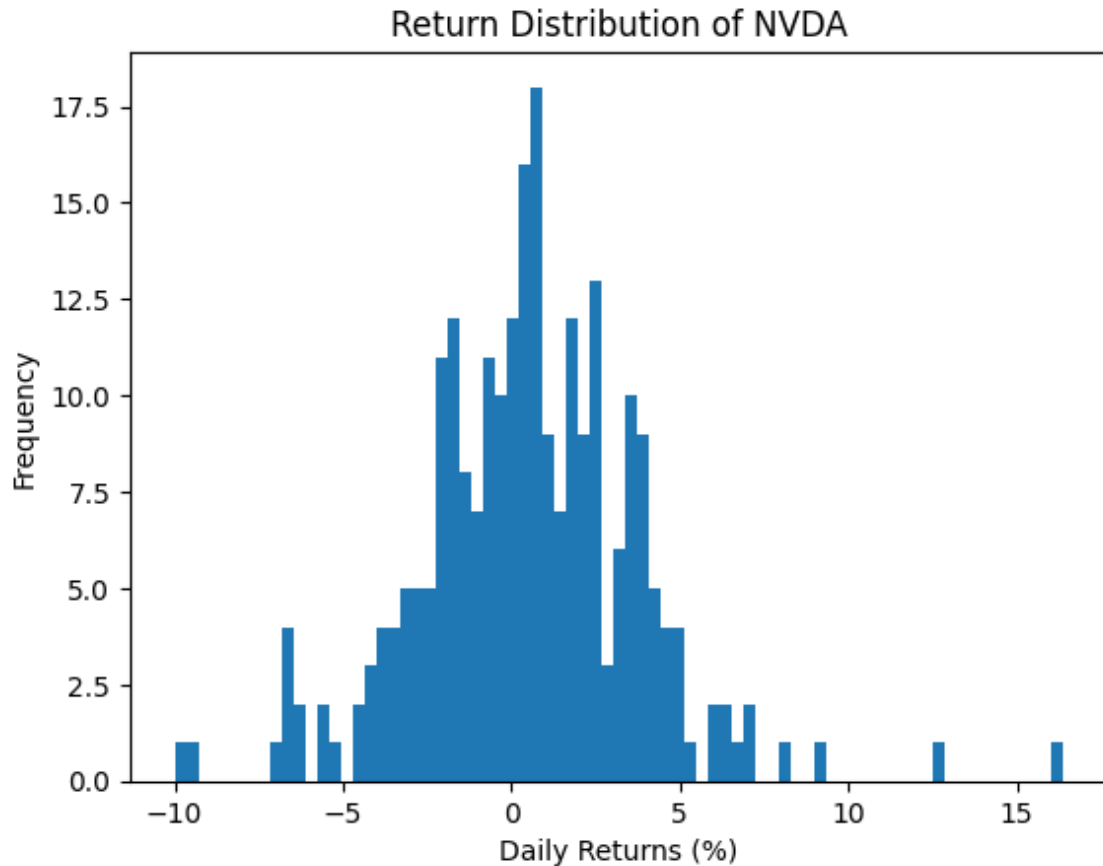
Figure 6.6: Daily Return Distribution of Nvidia (code is listed in Appendix B.1)

The variance ($\sigma^2 = 0.2764$) highlights high variability in returns, consistent with NVIDIA's innovative product cycles and exposure to rapid sector changes. The histogram of daily returns (Figure 6.6) further illustrates this broad range, reflecting NVIDIA's dynamic market activity .

These findings underscore NVIDIA's status as a market leader with substantial growth potential. However, the high volatility associated with its stocks indicates significant risks tied to market or company-specific events, reinforcing the opportunities and challenges of investing in a high-growth yet volatile sector.

6.5 International Partnerships

Another factor contributing to NVIDIA's dramatic financial growth in AI industries is its international collaboration with other global companies outside the U.S., particularly in India and Japan. According to NVIDIA's Q3 FY25 presentation [13], Tata Communications, one of India's leading tech giants, is building AI factories with tens of thousands of NVIDIA's GPUs, which is expected to boost GPU deployments in India by approximately tenfold. Similarly, in Japan, NVIDIA technologies have been adopted by major tech companies such as Softbank to develop the nation's most powerful AI supercomputer and integrate AI networks into telecommunications infrastructure. Additionally, leading companies like Fujitsu and NTT are leveraging NVIDIA's AI technologies for industrial enterprise applications.

6.6 Conclusion

Considering NVIDIA's exceptional performance in the AI and semiconductor industries alongside its inherent volatility and valuation risks, we recommend that assigning NVIDIA a rating of **(2) Buy**. While NVIDIA remains a leader in AI and semiconductor technologies, the risks associated with its high growth profile warrant a slightly cautious approach for investors seeking a balance of risk and reward.

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Appendix A

Deloitte's Baseline Forecast

Figure 18

Baseline (60%)

% year over year unless mentioned otherwise	History							Forecast				
	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
GDP and components												
Real GDP	2.5	3.0	2.5	−2.2	5.8	1.9	2.5	2.7	1.5	1.7	2.1	2.0
Real consumer spending	2.6	2.7	2.0	−2.5	8.4	2.5	2.2	2.4	1.8	1.6	1.6	1.6
Real consumer spending, durable goods	6.8	6.6	3.3	8.0	16.7	−0.3	4.2	1.6	1.8	1.7	1.7	1.6
Real consumer spending, nondurable goods	2.8	2.6	2.9	3.3	8.5	0.6	0.8	1.7	1.4	1.0	1.2	1.2
Real consumer spending, services	1.9	2.2	1.5	−5.9	6.9	3.7	2.3	2.8	2.0	1.8	1.7	1.7
Real investment in private housing	4.3	−0.7	−0.9	7.2	10.7	−9.0	−10.6	4.8	0.6	1.3	1.8	1.9
Real fixed business investment	4.6	6.9	3.7	−4.7	5.9	5.2	4.5	4.2	4.0	3.9	4.3	3.7
Real inventory accumulation	33	54	71	−30	13	128	44	72	30	4	4	4
Real exports of goods and services	4.1	2.9	0.5	−13.1	6.3	7.0	2.6	2.2	4.2	5.2	5.1	4.5
Real imports of goods and services	4.7	4.0	1.2	−9.0	14.5	8.6	−1.7	3.8	4.2	4.0	3.4	3.0
Real government consumption and investment	0.6	2.0	3.9	3.2	−0.3	−0.9	4.1	2.9	1.0	1.0	1.0	1.1
Real federal government consumption and investment	0.5	3.5	3.8	6.1	1.4	−2.8	4.2	2.1	1.0	1.0	1.0	1.0
Real state and local government consumption and investment	0.6	1.1	4.0	1.4	−1.3	0.2	4.0	3.4	1.2	1.1	1.1	1.2
Prices												
Consumer price index	2.1	2.4	1.8	1.2	4.7	8.0	4.1	3.0	2.3	2.2	2.1	2.0
Chained price index for personal consumption expenditures	1.7	2.0	1.4	1.1	4.2	6.5	3.7	2.5	2.0	2.0	1.8	1.9
Chained GDP price index	1.8	2.3	1.7	1.3	4.6	7.1	3.6	2.4	2.1	2.0	1.8	1.8
Employment cost index	2.4	2.8	2.7	2.6	3.3	4.9	4.5	4.0	3.4	3.2	3.0	2.9
Labor markets												
Average monthly change in employment	190	190	167	−728	343	521	295	216	145	101	84	80
Unemployment rate (percentage)	4.4	3.9	3.7	8.1	5.3	3.6	3.6	4.1	4.2	4.1	4.0	4.0
Employment to population (percentage)	60.1	60.4	60.8	56.8	58.4	60.0	60.3	60.1	60.0	59.9	59.9	59.8
Income and wealth												
Real disposable personal income	3.1	3.6	3.1	6.4	3.2	−6.0	4.1	1.6	2.7	3.0	2.9	2.5
Net household wealth (US$ trillions)	104	104	117	131	150	145	156	168	172	174	177	181
Personal saving rate (percentage of disposable income)	5.8	6.4	7.4	15.2	11.2	3.3	4.5	3.7	4.6	5.9	7.1	7.9
Corporate profits before tax	3.8	6.3	4.4	−3.5	22.6	9.8	1.5	4.7	−0.4	3.5	5.3	5.9
Housing												
Housing starts (thousands)	1,205	1,247	1,292	1,394	1,605	1,552	1,421	1,356	1,438	1,466	1,444	1,441
Stock of owner-occupied homes (millions)	137	138	140	141	142	144	145	147	148	149	151	152
Interest rate of 30-year fixed rate mortgages (percentage)	3.99	4.54	3.94	3.11	2.96	5.33	6.80	6.72	6.10	5.55	5.31	5.28
Foreign trade												
Current account balance, share of GDP (percentage)	−1.9	−2.1	−2.1	−2.8	−3.7	−3.9	−3.3	−3.4	−3.4	−3.2	−2.9	−2.6
Merchandise trade balance (US$ billions)	−792	−870	−846	−901	−1,071	−1,177	−1,065	−1,171	−1,300	−1,350	−1,372	−1,378
Relative unit labor costs (index, 2008 = 100)	105.2	103.0	107.5	112.9	110.3	113.1	113.1	115.3	116.9	117.3	116.5	115.3
Financial												
Federal funds rate (percentage)	0.97	1.78	2.16	0.42	0.13	1.73	5.07	5.18	3.99	2.99	2.38	2.38
Yield on 10-year treasury note (percentage)	2.33	2.91	2.14	0.89	1.44	2.95	3.96	4.11	3.71	3.63	3.54	3.51
Government												
Federal budget balance, unified basis (share of GDP, percentage)	−3.5	−3.9	−4.5	−12.3	−13.4	−5.6	−7.0	−5.9	−6.1	−6.2	−5.8	−5.7

Source: Deloitte analysis.

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Figure A.1: Deloitte Forecast on U.S. Economy

Appendix B

Codes For Case Study

Return Distribution of Nvidia

```python
# Ticker name
ticker = 'NVDA'

# Read data
stock_data = yf.download(ticker, start="2023-12-01", end="2024-11-27")

# Ensure the data are sorted by Date
stock_data = stock_data.sort_values(by='Date')

# Show the first five rows of stock_data
stock_data.head()

# Get the adjusted close prices
stock_prices = stock_data['Adj Close']

# Change the data type to Dataframe
stock_prices: pd.DataFrame = stock_prices.to_frame()
print(type(stock_prices))

# Display the result
stock_prices

# Calculate the daily returns of the adjusted close price
```

```python
24  stock_prices['Returns'] = stock_prices['Adj Close'].pct_change()
25
26  # Check the first five rows of stock prices
27  print(stock_prices.head(3))
28
29  # Quick check
30  print("Quick check, the first entry in 'Returns' is: "+str
        ((55.089348-55.042877)/55.042877))
31
32  # Convert the decimal returns into percentage returns
33  percent_return = stock_prices['Returns']*100
34
35  # Drop the missing values
36  returns_plot = percent_return.dropna()
37
38  #Plot the returns histogram
39  plt.title('Return Distribution of {}'.format(ticker))
40  plt.xlabel("Daily Returns (%)")
41  plt.ylabel("Frequency")
42  plt.hist(returns_plot, bins=75,density=False)
43  plt.show()
44
45  # Find N
46  N = stock_prices['Returns'].dropna().count()
47
48  # The (1 + Return) component
49  return_comp = (1 + stock_prices['Returns'].dropna()).prod()
50
51  # Annualized return
52  annualized_return = return_comp**(252/N) - 1
53  print("The annualized return is: "+str(annualized_return))
54
55  sigma_daily = np.std(stock_prices['Returns'].dropna())
56
57  # Annualize the standard deviation
58  sigma_annualized = sigma_daily * np.sqrt(252)
```

```
59  print("The standard deviation of the daily return is: "+str(
        sigma_annualized))
60
61
62  # Calculate the annualized variance
63  variance_annualized = sigma_annualized**2
64  print("The daily variance is: "+str(variance_annualized))
65
66  # Drop the missing values
67  clean_returns = stock_prices['Returns'].dropna()
68
69  # Calculate the third moment (skewness) of the returns distribution
70  returns_skewness = sp.stats.skew(clean_returns)
71  print("The skewness of the returns distribution is: "+str(
        returns_skewness))
72
73  # Run the Shapiro-Wilk test on the stock returns
74  shapiro_results = sp.stats.shapiro(clean_returns)
75  print("Shapiro results:", shapiro_results)
76
77  # Extract the p-value from the shapiro_results
78  p_value = shapiro_results[1]
79  print("P-value: ", p_value)
```

Listing B.1: Return Distribution of Nvidia