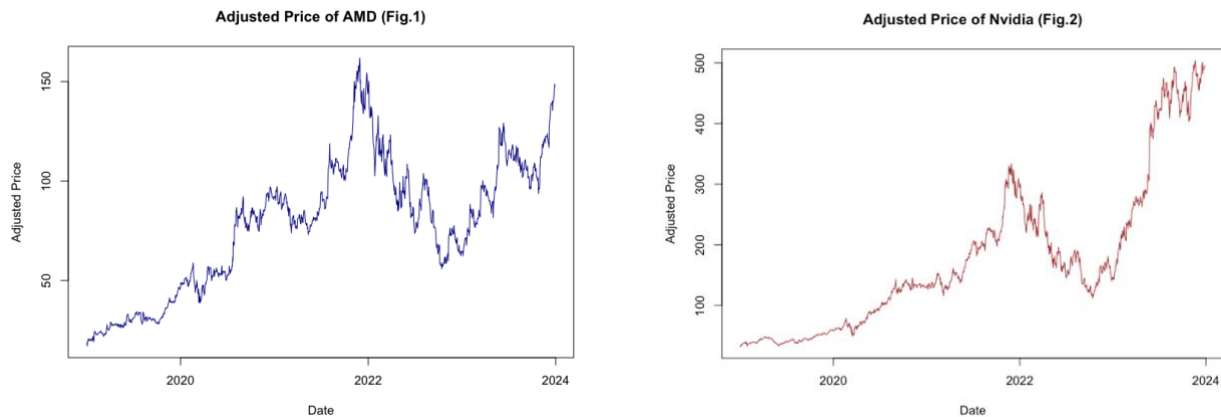


## Risk and Return Analysis of AMD & Nvidia

This report aims to analyse and compare the adjusted price, daily return and various statistical metrics of AMD and Nvidia in order to give an investment recommendation. The data used for this analysis is the daily closing price and was accordingly adjusted to account for stock splits and dividends. It was imported from the Centre for Research and Security Prices (CRSP) from the January 1, 2019 to December 29, 2023. AMD and Nvidia are top semiconductor manufacturing companies; AMD focuses on CPUs/GPUs for consumer electronics and data centers, whereas Nvidia leads in GPUs for gaming, AI, and high-performance computing

### Price analysis:

The following figures highlight the time-series of AMD and Nvidia's adjusted prices from 2019 to 2023. Both stocks display a long-term upward trend, punctuated by key market events that influenced their price movements.



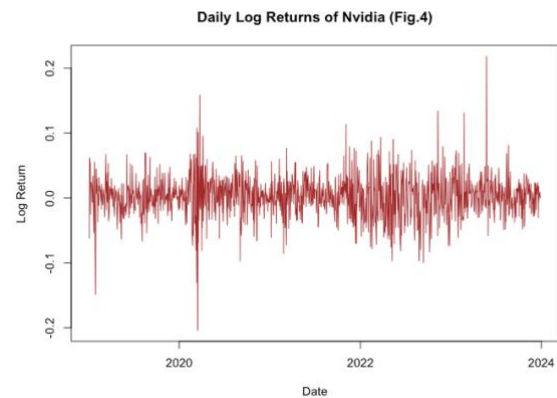
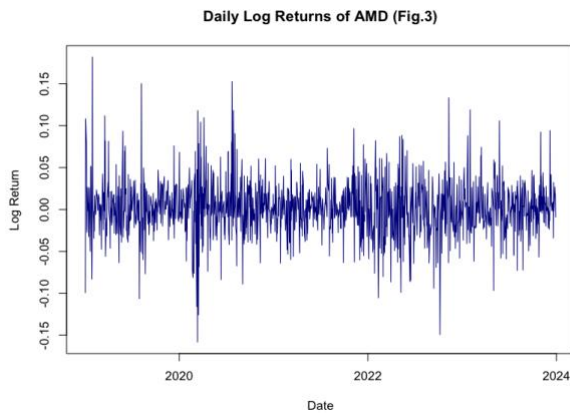
Early 2020 saw growth in both stocks, driven by pandemic-fuelled demand for tech in remote work, gaming, and cloud computing. In early 2022, both stocks experienced a notable spike, likely due to increased interest in artificial intelligence (AI), particularly benefiting Nvidia as a leader in AI hardware. However, later that year, both stocks declined due to a tech sector correction, driven by rising inflation and interest rates.

After mid-2023, AMD and Nvidia's price trends began to diverge. Nvidia showed more fluctuations, likely due to variable demand for its AI and high-performance computing (HPC) products, while AMD's more stable trend reflects steady demand and its diversified focus. Overall, the high **correlation coefficient of 0.76** indicates that the two stocks respond similarly to market forces, although recent divergence suggests unique demand drivers.

### Focus on volatility:

The daily log return plots for AMD and Nvidia highlight each stock's volatility and show how economic and sector-specific events influenced their fluctuations. In 2020 and 2021, both stocks experienced moderate volatility with occasional spikes, especially for Nvidia, due to supply chain disruptions and high demand for its newly launched GPUs. The graphics card shortage, driven by gaming and cryptocurrency mining demand, led to irregular price movements for Nvidia during this period. In 2022, volatility increased for both stocks as inflation and anticipated interest rate hikes pressured growth stocks, leading to larger daily fluctuations. Early 2022 saw a spike in Nvidia's returns due to rising enthusiasm for AI, as Nvidia benefited from demand in this sector. After mid-2023, a divergence in

volatility became evident. Nvidia's returns showed more pronounced fluctuations, driven by demand in AI and HPC, while AMD's returns were more stable, reflecting its diversified product portfolio and steady demand after acquiring Xilinx in early 2022.



### **Comparative Statistics Analysis & Recommendation:**

	Stock	Mean	SD	Skewness	Kurtosis
1	AMD	0.001637046	0.03359359	0.20020247	5.770494
2	Nvidia	0.002129694	0.03244955	0.05120704	7.043779

**Mean:** Nvidia shows a slightly higher average daily return (0.213% per day) compared to AMD (0.164% per day). Although marginal, this result indicates that on average, Nvidia provided greater returns on investment per day.

**Standard Deviation (SD):** The standard deviation reflects each stock's daily price volatility, with AMD (3.36%) showing slightly higher volatility than Nvidia (3.24%). Both stocks have similar levels of volatility, which is typical for growth-oriented tech companies.

**Skewness:** Positive skewness indicates a tendency toward positive extreme values (i.e., days with unusually high returns). AMD's higher skewness (0.20) suggests it has a slightly greater tendency for large positive returns compared to Nvidia (0.051). Nvidia's near-zero skewness indicates a more balanced return distribution, suggesting that extreme positive returns are less frequent for Nvidia than for AMD.

**Kurtosis:** Both stocks have kurtosis values significantly above 3 (skew of the normal distribution), indicating "fat tails" or a higher probability of extreme values (both gains and losses). Nvidia's higher kurtosis suggests a greater tendency for extreme price movements. This characteristic could make Nvidia is more suitable for investors who can tolerate sudden large fluctuations, as it may produce sharp gains but also potentially sharp losses.

Based on the above analysis, **Nvidia** may appeal to more risk-tolerant investors. Its higher average return, combined with high kurtosis, suggests potential for both significant gains and large swings, particularly given its focus on fast-growing markets like AI and high-performance computing. Nvidia's return profile, with a higher tendency for extreme values, might suit investors who are comfortable with volatility and seeking exposure to high-growth sectors.

**AMD**, on the other hand, appears more suitable for investors with a moderate risk tolerance. Despite similar volatility levels, AMD's returns show slightly lower kurtosis, indicating fewer extreme price movements. Additionally, AMD's higher skewness suggests a greater likelihood of occasional positive returns. Investors seeking growth exposure in the tech sector but with slightly more stability may prefer AMD.