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AI effect - Impact of Generative AI adoption announcements on company

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Abstract

Generative artificial intelligence (AI) is one of the most discussed and relevant topics today. Companies integrating generative AI have the potential to develop innovative products and services, draw in a larger customer base, and boost stock valuation. This research aims to investigate the impact of AI implementation announcements on stock prices, considering both short-term and long-term perspectives. Utilizing a dataset of 179 announcements, this study employs regression analysis and event study methodology to analyze the stock price reaction dynamics of major technology firms, including Microsoft, Google, Amazon and Meta, to generative AI-related announcements. Contrary to the prevailing optimistic projections, our initial findings indicate that announcements of generative AI integration do not lead to immediate increases in stock prices. This suggests that the market's response is mixed, with some investors possibly undervaluing or remaining skeptical about the impact of AI. Furthermore, our analysis shows that in the long run, AI-related announcements do not significantly influence stock price trends. In contrast, quarterly earnings reports have a direct, though modest, correlation with changes in stock prices. Findings highlight the complexity of market reactions to generative AI announcements and emphasize the important role of investor perceptions and market sentiment in shaping how stock prices respond to technological innovations.

Keywords: Generative AI, Generative AI announcements, stock market reaction, event study, regression analysis

1. Introduction

In the last ten years, artificial intelligence (AI) has evolved rapidly, affecting every aspect of our lives. Many world-renowned companies are already intensively introducing AI technologies into the structure of the company and it has a tangible effect on their work, including the shares of the company itself. Artificial intelligence was first introduced in the mid-20th century, and since then it has evolved in different directions becoming one of the most ambitious technological innovations. The advent of big data and the improvement of machine learning algorithms have made it possible to create more complex systems of text and generative image. Over the years, many discoveries and breakthroughs have been made, giving impetus to a new branch of development – generative AI. The generative AI was first released in 2017, but the real success came only with the release of Chat GPT in 2019. Currently, the most popular models are: GPT, Whisper, Gemini, etc.

Generative technology allows you to apply in any business sphere, including design, sales, marketing and finance. Henriksson and Nyqvist (2022) state, «In short, AI is improving quickly, becoming faster, more precise and covering more data, i.e., further improved precision in predictions. As a result, many business sectors are rushing to implement it to some degree. Among these are supply chain management, fixed assets, R&D, sales, marketing, healthcare, and automotive industries»(p. 6). However, the market response to such events is difficult to predict and depends on many factors. Herreman (2021) studied that, «it can be an announcement of mergers and acquisitions, launch of a new product, capital expenditure, issue of shares or, most importantly, announcement of a new information technology»(p. 1).

This paper examines the impact of announcements regarding the use of generative AI on the fluctuations in stock prices of companies. This study aims to conduct a thorough analysis of the effect of company announcements on stock prices.

Research hypothesis:

H1 Announcements about the adoption of generative AI positively impact a company's short-term results.

H2 Generative AI adoption announcements have no effect on long-term results

The project will involve a comprehensive examination of the unique aspects of this impact, including an analysis of existing research, a study of various methods and approaches to evaluating results, and an analysis of the financial data of well-known companies.

To achieve this goal, the following research question will be addressed:

1. How do AI adoption announcements affect the value of the firm and stock price movements in the short term?
2. How do public announcements of Generative A.I. adoption affects the financial performance of companies in the longer period - financial quarter?

It is important to emphasize that the market impact of AI is still evolving and may yield both positive and negative effects. This study is distinctive in its approach, and the results are anticipated to be valuable, offering new insights in the domain of modern business.

2. Literature review

In reviewing the literature in this area, earlier studies on the business benefits of Artificial Intelligence were consulted. The stratum of articles is related to studying the potential profitability of AI, the impact on the workforce, strategic decisions and company operations are studied.

To maintain and increase their profitability, companies are trying to keep up with the times and invest in innovation and AI. The implementation helps to adapt to a rapidly changing environment and become more agile, resilient to any competition and difficult times. A study by Wamba-Taguimdje et al. (2020), which employed a qualitative analysis of 500 case studies, concluded that AI has the potential to enhance productivity at the organizational, administrative, marketing, financial and the process level. On the labor impact side, AI investments favor large firms by increasing sales, employment, and market share. This is the result of a study by Babina et al. (2023), where they propose a new measure of AI investment using employee resumes from Cognism and job postings from Burning Glass Technologies.

Profitability from a financial point of view of AI adoption and development can affect enterprise value, and consequently its share price. The study of the literature was further extended to include an analysis of reactions to company announcements. The articles can be categorized into studies of reactions to blockchain, dividend payout, new product launches and innovation investments. Studies were examined on the impact of innovation investment announcements across different markets. These studies encompassed both the implementation and realization planning of such investments, as well as their success rates. The primary objective was to detect any abnormal returns or losses associated with these announcements. Henriksson & Nyqvist (2022) studied 76 announcements from 43 sample firms in North

European markets and concluded that AI-enabled announcements have a significant positive impact, which means that the investment is valuable. However, there are nuances to which companies specifically are worth a large investment, as proven by the research findings.

For instance, an analysis of 217 advertisements in the Australian market related to IT investments reveals that the market anticipates IT-enabled firms will generate greater future cash flows from their IT investments compared to IT-producing firms (Fouad & Karlheinz, 2009). Regarding firm size, Fouad and Karlheinz (2009) in their study came up with results indicating that the market evaluated the return on IT investment more favorably for small firms than for large firms across the entire sample, all industries and all years. Herremans (2021) in a similar study attributes this to nascent technology and the associated uncertainty and risks, as market participants lack the knowledge to properly understand and evaluate the announcement in a timely manner. And he also argues that it is not enough to simply innovate to improve efficiency, the firm must have a future orientation and a highly competent senior management team to manage it. Thus, articles show that innovation is valuable, but there are limitations and restrictions without which it is quite problematic for firms to benefit.

Generative AI such as ChatGPT comes later and accordingly the list of studies on this specific topic is relatively scarce. For example, one study on this topic by Eisfeldt et al. (2023) found that the impact of ChatGPT issuance was significant, leading to a difference in firm profitability of about 0.4% per day, which translates to more than 100% in annualized terms, and a correlation with organizational capital and gross profitability. This research examines how generative AI affects workers, particularly focusing on the efficacy of problem-solving using GPT chat across various professions. The paper concludes that the emergence of language

models and generative AI represents a major technology shock that has a significant impact on the overall value of companies (Eisfeldt et al., 2023).

To summarize, the majority of existing studies document positive short-term outcomes for small and medium-sized firms utilizing the technology. However, there is a notable gap in the literature, as no studies have yet examined the long-term effects of generative AI. Our study aims to track not only the short-term effect of such claims, but also the long-term effect to determine whether the expectations of profitability are realized and whether this is simply a trend and marketing ploy by companies. The impact of creating and releasing artificial intelligence (AI) within major IT companies requires thorough clarification. To achieve this, an analysis of companies in the US market will be conducted, given that AI development and advancement predominantly occur within US-based firms.

3. Dataset and Methodology

3.1 Data Collection

The research is based on data collected for the period from 2018 to April 2024, based on IT organizations operating in the United States, including Microsoft, Google, Meta, and Amazon. Participating companies are leading AI innovators, to make the product, service, and operation better. In addition, these companies were chosen for their significant contributions to AI research and development, making them key players in the industry's evolution. The data collected covers a range of financial metrics, including Generative AI announcements, quarterly reports of companies, company betas, stock prices, earnings, and risk-free rates.

A comprehensive search of announcements was conducted using such key terms as "Generative Artificial Intelligence", “Generative AI announcements” and "Investments in AI".

Main sources used to identify these announcements are major databases, besides news sources such as Google News, Bloomberg, and company press release archives.

To ensure the relevance and quality of the collected data, specific inclusion and exclusion criteria were applied. Announcements were included if they met the following criteria: (a) directly related to generative artificial intelligence or investments in AI, (b) originated from one of the four targeted IT firms (Microsoft, Google, Amazon and Meta), and (c) were published by credible and reputable sources within the last five years. This timeframe was chosen to ensure that the data reflected current trends in AI development and investment. Moreover, announcements that were not explicit or described the underlying generative AI and those that did not fully disclose information about newly released generative intelligence were not used. This exclusion process helped maintain the integrity and uniqueness of the dataset.

In total, this research analyzed 179 announcements made by Microsoft, Google, Meta, and Amazon. The collected announcements were then categorized based on their content. The categories included: (a) release of new AI products and updated versions, (b) AI research and development initiatives, (c) corporate investment in AI, major partnerships (d) availability of generative AI, open access and addition of new tools. Each announcement underwent a validation process and was weighed regarding relevance, importance, credibility of the source, and cross-verification across multiple sources.

Beta values and the stock price of the company were obtained from Yahoo Finance, which was considered one of the most reliable sources of a financial dataset (Yahoo Finance, 2024). The S&P 500 was considered due to the broad and comprehensive inclusion of top corporations, which makes it relevant to the market research, regarding the daily stock price of the top four corporations that fall in the index as S&P Dow Jones Indices (2024). This research

considered quarterly revenue statistics cleared in the earnings report and which is made public. To validate the free-risk interest rate, such data was cited from a U.S. government website that states the return on Treasury bonds.

3.2 Event study methodology

To analyze the short-term effect of Generative Artificial Intelligence announcements, an event study methodology was employed. This methodology revolves around the concept of an "event day" or "day 0," where the "event" refers to a significant company announcement. In the context of this research, the event is defined as the specific day when companies publicly announce the adoption, availability, or introduction of new Generative AI.

Application of the event study methodology is a widely used statistical method in the financial sector, in the financial sector on the basis of the efficient market hypothesis. Based on the efficient market hypothesis, financial markets process new information efficiently, which means that stock prices should quickly reflect any new data (Fama, 1970).

This approach is based on the framework described by Lui et al. (2022), focusing on the market's reaction to AI announcements. Understanding market reactions to AI-related innovations encompasses a total of five days. The event window extends from the five days before an announcement to the five days after an announcement ([-5, +5] days). Selecting this specific time frame allows for capturing both the immediate market reaction and the potential delayed response to the announcement. This comprehensive approach facilitates a more profound understanding of market sentiment, which may not be immediately apparent on the announcement day but become evident shortly after.

Abnormal returns on this day may provide an indication of how effectively the market responds to new information regarding AI adoption. In other words, any significant stock price

deviation on this day could demonstrate the market's perception of the information. These abnormal returns can provide insight into whether the market perceives AI announcements as a potential addition to a company's value or as a potential risk. The abnormal return (AR) per day *t* on a stock is calculated using the following formula:

$$AR_{it} = R_{it} - E(R_{it})$$

In this equation, *Rit* represents the actual return of the stock on day *t*, while *E(Rit)* indicates the expected return. Expected returns are calculated using the capital asset pricing model (CAPM).

The capital asset pricing model (CAPM) was applied, to forecast expected returns. It is reliable financial model utilized an asset's systematic risk to estimate its expected return, thus forming the foundation of the computation process:

$$E(R_i) = R_f + \beta_i(R_m - R_f)$$

In this equation, *Rf* represents the risk-free rate, firm's beta is *Bi*, while Rm represents the market return. The risk-free rate is obtained from the US government daily treasury bill rates, which can be accessed at the US department of the treasury website (2023). Daily treasury bill rates were used to calculate the risk-free rate in this analysis.

The computation methodology involved deriving expected returns and subsequently contrasting them with actual price performances. A notable divergence between the two indicated the presence of abnormal returns, which could be incidental due to unexpected external factors or may result from manipulative tactics. For these calculations, data was assembled from authoritative sources such as S&P 500 and Yahoo Finance databases, focusing primarily on the

daily trading values of participating firms throughout the event window. The S&P 500 database was utilized as a benchmark due to its reputation as the premier resource for both U.S. and global market research. Primary emphasis was put on gathering data concerning the daily stock prices of participating companies (Microsoft, Google, Amazon, and Meta) during the event period, specifically selecting the Adjusted Close (Adj Close) stock price as the key metric. This metric was chosen because it offers a precise reflection of the stock's true value, incorporating adjustments for corporate events such as dividends, stock splits, and new stock issuances. By reflecting the stock's true value, the Adj Close price provides a consistent measure of performance over time.

To gain a comprehensive understanding of the overall impact, abnormal returns are combined over the event period, leading to the cumulative abnormal returns. (CAR), where *t1* represents the initial day, while *t2* indicates the final day of the event window.

$$CAR_i = \sum_{t=n1}^{n2} AR_{it}$$

In this formula, the abnormal return for a given stock on a particular day is denoted as *ARit* and cumulative abnormal returns for stocks are represented by *CARi.* This aggregated measure provides a good comprehensive view of the overall impact of the AI announcement's overall impact on a firm's valuation, encapsulating every perceivable market reaction during the studied timeframe.

T-test is used to test the statistical significance of cumulative abnormal returns. This step is crucial for determining whether the observed changes in stock prices around the announcement date are statistically different from zero. The t-statistic is calculated as follows:

$$t = \frac{sCAR}{CAR}$$

A high value of t-statistics indicates that Generative AI announcements is quite a significant factor for the fluctuation of stock prices. T-statistics and p-value are two important aspects in the event studies. If t-statistics show the relationship between the day event and CAR, the p-value shows how likely that this relationship has arisen accidentally. These two coefficients are important for obtaining statistical evidence-based conclusions about the impact of the event on stock price.

3.3 Regression analysis methodology

To calculate the long-term impact of Generative AI announcements, regression analysis is applied. This study used the work of S. Pynnönen's work "On regression based event study" (2005), which demonstrates that traditional event studies with non-overlapping event windows can be effectively modeled using dummy variable regressions, where the residuals of the event window is dummy with variables zero-one.

The regression model used in this analysis is structured as follows:

$$\textbf{Adjusted Share Price} = \alpha + \beta 1 * x1(\textbf{Quarterly Earnings}) +$$

$$+ \beta 2 * x2(\textbf{AI-Announcement}) + error$$

In this framework, the dependent variable is the adjusted share price recorded on the announcement day. Selected variable accurately reflects the market's immediate reaction to new information and also adjusted share price accounts for various external influences.

The first independent variable ($x1$) represents quarterly earnings, serving as an indicator of company performance. For the second independent variable ($x2$), a dummy variable is employed to indicate the implementation status of AI announcements, further multiplied by importance indexes. The dummy variable is coded as follows:

1 - for implemented announcements

0 - for not implemented announcements

The importance indexes for AI-related announcements are specified as follows:

1: High importance (e.g., major launches or detailed descriptions of new AI products).

0.666: Medium importance (e.g., successful implementations or partnerships).

0.333: General importance (e.g., future plans or new tools).

The dependent variable is the adjusted stock price on announcement day, capturing immediate market reactions. Independent variables include quarterly earnings ($x1$), a fundamental determinant of financial performance, and a dummy variable ($x2$) to quantify impact of AI announcements categorized into four levels of importance (0, 0.333, 0.666, and 1).

Investors often orient themselves to earnings as a measure for share price. A recent example is Microsoft's performance in Q3 2023. The company reported a revenue of $52.9 billion, which exceeded analysts' estimates by 27%. This strong performance was driven largely by investments in artificial intelligence, particularly through their strategic partnership with OpenAI. As a result, Microsoft's stock rose by 6.2% (GeekWire, 2023; Microsoft, 2023; Reuters, 2023). Therefore, in this research, the first independent variable ($x1$) is designated as quarterly earnings.

The dataset spans from January 2018 to April 2024. A total of 179 AI investment announcements were collected from the four participating companies: Microsoft, Google, Amazon, and Meta. In this research, the importance of AI announcements is categorized by different values. General AI-related announcements (0.333) include future plans in AI or the introduction of new tools, providing insights into the company's strategic direction and potential long-term benefits. Medium importance generative AI announcements (0.666) cover significant

news like successful implementation and utilization by partner companies, showcasing practical applications and indicating progress in AI deployment. High-impact generative AI announcements (1) involve major releases of new AI products or significant additions to existing capabilities, characterized by detailed descriptions of their purpose, innovative features, and potential use cases, reflecting their substantial market influence. Non-implemented announcements (0) indicate planned initiatives or ideas that have not yet been put into action, providing a baseline for comparison.

To ensure the validity of the regression analysis, several critical assumptions were established. Linearity assumes a linear relationship exists between the independent variable and the dependent variable. Independence means that each observation is independent of the others. Lastly, normality assumes that the error terms follow a normal distribution. These assumptions are essential for maintaining the robustness and reliability of the regression model, thereby ensuring that the results accurately represent the data patterns and relationships.

4. Analysis and Results

4.1 Event-study results

This study examined four globally renowned technology giants: Microsoft, Google, Meta, and Amazon. Over the period from 2018 to 2024, more than 179 announcements related to the use of artificial intelligence (AI) within these companies were investigated.

For instance, Microsoft, one of the largest software developers, first publicly discussed its AI research initiatives in May 2018. From that point forward, Microsoft embarked on an extensive development of AI technologies, which were initially integrated into its computer software. These developments not only captured public attention annually but also attracted

significant investment. This influx of interest and capital subsequently had a notable impact on Microsoft's stock performance.

Table 1
Microsoft's Event analysis-result

Event date	Abnormal Return	Cumulative Abnormal Return	t-test
2/13/2020	-0.55%	0.013%	0.59
1/17/2023	-0.79%	0.07%	3.01
3/17/2023	1.72%	0.06%	1.28
5/27/2023	-1.05%	0.075	2.23
9/21/2023	0.54%	0.013%	0.4
9/23/2023	0.05%	-0.81%	-0.65
10/3/2023	0.88%	0.05%	1.63
10/11/2023	0.0001%	0.07%	1.21
11/1/2023	0,86%	0.10%	2.64
2/26/2024	-0,88%	0.07%	3.89

The initial subject of our analysis is Microsoft corporation. Over the past five years of AI research, numerous announcements have been made. This analysis focuses on the most significant announcements within the period from 2018 to 2024. To see the overall impact of the announcement on the stock price, it was decided to use 10 significant dates for analysis. Table 1 clearly shows the results of all (or no) impact on the stock price.

The most significant result may have been released on March 17, 2023. The abnormal return of 1.72%, as indicated in the first table, suggests that the event had a slightly favorable impact on the stock price during the event period. This means that returns for the period were on average 1.72% higher than expected. However, the slightly favorable impact on the event window indicates a cumulative abnormal return, 0.065%. In other words, the positive abnormal returns at the beginning of the period were likely negated by negative or less than expected

returns. That is, the stock price during the event was generally in line with expectations. The T-statistic of 1.28 is relatively on the low side. This is a positive result, but again not high enough to refute the hypothesis that the observed anomalous return of 1.72% may well be the product of chance. A higher t-statistic (typically above 2.0 in absolute value) would provide clearer evidence that the deviation is indeed significant.

It is also noteworthy that there have been times when results have been unfavorable. On February 13, 2020, for example, the abnormal return was -0.558%. This shows that throughout the event window, the share price was on average 0.558% below expected returns. This event can be linked to lower outputs in 2020 (during the COVID-19 period, the pandemic, when many companies lost their positions and profitability, which means a negative result may not even be related to the announcement).

Table 2
Google's Event analysis results

Event date	Abnormal Return	Cumulative Abnormal Return	t-test
2/6/2023	-0.83%	-0.31%	-0.06
2/20/2023	1.03%	0.00%	-1.54
4/21/2023	0.12%	-1.65%	-0.4
5/10/2023	3.76%	-0.04%	-0.97
5/15/2023	0.04%	0.01%	0.64
6/13/2023	-0.45%	0.64%	0.22
9/19/2023	0.35%	-0.07%	-1.65
10/23/2023	1.13%	-0.06%	-1.4
2/20/2024	1.03%	0.00%	0.02
5/15/2024	0.04%	0.01%	0.64

For comparison, it is possible to examine the data of one of the most advanced IT companies of the world - Google (Alphabet). Recent data indicates that Google is at the forefront of AI investments, committing an impressive $30.7 billion to this area. The technology giant

leverages AI to enhance its search engine and various other products, including Google Assistant and Gemini (Bard). Compared to other companies, Alphabet started to spin AI versions a year ago. Its main objective was to compete with other companies to create and improve AI individual versions.However, their start in early 2023 failed when the program did not start at the presentation. As shown in table 2 most unfavorable performance for Google can be attributed to the announcement made on February 6, 2023. It was possible to notice that abnormal return is -0.83%, indicating that the stock price was 0.83% lower than expected. This indicates the presence of a negative event or factor that negatively affected the market. A cumulative abnormal return of -0.31% indicates an overall share price decline of 0.31% over the observed period. This smaller figure compared to the abnormal returns for a single period suggests that while there were downsides, they may not have always been significant. T-statistics close to zero (-0.06) indicate that these outliers are not statistically significant, showing a high possibility that the observed abnormal returns are the result of chance rather than specific event.

Table 3
Amazon's Event analysis-results

Event date	Abnormal Return	Cumulative Abnormal Return	t-test
4/2/2020	-0.63%	-0.13%	-0.8
6/3/2021	-0.71%	-0.02%	-1.15
4/13/2023	3.92%	-0.08%	-2.9
7/25/2023	0.66%	-0.07%	-2.52
9/13/2023	3.27%	-0.12%	-3.45
9/28/2023	0.17%	-0.13%	-2.95
11/27/2023	1.77%	-0.07%	-3.52
3/13/2024	1.73%	-0.06%	-1.69
4/30/2024	-0.61%	-0.06%	-1.27
5/7/2024	0.74%	-0.04%	-1.39

Table 4
Meta's Event analysis-result

Event date	Abnormal Return	Cumulative Abnormal Return	t-test
9/20/2021	0,68%	-0,71%	-0,13
8/9/2022	0,06%	0,81%	0,16
9/29/2022	-0,46%	-0,09%	-0,92
6/13/2023	0,33%	-0,09%	-2,75
6/16/2023	0,04%	-0,10%	-2,71
7/18/2023	0,66%	-0,08%	-3,18
8/8/2023	-3,59%	-0,08%	-1,91
10/4/2023	1,73%	-0,10%	-2,54
11/16/2023	0,04%	-0,10%	-2,71
5/14/2024	1,36%	-0,10%	-2,15

Meta and Amazon are also developing their own version. In recent years, each of these companies has spent more than a billion dollars investing in. However, as shown in Table 3 and in Table 4, CAR is negative, indicating a potential underestimation of the stock around the event. Negative CAR assumes that the average return on shares was lower than expected return during the event. T-stat is negative due to negative CAR. Overall, the results could provide more definitive insights into the event's impact on the stock price. Negative CAR hints at a possible negative effect, but t-stat suggests that it is not statistically significant.

A comparative analysis of these companies reveals that, in the short term, no announcement significantly positively affected stock prices. Despite this lack of immediate positive impact, these companies continue to invest and develop. These findings lead to the rejection of our initial hypothesis, which posited that announcements would have a positive impact on stock prices.

4.2 Regression analysis results.

As previously discussed, interest in generative AI appears only from mid-2023. The period from 2018 to 2023 was selected, and the sample of announcements for the regression analysis was expanded to include both general AI releases and generative AI releases. The number of observations totaled 132. To ensure comprehensiveness, the analysis also encompasses data from the first quarter of 2024.

The results of the regression analysis for all our surveyed companies yielded roughly the same values with some differences. As a result, our second hypothesis is confirmed.

Microsoft results

Table 5.1
Microsoft's summary output

Regression Statistics	
Multiple R	0.9688248
R Square	0.9386215
Adjusted R Square	0.9350110
Standard Error	23.9526500
Observations	37

Microsoft is one of the companies which spends huge amounts of investment on innovation development. Table 5.1 shows Microsoft's summary outputs by regression. Let us first look at the statistical significance measures of the analysis. The Microsoft data show a Multiple R of 0.97, this is closer to 1, implying that there exists a correlation between share prices and independent variables (X1, X2): quarter earnings and AI-announcements. Microsoft's

R square shows results of 0.94, which means that the predictor data can explain the value of variable Y.

Table 5.2
Microsoft's regression results

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-132.803079	22.9426973	5.7884685	0.0001621
Quarterly earnings (X1)	0.00820991	0.00054199	15.147572	0.0001108
AI-announcements (X2)	14.1912174	13.1939467	1.0755855	0.2896863

However, an examination of the individual values of each independent variable reveals that revenue (X1) exerts more impact than AI announcements (X2). For this purpose, let's look at the coefficients and P-value. In the case of variable X1, the P-value is almost zero and it is less than the significance level of 0.05 (Table 5.2), hence the coefficients are statistically significant, unlike variable X2 whose data exceeds the 0.05 level.

The coefficients of variables reflect the degree of influence of our predictor data. The values of X1 and X2 (coefficients) are positive, indicating a direct correlation between the share price data and the quarterly earnings variable (Table 3.2). The AI-Announcements coefficient also has a positive value, which could indicate that the stock price tends to increase when AI implementation is announced, but this is irrelevant as there is no statistical significance here.

Google results

Table 6.1
Google's summary output

Regression Statistics

Multiple R	0.924915844
R Square	0.855469319
Adjusted R Square	0.845501686
Standard Error	13.05889485
Observations	32

Overall, Google's multiple regression has a linear relationship between the variable share price (Y) and earnings (X1), dummy variable (X2) which is shown by Multiple R value of 0.92 (Table 6.1). R square Google shows a result of 0.86 which means that the predictor data can explain the value of variable Y for 86%.

Table 6.2
Google's regression results

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	2.540400084	8.326922244	-0.30508272	0.76248211
Quarterly earnings (X1)	0.001744071	0.000137584	12.67642098	0.00023638
AI-announcements (X2)	9.797521077	6.792864437	1.442325424	0.15992461

In Table 6.2, the P-value of the revenue variable is practically approaching zero, indicating statistical significance and demonstrating the presence of a relationship. The Dummy variable's value exceeds the level of 0.05 and it is not statistically significant.

The coefficient values show a direct effect on share price as the values are positive, however, the P-value of X2 shows a weak relationship and does not affect the dependent variable.

Meta results

Table 7.1
Meta's summary output

Regression Statistics	
Multiple R	0.591498671
R Square	0.349870678
Adjusted R Square	0.30343287
Standard Error	70.29542063
Observations	31

As you can see in Table 7.1, Meta has a correlation coefficient (Multiple R) of 0.59, and R-square data that is less than 0.50. In other words, there is a small correlation, but it is weak enough to draw loud conclusions.

Table 7.2
Meta's regression results

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	69.6827409	46.10644637	1.51134486	0.14190553
Quarterly earnings (X1)	0.00653209	0.001926203	3.39117718	0.00208952
AI-announcements (X2)	-0.12758169	35.19540066	-0.00362495	0.99713342

The coefficients of the variables indicate a positive and negative result, however the P-value in the case of Meta indicates that only our earnings variable have a relationship as the value less than the significance level of 0.05.

Amazon results

The last company researched is Amazon, which began implementing generative AI later than any other company.

Table 8.1.
Amazon's summary output

Regression Statistics	
Multiple R	0.667283947
R Square	0.445267866
Adjusted R Square	0.407010477
Standard Error	24.52608422
Observations	32

In the case of Amazon, Multiple R is more than 0.50 which means that there is a correlation, but R square shows that our values cannot explain the movement of Y.

Table 8.2
Amazon's regression results

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	69.646661	14.1242411	4.93100199	0.000030729
Quarterly earnings (X1)	0.00049089	0.00012952	3.78994365	0.00070546
AI-announcements (X2)	13.8693344	10.9012785	1.27226677	0.2133856

The results regarding Amazon, as well as other companies investigated, show that stock price changes are influenced solely by quarterly revenue, because the P-value associated with the AI-announcement variable lacks statistical significance.

The coefficient yields for X1 a positive outcome, signifying a direct correlation between quarterly revenue and stock price.

Thus, the results of this analysis show the dependence of share price only on quarterly earnings across all companies and reject the impact of AI-announcements on share price in the longer run.

5. Conclusion

This research explores the impact of Generative AI adoption announcements on the firm value of technology companies, analyzing stock price movements from both short-term and long-term perspectives. Dynamics of price reactions to AI announcements have been investigated in large tech companies in the US such as Microsoft, Google, Amazon, and Meta.

The research points towards mixed market responses to the announcement. The event's results indicated that the announcement did not impact the stock price in the short term, with neutral reactions from some companies and no effect on most. The analysis of the regression shows that the share price variance is mostly determined by the variation in earnings for Microsoft, Google, Amazon, and Meta, and there is no long-run impact of the AI announcements on the prices of these respective companies.

Additionally, given the rapid development of technology, there is a need for more research on an ongoing basis. Over time, as more data becomes available, we expect that the impact of Generative AI announcements may become more pronounced on stock performance.

For investors, this study highlights the importance of not relying exclusively on recent announcements about artificial intelligence (AI). Instead, focus on the fundamental indicators of the company. This way, investors can make informed choices based on the internal value of the company, rather than on the market's reaction to announcements about artificial intelligence.

5.1. Limitations

Limitations of this research are provided by the fact that it is based on publicly available data; therefore, the depth of the analysis is limited. This research, in focusing on publicly traded companies, disregards the smaller firms that could also represent significant players in the AI sector and could adopt the AI technologies quite differently, yielding impacts on other dimensions for the larger firms. Consequently, this study does not take into account the complexities of market conditions and sentiment, which could be important drivers of the findings. Conceptions of the capabilities of AI might be perceived quite differently by investors, and a focus solely on stock prices might neglect other dimensions of firm value. Furthermore, geographic limitations are that the study was conducted only in the US.

Bibliography

Abrahamsson, J., Maga, A. A., & Nicol, C. (2019). The effect of business model innovation announcements on share prices: A study of US listed technology firms. Journal of Business Models, 7(2), 37-52. https://doi.org/10.5278/ojs.jbm.v7i2.2141

Al Naqbi, H., Bahroun, Z., & Ahmed, V. (2024). Enhancing work productivity through generative artificial intelligence: A comprehensive literature review. *Sustainability, 16*(3), 1166. https://doi.org/10.3390/su16031166

Alphabet Inc. (2023). *Quarterly earnings*. Alphabet Investor Relations. https://abc.xyz/investor/news/earnings/

Amazon Staff. (2023, September 28). AWS announces the general availability of Amazon Bedrock and powerful new offerings to accelerate generative AI innovation. *US About Amazon.*https://www.aboutamazon.com/news/aws/aws-amazon-bedrock-general-availability-generative-ai-innovations

Babina, T., Fedyk, A., He, A. X., & Hodson, J. (2023). Artificial intelligence, firm growth, and product innovation. *Journal of Financial Economics (JFE)*. http://dx.doi.org/10.2139/ssrn.3651052

Bloomberg. (2024, January 4). Microsoft AI Copilot keyboard new key is MSFT's biggest change in years. *Bloomberg*. https://www.bloomberg.com/news/articles/2024-01-04/microsoft-ai-copilot-keyboard-new-key-is-msft-s-biggest-change-in-years

Bratis, T., Laopodis, N. T., & Kouretas, G. P. (2017). Assessing the impact of an EU financial transactions tax on asset volatility: An event study. *International Review of Financial Analysis, 53*, 12–24. https://doi.org/10.1016/j.irfa.2017.08.002

Eisfeldt, A. L., Schubert, G., & Zhang, M. B. (2023). Generative AI and firm values (Working Paper No. 31222). *National Bureau of Economic Research.* https://doi.org/10.3386/w31222

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance, 25*(2), 383-417. https://doi.org/10.2307/2325486

Google. (n.d.). *Google Gemini updates.* https://gemini.google.com/updates?hl=eng

Gopalakrishnan, S., Srinivas, V., & Chauhan, A. (2023). *Unleashing a new era of productivity in investment banking through the power of generative AI.* Deloitte Insights. https://www2.deloitte.com/xe/en/insights/industry/financial-services/financial-services-industry-predictions/2023/generative-ai-in-investment-banking.html

Henriksson A., Nyqvist V. (2022) *The Value of AI Investments: An Event Study on Abnormalities in Risk and Return following AI Investment Announcements.* https://www.diva-portal.org/smash/get/diva2:1669712/FULLTEXT01.pdf

Herremans, Z. (2021). *The effect of novel technology announcements on stock prices: An empirical study assessing stock prices for Belgian companies investing in Industry 4.0 novel technologies.* https://libstore.ugent.be/fulltxt/RUG01/003/010/428/RUG01-003010428_2021_0001_AC.pdf

Lui, A. K., Lee, M., & Ngai, E. W. (2022). Impact of artificial intelligence investment on firm value. *Annals of Operations Research, 308*(1), 373-388. https://doi.org/10.1007/s10479-020-03862-8

Liu, W., Wang, J., & Choi, T.-M. (2022). Blockchain announcements and stock value: A technology management perspective. *International Journal of Operations & Production Management, 42*(5). https://doi.org/10.1108/IJOPM-08-2021-0534

Meta. (2021, October 28). Introducing Meta: A social technology company. *Meta.* https://about.fb.com/news/2021/10/facebook-company-is-now-meta/#:~:text=Today%20at%20Connect%202021%2C%20CEO,find%20communities%20and%20grow%20businesses

Meta Platforms, Inc. (2023). Meta reports fourth quarter and full year 2023 results. *Meta Investor Relations.*https://investor.fb.com/investor-news/press-release-details/2023/Meta-Reports-Fourth-Quarter-and-Full-Year-2023-Results/default.aspx

Microsoft. (2023). Investor relations. *Microsoft.* https://www.microsoft.com/en-us/investor

Microsoft. (2023). Quarterly reports. *Microsoft Investor Relations.* https://www.microsoft.com/investor/reports/ar23/

Mishra, S., Ewing, M. T., & Cooper, H. B. (2022). Artificial intelligence focus and firm performance. *Journal of the Academy of Marketing Science, 50*(6), 1176–1197. https://doi.org/10.1007/s11747-022-00876-5

Nadler, D., & Schmidt, A. B. (2016). Impact of macroeconomic announcements on US equity prices: 2009–2013. *Journal of Forecasting, 35*(1), 34-42. https://doi.org/10.1002/for.2359

Nagm, F., & Kautz, K. (2008). The market value impact of IT investment announcements: An event study. *Journal of Information Technology Theory and Application (JITTA), 9, 61-79* https://www.researchgate.net/publication/284801879_The_Market_Value_Impact_of_IT_Investment_Announcements_-_An_Event_Study

Pynnönen, S., Laitinen, E., & Laitinen, T. (2005). On regression based event study. *Business, Economics.* https://www.semanticscholar.org/paper/On-regression-based-event-study-Pynnönen-Laitinen/8aae9220ff6e1db9c1c4da60528c89500aa4990e

Phuong, L. C. M. (2021). The impact of COVID-19 on stock price: An application of event study method in Vietnam. *Journal of Asian Finance, Economics, and Business, 8(*5), 523-531. https://doi.org/10.13106/jafeb.2021.vol8.no5.0523

Stankeviciene, J., & Akelaitis, S. (2014). Impact of public announcements on stock prices: Relation between values of stock prices and the price changes in Lithuanian stock market. *Procedia - Social and Behavioral Sciences, 156*, 538-542. https://doi.org/10.1016/j.sbspro.20``14.11.236

The Associated Press. (2024, April 25). Microsoft quarterly profit rises 20% as tech giant pushes to get customers using AI products. MarketBeat. Retrieved from https://www.marketbeat.com/articles/microsoft-quarterly-profit-rises-20-as-tech-giant-pushes-to-get-customers-using-ai-products-2024-04-25/

Ullah, S., Zaefarian, G., Ahmed, R., & Kimani, D. (2021). How to apply the event study methodology in STATA: An overview and a step-by-step guide for authors. *Industrial Marketing Management, 99*, A1-A12. https://doi.org/10.1016/j.indmarman.2021.02.004

U.S. Department of the Treasury. (2023). Daily Treasury bill rates. *U.S. Department of the Treasury.* https://home.treasury.gov/resource-center/data-chart-center/interest-rates/TextView?type=daily_treasury_bill_rates&field_tdr_date_value=2023

Wamba-Taguimdje, S.-L., Fosso Wamba, S., Kala Kamdjoug, J. R., & Tchatchouang Wanko, C. E. (2020). Influence of artificial intelligence (AI) on firm performance: the

business value of AI-based transformation projects. *Business Process Management Journal*, Vol. 26 No. 7, pp. 1893-1924. https://doi.org/10.1108/BPMJ-10-2019-0411

Yahoo Finance. (2023). Alphabet Inc. (GOOGLE) stock price & news. *Yahoo Finance.* https://finance.yahoo.com/quote/GOOGL/

Yahoo Finance. (2023). Amazon.com, Inc. (AMZN) stock price & news. *Yahoo Finance.* https://finance.yahoo.com/quote/AMZN/

Yahoo Finance. (2023). Meta Platforms, Inc. (META) stock price & news. *Yahoo Finance.* https://finance.yahoo.com/quote/META/

Yahoo Finance. (2023). S&P 500 (^GSPC) stock price & news. *Yahoo Finance.* https://finance.yahoo.com/quote/%5EGSPC/

Appendixes

Appendix A

Generative AI Market Share in the US (2024)

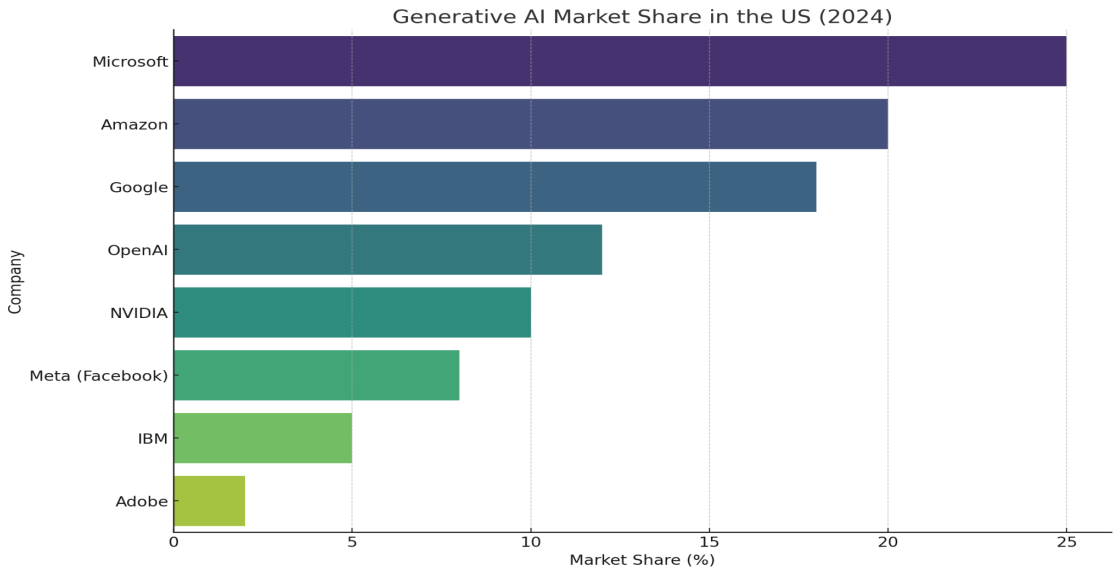
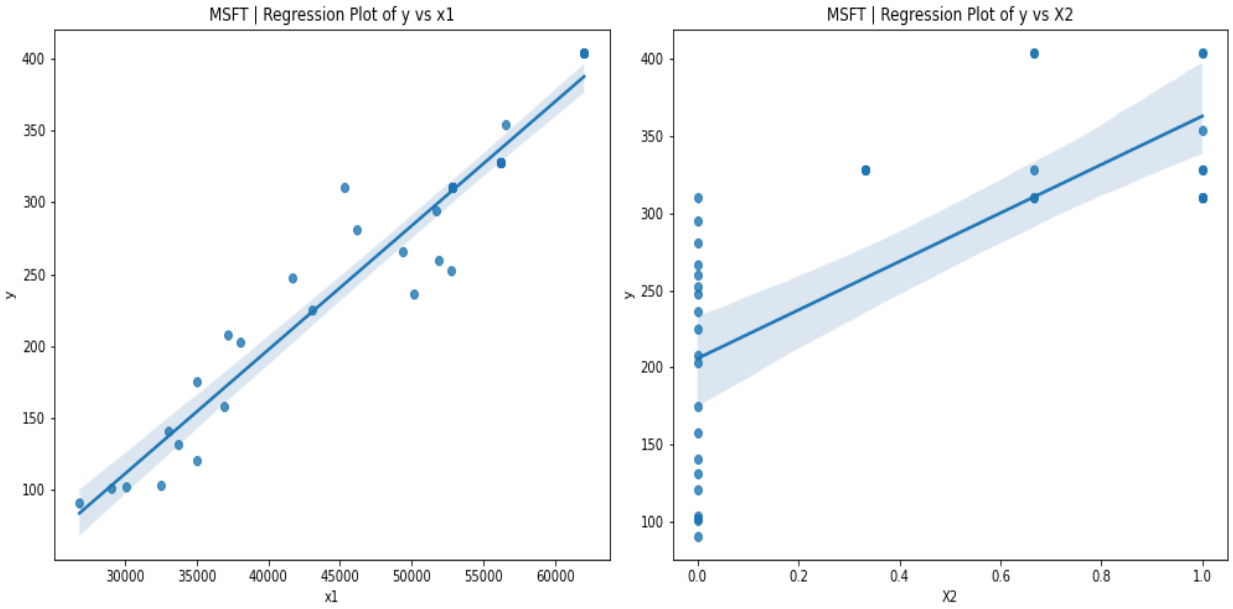


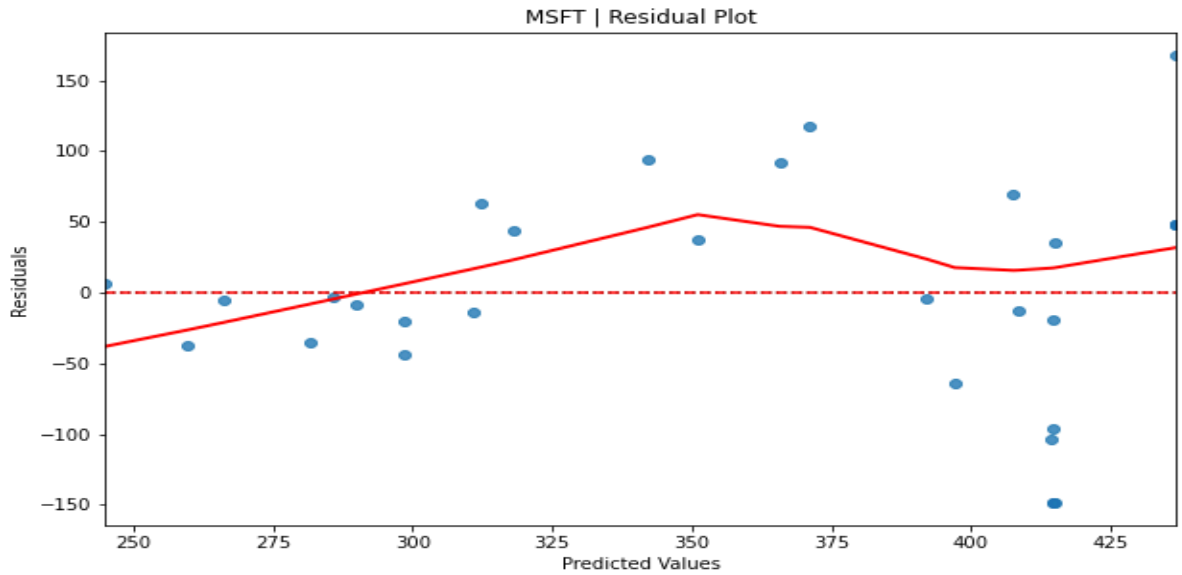
Figure A1. The bar chart above illustrates the market share percentages of various companies in the generative AI market in the US for the year 2024.

Appendix B

Regression Plots for Variables x1 and x2

Microsoft





Google | Pair Plot of Variables

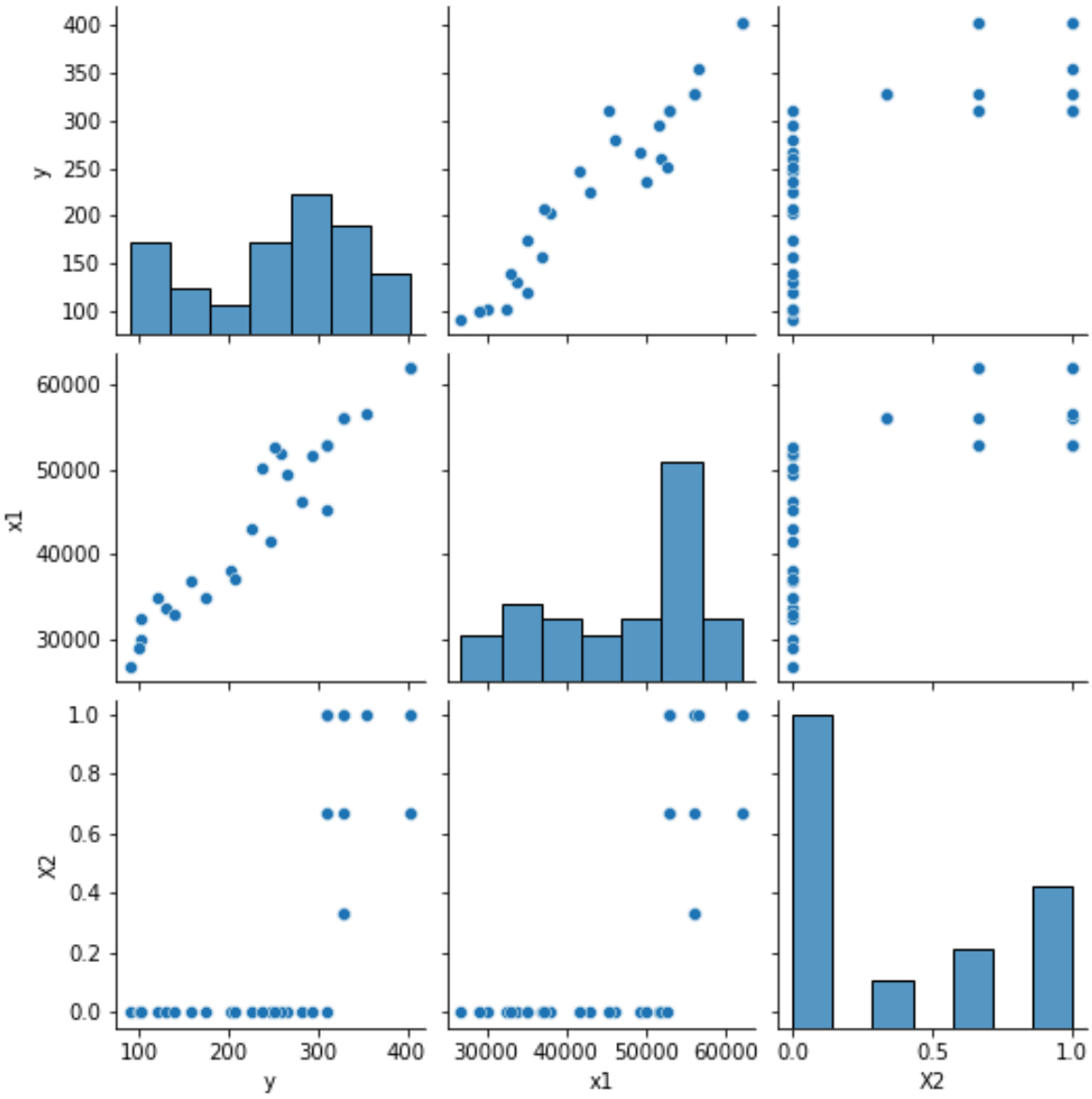
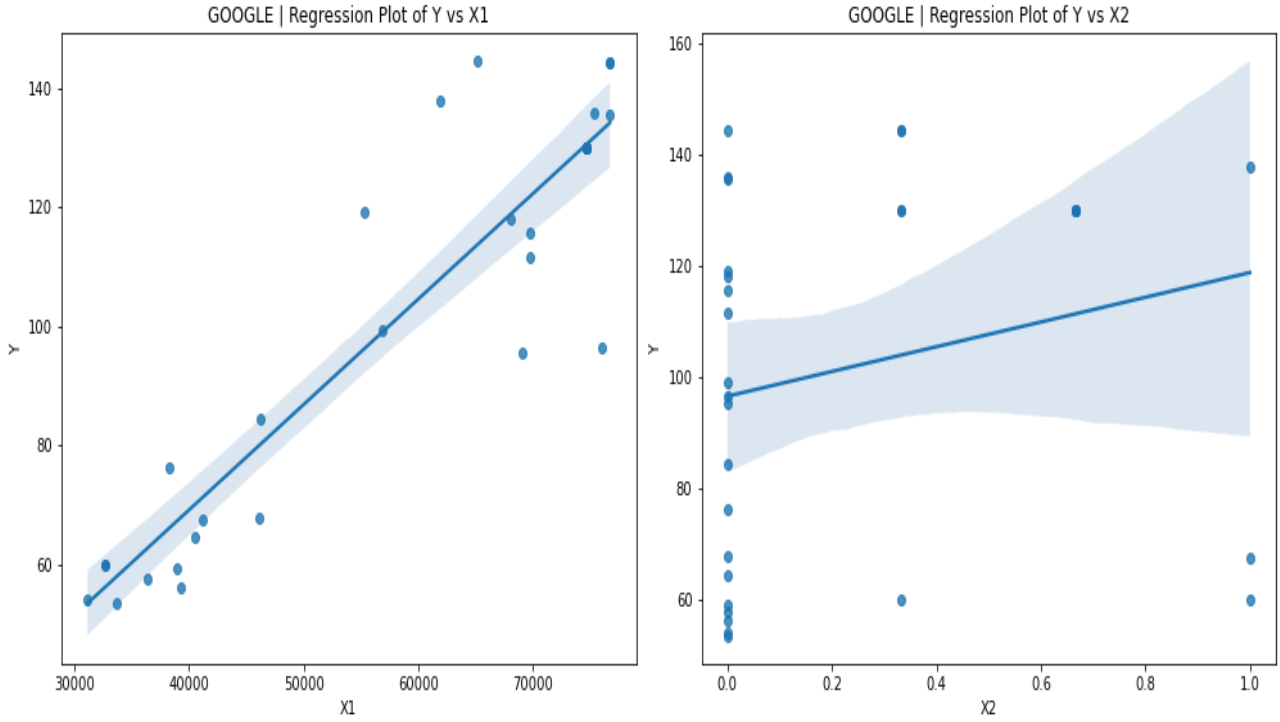
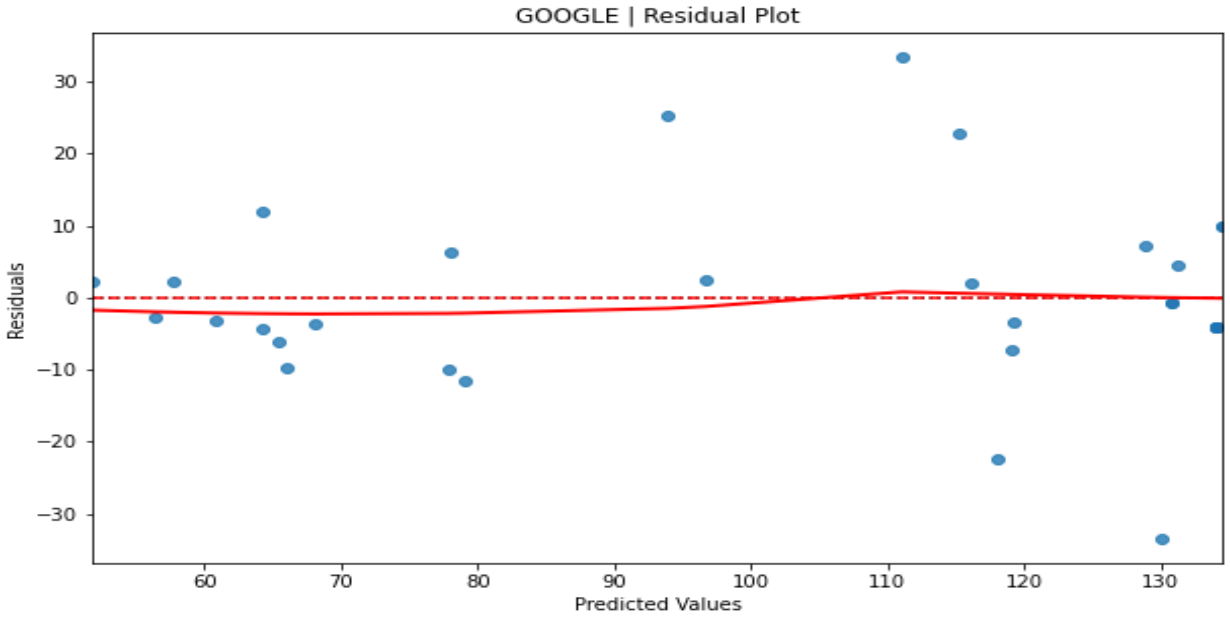


Figure B1. Microsoft regression plots

Google


GOOGLE | Regression Plot of Y vs X1
Y
X1
GOOGLE | Regression Plot of Y vs X2
Y
X2


GOOGLE | Residual Plot
Residuals
Predicted Values

Google | Pair Plot of Variables

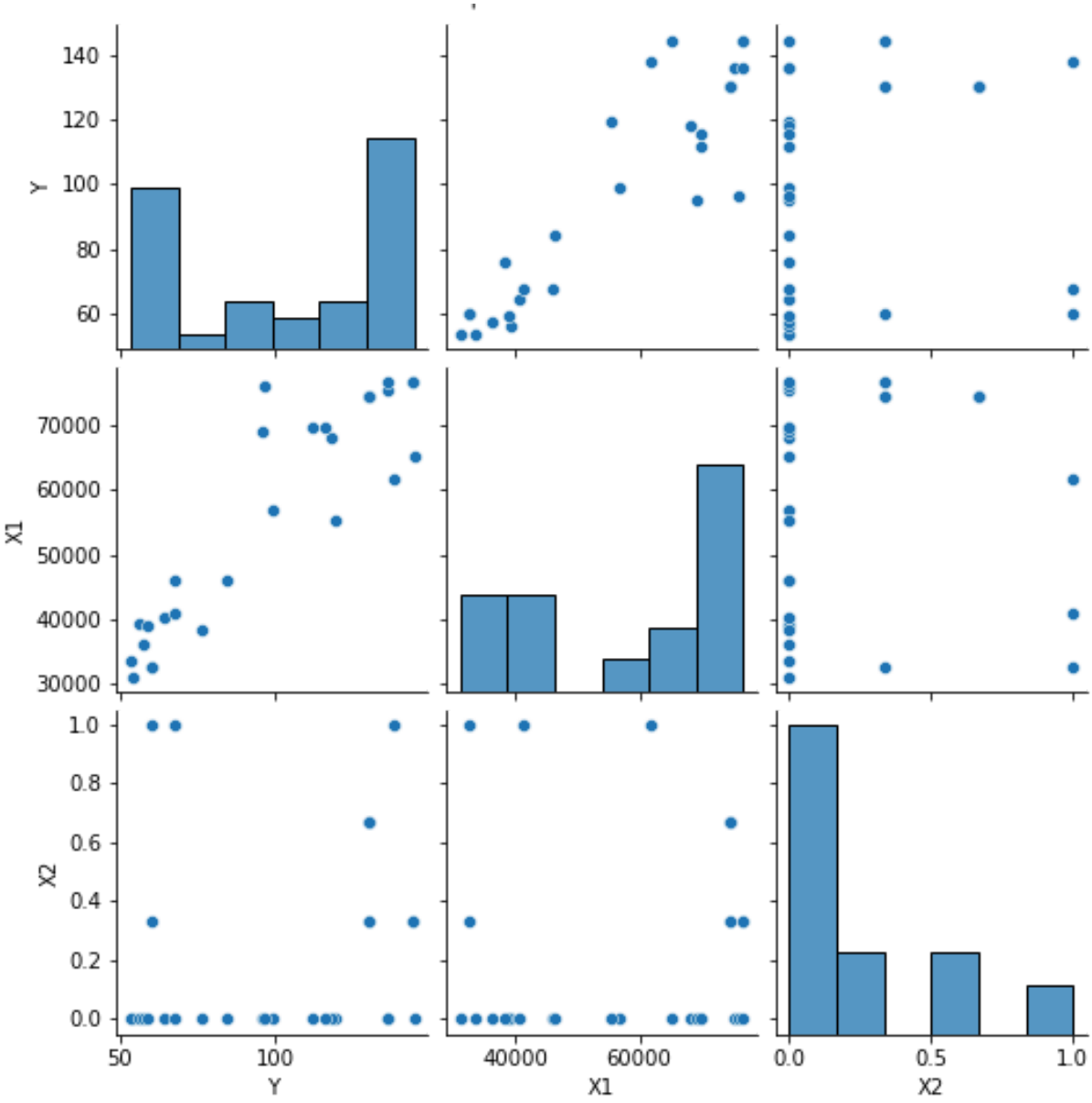
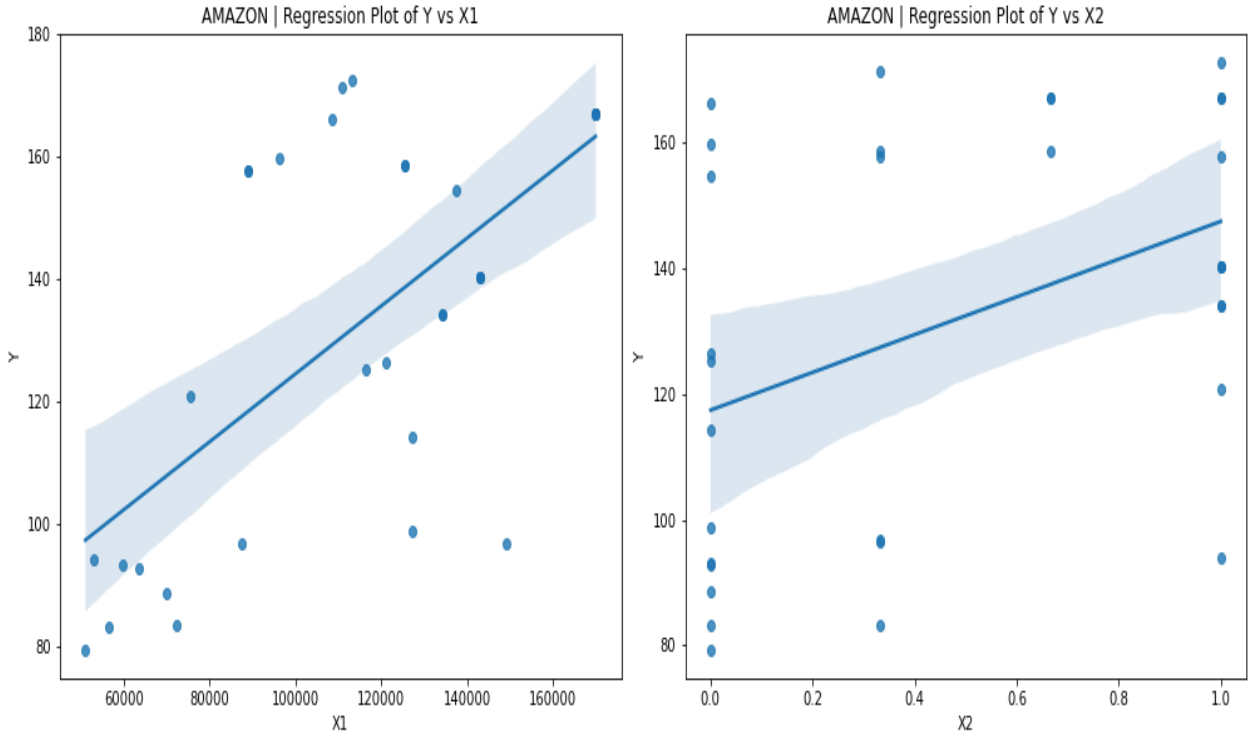
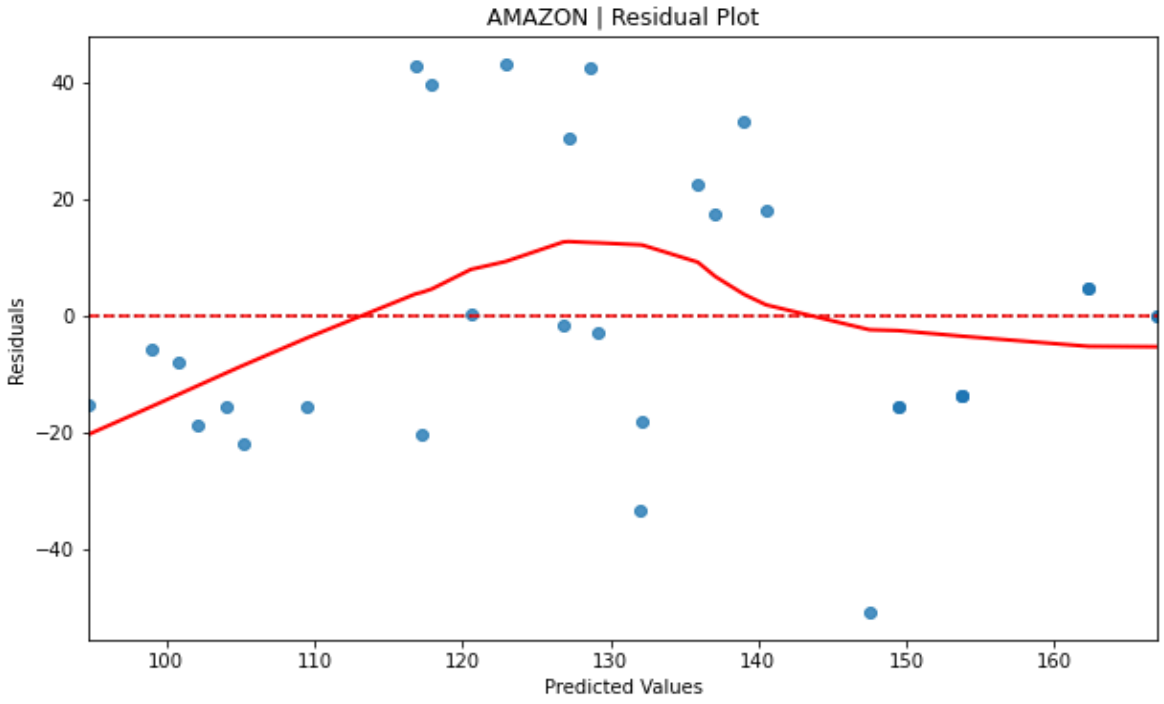


Figure B2. Google regression plots

Amazon


AMAZON | Regression Plot of Y vs X1
Y
X1
AMAZON | Regression Plot of Y vs X2
Y
X2


AMAZON | Residual Plot
Residuals
Predicted Values

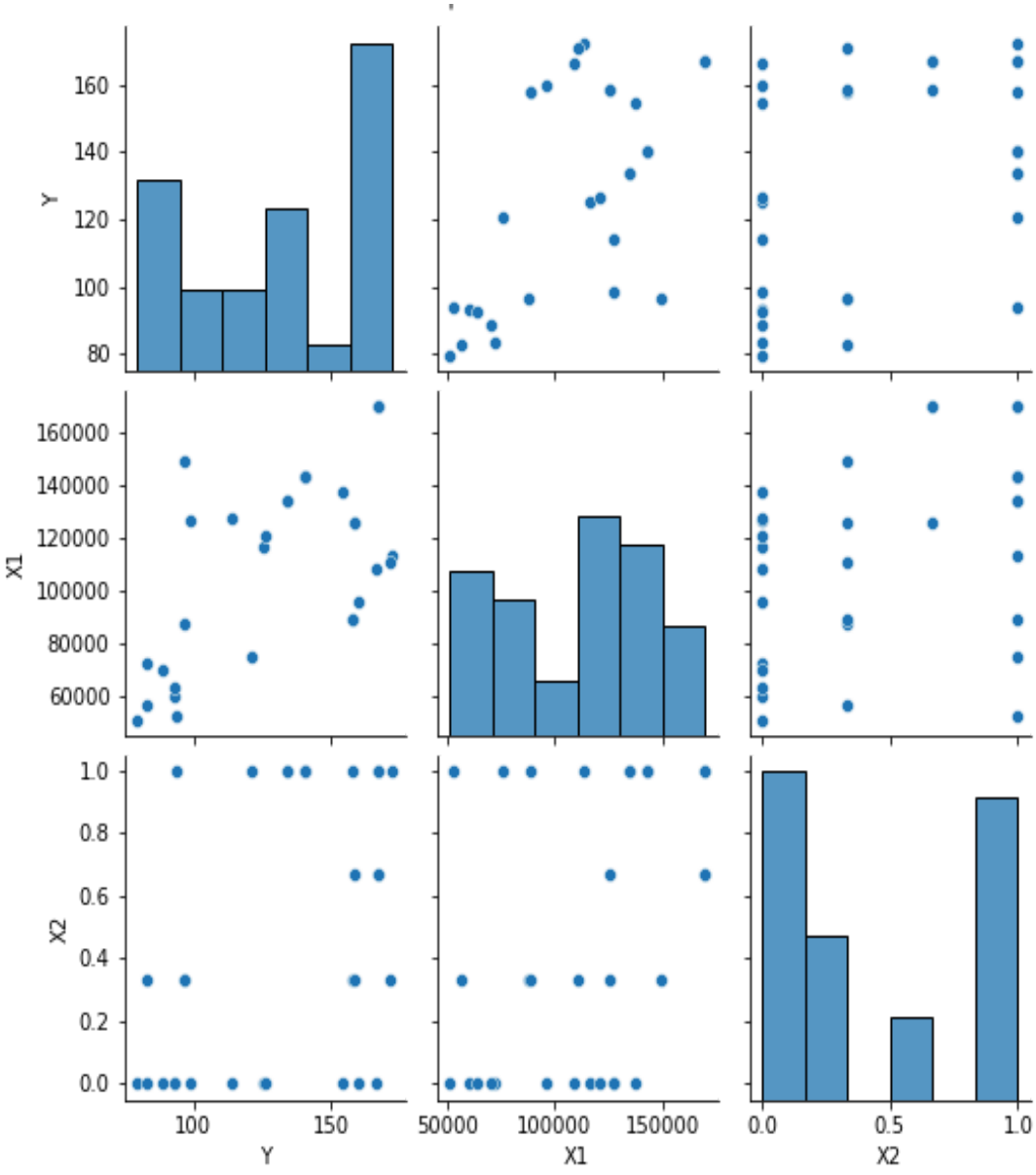
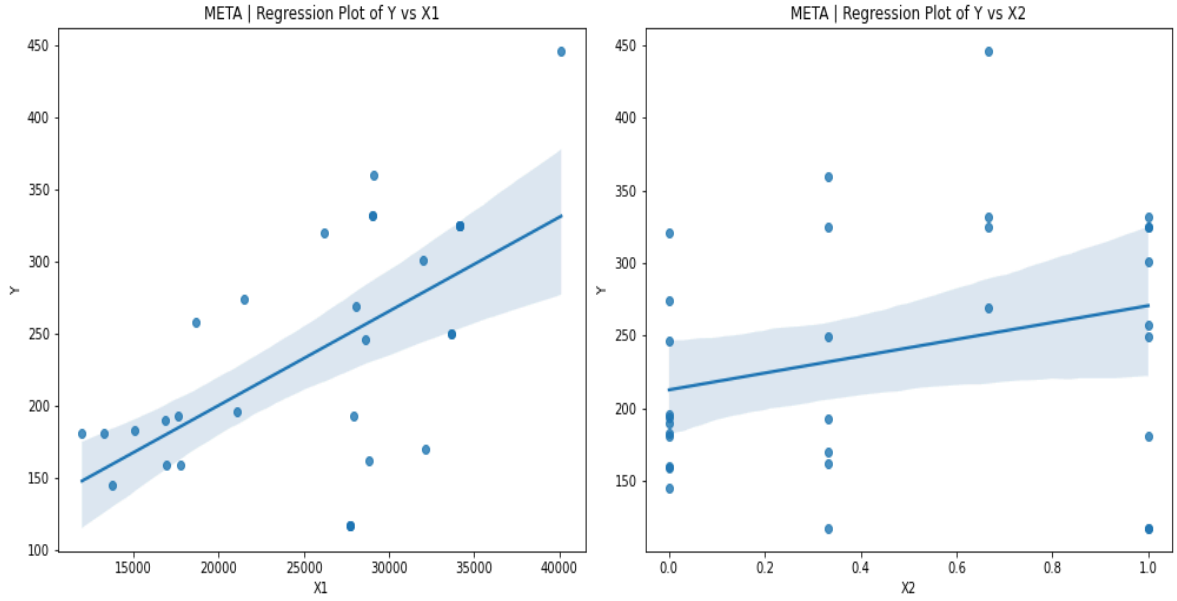
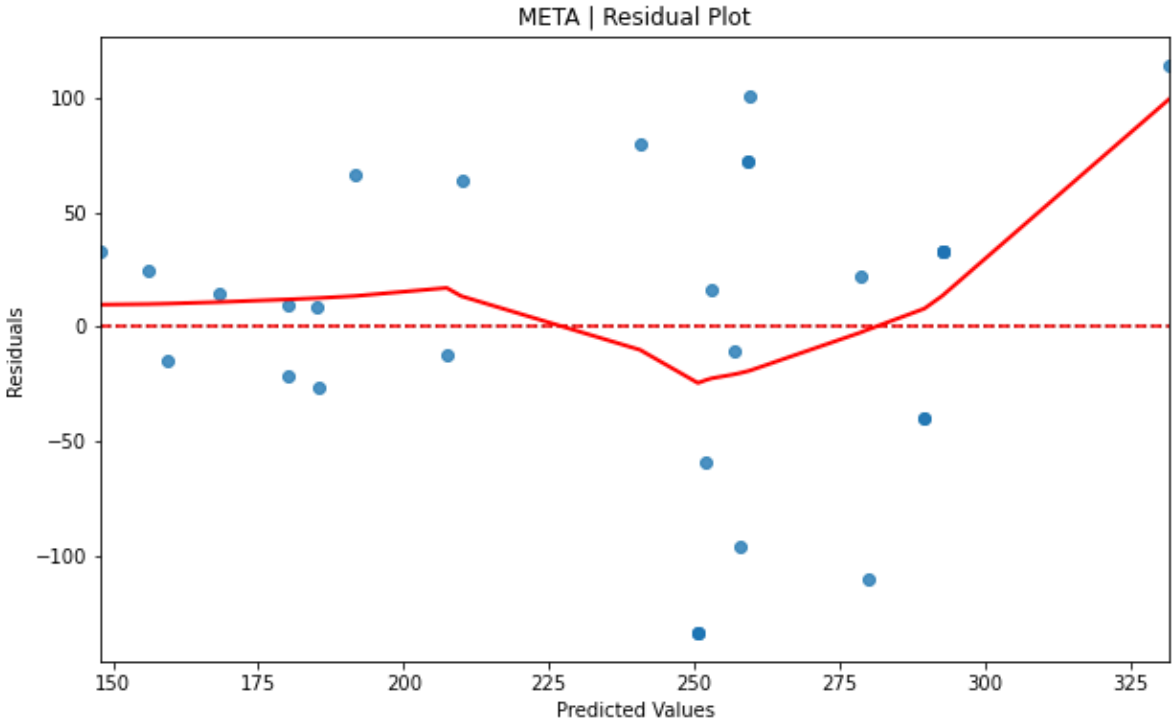


Figure B3. Amazon regression plots

Meta


META | Regression Plot of Y vs X1
Y
X1
META | Regression Plot of Y vs X2
Y
X2


META | Residual Plot
Residuals
Predicted Values

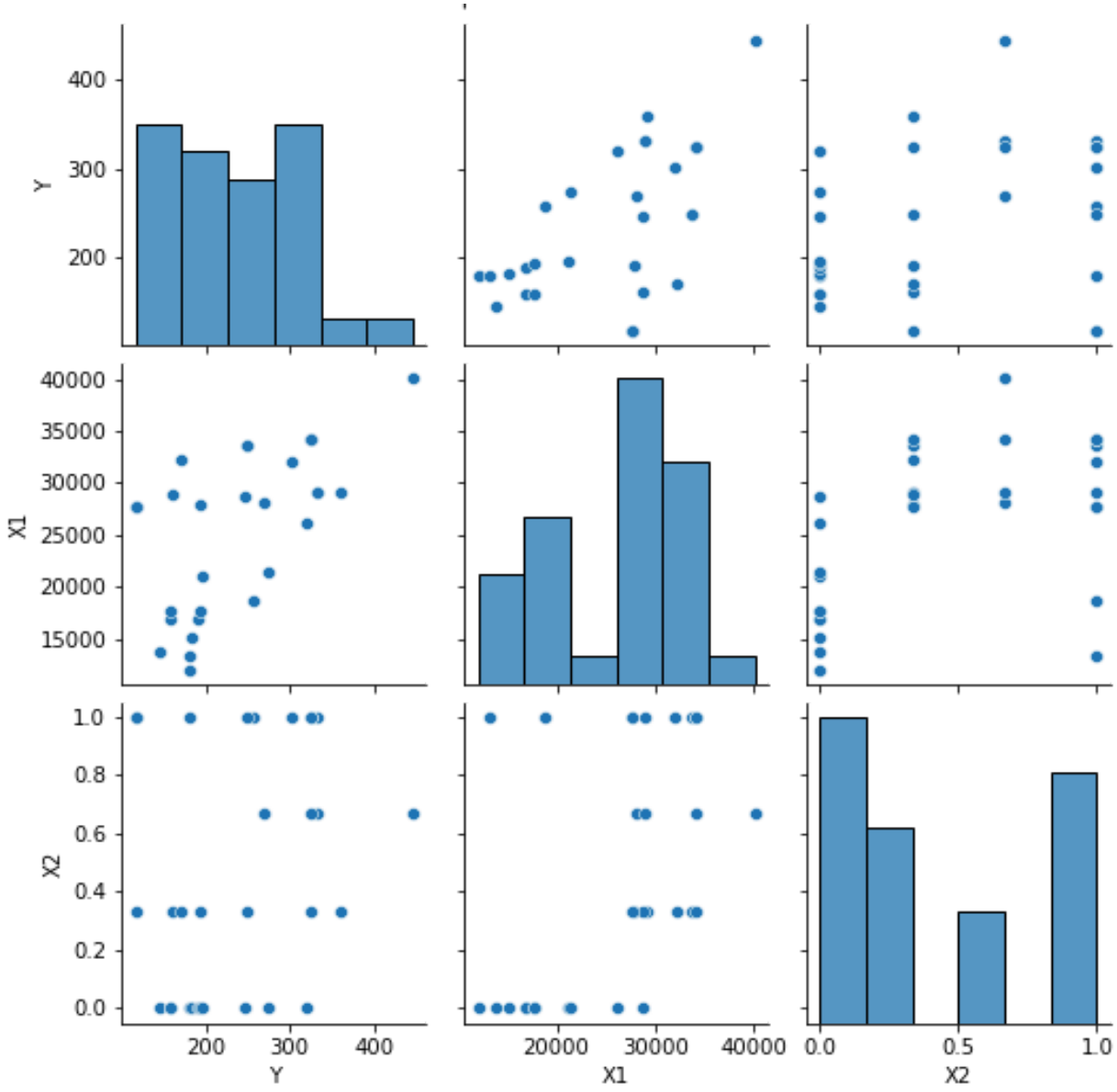


Figure B4. Meta regression plots

Appendix C

Stock Price and Volatility

Google

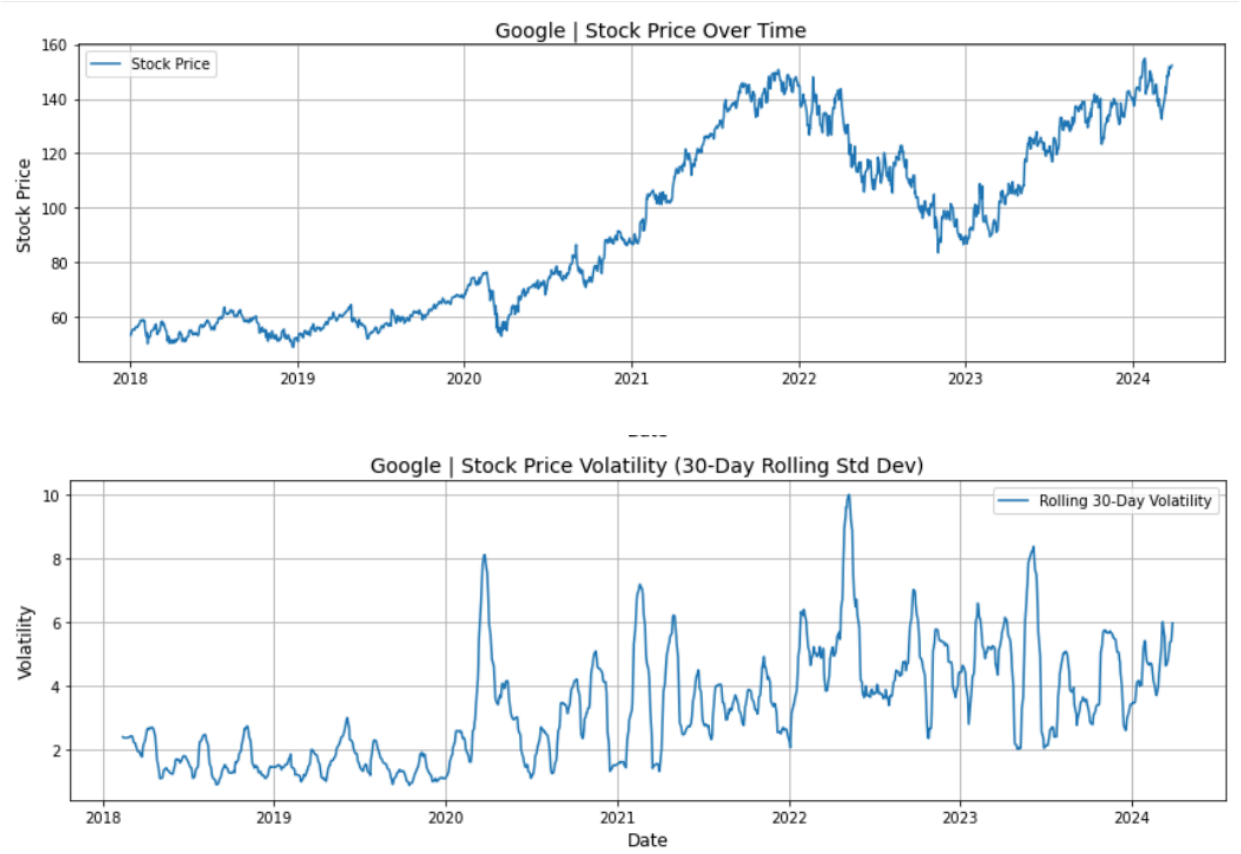


Figure C1. Google stock price and its 30-day rolling volatility from 2018 to 2024

Microsoft

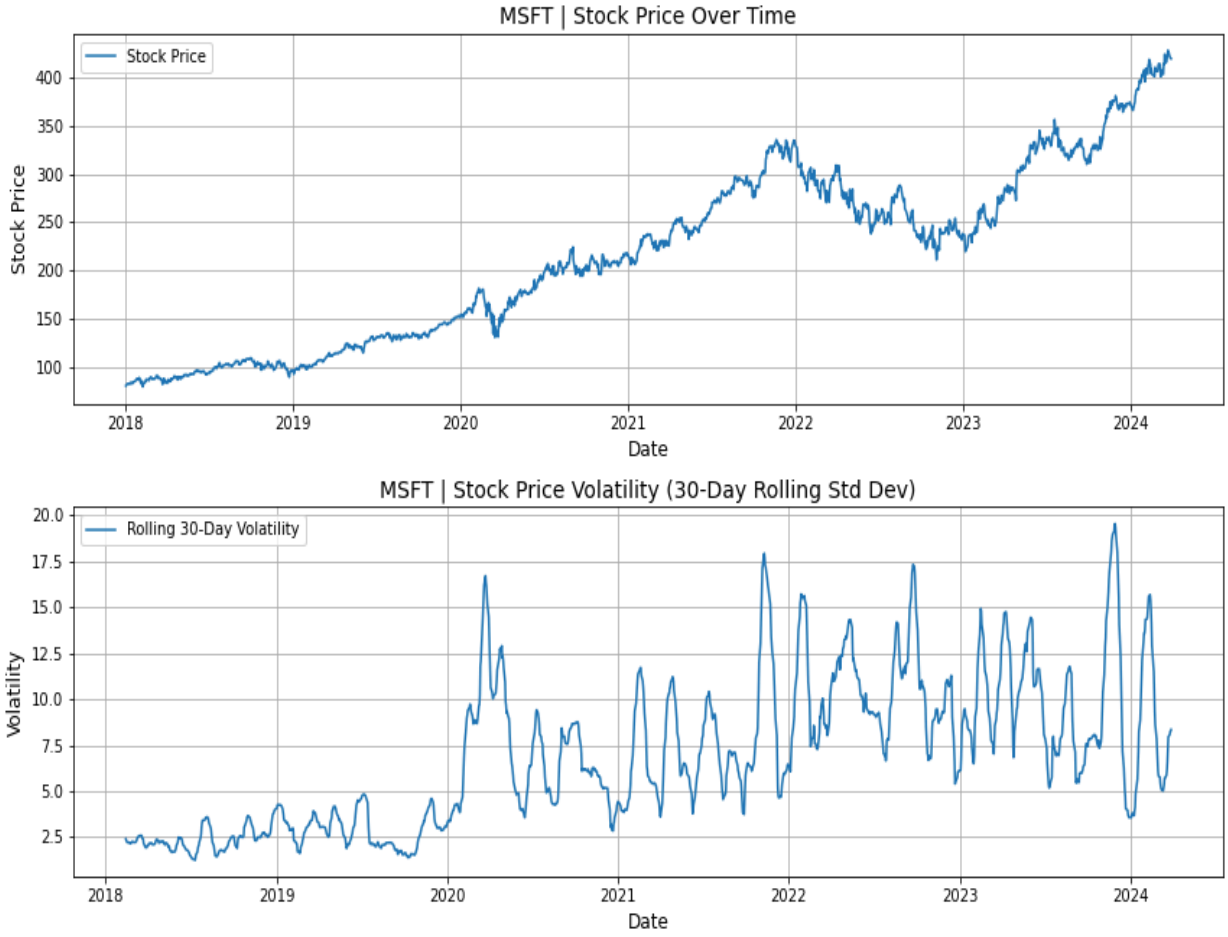


Figure C2. Microsoft stock price and its 30-day rolling volatility from 2018 to 2024

Amazon

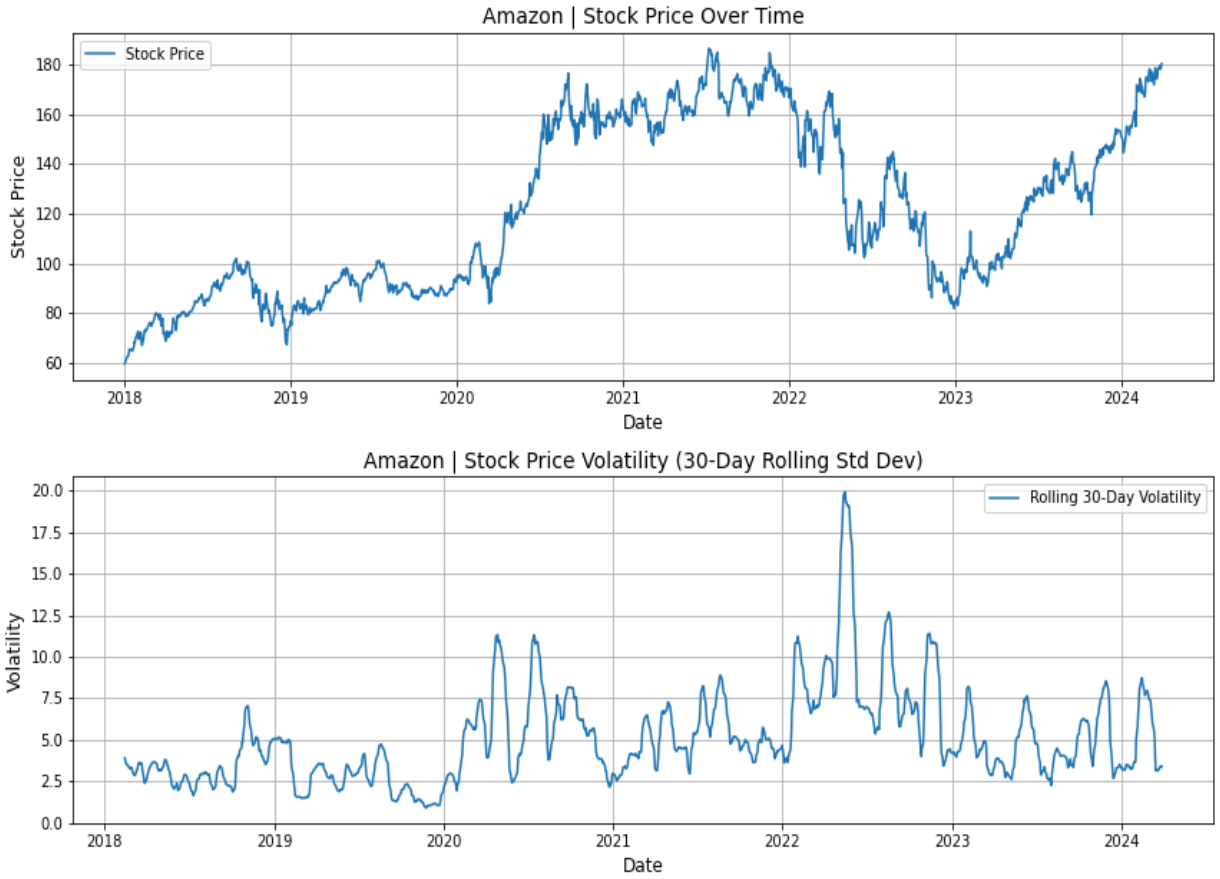


Figure C3. Amazon stock price and its 30-day rolling volatility from 2018 to 2024

Meta

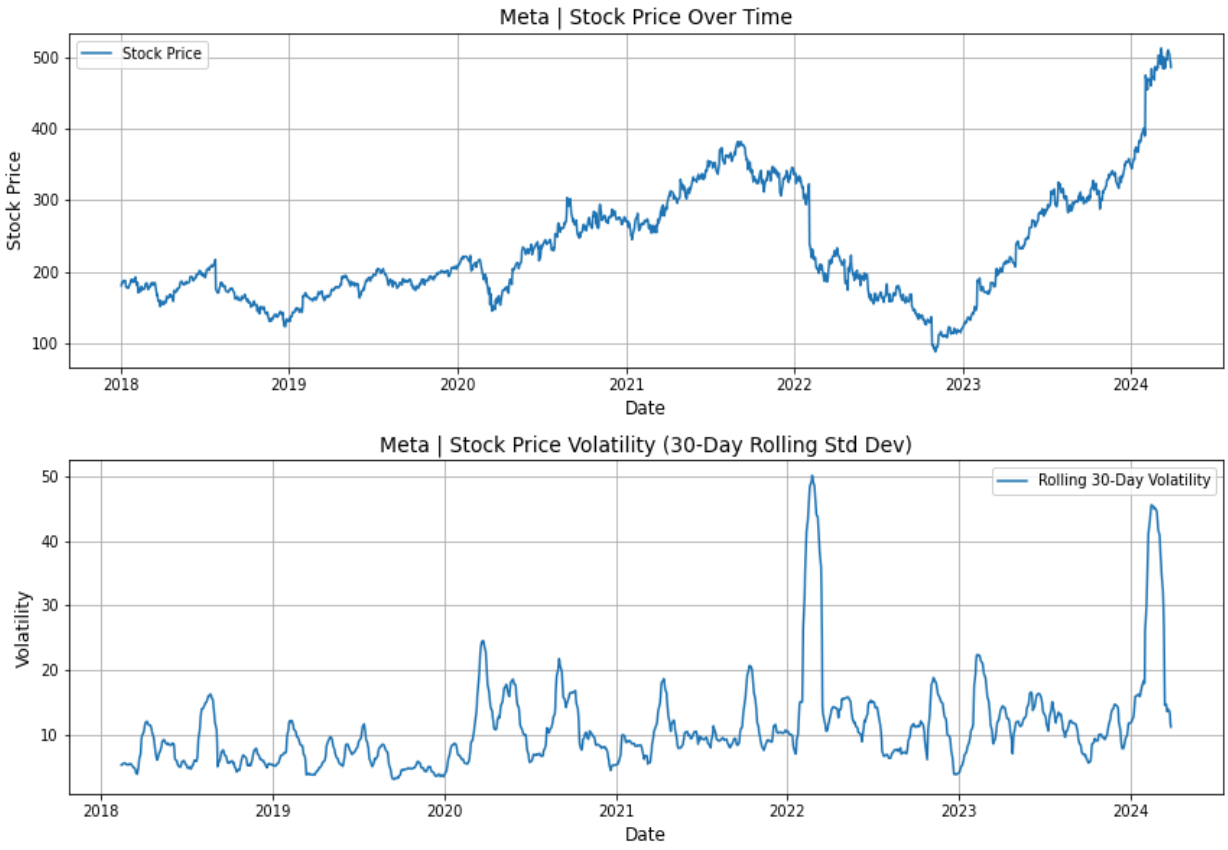


Figure C4. Meta stock price and its 30-day rolling volatility from 2018 to 2024